



Mr Zippy's

Installation/Operation Manual



AN O'HANRAHAN COLEMAN COMPANY

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Introduction to Model Z10000 Mr. Zippy's Ice and Water Machine

The Mr. Zippy's Ice and Water Vending Machine is a state-of-the-art, freestanding, self-service kiosk-type vending machine for the purpose of retail bulk ice and water sales at various outdoor locations. It has been designed and built with the customer and the operator in mind.



There are many features of this machine the operator needs to be familiar with in order to successfully operate it. Please read and understand this manual fully before attempting to make any repairs or adjustments. If there are any areas of repair, adjustment, or maintenance you do not understand, please contact your local distributor or the main office located in Houston, TX (800-999-9878) and a service technician will be happy to assist you. Great care must be exercised when making field adjustments or repairs. Again, if you do not understand what to do, **PLEASE CALL AND WE WILL HELP YOU.**

This machine utilizes several processes to produce high-purity, safe, clear, affordable ice and drinking water. Each process in this machine has been carefully designed and engineered to work in junction with each other. Please do not make any changes or alterations without approval of the parent company. Doing this may alter the quality of the product and will void the NAMA certification.

As the operator, you will be required to keep this machine in a clean and well-maintained condition.

Keep in mind at all times that this is a place where people come to buy a food product. A dirty or poorly maintained machine will deter people from using it, and they will go elsewhere. Once a customer is lost, they don't return. Keep the machine as clean as you would like to see it if you were a first time customer.



Copyrights and Disclaimers

Mr. Zippy's Ice and Water Vending Machine is completely developed and designed by Jim Coleman Company. Any un-authorized use of it is strictly forbidden without written permission from Jim Coleman Company. No alteration of its systems or operating procedures is allowed. For more information concerning this system contact:

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5842 West 34th
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Patents:

Mr. Zippy's is covered under the following patents:

Patents	Number	Issue date
Contaminated proof Purified Water Dispenser	5,881,913	3/16/1999
Contaminated proof Purified Water Dispenser and method	5,911,884	6/15/1999
Ice Dispenser with an Air Cooled bin	6,093,312	7/25/2000
Modular Water Vending system and Dispenser	RM255-001	Pending



NAMA Letters of Compliance



Serving the Vending, Coffee Service and Foodservice Management Industries

**LETTER OF COMPLIANCE
FOOD AND BEVERAGE VENDING MACHINES**

Name of Machine Manufacturer: **Jim Coleman Company**

Address: **5842 west 34th St.**

City: **Houston**

State: **TX** Zip: **77092**

Telephone: **713.683.9878**

Fax: **713.683.9624**

Model No.: **Z10001**

Effective Date: **January 8, 2008**

Additional comments on model identification if necessary:

Type of Product Vended: **Ice**

Special qualifications concerning product vended if necessary: **This Machine Intended for Connection to Inspected, Approved water Systems Containing 500 ppm of TDS or Less**

This machine has been evaluated against the requirements of the NAMA "Standard for the Sanitary Design and Construction of Food and Beverage Vending Machines" as recommended by the Automatic Merchandising Health/Industry Council which is based upon the U.S. Public Health Service "Food Code 2003." An affidavit from the manufacturer certifies that all equipment of this model number, from the effective date shown above, will be manufactured to comply with the requirements of the NAMA Construction Standard and Public Health Service Model Code. The evaluation of this equipment has included ambient temperature studies, where applicable, as well as other tests and determinations whenever necessary for complete evaluation.

Administrative Policies of the NAMA Vending Machine Evaluation Program states "...the Letter of Compliance or the name of the Public Health Consultant shall not be used for the purposes of advertising." No portion of this Letter of Compliance may be used for such purposes nor does it constitute endorsement of said equipment by the Public Health Consultant. This Letter of Compliance is not transferable without the permission of the NAMA Public Health Consultant issuing it.

Manufacturers may identify a machine, which has been issued a Letter of Compliance by placing a decal or plate on the machine visible from the front, which states this machine is "NAMA LISTED."

Issued by:


Public Health Consultant

Date Issued: **January 16, 2008**

Rev 2/05

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Serving the Vending, Coffee Service and Foodservice Management Industries

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Address: **5842 west 34th St.**

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State: **TX** Zip: **77092**

Telephone: **713.683.9878**

Fax: **713.683.9624**

Model No.: **Z10000**

Effective Date: **January 8, 2008**

Additional comments on model identification if necessary:

Type of Product Vended: **Drinking Water and Ice**

Special qualifications concerning product vended if necessary: **This Machine Intended for Connection to Inspected, Approved water Systems Containing 500 ppm of TDS or Less**

This machine has been evaluated against the requirements of the NAMA "Standard for the Sanitary Design and Construction of Food and Beverage Vending Machines" as recommended by the Automatic Merchandising Health/Industry Council which is based upon the U.S. Public Health Service "Food Code 2003." An affidavit from the manufacturer certifies that all equipment of this model number, from the effective date shown above, will be manufactured to comply with the requirements of the NAMA Construction Standard and Public Health Service Model Code. The evaluation of this equipment has included ambient temperature studies, where applicable, as well as other tests and determinations whenever necessary for complete evaluation.

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Water Purification for Ice and Water Machines Operation

The ice and water machines use city tap water and process it into high purity ice and drinking water on site. There are several separate systems incorporated into these machines to produce and vend the products. We will go through each step starting with the incoming water to the final vend of ice and water. Afterwards, you will have a general knowledge of the process.

- 💧 City water comes into the machine through the main inlet valve.
- 💧 The water goes through a carbon bed tank that removes the chlorine found in municipal tap water.
- 💧 The water then goes to the ion exchange water softener to remove calcium and other hardness minerals.
- 💧 The water then passes through a 5 five micron secondary filter to catch any loose carbon particles and to act as a safeguard against any remaining foreign material that could be in the system.
- 💧 The water has now completed the pre-treatment phase of the purification process and is ready for the Reverse Osmosis process of the water.
- 💧 When the tank level system senses that the storage tank needs to be refilled, the RO system is activated and RO water is put into the storage tank.
- 💧 Water pressure is maintained in the system by the system re-pressurization pump. This keeps a positive 60 psi on the lines to the ice machine and/or water machine.
- 💧 The final polishing filter is a charcoal filter used to remove any remaining impurities or taste of the water.
- 💧 The water is now ready for the vend stages.



MR. ZIPPY'S ICE & WATER MACHINE

1. Ice Vending System Operation

- A. When a customer wants to buy ice, they have the opportunity to purchase a BAG of ice or ICE IN BULK. The bag will hold approximately 10# of ice and the bulk will dispense approximately 20# of ice.



- The customer will begin by depositing coins and/or bills (\$1, \$5, or \$10 bills) in any combination to satisfy the purchase price of the ice they have decided to buy.
- After money has been deposited, the deposited amount will show on the display screen as “x.xx credit”.



- Credit will continue to display on the screen followed by a beep indicating to the customer that they need to do something.
- The customer will then make their selection of either bag or bulk ice purchase.





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- ☐ Bag Ice – upon selecting the bag ice option, and if the purchase amount for bag ice is satisfied, instructions will follow. The customer will take the bag, hang on the hooks, and press the ice button.



- ☐ Bulk Ice - upon selecting the bulk ice option, and if the purchase amount for bulk ice is satisfied, instructions will follow for the customer to take and place their container under the hooks and press the ice button. Once the customer has placed their container and pressed the ice button, ice will be dispensed into their container.



- Refund/Change – if the customer has deposited greater than the required price for their selection or presses the refund button, their change will be dispensed to them into the change cup.



B. Inside the machine many operations take place to successfully initiate and complete the ice vend:

1. The purified water in the holding tank goes to the ice machine reservoir.
2. The water is circulated across the cooling coils to form the ice cubes.
3. Once the ice is formed (approx. 15 min per drop), it drops into the ice tank.
4. The ice tanks hold the ice waiting for ice vend request.
5. Every hour the ice is rotated to keep it from freezing together.



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6. Once a customer pays for ice, the ice shearing gate is opened and approx. 10# of ice is dropped into the ice delivery bucket (this action is repeated for 20# bulk ice purchase).
 7. The ice delivery bucket delivers the ice to the ice delivery hopper.
 8. The ice delivery conveyor lifts the ice delivery hopper up and dumps into the ice funnel for delivery to the customer.
- C. There are many safe guards to the system to ensure a quality delivery of ice to the customer:
- ✓ Ice bucket eyes monitor the level of ice to ensure the customer gets a full purchase of ice.
 - ✓ The ice funnel eyes monitor the condition of the ice to ensure the delivery is accomplished with assistance, if needed.
 - ✓ The agitator prox ensures the ice is broken up and ready for delivery.
 - ✓ The coin level is monitored in the coin hopper to ensure customers can be funded their change/refund upon demand.
 - ✓ If low coins are monitored, the display shows a message to use correct change.
 - ✓ If a system failure occurs during the ice purchase process and the machine cannot recover, the machine goes out of order, the customer is refunded their money, and the display shows the machine "out of service."

2. Water Vending System Operation

- A. When a customer wants to buy water, they deposit coins and/or one-dollar bills in any combination up to \$5.00.
- The LED display on the control panel will show the amount of money that has been deposited.
 - Customers then place their bottles under either vend spout or both if more than one vend are desired.
 - By pressing the preferred button on the control panel, 1gal, 3gal, or 5gal vending is initiated.
 - After each completed vend, the LED display shows the amount of remaining credit.
 - After the containers are full, if there is any remaining credit, the customer pushes the coin return button to receive exact change.
- B. Inside the machine, many operations take place to successfully initiate and complete a vend:
1. The water that is routed to the vend nozzle from the storage tank passes through a polishing filter to remove any off tastes from the storage tank, then through an ultraviolet sterilization device to kill any bacteria that could be potentially present in the product water.
 2. When the customer presses a vend button, a signal is sent to the controller, and the process starts.
 3. The controller sends a signal to the shutter control valve, which opens the filler shutter and lowers the nozzle into position.
 4. Once the shutter has opened, and the vend nozzle has lowered into place, a signal is sent from the filler back to the controller verifying that the nozzle is in place, and the filling of the bottle can begin.



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5. An electric signal is sent to the vend control valve, and water begins to flow into the customer's bottle.
6. A flow meter in the vend system sends pulse signals to the controller which counts these impulses until a set point is reached.
7. At that time, the controller shuts off the vend control valve and closes the shutter, completing the vend cycle.

C. There are safeguards in the system with which you must be familiar:

- ✓ If the total dissolved solids in the product water increases above the set point for any reason, the TDS controller will de-activate the coin acceptor and the "Sold Out" light will come on.
- ✓ If the ultraviolet sterilizer fails, that particular vend window will become inoperable. This prevents the customer from buying poor quality water or receiving potentially bacteria contaminated water.
- ✓ If either of these conditions exists, it is imperative that the problem be corrected immediately before the machine can come back in service.



1. Specifications

- Water line required $\frac{3}{4}$ "
- Drain line 4"
- Must be connected to an approved water source
- Electrical required:
 - 208/240 volt single phase-100 amp service - actual draw is 61 amps
 - Alternate electrical specs for 3 phase service
 - 208/240 volt 3 phase – 100 amps service - actual draw 50 amps
 - If a second ice production unit is added then the electrical draw will be 30 amps higher.

Water Production

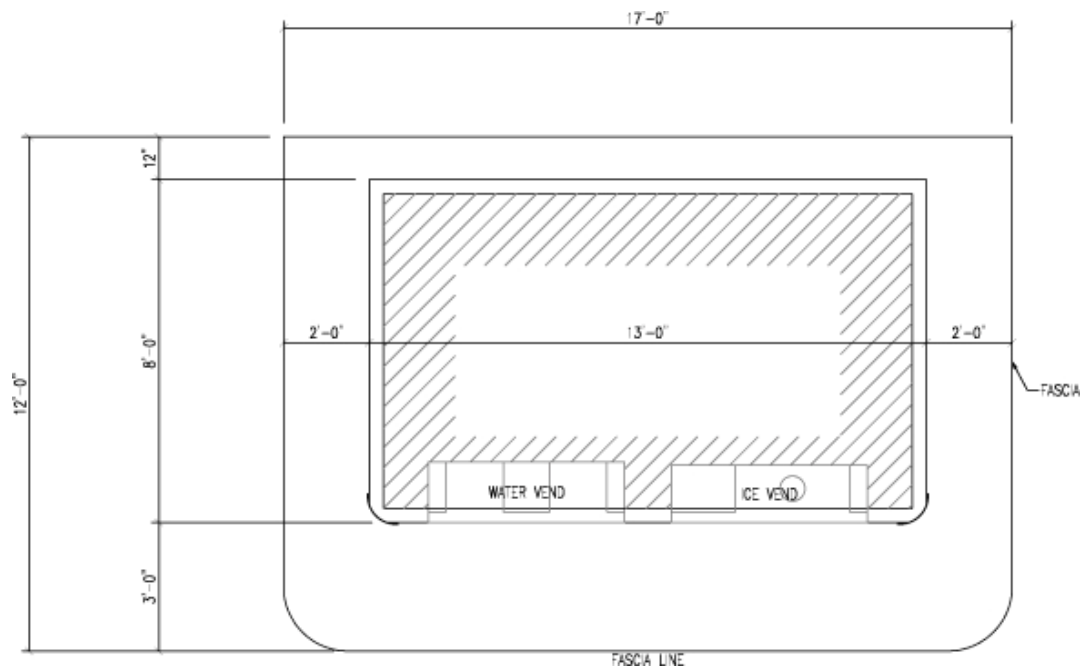
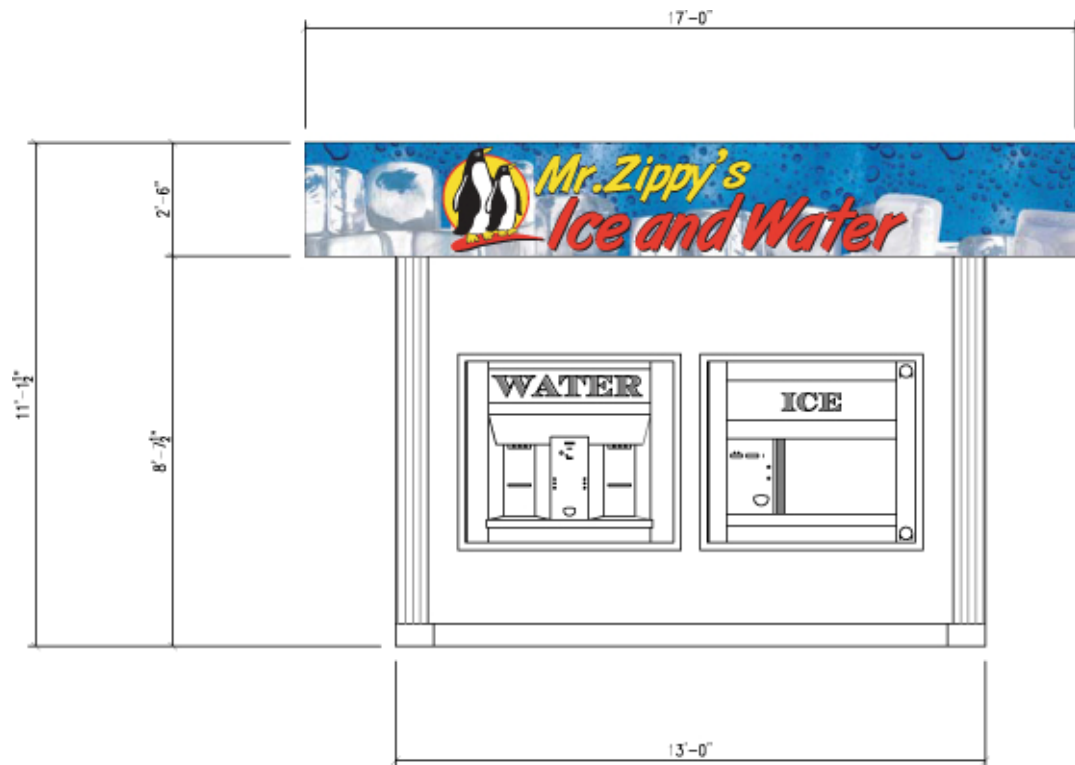
- Mr. Zippy's uses an 8 stage water filtration system to ensure the production of pure quality great tasting drinking water.
- RO production approximately 2000 gallons per day
- RO production will vary depending on water temperature.
- RO storage approximately 160 gallons
- Pure water delivery system - 2 separate vending windows
- Dispenses 1 gallon, 3 gallon or 5 gallon based upon customer selection.
- Accepts nickels, dimes quarters, tokens, \$1.00 bills and \$5.00 bills

Ice Production

- Mr. Zippy's ice production uses purified water to insure a clean great tasting ice. Our units produce a $\frac{3}{4}$ " square cube.
- Approximately 2000 lbs of ice production per day standard.
- Production of ice will vary based upon air and water temperature.
- Ice maker is rated based upon manufacturer specifications.
- Another 2000 lbs of ice production available to increase capacity to 4000 lbs per day.
- Approximately 1900 lbs ice storage
- Dispenses - 10 lb bag ice or bulk ice depending on customer selection.
- Accepts Quarters, Tokens, \$1.00 bills, \$5.00 bills, \$10.00 bills.
- Dispenses change in quarters



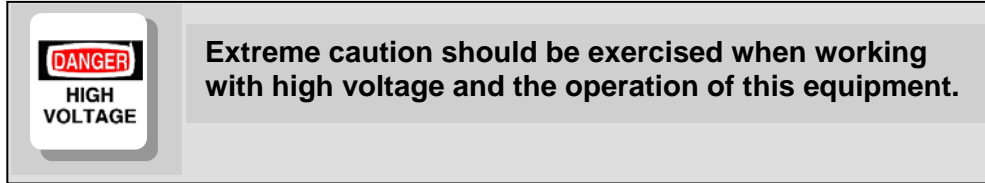
MR. ZIPPY'S ICE & WATER MACHINE





Safety

1. Important Safety Instructions



Do not throw away these important safety instructions. The instructions pertain to risk of fire, electrical shock, and or injury to persons.

- Read all instructions before using this product.
- STAY ALERT- Always gives complete attention to your actions.
- Do not operate this product when fatigued or under the influence of alcohol or drugs.
- Keep operation area clear of all persons.
- Do not attempt to reach over equipment or stand on any unstable support. Keep good footing and balance at all times.
- Disconnect all power before installing or servicing this equipment. If the power disconnects are out of sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electrical shock.
- A qualified electrician should install all wiring according to local, state, and federal electrical codes.

2. Unpacking the Equipment

Before any operation can be carried out there must be a time of planning. This is no different for the installation of Mr. Zippy's Ice and Water Machine. Carefully plan the layout and setup before starting the installation process.

Thoroughly inspect each component for visible damage. Uncrate the equipment **only if there is no damage.**

🔧 **NOTE:** Carefully inspect and evaluate the freight upon arrival. If there is damage to any boxes or crates immediately report it to the freight carrier.



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3. Using Suggested Installation Procedures

This manual contains a suggested installation procedure. Located in the back are electrical schematic and layout drawings. These drawings should be used in assistance of equipment hook-up.

Completely read this manual **prior** to beginning installation. This will ensure a proper understanding of the machine and its installation procedures.



The installation of this equipment involves high and low voltage electrical connections. Only qualified and trained personnel should be used in its hook-up.



This equipment's circuit protection is located in the main electrical panel of the building supplying power to this device. Ensure that this protection is in place and rated according to the guidelines set forth on the equipment not to exceed 15 amps.



Installation

1. Distributor Responsibilities (delivery, install, start up, and training of the new owner.)

- A. The distributor will get the site ready for Mr. Zippy's by having the construction ready **before** the machine arrives on the truck. This will include having the proper permits for the machine before it arrives. He will have the Water and drain stubbed up in the correct place and also the Electrician to have the electrical service available.
- B. Mr. Zippy's Express Ice and Water machine will be delivered on a truck and trailer. The local distributor will unload the machine with a forklift. The machine weighs 9,500 lbs. and can be unloaded with a 12,000 lbs. heavy-duty forklift with 9' long forks.
- C. Once the unit is set on a foundation, it will need to be fastened down using anchor bolts. Please see the engineered drawings for correct placement of the anchor bolts. If the machine is on level ground a ½" by 5" anchor bolt is recommended.
- D. The unit will need to be sealed to the foundation to prevent insects or rodents from being able to get under the machine. You can use a concrete grout to seal machine to the foundation.
- E. The local distributor will then install the mansard fascia on the roof of the building.
 1. Lift the three long mansard frames to the roof and fasten them down.
 2. Fasten the six small frames to the roof pointing out to the sides of the building.
 3. Lift the condenser frame up and fasten the condenser frame to the mansard frame.
 4. Lift the condensers with the forklift and set them into the frame.
 5. Now you can either send the forklift back to the place you rented it from or continue to use it for the mansard.
 6. Raise the round fiberglass corners to the front of the building and fasten them in place.
 7. Take the long front flat panel and slide it in between the two round corners.
 8. Take the side panels and fasten them to the side frames.
 9. Fasten the two back panels to the mansard frame on the back of the building.
 10. Install the corners on the back
 11. Fasten the soffit between the building and mansard.
- F. The distributor will need to work with the electrician and plumber to make sure they perform their work properly.
- G. Once the electrical and plumbing work is complete, the distributor will need to start up the machine. Please refer to the start up procedure.
- H. Contact the local Manitowoc icemaker distributor to connect the condensers to the ice makers. The local distributor will charge for this service. Do not call Manitowoc before you have water and electricity connected to the ice makers and condensers.
- I. Once power, water, and drain are connected, the local distributor will start up the unit and begin operation. Once the ice makers are started up, it will take 24 hours to fill the ice tank. The whole installation process should take about five (5) working days to complete. Once complete, the distributor will need to spend one day training the new owner on the proper operation of the machine, including reviewing the sanitizing procedures.



2. Electrical Work

An Electrician will need to perform the following work:

- A. Contact the local power company and arrange for the proper size electrical service to be installed. This might require the power company to install electrical power transformers on the pole. Please arrange for this several weeks before the scheduled delivery of Mr. Zippy's Ice machine.
- B. Pull the necessary electrical permits to allow Mr. Zippy's to be installed.
- C. Bring in the electrical service from the power company to Mr. Zippy's (normally 100 amp 3 phase service.) Single-phase units are available. The electrical service can be an overhead service or an underground service (based upon local site conditions.) All electrical work must meet the National Electrical Code.
- D. The electric meter and electrical service can be mounted on the back of Mr. Zippy's building. Bring the wiring into the electrical breaker box mounted inside Mr. Zippy's.
- E. The electrician will need to install the lights inside the round holes in the fiberglass round corners. The electrician can run the electrical circuit from the inside electrical breaker panel to the lights on the roof. The electrician will need to control the lights by installing a photo electric cell on the roof. The electrician cannot drill a hole through the roof of Mr. Zippy's. The circuits must be run through the wall and then through the soffit of the building.
- F. The electrician will need to run electrical circuits from the breaker panel to the condensers on the roof. All electrical work must meet the National Electrical Code.
- G. Once all the electrical work is complete, the electrician will need to call for inspections and have the power company turn on the electrical service.

"This machine is intended for connection to Inspected, Approved Water Systems."



Such grounding must be in accordance with all applicable codes and be checked for continuity.

3. Plumbing Work

- A. Obtain the necessary plumbing permits to allow Mr. Zippy's to be installed.
- B. The plumber will need to bring in a ¾" water line and a 2" sewer line. Most local municipalities will allow the drain on Mr. Zippy's to be connected to a storm sewer line.
- C. The plumber will need to connect the ¾" water line into the backflow preventer located inside the building. Once the connection is made, the plumber will need to flush out the lines to make sure no debris enters into the back flow preventer.
- D. The plumber will need to provide a 2" drain line behind the building (see plans for exact location.) The drain line will need a 4" bell reducer so that all of the drain lines will drain into the sewer line. All drain lines must have a 2" air gap between the drain line and the



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sewer line. This ensures no backing up of water into the Ice and water machine (see the drawings.)

- E. Once complete, the plumber will need to call for inspections and have the water turned on or the meter set.
- F. Once the power, water, and drain are connected, the local distributor will start up the unit and begin operation. The whole installation process should take about five (5) working days to complete.



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System Start Up

The following list will assist you in ensuring all steps are taken to have your Mr. Zippy's Ice and Water machine ready for service. Place a ✓ in the box beside each step when it is completed.

- Flush All Water Lines
- Drain Water Tank
- Flush Charcoal Filter
- Remove Debris In Water Tank, Ice Tank, Ice Chute, And Ice Hopper
- Spray All Service Areas With Sanitation Solution Of Clorox And Water
- Fill Salt Container With Two Bags Of Salt
- Check For Water Hardness
- Check Motor Rotation On Condenser
- Check Motor Rotation On Ice Agitator On Bottom Of Tank
- Check For Water Leaks
- Check Valve Readings On R.O.
- Water Tank Is Filled To At Least Half Full
- Ice Dropped Within 20 Minutes
- Ice Machine Runs For At Least 4 Hours
- Test Ice And Water Doors For Proper Operation (Electronics, Bag Dispenser, Etc.)



1. System Start Up (Water)

A. Flush all lines

- This will empty the water lines of any debris that has collected in the installation, such as pvc shavings, glue, dirt, etc. This will keep the filters and solenoids from collecting extra material that will shorten their usage time.
- Turn incoming water off at valve inside building
- Take hose loose from incoming side of carbon tank
- Turn water on slowly
- Open valve and let run for 5 minutes to drain
- Shut off valve
- Wait 5 more minutes
- Open valve and let run for additional 5 minutes
- Turn off valve and replace hose on carbon tank
- Turn incoming water back on at valve inside building

B. Setup Water Softener

- See manual in appendix
- Test incoming water hardness and adjust softener accordingly based on incoming water hardness

C. Flush Charcoal System

- Remove outgoing line from the charcoal filter
- Either run a hose from valve fitting to outside, or let water run out on floor
- Allow water to run for five minutes slowly and shut off
- After a few minutes, turn valve on again and allow to run for another five or until water coming from charcoal filter is clear
- Replace hose
- Secure all hoses and lines and turn water back on
- Check for leaks

D. Fill Softener with Salt

- Put at least 2 bags of salt into brine tank

E. Turn R.O. on at Breaker Box

- Turn the RO switch from Normal to Test
- The RO will now start producing RO water
- Watch the two flow valves for reading approx. . . .9 gpm product, 1.49gpm reject
- Allow to run until the holding tank is over half full.
- When the tank gets over half full turn the RO switch from Test to Normal
- RO water will now fill the tank, shutting off when product water has filled the tank.

F. Water Deliver Pressure

- When facing the RO system observe two pumps on the bottom of the unit
- Left hand Procon pump is for production of RO water the larger Grundfoss pump on right is for water delivery.
- Once water has filled the tank turn on the large valve located on the bottom of the tank
- Push the switch on the top of the Grundfoss pump 1 time to turn on the re-pressurization
- Observe that at least 60 psi is being read on gauge J (water pressure at door)
- Turn water valve on located near gauge J



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G. Water Delivery Sanitization

- For complete sanitization procedure see Maintenance and Cleaning section
- Use sanitization mixture of 1/2 oz. Clorox to 1 gallon water
- Spray sanitization liquid on delivery nozzles and bottle area of water machine

Water is now ready to be delivered to the customer.

2. System Start Up (Ice)

A. Remove debris in the following:

- Ice tank
- Ice chute
- Ice bucket/hopper

B. Disinfect tank

- Disinfectant Ratio: 1/2 oz. Clorox to 1 gallon water
- Spray the mixture on all surfaces inside tank, tank walls, ice chute, ice hopper, delivery hopper, outside of both water and ice doors. In short, sanitize anything that comes in contact with ice and water!



Caution: Allow the sanitization mixture to naturally dry! Do not wipe dry!

C. Turn on Ice Machine water supply

- Turn water valve on located near gauge J

D. Turn electricity on to Control Panel

- Insure both ice machines are plugged into the breaker controlled duplex plug located to the left of the ice holding tank
- Turn on ice machine breaker at breaker panel
- Turn on 3-phase breaker for condenser

E. Changing the harvest sequence water purge

- Reprogram the water purge on the Manitowoc to save water and increase production of ice. See the Manitowoc operations manual for detailed instructions, pages 3-7

F. Check orientation of compressor motors

- Observe and listen to compressors on top of building
- If the compressors exhibit a loud sound – rotation is backwards on condenser and rotation will need to be reversed. Smooth running compressors are normal rotation

G. Reversing rotation of compressor motors



The installation of this equipment involves high and low voltage electrical connections. Only qualified and trained personnel should be used in its hook-up.



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- Unplug ice machines
- Remove cover from electrical panel
- Locate 3 pole breaker for condenser
- Move the top leg to the middle leg and place the middle leg where the top leg was
- Retest the motor rotation by observing and listening for a smooth running compressor unit
- If everything is correct:
- Replace cover from electrical panel
- Plug ice machines in

NOTE: If you have two ice machines, you will have to perform these procedures on both machines.

H. Ice Drops

- Change the dump cycle on the Manitowoc ice maker to zero
- Within 20 minutes you should hear ice drop from ice machine into ice tank
- If no ice has dropped within 30 minutes verify that the units have water supply and electricity
- Check rotation of ice agitator blades clockwise when viewing from top of tank



CAUTION: The ice dropped during the first four hours of testing is NOT consumable! Use only to test the bag delivery system and bulk dispensing. When finished, dispose in a proper place for melting.

- Continue to run ice for at least four hours
- Vend the ice to ensure the coin and cash mechanisms work and the ice level is lowering in the ice tank.
- At least 10 inches of ice should be vended out the ice machine to insure that the ice is ready for consuming by the customer.

I. Vending Operations and Testing (Ice and Water)


- Water – The unit should come to you already set up with your vended prices, calibrated and ready to vend to the customer. The water door should show that correct change should be used. Purchase at least \$10 in quarters, \$4 in nickels, and \$5 in dimes and fill the changer located on the back of the water door.
- Water – Test the 1,3, and 5 gal vend by purchasing water through the vending mechanism using a mix of coins and bills insuring that the proper purchase is made and correct change is given.
- Ice – Locate the bag dispensing unit located to the right of the ice storage tank. Install 1 wicket of bags by placing over the bars coming from the bag storage area. While the unit is making ice it will not vend until enough ice is in the tank and the tank sensor detects it. The unit will display “Out of Service” while in this state. Once enough ice is in the tank the display will show “Use Correct Change”.
- Fill the coin hopper with 400 quarters. The sensor will detect that the hopper now has enough coins to dispense change and the display will now show “Deposit Money”. The ice machine is now ready to dispense ice in bags or bulk.



J. Check Orientation of Ice Agitator in Tank

- Lift tank cover and observe the rotation of the ice agitator blades in the bottom of the ice tank. The blades should be going in a clockwise manner when the agitator is running.
 - Observing rotation
 - On the Red Lion press F7 to access the “Force Outputs” page
 - Scroll through the outputs until you see the “agitator forward” page.
 - Force the output on
 - After observation force the output off
- If the agitator blades are backwards they will be turning in a counterclockwise manner and will need to be reversed.

K. Reversing rotation of agitator blades – Variable Frequency Drives (vfd)

	<p>The installation of this equipment involves high and low voltage electrical connections. Only qualified and trained personnel should be used in its hook-up.</p>
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- Locate the breakers in the breaker panel to the ice control panel and turn off
- Open the ice control panel door
- Caution: Observe lights on plc and vfd drives and insure they are off, this will insure that not power is in the control panel
- Locate the large vfd on the upper right of the control panel
- Locate the 3 motor wires on the bottom of the drive
- Reverse the 2 left wires
- Close the control panel
- Turn on the circuit breakers in the breaker panel
- Retest the agitation blades by observing the rotation as listed above

3. How to Program the Water Door Controller

1. Service Mode:

A. Entering Service Mode

- The service mode is entered by pressing the yellow MODE switch located on the far right corner of the logic board. Pressing the MODE switch once will place the controller into service mode. Successive presses of the MODE switch will cause the controller to toggle in and out of service mode.

B. Indications of service mode

- To access the various modes, it is necessary to press the Exit button on the outside panel once. This will bypass the Locked ACCt function.

C. Exiting Service Mode

- Service Mode can be exited in three different ways. The first method is to press the MODE switch a second time. This will cause the controller to abort service mode and



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return to sales mode. If you were in the process of changing a parameter, such as the vend time out, this change will be aborted and the previous setting will remain unchanged. Parameter changes are only recorded if they are terminated using the “Enter” key. More on this and other keys later.

- The second method of exiting service mode is to press the “Exit” key. Pressing the exit key is similar to pressing the MODE key, except that using the Exit key will abort service mode one level at a time and it might take a few presses to exit service mode completely. As in the case with the MODE switch, the Exit key will abort changes in progress unless the Enter key is pressed first.
- Lastly, service mode can or will be exited automatically by allowing an inactivity timer to time out. The inactivity timer is always running when the controller is in service mode. If a key is pressed, the timer is restored to its maximum value. If no keys are pressed for a period of about 3 minutes, the inactivity timer will expire and the controller will return to sales mode.

D. Navigating your way through the service mode

- Service mode operation is influenced by the action of the four front panel selection switches. These switches serve a dual purpose, which is related to the mode that the controller is in. In sales mode, the front panel selection switches are used by the customer to select a product to be vended (1 gallon, 3 gallon and 5 gallons). In service mode, these same switches change function and allow the service person to navigate between service mode functions and change various parameters on the controller. The sales mode and service mode key functions are as defined below:

Mode	Key #1	Key #2	Key #3	Key #4
Sales Mode	1 gal, side A	5 gal, side A	1 gal, side B	5 gal, side B
Service Mode	ENTER	Exit	scroll UP	scroll DOWN

Side A is on the left and Side B is on the right.

2. Service Mode key assignments

A. The UP key

- In service mode, the “UP” key is used to increment functions or numbers. It can be used to move forward through the menu of functions, or increase the value of a setting or parameter from within a function.

B. The DOWN key

- In service mode the “DOWN” key is used to decrement functions or numbers. It can be used to move backwards through the menu of functions, or to decrease the value of a setting or parameter from within a function.

C. The UP and DOWN keys

- These keys can also be used in conjunction with one another to successfully locate a function or number. For instance, if you were attempting to set the 1 gallon vend price to 0.25, and you were using the UP key to increment the price and you accidentally overshot and ended up at 0.35. You could use the DOWN key to decrement the price back down to 0.25. You can also use the same principal to return a menu item that you were looking for but had mistakenly passed by.



D. The EXIT key

- In service mode the “Exit” key is used to exit a function or to recover from an inadvertent parameter change before it is recorded. The Exit key allows you to abort changes in progress and, if pushed successively, can also terminate the current service mode function and eventually leave service mode all together.
- For example, if you were in service mode and were changing the 1 gallon vend price, the first press of the Exit key would terminate the 1 gallon price modifications and would return the controller to the set price mode. At this point you are still within the set price function. If you were to press the ENTER key now, you would return to editing the 1 gallon vend price. If you were to press the Exit key again, you will be removed from the set price function and placed in the main service mode feature menu. A third depression of the Exit button would place the controller out of service mode and back into sales mode.

E. The ENTER key

- The ENTER key is used to activate a service mode function or to affirm and record a parameter change. All changes must be followed by the pressing of the ENTER key or they will not be recorded.

3. Service mode functions and options

The table below summarizes the service mode functions and options that are available in service mode. These functions are described in detail later in this document. The listing shown proceeds in the order of occurrence as the features appear in the service mode if the UP key is pushed several times.

Service mode function or option	Function or option description
“ACct”- accounting	Allows resettable cash and vend counters to be read and/or reset
“PriC”- price setting	Allows vend price to be set for 1 and 5 gallons
“POUr”- vend quantity	Allows adjustment of vend counts and maximum vend time
“tEst”- test vend	Allows test vending without altering MIS totals
“Opt”- vend options	Allows enabling or disabling of options

- ACct – Accounting data retrieval mode
Accounting data is not accessible by anyone other than the person collecting the money.
- PriC – Price setting mode
The PriC function allows the prices of both, one, three and five gallon vends to be adjusted and the maximum credit acceptance level to be set. The vend price can be set to any price over the range of \$0.00 (free vend) to \$99.95, subject to the minimum price increment

The maximum credit acceptance level is the maximum amount of coins and bills that can be deposited before the coin mech. and bill validator will automatically stop accepting further credit. The maximum credit acceptance level using bills is also influenced by the number of coins in the coin mech. tubes.

The controller can override the service mode setting for the maximum credit when there is a low change condition. The controller has been programmed to accept no more credit than can be paid out by the coin mech. if the customer presses the escrow lever. In



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other words, the controller will disable the bill validator and coin mech. when the level of credit accrued has reached the value of coins being held in the tubes of the coin mech.

- To set the one gallon price

To enter price mode, enter service mode as described earlier and press the UP key until front panel display shows the message "PrC". Now press the ENTER key and you will be in set price mode. The display should now show the message "Pr-1" alternating with the current vend price for one gallon of water. If you wish to change this price, press the ENTER key. You should now see the one gallon vend price holding on the display and the "Pr-1" message should not return.

If you wish to increase the vend price, press the UP key. The price should increase. If you wish to lower the displayed price, press the Down key and the price should decrease. Pressing and holding the UP or DOWN key for more than five seconds will cause the number to change in high speed mode. If you overshoot the desired vend price, use the UP or DOWN key to move the number to the desired value. Once you have finished pricing the selection press the ENTER key and the new vend price will be locked in. if you wish to terminate 1 gallon pricing without changing the previous price, use the Exit key.

- To set the three gallon price

To enter price mode, enter service mode as described earlier and press the UP key until front panel display shows the message "PrC". Now press the ENTER key and you will be in set price mode. Press the UP key once. The display should now show the message "Pr-3" alternating with the current vend price for three gallon of water. If you wish to change this price, press the ENTER key. You should now see the three gallon vend price holding on the display and the "Pr-3" message should not return.

If you wish to increase the vend price, press the UP key. The price should increase. If you wish to lower the displayed price, press the Down key and the price should decrease. Pressing and holding the UP or DOWN key for more than five seconds will cause the number to change in high-speed mode. If you overshoot the desired vend price, use the UP or DOWN key to move the number to the desired value. Once you have finished pricing the selection press the ENTER key and the new vend price will be locked in. if you wish to terminate 3 gallon pricing without changing the previous price, use the Exit key.

- To set the five gallon price

To set the five gallon vend price, enter price mode as described above. Then press the UP key until the message "Pr-5" appears on the display alternating with the current vend price for the five gallons of water. If you wish to change this price, press the ENTER key. You should now see the five gallon vend price freeze on the display and the "Pr-5" message should not return. Follow the one gallon price setting instructions above for setting the five gallon price. Be sure to press the ENTER key or the price changes will not be recorded.

- To set the maximum credit level

To set the maximum credit level, enter price mode as described above. Press the UP key until the message "Hi" appears in the display alternating with the current setting for maximum credit. If you wish to change the displayed number press the ENTER key. The maximum credit number will freeze on the display and the "Hi" message will not return. Use the UP or DOWN keys to set the maximum credit level. When finished press the



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ENTER key to lock in the changes. If you do not wish to save the changes, press the Exit key and the changes will be aborted.

- **POUr – Dispense parameter mode**
The POUr function allows the flow meter counts to be adjusted for the volume of water to be dispensed or “poured” during a one or five gallon vend. The maximum allowable vend time can also be adjusted.

To enter POUr mode, enter the service mode as described earlier and press the UP key until the message “POUr” appears on the front panel display. Now press the ENTER key and you should now see the message “FL-1” alternating with the current flow meter count corresponding to a one gallon dispense.

- **Changing the one gallon dispenses flow meter count**
If you wish to change the flow meter count for the one gallon dispense, enter POUr mode as described above. Press the UP key until the message “F1-1” is shown in the display alternating with the current flow meter count for the one gallon dispense. Press the ENTER key and the one gallon flow meter count should freeze in the display and the “F1-1” should not return.

NOTE: The “F1-1” display indicates adjustments may be made to side A (left side), one gallon flow meter count and “F2-1” indicates side B (right side), one gallon flow meter count.

F1-1	Side A (left side), one gallon flow meter
F2-1	Side B (right side), one gallon flow meter

Adjustments to one gallon dispensing volumes are typically done using 10 to 30 count adjustments.

You can use the UP or DOWN keys to change the flow meter count up or down. Be sure to lock in your changes by pressing the ENTER key before exiting service mode. As with the other features, if you have changed the flow meter count and do not wish to save the changes, press the Exit key and your changes will be ignored.

- **Changing the three-gallon dispenses flow meter count**
If you wish to change the flow meter count for the three gallon dispense, enter POUr mode as described above. Press the UP key until the message “F1-3” is shown in the display alternating with the current flow meter count for the three gallon dispense. Press the ENTER key and the three gallon flow meter count should freeze in the display and the “F1-3” should not return.

NOTE: The “F1-3” display indicates adjustments may be made to side A (left side), three gallon flow meter count and “F2-3” indicates side B (right side), three gallon flow meter count.

F1-3	Side A (left side), three gallon flow meter
F2-3	Side B (right side), three gallon flow meter

Adjustments to three gallon dispensing volumes are typically done using 10 to 30 count adjustments.

You can use the UP or DOWN keys to change the flow meter count up or down. Be sure to lock



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in your changes by pressing the ENTER key before exiting service mode. As with the other features, if you have changed the flow meter count and do not wish to save the changes, press the Exit key and your changes will be ignored.

Changing the five gallon dispenses flow meter count

If you wish to change the flow meter count for the five gallon dispense, enter POUr mode as described above. Press the UP key until the message "F1-5" is shown in the display alternating with the current flow meter count for the five gallon dispense. Press the ENTER key and the five gallon flow meter count should freeze in the display and the "F1-5" should not return.

NOTE: The "F1-5" display indicates adjustments may be made to side A (left side), five gallon flow meter count and "F2-5" indicates side B (right side), five gallon flow meter count.

F1-5	Side A (left side), five gallon flow meter
F2-5	Side B (right side), five gallon flow meter

Adjustments to five gallon dispensing volumes are typically done using 50 to 100 count adjustments.

Change the count using the same methods as described above in section on **changing** the one gallon dispense flow meter count.

- Changing the maximum vend time
If you wish to change the maximum allowable one gallon vend time, enter POUr mode as described above and press the UP key until the message "SECS" is displayed alternating with the current maximum vend time. Press the ENTER key and the maximum dispense time should freeze in the display and the "SECS" message should not return.

At this point you can use the UP and DOWN keys to change the maximum vend time up or down. The one gallon maximum vend time will be multiplied by five gallon vend timing. Be sure to save your changes by pressing the ENTER key when you are done.

The preset vend time of sixty seconds should be adequate for all vending applications. If you feel you need to change this setting, contact your supervisor or the home office at 1-800-297-5839 prior to making any adjustment.

- tESt - Test vend mode
Test vend mode is used to test the proper operation for the mechanical and electronic dispensing system without influencing MIS and accounting totals. Test vend mode can also be used to confirm the proper setting of the flow meter counts that were set in the POUr mode. To enter the tESt mode, enter service mode as explained earlier and press the UP key until the message "tESt" appears on the display. Press the ENTER key and you should see the message "t1-1" on the display.
- To test vend a selection
To test vend a selection use the UP or DOWN keys to select the vend port and quantity of water you wish to test. The sequence on the display should be as follows: "t1-1" (pour1, 1 gallon) ", "t1-3 (pour, 3 gallons), "t1-5" (pour 1, 5 gallons), "t2-1" (pour 2, 1 gallon), "t2-3 (pour, 3 gallons), and finally "t2-5g" (pour 2, 5gallons). When you have finished with your selection, press the ENTER key to start the test. The quantity of water



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you selected should now be dispensed from the vend nozzle you selected.

The actual quantity of water dispensed will be a function of the flow meter count you have set up in POUr mode. As the water is being dispensed, the flow meter count will be displayed on the front panel display. You can use the correct size water container to measure the quantity of water dispensed during the test. You can use this information to calibrate the flow meters by adjusting the flow meter counts in the POUr function.

- Opt – Vending options mode

The Opt mode is used to select how the controller should behave during a specific set of vending circumstances. There are three vending options you can selectively enable or disable. Both options are disabled by default and must be enabled if you wish to use them. The options are described as below.

Option “Nch”: No Cheat, this option prevents the machine from cheating the customer by disallowing vends that would otherwise occur when the changer can not pay back the proper amount of change due after a vend. It should be understood that the customer is always warned about the potential for being cheated when the “exact change” light is illuminated.

Option “Fvnd”: Forced vend, this option requires that any money the customer places in the machine be used to acquire a product, unless the machine has sold out. This prevents a customer from using the machine as a dollar bill changer rather than as a vending machine.

Option “ShOt”: Shake off time, this option allows the adjustment of the amount of time the vend nozzle stays in the “Down” position before retracting to allow the water remaining in the nozzle to drain. This option should always be set at 4.

- Changing vend options

To change the vend options you must first enter into Opt mode. To do this, place the controller in to service mode as described above and press the UP key until the message “Opt” is displayed on the front panel. Press the ENTER key and the display should now show the message “Nch” alternating with the word “ON” or “OFF” (depending on whether option is enabled or disabled). If you press the ENTER key again, the ON or OFF should freeze in the display and the “Nch” should no longer be visible. At this point you can use the UP or DOWN keys to toggle the ON or OFF state of the no cheat option. Be sure to lock in changes by pressing the ENTER key. This same method of changing states applies to the forced vend option.



Maintenance Schedule

1. Maintenance Requirements

Daily:

- Clean both ice and water vend window
- Sanitize the ice delivery hopper, funnel, and ice gate
- Sanitize the water delivery nozzles
- Run ice delivery test for bag and bulk
- Add ice bags
- Run one test gallon from each vend nozzle
- Removes scuffs, mud, etc. from exterior
- Remove graffiti
- Clean litter and trash from around building and parking lot

Weekly:

- Check chlorine level and hardness levels
- Check for leaks
- Visually check UV sterilizers and Ozone generator
- Check and record all pressure readings
- Check and record RO flow meters for correct flows
- Check and record TDS meter
- Record gallon meters
- Add softener salt to salt tank if needed
- Drain air system

Monthly:

- Replace carbon polishing filter

Quarterly

- Take required bacteria samples of water and submit to the lab

Semi-Annually:

- Change UV bulbs

Annually:

- Sanitize the ice storage tank
- Empty the ice storage tank and check all the bolts and key way on stirring blades

As Necessary:

- Pressure wash entire unit and signage
- Visually inspect signage and make sure all lights are functioning
- Replace Big Blue and five-micron filters
- Adjust fill rate and amount
- Back flush or replace carbon tank(s)
- Adjust RO system



MR. ZIPPY'S ICE & WATER MACHINE

2. Mr. Zippy's Maintenance Log Sheet

Location: _____

Date: _____

Unit #: _____

Tech: _____

Month: _____

Time: _____

Week 1 Week 2 Week 3 Week 4 Week 5

	Date:	Date:	Date:	Date:	Date:	
Chlorine						Running <.5ppm
Hardness						Running <3 grains
Gauge A						Running min 20 psi
Gauge B						Running
Gauge A-Gauge B						<10 psi diff ¹
Gauge J						Water being del. ²
Gauge E						Running <195 psi
Gauge C						Running .07 ³
Gauge D						Running 1.4 ³
Gauge F						>50 psi
Gauge G						5 psi
Gauge H						.5 cfm.
Gauge I						.5 cfm.
TDS Meter K						
Ozone Present?						Yes/no
Drain Air Tank						Yes/no
Heavy Cleaning						Yes/no
Coin Hopper Coins						Ok/no
1 Gal Test Vend A						
1 Gal Test Vend B						
10# Bag Ice Vend						
20# Bulk Ice Vend						
Add Salt						
Light Check						
RO Test Switch						Normal
Add Bags						
Ice Sales						
Water Sales						
Machine Sanitizing						
Replace Filter (Big Blue)						
Replace RO Pre Filter						
Replace Final Polish Filter ⁴						

Notes/Comments:

¹ Gauge A is the incoming water pressure. If gauge B's reading differential is greater than 10 psi difference then gauge A then change the 5 Micron filter in the Blue filter housing on the RO. ² Gauge J is the delivery water pressure. ³ Gauge C is the RO product water and Gauge D is the RO reject water, gauge C should ½ of the reading on gauge D. ³ Reference the RO manual for settings and troubleshooting techniques. ⁴Change charcoal filter monthly.



MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy's Maintenance Log Sheet

Location: _____
 Unit #: _____
 Month: _____

Date: _____
 Tech: _____
 Time: _____

Week 1 Week 2 Week 3 Week 4 Week 5

	Date:	Date:	Date:	Date:	Date:	
Chlorine						Running <.5ppm
Hardness						Running <3 grains
Gauge A						Running min 20 psi
Gauge B						Water Press 5 Micron
Gauge A-Gauge B						Running <10 psi diff ¹
Gauge J						Water being del. ² Block Char Filter
Gauge E						Running <195 psi RO Production
Gauge C						Running .07 ³ Product
Gauge D						Running 1.4 ³ Reject
Gauge F						>50 psi Air Pressure
Gauge G						5 psi Ozone Pressure
Gauge H						.5 cfm. Ozone Door
Gauge I						.5 cfm. Ozone Tank
TDS Meter K						RO Door
Ozone Present?						Yes/no Fresh Smell
Drain Air Tank						Yes/no
Heavy Cleaning						Yes/no
Coin Hopper Coins						Ok/no
1 Gal Test Vend A						
1 Gal Test Vend B						
10# Bag Ice Vend						
20# Bulk Ice Vend						
Add Salt						
Light Check						
RO Test Switch						Normal
Add Bags						
Ice Sales						
Water Sales						
Machine Sanitizing						
Replace Filter (Big Blue)						
Replace RO Pre Filter						
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MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy's Maintenance Log Sheet

Location: _____
 Unit #: _____
 Month: _____

Date: _____
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 Time: _____

Week 1 Week 2 Week 3 Week 4 Week 5

	Date:	Date:	Date:	Date:	Date:	
Chlorine						Running <.5ppm
Hardness						Running <3 grains
Gauge A						Running min 20 psi
Gauge B						Water Press 5 Micron
Gauge A-Gauge B						Running <10 psi diff ¹
Gauge J						Water being del. ² Block Char Filter
Gauge E						Running <195 psi RO Production
Gauge C						Running .07 ³ Product
Gauge D						Running 1.4 ³ Reject
Gauge F						>50 psi Air Pressure
Gauge G						5 psi Ozone Pressure
Gauge H						.5 cfm. Ozone Door
Gauge I						.5 cfm. Ozone Tank
TDS Meter K						RO Door
Ozone Present?						Yes/no Fresh Smell
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Coin Hopper Coins						Ok/no
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10# Bag Ice Vend						
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MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy's Maintenance Log Sheet

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 Unit #: _____
 Month: _____

Date: _____
 Tech: _____
 Time: _____

Week 1 Week 2 Week 3 Week 4 Week 5

	Date:	Date:	Date:	Date:	Date:	
Chlorine						Running <.5ppm
Hardness						Running <3 grains
Gauge A						Running min 20 psi
Gauge B						Water Press 5 Micron
Gauge A-Gauge B						Running <10 psi diff ¹
Gauge J						Water being del. ² Block Char Filter
Gauge E						Running <195 psi RO Production
Gauge C						Running .07 ³ Product
Gauge D						Running 1.4 ³ Reject
Gauge F						>50 psi Air Pressure
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Gauge I						.5 cfm. Ozone Tank
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Drain Air Tank						Yes/no
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Notes/Comments:

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MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy's Maintenance Log Sheet

Location: _____
 Unit #: _____
 Month: _____

Date: _____
 Tech: _____
 Time: _____

	Week 1	Week 2	Week 3	Week 4	Week 5	
	Date:	Date:	Date:	Date:	Date:	
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Gauge A						Running min 20 psi
Gauge B						Running
Gauge A-Gauge B						<10 psi diff ¹
Gauge J						Water being del. ²
Gauge E						Running <195 psi
Gauge C						Running .07 ³
Gauge D						Running 1.4 ³
Gauge F						>50 psi
Gauge G						5 psi
Gauge H						.5 cfm.
Gauge I						.5 cfm.
TDS Meter K						
Ozone Present?						Yes/no
Drain Air Tank						Yes/no
Heavy Cleaning						Yes/no
Coin Hopper Coins						Ok/no
1 Gal Test Vend A						
1 Gal Test Vend B						
10# Bag Ice Vend						
20# Bulk Ice Vend						
Add Salt						
Light Check						
RO Test Switch						Normal
Add Bags						
Ice Sales						
Water Sales						
Machine Sanitizing						
Replace Filter (Big Blue)						
Replace RO Pre Filter						
Replace Final Polish Filter ⁴						

Notes/Comments:

¹ Gauge A is the incoming water pressure. If gauge B's reading differential is greater than 10 psi difference then gauge A then change the 5 Micron filter in the Blue filter housing on the RO. ² Gauge J is the delivery water pressure. ³ Gauge C is the RO product water and Gauge D is the RO reject water, gauge C should ½ of the reading on gauge D. ³ Reference the RO manual for settings and troubleshooting techniques. ⁴Change charcoal filter monthly.



Maintenance Procedure

Sanitization

This machine utilizes several processes to produce high-purity, safe, clear, affordable ice and drinking water. Each process in this machine has been carefully designed and engineered to work in junction with each other. Please do not make any changes or alterations without approval of the parent company. To do this may alter the quality of the product and will void the NAMA certification.

As the operator, you will be required to keep this machine in a clean and well-maintained condition. Keep in mind at all times that this is a place where people come to buy a food product. A dirty or poorly maintained machine will deter people from using it, and they will go elsewhere. Once a customer is lost, they don't return. Keep the machine as clean as you would like to see it if you were a first time customer.

1. Cleaning and Maintenance – In Place

A. Sanitizing Procedures

1. The Mr. Zippy's Z10000 Ice and Water vending machine should be thoroughly sanitized after installation prior to opening for use by the general public. It should likewise be sanitized anytime work is performed on the purification or storage system.
2. Recommended sanitizing agent is regular unscented household bleach (Clorox or equivalent). It is available at any grocery store.
3. Mix ½ oz. bleach to one (1) gallon of water for general cleaning and sanitizing purposes.
4. How to sanitize entire water production system:
 - a. Turn off City Water
 - b. Remove RO membrane and close drain adjustment valve. Remove RO pre filter
 - c. Fill filter housing with sanitizer
 - d. Apply city water pressure and flush sanitizer into storage tank for 5 minutes
 - e. Reinstall RO membrane and pre filter. Adjust flows and continue flushing until storage tank is full
 - f. Shut off the RO system
 - g. Remove final polishing filter
 - h. In test mode, run a minimum of 30 seconds through each dispensing nozzle
 - i. Attach a hose to the outside hose connection, and open valve. Run until the tank is empty
 - j. Reinstall membranes and filters. Run and adjust RO to specifications and allow machine to fill
 - k. Repeat steps H through J with water only to flush



B. Water Side Sanitizing (Exterior)

1. Remove grates from the water delivery area
2. Use any stainless steel cleaner/polish and thoroughly spray the area
3. Use a clean cloth to polish the stainless paying close attention to not so obvious areas
4. Clear any gathered debris from the drains and strainers
5. Replace grates
6. Use a light detergent to clean the front decal of the vending area
7. Rinse away any soap or cleanser build up on the system from cleaning.
8. Take sanitizing solution and saturate any and all areas that will dispense or store water.
9. Spray dispensing nozzles and plastic nozzle protectors
10. Allow sanitizing solution to dry for 2 minutes.

C. Ice Side Sanitizing (Interior)

1. Ice Tank
 - Remove any debris that may be in the ice tank
 - Inspect tank closure lids for dirt, dust , debris
 - Verify blades (movable and stationary) are clean
 - Verify that ice shearing gate is clean
2. Ice Bucket
 - Inspect interior of ice bucket for dirt and debris
 - Verify that ice bucket travel chute is clean
3. Ice delivery hopper
 - Inspect and insure that ice delivery hopper is clean on all sides and perforated bottom
4. Ice hopper and ice gate
 - Inspect all sides of the ice hopper
 - Insure ice gate is clean and clear of debris
5. Disinfecting Interior components
 - Spray the sanitizing mixture liberally on all surfaces inside tank, tank walls, ice chute, ice hopper, delivery hopper, and ice gate. In short, sanitize anything that comes in contact with ice and water!
6. Allow sanitizing solution to dry for 2 minutes.

D. Ice Side Sanitizing (Exterior)

1. Remove grates from the ice delivery area
2. Use any stainless steel cleaner/polish and thoroughly spray the area
3. Use a clean cloth to polish the stainless paying close attention to not so obvious areas
4. Clear any gathered debris from the drains and strainers
5. Replace grates
6. Use a light detergent to clean the front decal of the vending area
7. Rinse away any soap or cleanser build up on the system from cleaning.



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8. Take sanitizing solution and saturate any and all areas that will dispense ice.
9. Spray ice gate
10. Allow sanitizing solution to dry for 2 minutes.

E. Routine Cleaning

1. It is imperative that the unit be maintained in a clean and attractive state at all times. The exterior vend area should be cleaned and polished daily. The interior, surfaces, signs and outer surface of the unit should be thoroughly cleaned weekly – more often in rainy or windy weather.
2. For cleaning the stainless steel vend areas, use a good quality stainless steel cleaner/polish. For the vend nozzle guides use sanitizing liquid mix as mentioned above. A good, general household cleaner such as Formula 409 is preferred for the exterior surfaces and signs. Be sure to thoroughly rinse all cleaner off all surfaces to prevent spotting and buildup. These products are available locally at grocery stores in the household cleaner department.

F. Filter replacement and replenishment schedule

1. The gauges mounted directly on top of the filter housings monitor the Blue filter. When you see a 10-pound per square inch differential between the A and B gauges, it is necessary to change that filter.
2. Shut off the incoming water valve and relieve the line pressure before removing the filter housing. Replace with only the correct, approved filter. Under no circumstances substitute any other filter. Failure to do so may result in damage to the system and/or reduced water quality.

G. Reverse Osmosis Membrane

1. The reverse osmosis membrane should last for several years. However, if you experience lower pure water flow, or increased TDS (total dissolved solids), the membrane may be in need of cleaning or replacement.
2. If you experience this difficulty, please refer back to the troubleshooting guide later in the manual.

2. Cleaning and Maintenance – Exterior

We cannot stress the importance of a clean sanitary unit enough. It should be your top priority as the operator or maintenance person. The success or failure of this machine rests largely upon your attention to this issue.

Exterior cleaning and maintenance:

1. Daily / Clean both windows of the water and ice machine with stainless steel cleaner or other quality cleaner, paying close attention to all surfaces including the control panels, fold down shelves, vend area, and signs. DO NOT use Comet or other abrasive type cleaners, as this will scratch the surfaces!! Use clean paper towels or freshly laundered towels only.



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2. Daily / Ice Machine—Sanitize ice gate and bag hooks with a disinfectant spray ¹, and rinse liberally with a spray bottle full of fresh product water ².
3. Daily / Water Machine—Sanitize the nozzle guides, ice gate, and bag hooks with a disinfectant spray ¹, and rinse liberally with a spray bottle full of fresh product water ².
4. Daily / Ice Machine—Run 1 test bag of ice looking for ice quality and integrity. Ice should be dry, loose, and not frozen together in blocks.
5. Daily / Water Machine—Run one test gallon from each vend nozzle to test for correct operation. Fill calibrations should be checked weekly or as needed.
6. Daily—Inspect exterior of building for trash, cigarette butts. Dispose of properly.
7. Daily—Remove any scuffs, mud, marks, from building with a stiff bristle brush and a spray cleaner such as “409”.
8. Weekly—Visually inspect the signage for dirt, bugs. Clean as necessary with Windex.
9. Weekly or as necessary—Sweep and/or hose parking lot to remove road grime, scrape used chewing gum off of parking lots.
10. If the machine has been sprayed with graffiti, remove at once! Never leave graffiti overnight, as research proves that the best way to combat this problem is to never let it stay on, and eventually they will go elsewhere. Spray paint can be removed from stainless steel parts with paint thinner or Goof Off.
11. The bacteriological quality of the product water must be tested by an EPA or State Health Department approved laboratory once monthly or as required by state law, or at least semi-annually.
12. Weekly—Fill out the weekly log sheet for each machine at the time you do the weekly maintenance (see sample log sheet on the next page). Be sure to fill out this log sheet accurately and completely every week. This gives a method of tracking maintenance problems as well as the functional history of each machine. The sample log sheet on the next page has been provided to give an example of a correctly filled out form for a typical week.

¹ **Disinfectant spray is a mixture of 1 gal of water and ½ ounce of household bleach.**

² **Fresh product water should be RO water or distilled purified water.**

3. Cleaning and Maintenance – Interior

1. Daily—Check for leaks. Repair leaks as they are found.
2. Weekly—Visually check both UV sterilizers for light and the ozone generator for ozone scent.
3. Weekly—Manually start RO by turning the test switch on the front of the RO unit to test. Check gauge A and B pressures, gauge B and C pressures, product flow (gauges G and H), reject water (Gauge I), and pump gauge (Gauge F) pressures. Record data on log sheet. Adjust if necessary, replace filters as needed. Note: Test



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switch bypasses all shut off components in the system and will continue to run until it is put back into the "Normal" position.

4. Weekly—Check TDS meter and record on log sheet. Reading should be less than 3 ppm. If reading is greater than 3 ppm refer to troubleshooting section for suggested solutions.
5. Weekly—Record ice and water sales by observing the readings on the user interface (Red Lion) on the front of the control panel. Compare the weekly reading to ensure that activity has occurred since the previous reading.
6. Weekly—Drain moisture from the air tank by opening the drain valve located on the bottom of the tank above the water vend door. Failure to drain the tank will lead to premature failure of the solenoid valves that operate the filler mechanism as well as other systems.
7. Weekly – Check air/water separators. CAUTION!! Shut off air supply and relieve air pressure before attempting to service any pneumatic component. Drain water from separators and recharge the system by turning the air back on.
8. Weekly—Check chlorine level. The chlorine test is done using the chlorine test kit provided. If chlorine reading is high, immediate attention must be given to the charcoal filter after the water softener, see the charcoal filter flush procedure in this manual. If after the flush the chlorine reading continues to be high, then the charcoal must be replaced. Failure to address this problem will result in permanent damage to the RO membrane. Contact the factory for charcoal replacement.
9. As Necessary—Sweep and mop the floor of the building.
10. As Necessary – Visually check and clean entire interior including walls, floors, equipment, etc.
11. Weekly – Check salt level in softener brine tank and replenish as needed.
12. Weekly – Sanitize the ice bucket components using the sanitization solution
 - a. Pressing the sanitize button on the Red Lion or F5.
 - b. Extend the ice transfer bucket
 - c. Liberally spray the inside of the ice transfer bucket
 - d. Retract ice transfer bucket
 - e. Spray the ice transfer bucket shelf
 - f. Spray the ice transfer hopper
 - g. Spray the ice delivery hopper
 - h. Spray the ice delivery gate
 - i. Allow to set for 2 minutes, then put machine back in service



4. Filter Replacement

The carbon polishing filters should be changed once monthly, and the Big Blue and five-micron filter should be changed when the pressure differential between the test gauges becomes too great. Use the following procedures for changing these filters.

To change Blue or RO Pre-treatment Filter, use the following procedures:

- A. Shut off the incoming water valve.
- B. Start and stop the RO system. This will relieve the pressure in the RO system or press the pressure relief valve located on the top of the blue housing.
- C. Using the correct filter wrench, turn the filter housing counter-clockwise to remove filter housing.
- D. Remove used filter and pour out remaining water.
- E. Verify that the O ring inside the housing is seated properly in the retaining groove.
- F. Insert correct replacement filter (Part No Z66040-16) into the housing, making sure it is fitted properly in the bottom.
- G. Replace housing, making sure the top of the filter fits properly in the adapter housing.
- H. Tighten filter housing until the O-ring contacts the housing adapter, then tighten approximately one-quarter turn. **DO NOT OVER TIGHTEN!!**
- I. Turn on incoming water then check for leaks.
- J. Start RO by putting the test/normal switch located on the front of the RO Service Panel to the "test" position. Check for leaks and note pressure differentials. Return the test/normal switch back to the "normal" position.
- K. Using a service report form, record which filters were changed, and the date of the change.

To replace the carbon-polishing filter, use the following procedure:

Note: The carbon polishing filters at the vend windows will never plug due to the pure nature of the water; however, it is very important to change these once monthly. Failure to do so will cause an algae growth around this filter and compromise the quality of the water sold to your customer.

- A. Close the ball valve handle located to the right of the polishing filter.
- B. Press the pressure relief valve located on the top of the filter housing. Gauge J should go to 0 psi.
- C. Using the filter wrench, turn the filter housing counter-clockwise to gain access to the filter.
- D. Discard the used filter, and pour out remaining water.



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- E. Verify that the O-ring inside the housing is seated properly in the bottom.
- F. Insert correct replacement filter (Part No. Z890206) into the housing, making sure it is fitted properly in the bottom.
- G. Replace housing, making sure the top of the filter fits properly in the adapter housing.
- H. Tighten filter housing until the O-ring contacts the housing adapter, and then tighten approximately one-quarter turn. **DO NOT OVER TIGHTEN!!**
- I. Open the ball valve located next to the polishing filter. You should see the gauge now reading pressure.
- J. After changing filters, vend at least five (5) gallons of water from each vend nozzle to flush the new filters. This is VERY important because the first few gallons will taste like the filter.
- K. Using a service report form, record which filters were changed, and the date of the change.
- L. Taste test the water from the nozzles.

Filter Replacement Chart

Part #	Filter Description
Z66040-16	Single R.O. Pre-treatment
Z890206	Single Carbon Polishing
	1 Case R.O. Pre-treatment
	1 Case Carbon Polishing
	Filter Wrench

5. Carbon Tank Care, Testing, and Replacement

The carbon tank in the machine serves a very important purpose. It removes the chlorine the municipality puts in the water, as well as various pesticides, if they are present. Chlorine is very detrimental to the reverse osmosis membrane material. Consequently, it is critical to test the chlorine level of the water after it leaves the carbon tank. Using the chlorine tester supplied to you (Part No. Z62175), test for chlorine at least once per week. The maximum reading for chlorine should never exceed .5 ppm - parts per million.

6. How to Test for Chlorine

- Test for chlorine at the test valve located on the RO pre-filter following the manufacturer's instructions on the test kit.

**NOTE: The RO must be running when taking the sample.
When finished, record this reading.**



7. How to Back Flush a Carbon Tank

- Shut off the incoming water valve.
- Start RO system to relieve pressure.
- After all the pressure is out of the system, disconnect the 2 fittings on the filter.

NOTE: Mark the hoses before you disconnect them since they need to be reconnected the way they came off.

- Connect an adapter hose from the inlet hose to the outlet of the carbon tank.
- Connect a drain hose to inlet side of carbon tank. Place open end in the floor or door drain.
- Open the inlet valve and let the water flow through the filter and run to drain for fifteen (15) minutes at approximately 5 gallons per minute.
- Shut off the inlet valve and reconnect the carbon tank as it originally was.
- Turn on the inlet valve, check for leaks, and manually restart the RO system.
- Record action on service report.
- Retest the chlorine level the following week. If the level is still high, the carbon tank must be replaced.

8. How to Replace a Carbon Tank

- Shut off the incoming water valve.
- Start RO system to relieve pressure.
- After all the pressure is out of the system, disconnect the two fittings on the filter.

NOTE: Mark the hoses before you disconnect them since they need to be reconnected the way they came off.

- Carefully take the carbon tank out of the unit.
- Put the replacement tank in.
- Connect an adapter hose from the inlet hose to the outlet of the small carbon tank.
- Connect a drain hose to inlet side of the carbon tank. Place the open end in the drain tank (see instructions on back flushing a carbon tank previously discussed) and back flush as per instructions.



CAUTION: Failure to back flush a new carbon tank will contaminate the pretreatment system with carbon fines (dust) and do considerable damage!!!

- Reconnect carbon tank in the normal operating mode.
- Turn on the incoming water valve.
- Manually start the RO system.



- Check for leaks.
- Record action on service report form.
- Check the pressure differentials the following day and replace the RO pre filter, if necessary, due to carbon fines buildup that could occur from changing the carbon tank.

9. Cleaning and Maintenance – Ultraviolet Sterilizers

The ultraviolet sterilizers in the Z10000 Mr. Zippy's Ice and Water machines are designed to kill bacteria and sterilize the product water just prior to vending. UV sterilization relies on complete light penetration to all of the water that passes through the sterilizers. Consequently, it is imperative that the UV bulbs and the quartz sleeves in the sterilizers be kept spotlessly clean.

A. Cleaning the UV Lamp and Quartz Sleeve

Avoid touching any of the surfaces of the bulb and handle the quartz sleeve by the ends only. Use only clear water and clean dry towels to clean these parts. DO NOT use Windex or other cleaning agents. These parts must be spotlessly clean with no fingerprints left on them.

1. UV Lamp-Bulb

- a. In order for disinfection to remain effective, the UV lamp must be checked and replaced on a regular basis. Bacteria that may have survived the filtration process is killed by the UV light when exposed to a specific wavelength of UV light (13,000 $\mu\text{WS}/\text{cm}^2$ at 254 nm). As the UV lamp ages, the intensity output weakens. Therefore, it is important to check the UV lamp a minimum or every six (6) months and replace it every twelve (12) months. Alternately the lamp may be replaced every six (6) months.
- b. Replacement of the UV lamp is required every six months. This ensures the correct wavelength ultraviolet light and eliminates the need for testing of the UV lamp.
- c. To change the UV bulb:

To replace the lamp, there is NO need to disconnect the system from the water supply, nor drain the water from the system. Lamp replacement is a quick and simple procedure requiring no special tools.

- Disconnect the power source to the unit.
- Remove the lamp connector by sliding the metal retaining ring away from the body of the connector.
- Remove connector and lamp from the reactor chamber.
- Separate the lamp from the connector. Do not twist the lamp from the connector; simply slide the two apart. Avoid touching the lamp on the glass portion. Handling the lamp on ceramic ends is acceptable. If you must touch the lamp glass, please use a soft, clean cloth.
- Fully remove the lamp from the reactor chamber being careful not to angle the lamp as it is being removed from the chamber. If the lamp is removed at an angle, pressure will be applied on the inside of the quartz sleeve, causing the sleeve to fracture.



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- To install the new lamp, first remove the lamp from its protective packaging; again, be careful not to touch the glass lamp itself.
- Carefully insert the lamp into the reactor vessel (actually inside the quartz sleeve).
- Insert the lamp fully into the chamber leaving about two inches protruding from the chamber.
- Attach the connector to the UV lamp. The connector is “keyed” and will only allow correct installation in one position.
- Ensure the connector is fully seated onto the UV lamp.
- Once the lamp is seated connector, slide the connector over the aluminum retaining nut.
- Make sure the metal retaining ring on the connector is pulled away from the body of the connector in order that the connector may slide fully over the retaining nut.
- Once the connector is located fully over the retaining nut, slide the metal ring back in to lock the connector in place.
- As this connector is keyed to the reactor chamber, make sure the depression on the connector is located over the ground lug located on the reactor chamber.

**WARNING! In order to maintain certification and insure proper operation of this machine, only use replacement parts authorized by or obtained from Jim Coleman Company
5842 West 34th Street Houston, TX 77092 1-800-999-9878**



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Required Supplies List

Following is a list of required supplies to maintain the Z10000 Mr. Zippy's Ice and Water Machine. Please be sure that these and any other items you find useful or necessary are available for routine maintenance.

- ✓ Paper towels or clean white towels
- ✓ Stainless steel cleaner
- ✓ Scrub pads
- ✓ Formula 409 or equivalent cleaner
- ✓ Clorox bleach or equivalent
- ✓ Spray bottle
- ✓ Salt—extra coarse softener salt or softener pellets
- ✓ Chlorine tester
- ✓ Hardness tester
- ✓ Broom
- ✓ Sanitation Kit

Consumable Parts List

Consumable parts that should be stocked in each service vehicle:

Quantity	Part #	Description
2	Z66040-16	Five-Micron Filter
2	Z890206	Carbon Filter



7.2 Pressure Gauges and their Functions

- **Gauge A:** the incoming line pressure gauge and is mounted directly on the behind and top of the five micron filter. This gauge shows the line pressure coming from the municipal water supply (city water). The amount of pressure it shows will vary as the city system fluctuates. However, the Model Z10000 Machine requires at least 20 psi at this gauge to function properly.
- **Gauge B:** the Blue RO Prefilter differential gauge. If there is more than 10-psi difference between A and B with the RO running, the filter needs to be changed. (5 Micron Part No. Z66040-2)
- **Gauge C:** the RO product gauge. This gauge should read .7gpm – 1.1gpm with RO running
- **Gauge D:** the RO reject gauge. This gauge should read 2 times what the product gauge is reading 1.4gpm – 2.2gpm running
- **Gauge E:** the RO pump pressure gauge. It should read between 180 to 200 psi with the RO running. If this pressure is out of range with the RO running, the RO needs to be readjusted or repaired.
- **Gauge F:** the air pressure gauge. It is the system air pressure gauge it should read 70-90 psi
- **Gauges G:** the ozone supply pressure gauge. It should read 5 psi.
- **Gauge H:** the door ozone supply. It should read .5 cfm.
- **Gauge I:** the tank ozone supply. It should read .5 cfm.
- **Gauges J:** the water supply delivery pressure. This gauge monitors the delivery pressure for the water door and the ice machines. It should read 20-60 psi.



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7.3 Water Sample and Testing Procedure

The product delivered to the customer from a Mr. Zippy's Ice and Water machine is considered to be food grade consumables and should be handled accordingly. Periodic testing of the quality of product should be done based upon your local requirements.

The following description is based on the requirements of the Texas Health Services under the Department of Health Services Guidelines.

1. Water Sample

- a. A water sample must be taken and submitted to a testing laboratory for "Microbiological" study.
- b. Each water sample must be taken not more than 90 days apart.
- c. Sample results must be maintained and on premise for a period of 2 years (Texas). *Compliance must be done for your local requirements.*

2. Sample Procedure

- a. Once a lab has been identified to do the samples, they will provide you with a pure and sealed water sample bottle for your sample and the necessary forms needed for the test. (See sample on page ??)

City of Houston Health Department
North Environmental Laboratory
1600 North St.
Houston, TX 77002
LAB # 18330

Sample Form

SAMPLE IDENTIFICATION (Print Name and Address) (City, State and Zip)
Report Date: _____ Sample Number: _____
PUBLIC WATER SYSTEM NO.: _____ COUNTY: _____
PUBLIC WATER SYSTEM NAME: _____
Address: _____
City: _____ State: _____ Zip: _____
 Commercial Domestic Residential City Address # _____

SAMPLE SITE/COLLECTION DATE AND TIME
Date (Time & Date): _____
Service Date: _____
Service Time: _____
Service Date/Time: _____

SYSTEM TYPE **SAMPLE TYPE** **WATER SOURCE**
Drinking Non-potable Other: _____
Surface Groundwater Other: _____
Tap Well Other: _____
Other: _____

LABORATORY REPORT (Do not write below) **REPEAT SAMPLES are required**
Number of samples collected: _____
Number of samples analyzed: _____
Number of samples returned: _____
Number of samples returned to the Distribution System: _____

COLOUR/ODOR/TASTE **QUESTIONS about repeat samples?**
Turbidity: _____
Color: _____
Odor: _____
Taste: _____
Other: _____
Call 281-835-2300

SAMPLE UNSUITABLE FOR ANALYSIS (This unsuitable sample must be replaced within 24 hours)
 Sample not in the required water 24-hour collection period Sample not representative of the system
 Sample not in the required water 24-hour collection period Sample not representative of the system
 Sample not in the required water 24-hour collection period Sample not representative of the system
 Sample not in the required water 24-hour collection period Sample not representative of the system

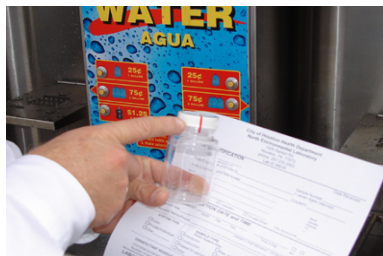
Submit to: 1600 North St., Houston, TX 77002, Phone: 281-835-2300, Fax: 281-835-2300



Test Bottle

Thumbnail of Water Test Form

- b. You must procure these bottles and the forms from the lab.
- c. Remove the seal from the bottle when you are ready to take the sample.





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- d. Remove lid on sample bottle and deposit money into the water machine.



- e. Begin dispensing water through the machine and fill sample bottle to the line or 100ml.



- f. Replace the lid, tightly.



- g. Fill out form and deliver to lab for testing. Lab will require a fee to process the test. Once the fee has been paid, the lab will assign the sample a lab number. Ensure that the lab report you receive references this lab number.
- h. Results will be sent to the designee on the lab report.



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3. Chain of Custody

- a. Some jurisdictions will require a “Chain of Custody” form if the sample is not delivered by the person taking the sample. See your local requirements. (See sample on page ??)

Chain of Custody	
1. I certify that these samples were collected and sealed by me at _____ AM / PM on ____/____/____ and received in my custody until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
2. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
3. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
4. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
5. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
6. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
7. I certify that these samples were continuously in my custody from the time of receipt listed above until transferred to _____ at _____ AM / PM on ____/____/____.	Signature: _____
8. I certify that these samples were continuously in my custody from the time of receipt listed above until the completion of laboratory analysis on ____/____/____.	Signature: _____

3-08 Revised Form 01/2006

Thumbnail of Chain of Custody

NOTE: Water sample must be delivered to lab within 30 hours for valid testing.



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7.3.1 Sample Water Testing Form

City of Houston Health Department
 North Environmental Laboratory
 1128 Rankin Rd.
 Houston, TX 77071
 Phone 281.233.2563
 Lab ID 48030

Sample Form

SAMPLE IDENTIFICATION Date Received _____

Report Date _____ **Out Gray Boxes and Deliver Form Along With Sample**

MO/DAY/YR

PUBLIC WATER SYSTEM ID _____ Sample Number _____
↻ seven digits (required)

PUBLIC WATER SYSTEM NAME _____ COUNTY _____

Name _____

Street Address _____

City, State, Zip _____

Phone _____

Send Sample Results To: _____

Owner/PWS
 Operator
 Private/Other
 City Account # _____

SAMPLE SITE/COLLECTION DATE and TIME

Date/Time Collected: _____

Month Day Year Time of Day am pm

Sample Site: _____
(address or other description – not sample site number)

Sampler Name/Phone _____

SYSTEM TYPE	SAMPLE TYPE <small>(Public Systems Only)</small>	WATER SOURCE
<input type="checkbox"/> Public <input type="checkbox"/> Private/Individual <input checked="" type="checkbox"/> Other Source Ice and Water	<input type="checkbox"/> Distribution <input type="checkbox"/> Raw: well # _____ <input type="checkbox"/> Construction <input type="checkbox"/> Special _____ <input type="checkbox"/> Repeat for sample # _____ <input type="checkbox"/> Other	<input type="checkbox"/> Groundwater (Well) <input type="checkbox"/> Surface Water (Lake, River)

DISINFECTANT RESIDUAL (Mandatory) _____ mg/L Free Chlorine

(Compliance samples should not be collected if no residual is present) Chloramine (Total Chlorine)

Number of samples collected _____

LABORATORY REPORT (Do not write below) REPEAT SAMPLES are required when Coliform organisms are Found in Routine Distribution samples

Test Method Used: Chromogenic/Fluorogenic Colilert® -18

COLIFORM ORGANISMS:

Total Coliform

Found NOT Found

E. coli

Found NOT Found

Questions about repeat samples?
 Call TCEQ @ 512.239.6020

Unsuitable for analysis (see below) Analyst Initials _____

SAMPLE UNSUITABLE FOR ANALYSIS (this unsuitable sample must be replaced within 24 hours)

<input type="checkbox"/> Sample too old. Not received within 30 hours of collection	<input type="checkbox"/> Sample has excessive color/turbidity
<input type="checkbox"/> Quantity insufficient for analysis (100 ml required)	<input type="checkbox"/> Sampled leaked/bottle cracked in transit
<input type="checkbox"/> Form incomplete/ date discrepancy (CIRCLE errors)	<input type="checkbox"/> Excessive Chlorine residual
<input type="checkbox"/> Inconclusive result	<input type="checkbox"/> Other reason: DESCRIBE _____

Submit to TCEQ/Public Drinking Water MC-155, PO Box 13087, Austin, TX 78711 Fax Positive to 512.239.3666



7.3.2 Sample Chain of Custody Form

Chain of Custody	
1.	I certify this/these sample(s) were collected and sealed by me at ____:____ AM / PM on ____/____/____ and remained in my custody until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
2.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
3.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
4.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
5.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
6.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
7.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ____:____ AM/PM on ____/____/____. Signed: _____
8.	I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until the completion of laboratory analysis on ____/____/____. Signed: _____



Chain of Custody

1. I certify this/these sample(s) were collected and sealed by me at ___ : ___ AM / PM on ___ / ___ / ___ and remained in my custody until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

2. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

3. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

4. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

5. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

6. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

7. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

8. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until the completion of laboratory analysis on ___ / ___ / ___.

Signed: _____



Chain of Custody

1. I certify this/these sample(s) were collected and sealed by me at ___ : ___ AM / PM on ___ / ___ / ___ and remained in my custody until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

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Signed: _____

4. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

5. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

6. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

7. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

8. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until the completion of laboratory analysis on ___ / ___ / ___.

Signed: _____



Chain of Custody

1. I certify this/these sample(s) were collected and sealed by me at ___ : ___ AM / PM on ___ / ___ / ___ and remained in my custody until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

2. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

3. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

4. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

5. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

6. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

7. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until transferred to _____ (name) at ___ : ___ AM/PM on ___ / ___ / ___.

Signed: _____

8. I certify this/these sample(s) were continuously in my custody from the time of receipt listed above until the completion of laboratory analysis on ___ / ___ / ___.

Signed: _____



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User Interface (Red Lion)

The Red Lion Operator Interface Panel is mounted on the door of the electrical control panel of the Mr. Zippy's Ice and Water Machine. The interface panel is called a human-machine interface (HMI). HMI's are tools for us, as humans, to be able to change settings on the machine, which, in this case, is the CP1H Programmable Logic Controller (PLC).

Setup data, income levels, alarms, timers, inputs and outputs, etc are stored in the memory of the PLC inside the control panel. With the Red Lion HMI, you can view data, perform tests, and make various changes to, timers and other memory locations in the PLC. The Red Lion is not necessary for the ice and water Machine to function. In fact, if you disconnected the Red Lion, the machine will continue to operate.

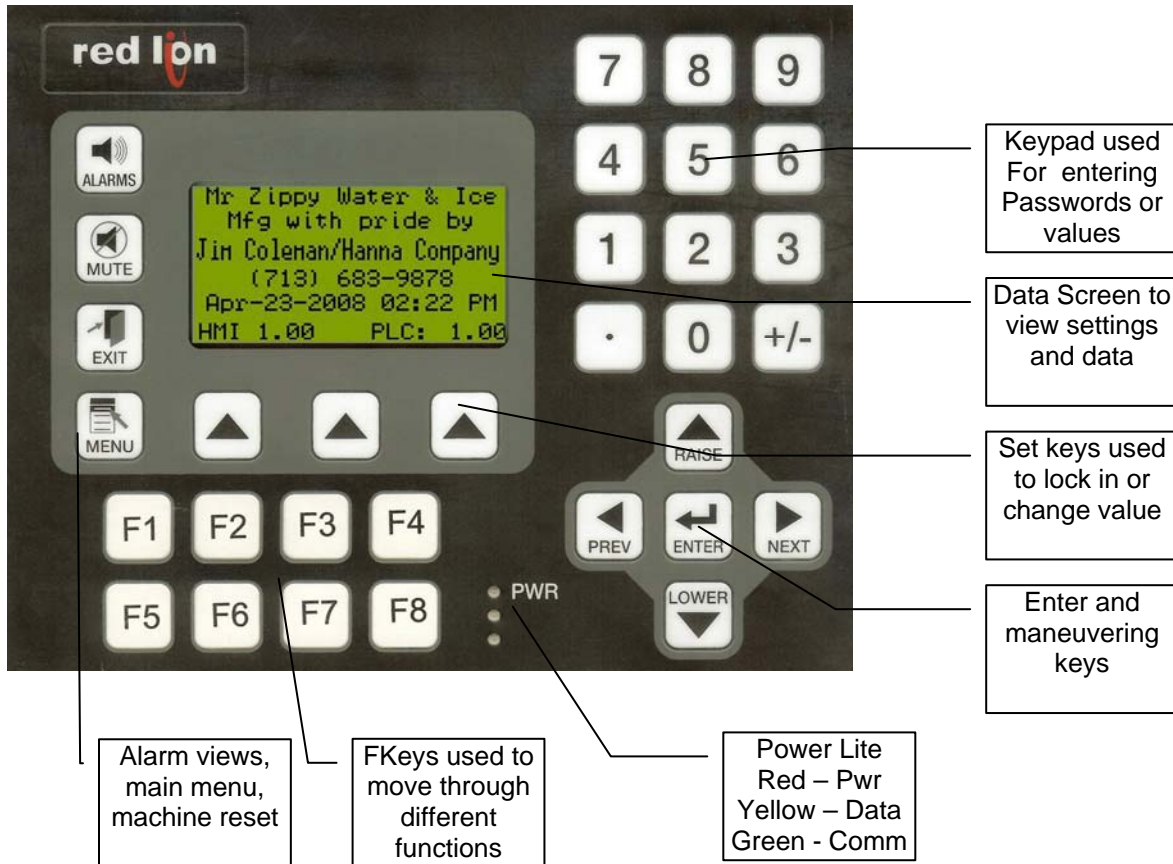
The PLC and Red Lion have their own independent programs stored in their own internal memory. When it is first powered up the Red Lion will display the following screen in approximately 5 to 6 seconds:



JCC developed the programs for the Red Lion and the CP1H. The two numbers at the bottom of the screen represent the version numbers of your unit. The first number (HMI x.xx) represents the current version stored in the Red Lion. The second number (PLC x.xx) represents the current version stored on the CP1H.

The following screen will familiarize you on the methods used to move throughout the screens needed to service and adjust your machine.

1. This is an image of the Red Lion HMI.



2. Key Table

Name	Description
Alarms	Use this key to view the different alarms
Mute	Not Used
Exit	Machine Reset
Menu	Display Main Menu with Software versions
F1	Bag Inventory
F2*	Timers and Counters
F3*	Prices and Revenue
F4	Operations View
F5	Not Used
F6	Not Used
F7	Technicians Menu
F8*	Site Settings
Pwr	Red, Yellow, Green
Prev, Next, Lower, Raise, Enter	Maneuvering keys used to move through the HMI screens.
Set Keys	Used to change or lock in a value
Data Screen	Use to view software versions
Keypad	Used for entering Passwords or changing values
*	These items require password to access



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F8	Site Settings	0-Number of Dumps/Bag> 1-Change Password>>>>> 2-Pager Values>>>>>>>>>>>> 3-Enter IP Address	One/10# Bg Two/20# Bg View/Technician/Revenue/Owner Site No / Send Delay / Answer Delay / Hang Up Delay / #1, #2, #3 Change, IP Addr, Mask, Gate
----	---------------	--	--

The following section will take each screen from the table above and briefly describe what is needed to work through that screen for viewing or changing data.


3. Passwords

Passwords are used to control access to the system. These passwords are changeable according to you. There are 4 levels of passwords available. View(Default #1) – allows only the viewing of technical data. Technician(Default #2) – allow the technician to reset, calibrate, or test settings. Revenue(Default #3) – allows the changing of prices and viewing of revenue. Owner(Default #4) – allows access to all screens and data.



For example press  the Bag Inventory screen will come up.




then press  the log in page will come up,



press  and then  now press



then  and you will go to the Bag Inventory screen. Follow this sequence each time you select an item that prompts you with the Log In Page.



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F1 Bag Inventory



This function allows you to change the quantity of bags available to the customer. Bags come on wickets of 100 each.



Press the arrow below **Add Bags**, this will bring up **Add 100 Bags**. Press the arrow

below **Add 100 Bags** to add 100 bags, the screen will return to the base screen now reflecting the added 100 bags. To better fine tune the number of bags available press the arrow

below **Change** if prompted for a password, input password according to the Password

procedure. Change bag count by pressing the  or the  buttons. This will advance or lower the count accordingly.

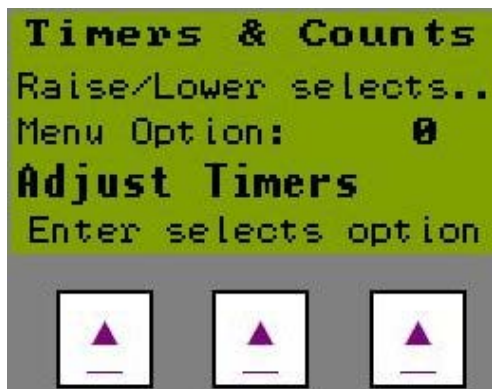
F2 Timers and Counters

Timers and Counters are system settings used to operate the different components. For instance the "Ice Transfer Time" is set .5 seconds. This allows the ice transfer bucket to remain over the ice conveyor bucket for ½ of a second. This insures that the ice has plenty of time to drop before the ice transfer bucket returns to its home position. These settings are factory set and should not be changed without consulting technical support on the Mr. Zippy's units.

WARNING! Making any changes in the Timers and Counters can greatly affect the way the machine performs. Please contact Technical Support prior to making changes. Jim Coleman Company 1-800-999-9878



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Press **F2** to display the Timers and Counts screen.

Now press **ENTER** to access the different screens under the Adjust Timers beginning with



vacuum Buildup. You can change the value by








pressing the **RAISE** or **LOWER** buttons to change the value. Use the **NEXT** button to

advance to the next choice or the **PREV** button to return to the previous choice. Below is a table identifying the options and their default settings:

Option	Setting
Vacuum Buildup	2.0s
Vacuum Watchdog	5.0s
Agitator Off Delay	.10s
Ice Transfer Time	.50s
Bucket Staging	5.0s
Agitator Repeat Cycle	60m
Water Left Side	1g – 17s
	3g – 56s
	5g – 87s
Water Right Side	1g – 17s
	3g – 56s
	5g – 87s




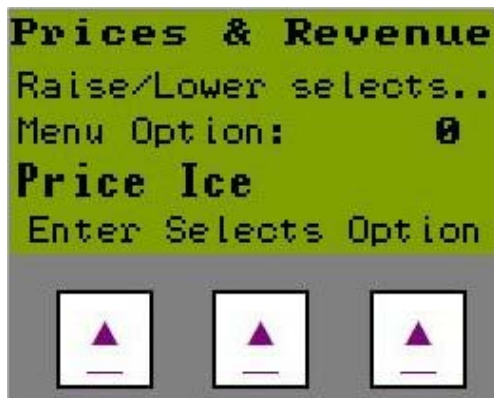
MR. ZIPPY'S ICE & WATER MACHINE


Press the  to return to the Timers and Counters screen. Press the  button to go to the Adjust Counters screen. Press  button to access the counters screen. Just like the Timers setting use the  and  buttons to change the values and use the  and  buttons to move between the Counter selections. Below is a table identifying the options and their default settings:

Option	Setting
No. of Ice Retries	3
No. of Agitator Motions	3
No. of Bags Detected	3
No. of Cylinder Movements	3

F3 Prices and Revenue

The Prices and Revenue section allow you to change the price of Ice and/or Water. This step is critical to accurate accounting. Press  to access the Prices and Revenue Screen.



Press  to choose one of the settings screens

such as "Price Ice" or press  to advance to the next selection.

The **Price Ice**, **Price Water**, and **Price Token** selections change the values and prices of these items. Refer to Fkey Table on page 57 for a flow chart of these




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choices. Press 3 times to get to the Revenue Viewing screens.



Press  to view the data. The Data will be viewed in several formats beginning with This Day, This Month and This Year. Scroll through the

different views by pressing the . You can also view


\$'s Last 7 days, **\$'s Last 12 Months**,
Best Day Last Week, **Best Day Ever**,
Best Month Ever, and **Best Year Ever**.

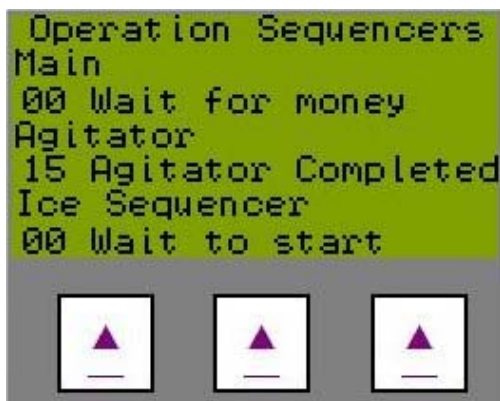
Please be aware that data is non re-settable. This maintains the integrity of the data for future reference.



F4 Operations View

The Operations Sequencer screen allows the user to view the operations of the machine as they should appear. There are no changes that can be made here, just viewing. This section will be

used the most when/while troubleshooting a problem with a technician. Press  to view the Operations Sequence Screen.



F5 Not Used

F6 Not Used

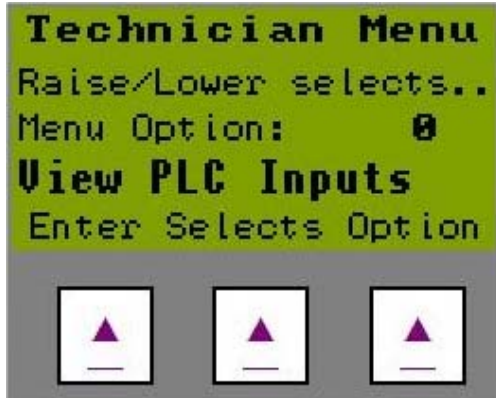
F7 Technicians Menu

The Technicians Menu is used for a multitude of functions. The technician will be able to use this screen to view Inputs and Outputs, Force Outputs on for testing, test some of the functions and much more. As many of the screens this screen is password protected and should only be


used by a qualified tech. Press  to enter the menu.





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Press the  button to advance through the


selections available to the technician. Press the  to **View PLC Inputs**. This will allow the tech to view inputs coming on and going off.





If the box on the right of the screen is  then this means the input is off. If the box on the right is  then this means the input is on. Press the



 button to view other inputs not shown on the screen. At the top of the screen is the



location of the inputs being viewed. In this case  channel 100 is being viewed. Refer to the technical drawings to locate this channel. View other channels

by pressing the  button. After viewing the PLC Inputs press the  button to return

to the Technician Menu. Press the  button to advance to the

View PLC Outputs


. The View PLC Outputs work exactly as the View PLC Inputs.

Press  to return to the main Technician Menu. Press the  button to advance to the


Force PLC Outputs. The Force PLC Outputs allows the technicians to






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exercise certain operations for testing, formatting, or viewing. Press  to bring up the first



option to force, Ice Shear Gate   , press the  below the word force, you will now hear the Ice Shear Gate retract to the open position. You will also

observe both boxes on the screen  to darken. This will indicate that the Ice Shear Gate performed the requested operation. The item that was forced will remain in that position until you

reverse the operation by pressing the  below the word force. The Ice Shear Gate will close and the boxes will return to  indicating that the Ice Shear Gate has closed and

returned to it's normal operation. Press the  button to advance through the items that can be forced on the channels as listed below:

Channel 100

- Ice Shear Gate
- Ice Xfer Bucket
- Swing Arm Bag Position
- Swing Arm Dispense
- Pickup Extend
- Pickup Retract
- Dispense Extend
- Dispense Retract

Channel 101

- Ice Dispense Gate
- Bag Dispense Gate
- Agitator Fwd
- Agitator Rev
- Agitator Speed
- Conveyor Raise
- Conveyor Lower
- Vacuum Motor

Channel 2001


- Water Vend Control Power






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Spare
Ice Dam Plunger
Token Diverter
Coin Machine Control Power
Bill Machine Control Power
Sonalert Horn
Spare
Display Operating System
Correct Change
Reset Message
Coin Dispense
Pulse Timer
Msg 10 Pound
Msg 20 Pound
Msg Dispense

Each item can be forced on for testing and/or verification that the function is performing as expected.



Press  button to advance to the  Test Bag Dispenser Option. This selection allows you to test the functionality of the bag



dispensing mechanism. Press  button to advance to the Test Bag Dispenser screen. Press  button below the word test.

Upon reaching this screen press the  below the word test. You will see the following actions occur:






MR. ZIPPY'S ICE & WATER MACHINE

- 1.) The Bag Delivery Cylinder Retract
- 2.) The Vacuum Motor Turns On
- 3.) The Bag Swing Arm Advances To The Bag Load Position
- 4.) The Bag Pickup Box Moves Towards The Bags
- 5.) The Bag Swing Arm Return To The Bag Dispense Position
- 6.) The Bag Cylinder Extend And Place The Bag In Position
- 7.) The Vacuum Motor Turns Off



This test allows the technician to adjust and correct any bag dispense problems that may be occurring.


Press the  button to return to the  screen.

Press  to move to the  screen. When the test





The Technician Menu screen displays the following text: "Technician Menu", "Raise/Lower selects..", "Menu Option: 4", "Test Agitator", and "Enter Selects Option". Below the text are three buttons, each with a purple triangle pointing up and a horizontal line below it.

screen  comes up then press the  below the word Test. This will turn the agitator on for visual inspection of the blades, motor, drive, and gear box. Press the arrow below test for a second time to turn the agitator off.



The Agitator Test Cycle screen displays the following text: "<Agitator Test Cycle", "Start a 'dry' cycle of the agitator", and "Test". Below the text is a button with a purple triangle pointing up and a horizontal line below it.

Press the  to return to the main menu and press the  button to advance the next test procedure. The following list will briefly show the functions and their testing or setup procedure.




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Clean Ice Bucket	Press the arrow below the word 'extend' to extend the bucket. This will allow the bucket to be visually inspected or cleaned. Press the button again to retract the bucket to the home position.
Test 10 Lb Sequence	Press the arrow below the word test to start 1 10# test sequence. This will allow a test of dispensing a bag, dropping 10# of ice, and delivery of the ice.
Test 20 Lb Sequence	Press the arrow below the word test to start 1 20# test sequence. This will allow a test of dispensing a bag, dropping 20# of ice, and delivery of the ice.
Calibrate H2O Side A / B When facing the machine the A Side is on the left and the B Side is on the right.	Use this function for calibrating the water dispensing for revenue capture. Press the arrow below the 1Gal title and then purchase 1 Gal of water from the water machine. The fill time will increase as the gal is being dispensed. Perform the same procedure for 3 Gal and 5 Gal.
Set Time Clock	Press the enter button to enter the set time mode. Use the Raise and Lower keys to change the month, and then press the next key to advance to the day using the same procedure for each setting. When satisfied with the settings press the save button and then the enter button to lock the changes in.
Reset Cash Balance	The display on the Ice Machine can be reset by pressing the arrow below the word reset.
Disable Vac Switch	This function will allow you to bypass the vacuum sensor switch in the event of a failure of this switch while waiting on replacement.
Disable Ice Sensor	This allows the machine to operate without ice

F8 Site Settings Menu

The Site Setting Menu is used to setup specific settings for each site. The technician will use these screens to customize the location such as setting up the Internet IP. As most of the screens it is password protected and only a qualified tech should make changes to the settings.



Press  to enter the Site Settings Menu.



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Press  to advance through the selections

available to the technician. The first setting is



press


press  view the Num Dumps Per Bag setting.



This setting is used to change the amount of ice that will

be dumped when a customer purchases a bag of ice. Press one of the arrows below the

or   the number that is dark is the amount that is chosen. Caution: This should only be

done if you have purchased 20# bags for your Mr. Zippys Press  to return to the Site Settings menu.



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Press  to advance to

Passwords are used to control access to the system. These passwords are changeable according to you. There are 4 levels of passwords available. View(Default #1) – allows only the viewing of technical data. Technician(Default #2) – allow the technician to reset, calibrate, or test settings. Revenue(Default #3) – allows the changing of prices and viewing of revenue. Owner(Default #4) – allows access to all screens and data. Caution: When/If changing passwords document what they are and store in a safe place. If they are forgotten or lost your program will have to be reset.



Press  to access . From here you will be able to

change the passwords by pressing the  below . Press  on the password that is highlighted to change. Change the password by pressing and holding the

 or  buttons. Press the  or  buttons to advance to the next

password to change. Press  to return to the Site Settings menu.



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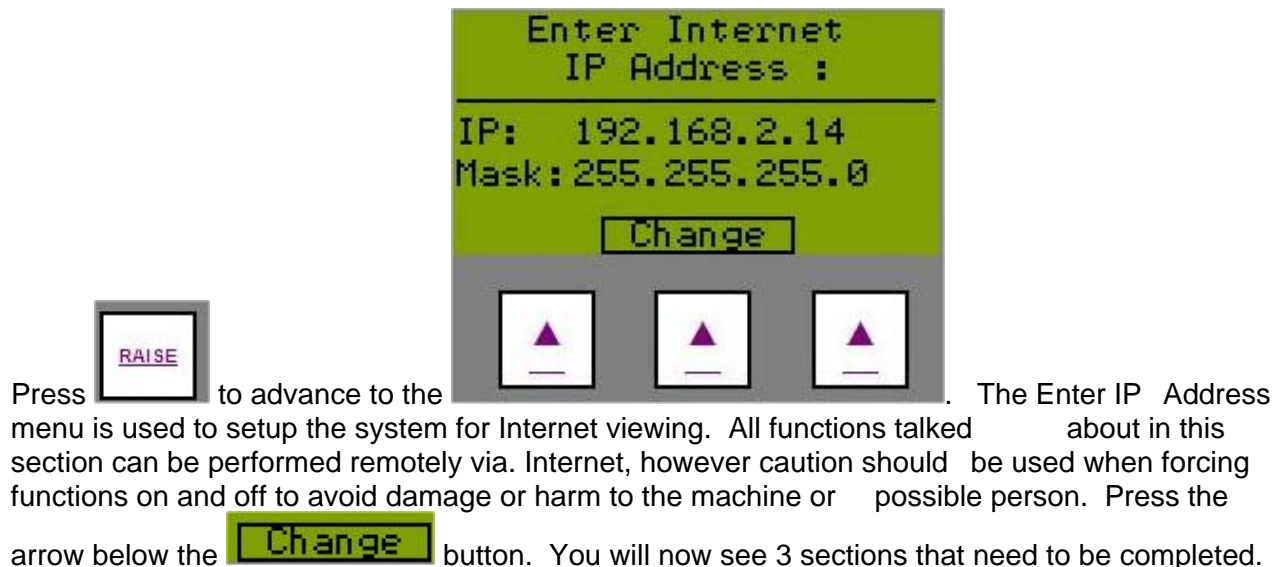
Press  to advance to the

The Pager Values Menu allows the customer to set up a paging system that will alert them in the event that there is a problem at the location. Setup the following:

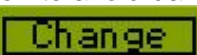
Site Number 0-999	The site number is used to identify which location is paging.
Pager Delay	Pager delay allows the phone to answer prior to sending error codes.
Pager Delay 2	This 2 nd delay is used for a delay after the phone has answered prior to sending the message.
Pager Delay 3	The 3 rd delay is for how long the connection is made prior to disconnecting.
Enter Pager Number	There are 3 pagers that can be dialed to send codes to. Use the previous and next button to advance through the numbers. Press enter on the number you want to change. Use the raise and lower buttons to put in your number, use the next and prev buttons to advance through the number pressing enter at the end to save the number..

Note: A phone line, modem, and pager service is required for this to work.

The following section should be done by an internet person that can provide IP, Mask, and Gateway data.



Press  to advance to the



The Enter IP Address menu is used to setup the system for Internet viewing. All functions talked about in this section can be performed remotely via Internet, however caution should be used when forcing functions on and off to avoid damage or harm to the machine or possible person. Press the arrow below the  button. You will now see 3 sections that need to be completed.



MR. ZIPPY'S ICE & WATER MACHINE

Enter IP Address
IP: 192.168.2.14
IP Adr: 000.000.000.000
Mask: 000.000.000.000
Gate: 000.000.000.000
Prev Accept

IP is assigned by the person configuring the system. The IP Mask is standard for your Internet provider. The Gateway will be provided by you Internet

provider. Press the  to access the highlighted choice, use the Raise and Lower buttons to make changes and the Previous and Next buttons to advance through the setting. Press enter to save the changes and Next to advance to the next setting. When all of the settings have been completed then press the  button to lock in all of the changes.

Connecting Mr. Zippy's to the Internet

Connecting Mr. Zippy's to the internet can prove to be a very useful tool for you. You will be able to view data such as alarms, income, status, and more from any internet connection in the world.

Note: Contact Jim Coleman Customer Service for assistance in Internet Connection

1-800-999-9878

Remote Access Configuration for Red Lion Controllers

:::DISCLAIMER:::

Configuring remote access to a Mr. Zippy's site over the Internet has inherent security risks associated with it. Even when best practices in security are followed there still remains a possibility that a site could be accessed by unauthorized users. Even small errors in configuration can increase the vulnerability of a site significantly.

The Jim Coleman Company will not be held liable for unauthorized site access, loss of data, theft of data or damage they may result from configuring remote access to a site.

This information is provided as a courtesy and reference to site operators and in no way implies a guarantee of security. A site should only be configured for remote access by an IT professional.



Synopsis:

This paper describes the procedure for configuring remote access over the Internet for the Red Lion controllers at a Mr. Zippy's site.

Prerequisites:

- A broadband Internet connection at the car wash site.
 - A static IP address provided by the ISP (Internet Service Provider.)
 - Internet Security Appliance (firewall/NAT Router) provisioned by IT Professional making the connectivity.
 - Ethernet network patch cables. One cable per Red Lion controller.
- *The length of the cable is determined by the distance from the Red Lion to the firewall.
- A desktop or laptop computer on site temporarily to be used for configuring the firewall.

Configuration:

Using an Ethernet cable connect the Red Lion controller to one of the ports labeled LAN/DMZ on the firewall.

Using an Ethernet cable plug in the incoming broadband service into the port labeled WAN on the firewall.

Then assign each Red Lion a unique IP address. The first controller should be assigned the address 192.168.1.10.

The subnet mask is 255.255.255.0

The gateway address is (xxx.xxx.xxx.xxx) provided by ISP.

To set the IP address information on the Red Lion controller press the *Site Data* button to access the Site Settings screen. Use the Raise/Lower buttons to scroll through the settings until you arrive at the Enter IP Address option. Then press the ENTER button.



Then press the arrow button under the *Change* option on the screen.



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Then use the key pad to enter the appropriate numbers in the fields. Note that all numbers are three digits so use leading zeros to pad single and double digit numbers. Use the NEXT and PREV buttons to navigate between the fields. Once the values are entered correctly press the arrow button under the Accept option on the screen to save the settings.

Then cycle power to the controller to make the settings take effect.

Next the firewall needs to be configured with the IP settings provided by the internet provider. This includes a static IP address, subnet mask, default gateway and DNS server information. Consult your ISP documentation for this information. Your IP professional should perform this duty.

Configuration is now complete. To access the Red Lion interfaces open a web browser and type the static IP address provided by the internet provider followed by a colon and the number that identifies the controller. The first controller number is 8000 the second is 8001 and so on.

For example if the static IP of the site was 127.0.0.1 you would type:

<http://127.0.0.1:8000> for the first controller

and <http://127.0.0.1:8001> for the second and so on.

This will bring up the screen below.



G3 Web Server

Option	Description
View Data	Display a list showing available data pages.
View Logs	Download files from the data logger.
Remote View	Display a view of the HMI's display and keyboard.

© 1993-2005 [Red Lion Controls](#)

Click the Remote View link and you will see the remote web interface of the Red Lion controller.



Troubleshooting on Mr. Zippy's Ice and Water

This section of the manual is designed to cover the basic steps of troubleshooting. This section assumes that you have basic skills in electrical and electronic troubleshooting and a good knowledge of plumbing. You will need to know how proxies operate and how to test them. You will also need to know how eyes operate and how to test them. This section does not cover every possible problem but it should cover most of them. You should read the entire owners manual first before attempting to repair the machine. You should also know the theory of operation on how the machine is designed to work before attempting to work on Mr. Zippy's.

1. *Ice Vend*

First step is to always check the Red Lion controller and look at the alarms to troubleshoot the ice vending problems. Most operations of the ice delivery system can be tested through the Red Lion by going to F7 and scrolling down to the operation to be tested. The alarms will give you the source of the problem. When the Red Lion shuts down the ice vending side due to a fault it will turn off the bill and coin acceptor to prevent customers from losing money.

In the owner's manual there is a section that explains the theory of operation for ice delivery, bag delivery, and agitator operation. You need to read this carefully and become familiar with the theory of operation to be able to identify problems and make the correct repairs.

- **Bill acceptor not accepting bills?** Check Red Lion controller to make sure that the unit is not disabled because of a different problem.
 - Is the red light on the back of the bill acceptor turned on or blinking? Read the code on the back of the bill acceptor for a detailed description of the cause of the fault. Please refer to the owner's manual for complete instruction of the bill acceptor.
 - If the light on the bill acceptor is not turned on then you will need to check the incoming 24v power to the bill acceptor. First check to see if the Red Lion controller is showing an alarm that would shut down the ice vending section.
- **Coin acceptor not accepting coins?** Check Red Lion controller to make sure that the unit is not disabled because of a different problem. Check for green power light on coin acceptor. Is the coin acceptor rejecting all coins? If so please disassemble the coin acceptor and check for foreign objects or bent coins. Also clean the coin path while coin acceptor is disassembled. If this does not correct the problem then check incoming power for 24v.
- **Ice tank is empty.** There are several reasons that this can happen. One reason is your sales exceed the production capacity of the ice maker. If this is true, once your ice maker fills the tank, the machine will go back in service without any outside assistance. You can check the ice production on your Manitowoc ice maker by simply timing how long it takes to produce a batch of ice. The Manitowoc should produce a batch of ice every 12 to 15 minutes. If your ice maker is greatly exceeding this then refer to the Manitowoc owner's manual for advanced testing of the ice maker. If your ice maker is not making any ice please check to make sure you have water going to the ice maker and that no breakers are tripped. You can unplug the ice maker and reset the computer to restart the ice maker. Air and Water temperature will affect ice production. The Manitowoc Owner's manual covers how much ice can be produced based upon outside air temperature.



MR. ZIPPY'S ICE & WATER MACHINE

- **Customer claims that they did not receive an ice bag.** You will need to test the ice machine and see if the machine is dispensing bags properly. Most likely the customer chooses the bulk ice selection and did not realize that you will not receive a bag. The computer will shut down the ice vending when you run out of bags. Before a customer can deposit money an ice bag will be loaded and be ready for delivery to the customer.
- **You find ice bags lying on the floor inside the machine.** This is normally caused by the customer purchasing a 10 lb vend of ice and simply not taking the bag when it is dispensed to him. If the customer does not take the bag then the bag dispenser tries to load a bag for the next customer and the bag will sometimes fall on the floor inside the machine. Test the bag dispenser to make sure it is performing properly.

WARNING: If your Mr. Zippy's has been shut down for several hours and the ice tank is almost full or full you will need to check **the rotation of the agitator blades before returning the machine back in to service.** Look under the tank while you vend a bag of ice to make sure the chain sprocket turns every time ice is dispensed. If the sprocket does not turn when ice is dispensed, then empty out the ice tank and check the blades and hub.



MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy Alarm Errors			
Alarm	Description	Service	Explanation
00	No Alarm	No	
01	Low Water Level	Yes	The RO water storage tank is empty. Check the RO system and find the problem with the RO system. Once water tank is full the ice side will then return back to working properly.
02	Low Coin Dispenser	No	The coin dispenser is low and needs to be filled. This disables the bill acceptor.
03	Out of Bags	Yes	Please reload the ice bags.
04	Ice Shearing Gate Open Fault <i>Test through Red Lion screen F7</i>	Yes	The ice shearing gate failed to open. Check the air pressure on the ice shearing gate regulator. Minimum pressure to operate properly is 70 psi.
05	Ice Shearing Gate Close Fault <i>Test through Red Lion screen F7</i>	Yes	The ice shearing gate failed to close. Check the air pressure on the ice shearing gate regulator. Minimum pressure to operate properly is 70 psi. Check the opening to see if any obstructions are keeping the gate from closing. You can remove the front of the ice transfer bucket to see the bottom of the tank and see the ice shearing gate.
06	Ice Bucket Close Fault <i>Test through Red Lion screen F7</i>	Yes	Ice bucket failed to extend. The bucket should extend smoothly and retract smoothly when manually operated. You can remove the front of the ice transfer bucket to see the bottom of the tank and see the ice shearing gate. This will allow you to see if there are any obstructions blocking the ice transfer bucket from extending.
07	Ice Bucket Open Fault <i>Test through Red Lion screen F7</i>	Yes	Ice bucket failed to retract. The bucket should extend smoothly and retract smoothly when manually operated.



MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy Alarm Errors			
Alarm	Description	Service	Explanation
08	Agitator Rotation Fault <i>Test through Red Lion screen F7</i>	Yes	Agitator failed to rotate during the vend operation or during the timed sequence. Observe the rotation of the sprocket under the ice storage tank. If the sprocket does not rotate then check the motor and gear box for proper operation. If the sprocket does rotate but the ice does not fall when the ice shearing gate is open then you will need to empty the ice tank to observe the blades turning. You can remove the front of the Ice transfer bucket to see the bottom of the tank and see the ice shearing gate. Check to make sure all the bolts are tight and that the keyway is in place.
09	Bag Delivery Fault <i>Test through Red Lion screen F7</i>	Yes	The bag delivery system failed to deliver a bag.
10	Bag Pickup Extend Fault <i>Test through Red Lion screen F7</i>	Yes	The air cylinder failed to extend to pickup an ice bag. The air pressure is set too low or the prox failed to detect the air cylinder movement.
11	Bag Pickup Retract Fault <i>Test through Red Lion screen F7</i>	Yes	The air cylinder failed to retract to pickup an ice bag. The air pressure is set too low or the prox failed to detect the air cylinder movement.
12	Swing Arm Fault <i>Test through Red Lion screen F7</i>	Yes	The air cylinder failed to swing the bag delivery arm. The air pressure is set too low or the prox failed to detect the air cylinder movement.
13	Swing Arm Fault <i>Test through Red Lion screen F7</i>	Yes	The air cylinder failed to swing the bag delivery arm. The air pressure is set too low or the prox failed to detect the air cylinder movement.
14	Bag Pusher Fault <i>Test through Red Lion screen F7</i>	Yes	The bag delivery system failed to deliver a bag. The air pressure is set too low or the prox failed to detect the air cylinder movement.
15	Ice Gate Open Fault <i>Test through Red Lion screen F7</i>	No	Check that the ice gate on the ice vending will open and close properly. This can be caused by a customer sticking their hand in the way when the gate is trying to open. The air pressure is set too low or the prox failed to detect the air cylinder movement.
16	Ice Gate Close Fault <i>Test through Red Lion screen F7</i>	No	Check that the ice gate on the ice vending will open and close properly. This can be caused by a customer sticking their hand in the way when the gate is trying to close. The problem is normally either the air pressure is set too low or the prox failed to detect the air cylinder movement.



MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy Alarm Errors			
Alarm	Description	Service	Explanation
17	Bag Gate Open Fault <i>Test through Red Lion screen F7</i>	No	Bag gate failed to open. This can be caused by a customer sticking their hand in the way when the gate is trying to open. The problem is normally either the air pressure is set too low or the prox failed to detect the air cylinder movement.
18	Bag Gate Close Fault <i>Test through Red Lion screen F7</i>	No	Bag gate failed to close. This can be caused by a customer sticking their hand in the way when the gate is trying to close. The problem is normally either the air pressure is set too low or the prox failed to detect the air cylinder movement.
19	10 lb Push Button Stuck	No	Check operation of 10 lb push button. Make sure it operates properly and replace if it does not.
20	20 lb Push Button Stuck	No	Check operation of 20 lb push button. Make sure it operates properly and replace if it does not.
21	Dispense Push Button Stuck	No	Check operation of the ice dispense push button. Make sure it operates properly and replace if it does not.
22	Machine Out of Service	Yes	This alarm shuts down the machine and will need a manual reset. Press the alarm key to look at the alarm that shows the root cause of the problem.
23	Drain High H2O Fault	Yes	The floor drain is clogged. Please find the obstruction and make sure the floor is drained properly. Please check for possible water leaks that could cause machine to fill with water. If the floor is not flooded then check the float switch for proper operation. Sanitize the machine completely if the floor is flooded.
24	Bag Sequence Fault <i>Test through Red Lion screen F7</i>	Yes	The bag delivery system failed to deliver a bag. Check the bag delivery system.
25	Agitator Sequence Fault <i>Test through Red Lion screen F7</i>	Yes	Agitator failed to rotate during the vend operation or during the timed sequence. Observe the rotation of the sprocket under the Ice storage tank. If the sprocket does not rotate then check the motor and gear box for proper operation. If the sprocket does rotate but the ice does not fall when the ice shearing gate is open then you will need to empty the ice tank to observe the blades turning. Check to make sure all the bolts are tight and that the keyway is in place.



MR. ZIPPY'S ICE & WATER MACHINE

Mr. Zippy Alarm Errors			
Alarm	Description	Service	Explanation
26	Coin Dispense Fault	Yes	The dispenser failed to dispense a coin. Do not remove coin dispenser or hopper from the base unless the power has been turned off. Check the coin dispenser for foreign objects and clean as necessary.
27	Low Ice Detected	Yes	Check the ice storage tank for ice. If the level of ice is less than 12" then this alarm will shut down the machine. Check the ice maker to make sure the ice maker is producing ice. If the ice maker is not producing ice check the water pressure and electricity coming into the ice maker. See the owner's manual on the ice maker for trouble shooting.
28	Low Air Pressure	Yes	Check the air compressor. Also drain the air compressor tank. You should have a minimum of 70 psi.
29	Bag Dispense Alarm <i>Test through Red Lion screen F7</i>	Yes	The bag delivery system failed to deliver a bag. Check the bag delivery system.
30	No Ice Transfer Bucket	Yes	The eyes failed to detect ice in the ice transfer bucket when the ice shearing gate opened. Check to see if there is ice in the tank. Also clean the eyes on the transfer bucket. Check the operation of the eyes to make sure they are operating normally.
31	Conveyor Top Fault <i>Test through Red Lion screen F7</i>	Yes	The conveyor failed to reach the top prox within 5 seconds of running. Check the keyway on the conveyor motor. Also check the top prox for proper operation.
32	Conveyor Bottom Fault <i>Test through Red Lion screen F7</i>	Yes	The conveyor failed to reach the bottom prox within 5 seconds of running. Check the keyway on the conveyor motor. Also check the bottom prox for proper operation.
33	Ice Dispense Push Button	No	Check operation of the ice dispense push button. Make sure it operates properly and replace if it does not.
34	Low Bag Magazine	No	This alarm is displayed when the Red Lion count shows less than 10 bags in inventory. Add Ice bags to bag magazine. Press the button on Red Lion to tell it that you have added bags.
35	Spare	No	
36	Water Vend Alarm	Yes	Water window failed to dispense water for customer. Check water pressure to vend window and check for proper operation.



2. Water Vend

- **Water Tank over flowing?** This is caused by the float switches in the water tank either being stuck or not operating properly. This can also be caused by the toggle switch on front of the RO system being turned on. Check operation of float switches and replace if defective.
- **Customer did not receive the proper amount of water when purchased?** If this happens the computer will refund the money to the customer and shut down that side of the water vending machine. This is normally caused by a clogged water filter on the water vending side. Replace clogged filter and test both vending windows at the same time. You should not see a reduced flow of water when both vending water stations are operating at the same time.
- **Water Tank is empty.** This is caused by the RO system is either not producing any water or is not producing enough water to keep up with demand. Look at the product flow meter on the RO system and see how much water the RO system is producing. The flow meter should show about 1 gpm. If the flow is about 1gpm then the tank should refill and the unit will go back in service. You will need to manually reset the water vend door so that it will start selling water again. If the flow meter indicates very low production such as .2 to .6 gpm then you will need to consult the RO owner's manual and find the cause of low production. Low production rates can be caused by hard water, worn out pumps, clogged membranes, or bad pressure regulators.
- **One water vend window works properly but the other water vend window will not dispense water.** This is caused by the water vend computer shutting down one side because it did not provide the customer with the proper amount of water when purchased. The customer did not lose any money because the computer refunded the money. You will need to reset the computer mounted on the back side of the water vend door. By resetting the computer this will allow you to test the water vend window to see what caused the problem.
- **Water Softener is not producing soft water.** You need to check the hardness of the water coming into the softener. Then check the hardness of the water coming out of the softener. The softener should reduce the water hardness to about 1 grain hardness or less. Make sure the softener is plugged in and is programmed correctly based upon the incoming water hardness. The softener will cycle itself based upon the number of gallons that flows through it. So if the water is very hard and the softener is not programmed properly it will not cycle itself at the proper time. If the softener was unplugged or did not have salt in the brine tank you will need to cycle the softener to allow it to start producing soft water. Please make sure there is adequate salt in the brine tank and then remove the cover on the softener and turn the knob according to the owners manual to cause the softener to go through a cycle. Observe the operation of the softener this will take about 45 -60 minutes to complete a cycle. Refer to the softeners owners' manual for a detailed description on all the steps that the softener goes through. After the softener has gone through a cycle you will need to test the water again for hardness. Since the softener is a dual tank system you might need to cycle both sets of tanks in order to get both tanks recharged and ready to make soft water.
- **Charcoal filter not removing chlorine.** If the charcoal filter is not removing the chlorine you have two choices. Your first choice is to replace the entire carbon filter with all new housing; second choice requires more labor but is less expensive. The second choice is



MR. ZIPPY'S ICE & WATER MACHINE

to remove the filter and just replace the charcoal only. In the owner's manual are detailed instructions on how to accomplish this.

- **Ozone generator not producing ozone.** Check to see if the ozone generator is getting power with a volt meter. The ozone generator should be receiving 9-12 v dc. If it is not receiving the correct power then look to see what wiring may have come loose that would cause no voltage to the Ozone generator. If the ozone generator is receiving the correct electricity and it still is not working then you will need to replace the ozone generator since this is not a repairable item.
- **RO system is producing high TDS (total dissolved solids) water.** The RO system should remove 98-99% of the TDS out of the water. You should first check the incoming TDS of the water and then test the product water coming out to the RO system. If the incoming water is 300 ppm TDS then the RO system will reduce this to 3 to 6 ppm of tds. If your RO system is not producing this quality of water you should check the membranes on your system. The reason membranes go bad is caused by hard water or water that has chlorine in it. Some membranes can be cleaned and returned back to service however a factory trained specialist will need to test the membranes to determine this.
- **RO system not producing enough water.** Your RO system should produce about 1 gpm of product water. If your system is producing about .4 to .6 then you need to check several things. First check to see if your water is soft going into the system. Also check the pressure setting on the regulator and how much water is being rejected. The normal rule is you will reject twice the amount of product water you produce. If you are not rejecting enough water this will cause the membrane to slowly clog up.



MR. ZIPPY'S ICE & WATER MACHINE

Input and Output card listing on Omron CPU

Channel 1 (**Input** located on CPU in Control Panel)

Channel	Description	Normal	Explanation
1.00	side a water being filled	Off	Comes on when side A is dispensing water for income monitoring
1.01	side b water being filled	Off	Come on when side B is dispensing water for income monitoring
1.02	float switch on floor	Off	Float switch mounted under ice tank to detect when floor drain is clogged
1.03	air pressure switch	Off	Senses air pressure from air compressor
1.04	water vending out of service	ON	Turns off when out of service
1.05	agitator VFD drive fault	Off	Signal from VFD to tell CPU there is a problem
1.06	conveyor drive fault	Off	Signal from VFD to tell CPU there is a problem
1.07	ice sensor- thermostat to detect ice	ON	Thermostat mounted on wall with remote probe mounted on ice tank wall

Channel 100 (**Output** located on CPU in Control Panel)

Channel	Description	Normal	Explanation
100.00	ice shear gate open	Off	Turns on to open ice shear gate
100.01	extend ice transfer bucket	Off	Turns on to extend ice transfer bucket
100.02	move swing arm to bag position	Off	Turns on to move swing arm to pick up a bag
100.03	move swing arm to dispense position	ON	This is on to allow the swing arm cylinder to stay in the dispense position
100.04	extend bag pick up cylinder	ON	This is on to allow the bag pickup cylinder to stay in the dispense position
100.05	retract bag pick up cylinder	Off	This turns on to retract bag pick up cylinder
100.06	dispense extend cylinder	Off	This turns on to dispense a bag.
100.07	dispense retract cylinder	Off	This turns on to retract the dispense cylinder.

Channel 101 (**Output** located on CPU in Control Panel)

Channel	Description	Normal	Explanation
101.00	open ice dispense gate	off	Turns on to open ice dispense gate
101.01	open bag dispense gate	off	Turns on to open bag gate
101.02	agitator forward direction	off	Turns on to rotate agitator blades forward.
101.03	agitator reverse direction	off	Turns on to rotate agitator blades reverse direction.
101.04	agitator speed select bit	off	Turns on to allow the agitator blades to start slowly.
101.05	raise conveyor bucket	off	Turns on to raise conveyor bucket.
101.06	lower conveyor bucket	off	Turns on to lower conveyor bucket.
101.07	vacuum motor	off	This turns on to start vacuum motor to pick up ice bag.



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Channel 2008 (Remote **Input** card located in Control Panel)

Channel	Description	Normal	Explanation
2008.00	prox on agitator sprocket	Off or ON	This prox is mounted under the tank to tell CPU the position of the agitator blades
2008.01	prox on upper conveyor	Off	This prox is mounted at the top of the conveyor to tell CPU to stop conveyor motor
2008.02	prox on lower conveyor	ON	This prox is mounted at the bottom of the conveyor to tell CPU that bucket is at home
2008.03	prox on ice transfer bucket extend	Off	This prox tells CPU ice transfer bucket is extended
2008.04	prox on ice transfer bucket retract	ON	This prox tells CPU Ice transfer bucket is retracted
2008.05	prox on ice shear gate extend (closed)	ON	This prox tells CPU that ice shear gate is closed
2008.06	prox on ice shear gate retract (open)	Off	This prox tells CPU that ice shear gate is open
2008.07	eyes on ice transfer bucket detect ice	ON	These eyes tell CPU that the ice did fall into the ice transfer bucket
2008.08	water level switch in water tank	ON	This is the low water switch in the RO tank to detect when tank is empty
2008.09	vacuum switch (bag detect)	Off	This turns on when it detects a vacuum once it grabs a bag
2008.10	prox on bag dispense cylinder extend	Off	Prox on bag dispense cylinder to tell CPU that cylinder is extended
2008.11	prox on bag dispense cylinder retract	Off	Prox on bag dispense cylinder to tell CPU that cylinder is retracted
2008.12	prox on bag pickup cylinder extend	ON	Prox on bag pickup cylinder to tell CPU that cylinder is extended
2008.13	prox on bag pickup cylinder retract	Off	Prox on bag pickup cylinder to tell CPU that cylinder is retracted
2008.14	prox on swing arm cylinder at bag position	Off	Prox on swing arm cylinder to tell CPU that cylinder is at bag pickup position
2008.15	prox on swing arm cylinder at dispense position	ON	Prox on swing arm cylinder to tell CPU that cylinder is at dispense position



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Channel 2009 (Remote **Input** card located on ice door)

Channel	Description	Normal	Explanation
2009.00	10 or 20lb ice bag switch	Off	This switch tells the CPU that customer selected a bag of ice
2009.01	20 lb bulk switch	Off	This switch tells CPU customer selected bulk ice
2009.02	ice dispense switch	Off	This switch tells CPU to open ice dispense gate and deliver ice
2009.03	refund button	Off	Turns on when refund switch is pressed
2009.04	coins delivered from hopper signal	Off	Coin hopper sends a signal for every quarter dispensed
2009.05	prox on bag delivery gate (open)	Off	This prox tells CPU that bag deliver gate is open
2009.06	prox on bag delivery gate (closed)	ON	This prox tells CPU that bag delivery gate is closed
2009.07	prox on ice delivery gate (open)	Off	This prox tells CPU that ice delivery gate is open
2009.08	prox on ice delivery gate (closed)	ON	This prox tells CPU that ice delivery gate is closed
2009.09	ice funnel eyes	ON	These eyes tell CPU when ice is inside the funnel
2009.10		Off	
2009.11	input from bill acceptor	Off	Flashes once for each bill accepted.
2009.12	input from token acceptor	Off	Flashes once for each token accepted
2009.13	input from quarter acceptor	Off	Flashes once for each quarter accepted
2009.14	coin sensor in coin hopper	ON	This sensor tells CPU that you have coins in coin hopper
2009.15	high coin sensor in coin hopper	Off	Turns on when you coin hopper is full

Channel 2001 (Remote **Output** card located on Ice door)

Channel	Description	Normal	Explanation
2001.00	water vending door 24vac power	ON	Always on to allow water vending door to operate.
2001.01		Off	
2001.02	ice plunger cylinder	Off	Turns on to extend ice plunger cylinder
2001.03		Off	
2001.04	coin acceptor power 24vdc	ON	Provides power to coin acceptor
2001.05	bill acceptor power 24vdc	ON	Provides power to bill acceptor.
2001.06	audible horn	Off	Turns on to sound horn
2001.07		Off	
2001.08	display - out of service message	Off	Turns on out of service message
2001.09	display – correct change message	Off	Turns on use correct change message



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2001.10	reset message display	Off	Turns on to reset message display
2001.11	dispense quarter from hopper	Off	Signal to coin hopper to dispense one quarter
2001.12	message- increment coin display	Off	Shows the amount of money deposited by customer
2001.13	message- 10lb bag selected	Off	Turns on to display 10lb bag selected message on display
2001.14	message- 20lb bulk selected	Off	Turns on to display 20lb bulk selected message
2001.15	message – dispense ice	Off	Turns on to display dispense ice message



Reverse Osmosis Manual

System Description

The Reverse Osmosis System is engineered with the best available components on the market to deliver purified water. Years of trouble free service, with little maintenance, can be expected.

SPARKLE REVERSE OSMOSIS UNIT RATINGS

Typical recovery rates and settings for a Sparkle R.O. System are as follows:

System Size	Product Water		Reject Water	
	Minimum GPM	Maximum GPM	Minimum GPM	Maximum GPM
1500 GPD System	.7	.9	1.4	1.5

Never exceed the above listed recovery rates or severe fouling will result and membrane warranty will be void. It is best and most economical to have a high rate of reject water, than to take a chance in damaging membranes by pushing the R.O. unit too hard.

If the unit is not producing the anticipated amount of product water, the following factors can usually be contributing to its failure:

A.TDS (Total Dissolved Solids) above 300 PPM

B.Hard water

If there are any problems, questions, or concerns on setting up this unit contact the company at 1-800-999-9878 or 1-713-683-9878.



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COMPUTER OPERATION DESCRIPTION

PRODUCTION

Computer receives a signal from upper float switch that tank is low on water. If signal is present over 10 seconds the computer will turn on water solenoid valve to production pump. After 10 seconds the computer then determines that if the water pressure is above 20 PSI, to turn on the production pump motor starter. If at any time the computer does not receive a signal from the pressure switch that water pressure is above 20 PSI, then the computer will turn off the production pump.

DELIVERY

Water delivery is accomplished using a re-pressurization pump. This pump monitors the delivery pressure of the water and maintains a constant 60 psi on the system lines. The pump turns on when the pressure drops below the preset amount. Safe guards are in place in the event there is no water available. Power and the run light on the Omron computer must be on for the computer to function properly.



MR. ZIPPY'S ICE & WATER MACHINE

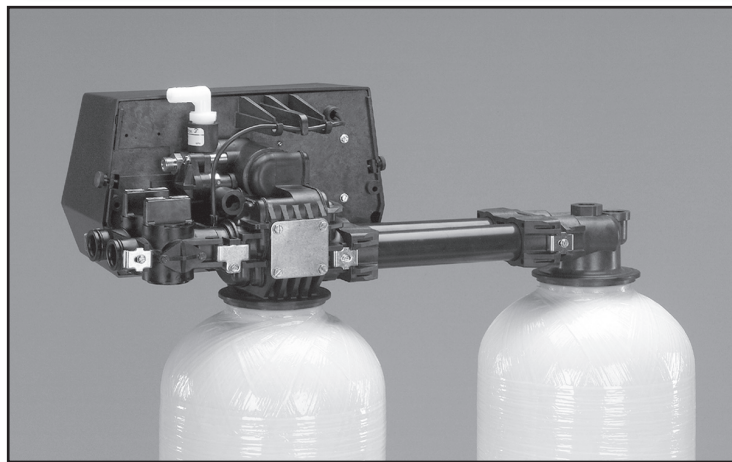
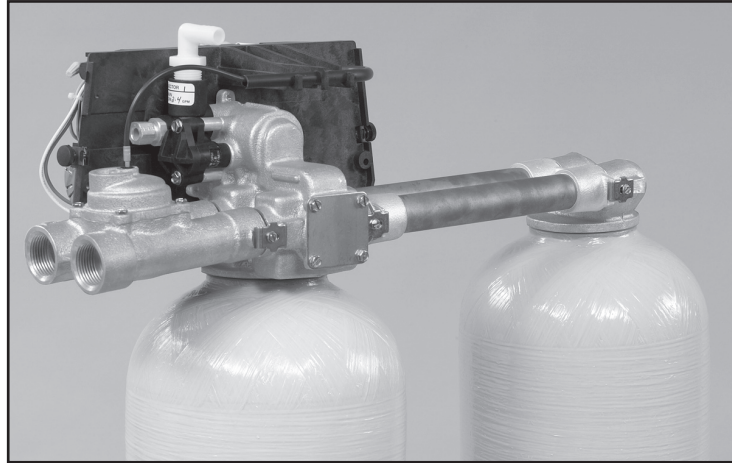
Mr. Zippy's RO Unit

Input/Output Schedule for Troubleshooting the RO system.

NO.	INPUTS	LIGHTS	LIGHT OPERATION
0000	Water Pressure Switch	On	Turns off when pressure is low
0001	Low Water Switch in RO tank	Off	Turns on when Tank Runs Empty
0002	Mid level Switch in RO tank	On	Turns on when Tank needs filling
0003	Upper water Switch in RO tank	Off	Turns off when Tank is full
0004	Air Pressure Switch	Off	Turns on when air pressure is low
0005	RO delivery pressure switch	Off	Turns on when delivery water pressure drops
0006	High TDS input	Off	Turns on when Hi TDS is detected
0007	Signal from Ice PLC	On	Turns off to shut down water side
	OUTPUTS	LIGHTS	LIGHT OPERATION
1000	Fault signal to water door (12vdc)	On	Turns off to stop water operation
1001	Fault signal to Ice PLC (24vdc)	On	Turns off to shut down ice operation
1002	RO Production Pump	Off	Turns on for RO production
1003	Flush solenoid (24vac)	Off	Turns on when flushing
1004	Incoming water sol. (24vac)	Off	Turns on during RO production
1005	Low RO product press lite (24vac)	Off	Turns on when product press is low
1006	Tank Empty lite (24vac)	Off	Turns on when tank is empty
1007	Low incoming water pressure lite (24vac)	Off	Turns on when there is insufficient water pressure for production

Model 9000/9100/9500

Service Manual



IMPORTANT: Fill in Pertinent Information on Page 3 for Future Reference

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IMPORTANT PLEASE READ:

- The information, specifications and illustrations in this manual are based on the latest information available at the time of printing. The manufacturer reserves the right to make changes at any time without notice.
- This manual is intended as a guide for service of the valve only. System installation requires information from a number of suppliers not known at the time of manufacture. This product should be installed by a plumbing professional.
- This unit is designed to be installed on potable water systems only.
- This product must be installed in compliance with all state and municipal plumbing and electrical codes. Permits may be required at the time of installation.
- If daytime operating pressure exceeds 80 psi, nighttime pressures may exceed pressure limits. A pressure reducing valve must be installed.
- Do not install the unit where temperatures may drop below 32°F (0°C) or above 125°F (52°C).
- Do not place the unit in direct sunlight. Black units will absorb radiant heat increasing internal temperatures.
- Do not strike the valve or any of the components.
- Warranty of this product extends to manufacturing defects. Misapplication of this product may result in failure to properly condition water, or damage to product.
- A prefilter should be used on installations in which free solids are present.
- In some applications local municipalities treat water with Chloramines. High Chloramine levels may damage valve components.
- Correct and constant voltage must be supplied to the control valve to maintain proper function.

Job Specification Sheet

Job Number: _____

Model Number: _____

Water Test: _____

Capacity Per Unit: _____

Mineral Tank Size: _____ Diameter: _____ Height: _____

Brine Tank Size & Salt Setting per Regeneration: _____

9000/9100/9500 Control Valve Specifications:

1. **Type of Timer:**

- A. 82 minute available regeneration time, 1/15 RPM
- B. 164 minute available regeneration time, 1/30 RPM

2. **Type of Meter:**

Mechanical Valves (Gallon Settings)

Meter	Standard Range	Extended Range
3/4"	125 - 2,125	625 - 10,625
1"	310 - 5,270	1,150 - 26,350
1-1/2"	625 - 10,625	3,125 - 53,125

3. Timer Gallon Setting: _____ Gallons

4. Regeneration Program Setting:

A. Backwash: _____ Minutes

B. Brine and Slow Rinse: _____ Minutes

C. Rapid Rinse: _____ Minutes

D. Brine Tank Refill: _____ Minutes

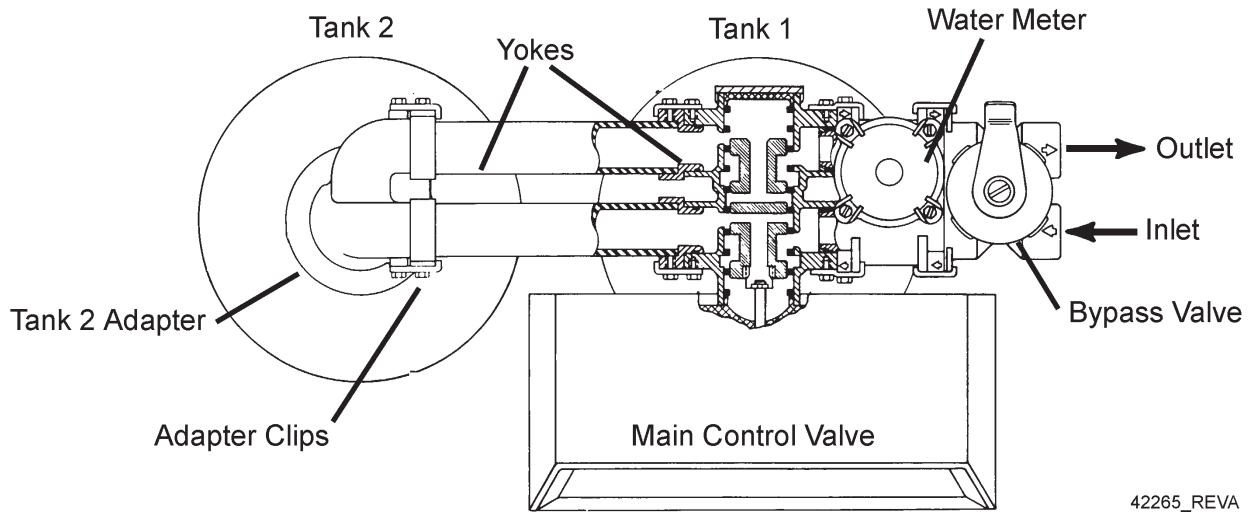
5. Drain Line Flow Control: _____ gpm

6. Brine Refill Rate: _____ gpm

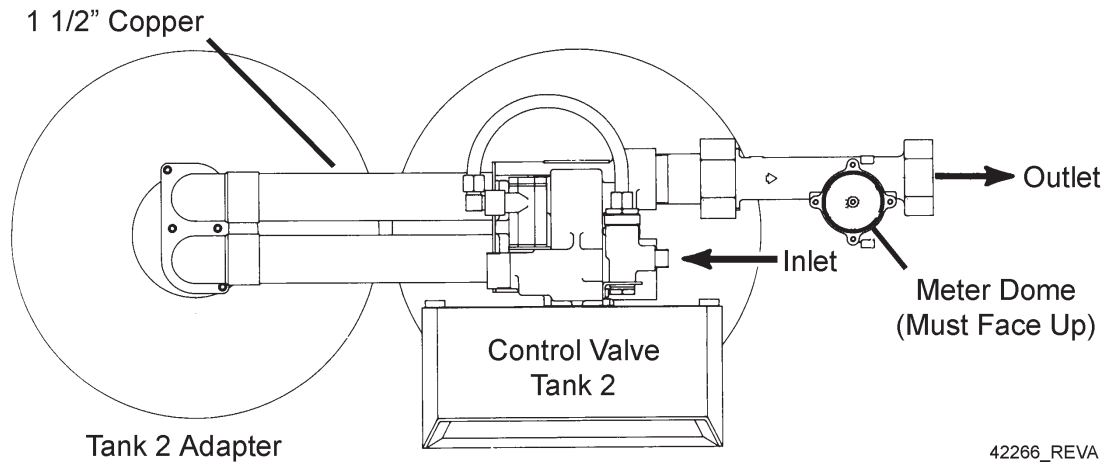
7. Injector Size: _____

Equipment Configuration

9000/9100 Equipment Configuration



9500 Equipment Configuration



General and Commercial Installation Checklist

1. Place the softener tank where you want to install the unit.
NOTE: Be sure the tank is level and on a firm base.
2. During cold weather it is recommended that the installer warm the valve to room temperature before operating.
3. Perform all plumbing according to local plumbing codes.
 - Use a 1/2" minimum pipe size for the drain.
 - Use a 3/4" drain line for backwash flow rates that exceed 7 gpm or length that exceeds 20' (6 m).
4. Both tanks must be the same height and diameter and filled with equal amounts of media.
5. The distributor tube must be flush with the top of each tank. Cut if necessary. Use only non-aerosol silicone lubricant.
6. Lubricate the distributor o-ring seal and tank o-ring seal. Place the main control valve on one tank and the tank adapter on the second tank.
NOTE: If required, solder copper tubing for tank interconnection before assembling on the main control valve and tank adapter. Maintain a minimum of 1" distance between tanks on final assembly.
7. Solder joints near the drain must be done before connecting the Drain Line Flow Control fitting (DLFC). Leave at least 6" (152 mm) between the DLFC and solder joints when soldering pipes that are connected on the DLFC. Failure to do this could cause interior damage to DLFC.
8. Use only Teflon tape on the drain fitting.
9. Be sure the floor under the salt storage tank is clean and level.
10. Place approximately 1" (25 mm) of water above the grid plate. If a grid is not utilized, fill to the top of the air check in the salt tank. Do not add salt to the brine tank at this time.
11. On units with a bypass, place in Bypass position.
 - Turn on the main water supply.
 - Open a cold soft water tap nearby and let water run a few minutes or until the system is free of foreign material (usually solder) resulting from the installation. Close the water tap when water runs clean.
12. Place the bypass In Service position and let water flow into the mineral tank. When water flow stops, slowly open a cold water tap nearby and let water run until air is purged from the unit. Then close tap.

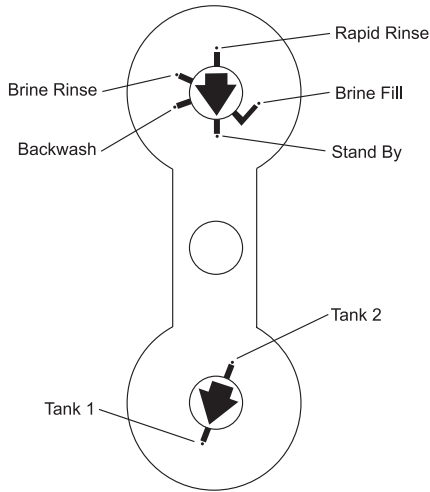
Electrical

13. Make all electrical connections according to codes. Plug the valve into an approved power source. Do not insert meter cable into the meter yet.
14. Tank one has control valve and tank two has adapter.
15. Look on the right side of the control valve, it has indicators showing which position the control valve is in during Regeneration and which tank is In Service.

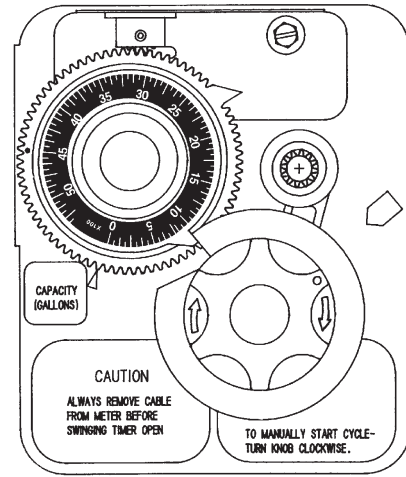
NOTE: Make sure the meter cable is not inserted in the meter dome. Swing the timer out to expose the program wheel (to swing timer out) grab onto the lower right corner of timer face and pull outward.

General and Commercial Installation Checklist

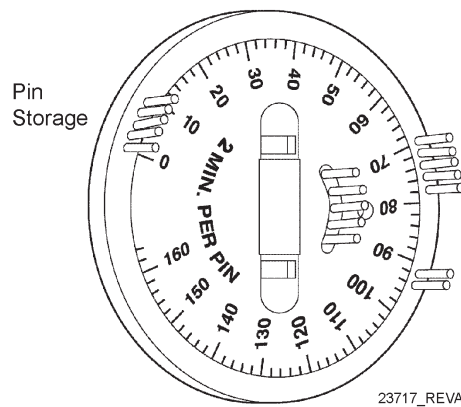
Control Valve Position Indicators



Timer



Program Wheel



16. Cycle timer into backwash position. Turn manual knob so that the micro switch rides on the first set of pins.
 - In this position the tanks switch (lower piston) and the control valve moves to the backwash position (upper piston).
 - Wait until the positioning of upper and lower pistons stops before advancing the timer further. If advanced too fast the control will not home into the In Service position (it will not advance to any other position). To correct this, rotate the manual knob back to In Service and start again into backwash.
- NOTE:** Once valve positions itself into the backwash cycle, the homing circuit locks in.
17. With all the air backwashed, slowly cycle the timer to the brine position; rapid rinse; and brine tank refill. Wait for the control drive motor to position itself in each cycle and stop, before advancing on to the next position.
18. Once back in the In Service position, cycle the control valve again into the backwash position. The tanks switch again, and air head backwashes out of the other tank. Cycle the control back to the In Service position. Leave the timer in the open position. **DO NOT** insert meter cable yet.

NOTE: Two motors are available.
1/15 RPM has 82 minute regeneration time.
1/30 RPM has 164 minute regeneration time.

General and Commercial Installation Checklist

WATER PRESSURE: A minimum of 25 pounds of water pressure is required for regeneration valve to operate effectively.

ELECTRICAL FACILITIES: A continuous 115 volt, 60 Hertz current supply is required. Make certain the current supply is always hot and cannot be turned off with another switch.

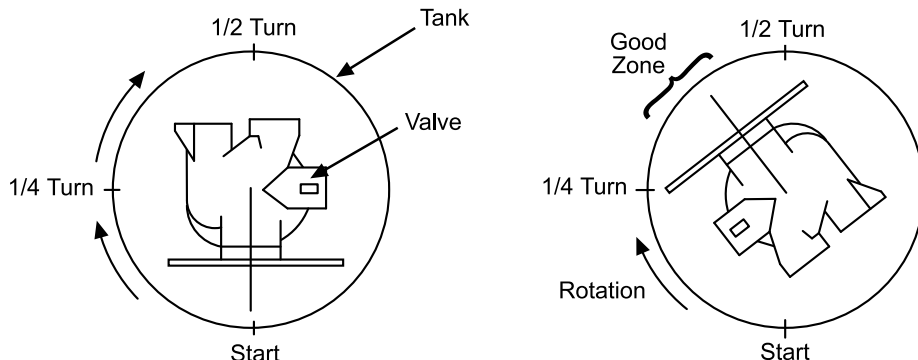
EXISTING PLUMBING: Condition of existing plumbing should be free from lime and iron buildup. Piping that is built up heavily with lime and/or iron should be replaced. If piping is clogged with iron, a separate iron filter unit should be installed ahead of the water softener.

LOCATION OF SOFTENER AND DRAIN: The softener should be located close to a drain.

BY-PASS VALVES: Always provide for the installation of a by-pass valve.


Valve to Tank Installation Instructions

1. Spin the valve onto the tank, ensuring the threads are not cross-threaded.
NOTE: All Fleck® valves are right-hand threads, or clockwise, to install
2. Rotate the valve freely without using force until it comes to a stop (this position is considered zero).
3. Rotate the valve clockwise from zero, between ¼ turn and ½ turn (see the diagram below).



NOTE: If lubricant is required, a silicone compound is strongly recommended. Dow Corning® Silicone Compound (available from Fleck®), is recommended for best possible results. Dow Corning® 7 Release Compound is used in the manufacture of Fleck® control valves. The use of other types of lubricants may attack the control's plastic or rubber components. Petroleum-based lubricants can cause swelling in rubber parts, including o-rings and seals.

Part No.	Description
16174	Silicone, 2 oz Tube
16586-8	Silicone, Dow #7 8 LB

	CAUTION <ul style="list-style-type: none">• Do Not Exceed Water Pressure of 125 psi.• Do Not Exceed 110° F.• Do Not Subject Unit to Freezing Conditions.
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Regeneration Cycle Program Setting Procedure

Setting the Regeneration Cycle Program

The Regeneration cycle program on the water conditioner is preset at the factory. However, portions of the cycle or program time may be lengthened or shortened for local conditions or system design.

1. Expose cycle program wheel by grasping timer in lower right hand corner and pulling. This releases snap retainer and swings timer to the left
NOTE: Meter cable must be removed from meter dome before opening timer.
2. Remove the program wheel by grasping program wheel and squeezing protruding lugs towards center. Lift program wheel off timer.
 - Switch arms may require movement to facilitate removal.
3. Return timer to closed position by engaging snap retainer in back plate.
 - Make certain all electrical wires locate above snap retainer post.

Changing Length of the Backwash Time

Looking at the numbered side of the program wheel, the group of pins starting at zero determines the length of time the unit backwashes.

Example: If there are six pins in this section, the time of backwash is 12 minutes (2 minutes per pin). To change the length of backwash time, add or remove pins as required.

- The number of pins multiplied by two equals minutes of backwash.

Changing Length of Brine and Rinse Time

The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that a unit will brine and rinse (2 minutes per hole).

To change the length of brine and rinse time, add or remove pins in the rapid rinse group of pins to increase or decrease the number of holes in the brine and rinse section.

- The number of holes multiplied by two equals minutes of brine and rinse.

Changing Length Of Rapid Rinse

The second group of pins on the program wheel determines the length of time the water conditioner rapid rinses (2 minutes per pin). To change the length of rapid rinse time, add or remove pins at the higher numbered end of this section as required.

- The number of pins multiplied by two equals minutes of rapid rinse.

NOTE: Program wheels with 0–82 minute cycle times, use one minute per pin or hole to set Regeneration times. The layout of pins and holes on the program wheel follow the same procedure as on this page.

Changing Length of Brine Tank Refill Time

The second group of holes on the program wheel determines the length of time the water conditioner refills the brine tank (2 minutes per hole).

To change the length of refill time, move the two pins at the end of the second group of holes as required.

The Regeneration cycle is complete when the two pin set at end of the brine tank refill section trips the outer micro-switch. The program wheel, however, continues to rotate until the inner micro-switch drops into the notch on the program wheel.

Programming

1. The control valve is set at the factory for backwash; brine and slow rinse; rapid rinse and brine tank fill times. Change any of these times by repositioning the pins and holes or adding more pins.

NOTE: Two speed timer motors are available

1/15 RPM has 82 minute Regeneration Time and each pin or hole equals one minute.

1/30 RPM has 164 minute Regeneration Time and each pin or hole equals two minutes.

Time Brine Refill and Meter Setting Procedure

2. The control valve has a separate brine tank fill cycle.
- Calculate the desired salt setting using the brine line flow control rate of refill (in gpm) multiplied by the timer setting. Then, using one gallon of fresh water dissolving approximately 3 lbs salt, calculate the refill time.

Example: A desired 30 lbs salt setting:

The unit has a 1.0 gpm refill rate so a 10 gallon fill is required.

$$10 \text{ gallons} \times 3 \text{ lbs/gals} = 30 \text{ lbs salt}$$

Set the timer refill section at 10 minutes.

$$10 \text{ minutes} \times 1.0 \text{ gpm} = 10 \text{ gallon fill}$$

NOTE: There must always be two pins at the end of a refill time to stop the fill cycle. With the Regeneration times set, place timer back to its original position, making sure the lower right hand corner snaps back into the backplate and the meter cable slides through the backplate and does not bind.

3. Setting the gallon wheel.

Knowing the amount of resin in each tank and the salt setting per Regeneration, calculate the gallons available, using the following capacities as a guide:

$$\frac{(\text{capacity per ft}^3 \times \text{ft}^3 \text{ of resin per tank})}{\text{compensated hardness of H}_2\text{O}} = \text{gallons available}$$

NOTE: Based on tank size:

More resin increases capacity, less resin decreases capacity.

More salt increases capacity, less salt decreases capacity.

Example:

Tank Diameter	=	16"
Compensated Hardness	=	35 grains per gallon (tested sample)
ft ³ Resin (based on flow rate)	=	4
lbs of Salt	=	8
Capacity per ft ³	=	24,000

$$\frac{(24,000 \times 4 \text{ ft}^3 \text{ of resin per tank})}{35 \text{ grains}} = 2,740 \text{ gallons available before regeneration}$$

DO NOT SET THIS FIGURE - GO TO STEP 4

- Because the control valve regenerates with soft water from the other tank, subtract the water used for regeneration. Take each regeneration cycle and calculate the water used.

Example: Unit is set for a 16" diameter tank with 4 ft³ of resin and salted at 8 lbs. per ft³, 7 gpm backwash, #3 injector, 1.0 gpm brine refill, and 60 psi and timer set for 10 min. backwash, 60 min. brine and rinse, 10 min. rapid rinse, 10 min. brine tank fill.

Backwash	10 minutes x 7.0 gpm =	70.0 gallons
Brine and Rinse	60 minutes x 1.0 gpm =	60.0 gallons
Rapid Rinse	10 minutes x 7.0 gpm =	70.0 gallons
Brine Tank Fill	10 minutes x 1.0 gpm =	10.0 gallons
Total Regeneration Water =		210.0 gallons

With the 2740 gallons available calculated in Step 3, subtract the Regeneration water used from the total water available.

2740 gallons available - 210 gallons used = 2530 gallons
(in Regeneration, Step 4)

Time Brine Refill and Meter Setting Procedure

4. Set meter wheel at approximately 2530 gallons. Lift the inner dial of the meter program wheel so that you can rotate it freely. Position the white dot opposite the 2530 gallon setting.

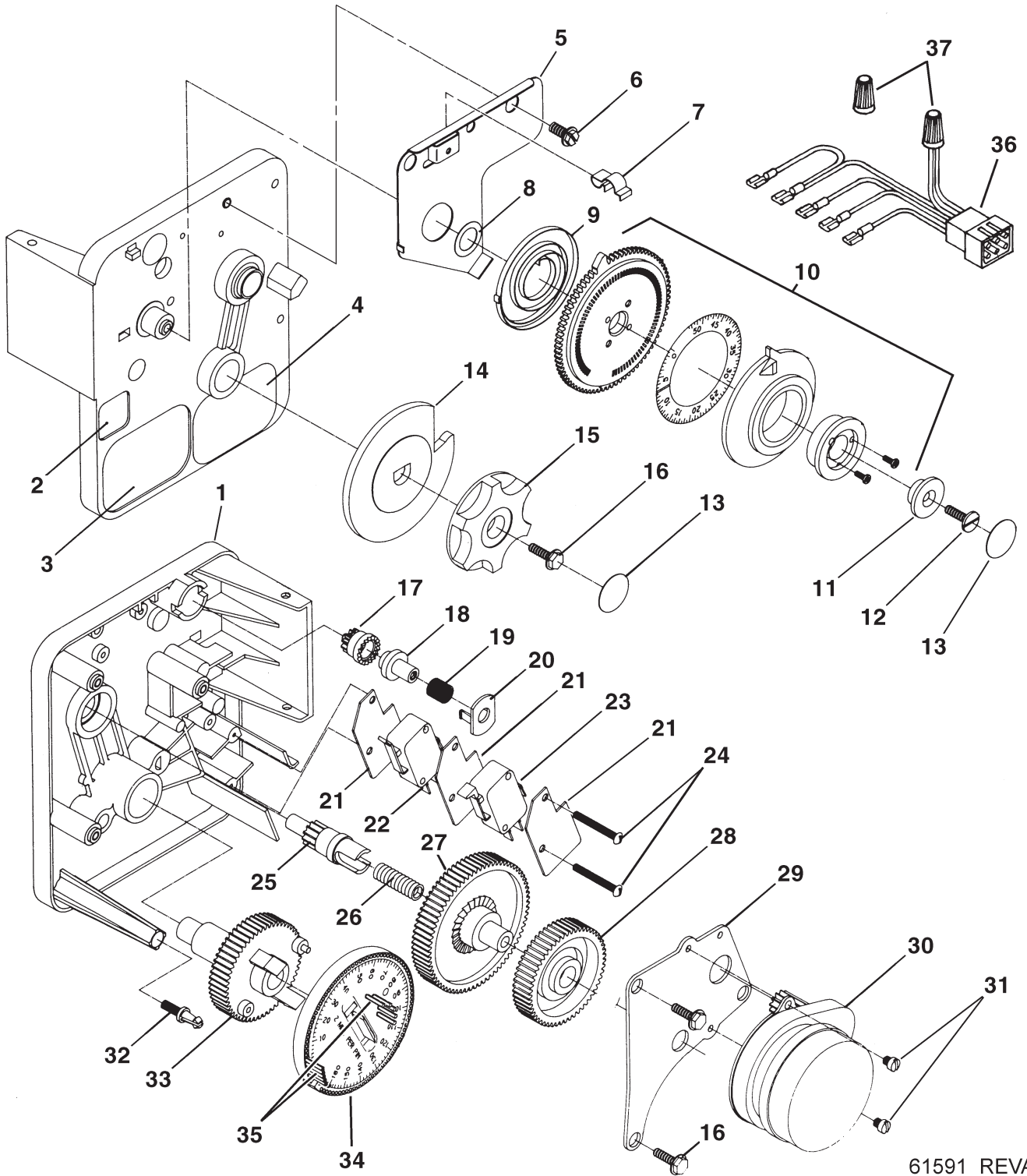
NOTE: There is a slight delay between the time the meter zeros out and the cycle starts. Units using the:
1/15 RPM motor, 82 minute Regeneration Time has a 9 minute delay
1/30 RPM motor, 180 minute Regeneration Time has an 18 minute delay.

NOTE: This delay period is not critical on residential equipment. However, take this factor into consideration for commercial applications by subtracting continuous flows for 9 minutes or 18 minutes from water available.

5. Insert meter cable into meter.
6. Check bypass.
7. Plug in unit.

9000/9100/9500 (3200 Series)

Electro Mechanical Timer Assembly



61591_REVA

For Service Assembly Numbers, See the Back of this Manual

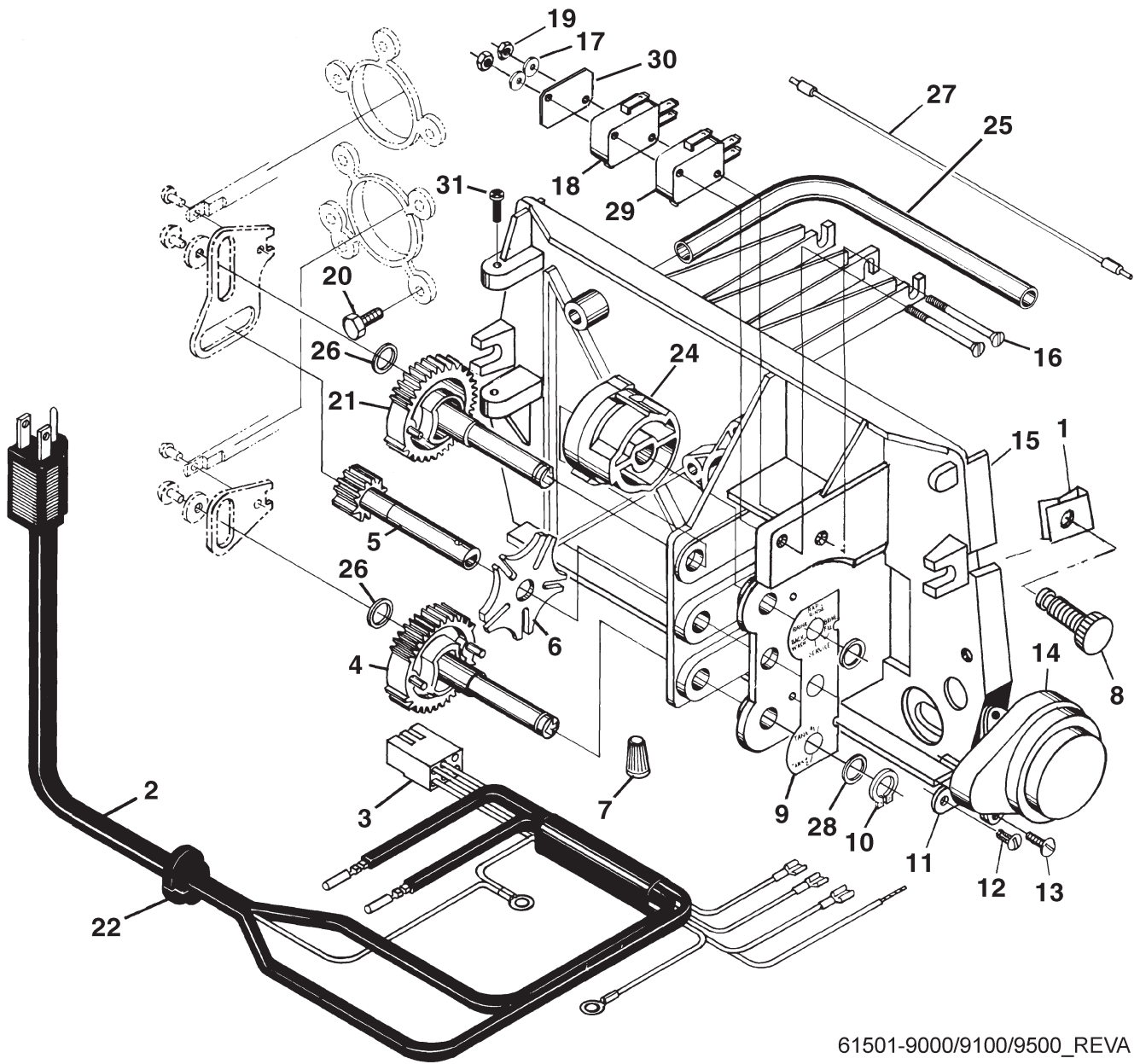
9000/9100/9500 (3200 Series)

Electro Mechanical Timer Assembly

Item No.	Quantity	Part No.	Description
1.....	1.....	13870-03.....	Housing, Timer, 9000
2.....	1.....	17870.....	Label, Indicator, 9000 Timer
3.....	1.....	15465.....	Label, Caution
4.....	1.....	16930.....	Label, Instruction
5.....	1.....	15227.....	Plate, Clutch, Actuator
6.....	1.....	10300.....	Screw, Slot Hex Wsh, 18-8 x 3/8
7.....	1.....	17513.....	Clip, Spring
8.....	1.....	15407.....	Washer, Plain, #4
9.....	1.....	15228.....	Spring, Return
10.....	1.....	16270-10.....	Program Wheel Assy, 9000 3/4
		16270-50.....	Program Wheel Assy, 9000/9500
		16270-30.....	Program Wheel Assy, 9000, 1" Std
		16270-40.....	Program Wheel Assy, 9000, 1" Ext
		16270-50.....	Program Wheel Assy, 9000/9500
		16270-60.....	Program Wheel Assy, 9500
11.....	1.....	13806.....	Retainer, Program Wheel
12.....	1.....	13748.....	Screw, Flt Hd St, 6-20 x 1/2
13.....	2.....	11999.....	Label, Button
14.....	1.....	15223.....	Actuator, Cycle
15.....	1.....	13886.....	Know, 3200
16.....	4.....	13296.....	Screw, Hex Wsh, 6-20 x 1/2
17.....	1.....	17724.....	Program Wheel, Pinion Drive
18.....	1.....	17723.....	Clutch, Drive Pinion
19.....	1.....	14276.....	Spring, Meter Clutch
20.....	1.....	14253.....	Retainer, Clutch Spring
21.....	3.....	14087.....	Insulator
22.....	1.....	15314.....	Switch, Micro, Modified
23.....	1.....	15320.....	Switch, Micro, Timer
24.....	2.....	11413.....	Screw, Pan Hd Mach, 4-40 x 1 1/8
25.....	1.....	13018.....	Pinion, Idler
26.....	1.....	18563.....	Spring, Idler Shaft
27.....	1.....	13017.....	Gear, Idler
28.....	1.....	13164.....	Gear, Drive
29.....	1.....	13887.....	Plate, Motor Mounting
30.....	1.....	18743.....	Motor, 120V, 60 Hz 1/30 RPM, 5600
		18824-1.....	Motor, 230V, 50 Hz 1/30 RPM
		19170.....	Motor, 120V 60 Hz 1/15 RPM
		18825.....	Motor, 230V, 50 Hz 1/15 RPM Mallory
31.....	2.....	13278.....	Screw, Phil Hd Mach, 6-32 x 1/8 Steel Zinc
32.....	1.....	14265.....	Clip, Spring
33.....	1.....	15055.....	Timer, Main Drive Gear
34.....	1.....	19210-02.....	Program Wheel Assy, 9000 1/15
		19210-05.....	Program Wheel Assy, 9000/3230
35.....	23.....	15493.....	Pin, Spring, 1/16 x 5/8 SS
36.....	1.....	15203.....	Harness, 9000/9500, Timer
37.....	2.....	40422.....	Nut, Wire, Tan
Not Shown ...	1.....	60320-02.....	Switch Kit, 3200/9000 Timer Auxiliary

For Service Assembly Numbers, See the Back of this Manual

Power Head Assembly



61501-9000/9100/9500_REVA

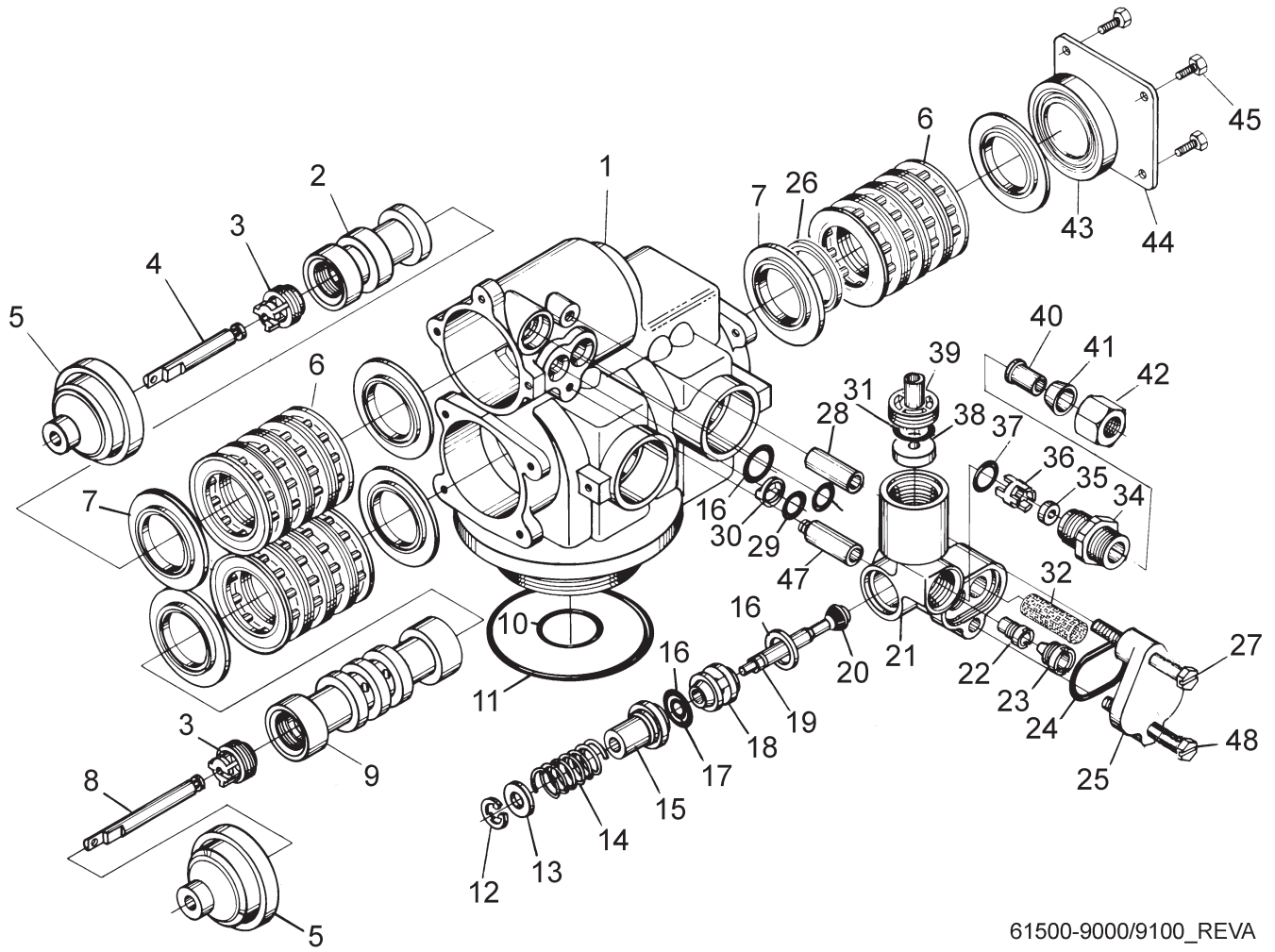
For Service Assembly Numbers, See the Back of this Manual

Power Head Assembly

Item No.	Quantity	Part No.	Description
1	2	18728	Nut, Tinnerman, U Type, 8-32
2	1	11838	Power Cord, 6' Fleck
		11839	Power Cord, 12' Fleck
		40084-12	Power Cord, 12' U.S., Round, 120V Sys 5, 6, 7 & 2900/3150/3900 #4
		11545-01	Power Cord Assy, 4' Black, Euro w/Terminals
		14678	Power Cord, U.S., 220/60
		19303-01	Power Cord Assy, Australian w/Terminals
		40085-12	Power Cord, 12' US, Round, 240V
		19674	Transformer, 24V, 9.6VA Residential Valves
		41475	Transformer, 24V, 9.6VA, European
3	1	15202	Harness, 9000/9500, Drive
		14822	Harness, 2900
		40041-06	Harness, Low V, 9000/9500
4	1	15134	Gear Assy, Drive, 1/2" Stroke 9000/9500
5	1	15135	Gear, Drive, 9000
6	1	14896	Wheel, Geneva
7	2	40422	Nut, Wire, Tan
8	2	19367	Screw, Designer Cover, Thumb 8-32 Blank UV Stable Material
9	1	15175	Label, Shaft Position
10	2	14917	Ring, Retaining
11	1	15199	Plate, Ground, 9000/9500
12	1	14430	Screw, Hex Wsh St, 6 x 1/4 Type "B"
13	2	19160	Screw, Phil Pan, Thread 6-32 x 3/8 Type 23 Zinc
14	1	18737	Motor, 24V, 50/60 Hz, 1 RPM
		18738	Motor, 120V, 50/60 Hz 1 RPM
		18739	Motor, 220V, 50/60 Hz 1 RPM
15	1	15131	Backplate, 9000
		17784-05	Panel, Control, 9000/9500 ET
16	2	15172	Screw, Flt Hd Mach, 4-40 x 1 3/8 Steel Zinc Plate
17	2	10340	Washer, Lock #4, Zinc
18		10218	Switch, Micro
19	1	10339	Nut, Hex, 4-40 Zinc Plated
20	1	15331	Screw, Hex Wsh Mach, 10-24 x 3/4 410 S.S.
21	2	15133	Gear Assy, Drive, 3/4" Stroke
22	1	13547	Strain Relief, Flat Cord Heyco #30-1
23	1	15810	Ring, Retaining
24	1	15132	Cam, Triple
		17331	Cam, 9500
		17765	Cam Assy, Aux Switch, 9500
25	1	15368	Tube, Cable Guide, 2-Tank
		17337	Tube, Cable Guide, 9500
26	2	15372	Washer, Thrust, 3/8
27	1	15216	Meter Cable Assy, 15.25"
		15425	Meter Cable, 13.25"
		17744	Meter Cable Assy, 20.75" 1 1/2" Std
		19121-01	Meter Cable Assy, SE, Paddle 6600/6700
		19121-05	Meter Cable Assy, ET, 28" 2750/3150 Systemax 4-6
		19791-01	Meter Cable Assy, Turbine/SE
28	2	15692	Washer, Plain, 3/8"
29	1	16433	Switch, Miniature
30	1	10302	Insulator, Limit Switch
31	2	15173	Screw, Slot Rd Hd Mach, 5-20 x 3/8
		Not Shown	
	1	60232-110	Cover, Designer, 1 Pc Black
	1	60232-112	Cover, Designer, 1 Pc Black w/Left Window
	1	60320-09	Switch Assy, 9000, Drive Cam
	1	60320-10	Switch Assy, 9500, Drive Cam

For Service Assembly Numbers, See the Back of this Manual

9000 Control Valve Assembly



61500-9000/9100_REVA

For Service Assembly Numbers, See the Back of this Manual

9000 Control Valve Assembly

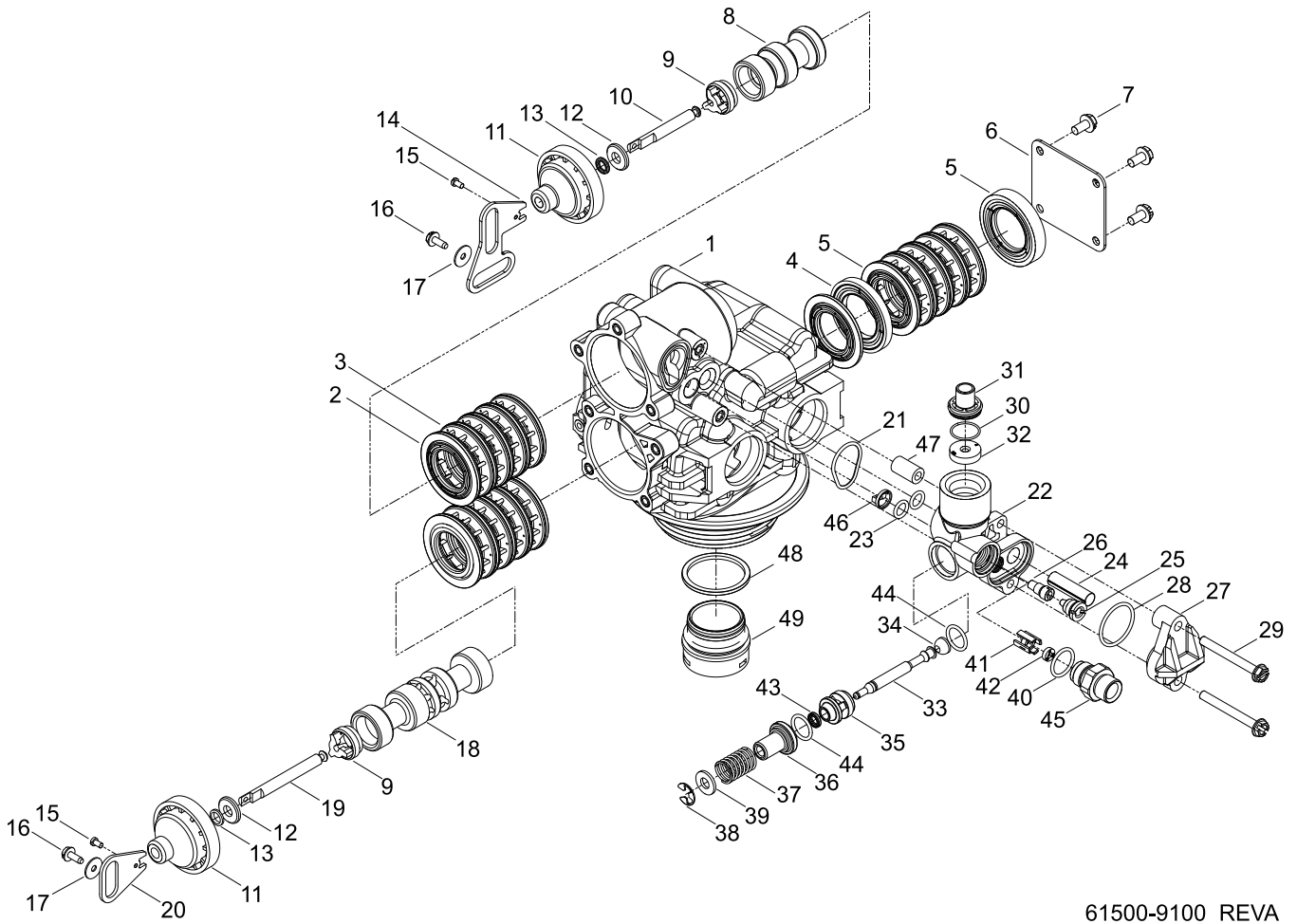
Item No.	Quantity	Part No.	Description
1	1	14861-01	Valve Body, 9000, Machined w/O-ring
		40688	Valve Body, 9100
2	1	14914	Piston, 9000, Upper
3	2	14309	Retainer, Piston Rod
		16590	Retainer, Piston Rod
4	1	14919	Rod, Piston, Upper
5	2	13446	End Plug Assy, White
		13446-01	End Plug Assy, White, HW
6	12	14241	Spacer, 5600
		14241-01	Spacer, Hot Water
7	16	13242	Seal, 5600
		18759	Seal, 5600 Low Drive Force
8	1	14920	Rod, Piston, Lower, 9000
9	1	14905	Piston, 9000
10	1	11710	O-ring, -215
11	1	12281	O-ring, -338
12	1	11981-01	Ring, Retaining
13	1	16098	Washer, Nylon Brine
14	1	11973	Spring, Brine Valve
15	1	13165	Cap, Brine Valve
16	3	13302	O-ring, -014
17	1	12550	Quad Ring, -009
18	1	13167	Spacer, Brine Valve
19	1	14925	Brine Valve Stem, 9000
20	1	12626	Seat, Brine Valve
21	1	15215	Body, Injector, 9000
22	1	10914-X	Injector Throat - Specify Size
23	1	10913-X	Injector Nozzle - Specify Size
		10225-X	Injector Nozzle, SS
24	1	13303	O-ring, -021
25	1	13166	Cap, Injector, 5600
26	1	16595	Spacer, 9000
27	1	13387	Screw, Hex Hd Mach, 10-24 x 1 3/4
28	1	13361	Spacer, 4650/9000
29	2	13301	O-ring, -011, Injector
30	1	13497	Disperser, Air, 5600
31	1	15348	O-ring, -563
32	1	10227	Screen, Injector
34	1	13244	Adapter, BLFC
35	1		Button, BLFC - Specify Size
36	1	13245	Retainer, BLFC
		12977	O-ring, -015
38	1		Button, DLFC - Specify Size
39	1	13173	Retainer, DLFC Button
40	1	10332	Fitting, Insert, 3/8
		15415*	Fitting, Insert, 1/2" Tube
41	1	10330	Fitting, Sleeve, 3/8 Celcon
		16124*	Fitting, Sleeve, Delrin
42	1	10329	Fitting, Tube, 3/8 Nut, Brass
		16123*	Nut, Brass
43	1	14928	Plug, End Stub, 9000
44	1	14906	Plate, End, 9000
45	4	15137	Screw, Hex Wsh Mach 10-24 x 3/8
47	1	13387	Screw, Hex Hd Mach, 10-24 x 1 3/4
		13361	Spacer, 4650/9000
48	1	13315	Screw, Hex Wsh Hd, 10-24 x 1 3/16
Not Shown	1	16140	Fitting, 1/2T x 1/4 NPT

NOTE: For Hot Water delete items 41 & 42 and use 18698 (Nut, 3/8 Tube, w/Sleeve) and 15414 (Nut, 2900, w/Sleeve)

*These parts are used with #4 injector and 2 GPM or larger BLFC (Items 34, 35, and 36 are not used).

For Service Assembly Numbers, See the Back of this Manual

9100 Control Valve Assembly



61500-9100_REVA

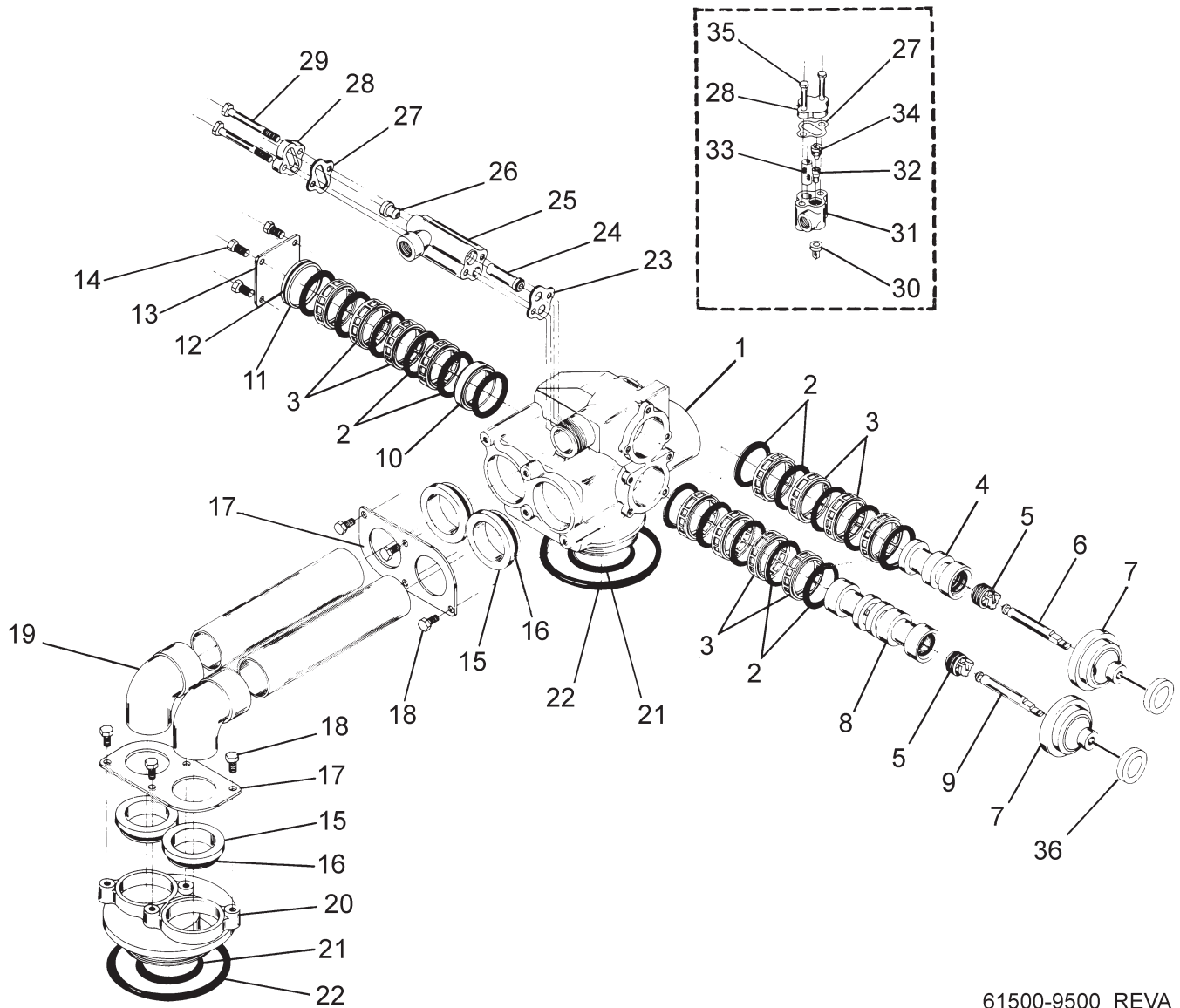
For Service Assembly Numbers, See the Back of this Manual

9100 Control Valve Assembly

Item No.	Quantity	Part No.	Description
1.....	1.....	40688.....	Valve Body Assy, 9100
2.....	16.....	13242.....	Seal, 5600
3.....	12.....	14241.....	Spacer, 5600
4.....	1.....	16595.....	Spacer, 9000
5.....	1.....	14928.....	Plug, End Stub, 9000
6.....	1.....	14906.....	Plate, End, 9000
7.....	4.....	15137.....	Screw, Hex Wsh Mach, 10-24 x 3/8
8.....	1.....	14914.....	Piston, 9000, Upper
9.....	2.....	14309.....	Retainer, Piston Rod
10.....	1.....	14919.....	Rod, Piston, Upper
11.....	2.....	13243.....	Plug, End, 5600
12.....	2.....	13008.....	Retainer, End Plug Seal
13.....	2.....	10209.....	Quad Ring, -010
14.....	1.....	14921.....	Link, Piston Rod
15.....	2.....	11335.....	Screw, Slot Phil Hd, 4-40 x 3/16
16.....	2.....	17020.....	Screw, Slot Ind Hex, 6-20 x 3/8
17.....	2.....	13363.....	Washer, Plain, .145 ID SS
18.....	1.....	14905.....	Piston, 9000
19.....	1.....	14920.....	Rod, Piston, Lower, 9000
20.....	1.....	15019.....	Link, Piston Rod, 9000/9500
21.....	1.....	41500.....	O-ring, Drain, 9100
22.....	1.....	15215.....	Body, Injector, 9000
23.....	2.....	13301.....	O-ring, -011, Injector
24.....	1.....	10227.....	Screen, Injector
25.....	1.....	10913-1.....	Nozzle, Injector, #1, White
26.....	1.....	10914-1.....	Throat, Injector, #1, White
27.....	1.....	13166.....	Cap, Injector, 5600
28.....	1.....	13303.....	O-ring, -021
29.....	2.....	13387.....	Screw, Hex Hd Wash, 10-24 x 1 3/4
30.....	1.....	15348.....	O-ring, -563
31.....	1.....	13173.....	Retainer, DLFC Button
32.....	1.....	12085.....	Washer, Flow, 1.2 GPM
33.....	1.....	14925.....	Brine Valve Stem, 9000
34.....	1.....	12626.....	Seat, Brine Valve
35.....	1.....	13167.....	Spacer, Brine Valve
36.....	1.....	13165.....	Cap, Brine Valve
37.....	1.....	11973.....	Spring, Brine Valve
38.....	1.....	11981-01.....	Ring, Retaining
39.....	1.....	16098.....	Washer, Nylon Brine
40.....	1.....	12977.....	O-ring, -015
41.....	1.....	13245.....	Retainer, BLFC
42.....	1.....	129095.....	Washer, Flow, .50 GPM
43.....	1.....	12550.....	Quad Ring, -009
44.....	2.....	13302.....	O-ring, -014
45.....	1.....	13244.....	Adapter, BLFC
46.....	1.....	13497.....	Dispenser, Air, 5600
47.....	1.....	13361.....	Spacer, 4650/9000/WCC
48.....	1.....	40538.....	Retainer, 32mm, O-ring Dist, 7000
49.....	1.....	61419.....	Kit, 1.05" Distributor, Adapter
Not Shown.....	1.....	13333.....	Label, Injector, Blank
Not Shown.....	1.....	10759.....	Label, .5 GPM, 1.5 LBS Salt/Min

For Service Assembly Numbers, See the Back of this Manual

9500 Control Valve Assembly



61500-9500_REVA

For Service Assembly Numbers, See the Back of this Manual

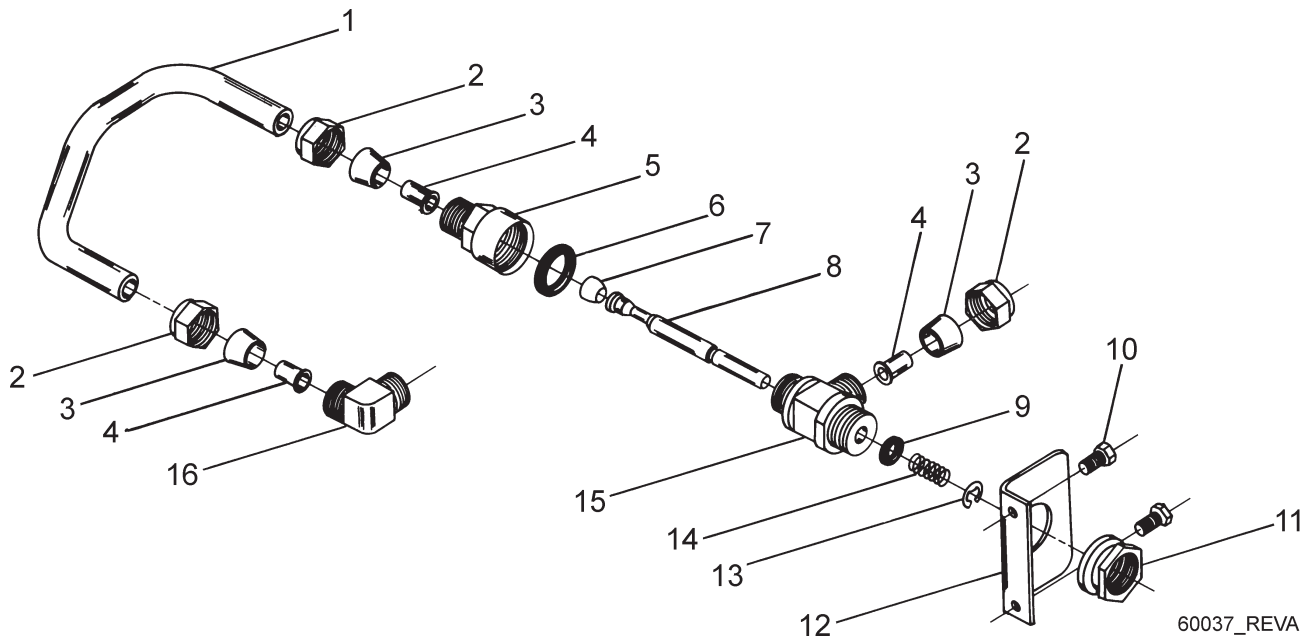
9500 Control Valve Assembly

Item No.	Quantity	Part No.	Description
1.....	1.....	16919-01.....	Valve Body, 9500 Machd
2.....	16.....	16101.....	Seal, 2850
3.....	12.....	16638.....	Spacer, 9500/2850
4.....	1.....	17110.....	Piston, 9500, Upper
5.....	2.....	14309.....	Retainer, Piston Rod
6.....	1.....	16957.....	Rod, Piston, 9500
7.....	2.....	17212.....	End Plug Assy, White
		17212-01.....	End Plug Assy, White, HW, 560CD
8.....	1.....	17111.....	Piston, 9500, Lower
9.....	1.....	16956.....	Rod, Piston, Lower
10.....	1.....	17092.....	Spacer, Disc, 9500
11.....	1.....	16955.....	Plug, End, 9500
12.....	3.....	16394.....	O-Ring -029
13.....	1.....	14906.....	Plate, End, 9000
14.....	4.....	41875.....	Screw, Phil Oval HD, #10-24 x 3/8 Mchd
		41876.....	Screw, Phil Oval HD, Mchd M5 x 0.8 x 10MM
15.....	4.....	17052.....	Fitting, Pipe, Coupling
16.....	4.....	17224.....	O-Ring -224
17.....	1.....	17061.....	Retainer, Coupling
18.....	8.....	10231.....	Screw, Slot Hex, 1/4 - 20 x 1/2
		17659.....	Screw, Hex Hd Mach, M6 x 12
19.....	2.....	17353.....	Fitting, Elbow, 1 1/2 x .065
20.....	1.....	16916-01.....	Adapter, 9500, 2nd Tan, Machd w/O-rings
21.....	2.....	13577.....	O-ring -226
22.....	2.....	16455.....	O-ring -347
23.....	1.....	14805.....	Gasket, Injector Body, 1600/1700
24.....	1.....	*14802.....	Throat, Injector
25.....	1.....	17777.....	Body, Injector, 1700
26.....	1.....	*14801.....	Nozzle, Injector
27.....	1.....	10229.....	Gasket, Injector Cap, 1600
28.....	1.....	11893.....	Cap, Injector, SS
29.....	2.....	14804.....	Screw, Hex Hd Mach, 10-24 x 2 3/4
		17655.....	Screw, Hex Hd, M5 x 70
30.....	1.....	16221.....	Disperser, Air
31.....	1.....	17776.....	Injector, 1600
32.....	1.....	10914-3.....	Throat, Injector, #3, Yellow
33.....	1.....	10227.....	Screen, Injector
34.....	1.....	10913-3.....	Nozzle, Injector, #3, Yellow
35.....	2.....	10692.....	Slot Hex Hd, 10-24 x
		17656.....	Screw, Hex Hd, M5 x 40
36.....	2.....	17558.....	Disc, Spacer, End Plug
Not Shown.....	2.....	19608-15.....	Disperser, Commercial 1 1/2"
Not Shown.....	1.....	11248.....	Pin, Roll 5/32 x 7/8
Not Shown.....	1.....	60366-XX.....	D.L.F.C. NPT - Specify Size

*Injector Throat	Injector Nozzle	Size	Color
14802-03.....	14801-03.....	#3C.....	Yellow
14802-04.....	14801-04.....	#4C.....	Green
14802-05.....	14801-05.....	#5C.....	White
14802-06.....	14801-06.....	#6C.....	Red

For Service Assembly Numbers, See the Back of this Manual

1600 Brine Valve System (for 9500)

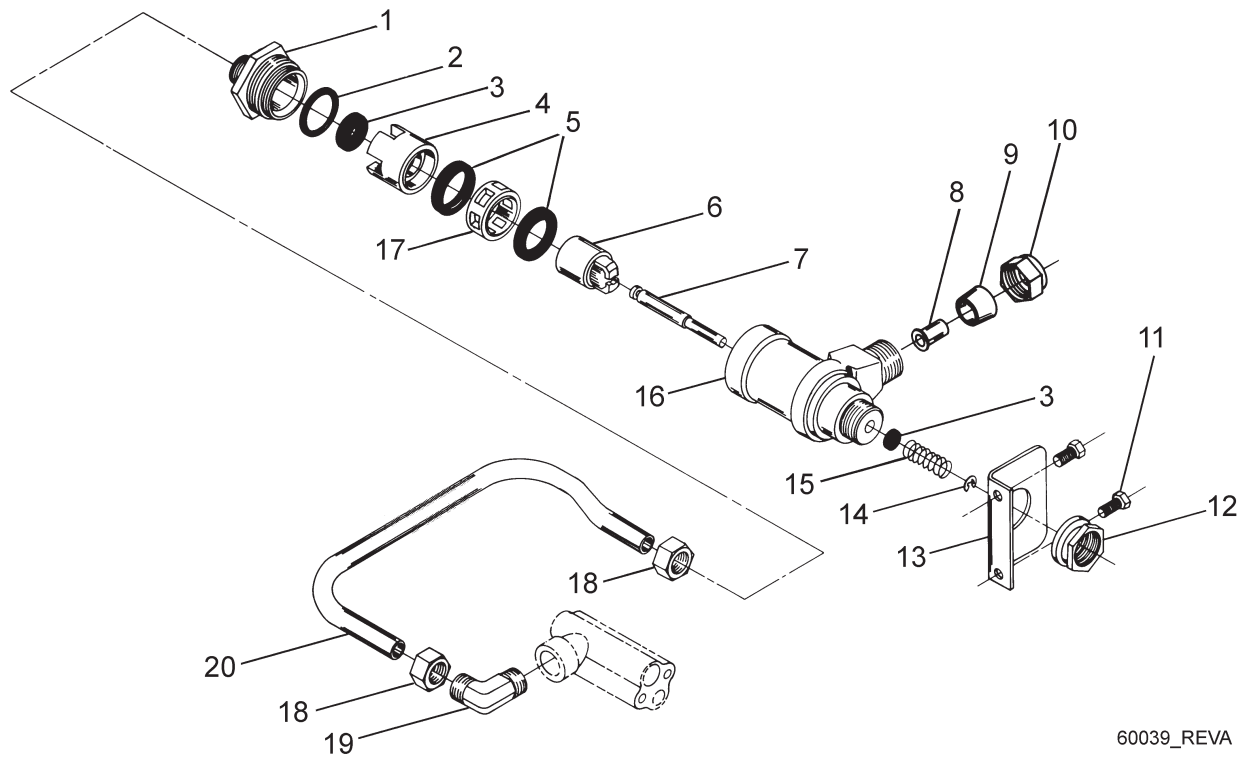


60037_REVA

Item No.	Quantity	Part No.	Description
1.....	1.....	16960.....	Tube, Brine Valve
2.....	1.....	10329.....	Fitting, Tube, 3/8 Nut, Brass
3.....	1.....	10330.....	Fitting, Sleeve, 3/8 Celcon
4.....	1.....	10332.....	Fitting, Insert, 3/8
5.....	1.....	12747.....	Fitting, Flow Control
6.....	1.....	12550.....	Quad Ring, -009
7.....	1.....	12626.....	Seat, Brine Valve
8.....	1.....	16958.....	Brine Valve Stem, 1600 Coated
9.....	1.....	11982.....	O-ring, -016
10.....	3.....	15137.....	Screw, Hex Wsh Mach, 10-24 x 3/8
11.....	3.....	10269.....	Nut, Jam, 3/84 - 16
12.....	3.....	16922.....	Bracket, Brine Valve Mounting
13.....	1.....	10250.....	Ring, Retaining
14.....	1.....	10249.....	Spring, Brine Valve
15.....	1.....	12748-01.....	Brine Valve Body, 1600
16.....	2.....	10328.....	Fitting, Elbow, 90 Deg.

For Service Assembly Numbers, See the Back of this Manual

1700 Brine Valve System (for 9500)

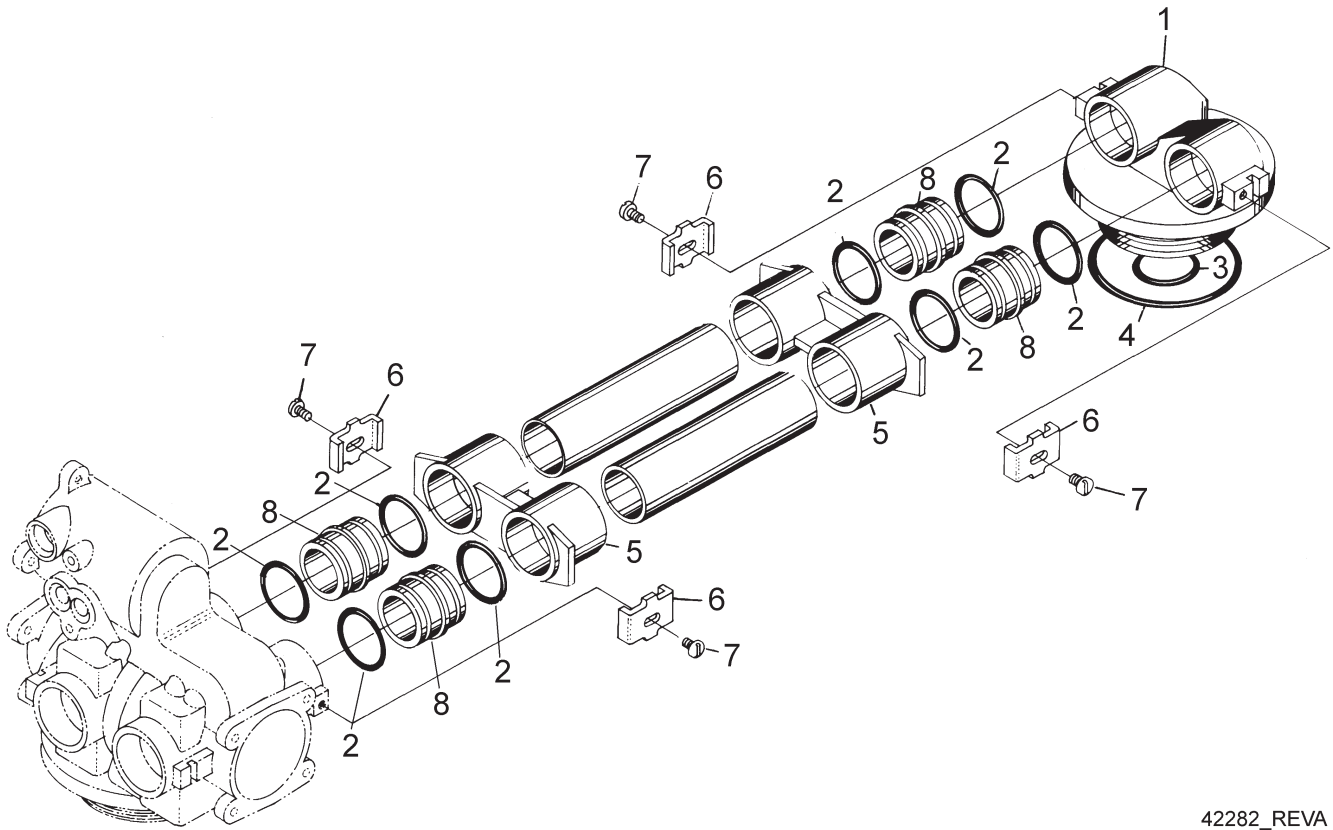


60039_REVA

Item No.	Quantity	Part No.	Description
1.....	1.....	14792.....	Plug, End, Brine Valve
2.....	1.....	13201.....	Quad Ring, -020
3.....	1.....	12550.....	Quad Ring, -009
4.....	1.....	14785-01.....	Retainer, Flow Control
5.....	2.....	14811.....	O-ring, -210, 560CD, Brine
6.....	1.....	14795.....	Piston, Brine Valve
7.....	1.....	16929.....	Brine Valve Stem, Coated
8.....	1.....	15415.....	Fitting, Insert, 1/2" Tube
9.....	1.....	16124.....	Fitting, Sleeve, Delrin
10.....	1.....	16123.....	Nut, Brass
11.....	1.....	15137.....	Screw, Hex Wsh Mach, 10-24 x 3/8
12.....	1.....	10269.....	Nut, Jam, 3/4 - 16
13.....	1.....	16922.....	Bracket, Brine Valve Mounting
14.....	2.....	10250.....	Ring, Retaining
15.....	1.....	15310.....	Spring, Brine Valve
16.....	2.....	14790.....	Brine Valve Body
17.....	1.....	14798.....	Spacer, 1700, Brine
18.....	1.....	15414.....	Nut, 2900, w/Sleeve
19.....	1.....	15413.....	Fitting, Elbow, Male, 1/2T x 3/8 NPT
20.....	1.....	16959.....	Tube, Brine 9500/1710, 10.6"

For Service Assembly Numbers, See the Back of this Manual

9000 Second Tank Assembly

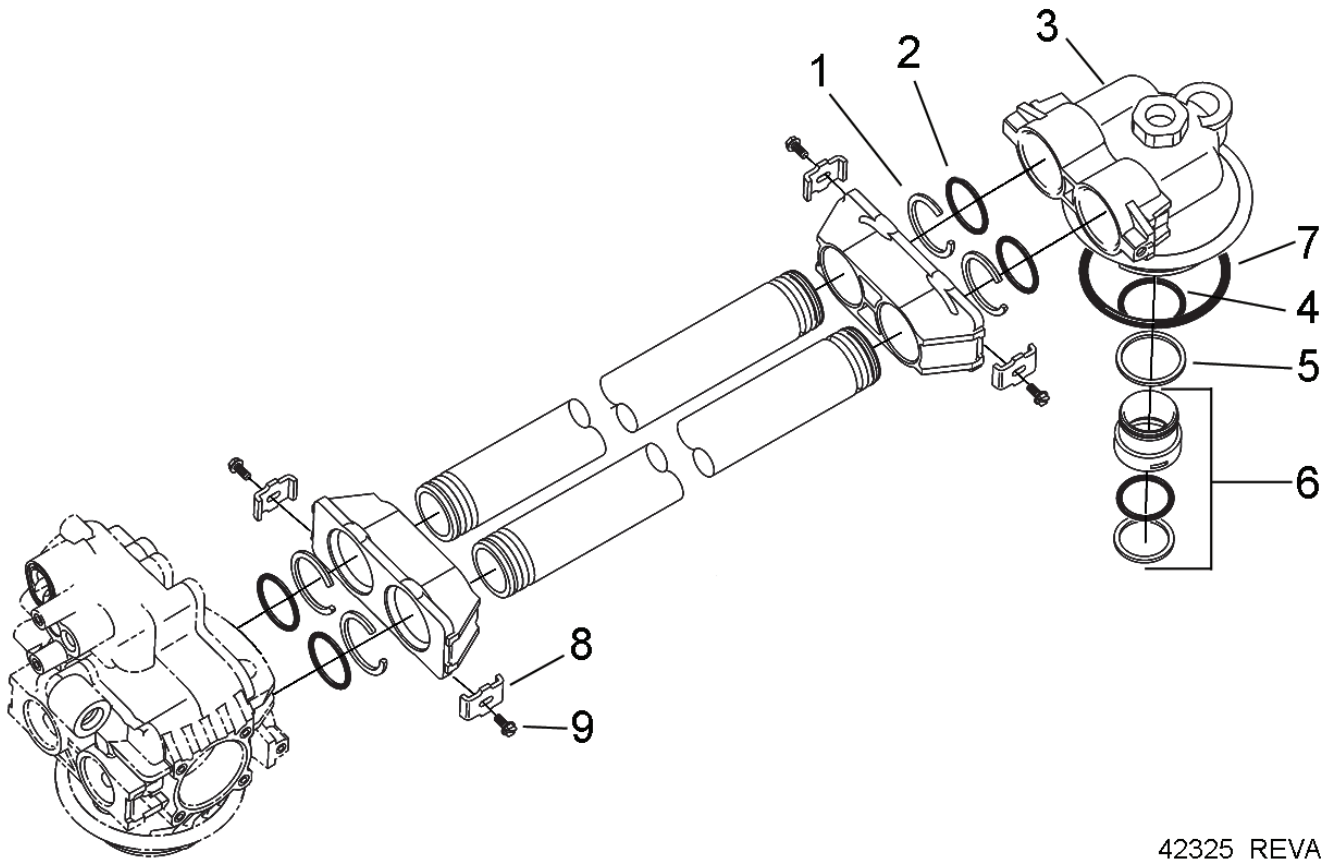


42282_REVA

Item No.	Quantity	Part No.	Description
1.....	1.....	14864-01.....	Adapter, 9000, 2nd Tank, Machd w/O-rings
2.....	8.....	13305.....	O-ring, -119
3.....	1.....	11710.....	O-ring, -215
4.....	1.....	12281.....	O-ring, -338
5.....	2.....	13708-40.....	Yoke, 1" Sweat
.....	1.....	15823-XX.....	Yoke Assy. Specify Tank Size
6.....	4.....	13255.....	Clip, Mounting
7.....	4.....	14202-01.....	Screw, Hex Wsh Mach, 8-32 x 5/16
8.....	4.....	15078.....	Adapter, 1" Coupling

For Service Assembly Numbers, See the Back of this Manual

9100 Second Tank Assembly

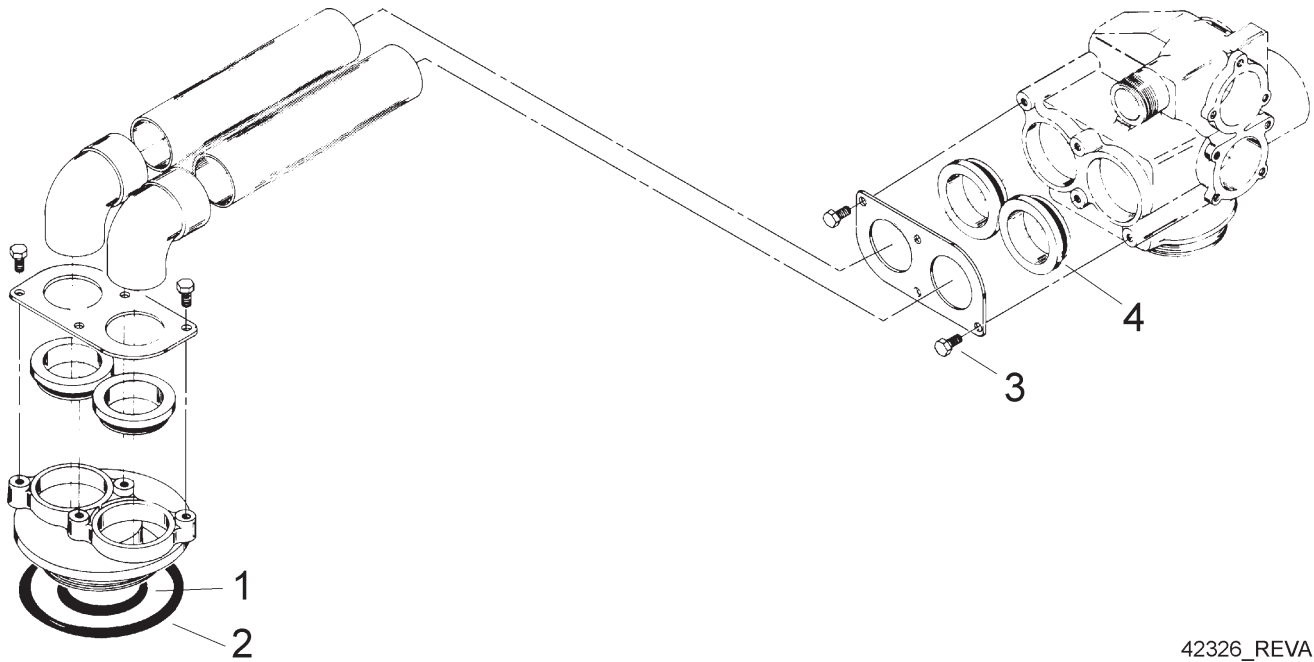


42325_REVA

Item No.	Quantity	Part No.	Description
1	4	40678	Ring, 9100, Yoke Retainer
2	4	13287	O-ring, -123
3	1	14865	Adapter Assy, 2nd Tank, 9100
4	1	19054	O-ring, -124
5	1	40538	Retainer, 32mm, O-ring Dist, 7000
6	1	61419	Kit, 1.05" Distributor, Adapter
7	1	18303	O-ring, -336
8	4	13255	Clip, Mounting
9	4	14202-01	Screw, Hex Wsh Mach, 8-32 x 5/16

For Service Assembly Numbers, See the Back of this Manual

9500 Second Tank Assembly

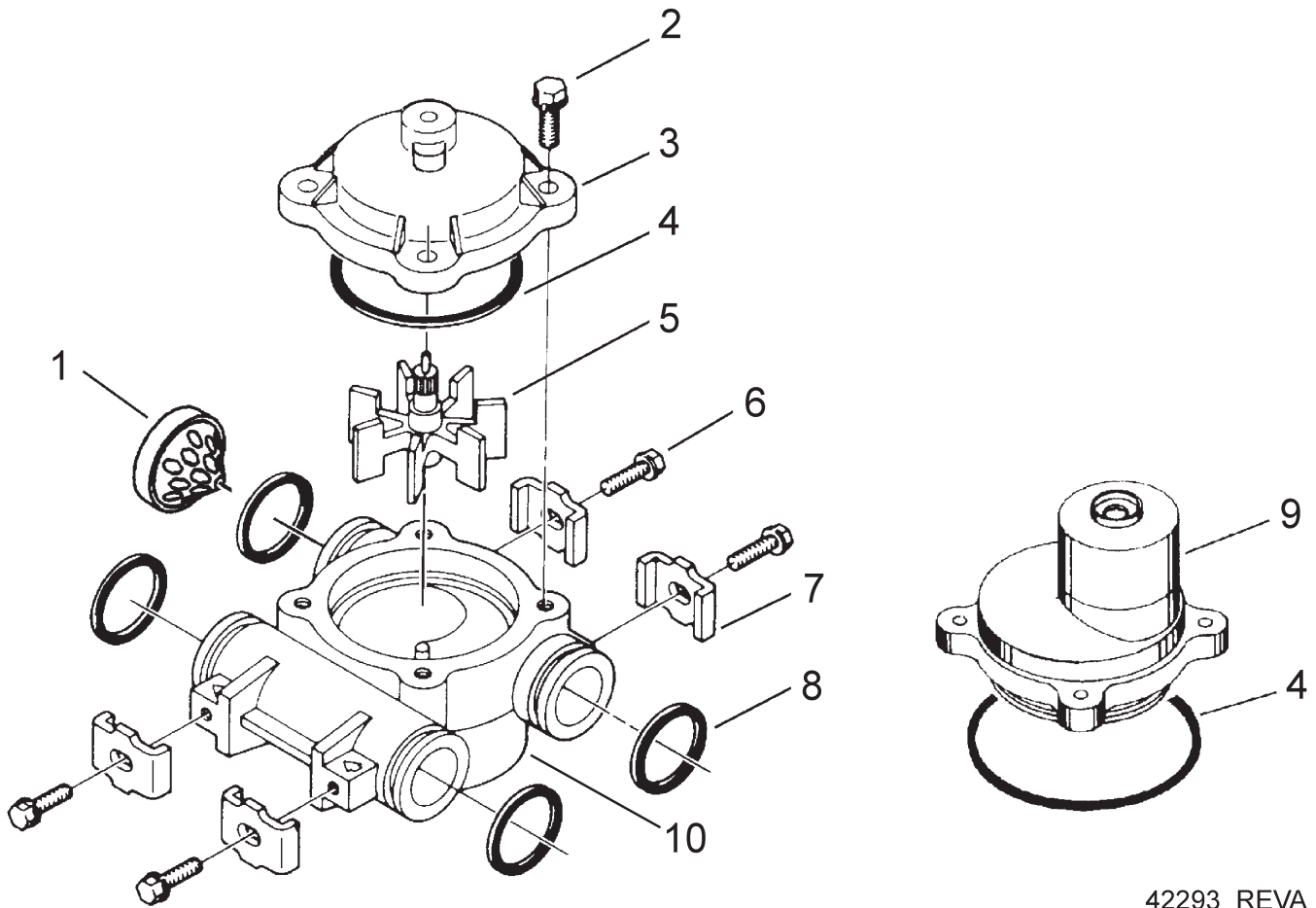


42326_REVA

Item No.	Quantity	Part No.	Description
1.....	1.....	13577.....	O-ring, -226
2.....	1.....	16455.....	O-ring, -347
3.....	8.....	10231.....	Screw, Slot Hex, 1/4 - 20 x 1/2
4.....	4.....	17224.....	O-ring, -224

For Service Assembly Numbers, See the Back of this Manual

3/4" Meter Assembly

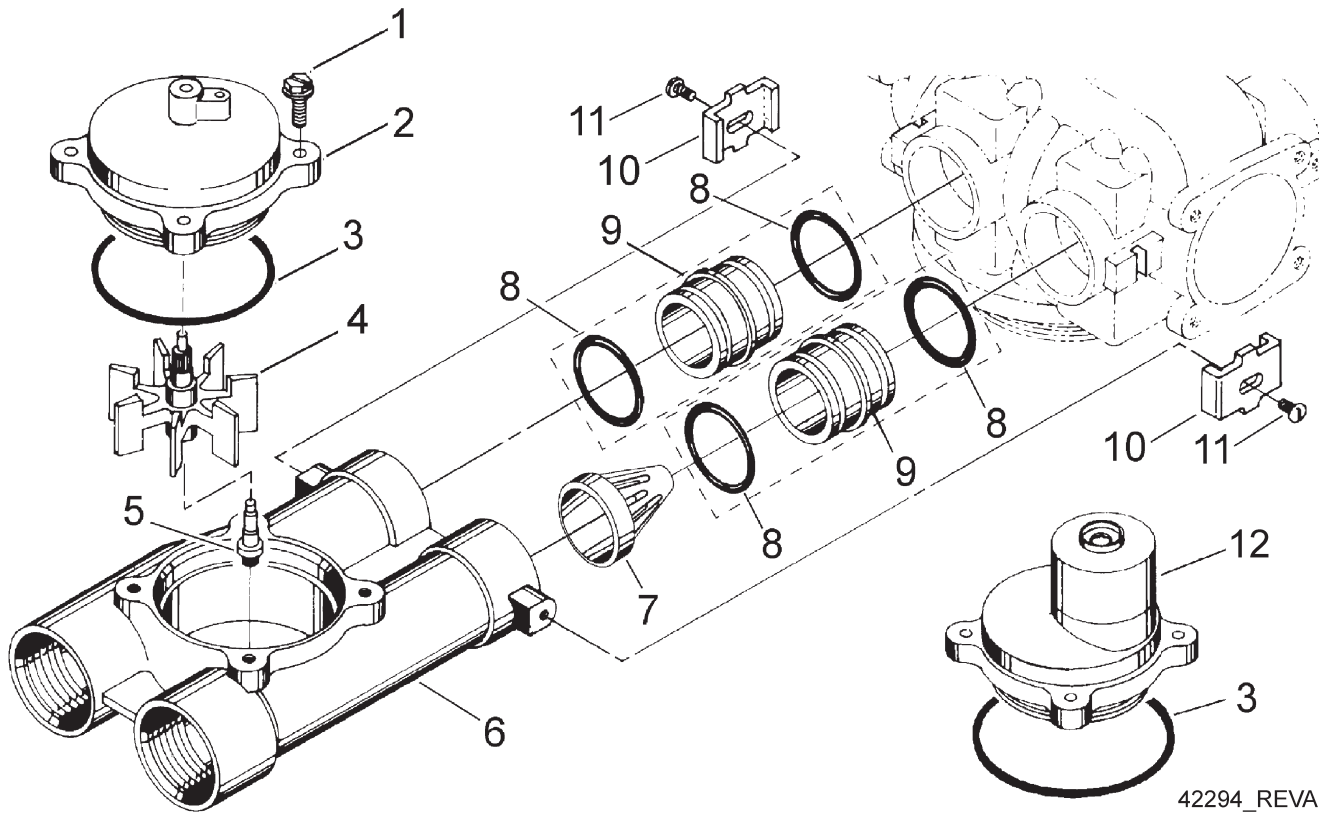


42293_REVA

Item No.	Quantity	Part No.	Description
1.....	1.....	14613.....	Flow Straightener
2.....	4.....	12473.....	Screw, Hex Wsh, 10-24 x 5/8
3.....	1.....	14038.....	Meter Cap Assy
4.....	1.....	13847.....	O-ring, -137, Std/560CD, Meter
5.....	1.....	13509.....	Impeller, Meter
6.....	4.....	13314.....	Screw, Slot Ind Hex, 8-18 x .60
7.....	4.....	13255.....	Clip, Mounting
8.....	4.....	13305.....	O-ring, -119
9.....	1.....	15150.....	Meter Cap Assy, Ext
		15237.....	Meter Cap Assy, Ext
10.....	1.....	13821.....	Body, Meter, 5600

For Service Assembly Numbers, See the Back of this Manual

1" Meter Assembly

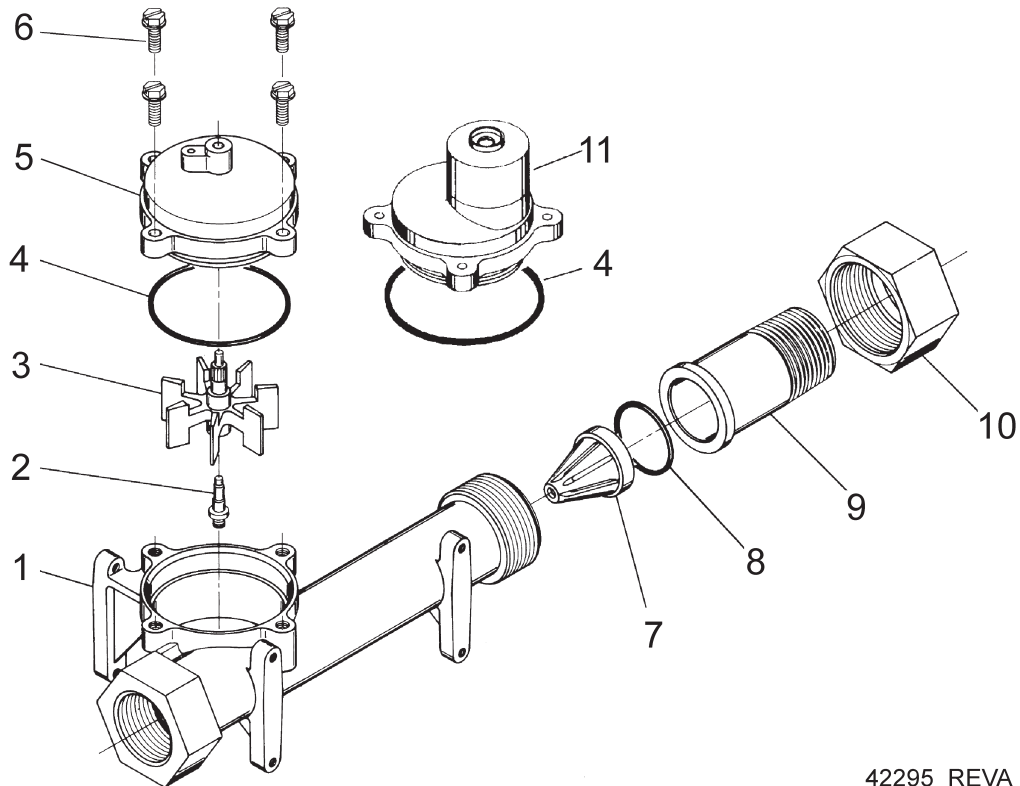


42294_REVA

Item No.	Quantity	Part No.	Description
1	4	12112	Screw, Hex Hd Mach 10-24 x 1/2
2	1	15218	Meter Cap Assy
		15237	Meter Cap Assy, EXT
3	1	13847	O-Ring, -137, STD/560CD, Meter
4	1	13509	Impeller, Meter
		13509-01	Impeller, Celcon
5	1	13882	Post, Meter Impeller
6	1	15043	Body, Meter, 9000 1"
7	1	14960	Flow Straightener, 1"
8	4	13305	O-Ring, -119
9	2	15078	Adapter, 1" Coupling
10	2	13255	Clip, Mounting
11	2	14202-01	Screw, Hex Wsh Mach, 8-32 x 5/16
12	1	15150	Meter Cap Assy, Ext
		15237	Meter Cap Assy, Ext

For Service Assembly Numbers, See the Back of this Manual

1 1/2" Meter Assembly

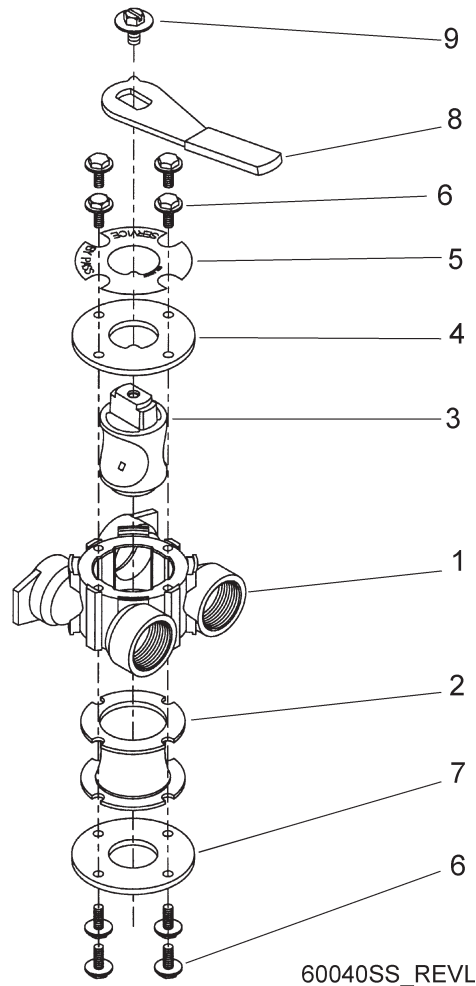


42295_REVA

Item No.	Quantity	Part No.	Description
1	1	17569	Body, Meter, 2850/9500
2	1	13882	Post, Meter Impeller
3	1	13509	Impeller, Meter
4	1	13847	O-Ring, -137, Std/560CD, Meter
5	1	15218	Meter Cap Assy
6	4	12112	Screw, Hex Hd Mach, 10-24 x 1/2 18-8 S.S.
7	1	17542	Flow Straightener, 1 1/2"
8	1	12733	O-Ring, -132
9	1	17544	Fitting, 1 1/2" Quick Connector
10	1	17543	Nut, 1 1/2", Q/C
11	1	15150	Meter Cap Assy, Ext
		15237	Meter Cap Assy, Ext
Not Shown ...	1	17790	Sleeve, Meter, 1 1/2" x 1"

For Service Assembly Numbers, See the Back of this Manual

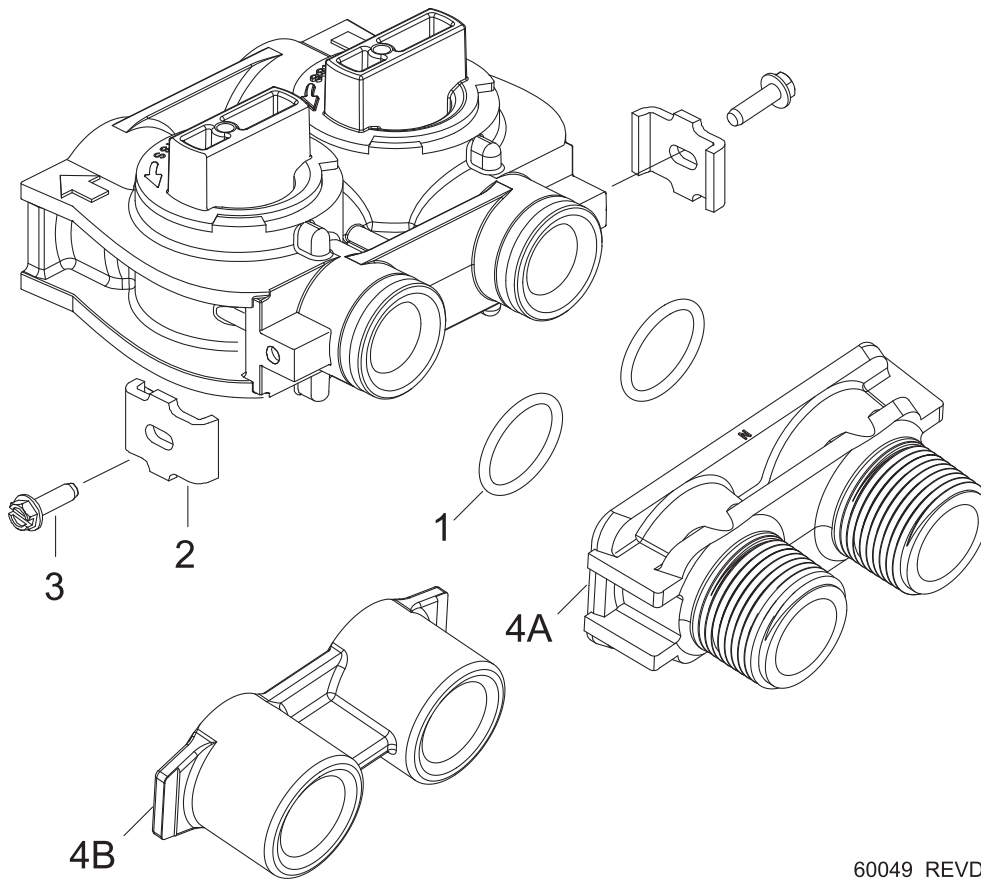
9000/9100 Bypass Valve Assembly



Item No.	Quantity	Part No.	Description
1.....	1	17290	By-Pass Body, 3/4"
		17290NP	By-Pass Body, 3/4" NP, 5600
		13399	By-Pass Body, 1"
		13399NP	By-Pass Body, 1" NP
2.....	1	14105	Seal, By-Pass, 560CD
3.....	1	11972	Plug, By-Pass, w/Wax
4.....	1	11978	Plate, By-Pass, Top
5.....	1	13604-01	Label, By-Pass, Standard Mount
6.....	8	15727	Screw, Hex Wsh Hd, 10-24 x 1/2
7.....	1	11986	Plate, By-Pass, Bottom
8.....	1	11979	Lever, By-Pass
9.....	1	11989	Screw, Sltd Ident, 1/4 - 14 x 1 1/2

For Service Assembly Numbers, See the Back of this Manual

Bypass Valve Assembly

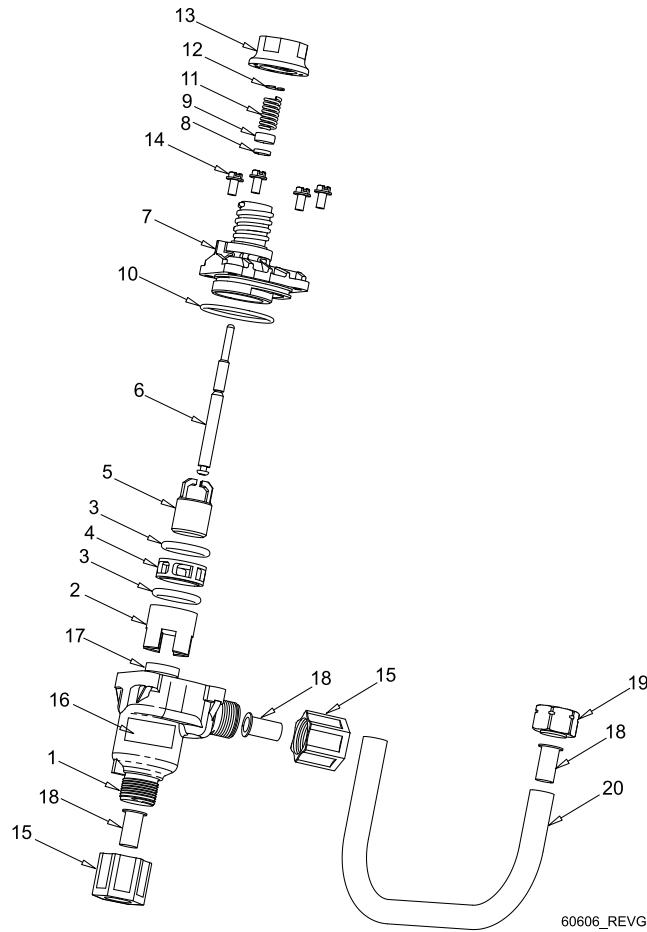


60049_REVD

Item No.	Quantity	Part No.	Description
1.....	2	13305	O-ring, -119
2.....	2	13255	Clip, Mounting
3.....	2	13314	Screw, Slot Ind Hex, 8-18 x .60
4A	1	18706	Yoke, 1", NPT, Plastic
		18706-02	Yoke, 3/4", NPT, Plastic
4B	1	41027-01	Yoke, 3/4", NPT, Cast, Machd
		41026-01	Yoke, 1", NPT, Cast, Machd, SS

For Service Assembly Numbers, See the Back of this Manual

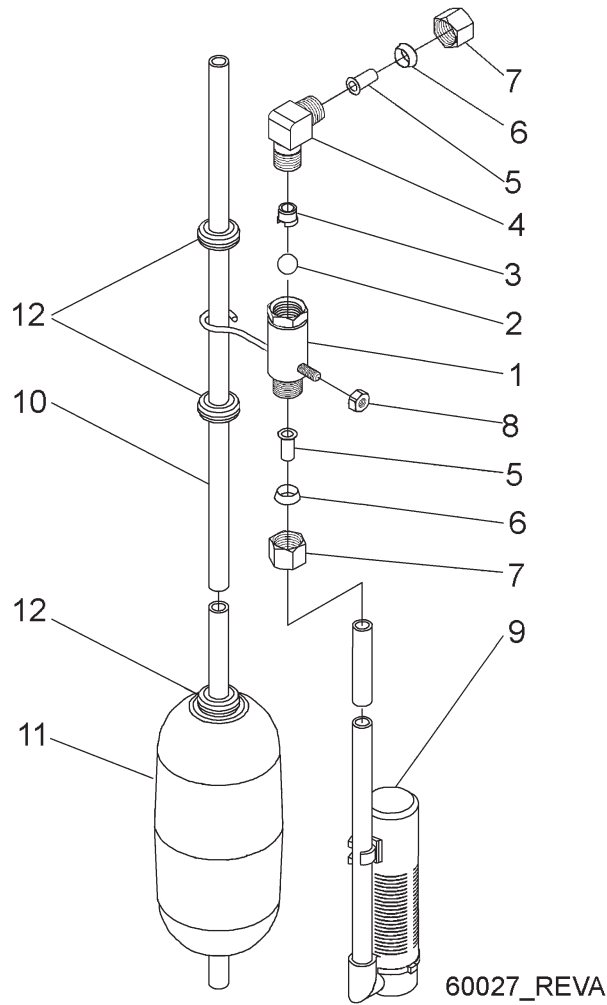
1710 Brine Valve System (for 9500)



Item No.	Quantity	Part No.	Description
1.....	1.....	41202.....	Brine Valve, 1700, Plastic, Top
2.....	1.....	14785-01.....	Retainer, Flow Control
3.....	2.....	14811.....	O-ring, -210, 560CD, Brine
4.....	1.....	14798.....	Spacer, 1700, Brine
5.....	1.....	14795.....	Piston, Brine Valve
6.....	1.....	41429.....	Stem, Brine, 1710, Plastic, 9500
7.....	1.....	41201.....	Brine Valve, 1700, Plastic, Bottm
8.....	1.....	12550.....	Ring, Quad, -009
9.....	1.....	17908.....	Sleeve, Brine Valve Stem
10.....	1.....	41547.....	O-ring, 2mm x 35mm
11.....	1.....	15310.....	Spring, Brine Valve
12.....	1.....	10250.....	Ring, Retaining
13.....	1.....	17906-01.....	Guide, Brine Valve Stem
14.....	4.....	14202-01.....	Screw, Hex Wsh, Mach, 8-32 x 5/16"
15.....	2.....	41056.....	Nut Assy, 1/2" Plastic
16.....	1.....	41493-XX.....	Label, BLFC, 1710 (Specify GPM)
17.....	1.....		Washer, Flow (Specify GPM)
18.....	3.....	15415.....	Fitting, Insert, 1/2", Tube
19.....	1.....	15414.....	Nut, 2900, w/Sleeve
20.....	1.....	16959.....	Tube, Brine 9500/1700, 10.6"

For Service Assembly Numbers, See the Back of this Manual

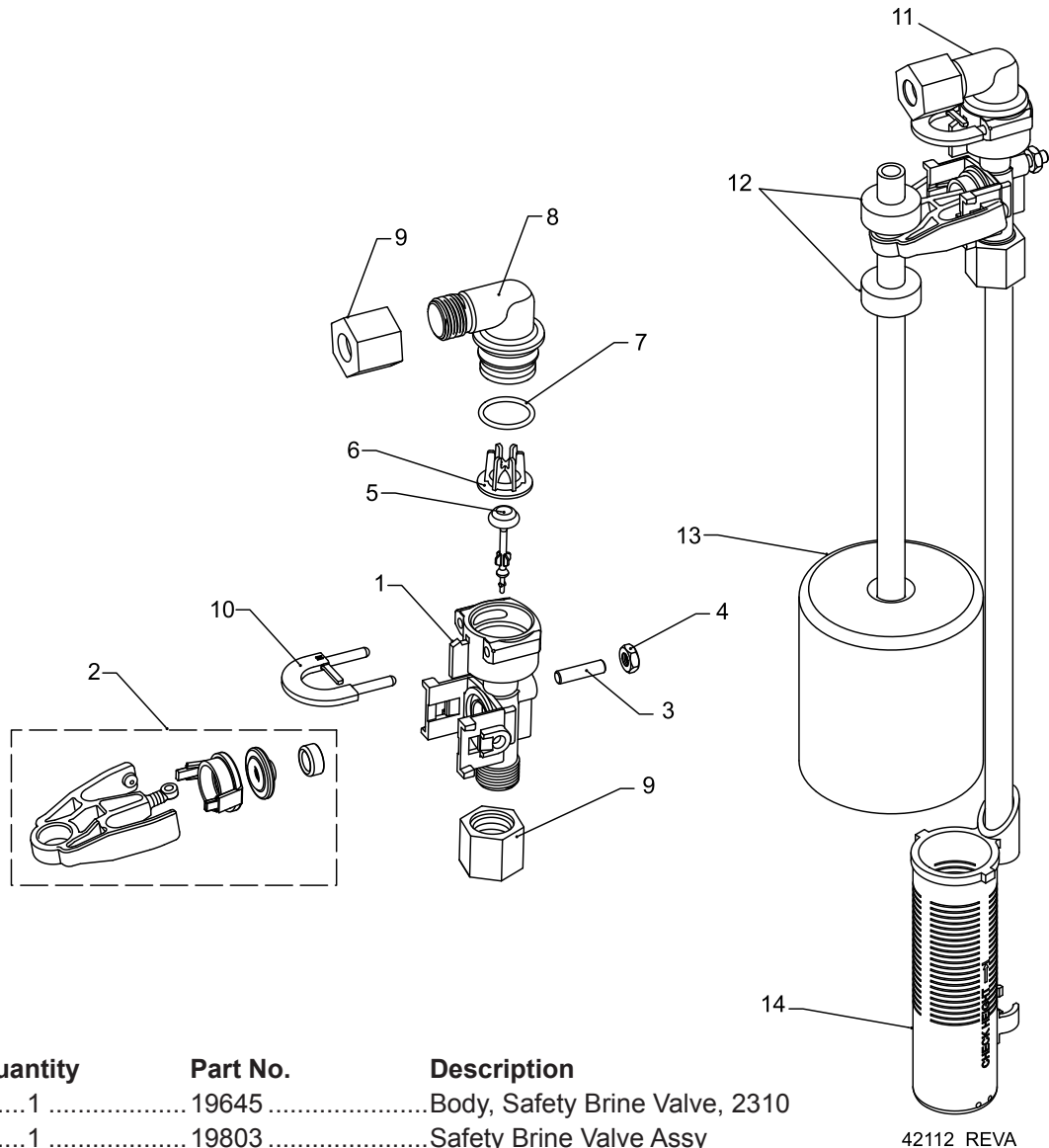
2300 Safety Brine Valve



Item No.	Quantity	Part No.	Description
1.....	1.....	60027-00.....	Safety Brine Valve, 2300, Less Elbow
2.....	1.....	10138.....	Ball, 3/8", Brass
3.....	1.....	11566.....	Ball Stop, Slow Fill
4.....	1.....	10328.....	Fitting, Elbow, 90 Deg. 1/4 NPT x 3/8T
5.....	1.....	10332.....	Fitting, Insert, 3/8
6.....	1.....	10330.....	Fitting, Sleeve, 3/8 Celcon
7.....	1.....	10329.....	Fitting, Tube, 3/8 Nut, Brass
8.....	1.....	10186.....	Nut, Hex, 10-32
9.....	1.....	60002.....	Air Check, #500
10.....	1.....	10149.....	Rod, Float
11.....	1.....	10700.....	Float Assy, Blue/White
12.....	3.....	10150.....	Grommet, .30 Dia

For Service Assembly Numbers, See the Back of this Manual

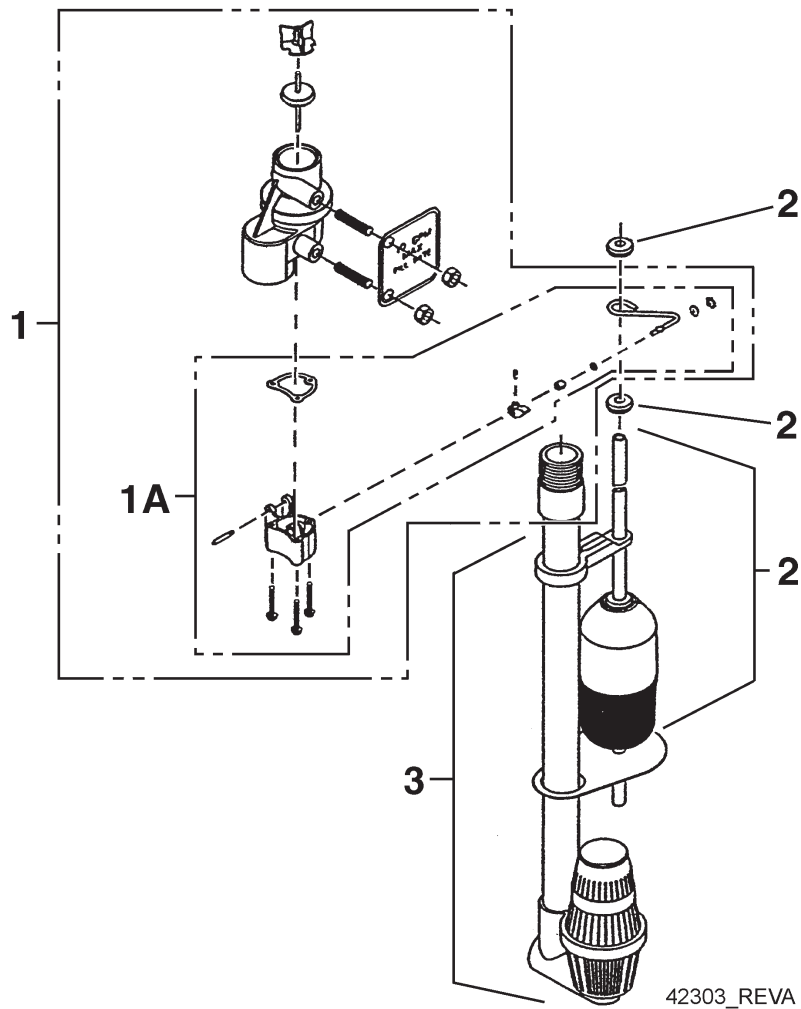
2310 Safety Brine Valve



Item No.	Quantity	Part No.	Description
1.....	1	19645	Body, Safety Brine Valve, 2310
2.....	1	19803	Safety Brine Valve Assy
3.....	1	19804	Screw, Sckt Hd, Set, 10-24 x .75
4.....	1	19805	Nut, Hex, 10-24, Nylon Black
5.....	1	19652-01	Poppet Assy, SBV w/O-Ring
6.....	1	19649	Flow Dispenser
7.....	1	11183	O-Ring, -.017
8.....	1	19647	Elbow, Safety Brine Valve
9.....	2	19625	Nut Assy, 3/8" Plastic
10.....	1	18312	Retainer, Drain
11.....	1	60014	Safety Brine Valve Assy, 2310
12.....	2	10150	Grommet, .30 Dia
13.....	1	60068	Float Assy, 2310, w/30" Rod
14.....	1	60002	Air Check, #500

For Service Assembly Numbers, See the Back of this Manual

2350 Safety Brine Valve



Item No.	Quantity	Part No.	Description
1.....	1.....	60038.....	Safety Brine Valve, 2350
1A.....	1.....	61024.....	Actuator Assy, 2350 Brine
2.....	1.....	60026-30.....	Float Assy, 400A/2350, 30" Red/Wht
3.....	1.....	60009-00.....	Air Check, #900, Commercial Less Fittings
		60009-01.....	Air Check, #900, Commercial, HW Less Fittings
Not Shown:			
1.....	1.....	18603.....	Fitting Assy, 900 Air Check 2350

For Service Assembly Numbers, See the Back of this Manual

Troubleshooting

Problem	Cause	Correction
1. Water conditioner fails to regenerate.	A. Electrical service to unit has been interrupted	A. Assure permanent electrical service (check fuse, plug, pull chain, or switch)
	B. Timer is defective.	B. Replace timer.
	C. Power failure.	C. Reset time of day.
2. Hard water.	A. By-pass valve is open.	A. Close by-pass valve.
	B. No salt is in brine tank.	B. Add salt to brine tank and maintain salt level above water level.
	C. Injector screen plugged.	C. Clean injector screen.
	D. Insufficient water flowing into brine tank.	D. Check brine tank fill time and clean brine line flow control if plugged.
	E. Hot water tank hardness.	E. Repeated flushings of the hot water tank is required.
	F. Leak at distributor tube.	F. Make sure distributor tube is not cracked. Check O-ring and tube pilot.
	G. Internal valve leak.	G. Replace seals and spacers and/or piston.
3. Unit used too much salt.	A. Improper salt setting.	A. Check salt usage and salt setting.
	B. Excessive water in brine tank.	B. See problem 7.
4. Loss of water pressure.	A. Iron buildup in line to water conditioner.	A. Clean line to water conditioner.
	B. Iron buildup in water conditioner.	B. Clean control and add mineral cleaner to mineral bed. Increase frequency of regeneration.
	C. Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system.	C. Remove piston and clean control.
5. Loss of mineral through drain line.	A. Air in water system.	A. Assure that well system has proper air eliminator control. Check for dry well condition.
	B. Improperly sized drain line flow control.	B. Check for proper drain rate.
6. Iron in conditioned water.	A. Fouled mineral bed.	A. Check backwash, brine draw, and brine tank fill. Increase frequency of regeneration. Increase backwash time.
7. Excessive water in brine tank.	A. Plugged drain line flow control.	A. Clean flow control.
	B. Plugged injector system.	B. Clean injector and screen.
	C. Timer not cycling.	C. Replace timer.
	D. Foreign material in brine valve.	D. Replace brine valve seat and clean valve.
	E. Foreign material in brine line flow control.	E. Clean brine line flow control.

Troubleshooting

Problem	Cause	Correction
8. Softener fails to draw brine.	A. Drain line flow control is plugged.	A. Clean drain line flow control.
	B. Injector is plugged.	B. Clean injector
	C. Injector screen plugged.	C. Clean screen.
	D. Line pressure is too low.	D. Increase line pressure to 20 P.S.I.
	E. Internal control leak	E. Change seals, spacers, and piston assembly.
	F. Service adapter did not cycle.	F. Check drive motor and switches.
9. Control cycles continuously.	A. Misadjusted, broken, or shorted switch.	A. Determine if switch or timer is faulty and replace it, or replace complete power head.
10. Drain flows continuously.	A. Valve is not programming correctly.	A. Check timer program and positioning of control. Replace power head assembly if not positioning properly.
	B. Foreign material in control.	B. Remove power head assembly and inspect bore. Remove foreign material and check control in various regeneration positions.
	C. Internal control leak.	C. Replace seals and piston assembly.

General Service Hints For Meter Control

Problem: Softener delivers hard water

Reason: Reserve capacity has been exceeded.

Correction: Check salt dosage requirements and reset program wheel to provide additional reserve.

Reason: Program wheel is not rotating with meter output.

Correction: Pull cable out of meter cover and rotate manually. Program wheel must move without binding and clutch must give positive clicks when program wheel strikes regeneration stop. If it does not, replace timer.

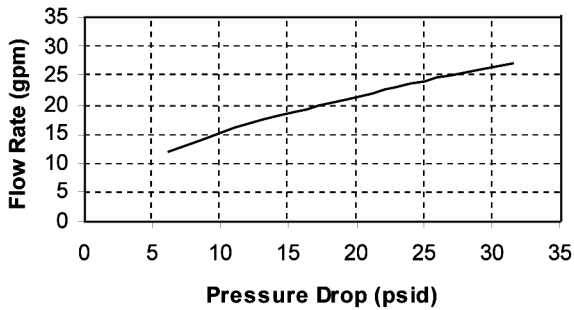
Reason: Meter is not measuring flow.

Correction: Check meter with meter checker.

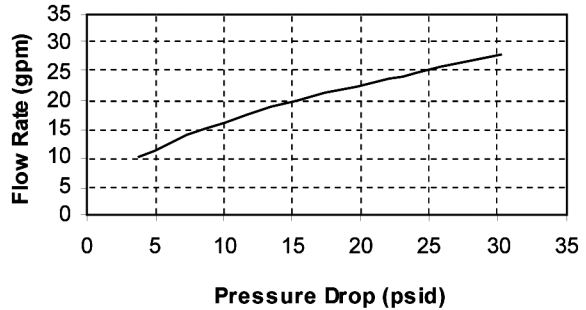
9000/9100/9500 Meter Flow Data

9000 Meter Flow Data

3/4" Mechanical Meter



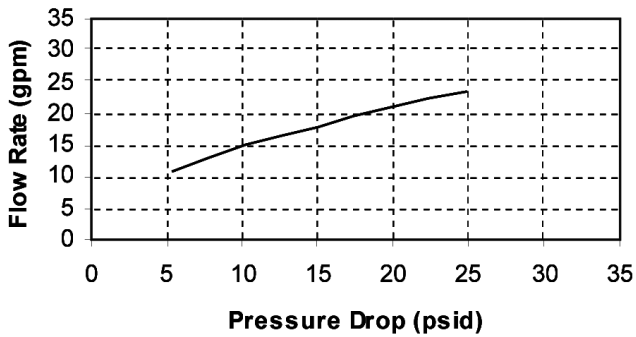
1" Brass Meter



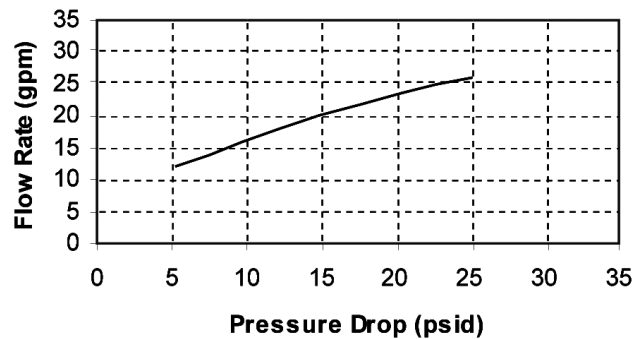
TR: 18467
41092

9100 Meter Flow Data

3/4" Mechanical Meter



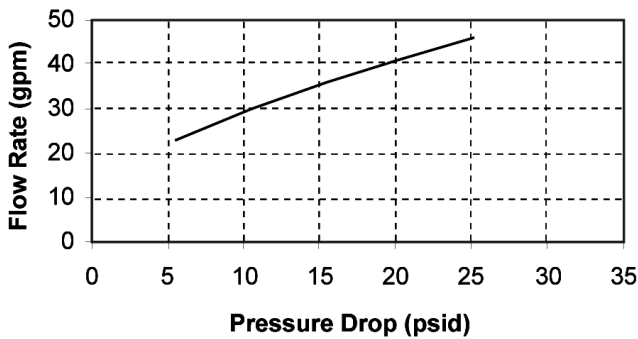
1" Brass Meter



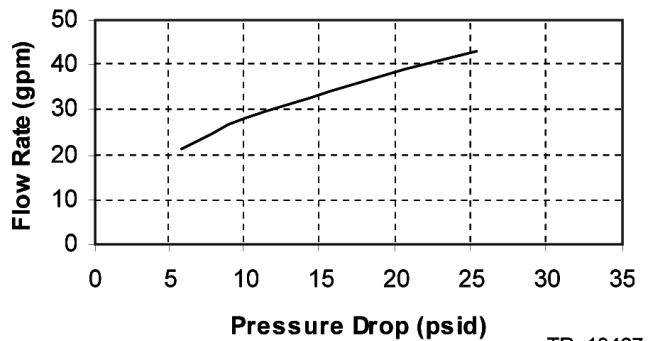
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9500 Meter Flow Data

1 1/2" Meter

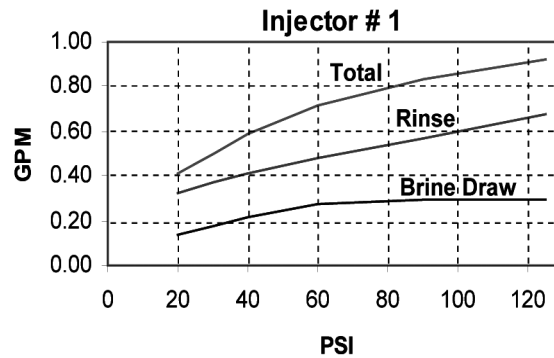
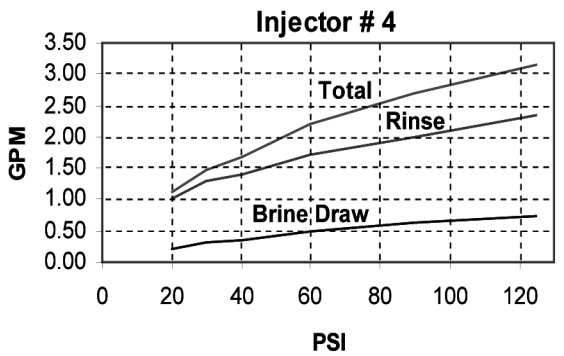
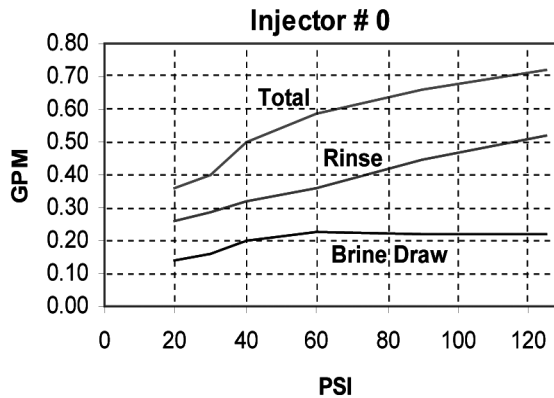
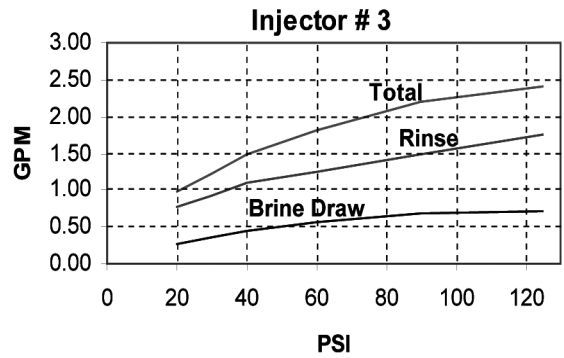
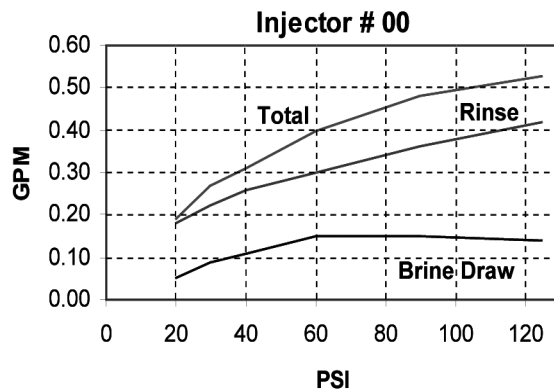
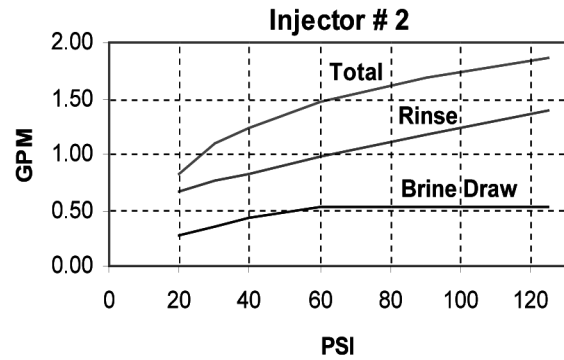
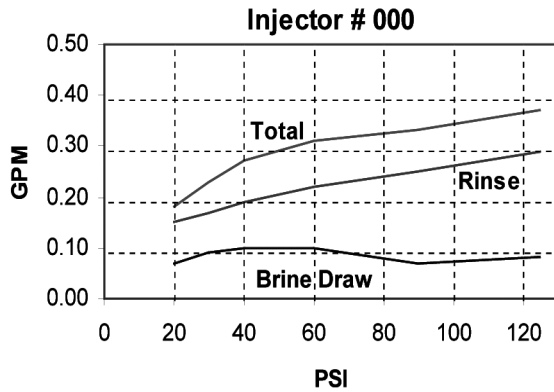


1 1/2" Meter Sleeved



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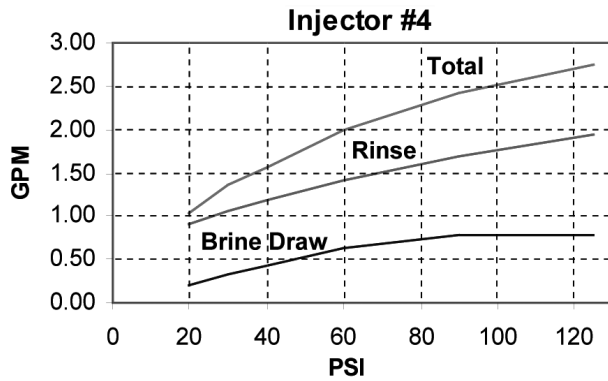
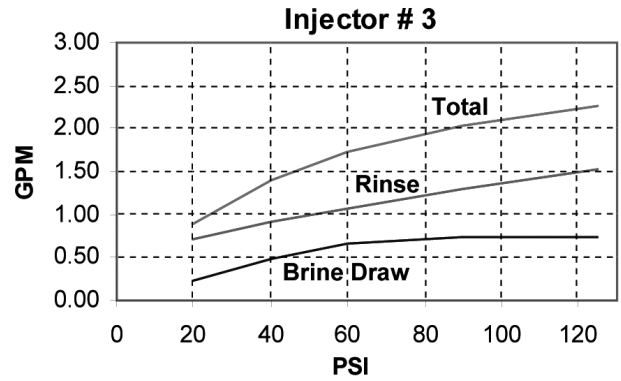
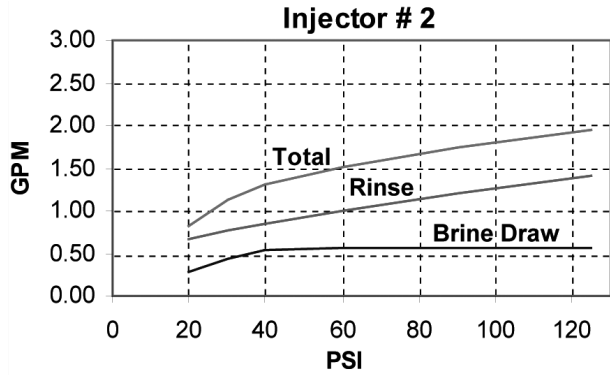
9000/9100 Injector Flow Data (1600 Series Injectors)



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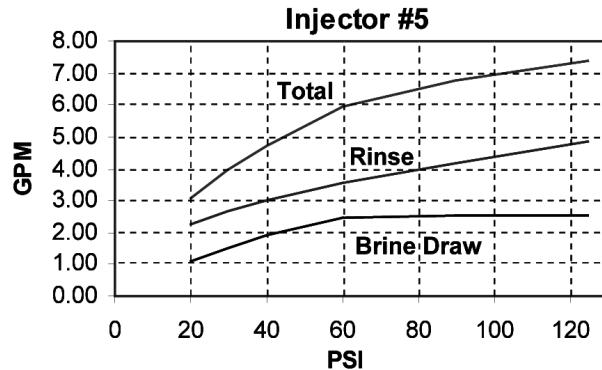
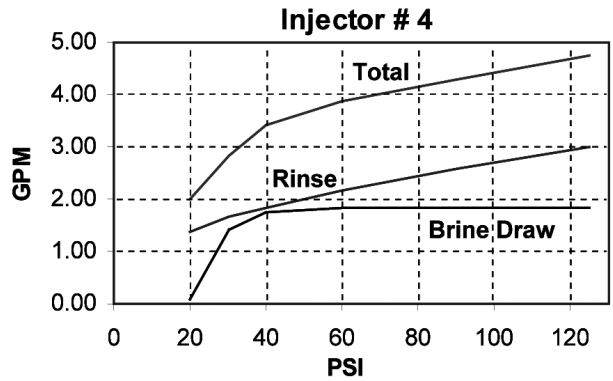
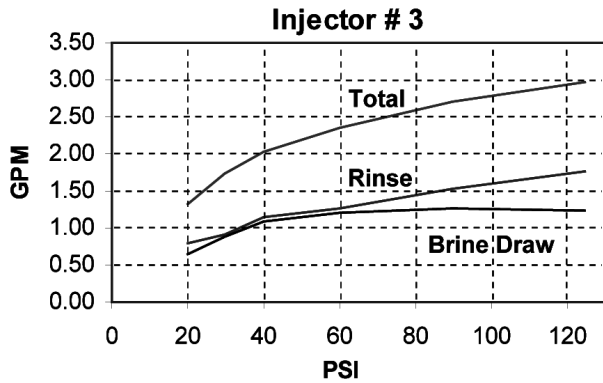
9500 Injector Flow Data (1600 & 1700 Series Injectors)

1600 Series Injectors



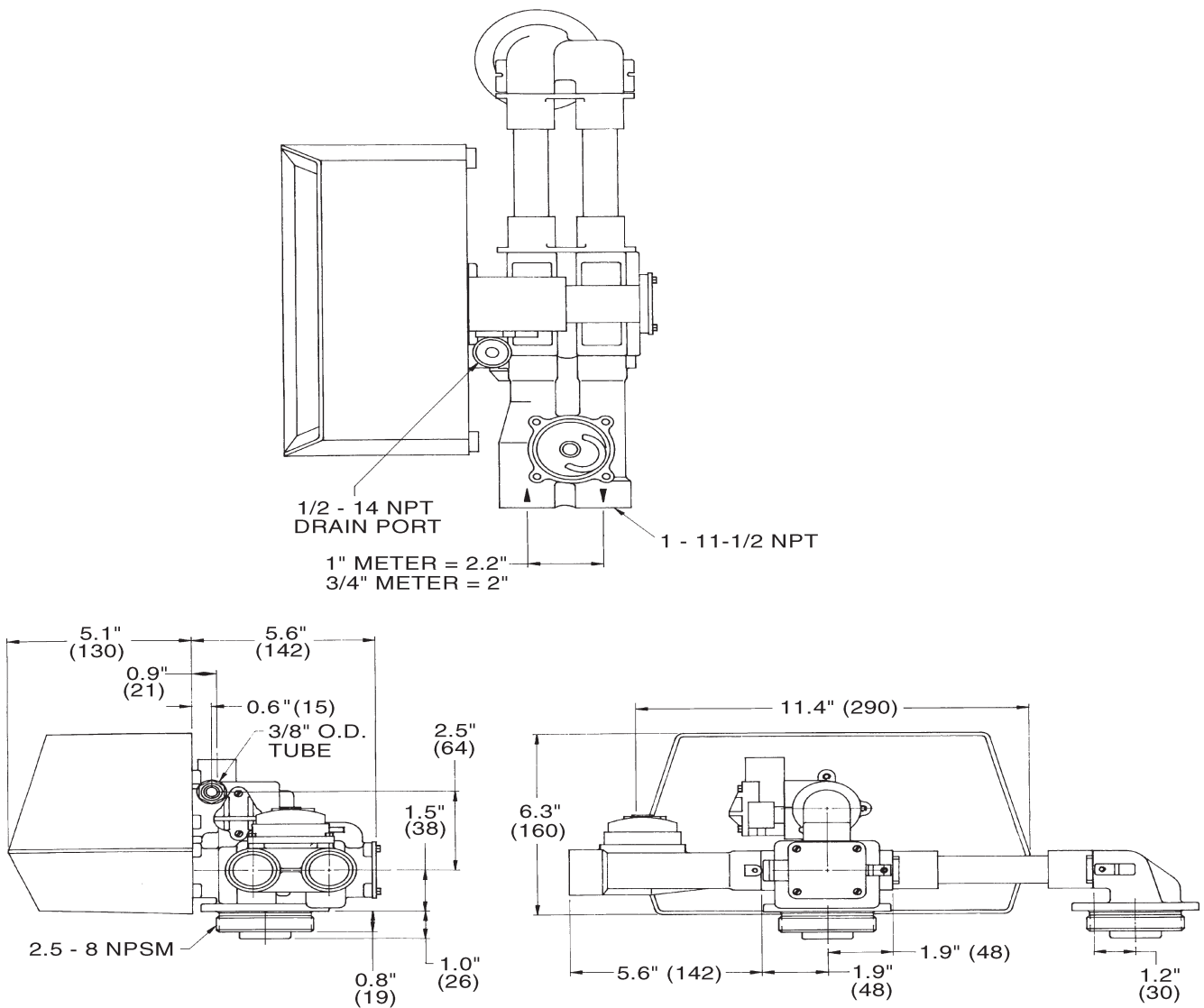
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1700 Series Injectors



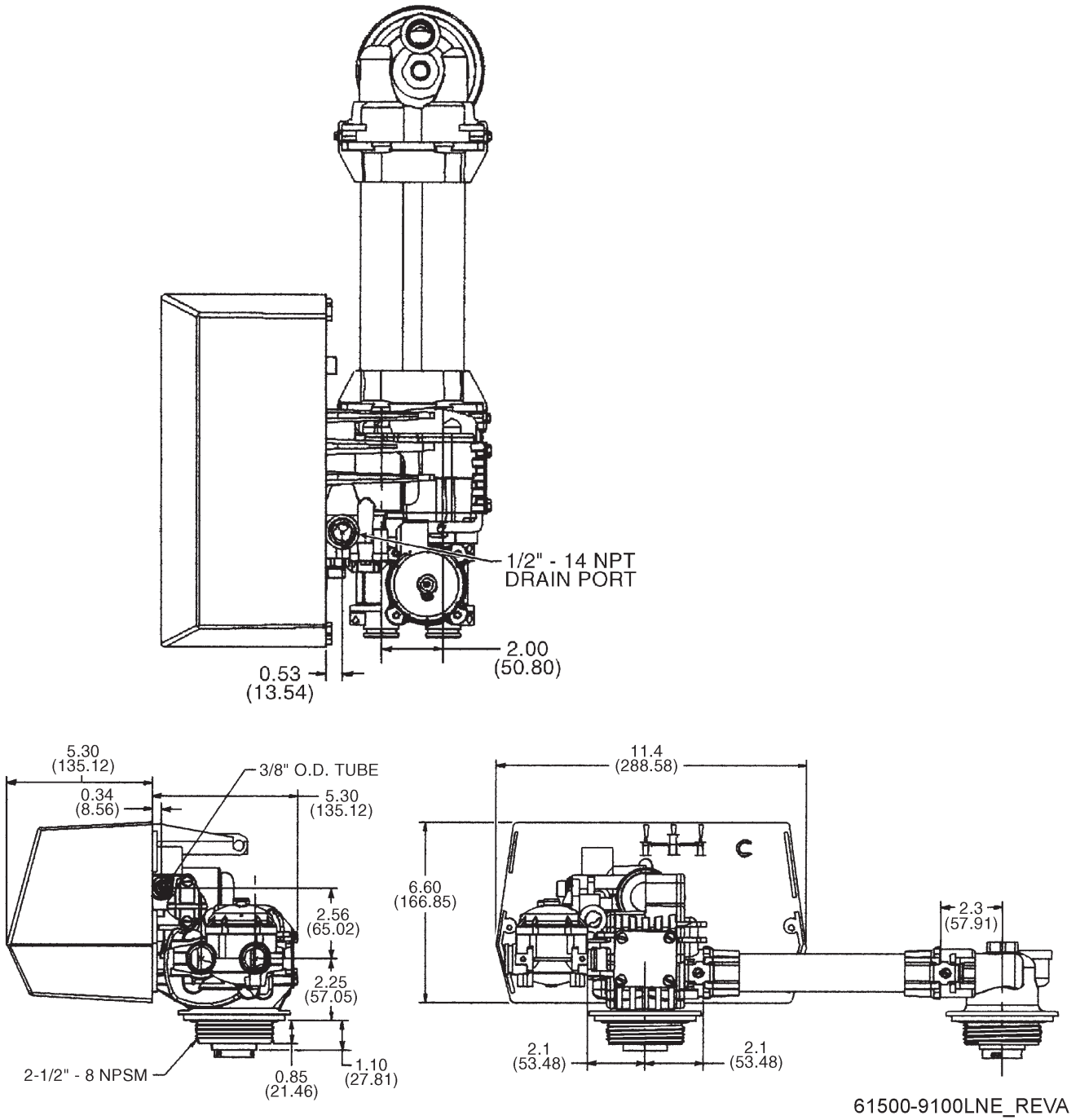
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9000 Control Dimensions

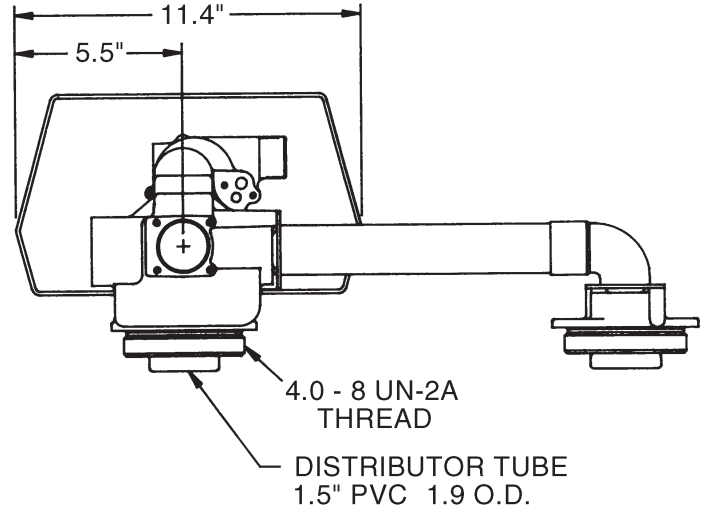
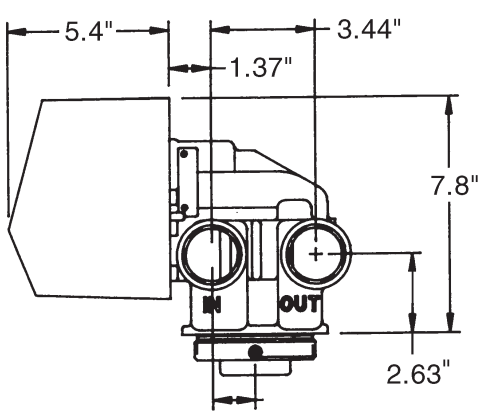
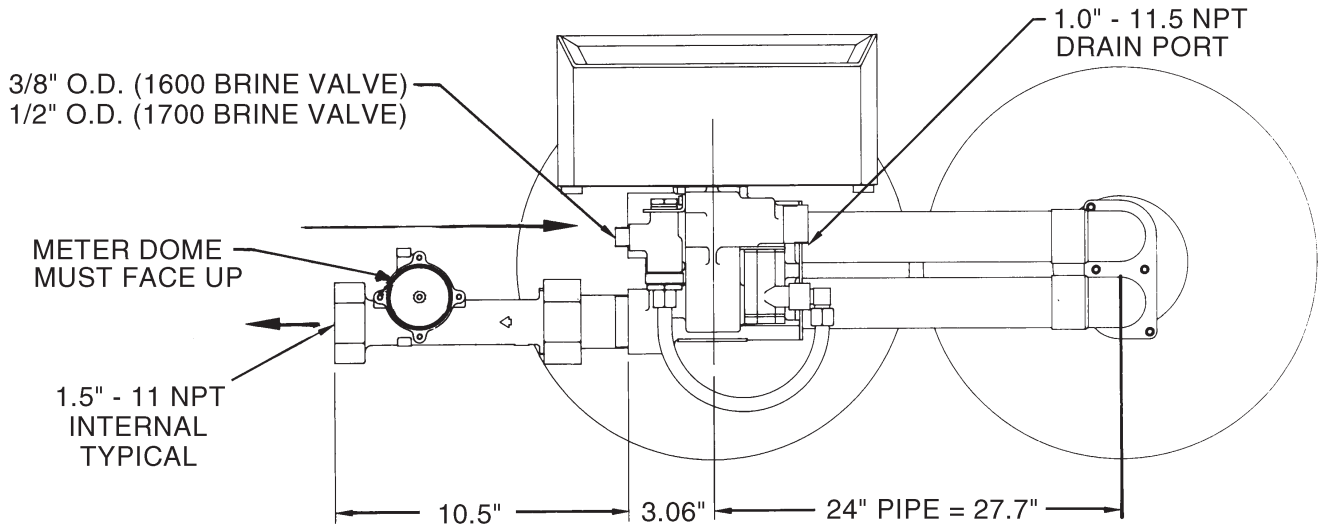


61500-9000LNE_REVA

9100 Control Dimensions



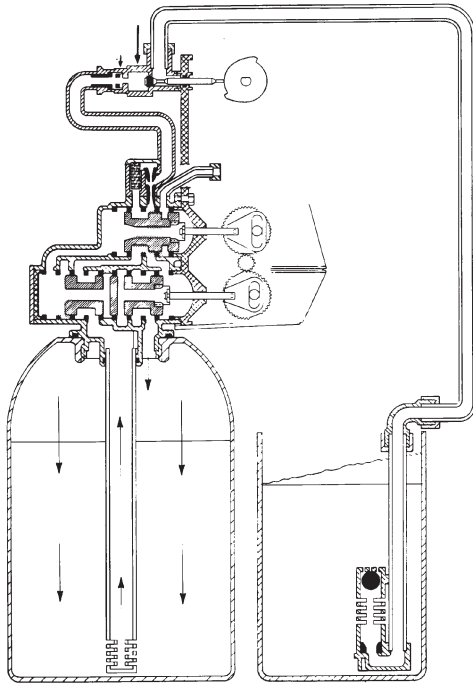
9500 Control Dimensions



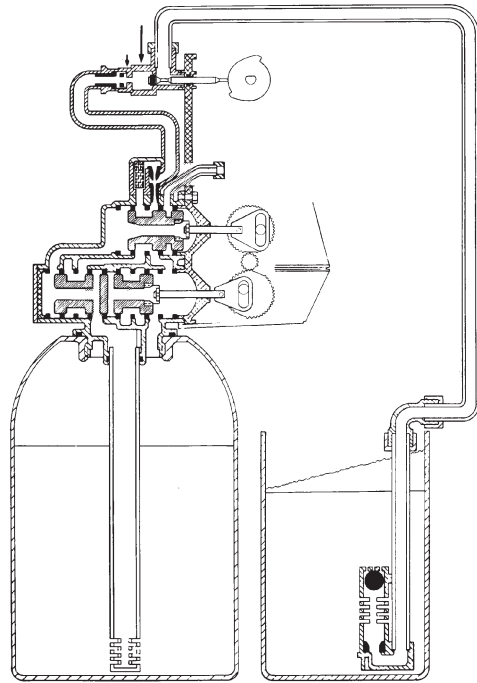
61500-9500LNE_REVA

Water Conditioner Flow Diagrams

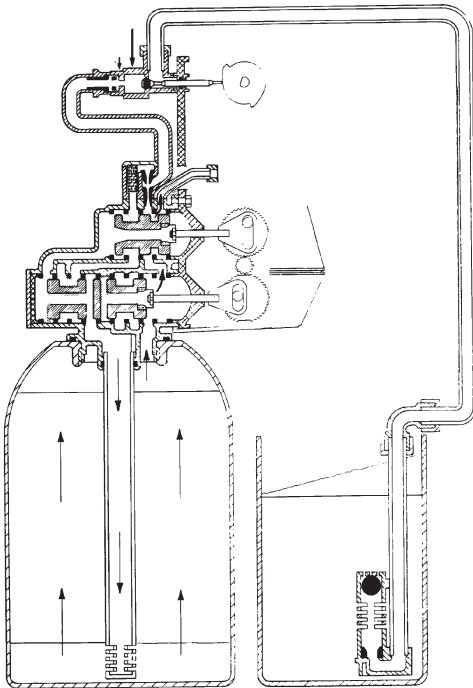
In Service Position



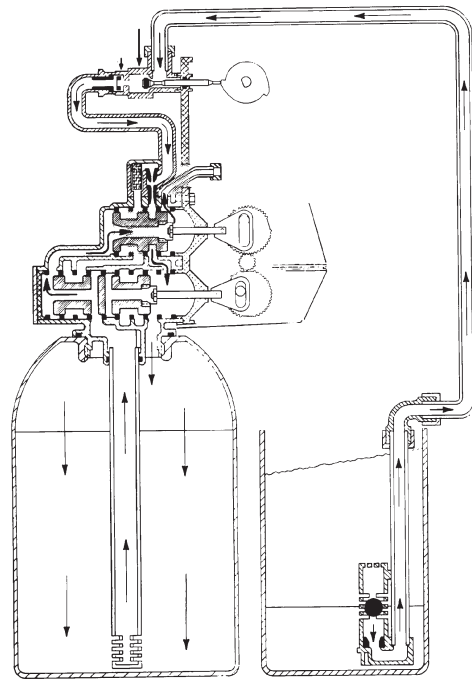
**Tanks Switching Position
(Meter Initiated Regeneration)**



Backwash Position

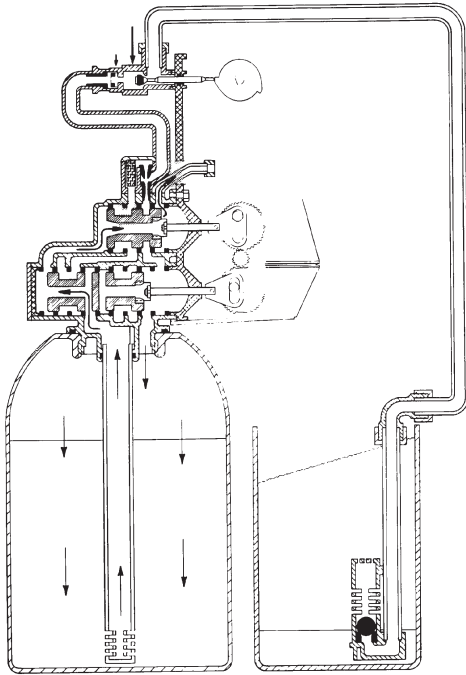


Brine Draw Position

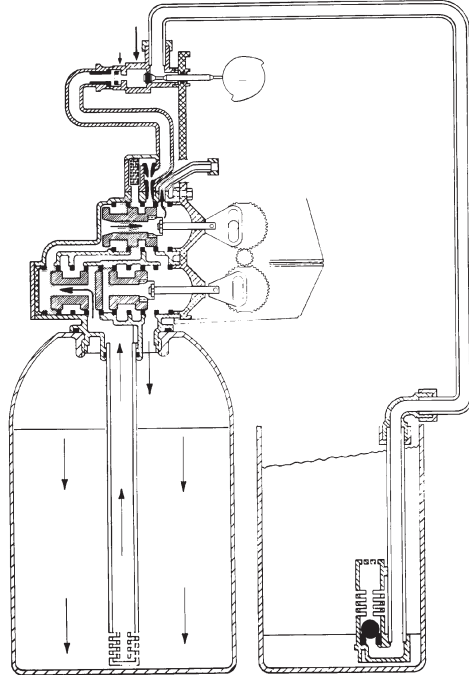


Water Conditioner Flow Diagrams

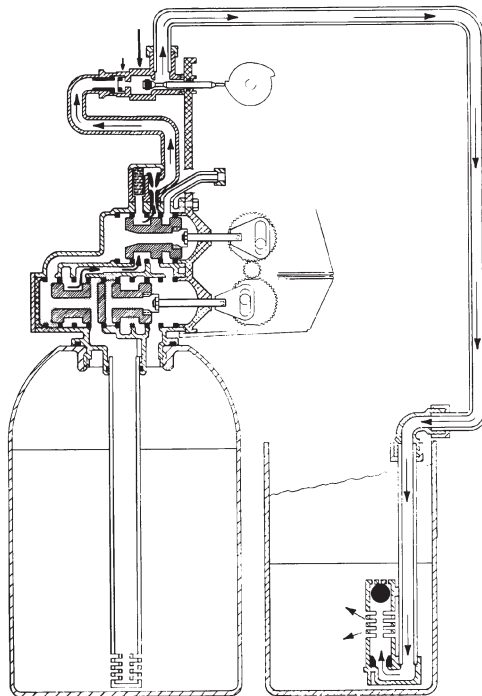
Slow Rinse Position



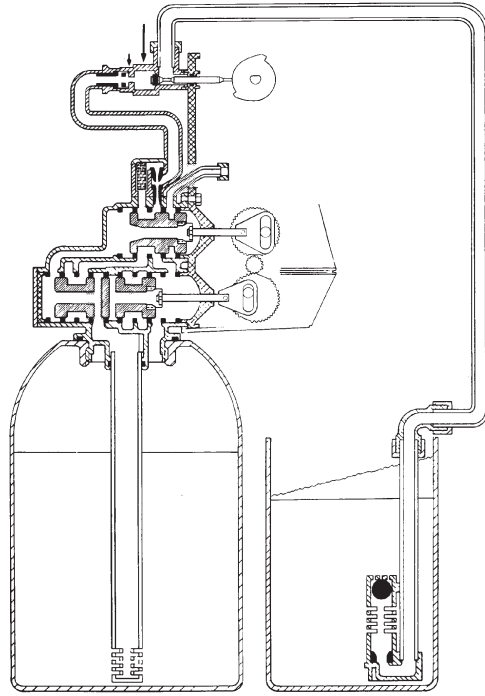
Rapid Rinse Position



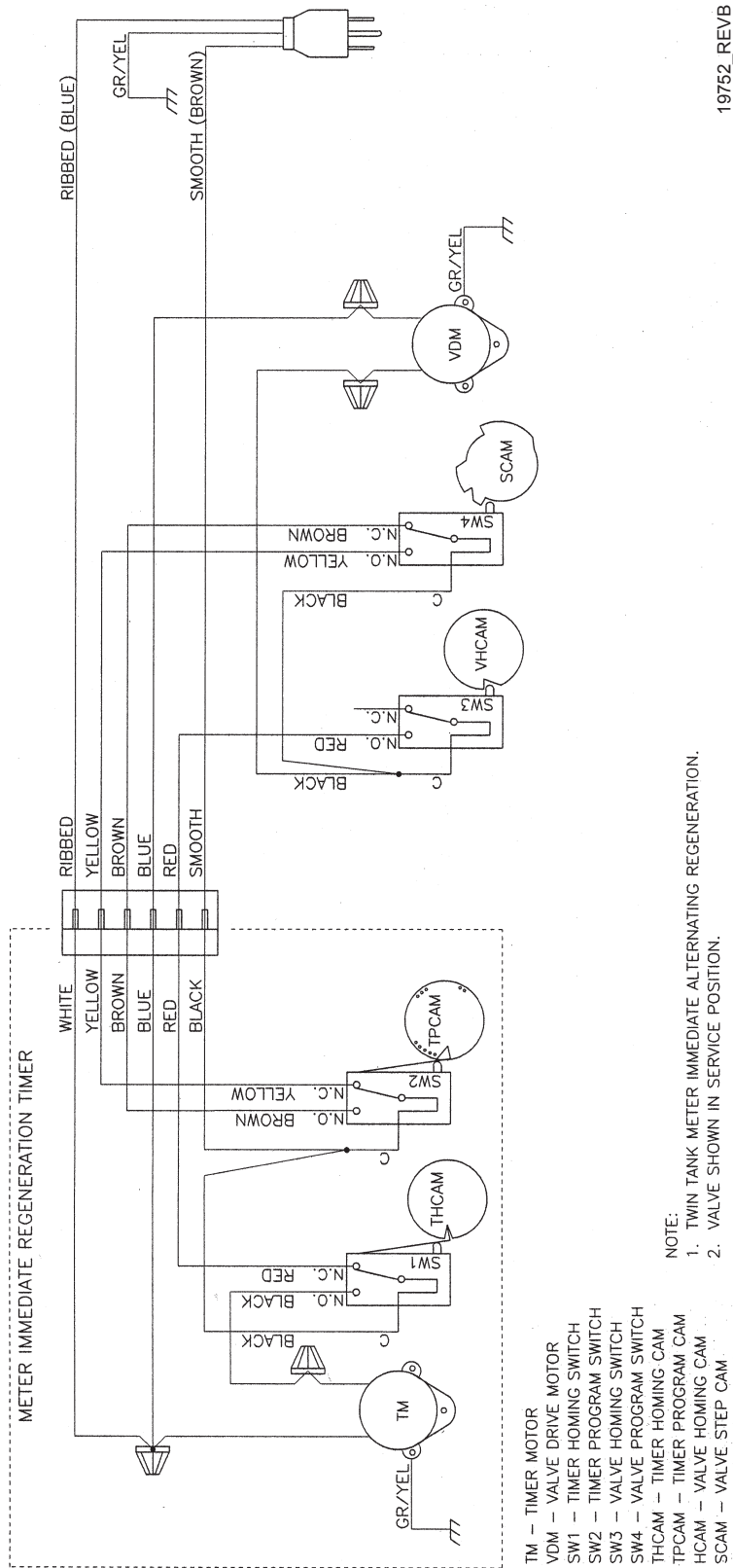
Brine Tank Fill Position



In Service Position, Tanks Switched



9000/9500 Wiring Diagram



19752_REV B

Service Assemblies

Brine Line Flow Controls (9000/9100):

60022-12 BLFC, .125 GPM, 5000/5600/9000/9100
 60022-25 BLFC, .25 GPM, 5000/5600/9000/9100
 60022-50 BLFC, .50 GPM, 5000/5600/9000/9100
 60022-100 BLFC, 1.0 GPM, 5000/5600/9000/9100
 60350 Brine Valve Assy, 9000/9100

Brine Line Flow Controls (9500):

60020-25 BLFC, .25 GPM, 1600
 60020-50 BLFC, .50 GPM, 1600
 60020-100 BLFC, 1.0 GPM, 1600

Brine Valve Assemblies:

60037-610 Brine Valve, 9500/1600, .25 GPM,
 Cold & HW 180°
 60037-620 Brine Valve, 9500/1600, .50 GPM,
 Cold & HW 180°
 60037-630 Brine Valve, 9500/1600, 1.0 GPM,
 Cold & HW 180°
 60350 Brine Valve Assy 9000/9100,
 Cold & HW 180°
 60350-01 Brine Valve Assy, 9000/9100/Twinfl100,
 Cold & HW 180°

1700 Brine Valve Assemblies (9500):

60039-XX Brine Valve, 1700/9500, Cold & HW 180°

Bypass Assemblies:

60040SS Bypass Valve, 5600, 3/4" NPT
 60041SS Bypass Valve, 5600, 1" NPT
 60049 Bypass Plastic Assy

Injector Assemblies (9000/9100):

60385-X Injector Assembly (specify size of injector)

Injector	Number	DLFC	Number	BLFC	Number
Red #0	00	Blank	0	Blank	0
White #1	01	1.2	1	0.25	1
Blue #2	02	1.5	2	0.50	2
Yellow #3	03	2.0	3	1.00	3
Green #4	04	2.4	4		
		3.0	5		
		3.5	6		
		4.0	7		
		5.0	8		
		7.0	9		

Injector Assemblies (9500):

60381-03 Injector Assy, 1700, #3, Cold & HW 150°
 60381-04 Injector Assy, 1700, #4, Cold & HW 150°
 60381-05 Injector Assy, 1700, #5, Cold & HW 150°
 60381-06 Injector Assy, 1700, #6, Cold & HW 150°
 60480-01 Injector Assy, 1600, #1, Plastic,
 Cold Water
 60480-02 Injector Assy, 1600, #2, Plastic,
 Cold Water
 60480-03 Injector Assy, 1600, #3, Plastic,
 Cold Water
 60480-04 Injector Assy, 1600, #4, Plastic,
 Cold Water
 60481-21 Injector Assy, 1600, #1, SS, HW 180°
 60481-21 Injector Assy, 1600, #2, SS, HW 180°
 60481-21 Injector Assy, 1600, #3, SS, HW 180°
 60481-21 Injector Assy, 1600, #4, SS, HW 180°

Meter Assemblies (9000/9100):

15078-01 Adapter, 1" Coupling
 60086 Meter Assy, 5600/9000/9100,
 3/4" Std/Range
 60087 Meter Assy, 5600/9000/9100, 3/4", Ext
 60389 Meter Assy, 9000/9100, 1"
 60389NP Meter Assy, 9000/9100, 1", N/P
 60389-20 Meter Assy, 9000/9100, 1", BSP/Metric
 60390 Meter Assy, 9000/9100, 1", Ext
 60390NP Meter Assy, 9000/9100, 1", Ext, N/P
 60390-20 Meter Assy, 9000/9100, 1", Ext/BSP/Metric
 60612 Meter Assy, 9000/9100, 1", Std Range,
 HW 150°
 60612NP Meter Assy, 9000/9100, 1", Std Range,
 HW 150°, NP
 14038 Meter Cap Assy
 15150 Meter Cap Assy, Ext
 15218 Meter Cap Assy
 15218NP Meter Cap Assy, Std, NP
 15237 Meter Cap Assy, Ext
 15237NP Meter Cap Assy, Ext, NP
 13509 Impeller, Meter
 13509-01 Impeller, Celcon, HW 150°

Meter Assemblies (9500):

60610-01 Meter, 2850/9500, 1 1/2" Std
 60610-01HW Meter, 2850/9500, 1 1/2" Std, HW 150°
 60610-01NP Meter, 2850/9500, 1 - 1/2" Std, N/P
 60610-02 Meter, 2850/9500, 1 - 1/2" Ext
 60610-02HW Meter, 2850/9500, 1 1/2" Ext, HW 150°
 60610-02NP Meter, 2850/9500, 1 - 1/2" Ext, N/P
 60610-21 Meter, 2850/9500, 1 - 1/2" Std/BSP Metric
 60610-21NP Meter, 2850/9500, 1 - 1/2" Std/BSP
 Metric, Nickel Plated
 60610-22 Meter, 2850/9500, 1 - 1/2" Ext/BSP Metric
 60610-22NP Meter, 2850/9500, 1 - 1/2" Ext/BSP
 Metric/Nickel Plated
 60611-01HW Meter, 2850/9500, 1" Sleeve,
 1 1/2" Std, HW 150°
 60611-01 Meter, 2850/9500, 1" Sleeve,
 1 1/2" Std Meter
 60611-01NP Meter, 2850/9500, 1" Sleeve, NP
 1 1/2" Std Meter
 60611-02 Meter, 2850/9500, 1" Sleeve,
 1 1/2" Ext Meter
 60611-02NP Meter, 2850/9500, 1" Sleeve, NP 1 1/2"
 Ext Meter
 17790 Sleeve, Meter, 1 1/2" x 1" (NOTE: when
 reducing a 1-1/2" meter to a 1" meter,
 the program wheel and timer settings must
 be changed to a 1" meter size)

Service Assemblies

Meter Checker Kits:

60460 Meter Checker Kit, Std
60461 Meter Checket Kit, Ext

Piston Assemblies:

60108 Piston Assy, 9500, Upper
60108-01 Piston Assy, 9500, Upper, HW 180°
60109 Piston Assy, 9500, Lower
60109-01 Piston Assy, 9500, Lower HW, 180°
60400 Piston Assy, 9000/9100, Top
60400-01 Piston Assy, 9000/9100, HW Upper, 180°
60401 Piston Assy, 9000/9100, Lower
60401-01 Piston Assy, 9000/9100 Lower, HW 180°

Seal & Spacer Kits:

60125 Seal & Spacer Kit, 5600/9000 Top
60125-20 Seal & Spacer Kit, Top, 559 PE
Cold and Chloramine
60125HW Seal & Spacer Kit, 9000/9100,
Upper HW 180°
60133 Seal & Spacer Kit, 9500, Lower,
Cold & HW 180°
60133-20 Seal & Spacer Kit, 9500, Lower
60133-30 Seal & Spacer Kit, 9500, Lower
60134 Seal & Spacer Kit, 9500, Upper,
Cold & HW 180°
60134-20 Seal & Spacer Kit, 9500, Upper
60134-30 Seal & Spacer Kit, 9500, Upper
60421 Seal & Spacer Kit, 9000/9100, Bottom
60421-20 Seal & Spacer Kit, 9000/9100,
Bottom 559PE
60421HW Seal & Spacer Kit, 9000/9100,
Bottom, HW 180°

Second Tank Assemblies (9000):

14202-01 Screw, Hex Wsh Mach, 8-32 x 5/16
18-8 S.S.
13255 Clip, Mounting
15078-01 Adapter Assy, 1" Coupling
14864-01 Adapter, 9000/9100, 2nd Tank,
Machd w/O-rings
14864-01NP Adapter, 9000/9100, 2nd Tank, Machd, NP
15823-06 Yoke Assy, 6" Tank & 6" Tube
15823-06NP Yoke Assy, 6" Tank, NP 6" Tubes
15823-12 Yoke Assy, 6" - 12" Tank, 8 1/2 Tube
15823-12NP Yoke Assy, 6" - 12" Tank, NP 8 1/2" Tubes
15823-14 Yoke Assy, 14" Tank, 10 1/2" Tube
15823-14NP Yoke Assy, 14" Tank, NP 10 1/2" Tube
15823-16 Yoke Assy, 16" Tank, 12 1/2" Tube
15823-16NP Yoke Assy, 16" Tank, NP 12 1/2" Tube

Second Tank Assemblies (9100):

60425-12 Tube Assy, 9100, 6-12" Tanks
60425-16 Tube Assy, 9100, 13-16" Tanks
14865 Adapter Assy, 2nd Tank, 9100
61419 Kit, 1.05" Distributor Adapter

Second Tank Assemblies (9500):

16919-01 Valve Body, 9500 Machd
16919-01NP Valve Body, 9500 Machd, NP
16919-21 Valve Body, 9500 BSP, Mtrc, Machd
16919-21NP Valve Body, 9500 BSP, Mtrc, Machd
Nickel Plated
60715-16 Tube Assy, 9500, 2nd Tank for
14" to 16" Tanks
60715-16NP Tube Assy, 9500, 2nd Tank, NP for
14" to 16" Tanks
60715-20 Tube Assy, 9500, 2nd Tank for 20" Tanks
60715-24 Tube Assy, 9500, 2nd Tank for 20" and
24" Tanks
60715-24NP Tube Assy, 9500, 2nd Tank, Nickel
for 20-24" Tanks

Tools:

12763 Stuffer Tool Assy, 5600/9000
13061 Puller Assy, Port Ring
13759 Tool, DLFC Retainer

Valve Body Assembly (9100):

40688 Valve Body Assy, 9100
18303 O-ring, -336
18569 Retainer, Tank Seal

Notes



7512i MDB Installation Guide

GENERAL INFORMATION

This document contains information for installing the MEI CASHFLOW™ 7512i coin manager.

- 7512i Multi-Drop Bus (MDB)

This product fits into the standard coin changer channel provided by vending machine manufacturers. It mounts on the existing three mounting studs/screws located in the vending machine.

The features of the Coin Manager include:

- Changeable/configurable coin cassette
- Five auto-replenishing coin tubes (flexibility)
- \$1 coin payout
- LCD display panel - gives instant status of unit
- Patented coin inventory recognition
- MDB interface
- Ability to manage coin inventory to minimum levels

Interface

MEI CASHFLOW™ 7512i operates in machines that support the MDB interface*. MDB is a serial communication interface standard that has migrated into vending equipment since 1996. It allows for multiple devices to be added to a single connection on the vending machine control board, by linking one device to another in series to the main MDB harness.

Rated Operating Voltage

Voltage: 34v d.c. 12W

The operating voltage of a MEI CASHFLOW™ 7512i coin manager is stated on the label of each product. The label is located on the left side of the coin manager.

**Note: MDB (Multi drop bus) interface information can be found on NAMA's website located at www.vending.org*

INSTALLATION INSTRUCTIONS

Before you begin...

*Remove the coin manager from the packaging material. Inspect unit for physical damage that may have occurred during shipping.

*Turn OFF the power supply to the vending machine.

*Push and hold the yellow button on the top right (below reject lever) of the coin manager and tilt the acceptor assembly forward. You do not have to remove the cassette (See Fig 1).

*Once open, the mounting holes are accessible. Hang the coin manager on the mounting studs/screws, ensuring that the changer is mounted on all three studs/screws (See Fig 2).

*Tighten screws (if required) and close the acceptor assembly.

* Remove cassette by sliding two fingers in the yellow latch and lift the cassette outwards and upwards as shown in Fig. 3.

* Manually fill cassette with coins. Insure that coins are inserted into the proper tubes.

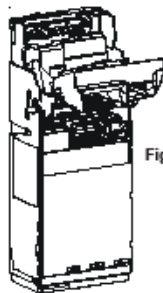
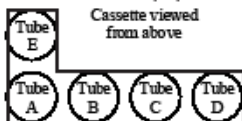


Fig. 1

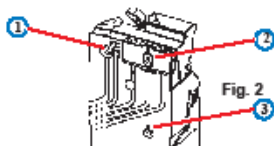
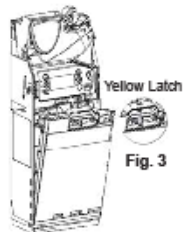


Fig. 2

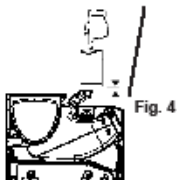


Yellow Latch

Fig. 3

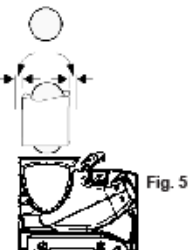
Alignment

*Once the coin manager is installed, check that there is a small gap (2-4 mm) between the lever on the vending machine and the return lever on the coin manager (See Fig 4). Check that when you press the coin return lever on the machine door, it fully opens the acceptor lid on the coin manager, then returns smoothly without holding the lid open.



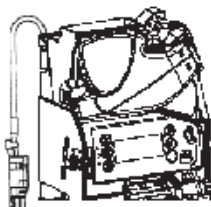
*Check the alignment of the coin input chute and cashbox chute. Insert some coins to check that they enter the coin manager properly and exit into the return cup (See Fig 5). Ensure that the coin chute does not rest on or open the flight deck lid.

Most machines allow you to adjust the return lever, coin chute, and the return cup to align with the coin manager. Align, adjust, and test as necessary to ensure coins are properly routed before continuing with these instructions.



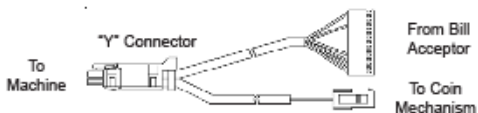
Connection

An MDB (Multi-Drop Bus) coin manager will be supplied with one or two harnesses. One connector transmits power and communication from the vending machine to the coin manager. The second harness allows for power and communication between the coin manager and another MDB device.



Coin manager with one harness...

- If you have a bill acceptor, connect the MDB harness coming from the coin

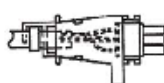


manager to the bill acceptor's "Y" connector.

If there is no bill acceptor, connect the coin manager harness to the harness coming from the machine's control board.

Coin manager with two harnesses... (Main and MDB Peripheral)

The purpose of having two harnesses (one male connector, one female socket), is that the 7512i coin manager has the ability to store bill acceptor audit data. The bill acceptor data can be viewed on the 7512i display. Connecting the bill



6 pin male connector
(connects to vendor)



6 pin female socket
(connects to other MDB device)

acceptor to the coin manager enhances the coin management capabilities.

- Disconnect the harness connecting the bill acceptor to the machine's control board. Attach the male connector coming from the coin manager to the female connector coming from the VMC. Attach the female connector from the coin manager to the bill acceptor's male connector.

- Tuck any excess length of harnessing inside the machine. Make sure all harnesses are not trapped when the coin return lever is pressed or when the vending machine door is closed.

- Now you may switch "ON" the power to the vending machine.

Initial Power Up (First Time Out of Box)

The coin manager will power up and check to see how many coins are in each tube. If the tubes are empty the coin manager will alert you which tubes are low (See figure 6). You should fill the three lowest coin value tubes with a minimum of five coins per tube (i.e. On a 5,5,25,10,25 configuration, you would have to fill tubes ACD).



Fig. 6

Once you've filled the cassette with coins, the coin manager will measure the tubes for 5 seconds and display a happy face, an "OK", and the total amount of change in the tubes (See Fig. 7). Dispense some coins from each tube to check that all coins drop into the coin return cup properly.



Fig. 7

If no cassette has been defined, the coin manager, when powered up, will display a warning message indicating the cassette needs to be defined before the product will operate (See fig. 8).

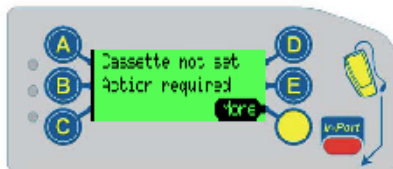


Fig. 8

The user needs to press the "more" key to proceed.

The user has two options:

*Enter the cassette model located on the front of the cassette (i.e. AB). The unit may be ordered with one of the cassette configurations shown on page 10.

or

*Insert a valid coin then select the tube location (A-E) to which that specific coin is to be routed. Repeat procedure on all five tubes until all tubes have been assigned a coin. Press "Next" , followed by "Accept".

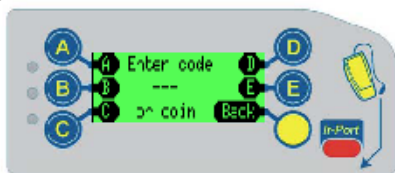


Fig. 9

Once you've defined the cassette, fill the cassette with coins. The coin manager will check tube capacity, then display a happy face, an "OK", and the total amount of change in the tubes (as shown in Fig. 7).

Service Menu

The yellow button below the "E" is the mode key. The mode key provides access to all of the features of the coin manager.

When the yellow MODE key is pressed once, the user interface will enter Service Mode where features can be selected by pressing the keypad (See Fig 10).

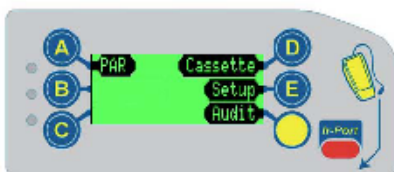


Fig. 10

After 5 seconds the screen will change slightly and the "audit" key will become the "Back" key.

Service Mode Features

PAR (Float)

The PAR default setting (comes set from the factory) is "PAR to Level". PAR to Level allows you set the level of each individual tube so that once the level is reached, further coins may be sent to the cash box.

The default PAR Level (from factory) is full tubes.

If you change the PAR setting to "PAR to Value". The default value is \$50.

Par to value looks at the total value of coins in all five tubes.

The PAR (or float) operation has three stages:

- Payout of any coins above the PAR
- Request insertion of coins that are below PAR
- Display Results

SETUP

After selecting the 'setup' button, a warning screen is displayed prompting a specific key sequence(ABC) to be entered to ensure that the setup menu is not accidentally entered (See Fig 11).



Fig. 11

When the setup menu has been entered it consists of a hierchial menu that can be navigated using up and down keys to locate the required sub menu (See Fig 12).



Fig. 12

Service Mode Features (Continued)

The current item is shown on the top line.

If "up arrow" key is pressed, the next menu item is displayed.

If "down arrow" key is pressed, the previous menu item is displayed.

If "back" is pressed the previous menu level is displayed.

If "back" is held for more than 2 secs, it exits the service mode.

If no key is pressed for 45 secs, then it exits the service mode.

The setup menu allows you to:

View Messages (If Present)

Change PAR styles, PAR levels, PAR value, snap shot

Manage Change

Change Cassettes or Individual Tubes

Token Teach

Perform Self Test (Manual / Auto)

View Error Log

Change Audit Setup

Setup MDB Options

along with other features...

Service Mode Features (Continued)

AUDIT

If the yellow Mode Key is pressed twice in quick succession (with cassette in), then the display will show audit information.

Each message will be shown for 3 seconds. The screen can be frozen on the display by pressing "pause". The "pause" button will then alter to become a "resume" button (See Fig 13). When the "resume" button is pressed, the screens will continue to show, in sequence, the audit information.



Fig. 13

Audit information displayed:

Value of Cash to Cashbox
Value of Cash to Tubes
Value dispensed as change
Value of manual dispense
Total Tube value
Tube A Count
Tube B Count
Tube C Count
Tube D Count
Tube E Count

Annualized Estimates follow

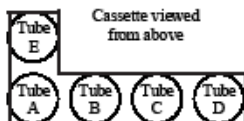
Sales Lost in Exact Change
Percentage time in Exact Change
Value of Sales in Exact Change
Value of Sales with Change Available
Number of Sales in Exact Change
Number of Sales with Change Available
Average Price with Change Available
Time In Change
Time With Change
Time Disabled by VMC

End of Audit

Service Mode Features (Continued)

CASSETTE

The coin manager can be ordered with one of several cassette configurations:



USA Cassettes

Key Code	Tube A	Tube B	Tube C	Tube D	Tube E
AA	10	5	25	25	5
AB	10	5	25	\$1	5
BA	25	5	25	25	25
BB	10	5	10	25	5
CC	Custom cassette 1 – defined in factory or by service tool				
CD	Custom cassette 2 – define yourself using cassette teach				
DAC	25	5	\$1	\$1	25
DCA	25	10	25	\$1	5
DCB	25	10	\$1	\$1	5
DCC	25	10	25	25	5
DCD	5	10	10	10	5
DCE	10	10	10	10	5

The coin manager can also be custom configured by removing any of the coin tubes and replacing them with another denomination tube. But there are restrictions:

Always include at least one 5c tube in all custom configured cassettes.

Do not place the \$1 tube in tube A or B position.

Do not place the 25 cent tube in tube B position.

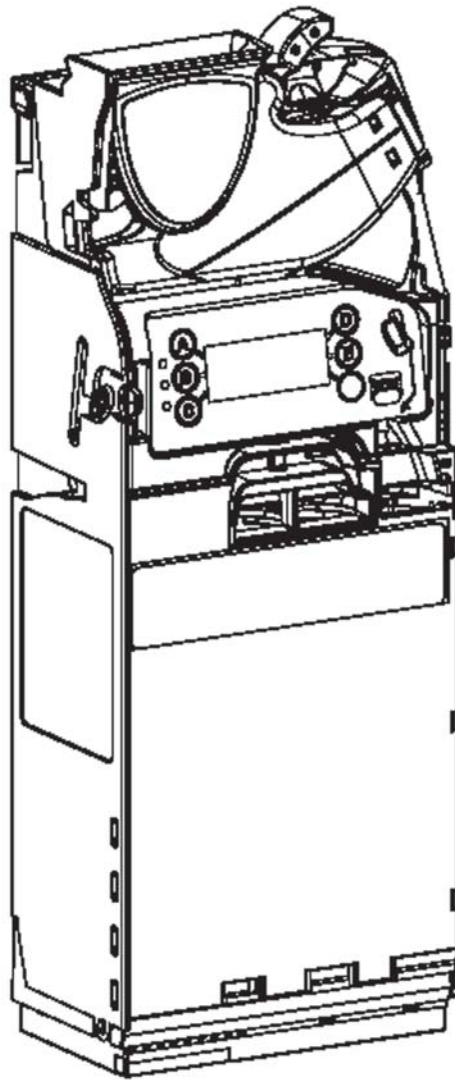
Do not place the 10 cent tube in tube E position.

Coin	Tube # & Base Color	Max Fill (\$) (by coin manager)	Manual Fill (\$) (do not fill more than)	Position In cassette
5c	22 Red	77 (\$3.85)	87 (\$4.35)	A,B,C,D,E
10c	19 White	115 (\$11.50)	127 (\$12.70)	A,B,C,D
25c	25 Black	84 (\$21.00)	96 (\$24.00)	A,C,D,E
\$1	27 Blue	89 (\$89.00)	81 (\$81.00)	C,D,E

For additional instructions on tube positioning, you may contact our help desk at 1-800-345-8172.

mei | cashflow®

Cashflow 7512i Operation & Service Guide



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Technical Support 1-800-345-8172
www.meigroup.com

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Part # 794471001 G2

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GENERAL INFORMATION

Introducing the MEI CASHFLOW™ 7512i coin manager.
Principle components of the coin manager are:

1 Reject Lever

2 Acceptor/Separator. Sensors determine the authenticity of a coin or token. Accepted coins or tokens are routed to one of five tubes or the cashbox. Rejected coins or tokens are routed to the coin return cup.

3 LED's. Red, Amber and Green LEDs are used to indicate the status of the coin manager.

4 Keypad and message display. This is used to configure the coin manager, by using a menu.

5 Coin tube cassette. This is used to store and route coins for dispensing as change, thus enabling bills of high denomination to be accepted.

6 Dispenser. This dispenses coins being returned as change.

Interface

MEI CASHFLOW™ 7512i operates in machines that support the MDB interface*. MDB is a serial communication interface standard that developed into vending equipment since 1996. It allows for multiple devices to be added to a single connection on the vending machine control board, by linking one device to another parallel to the main MDB harness.

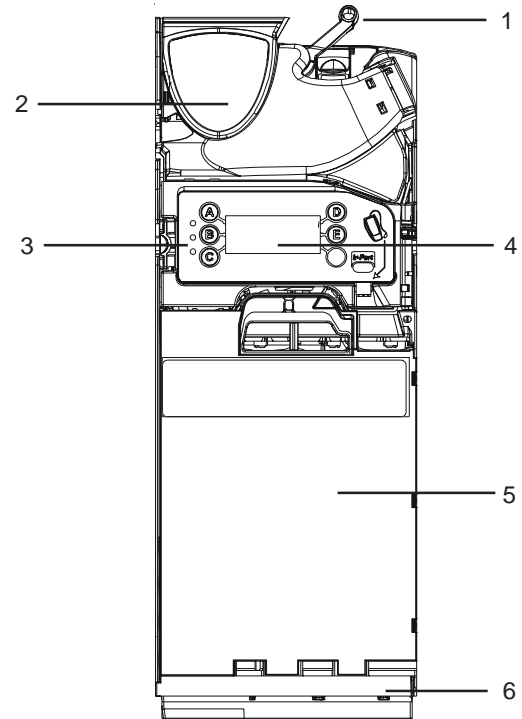
Rated Operating Voltage

Voltage: 34v d.c. 12W

The operating voltage of a MEI CASHFLOW™ 7512i coin manager is stated on the label of each product. The label is located on the left side of the coin manager. It must not be used with any power source other than that indicated.

The features of the Coin Manager include:

- In field changeable/configurable coin cassette
- Five auto-replenishing coin cubes (flexibility)
- \$1 coin payout
- LCD display panel - gives instant status of unit
- Patented coin inventory recognition
- MDB interface
- Ability to manage coin inventory to minimum levels



**Note: MDB (Multi drop bus) interface information can be found on NAMA's website located at www.vending.org*

INSTALLATION

Before you begin...

- Remove the coin manager from the packaging material. Inspect unit for physical damage that may have occurred during shipping.
- Turn OFF the power supply to the vending machine.
- Push and hold the yellow button on the top right (below reject lever) of the coin manager and tilt the acceptor assembly forward. You do not have to remove the cassette (See Fig 1).
- Once open, the mounting holes are accessible. Hang the coin manager on the mounting studs/screws, ensuring that the changer is mounted on all three studs/screws (See Fig 2).
- Tighten screws (if required) and close the acceptor assembly.
- Remove cassette by sliding two fingers in the yellow latch and lift the cassette outwards and upwards as shown in Fig. 3.
- Manually fill cassette with coins. Insure that coins are inserted into the proper tubes.

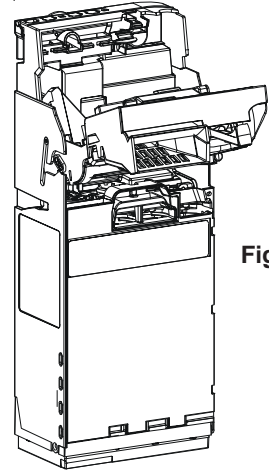
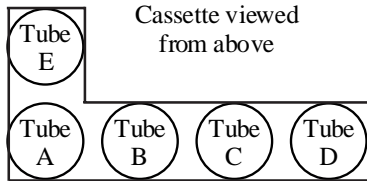
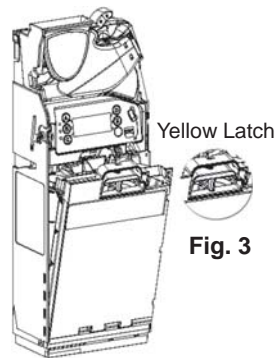


Fig. 1



Cassette viewed from above



Yellow Latch

Fig. 3

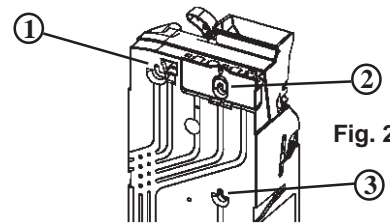


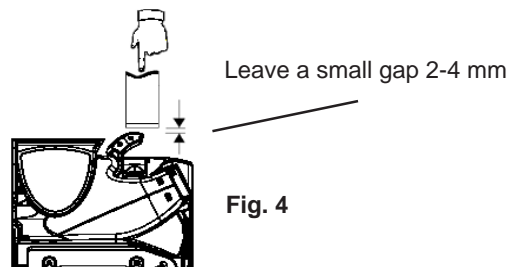
Fig. 2

Alignment

•Once the coin manager is installed, check that there is a small gap (2-4 mm) between the lever on the vending machine and the return lever on the coin manager (See Fig 4). Check that when you press the coin return lever on the machine door, it fully opens the acceptor lid on the coin manager then returns smoothly without holding the lid open.

•Check the alignment of the coin input chute and cashbox chute. Insert some coins to check that they enter the coin manager properly and exit into the return cup (See Fig 5). Ensure that the coin chute does not rest on or open the flight deck lid.

Most machines allow you to adjust the return lever, coin chute, and the return cup to align with the coin manager.



Leave a small gap 2-4 mm

Fig. 4

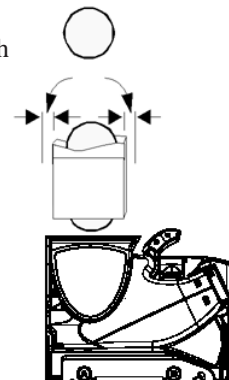
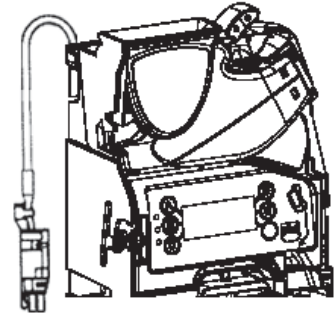


Fig. 5

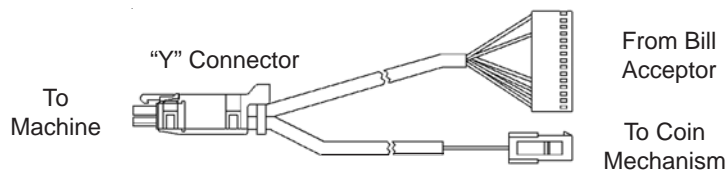
Connection

The coin manager will be supplied with one or two harnesses. One connects the coin manager to the vending machine. The second harness, if present, allows for power and communication between the coin manager and another MDB device.



Coin manager with one harness...(Main)

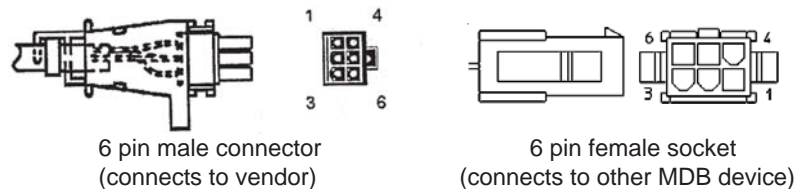
- If you have a bill acceptor, connect the MDB harness coming from the coin manager to the bill acceptor's "Y" connector.



- If there is no bill acceptor, connect the coin manager harness to the harness coming from the machine's control board.
- Switch on power.

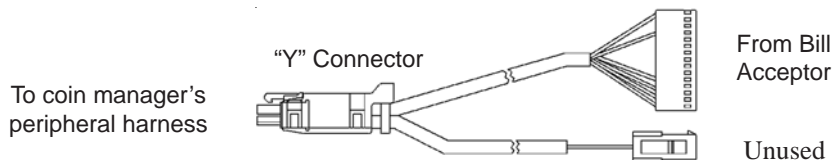
Coin manager with two harnesses... (Main and MDB Peripheral)

The purpose of having two harnesses (one male connector, one female socket), is that the 7512i coin manager has the ability to store bill acceptor audit data. The bill acceptor data can be viewed on the 7512i display. Connecting the bill acceptor to the coin manager enhances the coin management capabilities and allow you to collect critical business statistics (CBS is defined on page 19).



- Disconnect the harness connecting the bill acceptor to the machine's control board. Attach the male connector coming from the coin manager to the female connector coming from the VMC. Attach the female connector from the coin manager to the bill acceptor's male connector.

Note: There will be an unused MDB connector from the bill acceptor.



- Tuck any excess length of harnessing inside the machine. Make sure all harnesses are not trapped when the coin return lever is pressed or when the vending machine door is closed.

- Now you may switch "ON" the power to the vending machine.

Initial Power Up (First Time Out of Box)

The coin manager will power up and check to see how many coins are in each tube. If the tubes are empty the coin manager will alert you which tubes are low (See figure 6). You should fill the three lowest coin value tubes with a minimum of five coins per tube (i.e. On a 5,5,25,10,25 configuration, you would have to fill tubes ACD).



Fig. 6

Once you've filled the cassette with coins, the coin manager will measure the tubes for 5 seconds and display a happy face, an "OK", and the total amount of change in the tubes (See Fig. 7). Dispense some coins from each tube to check that all coins drop into the return cup properly.



Fig. 7

If **no** cassette has been defined, the coin manager, when powered up, will display a warning message indicating the cassette needs to be defined before the product will operate (See fig. 8).

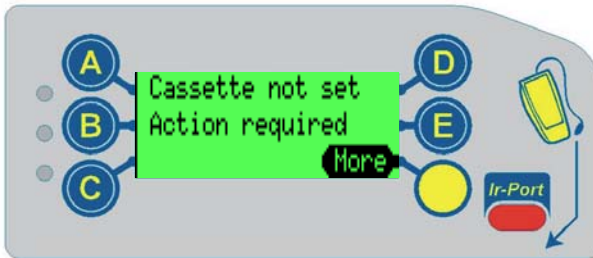


Fig. 8

The user needs to press the "more" key to proceed.

The user has two options:

- Enter the cassette model located on the front of the cassette (i.e. AB). The unit may be ordered with one of the cassette configurations shown on page 9.

or

- Insert a valid coin, then select the tube location (A-E) to which that specific coin is to be routed. Repeat procedure on all five tubes until all tubes have been assigned a coin. Press "Next", followed by "Accept".

Once you've defined the cassette, fill the cassette with coins. The coin manager will check tube capacity, then display a happy face, an "OK", and the total amount of change in the tubes (as shown in Fig. 7).

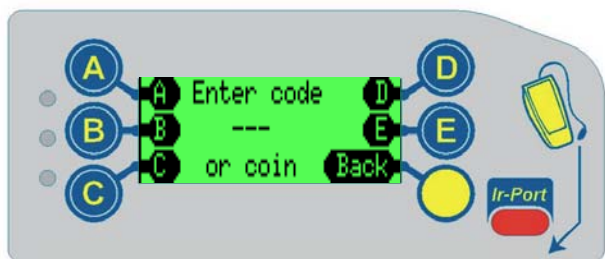


Fig. 9

Service Menu

The yellow button below the "E" is the mode key. The mode key provides access to all of the features of the coin manager.

When the yellow MODE key is pressed once, the user interface will enter Service Mode where features can be selected by pressing the keypad (See Fig. 10).

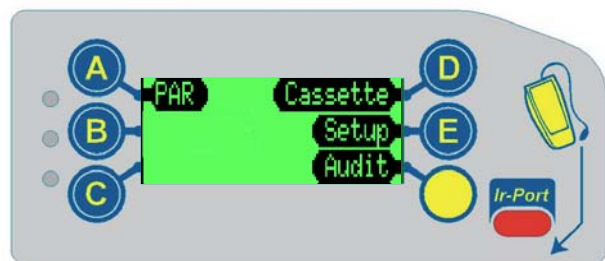
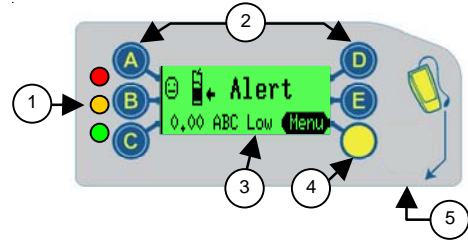


Fig. 10

After 5 seconds the screen will change slightly and the "audit" key will become the "Back" key.

Using the MMI Display

- 1 - 3 LEDs - Red, Amber, and Green provide changer status.
- 2 - Buttons A thru E - When the coin manager is in the idle state, the blue buttons can be used to dispense coins from the tubes. If however, the mode button is pressed before hand, these buttons are used to navigate through the service & set-up menu options.
- 3 - Display (LCD) - Displays warnings and menu information
- 4 - Mode Button - The mode button can be used to access the two configuration modes available. Service Mode and Set-up mode.
 - Service Mode: gives access to the most frequently used product configuration options.
 - Set-up Mode: gives access to general product configuration options that are required when setting up your coin manager.
- 5 - Service Connector - Allows you to connect a Cashflow programming Module (CPM) to the coin manager.



LED Light Codes


The 3 LEDs fitted on the coin manager provides up to the minute status information.




If all LEDs are off, then the coin changer has no power.. Check that there is power to the host machine and that the harness is connected properly. ○

During power up or when reset, the LEDs will cycle 5 times.





If a coin changer ever flashes alternate red and green , remove the coin changer, and send to a local service center.


Green LED Codes


A solid  means the coin manager is on and working properly.


Blinking  means coins are being measured.

1 blink  means a valid coin was accepted.


2 blinks  means an unknown coin was rejected.


3 blinks  means a valid coin that has been inhibited was rejected. You can program the coin manager or the vending machine to inhibited a coin.

Slow flashing  means the coin manager is in Set-up or Service Mode


Fast flashing  means the coin manager has a message available for display.


Amber LED Codes


Solid amber  means the coin manager is inhibited by the VMC.

1 flash  means there is a discriminator error

2 flashes  means there is an accept gate error

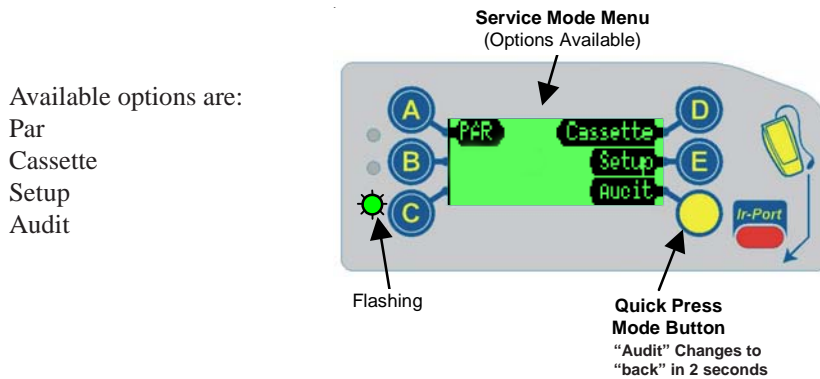
3 flashes  means there is a separator module top sensor or tube cassette error.

4 flashes  means there is a dispenser module error

5 flashes  means there is a low change alert

Accessing the Service Mode

A Quick press of the Yellow (mode) button will take you into the Service Mode menus. The display will change to show the available option available. (see picture below).



Par

If you press the **A** button in service mode, the coin manger will start par. The coin manager will either dispense excess coins or ask you to insert a specific quantity of coins into each tube to equal the set par value. (For more information on par options, refer to the set-up mode section).

PAR (Float)

The PAR default setting (comes set from the factory) is "PAR to Level". PAR to Level allows you set the level of each individual tube so that once the level is reached, further coins may be sent to the cash box.

The default PAR Level (from factory) is full tubes.

If you change the PAR setting to "PAR to Value". The default value is \$50.

Par to value looks at the total value of coins in all five tubes.

The PAR (or float) operation has three stages:

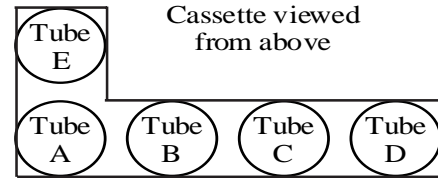
- Payout of any coins above the PAR
- Request insertion of coins that are below PAR
- Display Results

Cassette

If you press the **D** button in service mode, you enter cassette mode. In Cassette mode, you will need to enter a cassette code or insert a coin through the acceptor. The cassette mode allow you route coins to different tubes. You may choose a preprogrammed cassette or custom configure a cassette.

Pre-Programmed USA Cassettes

Key Code	TubeA	Tube B	Tube C	Tube D	Tube E
AA	10	5	25	25	5
AB	10	5	25	\$1	5
BA	25	5	25	25	25
BB	10	5	10	25	5
CC	Custom cassette 1 - defined in factory or by service tool.				
CD	Custom cassette 2 - define yourself using cassette teach.				
DAC	25	5	\$1	\$1	25
DCA	25	10	25	\$1	5
DCB	25	10	\$1	\$1	5
DCC	25	10	25	25	5
DCD	5	10	10	10	5
DCE	10	10	10	10	5



Custom cassettes:

You must always include at least one 5c tube in all custom configured cassettes.

Do not place the \$1 tube in position A or B.

Do not place the 25 cent tube in position B.

Do not place the 10 cent tube in position E

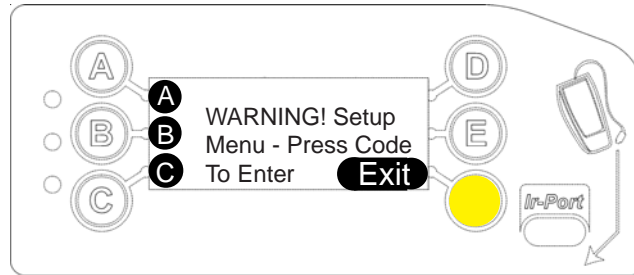
Coin	Tube Base Color	Max Fill (\$)	Manual Fill(\$)	Tube Position – OK
5c	Red	77 (3.85)	87 (4.35)	A,B,C,D,E,
10c	White	115 (11.50)	127 (12.70)	A,B,C,D,
25c	Black	84 (21.00)	96 (24.00)	A,C,D,E,
\$1	Blue	69 (69.00)	81 (81.00)	C,D,E,

Select the cassette option, Insert a nickel into the top of the coin manager. Select all tube locations (A-E) where you placed a nickel tube. Follow the same procedure with remaining coins for which a tube has been assigned in your custom cassette. Once all letters on the display have been replaced by a coin denomination press the next button. The display will ask you to accept / cancel the change. Once you accept the change press OK to complete the operation.

Setting or Changing Options

Setup

If you press the **E** button in service mode, you enter setup mode. In Setup mode a warning will appear asking you to press the A- B -C buttons to make sure you want to enter this menu. Once you press these buttons, you access to the following:



u to select par style (par to auto, par
ar to value).

- Messages*** *If a message is available setup mode will begin with this option to view the message. If no message is available, the setup mode will start with “par options”.
- PAR OPTIONS**
- CHANGE MGMT** Allows you to setup tube fill levels and coin payout mix to optimize coin return.
- VENDOR OPTIONS** Allows you to setup option that are specific to the Multi Drop Bus (MDB) interface.
- COIN CONFG** Allows you to setup token teach, security, coin setup, channel setup, exchange rate, and alarm timeout (0 - 1275 seconds).
- AUDIT CONFG** Allows you to view the machine id and serial number under the setup option, reset the ir pod password, and set the install date, edit report titles and edit interims in the printer option.
- GENERAL** Allows you to calibrate tubes, change coins being accepted, reset the clean-me level, save changer setting or restore the last saved settings.
- ERROR LOG** Allows you to view or reset the last 10 error logs recorded by the coin manager.
- TEST** Allows you to test the coin manager components, connectivity, and coin manager information.
- LANGUAGE** Allows you to change the language displayed (English, French, Spanish, Italian, Portugues, etc).

Defining each setup option:

- Messages*** Messages are the result of “tube wizard”. Tube wizard is an application that generates tube and cassette suggestions in any of the par options. These messages suggest different tube configurations based on the coin managers operation over previous weeks of constant operation. If coin demand changes or fluctuates over time, messages will appear suggestion changes.

Defining each setup option(continued):

PAR OPTIONS

Par is the level/value of coins that are to be left in the changer after the route person fills/services the coin manager. Three types of par options are: par levels, par value, and snapshot par.

Par to level

CHANGE MGMT

Tube fill level:

Fill to Max Capacity - means the tubes will fill to capacity. Capacity for each coin are: 5c - 77 coins, 10c - 115 coins, 25c - 84 coins, \$1 - 69 coins.

Fill to Par- means that additional coins, that exceed the setup amount, will be routed to the cashbox.

Large Coins - means "Best for customer" Fewest coins paid out to consumer.

Small Coins - means "Best for operator" Small coins dispensed more often. Less small coins directed to cashbox.

Change machine - Acts like a bill changer machine. Will give a mix of coins (i.e.\$1=3x25c,2x10c,1x5c).

VENDOR OPTIONS

Optimize change:

Off / On - If "On", the coin manager decides the best mix of change to dispense.

Levels:

Level - MDB protocol has Level 2 and Level 3 (MDB comms type). Keep always in Level 3. Consult MEI technical support for more detail regarding this option.

Coin Counts:

As TRC0004 - reports first 3 coins as zero as does the TRC6512.

As CF 1234 - reports all coins in tubes as does the CF690 (Euro).

Par coins:

Hide / Report - When filling, par coins credit is not reported in the hide mode. In report mode par coins are credited to the machine.

Coin Scaling:

Should be set to 5 for US and Canada. Never change this setting.

Decimal Pnt:

Should be set to 2 for US and Canada. Never change this setting.

Country:

Should be set to 0001 for US and Canada. Never change this setting.

COIN CONFG

Token Teach:

Select a location (1 - 6)

Value token - Enter value, then name then insert 32 samples

Vend token - Enter name, then insert 32 samples

Reject token - Enter name, then insert 32 samples

Slug - Enter name, then insert 32 samples

Security (changes settings for all 32 coin channels):

Hi acceptance - Default setting. Should remain in this mode unless frauds occur

Hi security - Tighter acceptance window. Used if frauds occur.

Coin Setup:

Allows operator to edit values (i.e. US and/or Canadian), enable/disable acceptance and change coin type (coin, token, slug).

32 coin channels available.

Defining each setup option(continued):

COIN CONFG

Channel setup:

Channel 1 -32 (enabled / disabled)

Acceptance parameters for an individual channel can be set.(i.e. changing the US.10 cent coin from high acceptance to high security).

Exchange rate:

Set the exchange rate between two currencies (i.e. exchange rate from US\$ to CN\$ is set at US\$1 to CN\$1.5819). The operator must set and maintain the exchange rates as they fluctuate.

Cleanme level:

Default level @ 59%. A cleanme message will appear if acceptance falls below this set value. An operator may change the percentage.

This percentage is based on:
$$\frac{\text{\# of accepted coins out of the last 64 coins}}{\text{the last 64 coins inserted}} * 100\%$$

Alarm timeout:

Operator may set unit to reject coins in increments of 5 seconds after a fraud is detected. Default has this feature turned off.

Alarm time x 5 seconds (i.e. if alarm time is set a “2”, coins will be rejected for 10 seconds after a fraud is detected).

The following types of tokens can be taught:

- **Vend token** – the token is reported as an MDB TOKEN to the machine, which typically treats it as a free vend token, for more precise information on vend token handling refer to the vending machine manual.
- **Value token** – the token is assigned a value (as per a coin) and accepted and routed to cashbox. As MDB does not distinguish between coin credit and token credit it will be possible to get change or returned monies having inserted a value token.
- **Reject vend token** – the token is reported as an MDB TOKEN to the machine, which typically treats it as a free vend token, for more precise information on vend token handling refer to the vending machine manual. However, this token will always be returned to the customer in the reject chute even though it is credited as being accepted as a token. A typical application would be using a token to open a newspaper vendor on a street corner.
- **Slug** – this allows a fraudulent object to be taught and inhibited, to prevent it being accepted and credited as a valid coin.

See token diagram on the next page.

Defining each setup option(continued):



AUDIT CONFG

Setup:

Reset audit - None, interims, totals + Interims

None - means no reset after collection of audit information

Interims - all interims values are reset after each collection

Totals + Interims - All values (including historical) are rest after collection. Operator decides on feature's use.

Machine ID: (default is unit serial number)

Operators may change this number to suit needs. The machine ID will appear in DEX readings.

IR password (Reset):

This option is for remote IR port. Does not affect the IR port on the changer keypad.

Printer:

The entire printer feature sets printed report parameters if an optional printer is installed on the changer.

Report type

Basic (print basic report)

Interims (prints basic + interims)

Free Vends (prints all three reports)

Report Languages - English, French, German, Dutch, Spanish

Report Title

Edit as needed.

Install date

Edit as needed.

Defining each setup option(continued):

GENERAL

Accept / pay:

Allows operator to change between coins accepted and coins paid out from tubes.

Calibrate tubes:

Should only be performed by service personnel!

Settings:

Allows operator to set configuration of changer and save. If settings are unknown, operator can restore to last saved setting.

Save (save new configuration settings)

Restore (restore last saved settings)

ERROR LOG

View / reset:

Allows operator to view last 10 error records. These are shown from newest to oldest.

Errors in log may be erased (reset).

TEST

Auto / Manual / Info:

Auto test - performs an auto test of all components of the coin manager. Upon completion of a successful test, the changer will display “passed”.

Manual test - Allows you to perform individual test of the components.

The components are:

Coin sensors (coin sensor idles)

Accept gate (checks accept gate sensor)

Gate Sensor

Separator

Cassette

Dispenser

Temperature

Comms

Other

Info:

In the info mode, the following information is provided for servicing purposes.

Software version, Hardware version, Boot loader version, coin manager serial number, acceptor serial number.

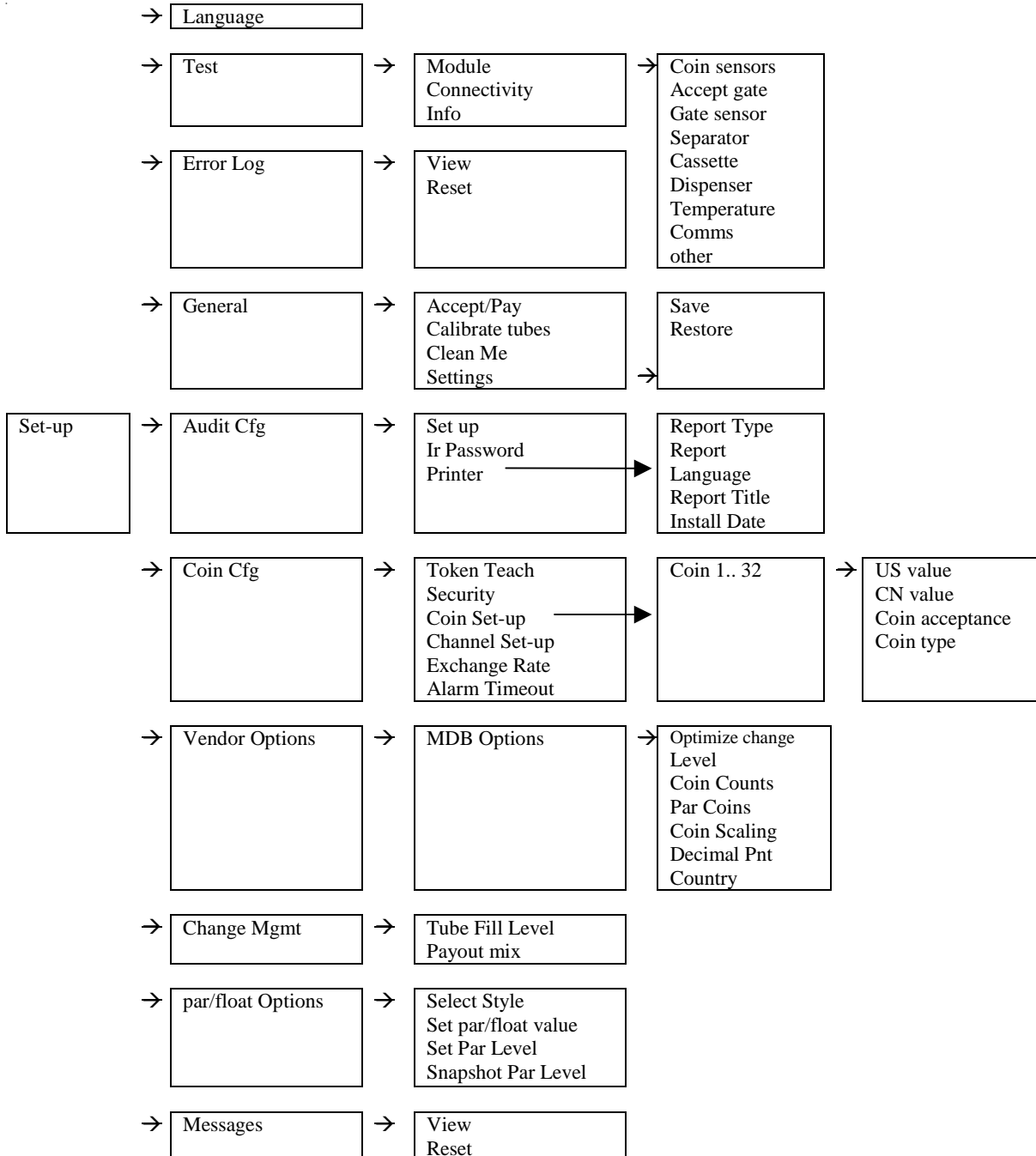
LANGUAGE

Language is set at factory. Operator can change as needed. The following languages are available.

English, French (Euro or Canadian), Spanish (Spain or Latin American) , Dutch, Portuguese, Italian.

Defining each setup option(continued):

Setup Menu Map



Audit

If the yellow Mode Key is pressed twice in quick succession (with cassette in), then the display will show audit information. Each message will be shown for 3 seconds. The screen can be frozen on the display by pressing “pause”. The “pause” button will then alter to become a “resume” button . When the “resume” button is pressed, the screens will continue to show, in sequence, the audit information.

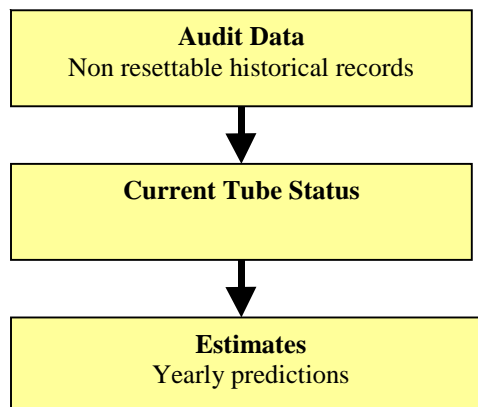
Audit information displayed:

Value of Cash to Cashbox	Annualized Estimates
Value of Cash to Tubes	Sales Lost in Exact Change
*Value of Bills Accepted	Percentage time in Exact Change
Value dispensed as change	Value of Sales in Exact Change
Value of manual dispense	Value of Sales with Change Available
Total Tube value	Number of Sales in Exact Change
Tube A Count	Number of Sales with Change Available
Tube B Count	Average Price with Change Available
Tube C Count	Time In Change
Tube D Count	Time With Change
Tube E Count	Time Disabled by VMC

* “Value of Bills Accepted” will be present in the audit information, only if the bill acceptor is attached to the coin manager’s optional MDB peripheral harness.

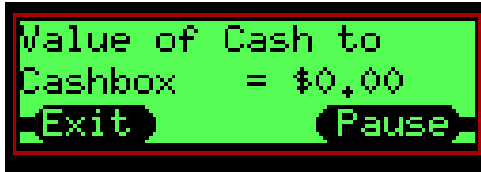
Audit Screens

There are three types of data shown. The first set of screens show historical data (sometimes referred to as totals or non-resettable values). These values are set to zero when the product is built and then always increase. The second set of screens show the current status of the tube counts and the third set show estimates for yearly performance.



Audit(Cont.)

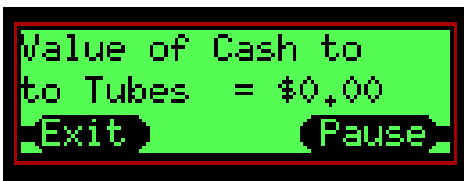
The first few screens show audit information that has been recorded from actual events. They are a historical record of what has occurred since the product was first built.



EVA DTS (DEX) reference CA306

Value of Cash To Cash Box Since Initialisation

Value of cash sent to the cashbox. Does not include value of free vend tokens. Non-Resettable.



EVA DTS (DEX) Reference CA307

Value of Cash To Tubes Since Initialisation

Value of all coins sent to the inventory tubes, including sales and manual fill modes. Does not include value of free vend tokens. Non-Resettable.

EVA DTS (DEX) Reference CA308

Value of Bills In Since Initialisation

Total value of all bills (banknotes) accepted. Does not include value of free vend tokens. Non-Resettable.

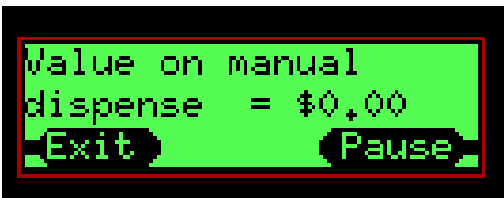
NOTE: This screen will only be shown if a bill validator is currently attached (or has been previously attached) to the MDB peripheral connector. The changer cannot record audit information if the bill validator is connected directly to the vending machine.



EVA DTS (DEX) Reference CA403

Value of Cash Dispensed Since Initialisation

Total value paid out as change plus the value manually dispensed. Non-Resettable.



EVA DTS (DEX) Reference CA404

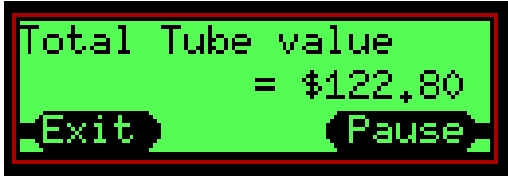
Value of Cash Manually Dispensed Since Initialisation

Total value dispensed manually. Non-Resettable.

Audit (Cont.)

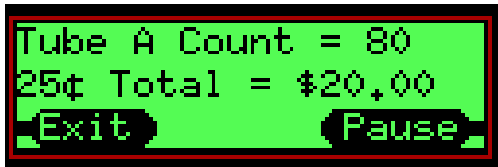
Current Tube Information

The next few screens show information that describes the current state of the coin tubes.



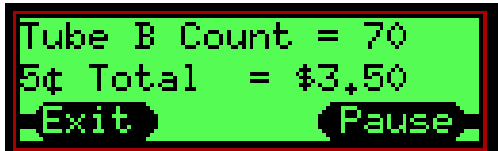
Total Tube Value

This is the total currency value of all the coins stored in the entire cassette.



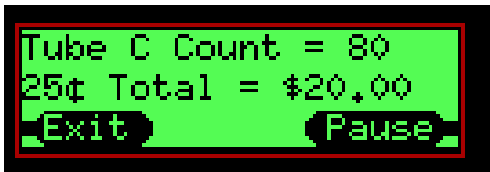
Tube A Count

This screen shows the number of coins in tube A e.g. 80 The type of coin e.g. 25 cent. The total value of coins in this tube \$20.00 (i.e. $80 \times 25c = \$20.00$)



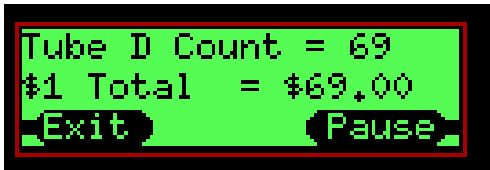
Tube B Count

This screen shows the number of coins in tube B, the type of coin and the total value of coins in this tube



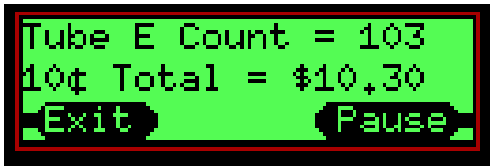
Tube C Count

This screen shows the number of coins in tube C, the type of coin and the total value of coins in this tube



Tube D Count

This screen shows the number of coins in tube D, the type of coin and the total value of coins in this tube



Tube E Count

This screen shows the number of coins in tube E, the type of coin and the total value of coins in this tube

Critical Business Statistics (CBS) - Estimates of Yearly Performance

This information provides annualized estimates of product performance and is based on a limited amount of information. The product collects data up to the last 28 days and makes yearly estimates based on this. However this information may not be totally accurate for the following reasons -

a) As the MDB protocol does not give the changer full knowledge of the vend cycle, the CF7XXX has to make some assumptions on when and what data to collect (i.e. when vends occur and how much they cost.).

Audit (Cont.)

Critical Business Statistics (CBS) - Estimates of Yearly Performance

b) The unit will store data for up to the last 28 days and will extrapolate this to give the yearly estimates, 1 full day of information is sufficient to start the process. Therefore predictions based on a small amount of information (less than 28 days or small number of transactions) may give wildly inaccurate predictions. This also does not account for any seasonal variation.

c) **Exact change** is when the changer has less than 5 tube coins of any of the lowest three coin denominations This may be a different algorithm to that used in the vending machine so the light on the front of the machine may not reflect what the changer thinks is happening.

d) If a tube is not in use (dispenser jam or tube jam) then the count for that tube is set to 0 and if it is a sole low denomination tube this will cause the changer to consider it is in exact change for 100% of the time.

e) If bills are used to pay for products and the validator is not connected to the changer MDB peripheral connector then some of yearly estimates will be wrong.

GUIDANCE NOTE: CBS information is not audit data and must be treated separately. As it is based on estimations it should really be used as a guide only.



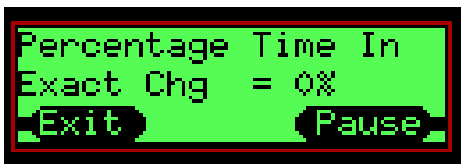
This message is shown for a few seconds as a prompt that the next few screens of information are estimates for the upcoming year.



Sales Lost in Exact Change

This value is an estimate of how much sales will have been lost because customers may have been deterred from using the machine because the exact change light is on.

This figure is calculated by comparing the daily rate of sales when the exact change light is on vs. daily rate of sales when exact change light is off then scaling this figure to be a yearly estimate.



Percentage Time in Exact Change

This is a computation of the % time the changer was low in change over the monitored period.

This percentage is computed using the actual measured amount of time in exact change over the monitored period and the duration of the period.

Audit (Cont.)

Critical Business Statistics (CBS) - Estimates of Yearly Performance

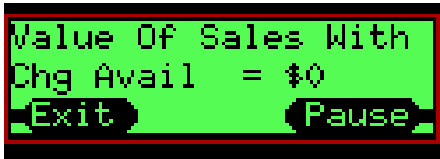


```
Value Of Sales In
Exact Chg = $0
Exit      Pause
```

Value of Sales in Exact Change

This is a yearly estimate of how much product will be sold when the changer deems it is in exact change.

Computed by averaging the amount of sales in exact change over the monitored period then scaling it to a yearly figure.



```
Value Of Sales With
Chg Avail = $0
Exit      Pause
```

Value of Sales With Change Available

This is a yearly estimate of how much product will be sold when the changer deems it has change available.

Compute an estimate by averaging the amount of sales when change is available over the last period

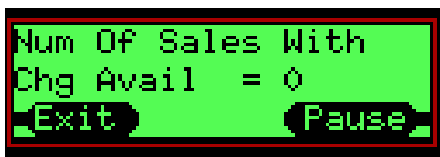


```
Num Of Sales In
Exact Chg = 0
Exit      Pause
```

Number of sales in Exact Change

This is a yearly estimate of how many products will be sold when the changer deems it is in exact change.

Averages the number of sales when in exact change light over the monitored period then scales it to a yearly figure.



```
Num Of Sales With
Chg Avail = 0
Exit      Pause
```

Number of sales with Change Available

This is a yearly estimate of how many products will be sold when the changer deems there is change available.

Averages the number of sales when not in exact change light over the monitored period then scaling it to a yearly figure.



```
Average Price With
Chg Avail = $0.00
Exit      Pause
```

Average Price With Change Available

This is computed by dividing total value of sales by the number of sales to get an average price.

Notes:

This figure may create a value which is not a multiple of valid coins e.g. 21 cents, this is likely to occur on vending machines that have more than one price. The value of a sale is not available over MDB and so the changer has to estimate this based on coins inserted and paid out. This simple estimation will not be correct if the machine is in multi vend mode, a bill validator is attached directly to the machine or any other non standard set-up.



```
Time With
Chg = 0 Secs
Exit      Pause
```

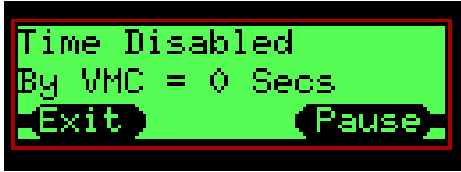
Time With Change Available

This is a yearly estimate of how long the changer will be operating with change available (i.e. exact change light OFF)

This is based on a daily average time with change available scaled to a yearly figure.

Audit (Cont.)

Critical Business Statistics (CBS) - Estimates of Yearly Performance



Time Disabled by VMC

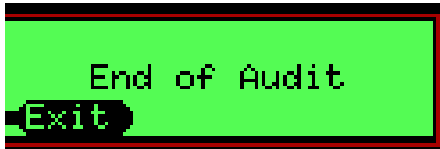
This is an estimate of how long in a year the machine will be disabled. This could be because of machine faults, sold out of product, jams etc

The average daily time disabled is scaled to make a yearly figure.

Notes

This excludes brief periods (less than 30 seconds) typically when the product is being vended

The changer does not have a real time clock so only measures time when it is powered on. If the machine is switched off at night and operates correctly during the day the changer will measure it as never being disabled.



End of Audit

This message indicates there are no more screens of information

CBS Yearly Estimate Formula

This section contains more detailed formula used in the computation of the CBS yearly estimates.

The following items are monitored during the monitoring period (which may be upto 28 days long) and are used as a basis for the estimates:

- Value of Sales
- Number of Sales
- Duration in Exact change
- Value of Sales when in exact change
- Number of Sales when in exact change
- Duration disabled by vending machine
- Elapsed time (time when the changer is powered on)

Sales Lost in Exact Change

$\text{SalesValueDuringOK} = \text{Sum of sales for last period} / \text{number of days in the period}$

$\text{SalesValueDuringEC} = \text{Sum of sales for last period} / \text{number of days in the period}$

$\text{SalesValueECPerDay} = (\text{SalesValueDuringEC} * \text{ONE_DAY_IN_MINS}) / \text{MinsInECCondition};$

$\text{SalesValueOkPerDay} = (\text{SalesValueDuringOK} * \text{ONE_DAY_IN_MINS}) / \text{MinsInOKCondition};$

Yearly sales lost in exact change = $(\text{SalesValueOkPerDay} - \text{SalesValueECPerDay}) * 365$

Audit (Cont.)

Critical Business Statistics (CBS) - Estimates of Yearly Performance

Percentage Time in Exact Change

Total time in exact change = sum of time in EC for last period

Average time per day in EC = total time in exact change / number of days in the period

Percentage time in exact change = (average time per day in EC/time for 1 day) * 100

Value of Sales in Exact Change

Daily sales in EC = sum of sales when EC ON in last period/ number of days in last period

Yearly sales in EC = daily sales in EC * 365

Values of Sales With Change Available

Daily sales with change available = sum of sales when EC OFF in last period/ number of days in last period

Yearly sales with change available = daily sales with change available * 365

Number of sales in Exact Change

Volume of daily sales with EC ON = sum of volume of sales when EC ON in last period/ number of days in last period

Yearly volume of sales with EC ON = volume of daily sales with EC ON * 365

Number of sales with Change Available

Volume of daily sales with EC OFF = sum of volume of sales when EC OFF in last period/ number of days in last period

Yearly volume of sales with EC OFF = volume of daily sales with EC OFF * 365

Average Price With Change Available

SalesValueDuringOK = sum of value of sales in the last period while EC is OFF

SalesNumberDuringOK; = number of sales in the last period while EC is OFF

average_price = SalesValueDuringOK / SalesNumberDuringOK;

Time With Change Available

SecsInECCondition = sum of time in exact change in last period

Daily average time in EC = SecsInECCondition / number of days in last period

Daily average time with change available = Number of seconds in a day - Daily average time in EC

Yearly Time with change = Daily average time with change available * 365

Time Disabled by VMC

Total time disabled = sum of time disabled in the last period

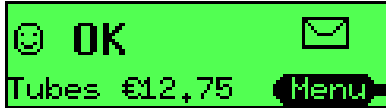
Average daily time disabled = total time disabled / number of days in the period

Yearly time disabled = average daily time disabled * 265

How to Section

How to remove envelope icon from display

Symptom: Envelope icon appears on display
Cause : SMS message available for reading
Fix: View, action and delete SMS message



The changer will indicate an SMS message is present as follows:

- Green LED flashes fast continuously
- Envelope icon appears on the display

The system reports the presence of an SMS message when:

- The operator has left a message for another operator/user
- Tube Wizard is recommending a change to cassette configuration



To view message(s):

- Press **Menu**
- Press **Setup**
- Press **abc**
- Press **Select** to choose messages
- Press **Select** to view messages
- Use **Up/Down** arrows to access messages



To delete message(s):

- Press **Menu**
- Press **Setup**
- Press **abc**
- Press **Select** to choose messages
- Press **Up Arrow**
- Press **Select**
- Press **Accept** to delete all messages



NOTES:

The same Tube Wizard message is not repeated in consecutive weeks for the same cassette - even if the recommendation made is still valid. Changing the cassette model resets the recommendation system.

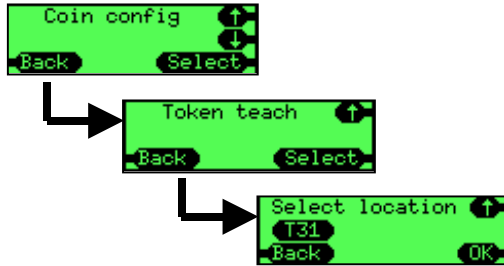
How to Section

How to delete a token

Symptom: Want to remove a previously taught token

Cause : Token was previously taught and accepted

Fix: Follow this procedure to delete the token data



Enter token teach by:

- Press **menu** then
- Press **Setup** then
- Press **abc**
- scroll to the “Coin cfg” menu and
- Press **Select**.
- Scroll to “Token Teach” menu
- Press **Select**.

Select the required token by:

- using the **up** and **down** keys
- press **OK**.



Select the type of token as:

- **Delete** - this will delete data for the existing token in this slot



A confirmation screen will be displayed:

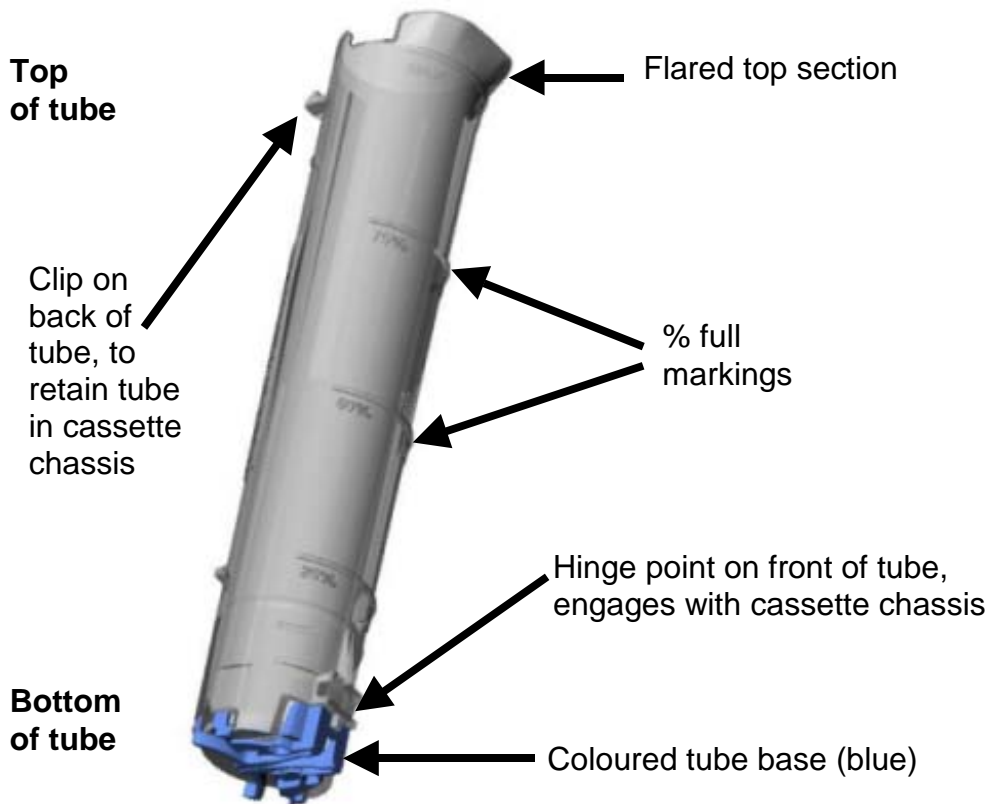
- Press **Accept** to delete the token

When a token has been deleted it will

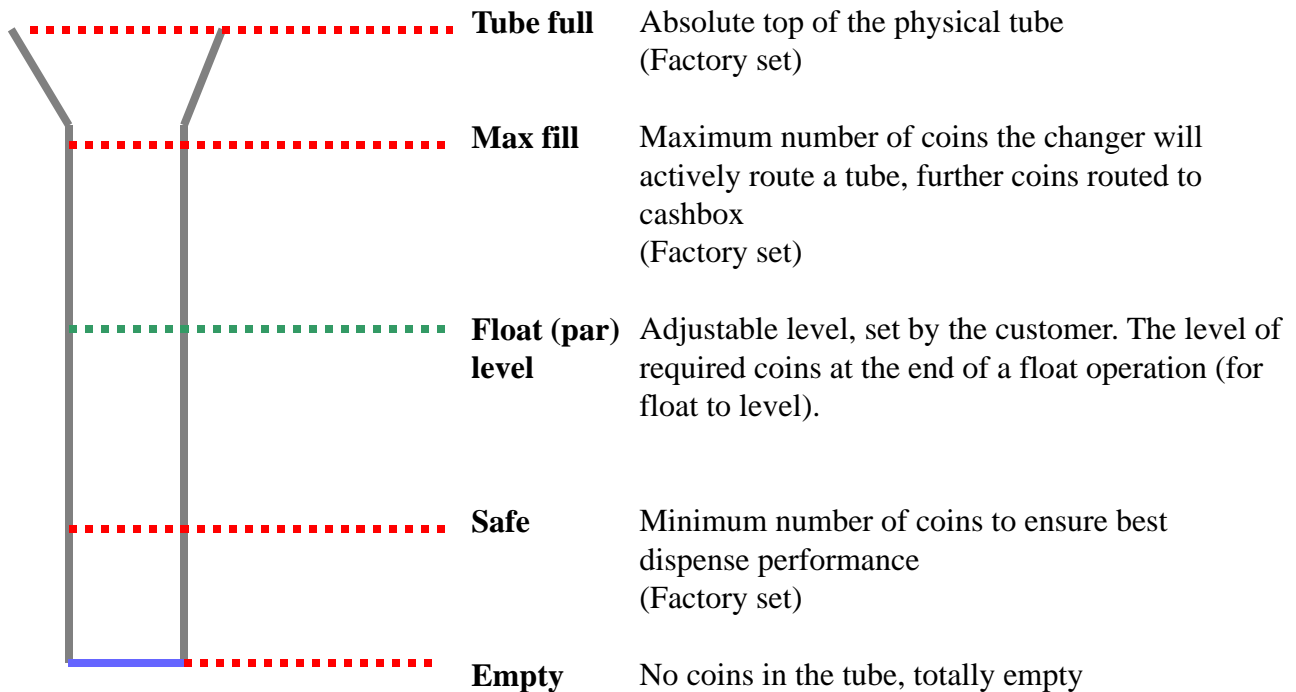
- Delete the data that was used to validate what object it was
- Delete the type of token
- Delete the token description (text string)

How to Section

How to understand tube terminology



Tube References (Soft Options)



How to Section

How to reset the “Clean me” message

Symptom: Changer indicates it requires the deck to be cleaned

Cause : Dirt build up on the coin flight deck

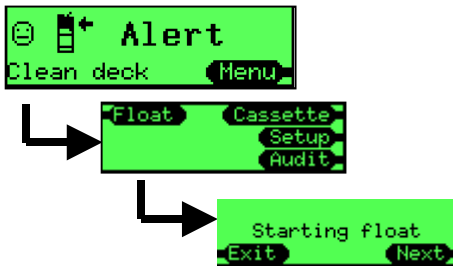
Fix: Follow the procedure below to Clean



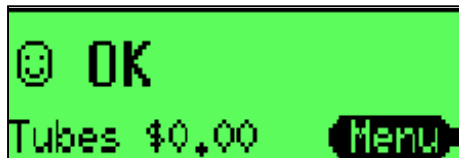
Changer displays a message indicating it needs cleaning because it has detected that recently (in the last 64 insertions) a lot of coins are not being discriminated as a valid coins



Open the lid
wipe both surfaces of the coin entry with a damp cloth
Close the lid



Press **menu**
Press **float** on 7900 or par on 7512
Press **A** (there is no prompt by the A key)



The changer now displays it is OK

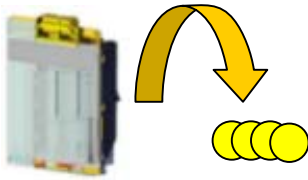
How to Section

How to calibrate a coin cassette

Symptom: Changer indicates the cassette has not been calibrated

Cause : The changer has not been previously calibrated with that cassette configuration

Fix: Follow the procedure below to perform the calibration



If the display indicates a cassette is un-calibrated or you want to improve the performance of the coin level sensing system by calibrating the exact cassette that is fitted to the changer then follow this procedure.

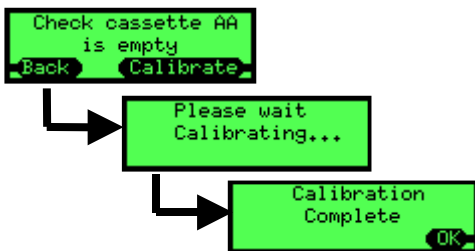
Remove the cassette and check it is empty then refit it.



Press **menu** then setup then abc

Scroll to the “General” menu then press **Select**

Scroll to the “Calibrate tubes” menu then press **Select**.



It will prompt you to check the corresponding cassette is fitted, if it is then press **Calibrate**, otherwise press **Back** and program the correct cassette code before restarting this procedure.

The changer will check each tube at least twice so there will be at least 10 clicks.

It will display a message when it has finished, press **OK**.



Press the **Back** key repeatedly to exit the menu, the main screen will now be shown with no un-calibrated warning.

How to Section

How to float/par the changer

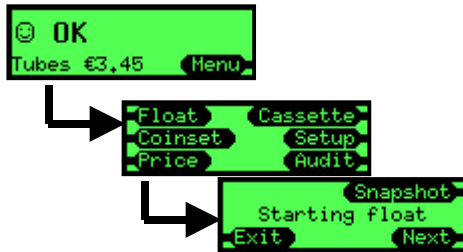
Symptom: Changer has more or less coins than the target float condition

Cause : Changer has paid out and received coins since last being visited

Fix: Float the changer as described

The float process involves two stages:

- Dispense of excess coins
- Addition of insufficient coins



If there is no action to be performed for a stage then it will automatically move onto the next stage.

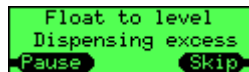
To start the float operation:

- Press **menu**
- Press **float**

The changer will display a screen indicating it is about to start the float process. Either

- Wait 2 seconds or/
- Press the **Next** key

(a) Dispense excess coins

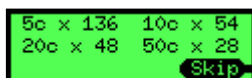
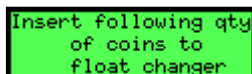


The changer will now dispense any excess coins, that is extra coins in the tube that are above the float setting. As coins are dispensed remove them from the coin return on the machine. If the coin return fills up with coins the dispense process can be paused (then resumed) by either:

- Press **Pause** key or/
- Press the reject lever

When all the excess coins have been dispensed the changer will move to stage 2 and ask the user to insert any additional coins it requires to achieve the float condition.

(b) Add extra coins



Insert the requested coins into the changer through the validator, the count of how many coins are required will decrease as coins are inserted. When sufficient quantity of a coin have been inserted it will stop prompting for that coin and reject any more of that type.

When all coins have been inserted it will display a message indicating that the float condition has been achieved.

It is possible to skip stages and not insert all the required coins, if this is done a different message will be shown at the end indicating the float condition was not achieved.

How to Section

How to set-up auto float/par

Symptom: Too much money in changer tubes
Cause : Manually set float/par levels are too high
Fix: Use auto float/par and set it up as described

What is Auto Float/par?

The aim of this algorithm is to have no settings for the customer to setup or compute and the changer to operate with the minimum amount of money in the tubes but ensuring the exact change light is rarely lit and that change is available for vends.

How Does it work?

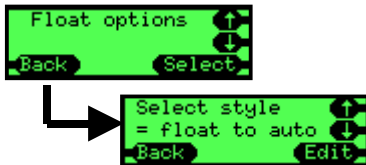
The algorithm uses probability calculations to reduce the chance of the exact change light coming and monitors prices and whether bills are used to determine the fewest number of coins with the best optimal mix.

Will it work immediately?

No, it requires some time to gather information on how the tubes are being used, during this time it will run the tubes at their maximum level to ensure there is always enough change.

How do you Set-up Auto Float?

Use the keypad and screen to enable this function by:



- Press Menu
- Press Setup
- Press abc
- Scroll to the item "Float options" then press Select
- Scroll to the item "Select style" then press Select
- Press Edit
- Use the up or down keys to alter the setting to "Float to auto" then press OK

How to Section

How to set-up float to value

Symptom: Want to improve coin mix in the tubes but keep same value in the tubes

Cause : Manually set float to level not working well enough

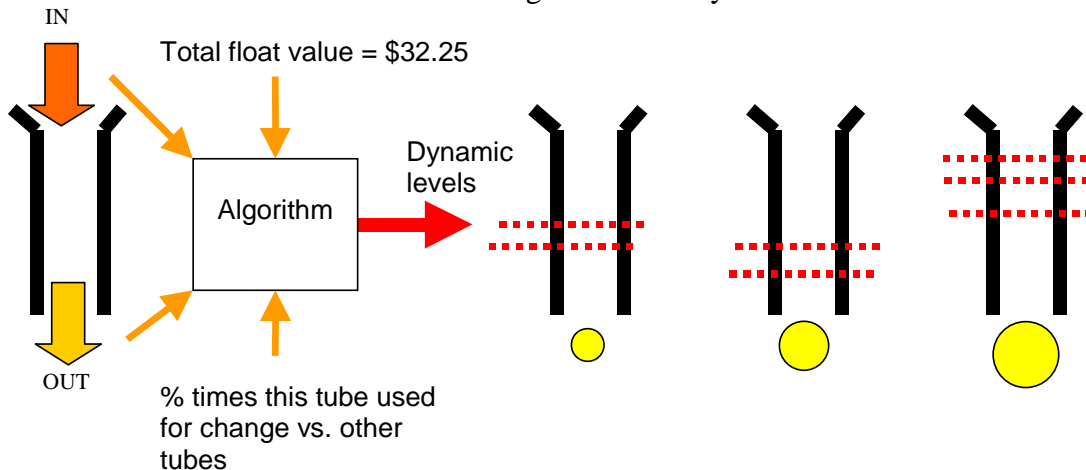
Fix: Use float to value to allow changer to compute coin levels

What is Float to value?

The aim of this algorithm is for the customer to have a simple setup and audit process i.e. they want \$xx in the tubes but for the changer to compute and dynamically alter the ratio of coins in the tubes to give the best mix of coins ready for change.

How Does it work?

The algorithm continually computes coin levels for each tube based upon whether tubes are naturally replenished or depleted and how often the tube is used for change. It will always try and have at least 7 coins in any tube to ensure the exact change indication is kept off, then add more coins to the tubes until the overall value for the entire cassette matches the target value set by the customer.



Will it work immediately?

Yes, however the initial mix of coins in the tubes may be non optimal

How do you set it up?

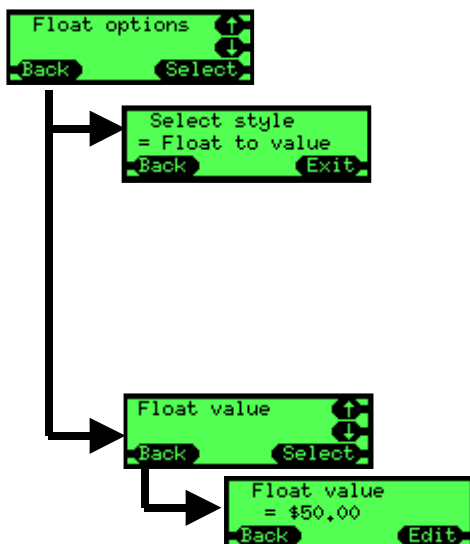
Use the keypad and screen to enable this function by:

Set the float style

- Press **Menu**
- Press **Setup**
- Press **abc**
- Scroll to the item "Float options" then press **Select**
- Scroll to the item "Select style" then press **Select**
- Press **Edit**
- Use the up or down keys to alter the setting to "Float to value" then press **OK**

Set the float value

- Scroll to the item "Float value" then press **Select**
- Press **Edit**
- Use the up/down/left/right keys to alter the value
- Press **OK**



How to Section

How to use snapshot float

Symptom: Want to set float levels to current cassette condition

Cause : Float not setup as required

Fix: Use snapshot float by following this procedure

The snapshot feature works regardless of the float style (to level or to value, not applicable to auto). When this function is triggered it takes a “snapshot” of the current cassette and uses that to setup the float settings.

If required fill the cassette with the required amount of coins.

- This maybe a specific mix of coins e.g. 30 x 5c, 20 x 10c, 10 x 20c
- Or so each tube is filled so the top of all the coins are at the same level
- Or the overall value of the cassette holds €20.00

To take a snapshot follow these steps:

- Press **menu**
- Press **float**
- Press **snapshot**

If operating in “float to level” the screen will show the current levels in the tubes

If you wish to adjust a value then

- press the **adj** key
- use the **up/down** keys to select the required tube
- press **Edit**
- use the **up** and **down** keys to alter the value
- press **OK**
- when all coin tube values have been updated (if required) press **Done**

- If the displayed values for float are acceptable then press **Accept**

If operating in “float to value” the screen will display the total value of coins currently in the cassette

- This value can be adjusted by pressing the **adj** key in a similar manner
- When the required value is displayed press **Accept**

How to Section

How to select a payout algorithm

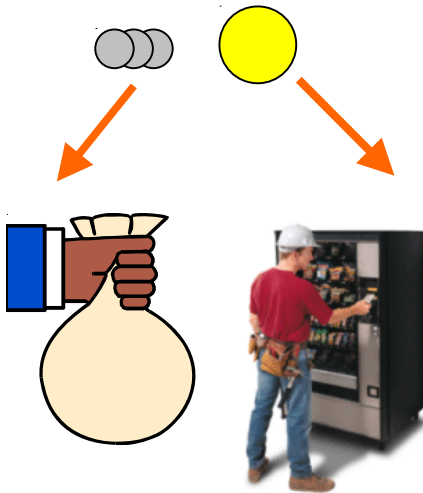
Symptom: Changer does not payout coins using required mix

Cause : Incorrect payout algorithm being used

Fix: Configure changer to use desired algorithm

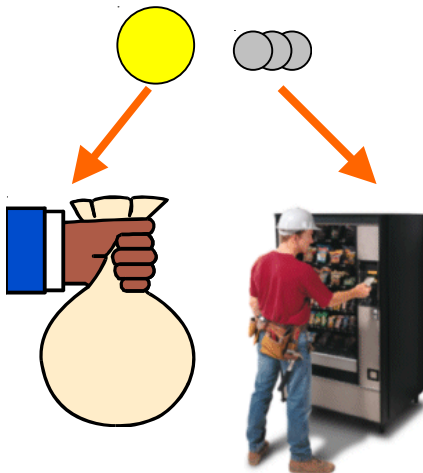
There are three payout algorithms in the Cashflow 7000 Series changer to improve the performance when used for particular tasks.

- **Big coins**
- **Small coins**
- **Change machine**



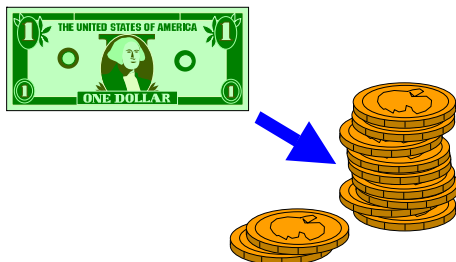
Big Coins (Best for Customer)

This is the default payout mix, use this if you want the fewest number of coins paid back to the customer. Hence these will typically be large value coins. This is sometimes referred to as a least coins algorithm



Small Coins (Best for Operator)

This simplifies the operation of counting coins in the cashbox for the routeman/counting room by having less quantity but higher value coins in the cashbox, as a result the customer may get a few extra small coins as change. This payout mix aims to leave the changer with space (10%) in the lowest two coin tubes for coins to be routed to rather than go to cashbox.



Change Machine

This is intended for applications where a dedicated change machine that converts bills to coins has been removed from the site and the remaining vending machines are setup to operate in a replacement capacity. The changer will try and payout one coin of each type, to give a mix of coins then pay any remaining value using the big coins algorithm.

All payout algorithms may be affected by the amount of change coins available, as typically they will try and stop a tube depleting to very low levels and use non preferred coins for payout instead.

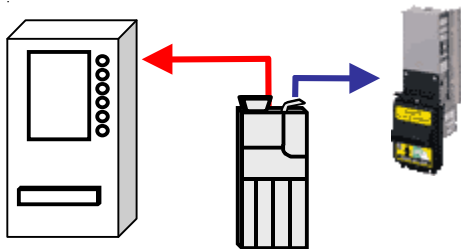
How to Section

How to audit bill information on an MDB changer

Symptom: No bill audit information in the changer

Cause : Bill validator connected between changer and MDB machine

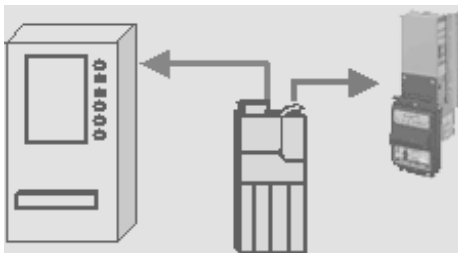
Fix: Connect the bill validator to the MDB peripheral loom on the changer as described



Connect the changer's MDB loom to the MDB loom on the vending machine (shown in red).

If one is not fitted then fit an MDB peripheral loom to the changer.

Connect the MDB peripheral loom from the changer to the MDB loom of the bill validator (shown in blue).



Power on the changer. The changer will listen to messages between the vending machine and the bill validator and audit any bills that are accepted.

```
Value of bills
accepted = $1
Exit      Pause
```

The audit value that records the non resettable value of bills accepted can be accessed on the display by pressing the yellow mode key twice in quick succession (**menu** then **audit**). When a validator is attached then this extra screen of information will be shown.

The audit data can be collected via the Ir port (or a DEX terminal if a DEX lead is fitted). Bill data will be logged in the **bold** fields in the audit data.

DEX Data Extract

```
DXS*9252131001*VA*V1/6*1
...
CA3*100*0*0*1*615*100*415*1
...
CA14*100*1*1*1*1
...
DXE*1*1
```

DEX field descriptions

CA301 = value of cash (coins and bills) in (interim)
 CA304 = value of bills accepted (interim)
 CA305 = value of cash (coins and bills) in (total)
 CA308 = value of bills accepted (total)
 CA1401 = bill value e.g. 100 for a \$1 bill
 CA1402 = number of this bill type accepted (interim)
 CA1403 = number of this bill type stacked (interim)
 CA1404 = number of this bill type accepted (total)
 CA1405 = number of this bill type stacked (total)

How to Section

How to setup tokens

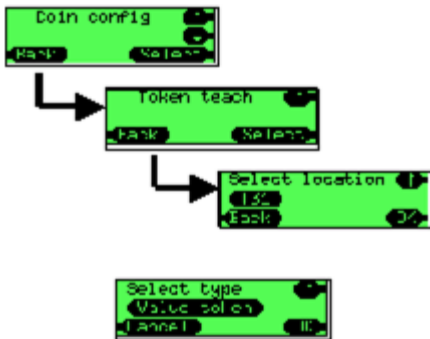
Symptom: Doesn't accept tokens

Cause : Tokens not taught or setup correctly in the changer

Fix: Teach and configure tokens as described

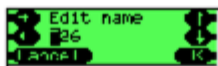
CF7512 can have upto 6 tokens taught in the field.

Press **menu** then **setup** then **abc** then scroll to the “Coin cfg” menu then press **select**. At the “Token Teach” menu press **select**. Slots 27 to 32 are reserved for the 6 tokens that can be taught. Select the required slot, typically an empty or unused one then press **OK**.

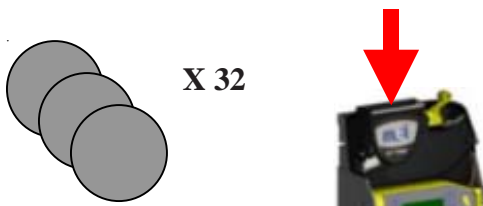


Select the type of token you are about to teach:

- **Value token** - a token that has a value (similar in use to a coin but tokens are routed to the cashbox only), you will be prompted later to enter a value for this token.
- **Vend token** - where the vending machine will typically give a free vend (this will vary from machine to machine)
- **Reject token** - this operates exactly like a free vend token but it is returned directly to the customer
- **Slug** - a fraudulent object that will be rejected
- **Delete** - this will delete data for the existing token in this slot



You can now alter the name that will be displayed when the token is finally set-up, by default it will be named “T” followed by the slot number e.g. **T26**. Use the cursor keys to alter the name then press **OK**



You will now be prompted to insert 32 samples of the token. Although you do not need to drop 32 the changer will perform significantly better if you drop as many as you can. You should not drop the same token repeatedly but use a collection of tokens of the same type.



When 32 tokens have been dropped a screen will be displayed, simply press the **finish** key.

The screen will then go to the beginning ready for another token type to be taught, if you have no more to teach then press the **back** key repeatedly to quit the menu.



Finally test that the tokens and all coins are accepted.

Frequently Asked Questions (FAQs)

How is MEI CASHFLOW™ 7000 different from other coin changers?

Simply put, MEI CASHFLOW™ 7000 is simple to use, yet very sophisticated in how it helps to manage change and information.

This product is a whole new breed of coin manager with improved features over other models. The combination of all these features resulted in the creation of a brand new tool that will increase your profitability and efficiencies, and make your life easier. The true breakthrough is how it will do the work for you without your constant intervention.

How does MEI CASHFLOW™ 7000 increase the operators' bottom-line?

By providing a better mix and more available change, better pricing options, bill flexibility, higher reliability and security, self reporting of lost sales and increasing account retention/customer satisfaction.

Drives Higher Sales:

1. Virtually eliminates exact change situations
2. Handles high value bills – \$10 and \$20 bills
3. Provides true price flexibility
4. Less down time – water resistant, jam resistant, more reliable
5. Reduces service call since drivers can fix most issues

Lowers Costs:

1. Accountability for all money, even cash in tubes
2. Provides instant paring
3. Drivers can resolve all jams, without tools
4. Virtually no training needed
5. Stores the least amount change necessary and prevents exact change issues
6. Reports on how well your team is doing.
7. Driver can alter the tubes by changing the cassette or the tubes

What does exact change really cost?

Most operators know it's a problem, believe current prices are correct or perceive the value of lost sales is insignificant. MEI CASHFLOW series 7000 shows you the true picture by individual vending machine.

MEI CASHFLOW series 7000 measures the selling rate when change is available and the selling rate when change is either unavailable or low. Then computes the percent of time the problem has occurred and the annualized value of not having enough change. For the first time management has the data from their own locations to show if exact change is truly a problem.

How does it eliminate exact change?

Through change optimization, complete and easy tube replenishment and highest tube capacity.

Change Optimization – MEI studied change algorithms and found many in traditional coin acceptors make poor use of change.

Frequently Asked Questions (FAQs) - Continued

For example, a 70¢ item purchased with a \$1 bill can:

- § payout three dimes
- § quarter/nickel combinations (even when the dime tube is full)
- § If the nickel tube is quickly emptied the machine is unnecessarily put into exact change for all other combinations.

The MEI CASHFLOW Series 7000 change override computes the coins to be paid and uses all combinations to stretch the available coins as far as possible. This feature prevents certain prices from starving the machine of change and allows the machine to have ample change.

Industry's only Five Tube Changer with Complete Tube Replenishment – Each tube can be replenished with the coins coming in from consumers. Coins are not diverted to the cashbox if space is available for that denomination.

Easy Replenishment –The driver can easily refill the change tubes.

- § The three tube openings are the largest available – so the driver can pour in an entire roll of change without even touching the mechanism.
- § A removable cassette can be refilled at leisure, and has an L-shaped base to prevent toppling.
- § The mechanism has a hook to hold the cassette in a completely accessible position. The driver does not need a flat surface for the cassette and won't need to hold open a flap with one hand while trying to hold the change bag, get out change and put into a narrow slot.

Highest Tube Capacity – MEI CASHFLOW series 7000 tubes hold more than the competition. MEI has five tubes, each with a height of 6 ¼ inches of coins (159mm). The total capacity of all tubes is 31¼ inches change. The MEI capacity for one is like having an extra “invisible tube” of capacity compared to competition.

Compare to the a five-tube competition with 5 3/8ths inches (136mm) tubes for a total of 26¾ inches. Another four-tube competitor has space for only 5 ¾ inches (148mm) of coins in a tube to its tube full sensor giving it a total replenishable capacity of less than 23 ½ inches.

What that means is that the MEI CASHFLOW series 7000 holds approximately 17% - 33% more volume in coins than its competitors' models.

How does the MEI CASHFLOW Series 7000 provide true price flexibility?

Stronger Location Negotiations – When negotiating to win a location the vend price can be the most important consideration. But, certain prices cause change problems unless there is a change machine on the same floor or in the same break room. Isolated machines run into exact change problems when moving off a quarter multiple. Even dropping the vend price from 75¢ to 70¢ can trigger untenable service calls to keep the machine's change replenished. The “exact change prevention” capabilities in MEI CASHFLOW Series 7000 allow the operator to negotiate without this constraint.

Maximize Specific Price Contracts – Certain customer contracts allowing pricing at or below 95¢. In many cases, so many consumers are inserting dollars that the available price cannot be used. This means

Frequently Asked Questions (FAQs) - Continued

a lower price of 75¢ or 85¢ is the highest that can be supported without being buried in service cost to top off a changer. (Industry average cost of service calls is \$50.) The flexible tube configuration, larger capacity and coin recycling enable better change management to support these price points.

Flexible Tubes to Optimize Payout – The cassette can have its tube reconfigured without using tools. They are simply unsnapped and the desired new configuration snapped in.

How does it handle high value bills, not just \$5 bills but \$10 and \$20 bills?

The unit allows the largest number of big diameter coins. Up to three, dollar tubes and a nickel tube can be used. The changer can hold over \$320 for making change. The unique L-shape cassette eliminates the constraint that all tubes must fit in a straight row across the front of the changer. Allowing MEI CASHFLOW series 7000 to handle truly large bills \$10s and \$20s that used to need a their own change machine.

What makes it water resistant, jam resistant and more reliable?

The unit meets MEI Gold Standard for Water Resistance. The MEI CASHFLOW series 7000 is designed to take abuse from vandals squirting water in openings, outdoor machines with leaky seals and drivers filling machines in the rain. The MEI CASHFLOW series 7000 will stay in service and prevent “jackpotting,” and shorted boards.

MEI engineers reviewed the existing market base for the problems experienced by operators. Not just MEI products, but all products. Iffy dispensing, coin jams, clearing out debris, off home dispensers and dozens of other potential weak points have been researched and solved by eliminating them from the design. For instance the lid opens wider. And, the dispenser has more than double the old power meaning sticky and gritty coins are no longer an issue. For example, weak areas have been reinforced making them tougher.

How does it reduce downtime and service calls?

Now the location staff or the route driver can fix the issues without leaving the machine down until the repairman can be scheduled. The unit is designed to allow sticky bits of paper, match boxes, etc. to be easily cleared without tools by the route driver.

Exact change is finally flagged. Exact change frustrates your customers, but on most machines there is no indication to the driver that there is a problem. It is left for him to “discover” one or more key tubes are short. Not a clear process for changers with opaque tubes. Finally, exact change triggers a warning, just like poor acceptance or dirt, with a warning light that is clearly visible.

How does MEI CASHFLOW Series 7000 provide accountability of all money, even cash in tubes?

Sonar zeros in on tube cash. No matter how the tubes are filled to what point, the level sensing sonar “reads it.” A single number is posted on the LCD display to show the total of all tubes. No eyeball readings, no hand calculations, just a single number. Less labor, less ambiguity.

All of the money. Bills stacked, coins to cash box, coins in the tubes, all are measured. Again by reporting a single number. If the tubes are replenished from traditional cash bag (take out a roll of dimes and take

Frequently Asked Questions (FAQs) - Continued

back five ones) then without special notes or accounting, the money will be tracked. The total in the cash bag will be the same (like value for like value) **and** the total net in the mechanism will be the same too.

Less temptation. Maintaining tight accountability with minimal effort also reduces the time spent on investigating and documenting cash irregularities.

What is the cash capacity of the tubes?

The tubes will hold up to \$343 in US coins. A typical set up would hold \$305.

How accurate is the sonar technology?

The sonar sensing is accurate +/- 2 coins. In approximately 0.2% (1 in 500), there could be a “fluke” where accuracy is compromised. But upon the next sonar reading, the accuracy is again at the expected high level.

How can my drivers attain instant paring?

MEI CASHFLOW series 7000 does all the work. The simplest accountability is to fill the machine with product (to its planned level) and to replenish the tubes in the changer to their planned levels. Paring the changer used to involve dumping out surplus coins and refilling the denominations that are not at their levels.

Now with MEI CASHFLOW series 7000’s advanced processor, the LCD display and the sonar system in the changer do most of the work. With the push of the par button, surplus coins are automatically dispensed. (And, if dispensing is too rapid, there is a pause button.) The display lists any denominations that are short and by how much.

MEI CASHFLOW series 7000 makes paring simpler, faster and more accurate.

Can my drivers manage service calls without tools?

Drivers call fix all jams and save two calls. Having all coin paths accessible without tools, and eliminating special repair training fix saves the cost of the repair call – typically \$50. As mentioned earlier it also makes money by brining the machine back to operation sooner. That is the second saving.

Driver can alter the tubes by changing the cassette or the tubes. As prices change or machines relocate, what is an ideal tube configuration may be suddenly be inappropriate. Both options for changing tubes are available in the MEI CASHFLOW 7000. Swap tubes individually by just snapping them in and out. Or, change out the entire cassette. In both situations the LCD display walks you through each step.

How much training is required?

Almost no training is needed, operations are very simple.

The “Smart” Display Menu Tells All. Similar to a cell phone, the display presents simple menus that list what is available and guide the driver though what to do. And, if desired, choose from up to 8 languages including Spanish and French.

Frequently Asked Questions (FAQs) - Continued

Service versus Replenish. Should you want to restrict what the drivers can change, the controls are build in. Paring or changing the tubes is available to everyone. However, changing par levels and change-making modes are restricted with a password.

How do I eliminate excess change in my tubes?

Every Coin Must Earn Its Keep. With MEI CASHFLOW 7000 only the least amount of change necessary is stored. The *automatic par* mode computes how many of each denomination is needed to prevent an exact change occurrence. This is the number of coins retained, not one extra. Automatic float customizes the change retained so it is best for that specific location.

Will the changer dispense to zero coin inventory?

Yes.

How can I tell how well my team is managing the equipment?

Last month statistics – provides reports to supervisors on how much time was spent in exact change mode, the value of lost sales and which tubes were replenished. This information can be used to improve driver training and provide objective feedback.

How will I restrict access to changer information?

You can set a code on the mechanism such that a supervisor can restrict access to sensitive soft option features. Drivers will however have access to audit data – as they should.

What is the life of a changer?

MEI CASHFLOW series 7000 has a projected 12-year design life, which is twice that of the competitors. And, an anticipated 20-year physical life.

Does MEI offer a trade-in upgrade program? - No

Can I get training for my technicians?

While downtime and repairs are minimal, route drivers can manage many required repairs during servicing. Drivers have true jam detection through the LCD diagnostics. MEI CASHFLOW series 7000 is very intuitive and requires practically no training. Most drivers who use a cell phone will find the LCD display very easy to navigate.

How will MEI CASHFLOW™ 7000 be serviced?

Service for MEI CASHFLOW series 7000 will be consistent with other MEI products. You may contact your MEI Authorized Service Center (ASC), just as you do with your other MEI products.

Do all tubes self fill?

Yes.

Can we just buy “tubes” to change the cassette?

Yes.

Frequently Asked Questions (FAQs) - Continued

Can we get labels to identify the tubes?

Yes, this is planned to be available for the launch date.

Are there limitations on the tube configurations?

The only restrictions are; no dollar tube in A or B-positions, no quarter tube in B-position, no dime tube in E-position.

Can you teach the changer in the field?

In the field, you can “teach” tokens and program coins.

What is the warranty on the MEI CASHFLOW series 7000?

The standard warranty period is 2 years, or the same as your current customer agreement.

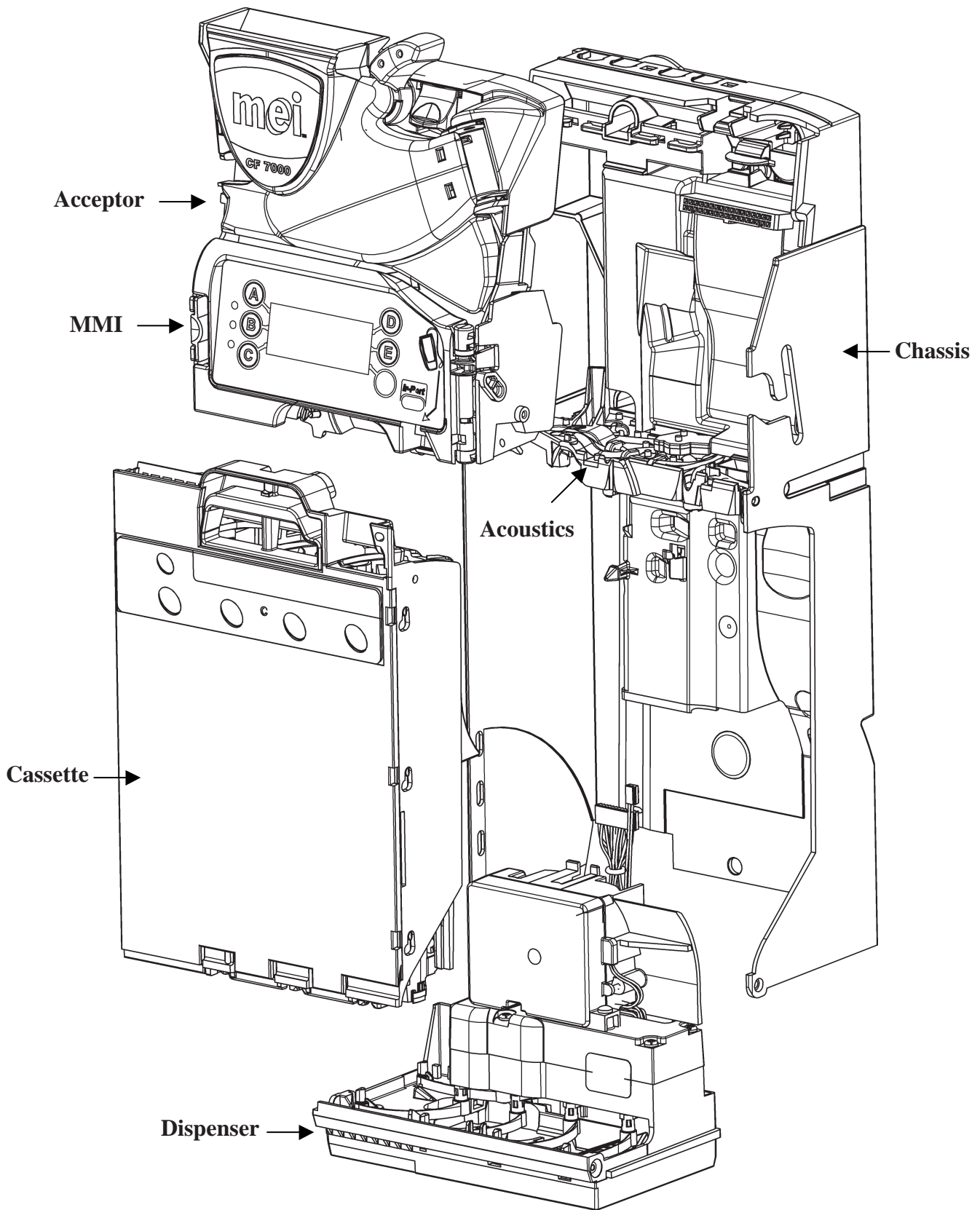
Who should I contact with questions about MEI products?

Your first line of contact is your MEI sales representative. For additional questions, you may contact the MEI customer service team, at 1-800-345-8215.

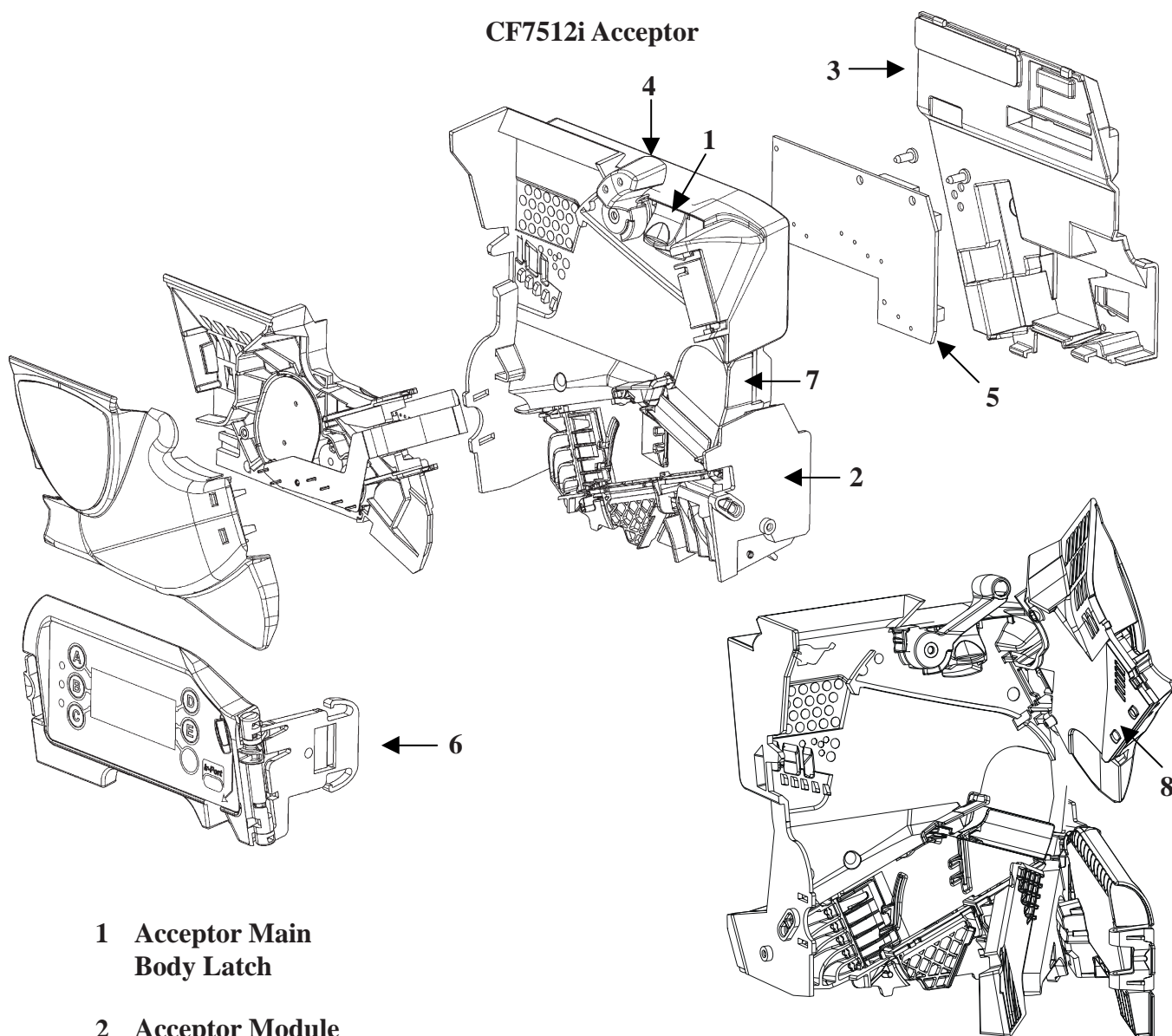
How do I reach the technical support call center?

The technical support number is staff by industry-specific technical field representatives and can be reached by calling 800-345-8215.

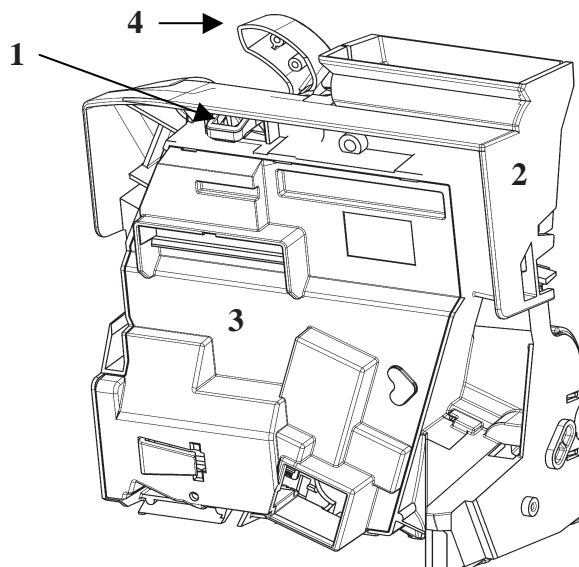
CF7512i Exploded Views



CF7512i Acceptor



- 1 Acceptor Main Body Latch**
- 2 Acceptor Module**
- 3 Acceptor Sensor Cover**
- 4 Reject Lever**
- 5 Interface Control Board**
- 6 MMI / LCD Assembly**
- 7 End Snubber**
- 8 Ramp Snubber**



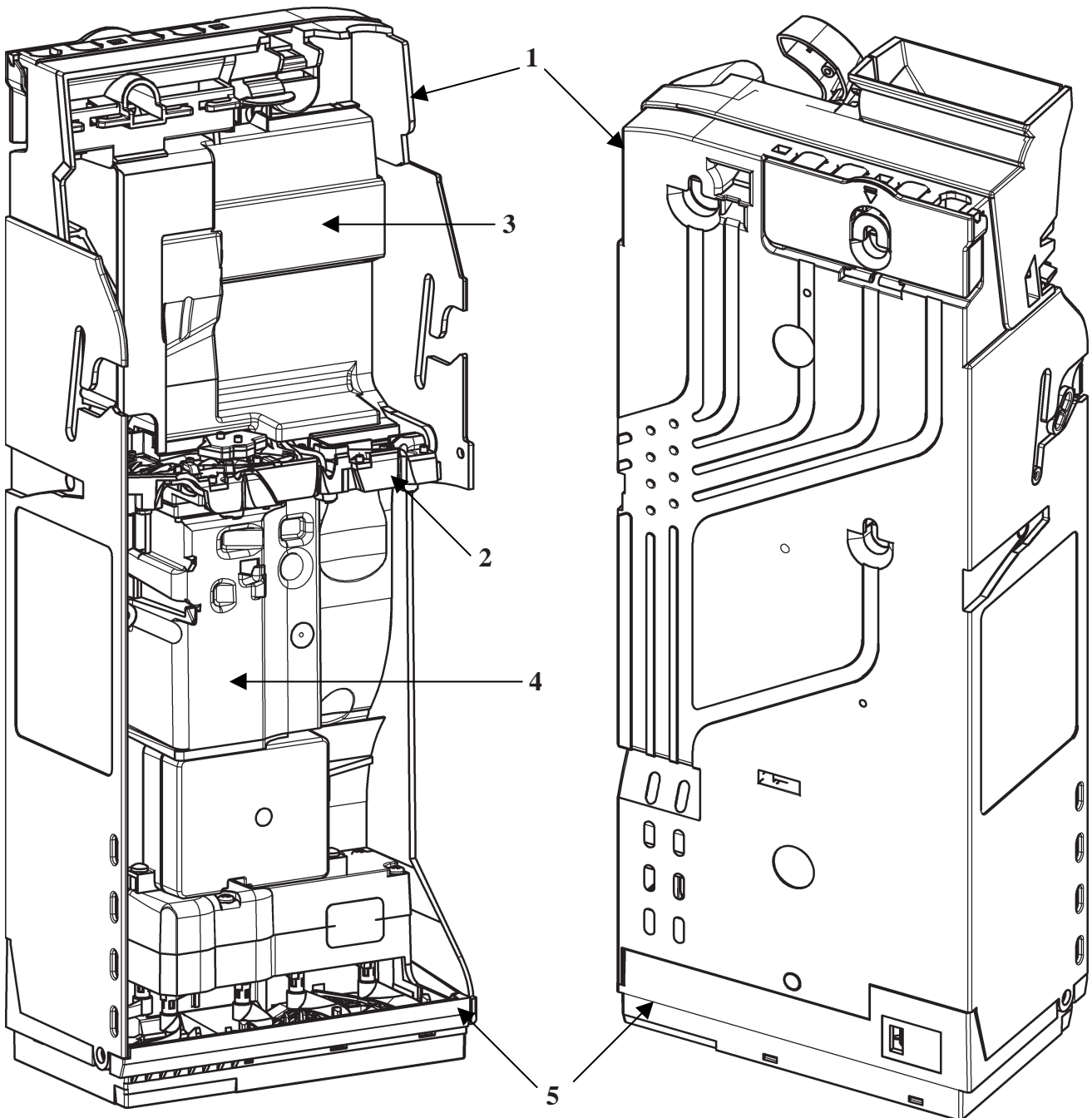
1 Chassis

2 Acoustic Manifold

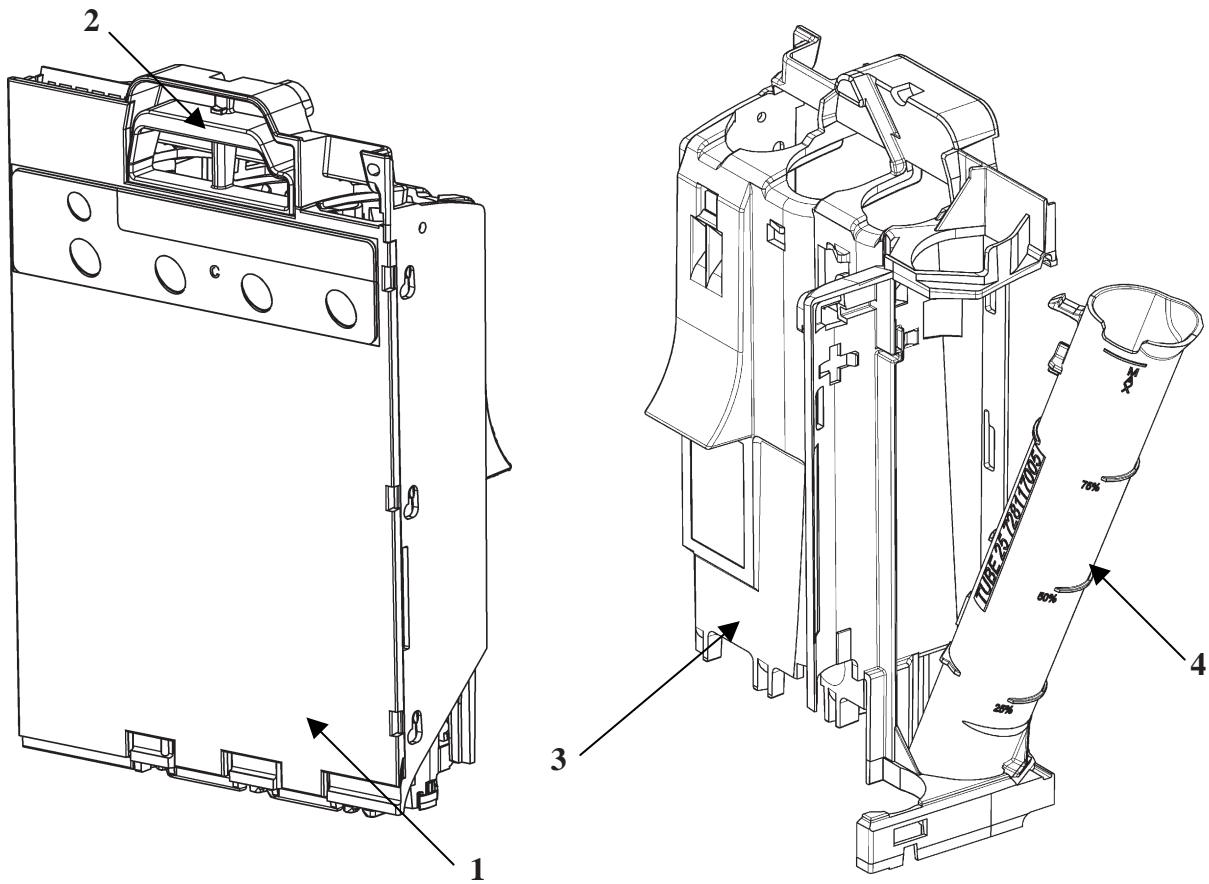
3 Upper Control Board Cover

4 Lower Control Board Cover

5 Dispenser Assembly



CF7512i Cassette



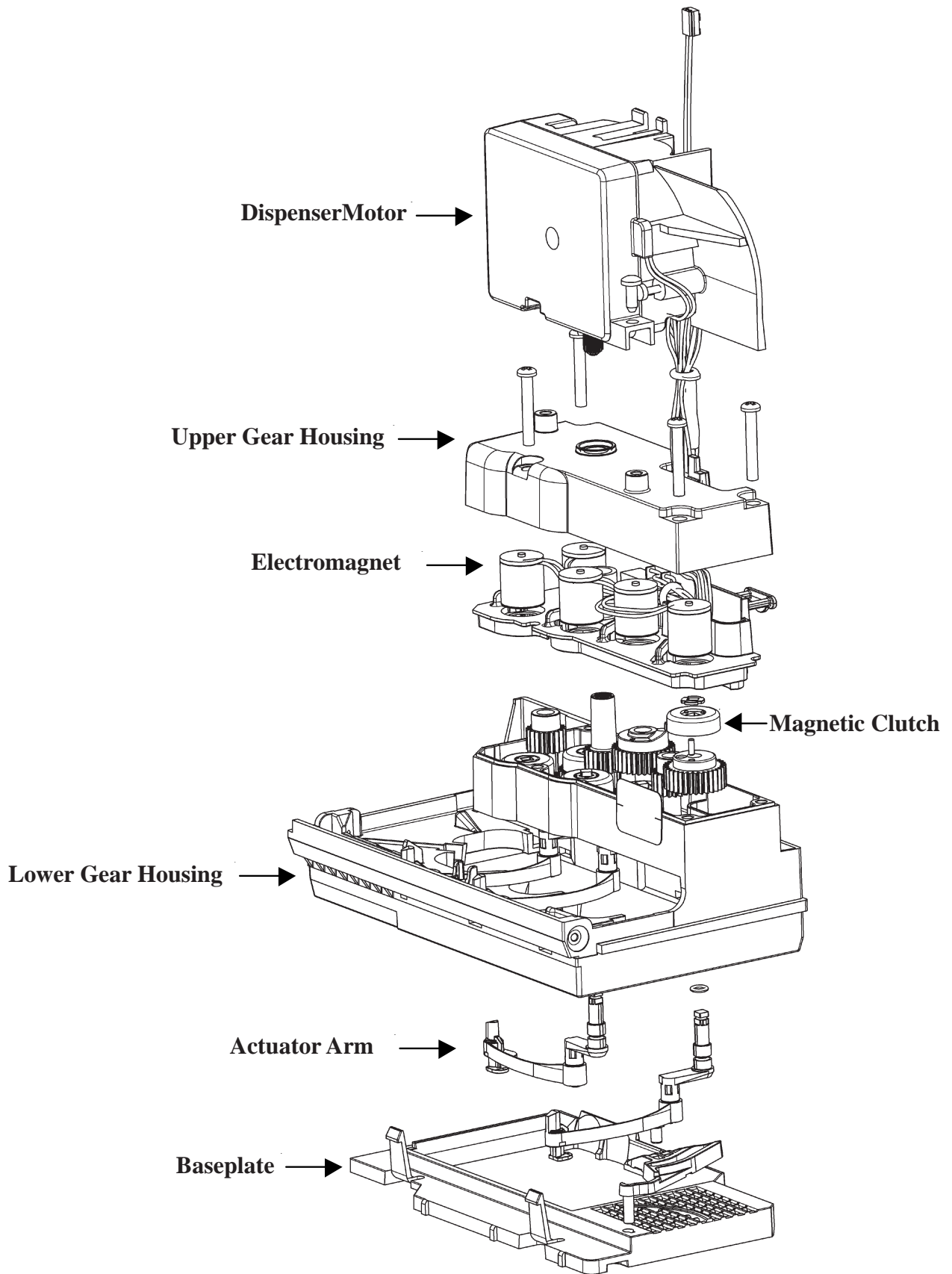
1 Cassette Cover

2 Cassette Release Latch

3 Cassette Skeleton

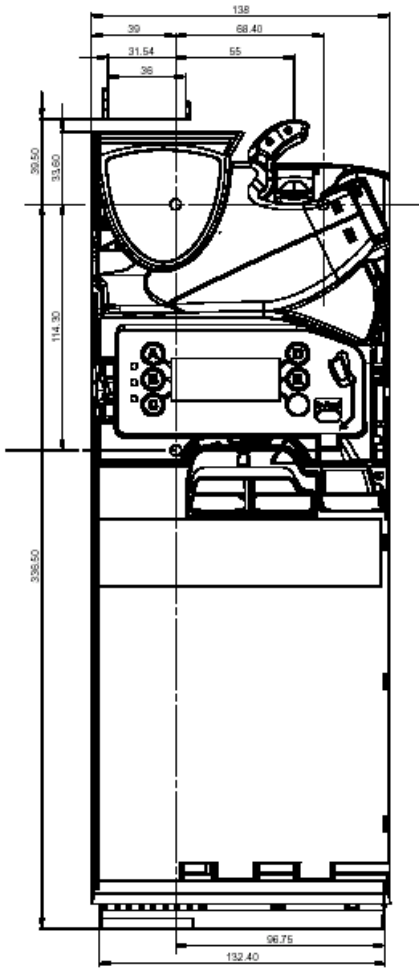
4 Coin Tubes

CF7512i Dispenser

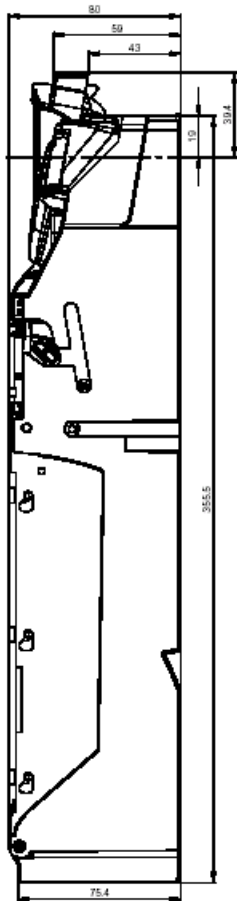


CF7512i Dimensions

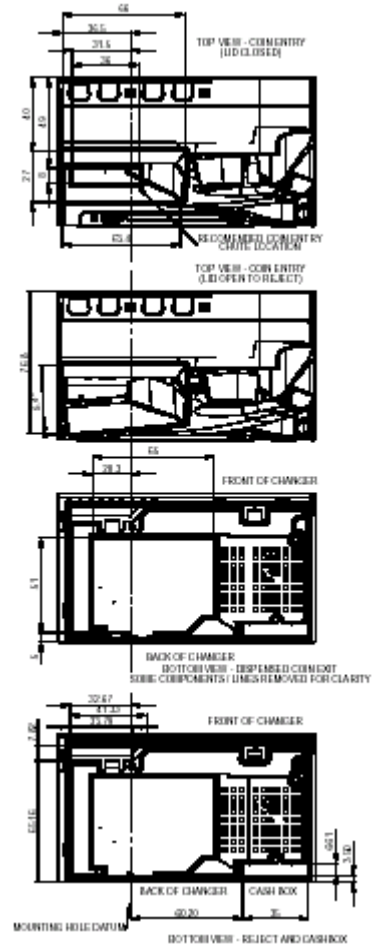
Front View



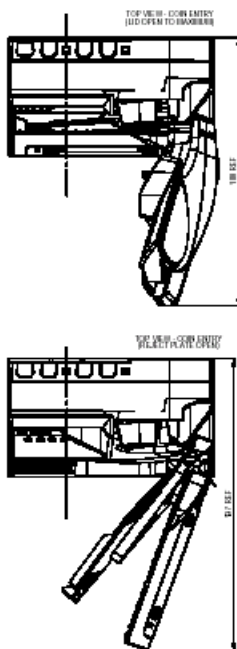
Side View



Bottom View



Top View



MEI

Technical Support 1(800)345-8172
Customer Support 1(800)345-8215
<http://www.meigroup.com>





VN2700R Series with Recycler Installation Guide

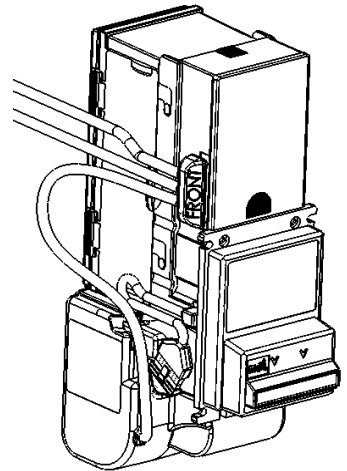
GENERAL INFORMATION

This bill validator is designed to fit into the standard bill acceptor opening provided by vending machine manufacturers. It mounts on either the existing four mounting studs located in the machine or on the mounting bracket provided in various mounting kits.

The VNR Recycler stores and provides \$1 or \$5 bills as change and accepts \$1, \$2, \$5, \$10 and \$20 for transactions. Recycling bills reduces coin usage and expands vending to higher value bills.

Features of the VN2700R include:

- \$1, \$2, \$5, \$10 and \$20 bill acceptance
- Four Direction bill acceptance
- Re-programmable Flash Memory (Flashport™)
- Coupon configuration
- Enhanced Security
- Easy access to the bill path, even when mounted
- 2 Character Diagnostic display (see back of unit)
- Multi-Drop Bus (MDB) vending Interface (24V)
- Supports free vend and value coupons
- Supports High Visibility Bezels (HVB) - Optional
- Lighted Bezel (standard)
- VNR Recycler (returns bills for change)



INTERFACE

The VN2700R Bill Acceptor operates via a MDB interface: The following harness is provided to support this interface:

250070096P - 24 VAC Multi-Drop Bus Interface (MDB)

Note: This harness fits onto the male connectors located on the left side of the Bill Acceptor and is designed to connect to the machine controller's and coin changer's Bill Acceptor interface harness.

For further information on either interface harnesses or mounting kits, please contact your supplier or MEI Approved Service Center.

INSTALLATION INSTRUCTIONS

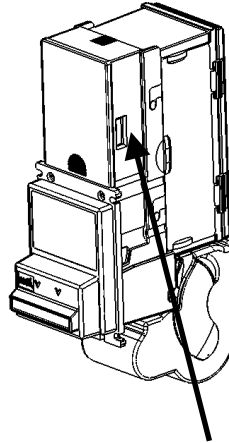
1. Set Bill Acceptor option switches.

Note: When you receive the product, all switches are off. This will automatically enable the options as follows:

- Accept \$1 and \$5 dollar bills.
- Four way accept.
- High Security accept.
- HVB (Optional) - Denom lights on with blended colors

Important Note: Placing any switch ON will override the above options, and the Bill Acceptor will operate according to the switch settings label.

NOTE: The unit may be configured with the attached coupon rather than using the option switches. For coupon configuration, turn all option switches OFF and proceed to Coupon Configuration instructions on page 5.



SWITCH DESCRIPTION	
1,2	Combination of these two switches selects number of enabled bill directions.
3	Position allows either acceptance or security to be maximized.
4-8	Individual switches enable or disable corresponding bill denomination.

1a. Recycler Factory Default Settings

When the VN2700R is received from the factory, the following option settings are by default:

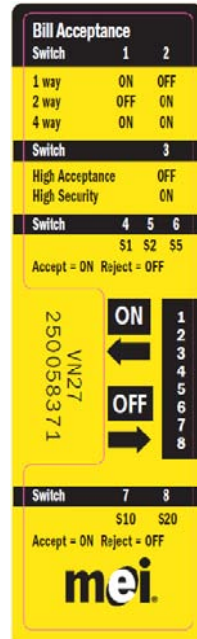
- Recycled Bill (rb) = \$1 (1)
- Interface (IF) = Level 3 (L3)
- Capacity (CA)= 25 notes (25)
- Par Level (PL)= 12 notes (12)
- High Visibility Bezel (Hb)= 'Rainbow' mode (bLEnd - scrolling)

Please refer to Section 10 for instructions regarding changing the recycler option settings.

2. Remove power from the entire machine.

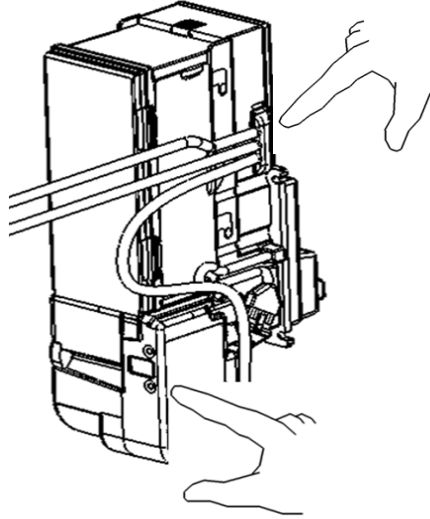
3. Install the VN2700R onto the Bill Acceptor mounting studs and through the mounting hole of the machine. Secure using the appropriate hardware. If you do not have a "full face" mounting bracket contact MEI or your MEI distributor and order part number: 250067030

Note: Several alternate Bezels are available for different vending machine applications. For further information regarding available Bezels, please contact your supplier, MEI Approved Service Center or MEI Help Desk.



4. Connect the VN2700R

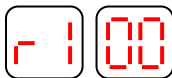
Locate the main MDB connector from the vending machine. Connect to the mating connector of the VN2700R. There is an additional cable coming from the VNR which connects to the coin changer. **Please note:** The coin changer **MUST** connect directly into the VN2700R. Other MDB devices must **NEVER** be connected between the coin changer and the VN2700R.



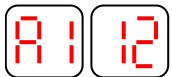
5. Apply power to the machine.

Observe that the MODE / SELECT display on the back of the VN2700R is ON.

During power up, the display shows the VNR Recycler firmware version and then the VN2700R Bill Validator firmware version. The display then changes to show the number of bills in the VNR Recycler.



Recycler
Firmware Version



Acceptor
Firmware Version



Recycler holds
18 bills



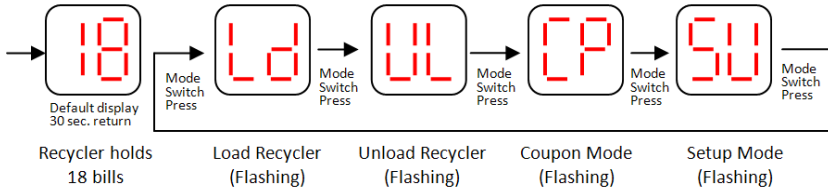
Unknown number
of bills in Recycler

By default, in normal operation, the display always shows the number of bills currently held in the Recycler available for use as change. If the recycler has lost count of the number of bills for whatever reason, then a double dash will be displayed. The recycler will recalculate and display the number momentarily. This could take up to 1.5 minutes.

6. MODE / SELECT Switches

The **MODE** switch will cycle between the different set-up modes. The available modes are **Load Recycler**, **Unload Recycler**, **Coupon Mode** and **Setup Mode**.

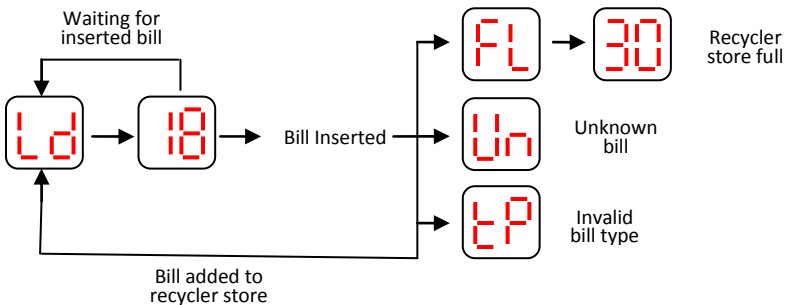
When the **MODE** switch is pressed and held for 2 seconds, the unit will stop displaying the bill count and will display the current mode. The text will flash. Each press of the **MODE** switch will toggle to the next mode. If a mode is selected and the user takes no further action for 30 seconds, the bill count display mode will be automatically selected.



When a mode is displayed, pressing the **SELECT** button will enter that mode.

7. Load Recycler Mode

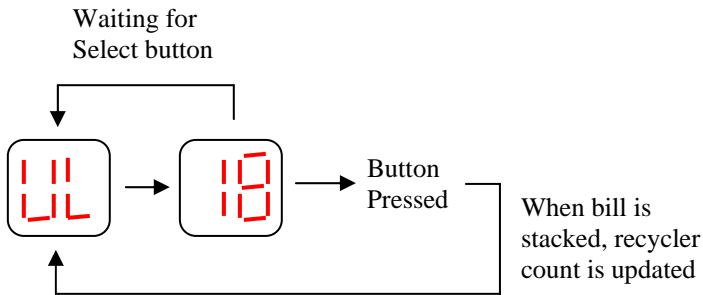
If the Load Recycler mode is selected, the display will stop flashing and alternate with the current bill count. The user may then insert bills of the type being recycled. Validation will be performed on the inserted bills. Unrecognized bills will be rejected and **'Un'** displayed for 5 seconds or until the user inserts another bill. Bills of the wrong type will be rejected with a **'tP'** error message displayed for 5 seconds or until the user inserts another bill. If the recycler is full, then **'FL'** will be displayed and bill input is inhibited. If there is no activity from the user for 30 seconds or the mode button is pressed, the Load Recycler mode will be exited.



8. Unload Recycler Mode

If the Unload Recycler mode is selected, the display will alternate number of bills and **UL**. Each further short press of the select button will move one bill from the recycler to the cassette. If there is no activity from the user for 30 seconds or the mode button is pressed, the Unload Recycler mode will exit. If the recycler is empty, then pressing the select button will have no effect.

If the select button is pressed for more than 2 seconds, the recycler will continuously move bills from the recycler to the cassette until a pre-determined, programmable number is reached. This number can be set using the **Par Level** option in **Setup Mode**, section 10, page 6. To unload to zero, the above method must be used to stack one bill at a time.



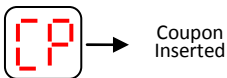
9. Coupon Mode

9a. Configuration Coupon Input Mode (All option switches set to OFF, see page 2)

If the Coupon Input mode is selected, the recycler will wait 120 seconds for the user to input a configuration coupon. If no coupon is input, the system will exit configuration mode and re-display the bill count.

If a configuration coupon is fed into the recycler, the system will attempt to decode the coupon and then return it. The display will momentarily show CF.

If the configuration is successful, then the front LEDs will flash 10 times. If the configuration process is not successful, the LEDs will flash a number corresponding to the section of the configuration coupon that is either not completed or completed incorrectly. Also, if the coupon is damaged or not the correct size, it will not configure correctly.



9b. Free Vend and Value Coupon programming.

If the Coupon Input mode is selected, the recycler will wait 120 seconds for the user to insert a Free Vend coupon, a \$1 Value coupon or a \$5 Value coupon. Depending on the current status of the coupon mode, the inserted coupon will either be accepted (display momentarily shows En for enabled) or rejected (display momentarily shows DI for disabled). If the coupon was accepted, then it is now enabled for use. If it was rejected, it is disabled. This mode toggles between enabling and disabling coupons.

NOTE: Value coupons are treated by the vending machine as cash. Change, including bills and coins, will be dispensed after a transaction.

9. Configuration Coupon Input Mode (continued)

Carefully cut the coupon from this Installation Guide. Copies are usable if made on a standard, carbon-based, non-color copier, AND if cut to match the size of the attached coupon. (Coupon is located on page 11.)

Fill out the coupon using a #2 or HB pencil. Fill in one block for each line (except section 3). Do not mark the back of the coupon.

Section 1 - Bill Direction Enable one or two-way (face-up) or four-way acceptance (all directions).

Section 2 - Bill Denomination Fill in one block for each denomination. Select High Accept for maximum bill acceptance. Select High Security for a higher level of discrimination. Select OFF to reject bills of that denomination.

Section 3 - High Visibility Bezel (HVB) options. (if applicable)

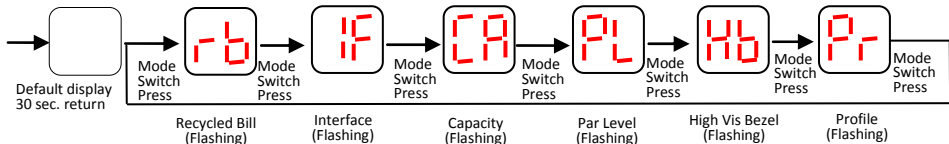
Fill in Denom to enable the denomination lights to operate. Leave blank for denomination lights to remain off. If color blending is desired, do not fill in any other box. Refer to Table 1 below for color combinations and fill in the appropriate box(es).

Boxes Filled In - RED, GREEN, BLUE	Resulting Colors on Bezel
None (no colors filled in)	Blend of all available colors
Blue only	Blue
Green only	Green
Green and Blue	Cyan
Red only	Red
Red and Blue	Magenta
Red and Green	Yellow
Red and Green and Blue	White

Section 4 - Bezel lights flash/ON.

10. Setup Mode

If the Setup Mode is selected, the recycler will cycle between different options. The available options are **Recycled Bill**, **Interface**, **Capacity**, **Par Level**, **High Visibility Bezel**, and **Profile**. The mode switch selects between the different options. Press and hold Select to save the displayed value. Pressing and holding the Mode Button will return to the Setup Option menu starting with 'rb'.



The **Recycled Bill** can be set to the value of the bill to be recycled. MEI recommends \$1 or \$5 notes for recycling in Vending applications.

The **Interface** can be set to:

dE - Demo Mode - This will allow unit to store, return and stack notes with power only. Once in Demo Mode, you must press mode and select simultaneously to get back to the menu.

Au - To be defined (do not use)

L2 - Level 2 MDB (use this when accepting \$20 notes)

L3 - Level 3 MDB (this is the default mode from the factory)

The **Capacity** defines the number of bills held by the Recycler in operation. Excess bills get stacked into the Magazine. The **Capacity** can be set to between 0 and 30.

The **Par Level** can be set to a value between 0 and 30. It defines the number of bills left in the Recycler when in unload mode and the Select Button is pressed and held. The Recycler will add bills up to the capacity setting during normal operation. This setting should be set to something below the **Capacity** level.

High Visibility Bezel (HVB) Options allows the operator to choose a primary color on the HVB or blend colors when the HVB is fitted.

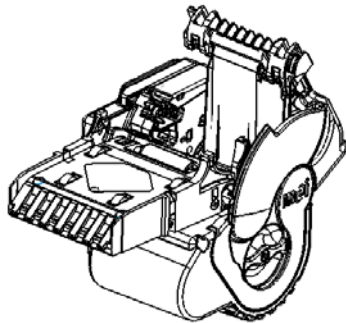
Profile mode allows the operator to calibrate the bill acceptor or the recycler film. It is recommended that operators do not enter this mode unless proper training has been received and calibration paper is available.

11. Check operation

- Insert a recycled bill (\$1 or \$5) and observe that it is accepted, and stored in the VNR Recycler.
- Load the recycler with recycled bills to the **Par Level** or **full** setting.
- Insert a high denomination bill (\$5, \$10 or \$20) and verify that proper credit has been established.
- Vend a selection with the largest enabled bill and confirm correct change given.

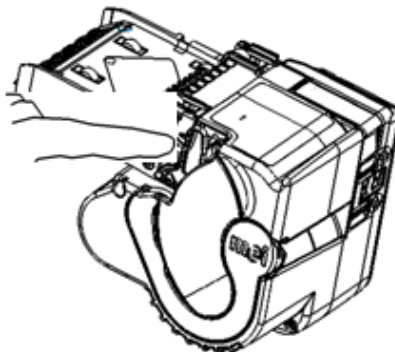
TO ACCESS BILL PATH

Remove both VNR Recycler and magazine for full bill path access.



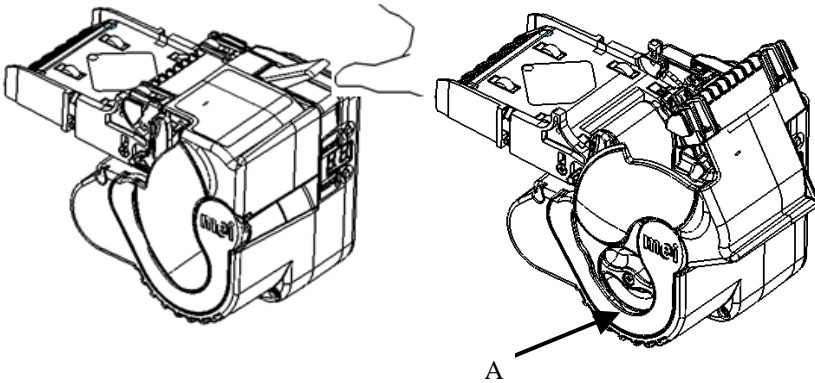
12. Remove VNR Recycler

To remove the VNR Recycler, pull yellow latch lever releasing latches and pull out Recycler.



13. Open Access Cover

Push up yellow release latch and pull back on Access Cover. This will open like a clamshell. Finger Disc is revealed (A).



14. Removing Recycled Bills

1. Powered - The push button (mode) will slowly move the rotor forward for unloading recycled bills. Please note: After opening the clamshell while powered up, the display will show 'Op'.

2. Manual - Rotate finger disc counter clockwise (see "A" above) to remove recycled bills.

15. Close Access Cover and Install VNR Recycler

To insert the VNR Recycler, push unit into LED location allowing yellow latches to snap engage into chassis.

Recycler will now reset itself (could take up to 1 minute), then start counting the loaded bills. Counting could take up to 1 and 1/2 minutes and depends on the number of bills loaded on the Recycler. The fewer the bills, the reset will take longer. This operation is required for the Recycler to function.

16. Cleaning

The VN2700R series will not need cleaning as often as magnetic sensing Bill Acceptors. If cleaning is required, use a soft cloth moistened with mild, non-abrasive detergent.

To clean the bill validator bill path remove both the VNR Recycler and Magazine for full bill path access.

The VNR Recycler does not require cleaning and could be damaged by aggressive cleaning.

17. Trouble shooting VN2700R

Unit Dead (won't power up)

1. Harness(es) may be loose, not properly connected, or bent pins.
2. Check source voltage to ensure that power is being supplied to the bill acceptor.

Pressing and holding the mode button does not change the display to the menu.

1. Unit may be in demo mode. Press the mode and select buttons simultaneously and release to enter the menu mode and change the interface to L2 or L3.

Error Codes

If an error occurs, the display will alternately flash 'Er' followed by an error code and then the number of bills in the recycler. When multiple errors occur, the display will cycle through each error in turn.

Note: For further information on trouble shooting and error codes for the VN2700R, please contact your MEI Authorized Service Center, the MEI Tech Support line, or the VN2700R Operation and Service Guide.

Universal Hopper Series Manual



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1. Diary of Changes

Issue 2.0	15 th May 2003
➤ 1 st Issue in new format.	
Issue 2.1	July 2003
➤ Added details of High Security Exit Window (Section 8.8).	
➤ Updated details in Table 2 .	
➤ Added Universal Hopper 'Lite' details.	
Issue 2.2	18 th Aug 2003
➤ Changed High level to Top level sense available for UH Lite	
Issue 2.3	28 th Aug 2003
➤ Added section 10 Product Compliance's .	
Issue 2.4	8 th Feb 2004
➤ Ammended details in Table 2 .	
Issue 2.5	10 th March 2004
➤ Corrected details in Table 2 .	
Issue 2.6	30 th June 2004
➤ Changed footer	

2. Introduction

Money Controls' Universal Hoppers were first introduced in 1984. The MKII and MKIII models proved themselves to be exceptionally reliable, with high count accuracy. The MK4 is the latest generation of this extremely successful series.

The MK4 Universal Hopper can be used as a direct replacement for MKII and MKIII Hoppers. Any specific variances are clearly indicated, where appropriate, in this manual. When ordering MK4 Universal Hoppers as a replacement, it is important to specify which version is being replaced.

The Universal Hopper 'Lite' is a cost effective solution for standard applications. Unlike the other Universal Hoppers, the 'Lite' has been designed to only work in Mode 1.

3. Safety Note - MK4 Hoppers only

To meet the requirements for EN 60950 the equipment must be installed according to the following requirements:-

- The equipment must be protected by a 3A fuse.
- The equipment must be supplied from a SELV limited power source.
- The equipment must be installed in an enclosure but positioned so that it is external to any fire enclosure area within the main enclosure.

4. General Description

The Universal Hopper is an “intelligent” large capacity coin and token dispenser ideal for a wide range of applications including Gaming, Vending and Transportation systems.

MKII and MKIII hoppers will handle most coins in the range 16.25mm - 30mm diameter and 1.25mm - 3.5mm thick, giving the following approximate capacities:-

Table 1: Approximate Hopper Capacities.

Diameter	Thickness	Approx. Capacity
28.4mm	2.21mm	800
24.25	1.75	1600

The MK4 and ‘Lite’ have extended the range to include 31mm diameter and 1mm thick coins.

The rate of payout, whilst being dependent on the coin dimensions and also the volumes of coins in the Hopper at any given time, is approximately 3 coins per second.

Precise payout is ensured through optical sensing and verifying of coin dispensing with an electronic security signal which alerts against coin jams, failed sensors and a bad power supply. LED indicators are provided for easy visual checking of power supply, security status and coin sensors.

The Universal Hopper has the in-built facility to operate in 3 modes:-

Mode 0 (Not available on the ‘Lite’ version)

the direct switching mode.

Mode 1

the hopper is controlled directly by a LOGIC (Motor) CONTROL LINE. When the line is ‘active’, the motor runs.

Mode 2 (Not available on the ‘Lite’ version)

the hopper is driven by pulses on the control line which allows the hopper to be used in place of a solenoid payout with no software and few hardware changes.

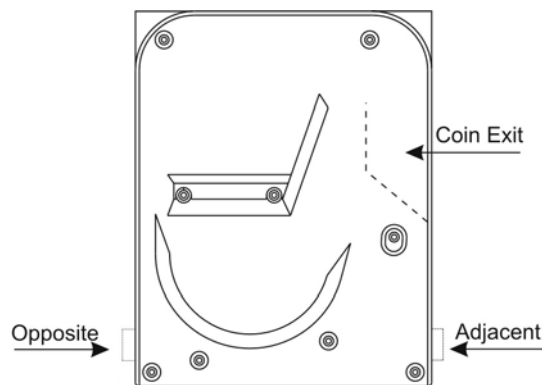
5. Options

There is a standard Universal Hopper handling coins in the diameter range of 21mm - 30mm, and the small coin Universal Hopper handling coins in the diameter range of 16.25mm - 20.9mm. Both of these models can be supplied with a number of options:-

5.1 Connector Position

The 12-pin connector can be in one of two positions, either on the opposite side of the coin exit, known as the standard position, or on the same side as the coin exit, known as the adjacent position.

Figure 1: Connector Position Options



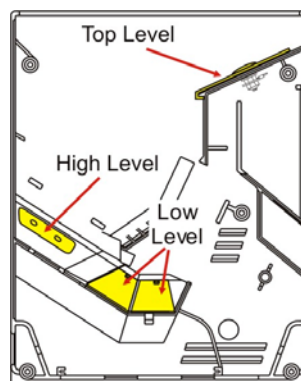
5.2 Level Sensing

Universal Hoppers can be supplied with a choice of coin sensing positions, these can be either:- High level or Top level.

High Level is NOT available with the Universal Hopper Lite.

All Hoppers are automatically supplied with a low level function to indicate coin starvation.

Figure 2: Sense Plate Position Options



5.3 Connector Options

MK4 Universal Hoppers are available with connectors compatible with MKII and MKIII Hopper installations. It is important, when ordering, MK4 Hoppers as a replacement to specify which version is being replaced.

Universal Hopper Lite is ONLY available with the 'Cinch' plug.

Figure 3: Connector Types



5.4 Coin Sizes

Table 2: Coin Size v Track Type.

Track Type	Coin Range	Hopper Type
Large coin	30.01 - 31.50 mm x 1.25 - 3.30 mm	MK4, Serial
Standard coin	21.01 - 30.00 mm x 1.25 - 3.30 mm	MKII, MKIII, MK4, Serial
Euro track [Yellow] (€2, €1, 50c, 20c, 10c, 5c)	19.00 - 26.40 mm x 1.50 - 2.50 mm	MK4, Serial
Euro small coin [Green] (1c, 2c, 5c, 10c)	16.25 - 20.90 mm x 1.00 - 3.1 mm previously called the small coin.	MKII, MKIII, MK4, Serial

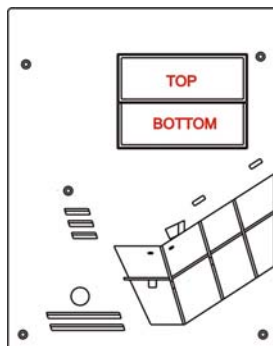
5.5 EMC

See section [9.1.2](#)

5.6 Passive Overflow

Either the top, the bottom, both or neither panel can be specified to be removed.

Figure 4: Passive Overflow Positions



5.7 Baseplate

The baseplate can be ordered with the following options:-

- fitted to the hopper
- packed separately
- supplied with no connector
- connector only (no baseplate)
- no baseplate
- the connector can be packed separately

All of the above options must be specified when ordering.

6. Installation

Important: Power should not be applied until the installation is complete.

1. Secure the baseplate in position, using the six fixing holes. The hole positions are shown in [Figure 18](#).
2. Wire up the baseplate connector to the host machine - see section [12.3](#) for connector details, and sections [8.8](#) & [10](#) for interfacing recommendations.

NOTE: The wire to be used should have a maximum length of 3 metres, and must be capable of handling the maximum currents and voltages specified in section [12](#).

3. Slide the hopper into the baseplate and ensure that the two halves of the connector are securely mated.
4. Turn on the power.

6.1 Safety

1. Do not put a hand into the hopper while the motor is running.
2. Static. It is possible for coins paid out to have a static charge on them.
3. Coins should be discharged to earth before being presented to the user.

IMPORTANT:
The hopper should not be installed/removed from baseplate with power connected.
Avoid inhalation of coin dust during any servicing operations.

7. Mechanical Description

7.1 General

The hopper is mounted in a machine via the base plate.

Electrical connection to the hopper is made via the 12 pin socket on the baseplate which mates with the corresponding plug on the hopper body. Coins are stored in the cashbox section of the hopper and fed onto the elevator belt via a passage in the centre plate. The cut-out in the centre plate has been designed to regulate the flow of coins onto the belt. The stirrer agitates the coins in the coin box in order to minimise the occurrence of bridging. The elevator belt is driven by a motor, gearbox, and idler gear. Coins are picked up at the bottom of the belt and carried up to the exit window. Optical sensors in the exit window detect the coins as they roll out of the hopper.

A cable connects the main control board to the 12 way socket and carries all power supplies and control signals.

7.2 Differences Between MKII, MKIII, MK4 and Lite Hoppers

Table 3: Hopper Differences.

Feature	MKII	MKIII	MK4	Lite
Motor Drive	Belt	Belt	Direct	Direct
Gears	Plastic	Plastic	Metal & Plastic	Metal & Plastic
µP PCB Location	Centre Plate	Centre Plate	Coin Box	Exit Window
LED's Location	PCB	PCB	Exit Window	None
Opto Sensors	2 sets	1 set	3 sets	3 sets
Track Guard	Blue	Green	None	None

7.3 Track guard Removal and Refitting (MKII and MK III only)

See [Figure 14](#).

Firstly, locate cut away slots in Centre plate and End plate at the base of the track guard opposite the PCB. Push track guard up to reveal a gap between body moulding and the guard. Insert broad flat bladed screwdriver or equivalent into gap and gently lever out the guard until the leading edge is above the outside edge of the body mouldings. Now slide the guard down towards the cut out and gradually withdraw it. Slide back the track guard to refit.

7.4 Coin Box Removal and Refitting

Please refer to the Universal Hopper Service Manual TSP053

7.5 Track and 12-Pin Plug access

Please refer to the Universal Hopper Service Manual TSP053

8. Electronic Description

8.1 General Electronic Description

Operation of the hopper is controlled by a 8-bit microprocessor.

The microprocessor allows the choice of 3 different operating modes (except for 'Lite' which only has Mode 1). It also provides the motor control drive via a darlington bridge and an optical payout detection output.

Separate power supplies are recommended for the motor supply input and the logic supply input. **Note:- The 'Lite' version only has one supply input.**

8.2 Operating Mode Selection (Universal Hopper Lite – Mode 1 ONLY)

Three modes of operation are available, selected via inputs IN1 and IN2 (pins 4 and 8 of the 12 way connector). Input signals may be controlled by the host machine, or may be hardwired. Additionally, input IN3 (pin 12) is the logic control line, used in modes 1 and 2. These inputs are passive pull-up active pull-down. The signals therefore default to logic '1' if left open circuit.

NOTE: It is strongly recommended that if these inputs are to be controlled by the host machine, then open collector NPN transistors, referenced to logic OV (connector pin 2) be used to set the input levels to IN1, IN2 and IN3.

With the exception of 'RESET' mode which can be applied at any time (with instantaneous effect), Mode selection is determined at power-up. The hopper allows a 100ms time-out after power-up, then reads the inputs IN1 and IN2. The hopper will remain in the selected mode until the power is removed, i.e., any further changes in the levels at IN1 and IN2 will be ignored.

See [Table 4](#).

Refer to section [11.5](#) for recommendations for driving input signals on pins IN1, IN2 and IN3.

Table 4: Mode Selection Logic Input.

Mode	IN1	IN2
0	1	1
1	0	0
2	1	0
Reset	0	1

8.2.1 MODE 0 - DIRECT SWITCHING (NOT 'LITE')

This is the default operating Mode, and is selected when all of the input selectors are left open circuit. When the 24V line is established, the motor starts in the forward direction and when the 24V power line is removed, the motor is braked.

8.2.2 MODE 1 - LOGIC CONTROL

In this mode the logic and 24V power supplies can be permanently connected and motor function is determined via a logic level on the IN3 input.

When IN1 (pin 4) and IN2 (pin 8) are pulled down to OV at power up, mode 1 is selected.

The operation of the motor is now controlled via a logic signal on IN3 (pin 12). With the 24V supply present, a low level on IN3 starts the motor and a high level on IN3 brakes the motor.

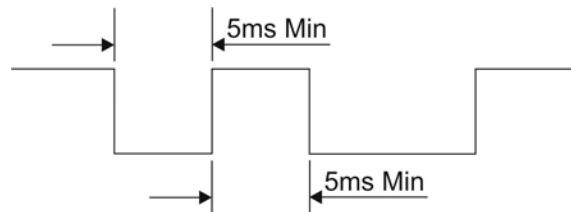
8.2.3 MODE 2 - COIN COUNTING (NOT 'LITE')

In this mode, the hopper will pay out a coin for every pulse it receives on input IN3.

Mode 2 is selected by setting IN1 (pin 4) high and IN2 (pin 8) low at power up. Once selected, the processor continually scans input IN3. When a pulse is detected on IN3, an internal register is incremented. When a coin is paid out, it is detected and the register is decremented.

The motor is started when the internal coin register is non-zero and is stopped when it returns to zero. The maximum count for the coin register is 4095 coins. Should the 24V line fail at any point, the motor is braked. When the 24V line re-appears, the payout of coins continues until the coin register returns to zero. Coin counting on IN3 can take place while coins are being paid out.

Figure 5: Minimum Timings



A pulse is defined as a falling edge followed by a rising edge.

Pulse edges may be no closer than 5ms (see [Figure 5](#)). This is so that the processor has adequate time to poll the IN3 pin and debounce. This represents a maximum pulse rate of 100Hz.

There is no lower limit. The waveform duty cycle is unimportant.

At power-up in mode 2, IN3 is high. The first falling edge will be recognised as the first pulse and the hopper motor will start running.

Pulsing on IN3 should not commence earlier than 130ms after the logic supply has been established. This will allow for the power-up time-out of 100ms and further processing time prior to running the main program.

8.2.4 RESET FUNCTION (NOT 'LITE')

The reset function is available on MKIII and, when specified on the MK4 version. In this mode the Hopper is reset, i.e. processor reset and motor drive disabled. This function is provided as added security enabling the host machine to immediately stop the Hopper irrespective of its mode of operation.

Whilst in this mode connecting IN3 (pin 12) to ground turns the exit window sensor off in order to test it is operative. Confirmation would be given as a signal output on pin 3 and 11 of the 12 pin connector.

8.3 Optical Sensors

Optical sensors are fitted in the exit window to detect coin payout.

The signal on Pin 11 is the 'Raw' coin output signal (Not applicable to the 'Lite'). A de-bounced coin output is available on Pin 3. When no coins are present at the exit window, the optical sensors are clear, the output transistors are open circuit, and the LED indicator is off. Coins passing the optical sensors obstruct the light path causing the output transistors to pull down to OV and the LED "SENSOR" indicator switches on.

8.4 Optical Security Feature

The output of the optical sensor is monitored by the microprocessor and if the sensor remains obstructed for more than one second, the motor will be braked and will remain off until either the sensor is cleared or power down takes place. This action will result if a coin jams in the exit window or if the optical sensor fails which could be checked by toggling IN3 in Reset mode.

If the security feature should operate, the security output on output pin 5 and the LED "SECURITY" indicator will be switched off. The optical security feature operates identically in all 3 Modes.

Note: The security feature works the same on the Universal Hopper Lite but there is no output pin to indicate to the host machine that there is a security issue.

8.5 Motor Operation

The DC motor is controlled by the processor via a transistor bridge. The motor will run provided that one of the sets of conditions shown below is met. If any single condition fails then the motor is braked and remains so until all conditions become true, or a power down occurs.

Mode 0 Motor Start Conditions: Security feature true - 24V line true.

Mode 1 Motor Start Conditions: Security feature true - 24V line true - IN3 input low.

Mode 2 Motor Start Conditions: Security line true - 24V line true - internal coin count non-zero.

When braking is initiated and for whatever reason, 50ms braking is carried out even if the fault condition recovers before that time. This guarantees that the motor is stationary when the bridge drivers change state, so that no excess current flows in the motor windings.

8.6 Motor Current Limit

The motor current is monitored by the processor. When the motor initially starts a high current flows generating maximum torque to force the coin belt up to speed. After a short time the motor current is reduced to a fraction of the initial surge current.

At any time after the initial surge, if the current rises above a pre-set value, then a jam is deemed to have occurred. The motor is braked for 50ms then reversed for 150ms. After a further 50ms

braking, the motor is started in the forward direction again. The current is tested after 100ms and if the jam has not been cleared the reversing cycle will be repeated. This action will continue until the jam has cleared. This reversing action is effective in clearing soft jams.

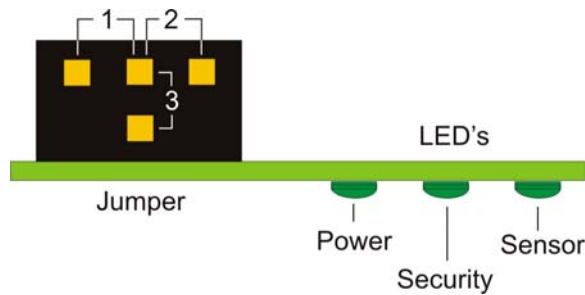
One further action is to test the current in the reverse direction during the final 50ms of the reversing cycle. If during that time period an over current is detected, then the motor will be braked for 50ms and then disabled for 1 second. This action limits the duty cycle sufficiently in the case where a jam is solid in order to prevent motor damage.

8.7 Coins With Holes

The MKII hopper has **not** been designed to handle coins with holes and cannot be guaranteed to perform correctly with such coins.

The MKIII hopper can count most coins with holes correctly, but requires a jumper, on the control board, to be set in the right position for small or standard coins - see below.

Figure 6: Jumper positions for coins with holes (MKIII Only)



If a MKIII hopper is converted from one coin size to the other, the jumper position must also be altered. This is achieved by removing the track guard, as described in [7.3](#), placing the jumper in the required positions, then refitting the track guard.

Table 5: Guide To Coinage v Jumper Position.

Coinage	Position 2 Small coin 17.5 - 21mm	Position 1 Standard coin 21 - 30mm
Danish 1 Kroner	x	
Danish 2 Kroner		x
Danish 5 Kroner		x

The MK4 exit window has been designed so that more coins with holes will be counted correctly. No adjustments are necessary to cope with standard and small coins.

Note:- Jumper position 3 is not used.

8.8 High Security Exit Window (Available for MK4 EMC version ONLY)

The high security version of the exit window has been designed to be retro-fittable into existing MK4 EMC hoppers. Hence, high security hoppers will use the same main control board as the existing EMC product and will retain the same operating modes.

The high security function will detect any attempts to “blind” the optical sensors by shining an external light onto them. Such an action could cause the hopper to miscount.

The detection procedure, during normal operation – stationary or paying out – is:-

- i). The infra-red LED's will be turned off for a fixed time, T_{off} ;
- ii). At the end of the time period, the state of the phototransistors will be examined;
- iii). If the phototransistors are in the correct state, i.e. not seeing any light, the LED's will be turned on again;
- iv). After a defined time, T_{int} , the test will be repeated.

The detection sequence, in the case of a fault – stationary or paying out – is:-

- i). The infra-red LED's will be turned off for a fixed time, T_{off} ;
- ii). At the end of the time period, the state of the phototransistors will be examined;
- iii). If the phototransistors are switched on, i.e. still seeing light, the LEDs will be left off and also the phototransistors will be disconnected for a defined time, T_{fault} . This time must be greater than 1 second;
- iv). When the phototransistors have been disconnected for 1 second, the main control board will recognise the condition as a blocked opto. The hopper motor will be stopped and the security output will be turned off. This will alert the host machine to the problem;
- v). At the end of the time period, T_{fault} , the optos will be turned on again and testing will resume.

It is the responsibility of the host machine to monitor the security signal and to take whatever action is deemed appropriate. All other functions of the hopper, i.e. motor control, jam clearing, coin counting, etc, are the same as the existing product.

NOTE: During the 1 second period, between the fault being detected and the motor stopping, it is possible that a few coins may be paid out and not counted.

8.8.1 TIMER VALUES

T_{off}	-	500 μ secs +/-10%
T_{int}	-	50 msecs +/-10%
T_{fault}	-	2 secs +/-10%

8.8.2 OPTO TEST

By holding the hopper in reset and toggling the IN3 line, the optics can be checked for a blockage prior to paying out.

During Reset, a High on IN3 will cause a low on “Output 1” and “Output 2”. Alternately a Low on IN3 will cause a high on “Output 1” and “Output 2”.

NOTE:- This is only true if the optics are NOT blocked.

9. Electrical Specification Power Supply Requirements

9.1 Power Supply

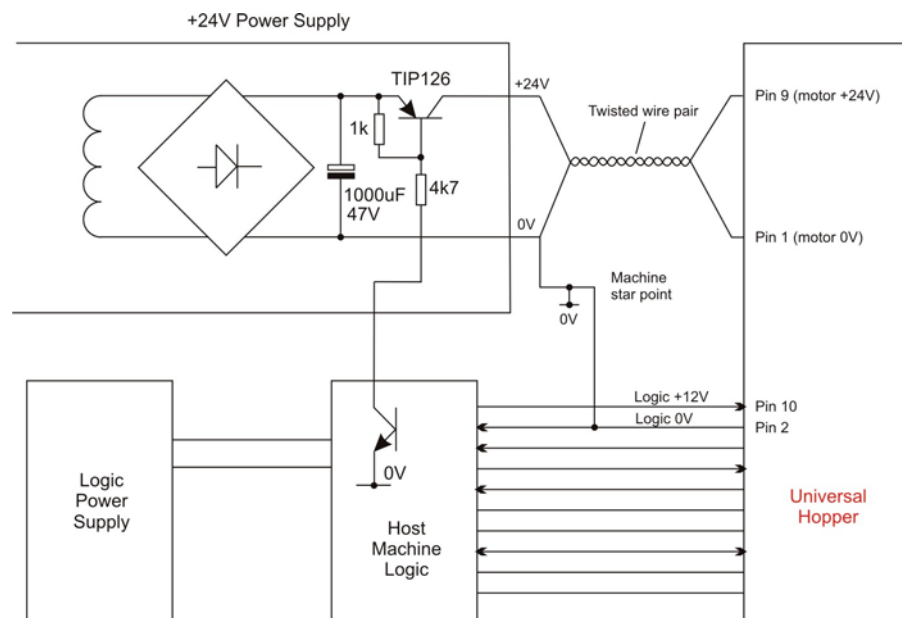
For ease of use and maximum noise suppression, the 0 volt logic line (pin 2) and the motor 0 volt line (pin 1) are **not** commoned inside the hopper. This means the outputs from the hopper (Opto and Security) are noise free.

9.1.1 SUGGESTED CONNECTION

A suggested connection diagram is shown in [Figure 7](#).

A twisted wire pair is recommended for the motor power leads to reduce the radiated noise. The TIP 126 arrangement shown would only be required for Mode 0 operation where power line interruption is the method of motor control. In Modes 1 and 2 the power line can be left permanently on and the TIP 126 and 1K and 4K7 resistors can be omitted.

Figure 7: Recommended Connection Diagram



9.1.2 EMC

The MKIII hopper is EMC hardened. There is a version of the MK4 hopper which is also EMC hardened. This is to help users to meet the European EMC regulations (EN50081 & EN50082). Further precautions should be taken with the installation to minimise the effects of electrical noise, i.e. –

- i) Max cable length = 3 metres
- ii) All wires to the hopper should be bundled together.
- iii) Minimum capacitance between the logic supply rails = 100 μ F

10. Product Compliance's

10.1 MK3

This product has been self assessed to EN 60950:1992 + Amdt A1 & A2: 1993 & A3: 1995 Safety.

10.2 MK3 (EMC)

This product has been self assessed to EN 60950:1992 + Amdt A1 & A2: 1993 & A3: 1995 Safety.

10.3 MK4

This product is compliant to EN 60950:1992 + Amdt A1 & A2: 1993 & A3: 1995 Safety.

10.4 MK4 (EMC)

This product is compliant to:-

EN 50081-1: 1992 Electromagnetic compatibility – Emissions.

EN 50082-1: 1997 Electromagnetic compatibility – Immunity.

This product is compliant to EN 60950:1992 + Amdt A1 & A2: 1993 & A3: 1995 & A4: 1996 Safety.

11. Applications

11.1 Output Sensor Interfacing

Both sensor outputs are open collector NPN transistors, as shown in [Figure 8](#).

When a coin is paid out, the raw sensor output will switch on, connecting output Pin 11 (Not connected on the 'Lite' version) to 0V, the Sensor output on Pin 3 will switch on approximately 5ms later - see [Figure 9](#). Both outputs will stay switched on until the coin has left the exit window. The open collector outputs are provided for easy interfacing to TTL, CMOS or relay inputs, see [Figure 10](#).

NOTE: A flywheel diode is required on any output which has an inductive load connected, e.g. a relay. A 30V maximum can be tolerated on these outputs (positive with respect to 0V).

Figure 8: Sensor Output Cct.

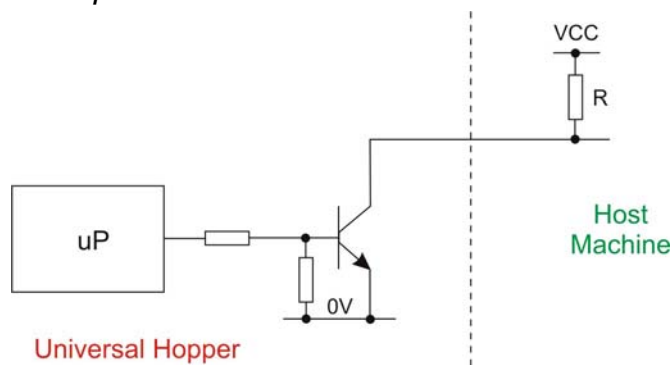
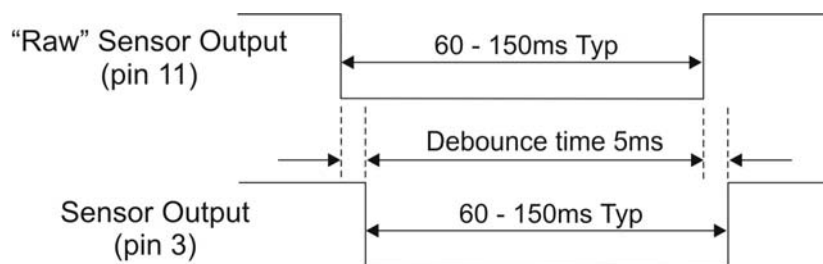


Figure 9: Sensor Output Waveforms.



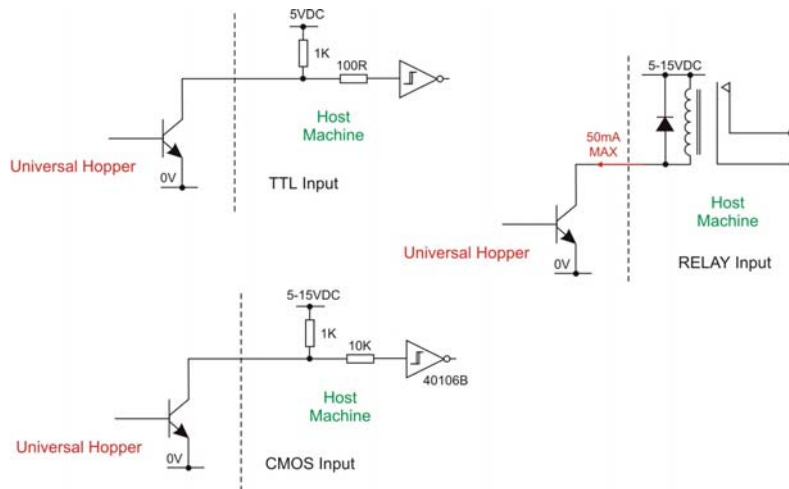
11.2 Motor Switch Off Time

When using the hopper in mode 0 (see section [8.2.1](#)) the host machine applies power to the motor and monitors the payout sensors, disconnecting the motor power when it has counted out the correct quantity of coins. The motor power should be removed within 30ms of the leading edge of the output. Similarly, to avoid erroneous payout in mode 1, IN3 should be taken high within 30ms of the leading edge of the opto SENSOR output (pin 3).

11.3 Security Output (Not 'Lite')

The security output is an open collector NPN transistor which should be connected as shown in [Figure 8](#). In normal operation the transistor will be switched on, i.e. the output pin will be connected to 0V. The transistor will switch off if a fault is detected – see section [8.4](#).

Figure 10: Recommended Security Output Sensor Interfaces.

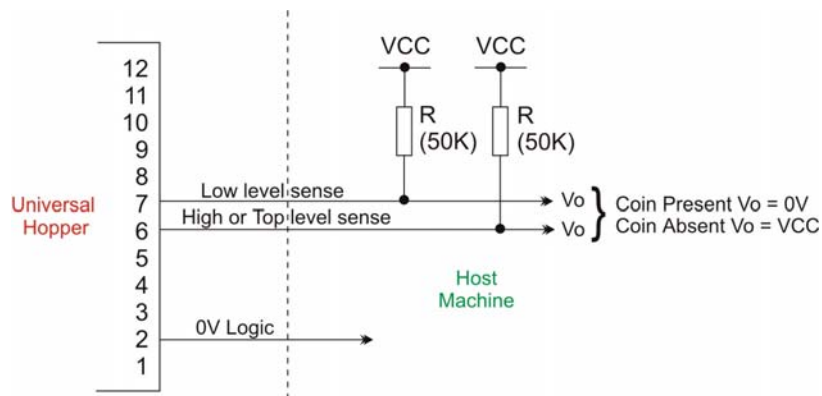


11.4 Level Sense Plates

Brass plates are used for level sensing. One plate is connected to the logic 0 volts and the other plates are wired to the 12 way connector - pin 7 for low level; pin 6 for either high or top level. See [Figure 11](#). The signal levels on these pins will be determined by the presence or absence of an electrical contact, via the coins, between the 0 volt plate and the other plates.

Note:- High Level is not available with the Universal Hopper Lite.

Figure 11: Recommended Level Sense Plate Interfaces.

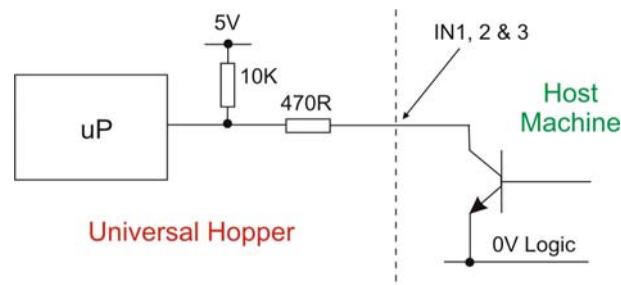


Tip:- [When the hopper motor is running, coins will be moving across the level plates. This could cause incorrect level signals. It is recommended that the level sense outputs are read when the hopper motor is switched off.](#)

11.5 IN1 to IN3 and Motor Control Inputs

These are the control signals from the host to the hopper which determine the Mode of operation. These are input to the hopper microprocessor via a resistor as shown in [Figure 12](#). IN3, if used, should always be driven via an open collector transistor referred to logic 0V. IN1 and IN2 can also be driven via open collector transistors (see [Figure 12](#)) or if no change of mode is required, then strapped to logic 0V or left floating (internal pull-up) depending on the mode required.

Figure 12: Recommended IN_x and Motor Control Inputs.



11.6 LED Indicators (Not 'Lite')

Three LED indicators are fitted on the hopper. On MKII and MKIII hoppers they are visible under the track guard at the top corner, at the side of the coin exit. MK4 hoppers have the LED's mounted in the coin exit area.

See [Figure 6](#) for details. The LED designations/positions are the same for all universal hoppers.

12. Technical Specifications

12.1 Coin Sizes

Please refer to [Table 2](#).

The MK4 hopper however has extended this range to include 31mm diameter coins. Coins falling outside of the above ranges may be used but would require special qualification. For more information contact Money Controls Technical Services Department.

12.2 Capacity

Approximate, (±10%), coin capacities can be estimated by applying the following formula.

$$\text{Capacity} = \frac{\text{Hopper Volume}}{\text{Coin Volume}}$$

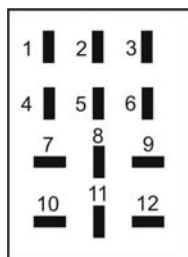
$$= \left[\frac{1,200,000}{\left(\frac{\pi \times D^2}{4}\right) \times T} \right]$$

Where D = Coin diameter (mm)
T = Coin thickness (mm)

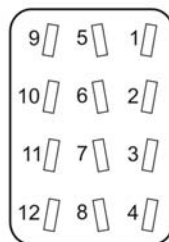
Alternatively a calculator program can be obtained from the Money Controls Technical Services Department.

12.3 Connections

Figure 13: Connector Pin-outs



MKIII Bulgin Connector



MKII Cinch Connector

Note:- Shown from back of connector on baseplate.

Table 6: Connector Pin-outs

Pin	Description	'Lite'
1	Motor supply 0 volt	Motor supply 0 volt
2	Logic 0 volt	Logic 0 volt
3	uP Sensor Output	uP Sensor Output
4	IN1	N.C.
5	Security output	N.C.
6	High or top level sense output	Top level sense output
7	Low level sense output	Low level sense output
8	IN2	N.C.
9	Motor supply	+24V Supply
10	Logic supply	N.C.
11	Raw Sensor Output	N.C.
12	IN3	Motor Control I/P

12.4 Motor Supply – Pin 9

Table 7: Motor Supply Requirements

Current consumption at 24V DC:-	
Nominal running current	0.5A
Nominal reverse current	1.0A
Nominal cut-out current during a reverse	1.5A
Nominal start-up current	2.0A
Power supply requirement	24V DC at 2 Amps
Supply Voltage:-	
Nominal voltage	24V DC
Absolute minimum voltage	18V DC
Absolute maximum voltage	27V DC
Maximum rise/fall time	50ms
Absolute worst case ripple at 24V	+3V/-6V

12.5 Logic Supply (Not 'Lite')

Table 8: Logic Supply Requirements

Description	Value
Nominal Supply	12V DC at 100mA
Absolute minimum voltage	11V DC
Absolute maximum voltage	27V DC
Maximum rise/fall time	100ms
Absolute worst case ripple	+/-1V

12.6 Logic Inputs (IN1, IN2, IN3 and Motor Control I/P)

Table 9: Logic Input Requirements

Description	Value (Vin)
Absolute maximum logic 0 input	$\leq 0.6V$
Absolute minimum logic 1 input	$\geq 2.4V$

12.7 Logic Outputs (Sensors, Security)

Table 10: Logic Output Parameters

Description	Value
Absolute maximum 'true' output Vout	<= 0.3V at 50mA
Absolute maximum sink current	100mA
Absolute maximum Voff	30 Volts
Sensor output typical pulse width	MKII/III 50 - 100ms MK4 70 - 120ms

12.8 Important Supply Notes

1. The specified maximum motor and logic +ve voltages must not be exceeded, otherwise damage/injury could result.
2. Hopper speed (and payout rate) varies with applied motor voltage
3. The power supply fall time is critical if the hopper is being used in mode 0. When the host machine has counted out the required number of coins, it must disable the +24 Volt supply. The motor is not disabled until the power line falls below a pre-set level of 18 volts DC, therefore there is a danger of extra coins being paid out if the power supply fall time is greater than 5ms. A power supply switching device such as a transistor, darlington or MOSFET is therefore recommended.
4. The standby current is the current drawn when the motor is disabled, e.g. if the coin register is zero in mode 2 or if IN3 is high in mode 1.

12.9 Environment

Table 11: Environmental Parameters

Description	Value
Operating temp	0 to 60°C
Storage temp	-20 to 60°C
Life	Up to 3 million coins
Mounting	±3° of vertical in any direction

NOTE: DO NOT use the hopper in an explosive atmosphere.

13. Hopper Dimensions and Exploded Diagrams

Figure 14: MKII and MKIII Exploded Diagram

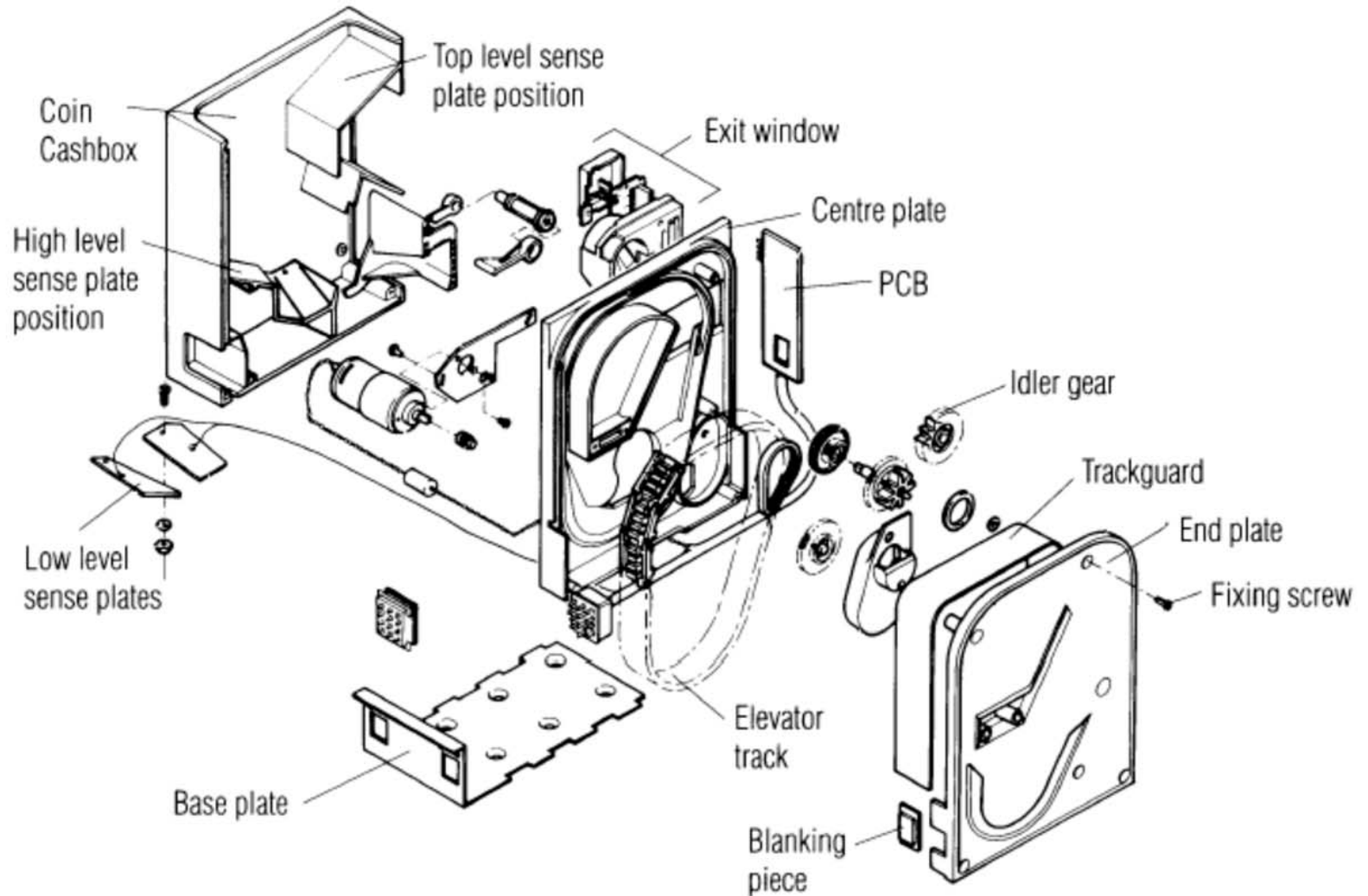


Figure 15: MKII and MKIII Dimensions

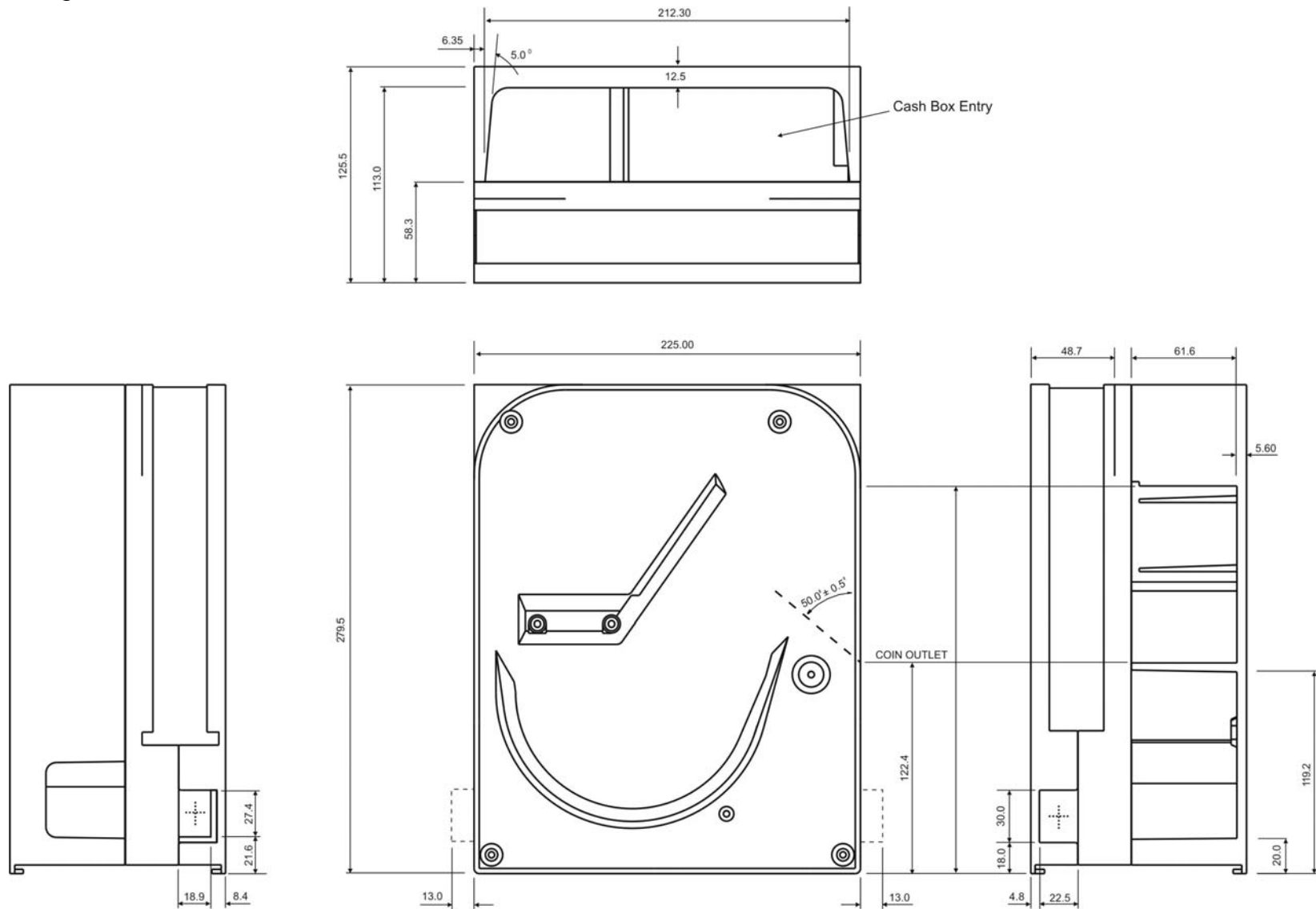


Figure 16: MK4 Exploded Diagram

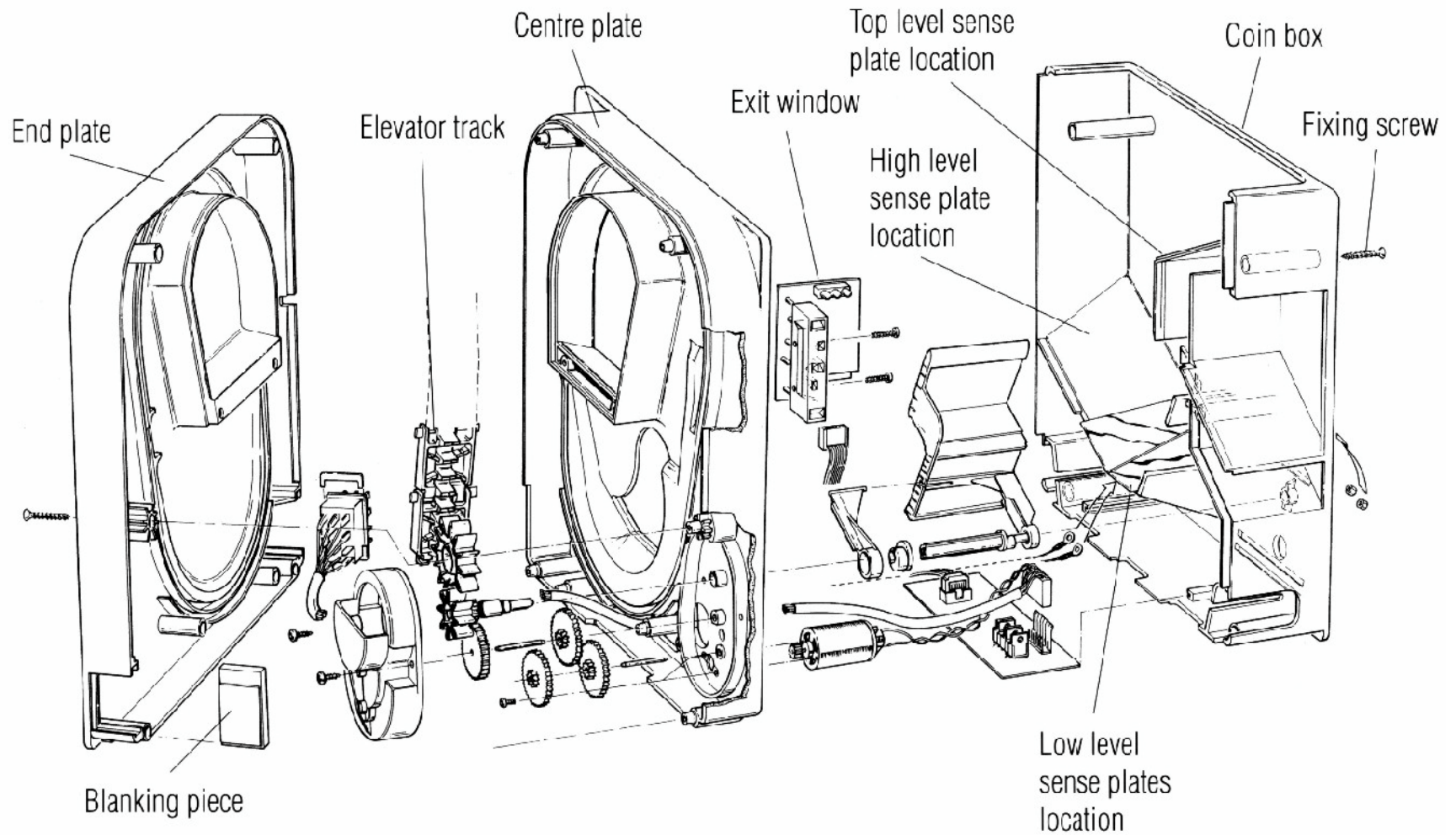


Figure 17: MK4 and 'Lite' Dimensions

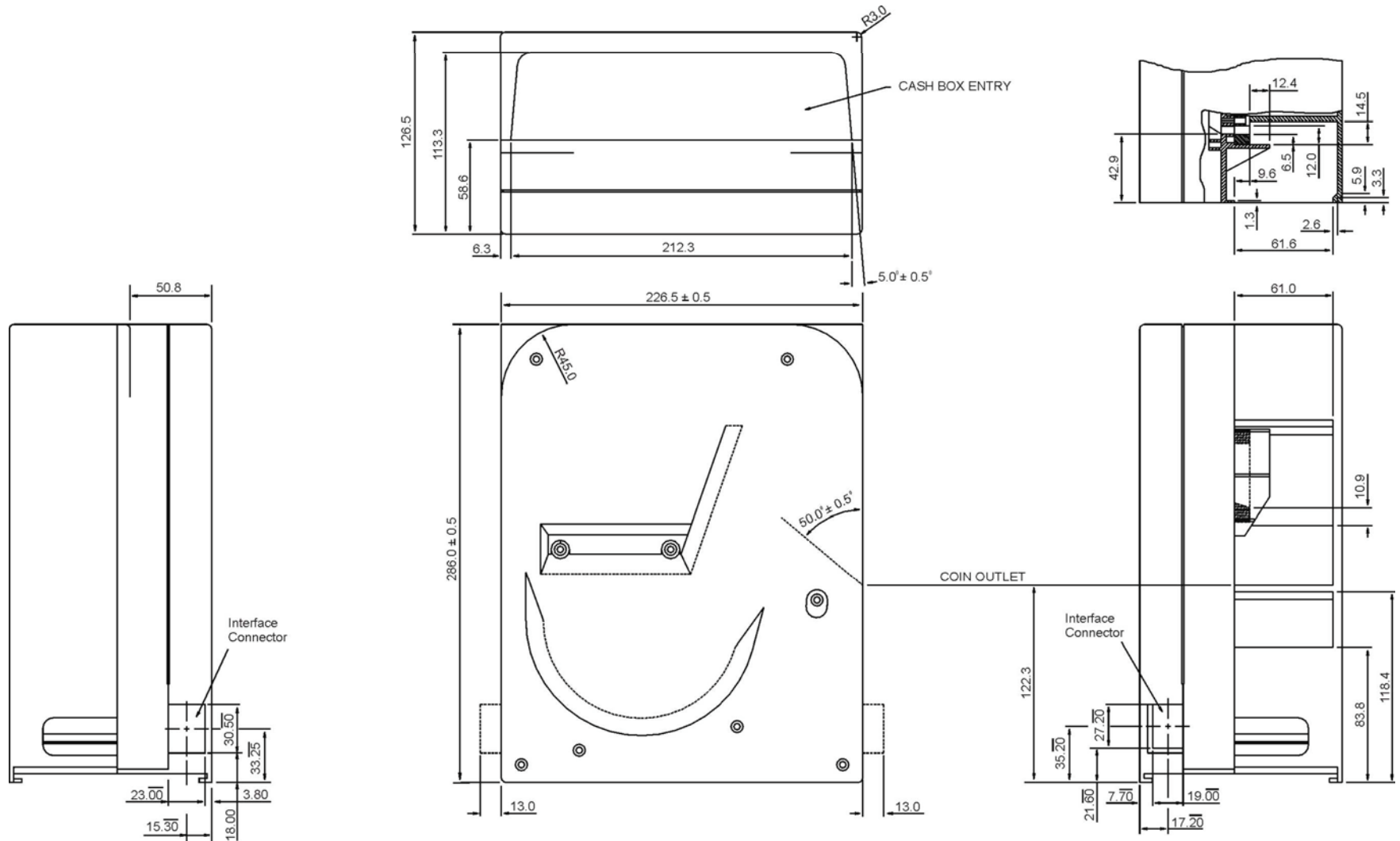
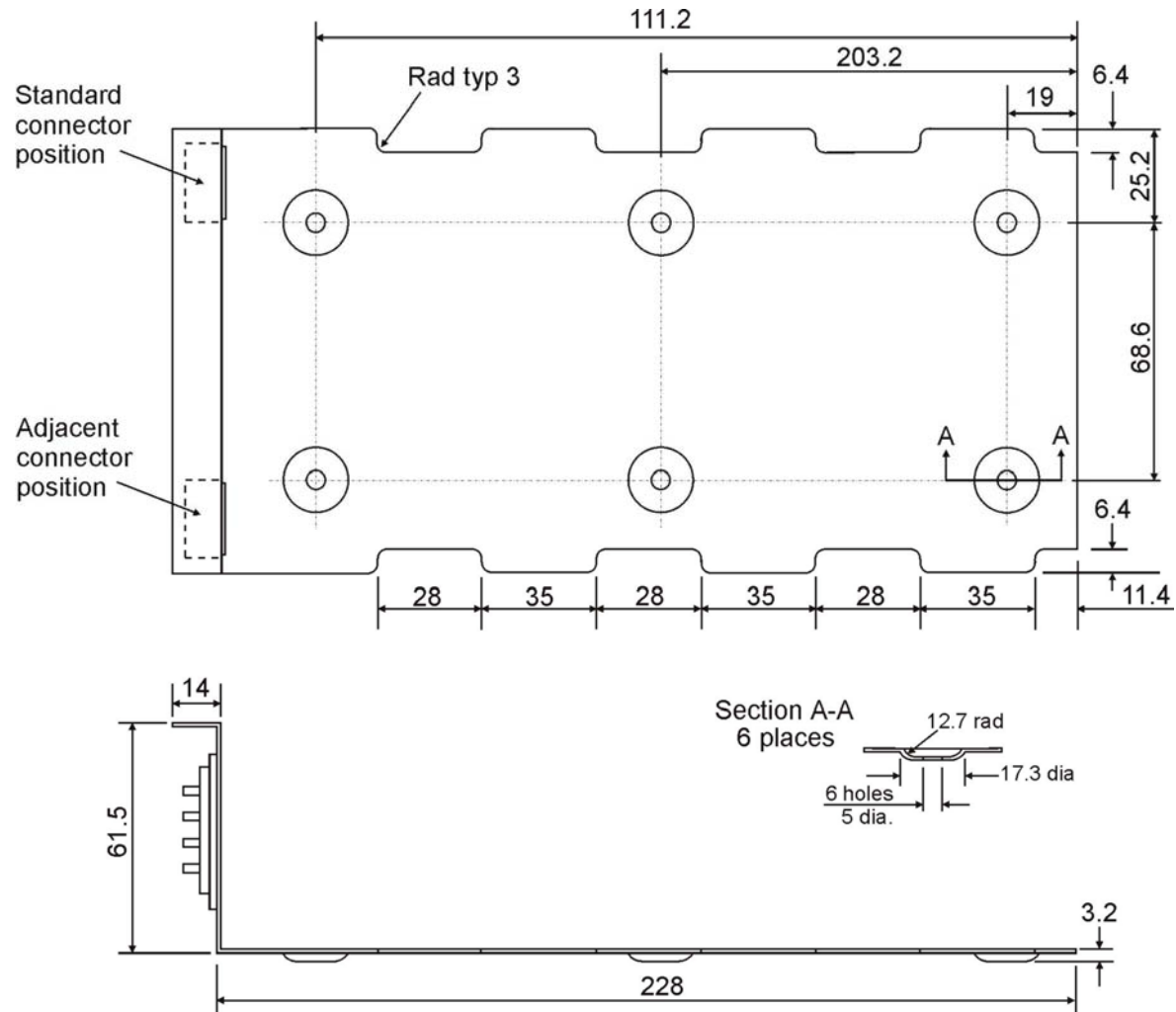


Figure 18: Baseplate Dimensions



This manual is intended only to assist the reader in the use of this product and therefore Money Controls shall not be liable for any loss or damage whatsoever arising from the use of any information or particulars in, or any incorrect use of the product. Money Controls reserve the right to change product specifications on any item without prior notice.



Manitowoc®



S Model & Ice Beverage QuietQube® Ice Machines with CVD® Technology

Installation, Use and Care Manual

Thank you for selecting a Manitowoc Ice Machine, the dependability leader in ice making equipment and related products. With proper installation, care and maintenance, your new Manitowoc Ice Machine will provide you with many years of reliable and economical performance.

Safety Notices

As you work on a QuietQube®-Series Ice Machine, be sure to pay close attention to the safety notices in this manual. Disregarding the notices may lead to serious injury and/or damage to the ice machine.

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



Warning

PERSONNEL INJURY POTENTIAL

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



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 ice machine. Be sure to read the Caution statement before proceeding, and work carefully.

Procedural Notices

As you work on a QuietQube®-Series Ice Machine, be sure to read the procedural notices in this manual. These notices supply helpful information which may assist you as you work.

Throughout this manual, 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 ice production and trouble-free operation of you Manitowoc Ice Machine. Read and understand this manual. It contains valuable care and maintenance information. If you encounter problems not covered by this manual, do not proceed, contact Manitowoc Ice, Inc. We will be happy to provide assistance.

Important

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

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

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Section 1 General Information

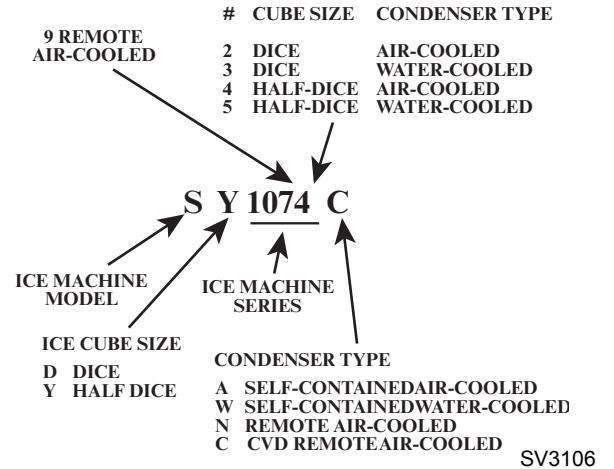
Model Numbers

This manual covers the following models:

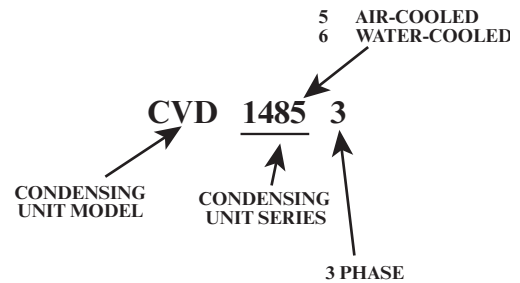
Ice Machine Head Section	CVD® Condensing Unit*
SD0672C SY0674C IB0624YC IB0622DC	CVD0675
SD0872C SY0874C IB0824YC IB0822DC	CVD0885
SD1072C SY1074C	CVD1085
SD1272C SY1274C IB1024YC IB1022DC	CVD1285
SD1472C SY1474C	CVD1485 CVD1486
SD1872C SY1874C	CVD1885
SD2072C SY2074C	CVD2075

For 3 phase electrical option: add the number "3" to the end of model number (CVD10853).

How to Read a Model Number



Remote Condensing Unit



Warning
PERSONNEL INJURY POTENTIAL

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

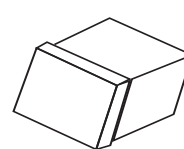
Warning

When installed on a bin an ice deflector is required. Prior to using a non-Manitowoc ice storage system with Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

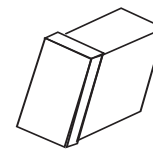
Warning

S1470C/S1870C/S2070C ice machines are not approved for use on Manitowoc B570 series bins.

Ice Cube Sizes



Dice
7/8" x 7/8" x 7/8"
2.22 x 2.22 x 2.22 cm



Half Dice
3/8" x 1-1/8" x 7/8"
0.95 x 2.86 x 2.22 cm

SV3105

Accessories

Contact your Manitowoc distributor for these optional accessories:

ICE BAGGER

Maximize profits from bagged ice sales with this convenient accessory. This sturdy unit rests on the bin door frame, and adapts for left or right side filling.

ICE DEFLECTOR

An ice deflector is required when the ice machine is installed on a bin. An ice deflector is not required when the ice machine is installed on a dispenser.

Warning

Manitowoc QuietQube® ice machines require a deflector when installed on an ice storage bin.

Prior to using a non-Manitowoc ice storage system with Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

ELECTRONIC BIN THERMOSTAT KIT - K00364

This kit reduces overflow and condensation issues and can be used on any Manitowoc ice machine installed on an ice dispenser. The kit includes a universal mounting bracket which attaches over the dispenser side wall.

Important

Ice/Beverage Ice Machines require the installation of a thermostat to maintain the dispenser ice level. The thermostat ships with the ice machine.

CVD1486 WATER COOLED CONDENSING UNIT (With High Pressure Water Regulating Valve)

A special order condensing unit is available that allows condenser water inlet pressure up to 350 psig (24.13 bar).

STACKING TWO ICE MACHINES ON A SINGLE DISPENSER

Ice/Beverage Ice Machines cannot be stacked.

S QuietQube ice machines cannot be stacked. However an adapter is available that allows two S QuietQube ice machines to be placed side by side on 60" Manitowoc F & B style bins. This requires an installation kit that is necessary to allow access to the shut-off valves during installation and will improve access during future service. Refer to sales literature to determine the proper installation kit for you application.

ARCTIC PURE WATER FILTER SYSTEM

Engineered specifically for Manitowoc ice machines, This water filter is an efficient, dependable, and affordable method of inhibiting scale formation, filtering sediment, and removing chlorine taste and odor.

MANITOWOC CLEANER AND SANITIZER

Manitowoc Ice Machine Cleaner and Sanitizer are available in convenient 16 oz. (473 ml) and 1 gal (3.78 l) bottles. These are the only cleaner and sanitizer approved for use with Manitowoc products.

Cleaner Part Number	Sanitizer Part Number
AuCS®-SO - 94-0546-3	AuCS®-SO - 94-0565-3
AuCS®-SI - 40-1326-3	AuCS®-SI - 40-1327-3

GUARDIAN SACHET PACKETS

Guardian sachet packets release chlorine dioxide on a controlled basis to inhibit the growth of bacteria and slime.

Guardian sachet packets are available through your local Manitowoc Ice Machine dealer.

DISPENSER

A counter-top dispenser is ideal for cafeterias and many types of self-service facilities. Manitowoc auto-fill, floor-standing ice dispensers meet the strict sanitary requirements of the food service, lodging and health care industries.

AUCS® AUTOMATIC CLEANING SYSTEM

This accessory reduces equipment cleaning expense. The AuCS® accessory monitors ice making cycles and initiates cleaning procedures automatically.

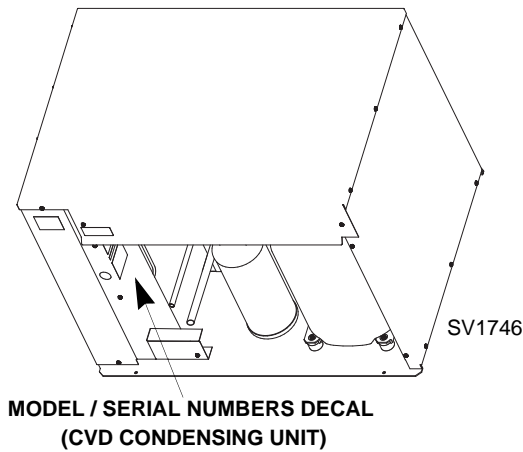
Model/Serial Number Location

Record the model and serial number of your ice machine and bin or dispenser in the space provided below.

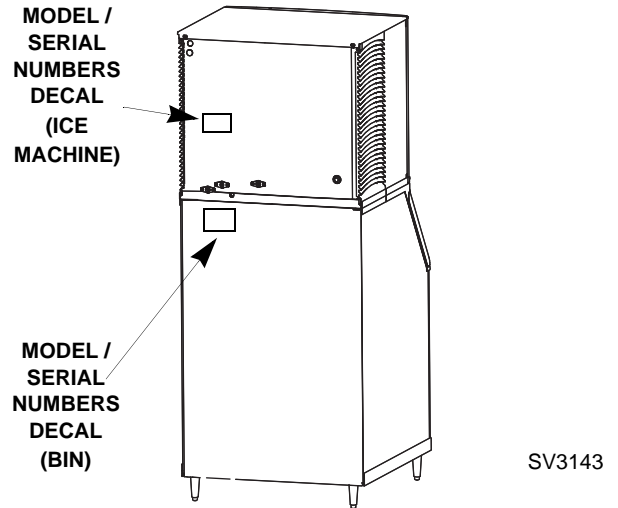
These numbers are required when requesting information from your local Manitowoc distributor, service representative, or Manitowoc Ice, Inc.

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 ice machine head section and condensing unit. Both model/serial numbers must be referenced to obtain warranty or service information.

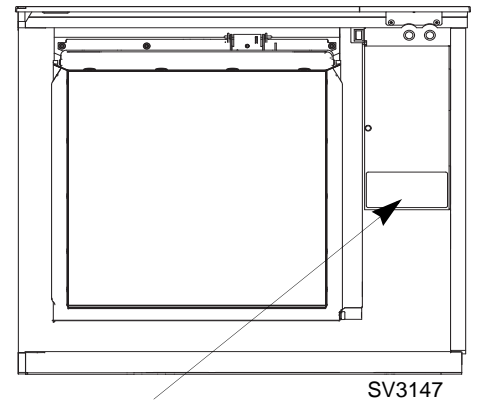
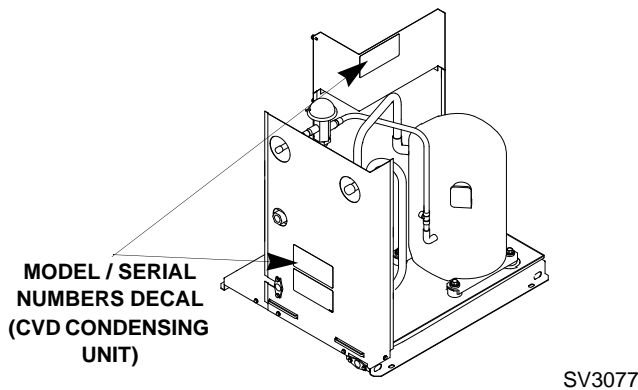
Condensing Unit



Ice Machine Head Section



CVD1486 Condensing Unit



**INSIDE FRONT COVER (ICE MACHINE HEAD SECTION)
FRONT OF CONTROL BOX OR SIDE OF CONTROL BOX**

Model/Serial Number Location

	Ice Machine	Bin or Dispenser	CVD Condensing Unit	AuCS Accessory
Model Number				
Serial Number				

Owner Warranty Registration Card

GENERAL

The packet containing this manual also includes warranty information. Warranty coverage begins the day the ice machine is installed.

Important

Complete and mail the OWNER WARRANTY REGISTRATION CARD as soon as possible to validate the installation date.

If the OWNER WARRANTY REGISTRATION CARD is not returned, Manitowoc will use the date of sale to the Manitowoc Distributor as the first day of warranty coverage for your new ice machine.

Warranty Coverage

COMMERCIAL ICE MACHINE LIMITED WARRANTY

The following Warranty outline is provided for your convenience. For a detailed explanation, read the warranty bond shipped with each product.

Contact your local Manitowoc Distributor or Manitowoc Ice, Inc. if you need further warranty information.

PARTS

1. Manitowoc warrants the ice machine against defects in materials and workmanship, under normal use and service for three (3) years from the date of original installation.
2. The evaporator and compressor are covered by an additional two (2) year (five years total) warranty beginning on the date of the original installation.

LABOR

1. Labor required to repair or replace defective components is covered for three (3) years from the date of original installation.
2. The evaporator is covered by an additional two (2) year (five years total) labor warranty beginning on the date of the original installation.

EXCLUSIONS

The following items are not included in the ice machine's warranty coverage:

1. **Normal maintenance**, adjustments and cleaning as outlined in this manual.
2. Repairs due to unauthorized modifications to the ice machine or use of non-standard parts without prior written approval from Manitowoc Ice, Inc.
3. Damage caused by improper installation of the ice machine, electrical supply, water supply or drainage, or damage caused by floods, storms, or other acts of God.
4. **Premium labor rates** due to holidays, **overtime**, etc.; travel time; flat rate service call charges; mileage and miscellaneous tools and material charges not listed on the payment schedule. Additional labor charges resulting from the inaccessibility of equipment are also excluded.
5. Parts or assemblies subjected to misuse, abuse, neglect or accidents.
6. Damage or problems caused by installation, cleaning and/or maintenance procedures inconsistent with the technical instructions provided in this manual.

AUTHORIZED WARRANTY SERVICE

To comply with the provisions of the warranty, a refrigeration service company qualified and authorized by a Manitowoc distributor, or a Contracted Service Representative must perform the warranty repair.

NOTE: If the dealer you purchased the ice machine from is not authorized to perform warranty service; contact your Manitowoc distributor or Manitowoc Ice, Inc. for the name of the nearest authorized service representative.

SERVICE CALLS

Normal maintenance, adjustments and cleaning as outlined in this manual are not covered by the warranty. If you have followed the procedures listed in this manual, and the ice machine still does not perform properly, call your Dealer, Local Distributor or the Service Department at Manitowoc Ice, Inc.

RESIDENTIAL ICE MACHINE LIMITED WARRANTY

WHAT DOES THIS LIMITED WARRANTY COVER?

Subject to the exclusions and limitations below, Manitowoc Ice, Inc. (“Manitowoc”) warrants to the original consumer that any new ice machine manufactured by Manitowoc (the “Product”) shall be free of defects in material or workmanship for the warranty period outlined below under normal use and maintenance, and upon proper installation and start-up in accordance with the instruction manual supplied with the Product.

HOW LONG DOES THIS LIMITED WARRANTY LAST?

<u>Product Covered</u>	<u>Warranty Period</u>
Ice Machine	Twelve (12) months from the sale date

WHO IS COVERED BY THIS LIMITED WARRANTY?

This limited warranty only applies to the original consumer of the Product and is not transferable.

WHAT ARE MANITOWOC ICE’S OBLIGATIONS UNDER THIS LIMITED WARRANTY?

If a defect arises and Manitowoc receives a valid warranty claim prior to the expiration of the warranty period, Manitowoc shall, at its option: (1) repair the Product at Manitowoc’s cost, including standard straight time labor charges, (2) replace the Product with one that is new or at least as functionally equivalent as the original, or (3) refund the purchase price for the Product. Replacement parts are warranted for 90 days or the balance of the original warranty period, whichever is longer. The foregoing constitutes Manitowoc’s sole obligation and the consumer’s exclusive remedy for any breach of this limited warranty. Manitowoc’s liability under this limited warranty is limited to the purchase price of Product. Additional expenses including, without limitation, service travel time, overtime or premium labor charges, accessing or removing the Product, or shipping are the responsibility of the consumer.

HOW TO OBTAIN WARRANTY SERVICE

To obtain warranty service or information regarding your Product, please contact us at:
MANITOWOC ICE, INC.
2110 So. 26th St.
P.O. Box 1720,
Manitowoc, WI 54221-1720
Telephone: 920-682-0161 Fax: 920-683-7585
www.manitowocice.com

WHAT IS NOT COVERED?

This limited warranty does not cover, and you are solely responsible for the costs of: (1) periodic or routine maintenance, (2) repair or replacement of the Product or parts due to normal wear and tear, (3) defects or damage to the Product or parts resulting from misuse, abuse, neglect, or accidents, (4) defects or damage to the Product or parts resulting from improper or unauthorized alterations, modifications, or changes; and (5) defects or damage to any Product that has not been installed and/or maintained in accordance with the instruction manual or technical instructions provided by Manitowoc. To the extent that warranty exclusions are not permitted under some state laws, these exclusions may not apply to you.

EXCEPT AS STATED IN THE FOLLOWING SENTENCE, THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OF MANITOWOC WITH REGARD TO THE PRODUCT. ALL IMPLIED WARRANTIES ARE STRICTLY LIMITED TO THE DURATION OF THE LIMITED WARRANTY APPLICABLE TO THE PRODUCTS AS STATED ABOVE, INCLUDING BUT NOT LIMITED TO, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT SHALL MANITOWOC OR ANY OF ITS AFFILIATES BE LIABLE TO THE CONSUMER OR ANY OTHER PERSON FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND (INCLUDING, WITHOUT LIMITATION, LOSS PROFITS, REVENUE OR BUSINESS) ARISING FROM OR IN ANY MANNER CONNECTED WITH THE PRODUCT, ANY BREACH OF THIS LIMITED WARRANTY, OR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY OF LIABILITY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

HOW STATE LAW APPLIES

This limited warranty gives you specific legal rights, and you may also have rights that vary from state to state or from one jurisdiction to another.

REGISTRATION CARD

To secure prompt and continuing warranty service, this warranty registration card must be completed and sent to Manitowoc within thirty (30) days from the sale date. Complete the following registration card and send it to Manitowoc.

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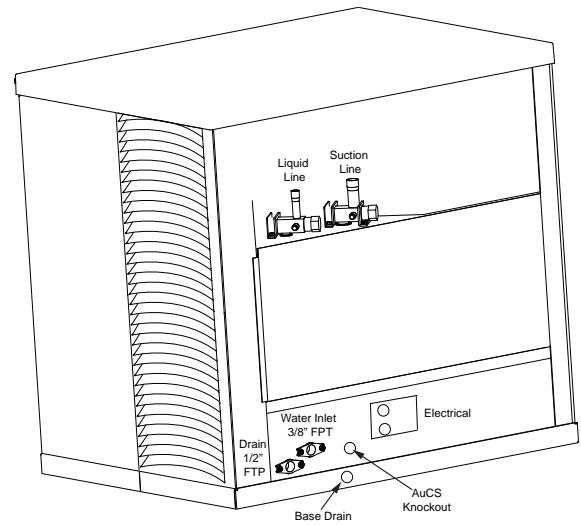
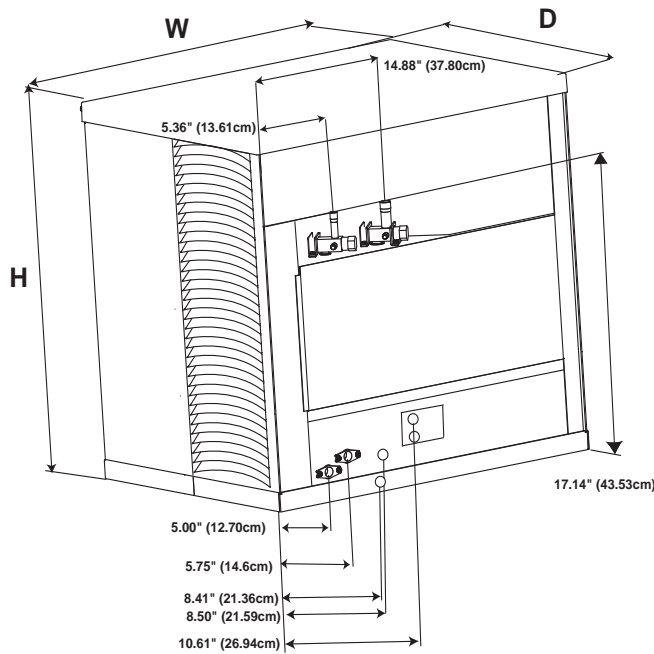
Section 2 Installation Instructions

Ice Machine Dimensions

Important

Failure to follow these installation guidelines may affect warranty coverage.

S0600C/S0850C/S1000C/S1200C ICE MACHINES

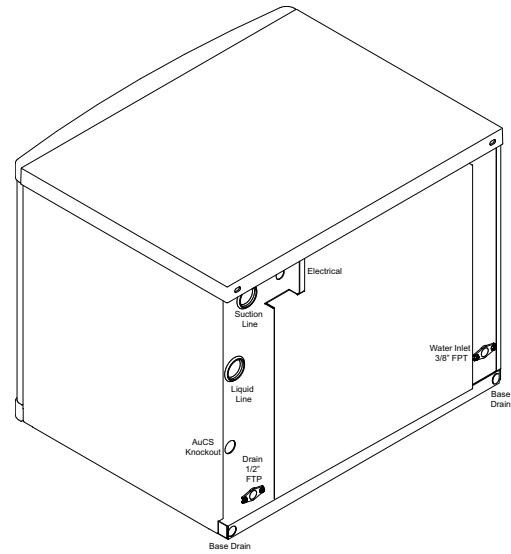
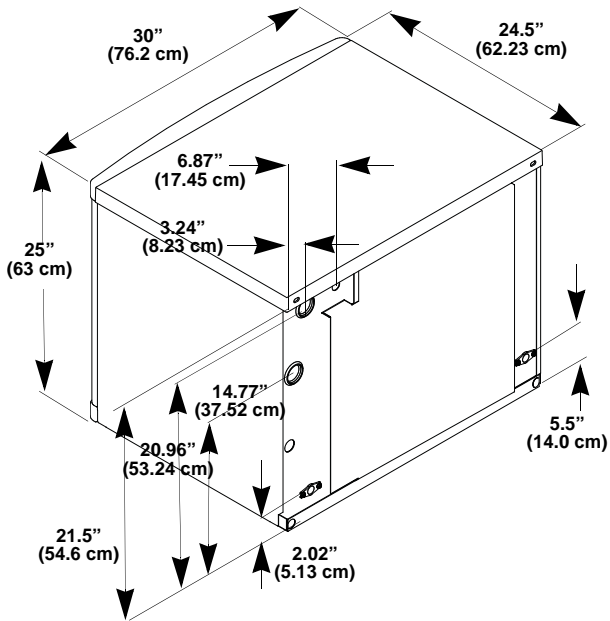


Ice Machine	Dimension D	Dimension W	Dimension H
S0600C	24.5 in (62.2 cm)	30 in (76.2 cm)	21.5 in (54.6 cm)
S0850C	24.5 in (62.2 cm)	30 in (76.2 cm)	26.5 in (67.3 cm)
S1000C	24.5 in (62.2 cm)	30 in (76.2 cm)	29.5 in (74.9 cm)
S1200C	24.5 in (62.2 cm)	30 in (76.2 cm)	29.5 in (74.9 cm)

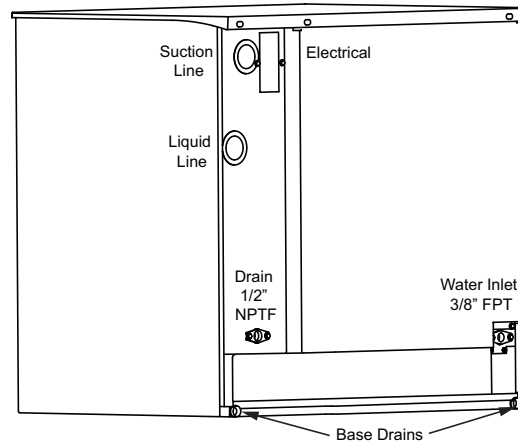
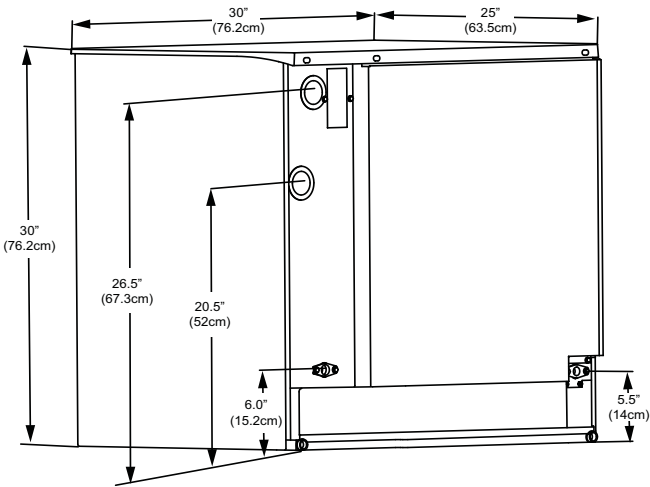
Stacking Two Ice Machines on a Single Storage Bin

S QuietQube ice machines cannot be stacked. However an adapter is available that allows two S QuietQube ice machines to be placed side by side on 60" Manitowoc F & B style bins.

S1470C ICE MACHINES



S1870C/S2070C ICE MACHINES

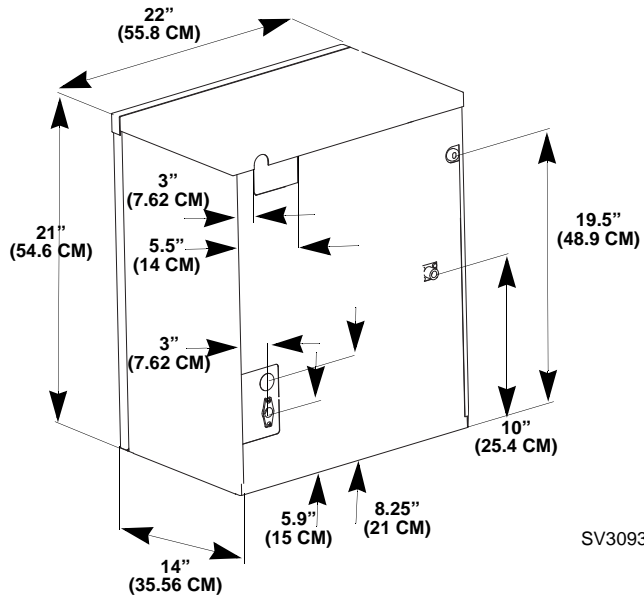


Warning

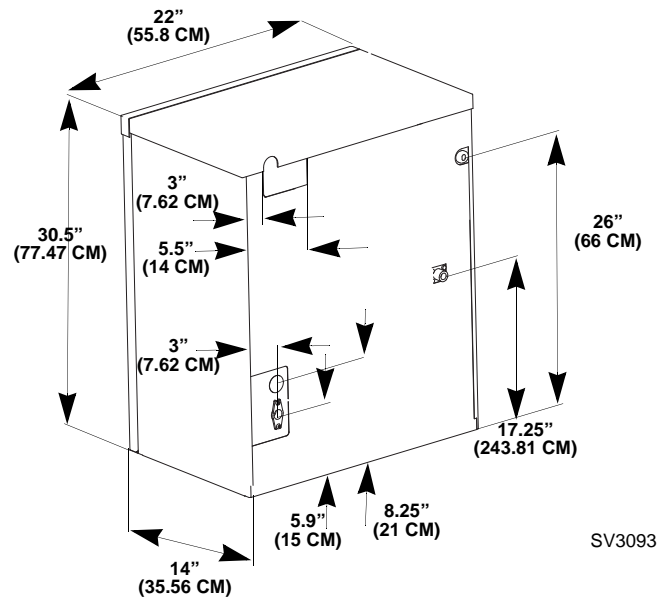
S1470C/S1870C/S2070C ice machines are not approved for use on Manitowoc B570 series bins.

Ice Machine Dimensions

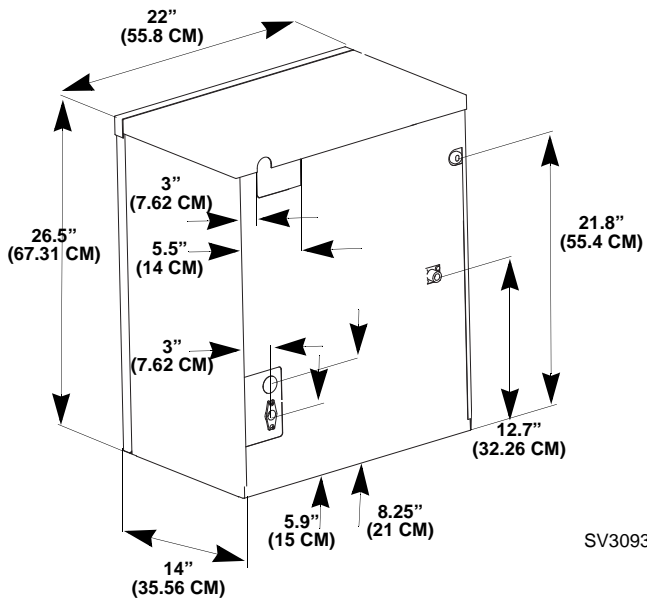
IB0600C ICE MACHINE



IB1000C ICE MACHINE



IB0800C ICE MACHINE

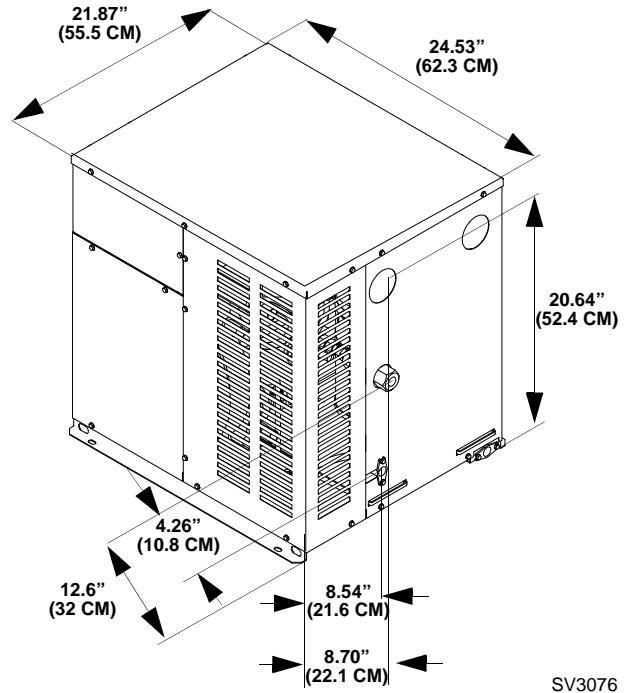
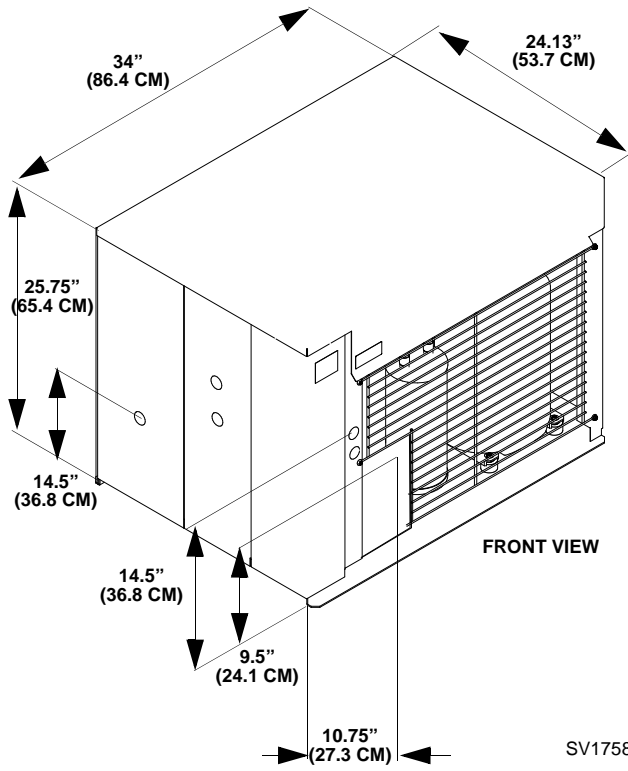


Important
Failure to follow these installation guidelines may affect warranty coverage.

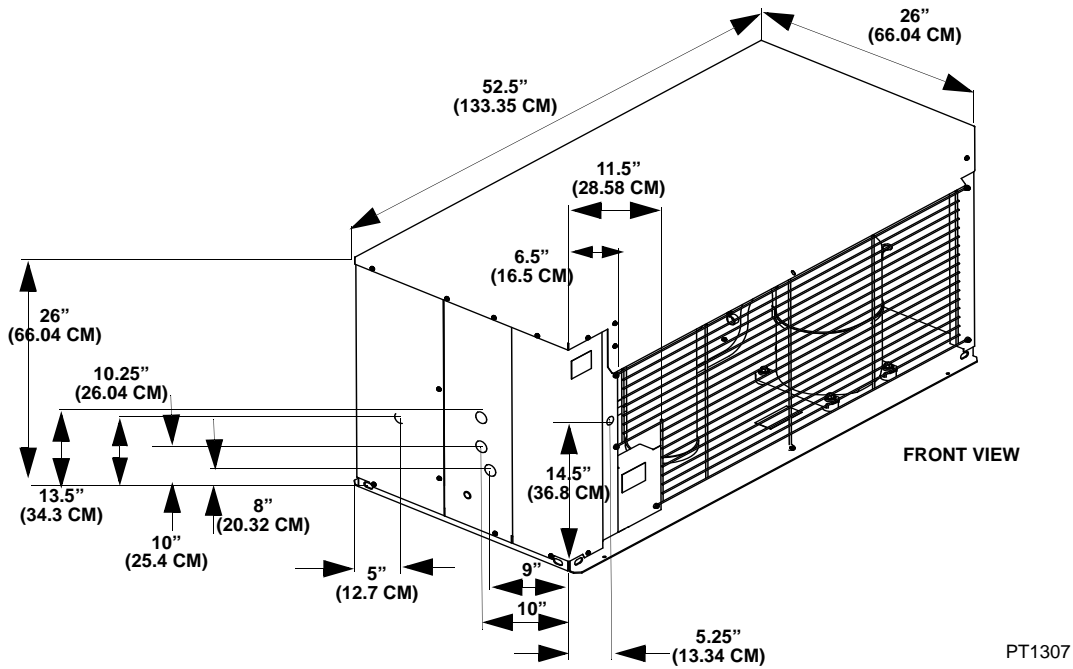
CVD Condensing Unit Dimensions

CVD0675/CVD0885/CVD1085/
CVD1185/CVD1285/CVD1485

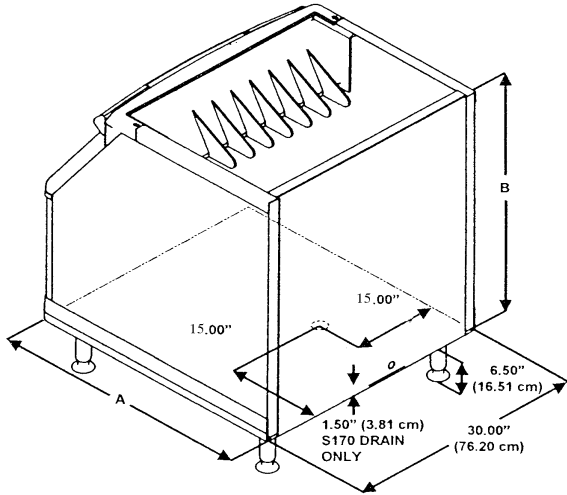
CVD1486



CVD1885/CVD2075 Air-Cooled



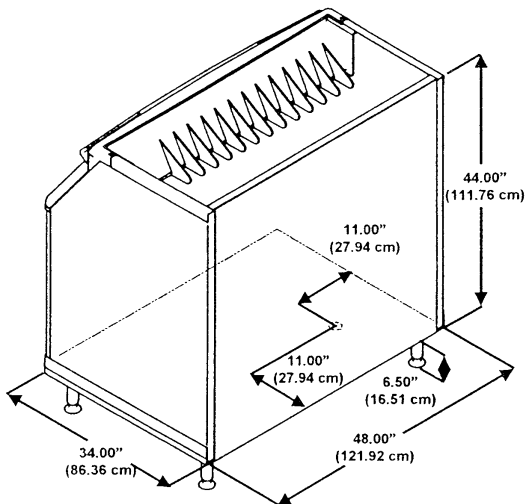
Ice Storage Bin Dimensions
30 INCH (76CM) ICE STORAGE BIN



Bin Model	Dimension A	Dimension B
B570	34.0 in (86.3 cm)	44.0 in (111.7 cm)

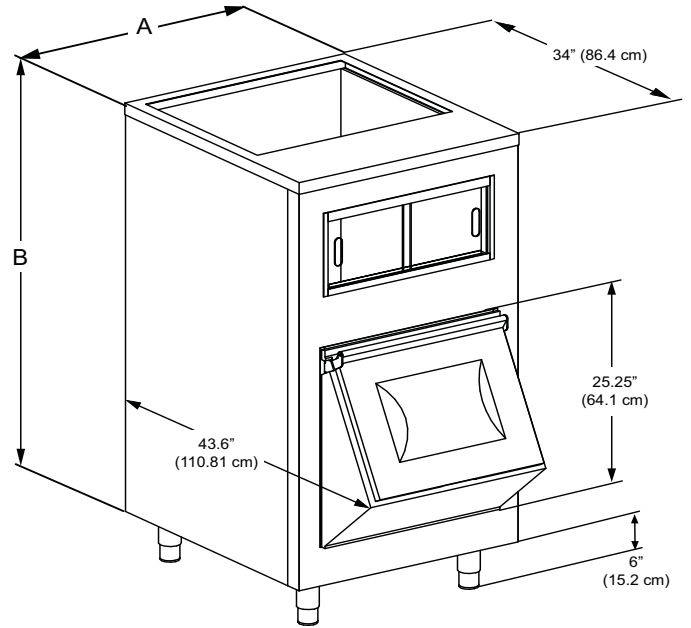
Warning
 Manitowoc QuietQube ice machines require the ice storage bin to incorporate an ice deflector.
 Prior to using a non-Manitowoc ice storage system with other Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

S970 ICE STORAGE BIN



Caution
 30" large capacity bins must be attached to the wall with the bracket provided with the bin.

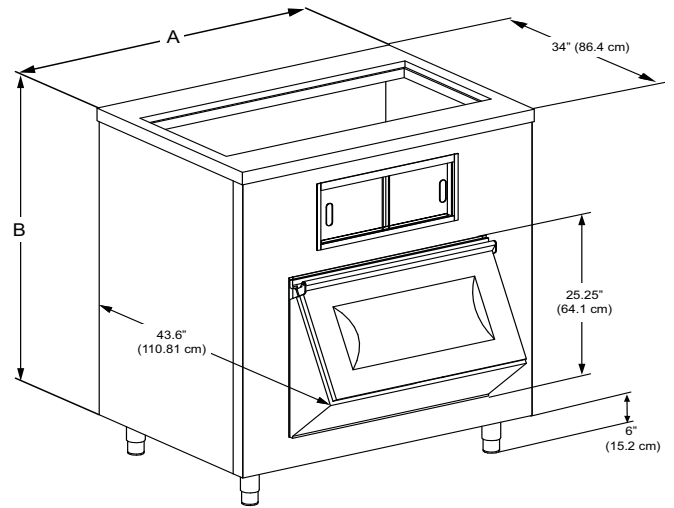
Large Capacity Ice Storage Bin Dimensions
30 INCH (76 CM)



Bin Model	Dimension A (Width)	Dimension B (Height)
B750	30 in. (76.2 cm.)	58 in. (147.3 cm.)
B1050	30 in. (76.2 cm.)	78 in. (198.1 cm.)

The bin drain is exactly in the center of the bin.

48 INCH (122 CM) & 60 INCH (152 CM)



Bin Model	Dimension A (Width)	Dimension B (Height)
B1100	48 in. (121.9 cm.)	55.0 in. (139.7 cm.)
B1400	60 in. (152.4 cm.)	55.0 in. (139.7 cm.)

The bin drain is exactly in the center of the bin.

General

These instructions are provided to assist the qualified installer. Check your local Yellow Pages for the name of the nearest Manitowoc distributor, or call Manitowoc Ice, Inc. for information regarding installation and start-up services.

Important

Failure to follow these installation guidelines may affect warranty coverage.



Warning

PERSONAL INJURY POTENTIAL

Remove all ice machine panels before lifting and installing.

Ice Machine Installation Options

CVD1486 CONDENSER WATER PRESSURE

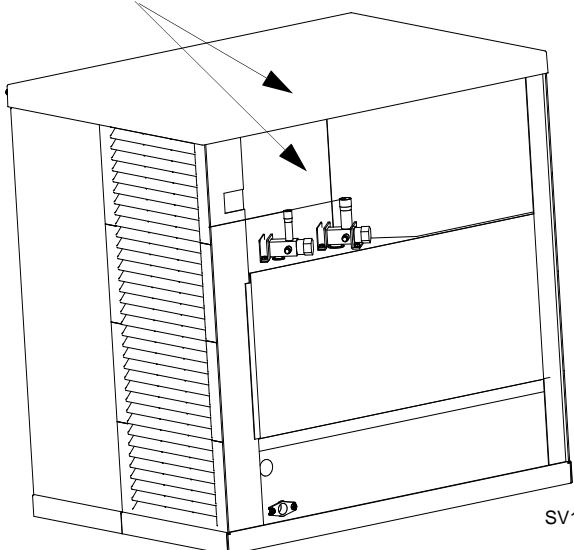
Water pressure at the condenser cannot exceed 150 psig (10.34 bar) with the standard water-regulating valve. Contact your distributor if your water pressure is greater than 150 psig (10.34 bar). A special order condensing unit is available that allows water pressure up to 350 psig (24.13 bar).

ICE MACHINE HEAD SECTIONS

The ice machine head can be installed with the electrical inlet, water supply inlet and refrigeration tubing entering from the back or top of the ice machine.

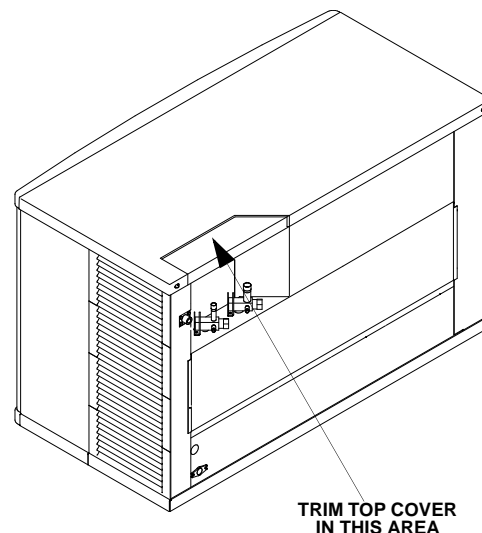
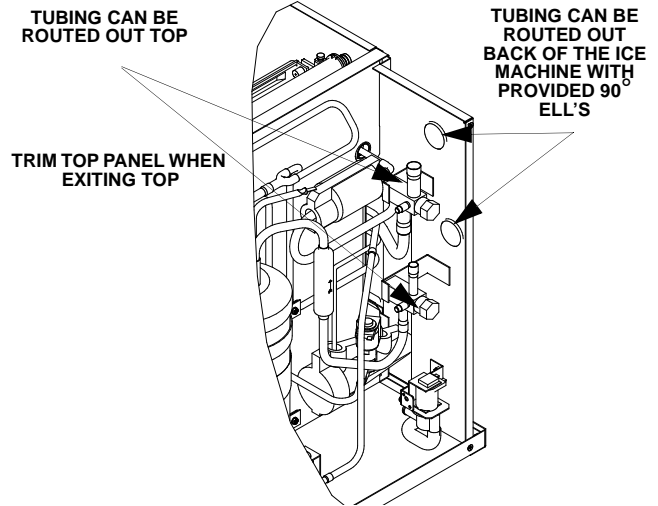
The ice machine water drain must exit the back of the ice machine.

TUBING CAN BE ROUTED OUT BACK OR TOP



SV1752

S1470C



Cut the top cover for top routing of electrical inlet, water supply inlet or refrigeration lines.

1. Prior to cutting, mount top cover onto ice machine.
2. Use ice machine back panel recessed area as a template to mark the underside of the top cover. Do not cut up to or past this line!
3. Using an aviator snips, cut top cover as needed:
 - A. Do not cut out entire area! Cut up to 1/8 inch to marked line.
 - B. Cut out only what is needed. (If routing only refrigeration lines out the top, cut just enough to route these lines.)
 - C. Do not cut out the entire corner area.

Ice Machine Head Section Installation Requirements

S600C/S850C/S1000C/S1200C/S1470C/S1870C/S2070C

The location selected for the ice machine must meet the following criteria. If any of these criteria are not met, select another location.

- The location must be free of airborne and other contaminants.
- The air temperature must be at least 35°F (1.6°C), but must not exceed 110°F (43.4°C).
- The location must not be near heat-generating equipment or in direct sunlight.
- The location must not obstruct airflow through or around the ice machine. Refer to ice machine head section clearance requirements.

IB0600C/IB0800C/IB1000C

- Ice/Beverage Ice Machines require the installation of a thermostat to maintain dispenser ice level. The thermostat ships with the ice machine.
- The ice machine head is installed with the electrical inlet, water supply inlet, refrigeration tubing and water drain entering from the back of the ice machine.
- The ice machine head section contains a service loop that must remain installed between the ice machine head section and line set. Sufficient tubing length must be available to allow 180° rotation of the ice machine.
- Maintain a 3" space between the back of the ice machine and the back of the dispenser to allow room for the refrigeration line set service loop.
- The water inlet and electrical connection must contain a service loop to allow future service and maintenance access.
- The drain line must contain a union or other suitable means of disconnection at the ice machine head section.
- The location must be free of airborne and other contaminants.
- The air temperature must be at least 35°F (1.6°C), but must not exceed 110°F (43.4°C).
- The location must not be near heat-generating equipment or in direct sunlight.
- The location must not obstruct airflow through or around the ice machine. Refer to ice machine head section clearance requirements.

Ice Machine Head Section Clearance Requirements

S600C/S850C/S1000C/S1200C/S1470C/S1870C/S2070C

Top 5" (12.7 cm) is recommended for efficient operation and removal of top cover/servicing.

Sides 5" (12.7 cm) is recommended for efficient operation and servicing. There is no minimum clearance required.

Back 3" (7.6 cm) required when routing electrical inlet, water inlet and refrigeration tubing out of the top of the unit.

5" (12.7 cm) required when routing all connections out the back.

IB0600C/IB0800C/IB1000C

Top 2" (5.1 cm) required clearance for cleaning procedures and servicing.

Back 5" (12.7 cm) required when routing all connections out the back.

Sides 8" (20.3 cm) required for servicing.

Caution

The ice machine head section must be protected if it will be subjected to temperatures below 32°F (0°C). Failure caused by exposure to freezing temperatures is not covered by the warranty. See "Removal from Service/Winterization".

Location of CVD Condensing Unit

The location selected for the CVD Condensing Unit must meet the following criteria. If any of these criteria are not met, select another location.

- The air temperature must be at least -20°F (-28.9°C) but must not exceed 130°F (54.4°C).
- *CVD675/CVD2075 Only* - The air temperature must be at least -20°F (-28.9°C) but must not exceed 120°F (48.9°C).
- *CVD1486 Only* - The air temperature must be at least 50°F (10°C) but must not exceed 110°F (43°C).
- The location must not allow exhaust fan heat and/or grease to enter the condenser.
- The location must not obstruct airflow through or around the condensing unit. See below for clearance requirements.

Condensing Unit Clearance Requirements

CVD675/CVD885/CVD1085/CVD2075

Top/Sides

There is no minimum clearance required, although 6" (15.2 cm) is recommended for efficient operation and servicing only.

Front/Back

48" (122 cm)

CVD1285/CVD1485/CVD1885

Top/Sides

There is no minimum clearance required, although 6" (15.2 cm) is recommended for efficient operation and servicing only.

Front

24" (61 cm)

Back

48" (122 cm)

CVD1486 ONLY

Top - 5" (12.7 cm) is required for efficient operation and servicing.

Front/Back/Sides - 12" (30.5 cm)

Bin Installation

All ice machines installed on a bin require an ice deflector. Manitowoc bins have a built in deflector that requires no modifications when used with a forward facing evaporator. Ice machines with multiple evaporators require a deflector kit.

Bin adapters or custom bin tops are available to allow installation of a 30" ice machine on a 48" or 60" bin. Refer to ice machine price list for options.

Warning

Manitowoc QuietQube ice machines require the ice storage bin to incorporate an ice deflector.

Prior to using a non-Manitowoc ice storage system with other Manitowoc ice machines, contact the manufacturer to assure their ice deflector is compatible with Manitowoc ice machines.

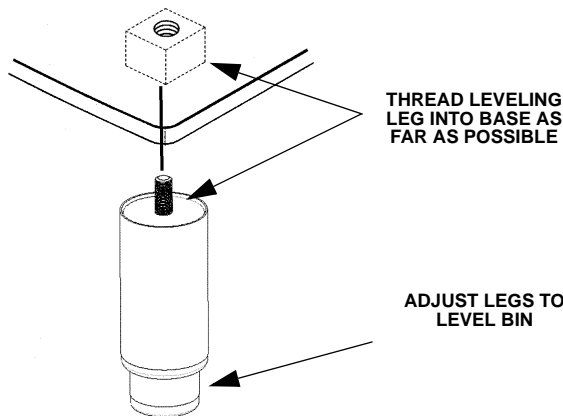
LEVELING THE ICE STORAGE BIN

1. Screw the leveling legs onto the bottom of the bin.
2. Screw the foot of each leg in as far as possible.

Caution

The legs must be screwed in tightly to prevent them from bending.

3. Move the bin into its final position.
4. Level the bin to assure that the bin door closes and seals properly. Use a level on top of the bin. Turn each foot as necessary to level the bin.



SV1606

Leveling Leg and Foot

S1470C/S1870C/S2070C INSTALLATION ON A MANITOWOC BIN

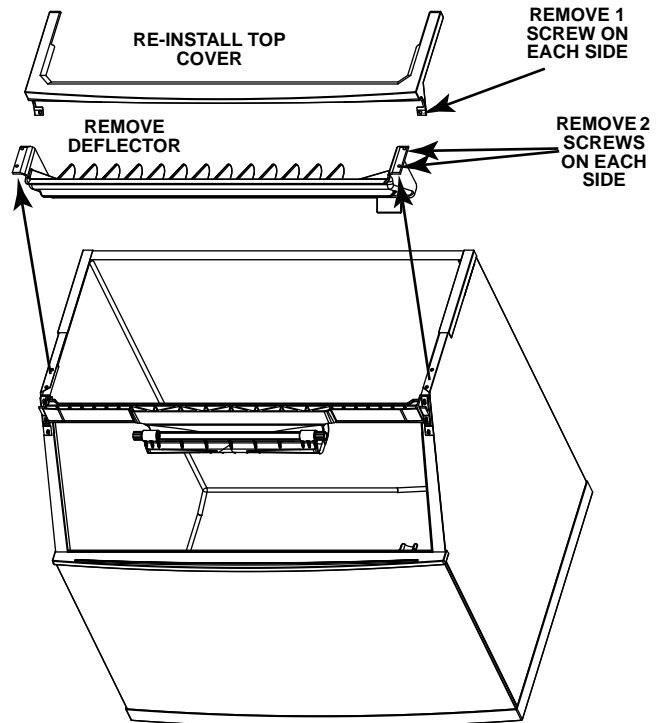
Warning

S1470C/S1870C/S2070C ice machines are not approved for use on Manitowoc S570 series bins.

An ice deflector kit is required for installation. Order appropriate kit (30" or 48") for your bin.

Step 1 Remove the stock ice deflector.

- A. Remove the left and right side cover screws
- B. Remove the cover to expose four screws, which secure the plastic deflector.
- C. Remove four screws and plastic deflector
- D. Install polymer spacer on each side and secure with the four screws.
- E. Reinstall cover and screws.

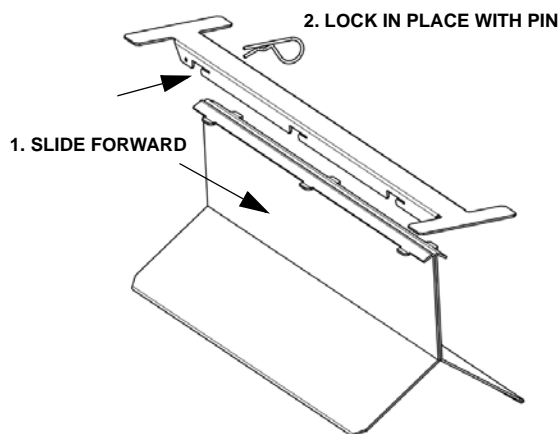


Step 2 Install front support and filler panels.

- A. Remove foam tape from front support location.
- B. Set front support in place and install foam tape.
- C. Position filler panels (align with front support), drill and secure.
- D. Install foam tape on front and back. Seal all foam tape edges.

Step 3 Install ice deflector.

- A. Locate center of ice machine drop zone (center is 11" from left edge of ice machine to left edge of bracket).
- B. Cut and remove foam tape on the front and the back of the bin where the deflector will be located.
- C. Remove any residual adhesive; areas must be clean and dry.
- D. Remove protective covering from double sided tape on bottom of deflector bracket.
- E. Install deflector bracket; Distribute equally to the front and back and locate pin to the rear.
- F. Apply foam tape over bracket and seal joints with silicone sealant.
- G. Refer to illustration and install deflector in mounting bracket.



Dispenser Installation

No deflector is needed for machines that match the size of the dispenser (30" head section on a 30" dispenser) unless required by the dispenser manufacturer. Adapters are required when a smaller ice machine is going on a larger dispenser (22" machine on a 30" dispenser).

IB0600C/IB0800C/IB1000C

Securing the Ice Machine to the Dispenser

Important

Manitowoc Ice/Beverage Ice Machines require an adapter for mounting. Adapters are not included with the ice machine, dispenser or bin and must be ordered separately. When a non-Manitowoc adapter is used, verify the adapter is compatible with Manitowoc Ice/Beverage Ice Machines prior to installation.

The ice machine and adapter plate must be secured to the dispenser to prevent tipping.

- Two holes are located in the front bottom rail of the ice machine, to allow attachment to the adapter plate.
- The adapter cover must be secured to the dispenser to prevent ice from dislodging the cover during agitation.

Warning

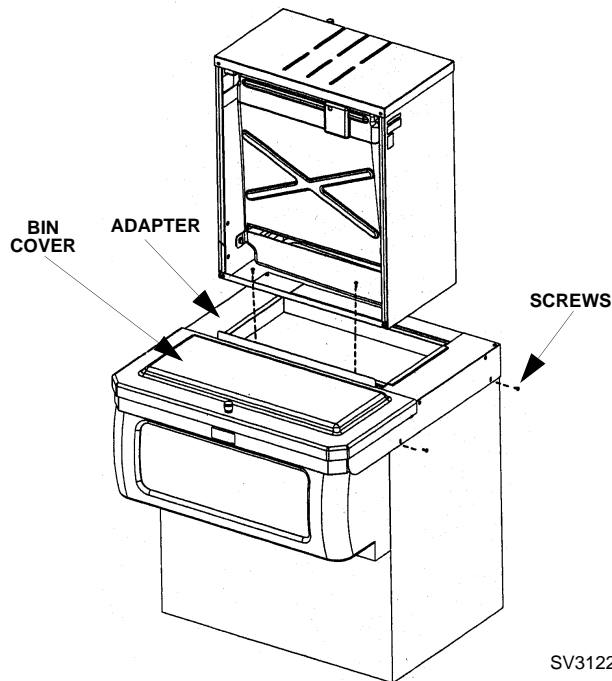
The ice machine and adapter plate must be secured to the dispenser to prevent tipping.

TYPICAL ICE BEVERAGE ON A DISPENSER

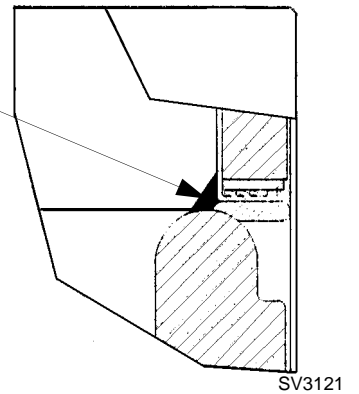
Important

DO NOT REMOVE the label on bin adapters. The retainer clips and brackets must be used.

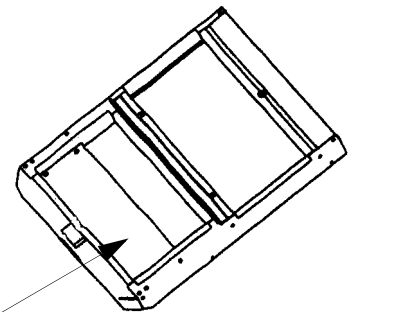
1. Install bin level thermostat bracket.
2. Set adapter on dispenser. Position the adapter so that the front flange of the adapter will be up against the front lip of the dispenser. Adapter may have to be moved towards the back of the dispenser.
3. Using the slotted holes in the adapter as a template, drill four (4) 9/64" diameter holes at the bottom of the slots. Note: Do not drill deeper than 1/4" past the sheet metal. Use a drill stop!
4. Fasten the adaptor to dispenser using the four (4) #8 screws supplied with the adaptor kit.
5. Set the ice machine on top of the adapter. Align holes in ice machine front angle with threaded bosses on the adapter.
6. Secure the ice machine to the adaptor with two (2) #8-32 screws supplied with the kit.
7. Set the bin cover on the adapter, move backwards until the cover hits the stop, and lower the plastic cover insuring that the latch locks.
8. To remove the bin cover, twist the knob, lift up, and pull forward.



PLACE A LARGE FILLET OF FOOD GRADE RTV INSIDE EDGE ALONG BOTH SIDES WHERE ADAPTER TOUCHES BIN



DEFLECTOR MUST STAY IN PLACE



Electrical Service

GENERAL

 **Warning**

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

VOLTAGE

For both the Ice Machine Head Section and the CVD® Condensing Unit, the maximum allowable voltage variation is $\pm 10\%$ of the rated voltage at ice machine start-up (when the electrical load is highest).

 **Warning**

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

All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes. The following precautions must be observed:

- The ice machine must be grounded.
- A separate fuse/circuit breaker must be provided for each condensing unit.
- A qualified electrician must determine proper wire size dependent upon location, materials used and length of run (minimum circuit ampacity can be used to help select the wire size).
- The maximum allowable voltage variation is $\pm 10\%$ of the rated voltage at ice machine start-up (when the electrical load is highest).
- Check all green ground screws in the control box and verify they are tight before starting the ice machine.

Important

Observe correct polarity of incoming line voltage.

Incorrect polarity can lead to erratic ice machine operation and a safety issue. This is especially critical on 230 volt / 50 cycle ice machines.

FUSE/CIRCUIT BREAKER

The ice machine head section and condensing unit are wired independently from each other.

Ice Machine Head Section

The ice machine head section does not require a dedicated circuit breaker.

CVD® Condensing Unit

A separate fuse/circuit breaker must be provided for each condensing unit. Circuit breakers must be H.A.C.R. rated (does not apply in Canada).

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 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. Manitowoc Ice requires minimum #8 AWG for S2070C condensing unit applications.

GROUND FAULT CIRCUIT INTERRUPTER

Ground Fault Circuit Interrupter (GFCI/GFI) protection is a system that shuts down the electric circuit (opens it) when it senses an unexpected loss of power, presumably to ground. Manitowoc Ice, Inc. does not recommend the use of a GFCI/GFI circuit protection with our equipment. If code requires the use of a GFCI/GFI then you must follow the local code. The circuit must be dedicated, sized properly and there must be a panel GFCI/GFI breaker. We do not recommend GFCI/GFI outlets as they are known for more intermittent nuisance trips than panel breakers.

Electrical Requirements

QuietQube® Ice Machine Head Section

Important

Due to continuous improvements, this information is for reference only. Please refer to the ice machine serial number tag to verify electrical data. Serial tag information overrides information listed on this page.

Local or state electrical code, length of wire run or materials used, can increase the minimum wire or breaker size requirement. A qualified electrician must determine the wire and breaker size, although the minimum wire size must meet or exceed the specifications in these charts.

Ice Machine	Voltage Phase Cycle	Maximum Fuse/Circuit Breaker	Total Amps	**Minimum Wire Size Required by Manitowoc	Minimum Breaker Size Required by Manitowoc
S0600C	115/1/60	15 amp	1.1	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	0.6		15 amp
S0850C	115/1/60	15 amp	1.1	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	1.5		15 amp
IB0620C IB0820C IB1020C	115/1/60	15 amp	1.4	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	0.8		15 amp
S1000C	115/1/60	15 amp	2.5	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	1.5		15 amp
S1200C	115/1/60	15 amp	2.5	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	1.5		15 amp
S1470C S1870C S2070C	115/1/60	15 amp	1.1	#14 Solid Copper Conductor	15 amp
	208-230/1/60	15 amp	0.6		15 amp
	230/1/50*	15 amp	0.6		15 amp

* Not available on S2070C models.
** All conductors must be solid copper wire

CVD® Condensing Unit

Important

Due to continuous improvements, this information is for reference only. Please refer to the condensing unit serial number tag to verify electrical data. Serial tag information overrides information listed on this page.

Local or state electrical code, length of wire run or materials used, can increase the minimum wire or breaker size requirement. A qualified electrician must determine the wire and breaker size, although the minimum wire size must meet or exceed the specifications in these charts.

Condensing Unit	Voltage/Phase/Cycle	Maximum Fuse/ Circuit Breaker	Minimum Circuit Amps	**Minimum Wire Size Required by Manitowoc	Minimum Breaker Size Required by Manitowoc
CVD0675	208-230/1/60	15 amp	9.6	#14 Solid Copper Conductor	15 amp
	208-230/3/60	15 amp	7.3	#14 Solid Copper Conductor	15 amp
	230/1/50	15 amp	9.0	#14 Solid Copper Conductor	15 amp
CVD0885	208-230/1/60	20 amp	11.8	#12 Solid Copper Conductor	20 amp
	208-230/3/60	15 amp	9.1	#14 Solid Copper Conductor	15 amp
	230/1/50	20 amp	10.0	#12 Solid Copper Conductor	20 amp
CVD1085	208-230/1/60	20 amp	12.5	#12 Solid Copper Conductor	20 amp
	208-230/3/60	15 amp	9.4	#14 Solid Copper Conductor	15 amp
	230/1/50	20 amp	10.9	#12 Solid Copper Conductor	20 amp
CVD1285	208-230/1/60	25 amp	14.7	#10 Solid Copper Conductor	25 amp
	208-230/3/60	20 amp	10.6	#12 Solid Copper Conductor	20 amp
	230/1/50	20 amp	11.7	#12 Solid Copper Conductor	20 amp
CVD1485	208-230/1/60	20 amp	20.0	#8 Solid Copper Conductor	20 amp
	208-230/3/60	15 amp	15.0	#10 Solid Copper Conductor	15 amp
	230/1/50	30 amp	20	#8 Solid Copper Conductor	30 amp
CVD1486	208-230/1/60	20 amp	20.0	#10 Solid Copper Conductor	20 amp
	208-230/3/60	15 amp	15.0	#12 Solid Copper Conductor	15 amp
	230/1/50	20 amp	20.0	#12 Solid Copper Conductor	20 amp
CVD1885	208-230/1/60	40 amp	25.0	#8 Solid Copper Conductor	40 amp
	208-230/3/60	25 amp	20.0	#10 Solid Copper Conductor	25 amp
	230/1/50	30 amp	20.0	#8 Solid Copper Conductor	30 amp
CVD2075	208-230/1/60	50 amp	40.0	#10 Solid Copper Conductor	50 amp
	208-230/3/60	40 amp	30.0	#10 Solid Copper Conductor	40 amp

NOTE: The QuietQube® Ice Machine Head Section and CVD Condensing Unit are wired independently from each other.

 **Warning**

CVD2075 ONLY

Connect power supply wiring directly to L1 & L2 on the contactor. Torque screws to the torque value specification on the contactor label. Follow all local, state and national electrical codes.

QuietQube® Ice Machine Head Section Electrical Wiring Connections

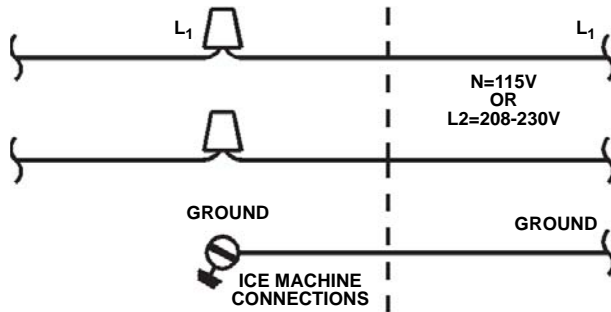
Warning

These diagrams are not intended to show proper wire routing, wire sizing, disconnects, etc., only the correct wire connections.

All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes.

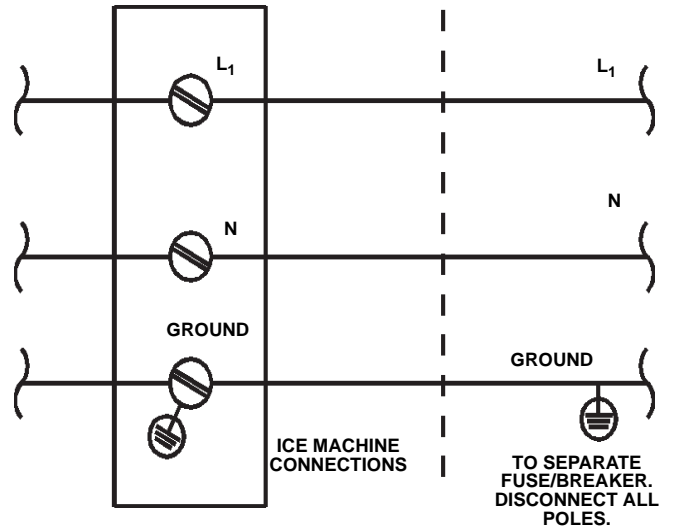
Though wire nuts are shown in the drawings, the ice machine field wiring connections may use either wire nuts or screw terminals.

**QUIETQUBE® ICE MACHINE HEAD SECTION
115/1/60**



SV1258


**QUIETQUBE® ICE MACHINE HEAD SECTION
230/1/50**



SV1191

FOR UNITED KINGDOM ONLY

As the colors of the wires in the mains lead of the appliance may not correspond with the colored markings identifying the terminals in your plug, proceed as follows:

- The wire which is colored green and yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth ground symbol  or colored green or green and yellow.
- The wire colored blue must be connected to the terminal which is marked with the letter N or colored black.
- The wire colored brown must be connected to the terminal which is marked with the letter L or colored red.

Condensing Unit Wiring Connections

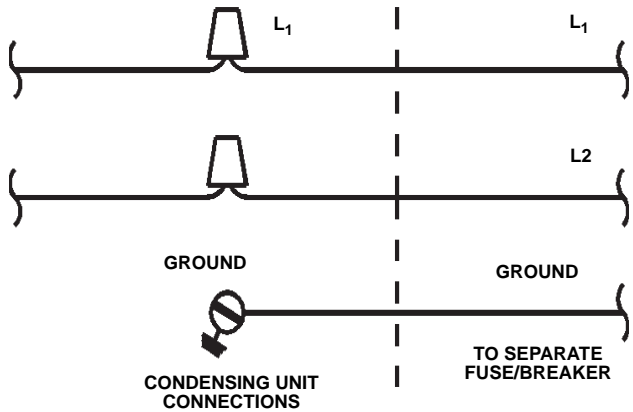
Warning

These diagrams are not intended to show proper wire routing, wire sizing, disconnects, etc., only the correct wire connections.

All electrical work, including wire routing and grounding, must conform to local, state and national electrical codes.

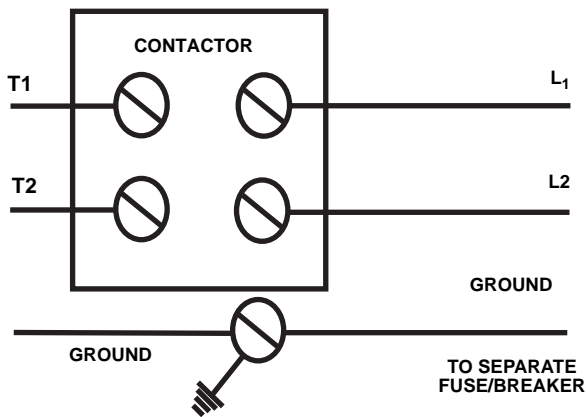
Though wire nuts are shown in the drawings, the ice machine field wiring connections may use either wire nuts or screw terminals.

**CVD CONDENSING UNIT
208-230/1/60**



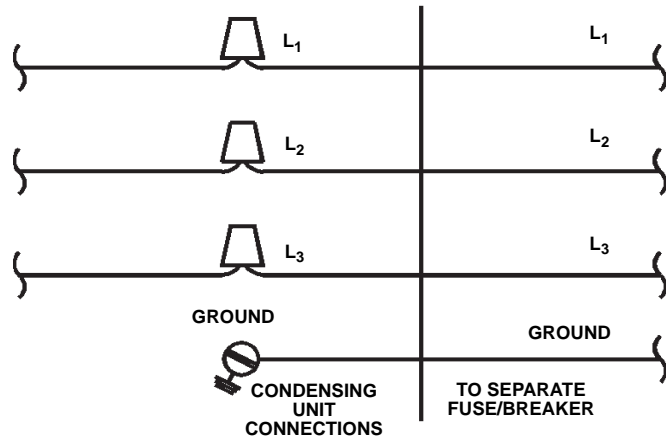
SV1258

**CVD2075 ONLY
CONDENSING UNIT CONNECTIONS**



SV1258a

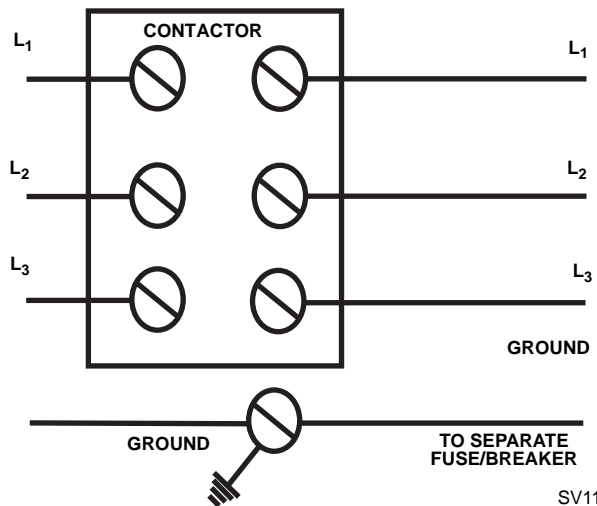
**CVD CONDENSING UNIT
208-230/3/60**



CONDENSING UNIT CONNECTIONS

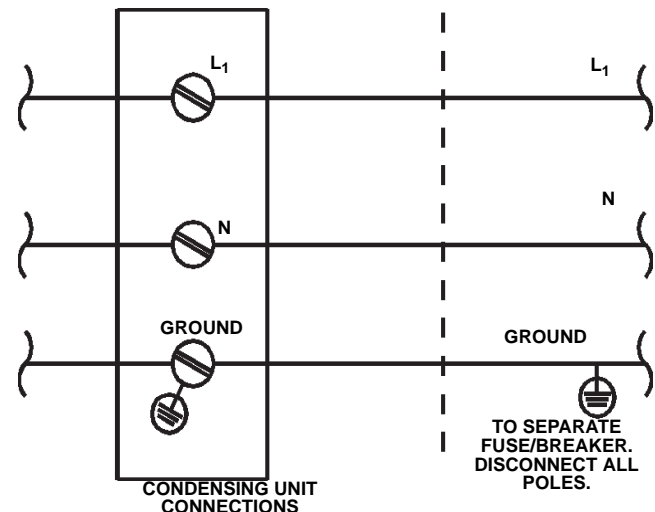
TO SEPARATE FUSE/BREAKER

**CVD2075 ONLY
CONDENSING UNIT CONNECTIONS**



SV1190a

**CVD CONDENSING UNIT
230/1/50**



TO SEPARATE FUSE/BREAKER. DISCONNECT ALL POLES.

Ice Machine Head Section Water Supply and Drains

POTABLE WATER SUPPLY

Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, and remove chlorine odor and taste.

Important

If you are installing a Manitowoc water filter system, refer to the Installation Instructions supplied with the filter system for ice making water inlet connections.

POTABLE WATER INLET LINES

Follow these guidelines to install water inlet lines:

- Do not connect the ice machine to a hot water supply. Be sure all hot water restrictors installed for other equipment are working. (Check valves on sink faucets, dishwashers, etc.)
- If water pressure exceeds the maximum recommended pressure of 80 psig (5.52 bar), obtain a water pressure regulator from your Manitowoc distributor.
- Install a water shut-off valve for ice making potable water.
- Insulate water inlet lines to prevent condensation.
- A 3' service loop or disconnect (union) must be installed at the ice machine head section.

DRAIN CONNECTIONS

Follow these guidelines when installing drain lines to prevent drain water from flowing back into the ice machine and storage bin:

- Drain lines must have a 1.5 inch drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- The floor drain must be large enough to accommodate drainage from all drains.
- Run separate bin and ice machine drain lines. Insulate them to prevent condensation.
- Vent the bin and ice machine drain to the atmosphere. The ice machine drain requires an 18" vent.
- Drains must have a union or other suitable means to allow in place disconnection from the ice machine when servicing is required.

Cooling Tower Applications (Water-Cooled Models)

A water cooling tower installation does not require modification of the ice machine. The water regulator valve for the condenser continues to control the refrigeration discharge pressure.

It is necessary to know the amount of heat rejection, and the pressure drop through the condenser and water valves (inlet and outlet) when using a cooling tower on an ice machine.

- Water entering the condenser must not exceed 90°F (32.2°C).
- Water flow through the condenser must not exceed 5 gallons (19 liters) per minute.
- Allow for a pressure drop of 7 psi (48 kPA) between the condenser water inlet and the outlet of the ice machine.
- Water exiting the condenser must not exceed 110°F (43.3°C).

IMPORTANT

The Commonwealth of Massachusetts requires that all water-cooled models must be connected only to a closed loop, cooling tower system.

Water Cooled Condenser Water Supply and Drains

CONDENSER WATER SUPPLY

Local water conditions may require treatment of the water to inhibit scale formation, filter sediment, and remove chlorine odor and taste.

WATER COOLED CONDENSER LINES

Follow these guidelines to install water lines:

- Contact your distributor if your water pressure is greater than 150 psig (1034 kPA). A special order condensing unit is available that allows water pressure up to 350 psig (2413 kPA).
- Install a shutoff valve (inlet and outlet on cooling tower or closed loop circuits) to allow isolation of the water system.
- Water entering the condenser must not exceed 90°F (32.2°C).
- Water flow through the condenser must not exceed 5 gallons (19 liters) per minute.
- Allow for a pressure drop of 8 psig (55 kPA) between the condenser water inlet and outlet.
- Water exiting the condenser must not exceed 110°F (43.3°C).
- Do not connect to the potable water filter system.

CONDENSING UNIT DRAIN CONNECTIONS

The condensing unit drain is provided to remove any condensate produced by the suction accumulator. Condensate amounts will vary depending on temperature and humidity.

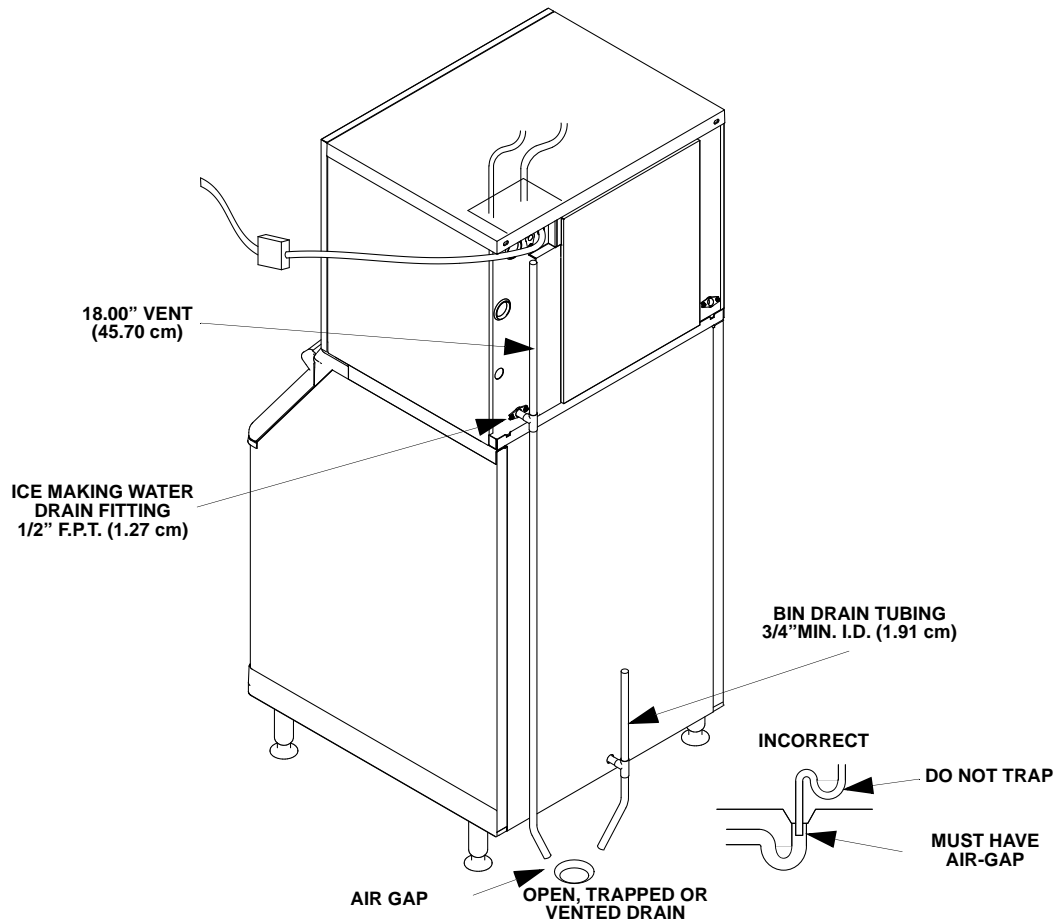
- The condensing unit must be level front to back and side to side to allow the condensate to drain.
- Drain lines must have a 1.5-inch drop per 5 feet of run (2.5 cm per meter), and must not create traps.
- Drain termination must meet applicable costs.

WATER SUPPLY AND DRAIN LINE SIZING/CONNECTIONS

⚠ Caution
Plumbing must conform to state and local codes.

Location	Water Temperature	Water Pressure	Ice Machine Fitting	Tubing Size Up to Ice Machine Fitting
Ice Making Water Inlet	35°F (1.6°C) Min. 90°F (32.2°C) Max.	20 psi (1.4 bar) Min. 80 psi (5.5 bar) Max.	3/8" Female Pipe Thread	3/8" (9.5 mm) min. inside diameter
Water Cooled Condenser	35°F (1.6°C) Min. 90°F (32.2°C) Max.	Standard 20 psi (1.4 bar) Min. 150 psi (10.3 bar) Max. High Pressure Option 20 psi (1.4 bar) Min. 350 psi (24.1 bar) Max.	1/2" Female Pipe Thread	1/2" (12.7 mm) min. inside diameter
Ice Making Water Drain	---	---	1/2" Female Pipe Thread	1/2" (12.7 mm) min. inside diameter
Bin Drain	---	---	3/4" Female Pipe Thread	3/4" (19.1 mm) min. inside diameter
Large Capacity Bin Drain	---	---	1" Female Pipe Thread	1" (25.4 mm) min. inside diameter

Refer to "Ice Machine Dimensions" at the beginning of Section 2 for the exact locations of inlets and drains for the model you are working on.



Typical Water Supply Drain Installation

Refrigeration System Installation

QuietQube® Ice Machine	Remote Single Circuit Condenser	Line Set*
S0600C IB620C	CVD675	RC-21
S0850C IB820C	CVD885	RC-31 RC-51
S1000C	CVD1085	
S1200C IB1020C	CVD1285	RC-20
S1470C	CVD1485 CVD1486	RC-30 RC-50
S1870C	CVD1885	
S2070C	CVD2075	

*Line Set	Suction Line	Liquid Line	Insulation Thickness
RC 21/31/51	5/8 inch (15.9 mm)	3/8 inch (9.5 mm)	1/2"(13mm) Suction Line 1/4" (7mm) Liquid Line
RC 20/30/50**	3/4 inch (19.1 mm)	1/2 inch (12.7 mm)	1/2"(13mm) Suction Line 1/4" (7mm) Liquid Line

****NOTE: The CVD2075 has a suction line fitting of 7/8" and a liquid line fitting of 5/8". Since the line set is sized differently, please use the provided bushings to properly connect the line set to the CVD Condensing Unit.**

Important

Manitowoc remote systems are only approved and warranted as a complete new package. Warranty on the refrigeration system will be void if a new ice machine head section is connected to pre-existing (used) tubing or condensing units or vice versa.

USAGE WITH NON-MANITOWOC CONDENSING UNITS

Manitowoc CVD® Condensing Units are specifically designed for usage with a QuietQube® Ice Machine Head Section. Standard condensing units and Non-Manitowoc condensing units will not operate a QuietQube® Ice Machine Head Section.

⚠ Caution

The refrigeration system warranty will not apply if the Manitowoc Ice Machine and Manitowoc CVD Condensing Unit are not installed according to specifications. This warranty also will not apply if the refrigeration system is modified with a condenser, heat reclaim device, or other parts or assemblies not manufactured by Manitowoc Ice, Inc.

Factory Equipment Refrigeration Amounts

ICE MACHINE HEAD SECTION

Each ice machine head section ships from the factory with a R-404A refrigerant charge appropriate for the entire system operation. The serial tag on the ice machine indicates the refrigerant charge. The refrigerant charge is sufficient to operate the ice machine in ambient temperatures between -20°F & 130°F (-29°C & 54°C)*. With line set lengths of up to 100 feet (30.5 m).

***CVD675/CVD2075** = -20°F to 120°F (-29°C to 49°C)

CVD1486 = 50°F to 110°F (10°C to 43°C)

⚠ Warning

Potential Personal Injury Situation

The ice machine head section contains the refrigerant charge. Installation and brazing of the line sets must be performed by a properly trained and EPA certified refrigeration technician aware of the **dangers of dealing with refrigerant** charged equipment.

⚠ Caution

Never add more than nameplate charge to the refrigeration system for any application.

CVD® CONDENSING UNIT

Each condensing unit ships from the factory pressurized with 50/50 nitrogen helium mixture that must be removed during the installation process (approximately 20 psig).

REFRIGERATION LINE SETS/TRAP KIT

Refrigeration Rated Tubing and Trap Kits are shipped capped with atmospheric pressure.

⚠ Warning

Installation of a QuietQube® Condensing Unit may require the use of special equipment for placement. Trained and qualified personnel are required for proper rigging and lifting. Holes are provided on the corners of the condensing unit to allow the use of lifting shackles.

Refrigeration Line Set Installation

GENERAL

Refrigeration line set installations consist of vertical and horizontal line set distances between the ice machine and the condensing unit. The following guidelines, drawings and calculation methods must be followed to assure proper oil return and CVD® condensing unit/ice machine operation.

The refrigeration line set installer must be USA Government-Environmental Protection Agency (EPA) certified in proper refrigerant handling and servicing procedures.

Warning

The ice machine head section contains refrigerant charge. The ice machine head section contains three (3) refrigeration valves that **must remain closed** until proper installation of the line sets is completed.

Warning

Disconnect electrical power to the ice machine head section and CVD® condensing unit before proceeding.

Step 1 Verify Ice Machine and CVD® Condensing Unit Locations Are Within Guidelines.

Prior to installation of the ice machine head section and CVD® condensing unit be sure that the distance between them is within the line set routing guidelines outlined in this manual.

Roof/Wall Penetration

If required, cut a 3-inch (76.2 mm) circular hole in the wall or roof for routing of refrigeration tubing. A qualified person must perform all roof penetrations.

Step 2 Route Refrigeration Tubing

Properly route refrigeration tubing between the ice machine head section and the CVD® condensing unit.

A. LINE SET LENGTH

100 feet (30.5 m) Length: The maximum measured length the line set can be.

The receiver is designed to hold a charge sufficient to operate the ice machine in ambient temperatures between -20°F (-28.9°C) and 130°F (54.4°C)*, with line set lengths of up to 100 feet (30.5 m).

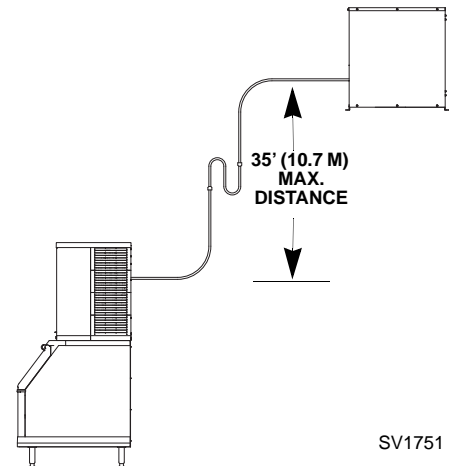
*CVD675/CVD2075 = -20°F to 120°F (-29°C to 49°C)

CVD1486 = 50°F to 110°F (10°C to 43°C). The maximum amount of lineset which can be exposed on the rooftop is 25% of the total length of the lineset.

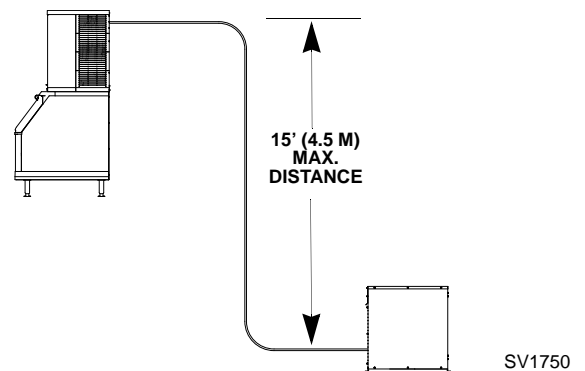
Important

QuietQube® ice machines will not function with line sets greater than 100 feet (30.5 m). Do not attempt to go beyond this distance and add refrigerant charge to compensate!

B. LINE SET RISE OR DROP



35 feet (10.7 m) Rise: The maximum distance the CVD® condensing unit can be above the ice machine.



15 feet (4.5 m) Drop: The maximum distance the CVD® condensing unit can be below the ice machine.

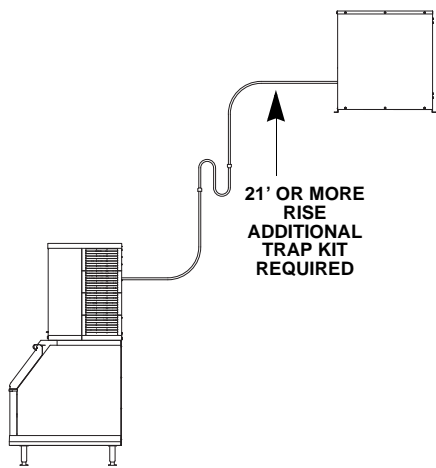
C. SUCTION LINE OIL TRAPS

⚠ Caution

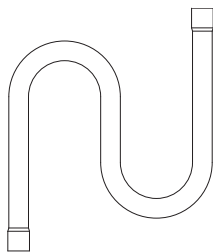
Do not form unwanted traps in refrigeration lines. Never coil excess refrigeration tubing.

0 to 20 feet (0 to 6.1 m) Rise: The ice machine head section has one oil trap built in which allows for a maximum condenser rise of 20 feet (6.1 m) without additional traps in the suction line.

21 to 35 feet (6.4 to 10.7 m) Rise: The suction line requires an additional Oil Trap (“S” type) to be installed. Install the trap as close as possible to midpoint between the ice machine head section and CVD condensing unit. S-Trap Kits are available from Manitowoc (refer to chart).



SV1751



SV1760

Manitowoc S-Trap Kit

Model	S-Trap Kit Number	Tubing Size
S600C S850C S1000C	K00172	5/8 inch (15.9 mm)
S1200C S1470C S1870C S2070C	K00166	3/4 inch (19.1 mm)

Service Loop

A service loop in the line set permits easy access to the ice machine for cleaning and service.

- **The supplied service loop (on Ice Beverage ice machines) is an installation requirement. Excess tubing length must be sufficient to allow 180° rotation of the ice machine.**
- A service loop is not considered an oil trap.
- The service loop is not included when calculating length, rise or drop of the tubing run.
- Do not use hard rigid copper for the service loop.

⚠ Caution

If a line set has a rise followed by a drop, another rise cannot be made. Likewise, if a line set has a drop followed by a rise, another drop cannot be made.

Step 3 Lengthening or Reducing Line Set Lengths

⚠ Caution

Do not form unwanted traps in refrigeration lines. Never coil excess refrigeration tubing.

When the line set required shortening or lengthening, do so before connecting the line set to the ice machine head section or the CVD condensing unit.

Step 4 Connecting the line set.

To prevent oxidation of the copper, purge line set and condensing unit with dry nitrogen while brazing.

Connect The Line Set To The Ice Machine Head Section

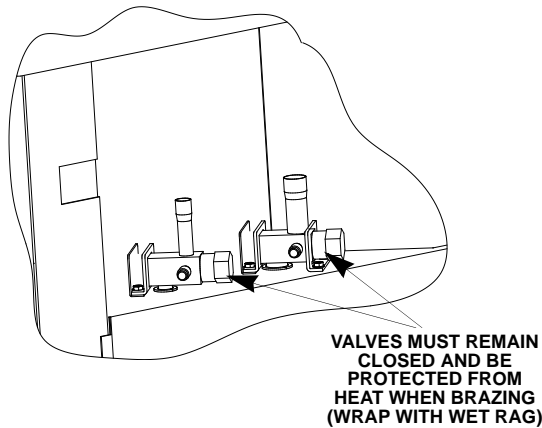
Warning

The ice machine head section contains refrigerant charge. The ice machine head section contains three (3) refrigeration valves that **must remain closed** until proper installation of the line sets is completed.

The line set can be routed for entry through the top or rear of the ice machine head section.

- Top routing requires the cover to be trimmed.
- Rear routing requires the use of the supplied 90° elbows.

The line set shut off valves at the back of the ice machine must remain closed and be protected from heat during the brazing process. Wrap the valves in a wet rag or other type of heat sink prior to brazing. Cool braze joint with water immediately after brazing to prevent heat migration to the valve.



SV1757

Warning

The condensing unit ships from the factory pressurized with a 50/50 mixture of nitrogen/helium. Bleed off pressure from both suction and liquid line access ports prior to cutting into refrigeration lines.

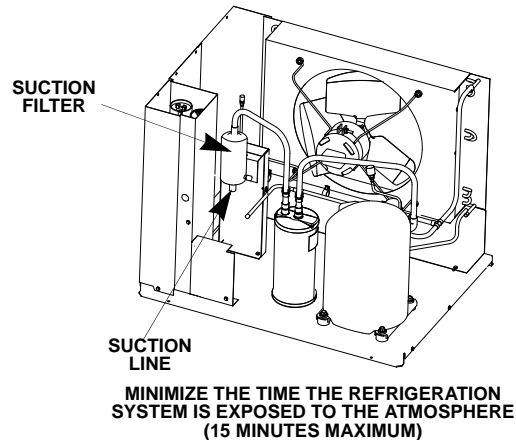
Connect The Line Set To The CVD Condensing Unit

Warning

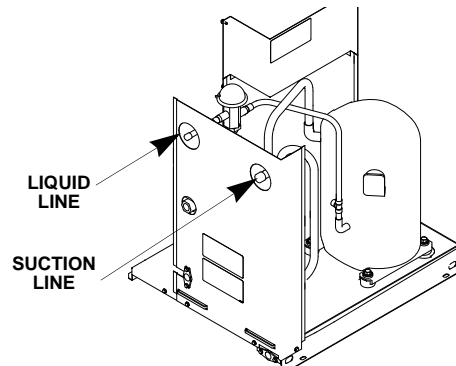
The condensing unit ships from the factory pressurized with a 50/50 mixture of nitrogen/helium. Bleed off pressure from both suction and liquid line access ports prior to cutting into refrigeration lines.

The compressor oil rapidly absorbs moisture. **Be prepared** to complete line set installation and start your evacuation process in order to minimize the time the compressor is exposed to the atmosphere. (Maximum amount of time the system can be exposed to the atmosphere is 15 minutes). The line set can be routed for entry through the front or left side of the condensing unit.

- Remove knockout for preferred location.
- Insert supplied plastic bushings in knockout holes to prevent tubing from contacting sheet metal.
- Use the supplied 90° elbows to route tubing.
- Cut the tubing ends of the suction and liquid lines and braze the line sets to the condensing unit.



SV2085



SV3077

Step 5 Pressure Test and Evacuate The Line Set and CVD Condensing Unit

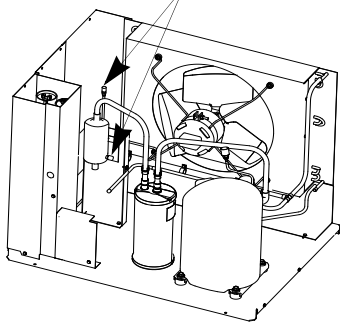
Schrader valve core removal tools that allow for removal and installation of the valve cores without removing manifold gauge set hoses are recommended to decrease the evacuation time.

Leave the line set shut off valves closed (front seated). Pressure test the line sets and CVD condensing unit with 150 psig of dry nitrogen. Add nitrogen at the line set shut off valves located at the back of the ice machine. Complete the pressure test, verify no leaks are present and remove the nitrogen from the system before connecting the vacuum pump. Connect a vacuum pump to both of the line set shut off valves located at the back of the ice machine head section. Evacuate to 500 microns (or less). To completely evacuate the CVD condensing unit, continue the evacuation for 30 minutes after reaching the 500 micron point.

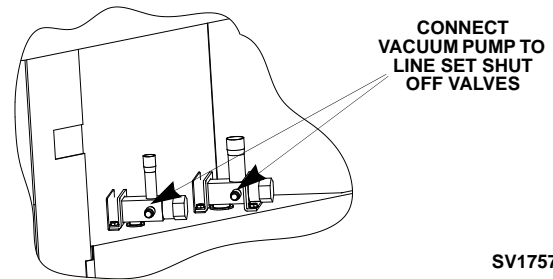
If required, the line set and condensing unit can be evacuated from the schrader valves located in the CVD condensing unit. Schrader valve core removal tools (that allow for putting the cores back in without removing vacuum pump hoses) must be used if evacuating from the condensing unit side.

Isolate the vacuum pump from the line set shut off valves and/or condensing unit access ports prior to proceeding. Open refrigeration system shut off valves. The suction line, liquid line and receiver service valves are closed during shipment and installation.

ALTERNATE CONNECTIONS AT CONDENSING UNIT SCHRADER VALVES

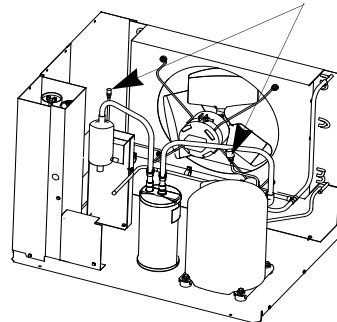


SV2085



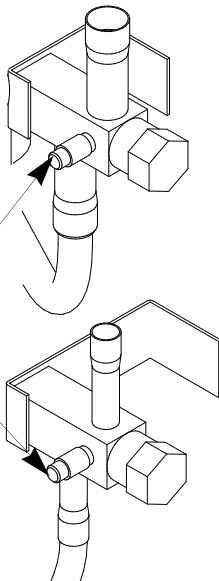
SV1757

CVD1485 CONDENSING UNIT SCHRADER VALVES



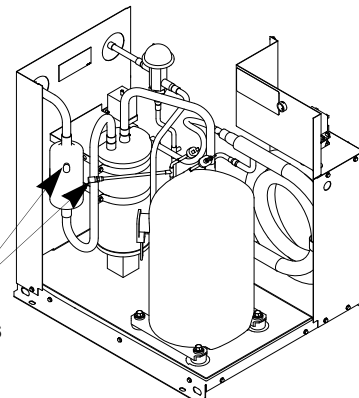
SV1757

CONNECT VACUUM PUMP TO LINE SET SHUT OFF VALVES



SV1769b

CVD1486 CONDENSING UNIT SCHRADER VALVES

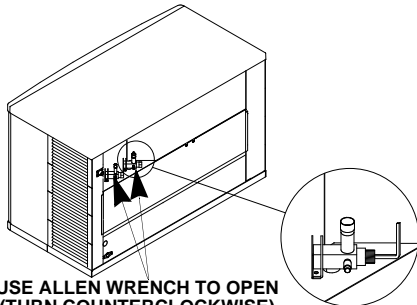


SV3081

Step 6 Open The Valves Prior To Starting The Ice Machine.

- A. Slowly backseat (open-turn counterclockwise) the suction line shut off valve.
- B. Slowly backseat (open-turn counterclockwise) the liquid line shut off valve.
- C. Slowly backseat (open-turn counterclockwise) the receiver service valve.

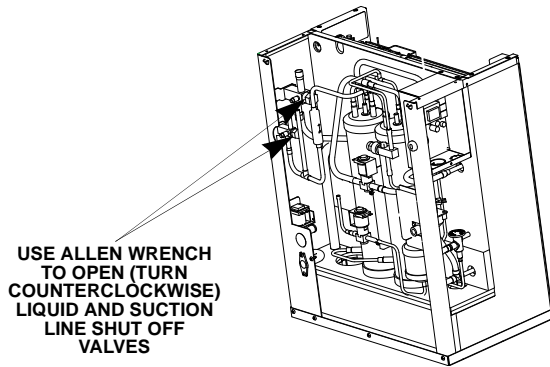
NOTE: You will not hear refrigerant flow when the valves are opened. Refrigerant will not flow until the toggle switch is placed in the ice position and the solenoid valve opens.



USE ALLEN WRENCH TO OPEN (TURN COUNTERCLOCKWISE) LIQUID AND SUCTION LINE SHUT OFF VALVES

SV1762

**OPEN SUCTION AND LIQUID LINE SHUT OFF VALVES
S0600C/S0850C/S1000C/S1200C**

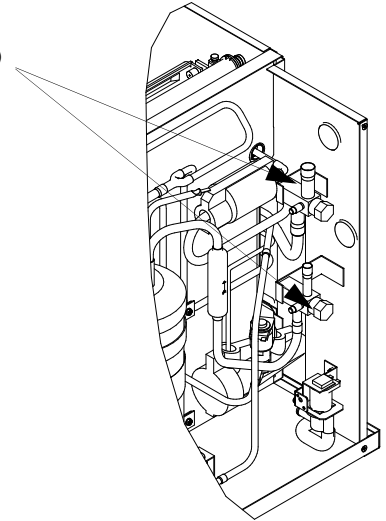


USE ALLEN WRENCH TO OPEN (TURN COUNTERCLOCKWISE) LIQUID AND SUCTION LINE SHUT OFF VALVES

SV3051

**OPEN SUCTION AND LIQUID LINE SHUT OFF VALVES
IB0600C/IB0800C/IB1000C**

USE ALLEN WRENCH TO OPEN (TURN COUNTERCLOCKWISE) LIQUID AND SUCTION LINE SHUT OFF VALVES



**OPEN SUCTION AND LIQUID LINE SHUT OFF VALVES
S1470C/S1870C/S2070C**

Caution

After opening suction, discharge and receiver service valves, refrigerant pressure will not be detected until the toggle switch is placed in the ice position and the harvest solenoid valve energizes.

Important

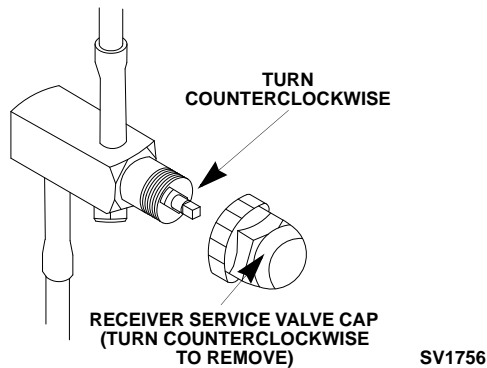
All refrigeration valve caps must be reinstalled to prevent future refrigeration leaks.

Verify O-ring in schrader valve caps are intact and reinstall on shut off valves to prevent refrigerant leakage. Replace shut off valve access caps and torque to the following specifications.

Torque Value's

Stem	18-20 ft. lbs.
Caps	12-15 ft. lbs.
Schrader Core	1.5-3 in. lbs.

Replace cap on receiver service valve and tighten.



Open Receiver Service Valve

There is a liquid line solenoid valve at the outlet of the receiver; refrigerant will not flow to the condensing unit until the ice machine head section is started. Connect power to both the ice machine head section and the CVD condensing unit. Place the ICE/OFF/CLEAN toggle switch into the ICE position, this will allow refrigerant to enter the line set and condensing unit.

Step 7 Leak Check The Refrigeration System

Leak check the new line set connections at the ice machine head section, condensing unit and S trap as well as all factory joints throughout the entire system. Disconnect power to the CVD condensing unit. Place the ICE/OFF/CLEAN toggle switch into the ICE position. This allows the low side and high side pressures to equalize. Place the ICE/OFF/CLEAN toggle switch in the OFF position. Connect power to the CVD condensing unit and allow system to pump down.

Step 8 Insulation Requirements

To prevent condensation the entire suction line including the shut-off valve must be insulated. All insulation must be airtight and sealed at both ends.

The following insulation requirements prevent condensation at 90°F (32.2°C) ambient 90% Relative Humidity. If higher humidity is expected, increase insulation thickness.

The entire suction line set, including the suction service valve located on the back of the ice machine requires:

Suction Line	Liquid Line	Min. Insulation Thickness
3/4 inch (19.1 mm)	1/2 inch (12.7 mm)	1/2" (13mm) Suction Line
5/8 inch (15.9 mm)	3/8 inch (9.5 mm)	1/4" (7mm) Liquid Line
7/8 inch (22.2 mm)	5/8 inch (15.9 mm)	3/4" (19mm) Suction Line 1/4" (7mm) Liquid Line

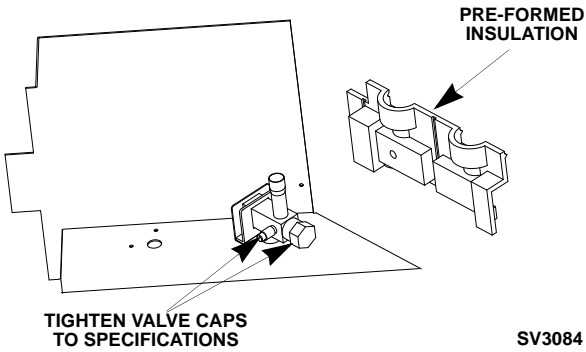
Important

To prevent condensation the entire suction line including the shut off valve must be insulated. All insulation must be airtight and sealed at both ends. The minimum requirements are for conditions at or below 90% humidity and 90°F (32.2°C) ambient. When higher humidity will be experienced, insulation wall thickness will need to be increased.

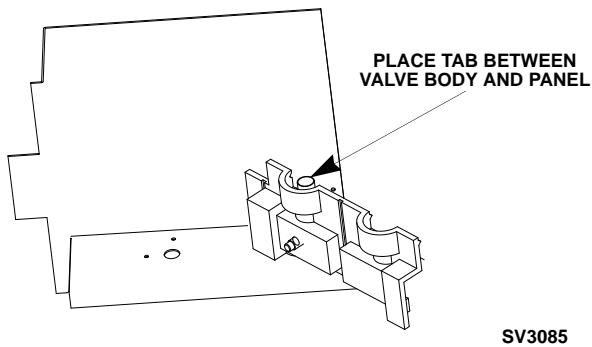
Suction Shut Off Valve Insulation

The pre-formed suction shut-off valve insulation is located in the plastic bag taped to the water curtain.

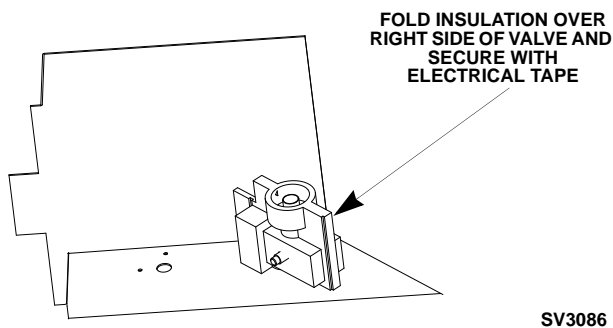
- A. Verify valve and schrader caps are tightened to specifications (see Step 6).

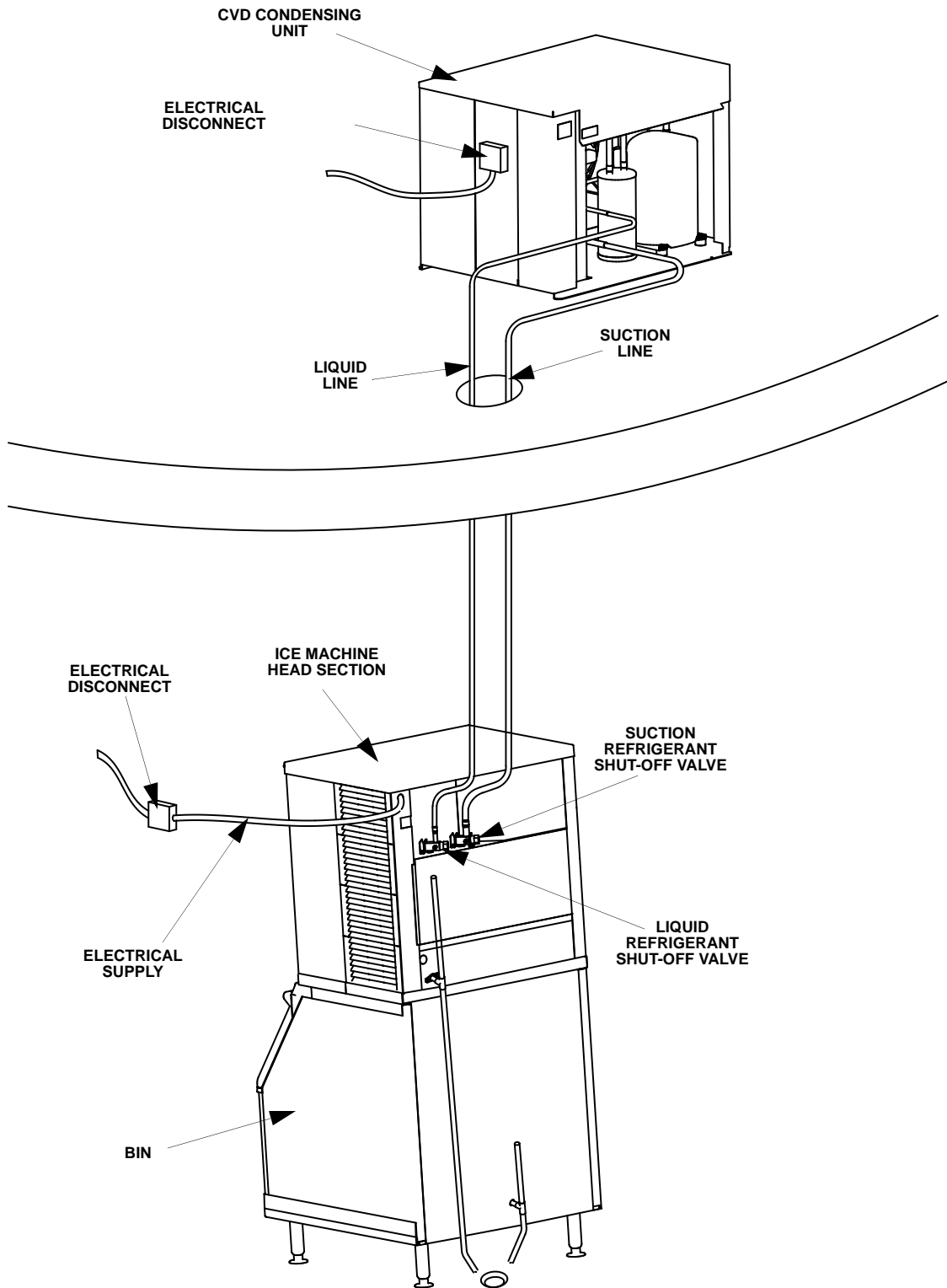


- B. Place insulation over schrader valve cap and left side of valve. Position the tab between the mounting bracket and rear panel.



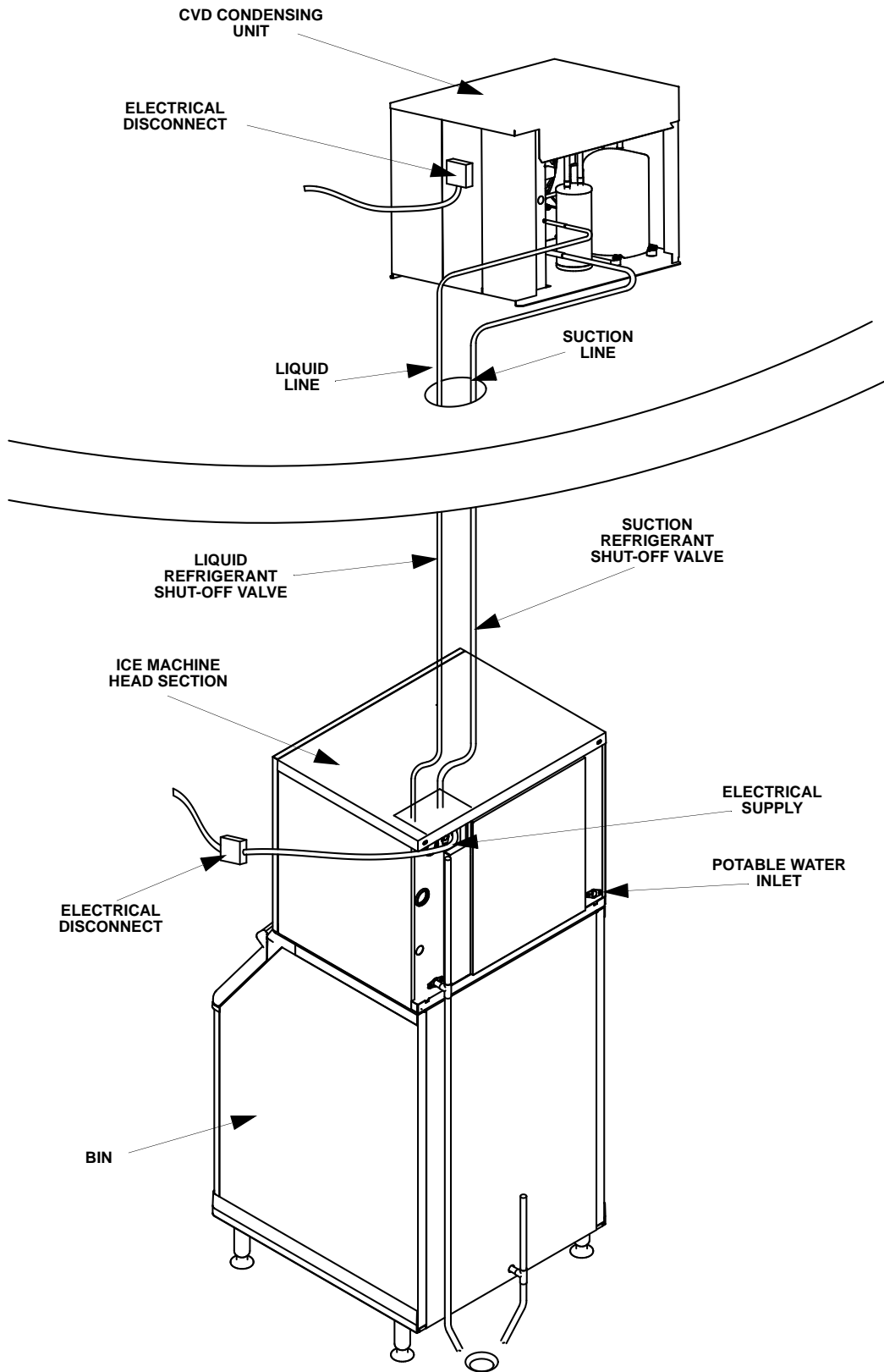
- C. Fold insulation and hold against right hand side of valve while securing with electrical tape. Seal the line set insulation to the shut off valve insulation with electrical tape.





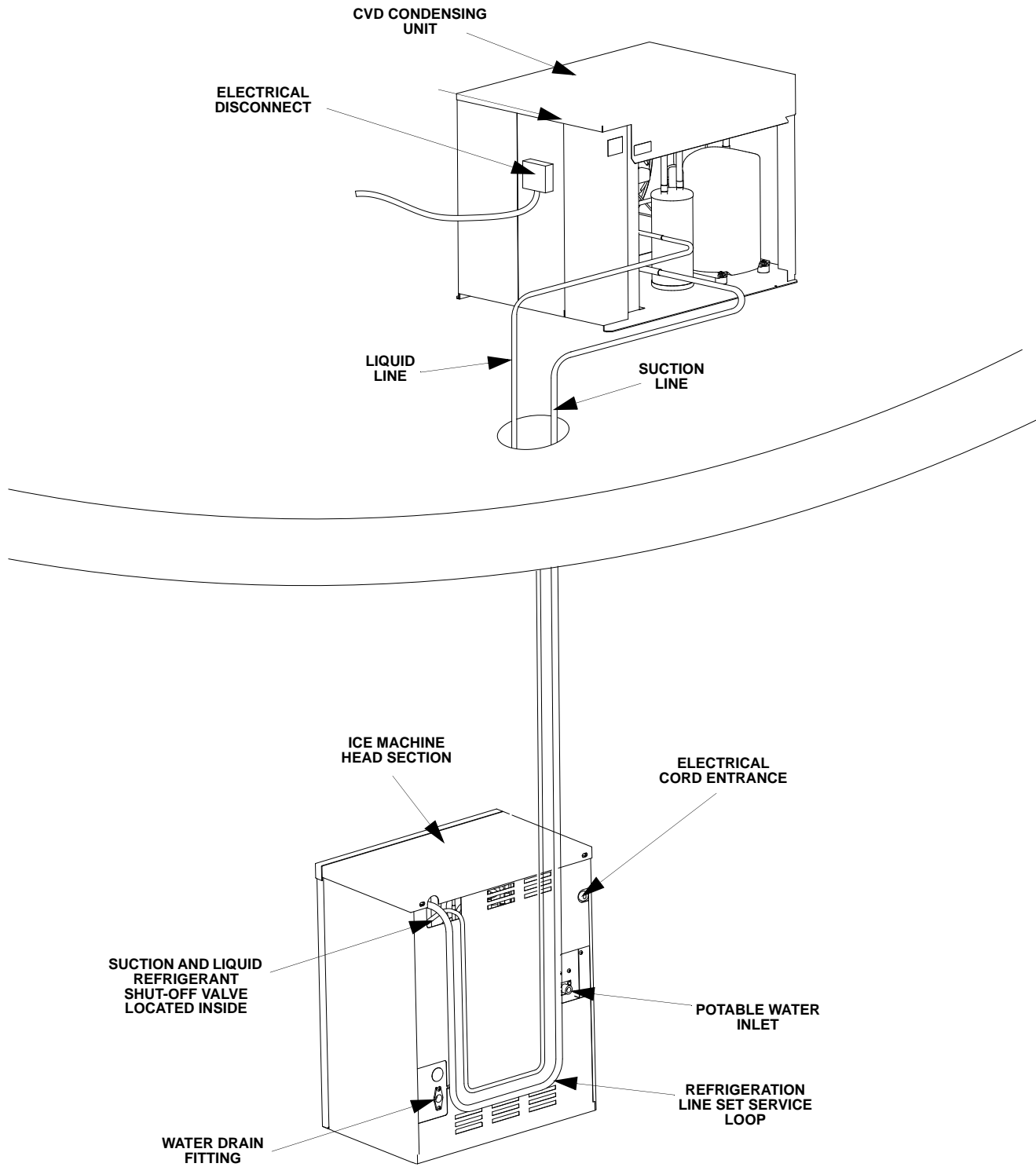
SV1759

Typical QuietQube® System Installation - S600C/S850C/S1000C/S1200C



SV1768c

Typical QuietQube® System Installation - S1470C/S1870C/S2070C



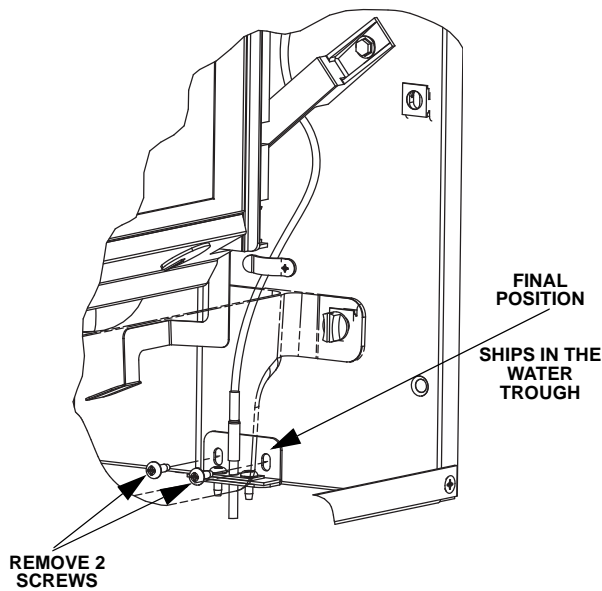
SV1759A

Typical Ice/Beverage System Installation - IB600C/IB800C/IB1000C

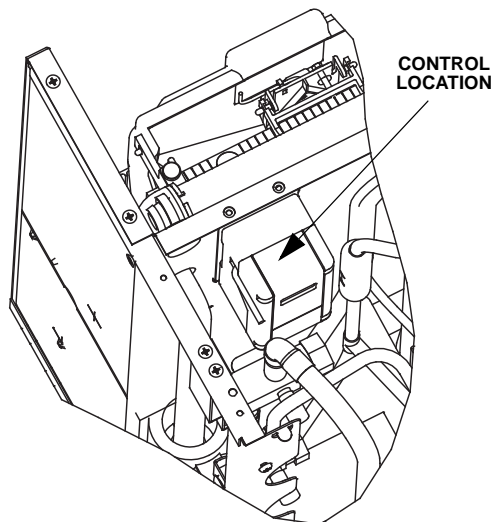
Electronic Bin Thermostat Instructions IB600C/IB800C/IB1000C Only

POSITIONING

1. Remove water trough.
2. Remove sensor probe from the water trough.
3. Remove 2 screws - see illustration below.
4. Position sensor probe into dispenser and secure with screws.
5. Re-install water trough.
6. The control is preset and does not require programming.



Bin Thermostat Location



Control Location

Installation Checklist

- | | |
|--|--|
| <input type="checkbox"/> Is the Ice Machine level? | <input type="checkbox"/> Has the ice machine receiver service valve been opened 100%? |
| <input type="checkbox"/> Has all of the internal packing been removed? | <input type="checkbox"/> Does the condenser fan motor operate properly after start-up? |
| <input type="checkbox"/> Have all of the electrical and water connections been made? | <input type="checkbox"/> Have all the refrigeration fittings and joints been leak checked? |
| <input type="checkbox"/> Has the supply voltage been tested and checked against the rating on the nameplate? | <input type="checkbox"/> Is the line set routed properly? |
| <input type="checkbox"/> Is there proper clearance around the ice machine for air circulation? | <input type="checkbox"/> Is a refrigeration oil trap (S-trap) installed if the condenser is installed 21 to 35 feet (6 to 11m) above the ice machine head? |
| <input type="checkbox"/> Has the ice machine been installed where ambient temperatures will remain in the range of 35° - 110°F (2° - 43°C)? | <input type="checkbox"/> Has the CVD® condensing unit been installed to prevent any roofing damage? |
| <input type="checkbox"/> Has the ice machine been installed where the incoming water temperature will remain in the range of 35° - 90°F (2° - 32°C)? | <input type="checkbox"/> Have the refrigeration lines been insulated and secured properly to prevent vibration? |
| <input type="checkbox"/> Are the ice machine and bin drains separately vented? | <input type="checkbox"/> Has the remote condensing unit been located where ambient temperatures will remain in the range of -20° to 130°F (-29° to 54°C)?
<i>CVD675/CVD2075 Only</i> - The air temperature must be at least -20°F (-29°C) but must not exceed 120°F (49°C). |
| <input type="checkbox"/> Are all electrical leads free from contact with refrigeration lines and moving equipment? | <input type="checkbox"/> Are the plastic bushings installed on the CVD® condensing unit to prevent refrigeration tubing from contacting the sheet metal panel? |
| <input type="checkbox"/> Has the owner/operator been instructed regarding maintenance and the use of Manitowoc Cleaner and Sanitizer? | <input type="checkbox"/> CVD1486 Only - Is the drain installed on the condensing unit? |
| <input type="checkbox"/> Has the warranty registration card been sent to the factory? | <input type="checkbox"/> Is the condensing unit level? |
| <input type="checkbox"/> Has the ice machine and bin been sanitized? | |
| <input type="checkbox"/> IB Only - Has the thermostat kit been installed and tested? | |
| <input type="checkbox"/> IB Only - Is the adapter secured to the dispenser? | |

Before Starting the Ice Machine

All Manitowoc ice machines are factory-operated and adjusted before shipment. Normally, new installations do not require any adjustment.

To ensure proper operation, follow the Operational Checks in Section 3 of this manual. Starting the ice machine and completing the Operational Checks are the responsibilities of the owner/operator.

Adjustments and maintenance procedures outlined in this manual are not covered by the warranty.

AuCS® Automatic Cleaning System

This optional accessory monitors ice making cycles and initiates cleaning procedures automatically. The AuCS® accessory can be set to automatically clean or sanitize the ice machine every 2, 4 or 12 weeks.



Warning

Potential Personal Injury Situation

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

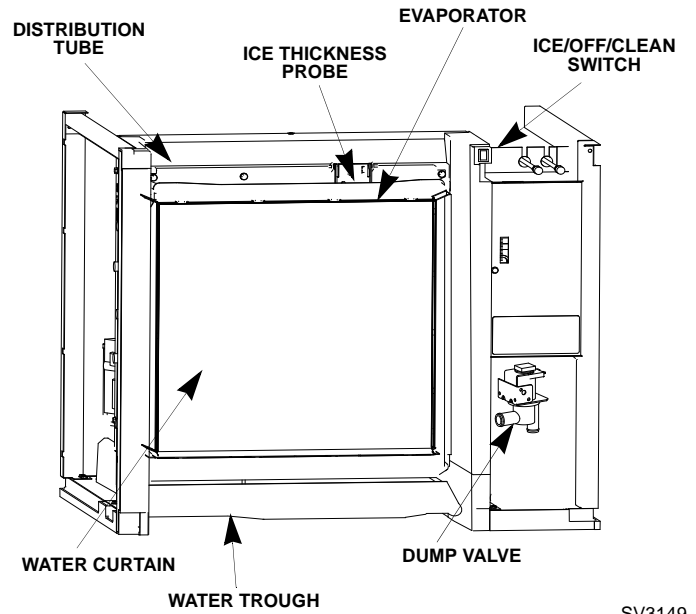
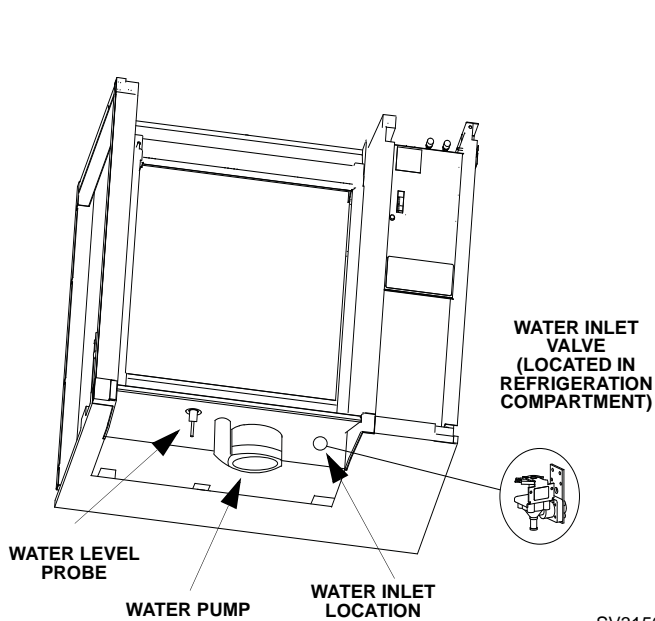
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Section 3 Ice Machine Operation

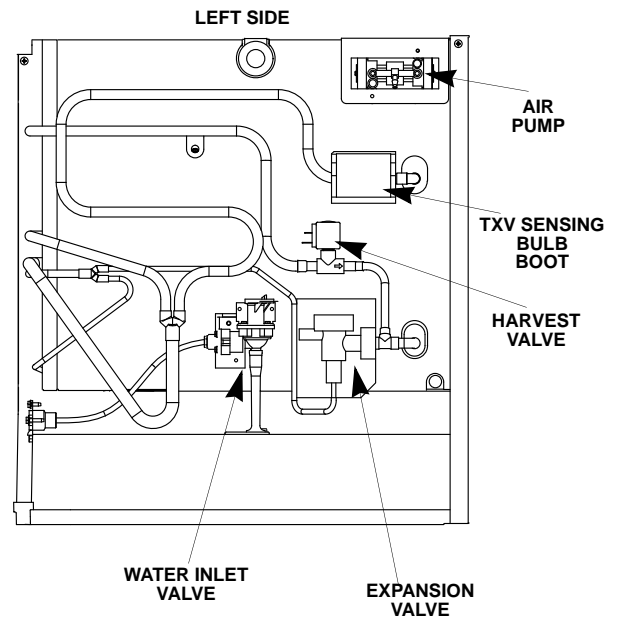
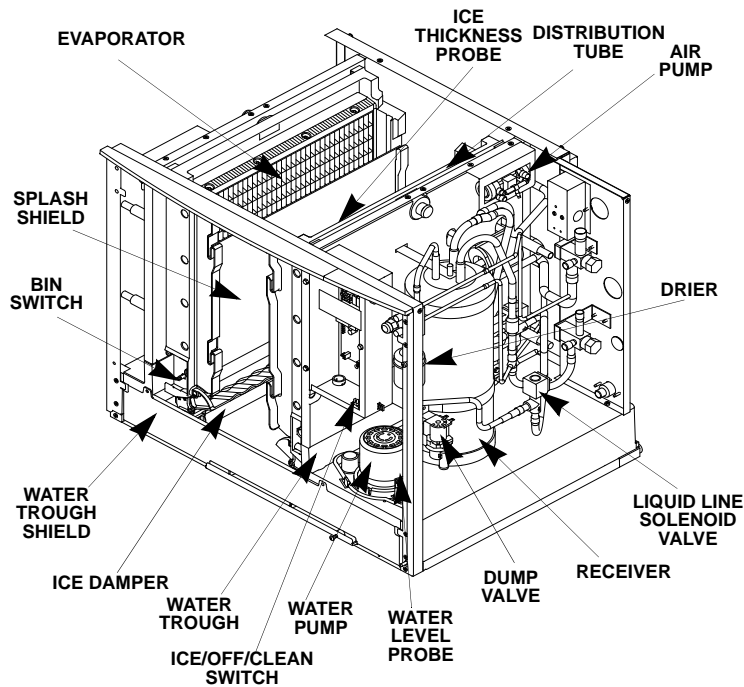
Component Identification

ICE MACHINE HEAD SECTION

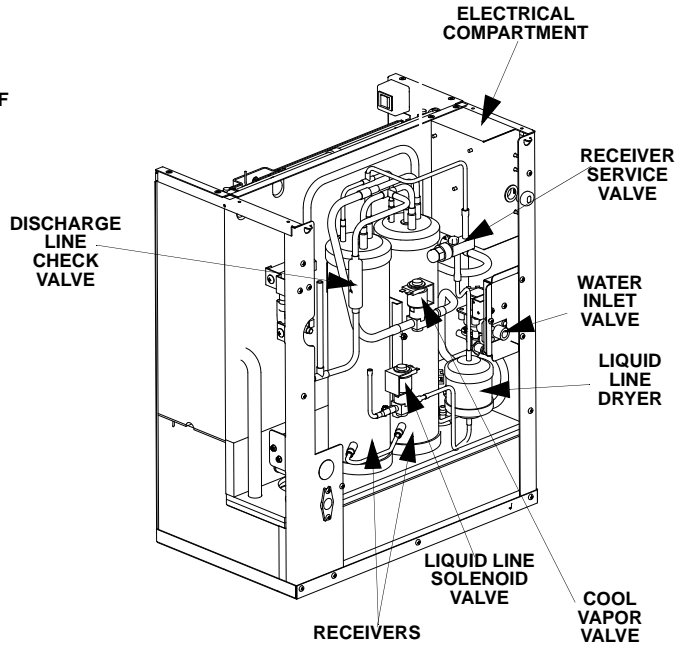
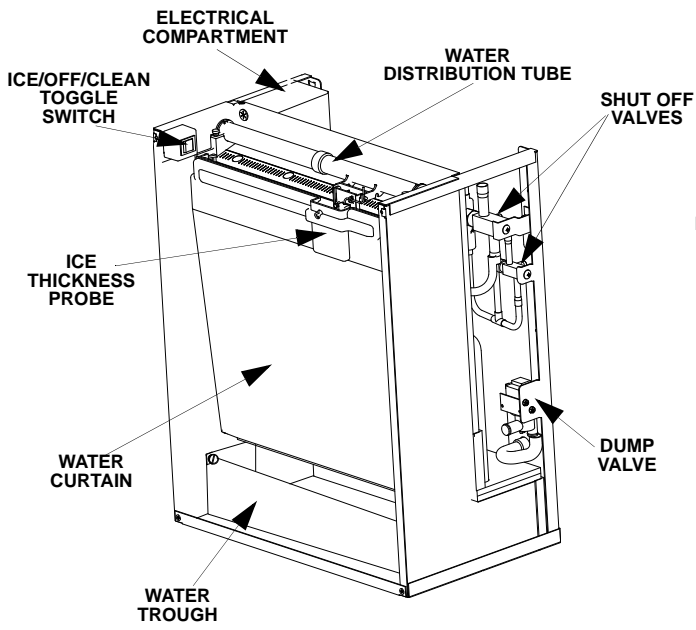
S600C/S850C/S1000C/S1200C



S1470C/S1870C/S2070C

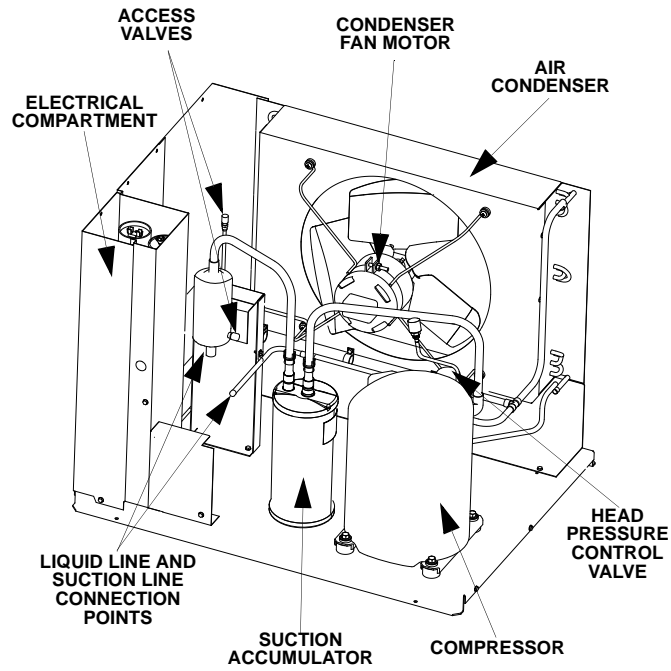


IB0600C/IB0800C/IB1000C



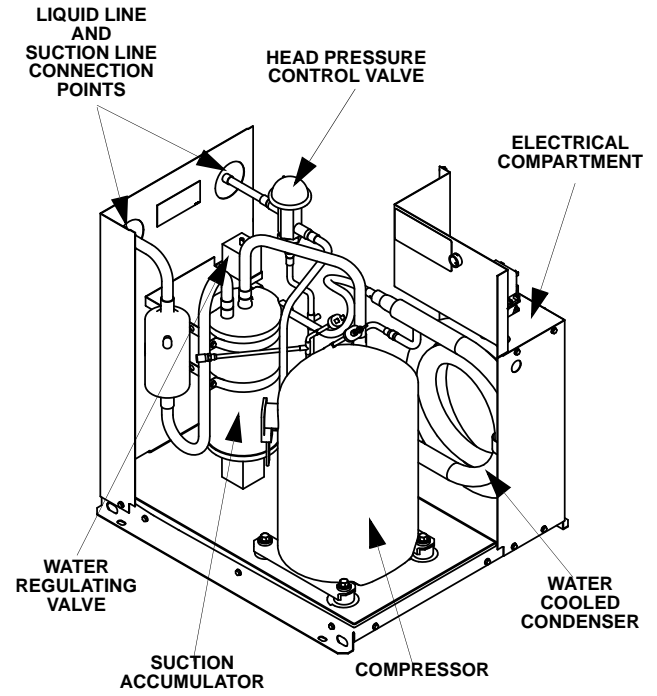
CONDENSING UNITS

CVD0675/CVD0875/CVD0885/CVD1085/
CVD1185/CVD1285/CVD1485



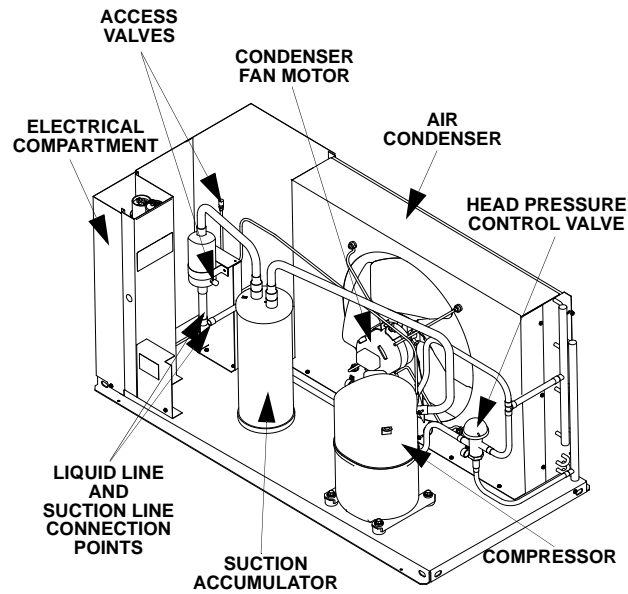
SV2085

CVD1486



PT1382

CVD1885/CVD2075



PT1306A

Ice Making Sequence of Operation

INITIAL START-UP OR START-UP AFTER AUTOMATIC SHUT-OFF

1. Water Purge

Before the compressor starts, the water pump and water dump solenoid are energized for 45 seconds, to completely purge the ice machine of old water. This feature ensures that the ice making cycle starts with fresh water.

The harvest valve and air compressor (when used) are also energized during water purge, although they stay on for an additional 5 seconds (50 seconds total on time) during the initial refrigeration system start-up.

2. Refrigeration System Start-Up

Ice Machine Head Section: The liquid line solenoid valve energizes after the 45 second water purge, and remains on throughout the entire Freeze and Harvest Sequences. The harvest valve and air compressor (when used) remains on for 5 seconds during initial compressor start-up and then shuts off.

The water fill valve is energized at the same time as the liquid line solenoid valve.

CVD Condensing Unit: When the refrigerant pressure is high enough to close the low-pressure control, (after the harvest valve energizes in step 1) the contactor coil is energized and the compressor starts. The compressor and fan cycling control* are supplied with power throughout the entire Freeze and Harvest Sequences. When the refrigerant pressure is high enough to close the fan cycling pressure control the condenser fan motor starts.

*The IB0600C & S0600C ice machines do not use a fan cycling control. The compressor and the condenser fan motor are wired through the contactor. Any time the contactor coil is energized, these components are supplied with power.

FREEZE SEQUENCE

3. Prechill

The compressor is on for 30 seconds (60 seconds initial cycle) prior to water flow, to prechill the evaporator. The water fill valve remains on until the water level probe is satisfied.

4. Freeze

The water pump restarts after the prechill. An even flow of water is directed across the evaporator and into each cube cell, where it freezes. The water fill valve will cycle on and then off one more time to refill the water trough.

When sufficient ice has formed, the water flow (not the ice) contacts the ice thickness probe. After approximately 10 seconds of continual water contact, the harvest sequence is initiated. The ice machine cannot initiate a harvest sequence until a 6 minute freeze lock has been surpassed.

Continued on next page ...

HARVEST SEQUENCE

5. Water Purge

The air compressor (when used) and the harvest valve(s) open at the beginning of the water purge to divert refrigerant gas into the evaporator. The water pump continues to run, and the water dump valve energizes for 45 seconds to purge the water in the sump trough. The water fill valve energizes for the last 15 seconds of the 45-second water purge.

After the 45 second water purge, the water fill valve, water pump and dump valve de-energize. (Refer to "Water Purge Adjustment" for details.)

When the refrigerant pressure is low enough to open the fan cycling pressure control the condenser fan motor stops.

- * The IB0600C & S0600C ice machines do not use a fan cycle control, therefore the condenser fan motor will continue to run in the harvest cycle.

6. Harvest

The air compressor (when used) remains energized and the harvest valve(s) remain open. The refrigerant gas warms the evaporator causing the cubes to slide, as a sheet, off the evaporator and into the storage bin. The sliding sheet of cubes swings the water curtain out or ice damper down, opening the bin switch.

The momentary opening and re-closing of the bin switch terminates the harvest sequence and returns the ice machine to the freeze sequence (steps 3-4).

AUTOMATIC SHUT-OFF

7. Automatic Shut-Off

Ice Machine Section: Shuts off when:

- The storage bin is full at the end of a harvest sequence.
- The sheet of cubes fails to clear the water curtain and hold it open.
- Ice damper is held down.

After the water curtain or ice damper are held open for 30 seconds, the ice machine shuts off. The ice machine remains off for 3 minutes before it can automatically restart.

CVD Condensing Unit: The liquid line solenoid valve closes, allowing the refrigeration system to pump down. When the refrigerant pressure is low enough to open the fan cycling pressure control the condenser fan motor stops. When the refrigerant pressure is low enough to open the low pressure control, the contactor coil is de-energized and the compressor stops.

The ice machine remains off until enough ice has been removed from the storage bin to allow the ice to fall clear of the water curtain or ice damper. As the water curtain or ice damper swings back to the operating position, the bin switch re-closes and the ice machine restarts (steps 1 - 2), provided the 3 minute delay period is complete.

- * The IB0600C & S0600C ice machines do not use a fan cycle control, therefore the condenser fan motor will energize and de-energize with the compressor.

Operational Checks

GENERAL

Manitowoc ice machines are factory-operated and adjusted before shipment. Normally, a newly installed ice machine does not require any adjustment.

To ensure proper operation, always follow the Operational Checks:

- when starting the ice machine for the first time
- after a prolonged out of service period
- after cleaning and sanitizing

NOTE: Routine adjustments and maintenance procedures outlined in this manual are not covered by the warranty.

WATER LEVEL

The water level sensor is set to maintain the proper water level above the water pump housing. The water level is not adjustable.

If the water level is incorrect, check the water level probe for damage (probe bent, etc.). Repair or replace the probe as necessary.

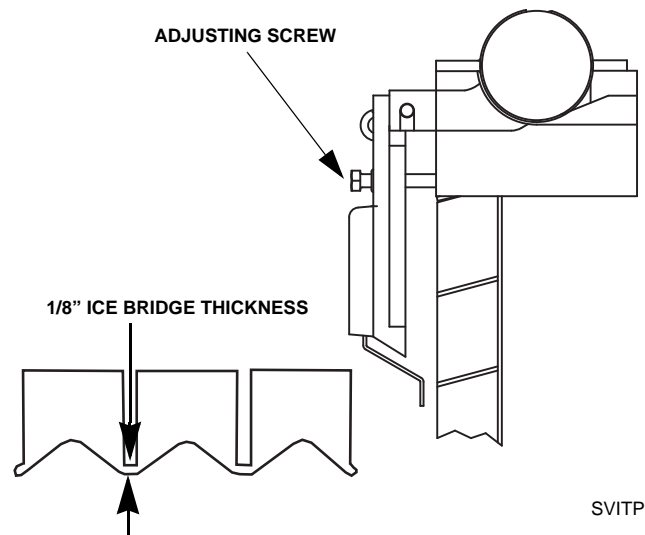
ICE THICKNESS CHECK

After a harvest cycle, inspect the ice cubes in the ice storage bin. The ice thickness probe is factory-set to maintain the ice bridge thickness at 1/8" (3.2 mm).

NOTE: Make sure the water curtain is in place when performing this check. It prevents water from splashing out of the water trough.

1. Inspect the bridge connecting the cubes. It should be about 1/8" (3.2 mm) thick.
2. If adjustment is necessary, turn the ice thickness probe adjustment screw clockwise to increase bridge thickness, counterclockwise to decrease bridge thickness. Set at 1/4" gap between ice machine and evaporator as starting point, then adjust to achieve a 1/8" bridge thickness.

NOTE: Turning the adjustment 1/3 of a turn will change the ice thickness about 1/16" (1.5 mm).



SVITP

Ice Thickness Check

3. Make sure the ice thickness probe wire and the bracket do not restrict movement of the probe.

HARVEST SEQUENCE WATER PURGE

The harvest sequence water purge adjustment may be used when the ice machine is hooked up to special water systems, such as a de-ionized water treatment system.

Warning

Disconnect electric power to the ice machine at the electrical disconnect before proceeding.

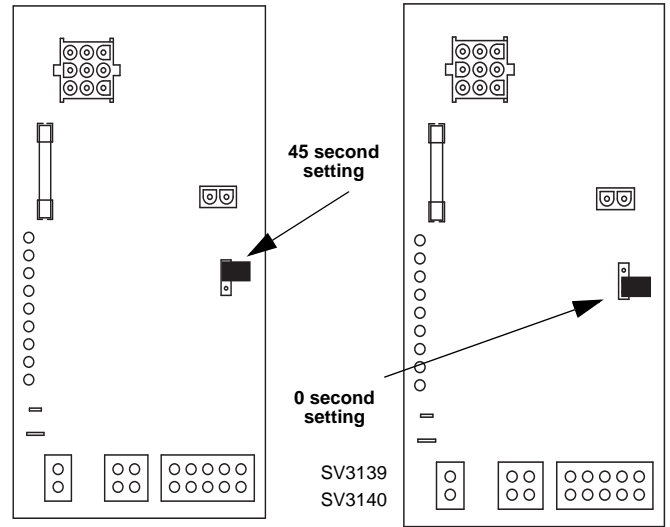
Important

The harvest sequence water purge is factory-set at 45 seconds. A shorter purge setting (with standard water supplies such as city water) is not recommended. This can increase water system cleaning and sanitizing requirements.

- The harvest sequence water purge is factory set for 45 seconds. Repositioning the jumper will set the harvest water purge to 0 seconds. This setting does not affect the SeCs or AuCs (cleaning) sequences.
- During the harvest sequence water purge, the water fill valve energizes and de-energizes by time. The water purge must be at the factory setting of 45 seconds for the water fill valve to energize during the last 15 seconds of the water purge. If it is set to less than 45 seconds, the water fill valve will not energize during the water purge.

Warning

Disconnect the electrical power to the ice machine at the electrical disconnect before proceeding.



Water Purge Adjustment

For your safety and to eliminate errors, we recommend that a qualified service technician make the harvest water purge adjustment.

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Section 4 Maintenance

Interior Cleaning and Sanitizing

GENERAL

Clean and sanitize the ice machine every six months for efficient operation. If the ice machine requires more frequent cleaning and sanitizing, consult a qualified service company to test the water quality and recommend appropriate water treatment. The ice machine must be taken apart for cleaning and sanitizing.

 **Caution**

Use only Manitowoc approved Ice Machine Cleaner and Sanitizer for this application (Manitowoc Cleaner part number 94-0546-3 and Manitowoc Sanitizer part number 94-0565-3). It is a violation of Federal law to use these solutions in a manner inconsistent with their labeling. Read and understand all labels printed on bottles before use.

CLEANING PROCEDURE

 **Caution**

Do not mix Cleaner and Sanitizer solutions together.

 **Warning**

Wear rubber gloves and safety goggles (and/or face shield) when handling ice machine Cleaner or Sanitizer.

Ice machine cleaner is used to remove lime scale and mineral deposits. Ice machine sanitizer disinfects and removes algae and slime.

Step 1 Remove front door and top cover. This will allow easiest access for adding cleaning and sanitizing solutions.

Step 2 Set the toggle switch to the OFF position after ice falls from the evaporator at the end of a Harvest cycle. Or, set the switch to the OFF position and allow the ice to melt off the evaporator.

 **Caution**

Never use anything to force ice from the evaporator. Damage may result.

Step 3 Remove all ice from the bin/dispenser.

Step 4 Place the toggle switch in the CLEAN position. The water will flow through the water dump valve and down the drain. Wait until the water trough refills and water flows over the evaporator, then add the proper amount of ice machine cleaner.

Model	Amount of Cleaner
S0600C/S0800C S1000C/S1200C	3 ounces (90 ml)
S1470C/S1870C/S2070C	9 ounces (270 ml)
IB620C/IB820C/IB1020C	5 ounces (150 ml)

Step 5 Wait until the clean cycle is complete (approximately 35 minutes) then place the toggle switch in the OFF position and disconnect power to the ice machine (and dispenser when used).

 **Warning**

Disconnect the electric power to the ice machine at the electric service switch box.

Step 6 Remove parts for cleaning.

Please refer to the proper parts removal for your ice machine.

S600C/S850C/S1000C/S1200C - Page 4-2 & 4-3.

S1470C/S1870C/S2070C - Page 4-4 & 4-5.

IB620C/IB820C/IB1020C - Page 4-6 & 4-7.

PARTS REMOVAL FOR CLEANING/SANITIZING**S600C/S850C/S1000C/S1200C****A. Remove the water curtain**

- Gently flex the curtain in the center and remove it from the right side.
- Slide the left pin out.

B. Remove the ice thickness probe

- Compress the hinge pin on the top of the ice thickness probe.
- Pivot the ice thickness probe to disengage one pin then the other. The ice thickness probe can be cleaned at this point without complete removal. If complete removal is desired, disconnect the ice thickness control wiring from the control board.

C. Remove the water distribution tube

NOTE: Distribution tube thumbscrews are retained to prevent loss. Loosen thumbscrews but do not pull thumbscrews out of distribution tube.

- Loosen the two outer screws (do not remove screws completely they are retained to prevent loss) and pull forward on the distribution tube to release from slip joint.
- Disassemble distribution tube by loosening the two (2) middle thumbscrews and dividing the distribution tube into two pieces.

D. Remove the water trough

- Depress tabs on right and left side of the water trough.
- Allow front of water trough to drop as you pull forward to disengage the rear pins.

E. Remove the water level probe

- Pull the water level probe straight down to disengage.
- Lower the water level probe until the wiring connector is visible.
- Disconnect the wire lead from the water level probe.
- Remove the water level probe from the ice machine.

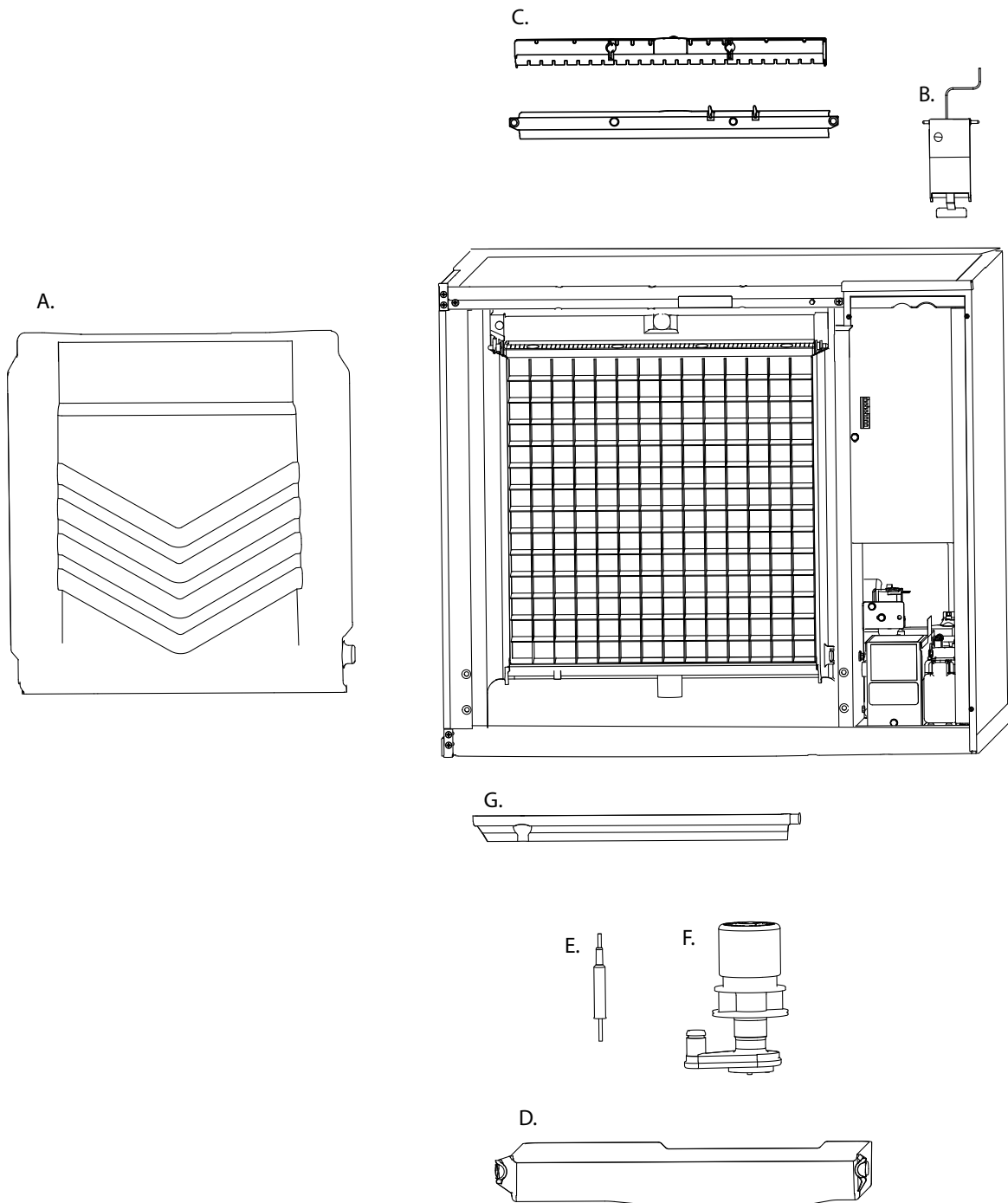
F. Remove the water pump.

- Grasp pump and pull straight down on pump assembly until water pump disengages and electrical connector is visible.
- Disconnect the electrical connector.
- Remove the water pump assembly from ice machine.
- Do not soak the water pump motor in cleaner or sanitizer solution.

G. Remove the evaporator tray from the bottom of the evaporator.

- Loosen thumbscrew on left side of tray.
- Allow left side of tray to drop as you pull the tray to the left side. Continue until the outlet tube disengages from the right side.

NOTE: Proceed to page 4-8, Step 7.



S1470C/S1870C/S2070C**A. Remove Splash Shields.**

- Grasp the top center of splash shields.
- Lift up and then out.

B. Remove ice thickness probe.

- Compress the hinge pin on the top of the ice thickness probe.
- Pivot the ice thickness probe to disengage one pin then the other. The ice thickness probe can be cleaned at this point without complete removal. If complete removal is desired, disconnect the ice thickness control wiring from the control board.

C. Remove distribution tubes.

- Distribution tubes thumbscrews are retained to prevent loss. Loosen thumbscrews but do not pull thumbscrews out of distribution tube.
- Loosen the two outer screws and pull forward on the distribution tube to release from slip joint.
- Disassemble distribution tube by loosening the two (2) middle thumbscrews and dividing the distribution tube into two pieces.

D. Remove the water trough shield.

- Grasp the water trough shield in the center and the left end.
- Flex the water trough shield in the center and pull the left end forward until clear of the side wall. Repeat for the right end.
- Pull water trough shield forward to remove.

E. Remove ice dampers.

- Grasp ice damper and apply pressure toward the back mounting bracket.
- Apply pressure to the front mounting bracket with thumb.
- Pull ice damper downward when the front ice damper pin disengages.

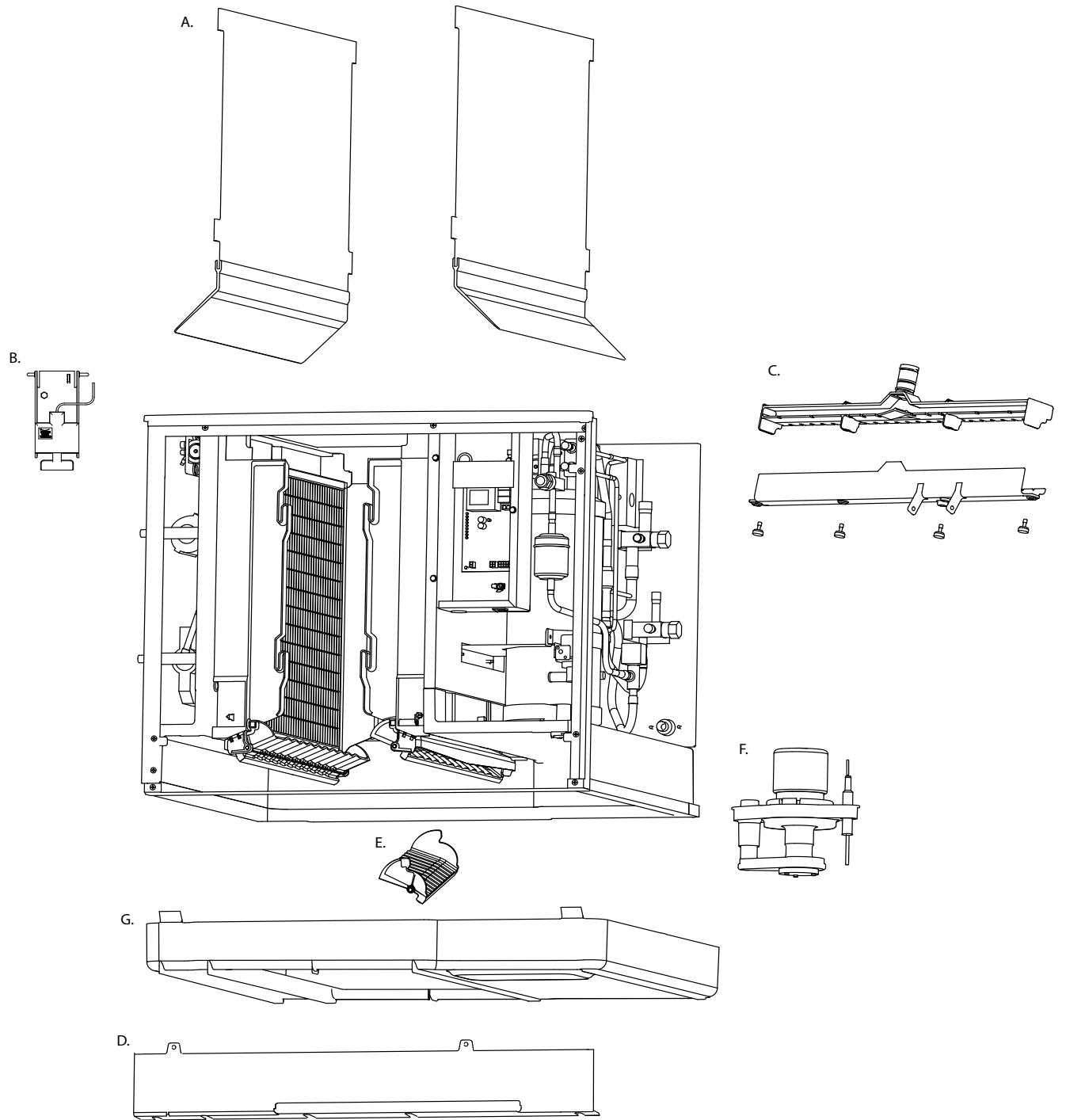
F. Remove the water pump assembly.

- Disconnect the vinyl distribution tube from the water pump.
- Disconnect the water pump and water level probe electrical connections.
- After the wires are disconnected squeeze the two tabs and lift the water pump assembly out of the ice machine.
- Do not immerse the water pump motor in cleaner or sanitizer solutions.

G. Remove the water trough.

- Depress the two tabs on the top of the water trough.
- Turn left and right ice dampers down to clear water trough.
- Pull forward on the water trough to remove.

NOTE: Proceed to page 4-8, Step 7.



IB620C/IB820C/IB1020C**A. Remove the splash shield**

- Remove quarter turn connector from the right side of splash shield.
- Gently bow the center of the splash shield and lift up and forward to remove.

Important

Splash Shield must be reinstalled to prevent water leakage.

B. Remove the water curtain

- Gently flex the curtain in the center and remove it from the right side.
- Slide the left pin out.

C. Remove the ice thickness probe

- Compress the hinge pin on the top of the ice thickness probe.
- Pivot the ice thickness probe to disengage one pin then the other. The ice thickness probe can be cleaned at this point without complete removal. If complete removal is desired, disconnect the ice thickness control wiring from the control board.

D. Remove the water level probe

- Loosen the screw that holds the water level probe in place. The probe can easily be cleaned at this point without complete removal. If complete removal is desired, remove the top cover, left and right side panels and control box cover. Disconnect the wire lead from the control board inside the electrical control box.

E. Remove the water trough

- Remove the quarter turn fasteners (turn counterclockwise) securing the trough in place.
- Pull forward on the water trough until the rear pins disengage from the water trough.
- Lift up and forward on the front of the water trough while allowing the rear of the water trough to drop.
- Remove the water trough from the ice machine.

F. Remove the water distribution tube

- Remove the clamp from the vinyl water hose on the right side of the distribution tube.
- Loosen the two thumbscrews which secure the distribution tube.
- Lift the right side of the distribution tube up, and then rotate it backward and to the right until the left side of the distribution tube disengages the thumbscrew.

⚠ Caution

Do not force this removal. Be sure the locating tab is clear before rotating the distribution tube back.

- Pull the vinyl hose off the distribution tube.

Disassemble for cleaning:

- Twist both of the inner tube ends until the tabs line up with the keyways.
- Pull the inner tube ends outward.

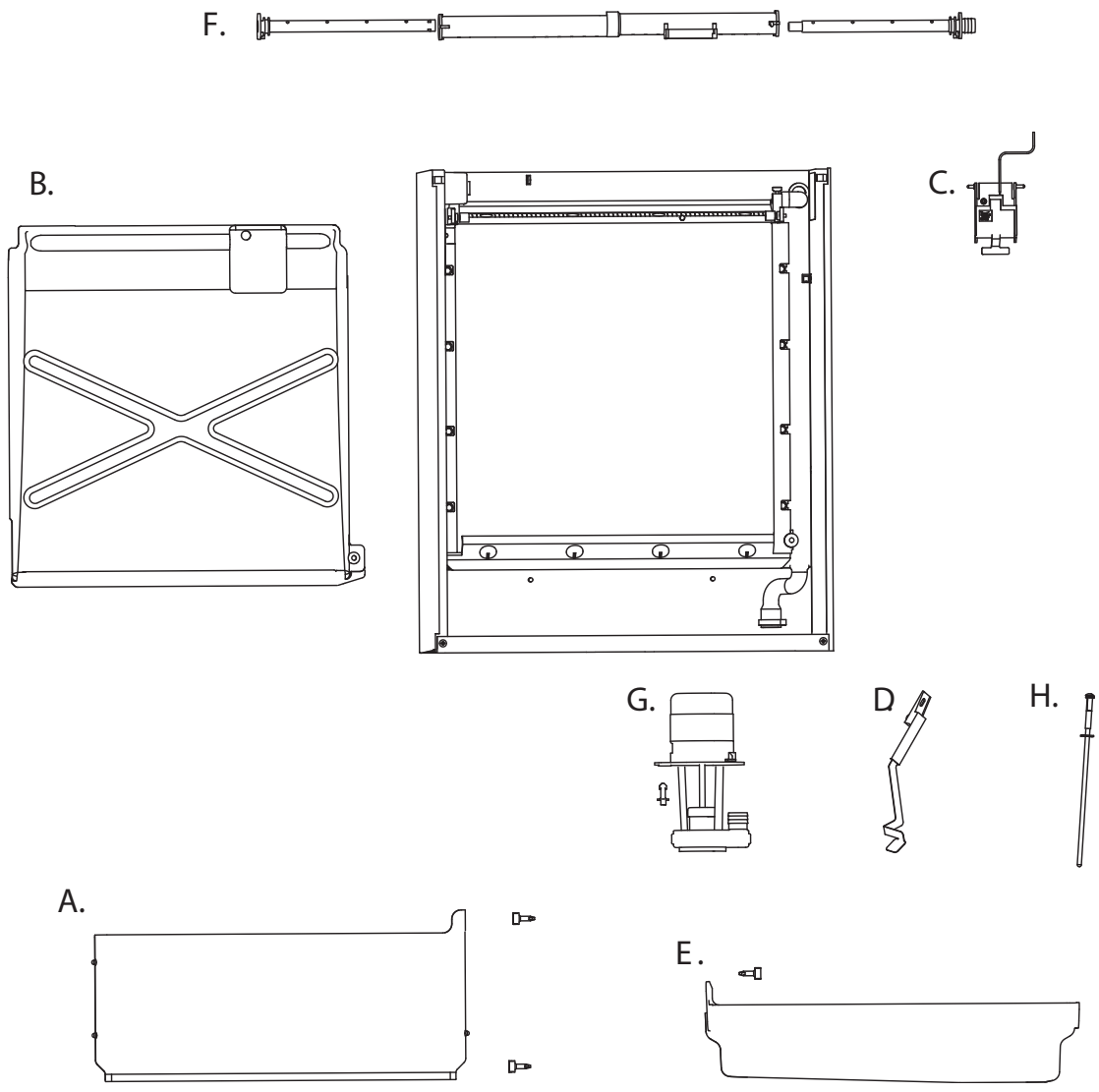
G. Remove the water pump.

- Note position of water pump outlet, and then disconnect vinyl hose from the pump outlet.
- Rotate the thumbscrew that secures the pump to the bulkhead 1/4 turn clockwise.
- Rotate the water pump assembly 1/4 turn counterclockwise.
- Lower the pump assembly into the evaporator compartment.
- Disconnect the water pump power cord.
- Remove water pump assembly from ice machine. Do not soak the water pump motor in cleaner or sanitizer solution

H. Remove the bin thermostat probe

- Loosen the 2 screws that holds the probe in place. The probe can easily be cleaned at this point without complete removal.

NOTE: Proceed to page 4-8, Step 7.



Step 7 Mix a solution of cleaner and warm water. Depending upon the amount of mineral buildup, a larger quantity of solution may be required. Use the ratio in the table below to mix enough solution to thoroughly clean all parts.

Solution Type	Water	Mixed With
Cleaner	1 gal. (4 l)	16 oz (500 ml) cleaner

Step 8 Use 1/2 of the cleaner/water mixture to clean all components. The cleaner solution will foam when it contacts lime scale and mineral deposits; once the foaming stops use a soft-bristle nylon brush, sponge or cloth (NOT a wire brush) to carefully clean the parts. Soak parts for 5 minutes (15 - 20 minutes for heavily scaled parts). Rinse all components with clean water.

Step 9 While components are soaking, use 1/2 of the cleaner/water solution to clean all foodzone surfaces of the ice machine and bin (or dispenser). Use a nylon brush or cloth to thoroughly clean the following ice machine areas:

- Side walls
- Base (area above water trough)
- Evaporator plastic parts - including top, bottom, and sides
- Bin or dispenser

Rinse all areas thoroughly with clean water.

Step 10 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer

Step 11 Use 1/2 of the sanitizer/water solution to sanitize all removed components. Use a cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/water solution. Do not rinse parts after sanitizing.

Step 12 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin (or dispenser). Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Side walls
- Base (area above water trough)
- Evaporator plastic parts - including top, bottom and sides
- Bin or dispenser

Do not rinse the sanitized areas.

Step 13 Replace all removed components.

Step 14 Reapply power to the ice machine and place the toggle switch in the CLEAN position.

Step 15 Wait about two minutes or until water starts to flow over the evaporator. Add the proper amount of Manitowoc Ice Machine Sanitizer to the water trough by pouring between the water curtain and evaporator.

Model	Amount of Sanitizer
S0600C/S0800C S1000C/S1200C	3 ounces (90 ml)
IB620C/IB820C	3 ounces (90 ml)
IB1020C	3.5 ounces (104 ml)
S1470C/S1870C/S2070C	12 ounces (355 ml)

Step 16 The ice machine will stop after the sanitize cycle (approximately 35 minutes). Place the toggle switch in the OFF position and disconnect power to the ice machine.

 **Warning**

Disconnect the electric power to the ice machine at the electric service switch box.

Step 17 Refer to step 6 and disassemble components. After disassembling proceed to step 18.

Step 18 Mix a solution of sanitizer and warm water.

Solution Type	Water	Mixed With
Sanitizer	6 gal. (23 l)	4 oz (120 ml) sanitizer

Step 19 Use 1/2 of the sanitizer/water solution to sanitize all removed components. Use a cloth or sponge to liberally apply the solution to all surfaces of the removed parts or soak the removed parts in the sanitizer/water solution. Do not rinse parts after sanitizing.

Step 20 Use 1/2 of the sanitizer/water solution to sanitize all foodzone surfaces of the ice machine and bin (or dispenser). Use a cloth or sponge to liberally apply the solution. When sanitizing, pay particular attention to the following areas:

- Side walls
- Base (area above water trough)
- Evaporator plastic parts - including top, bottom and sides
- Bin or dispenser

Do not rinse the sanitized areas.

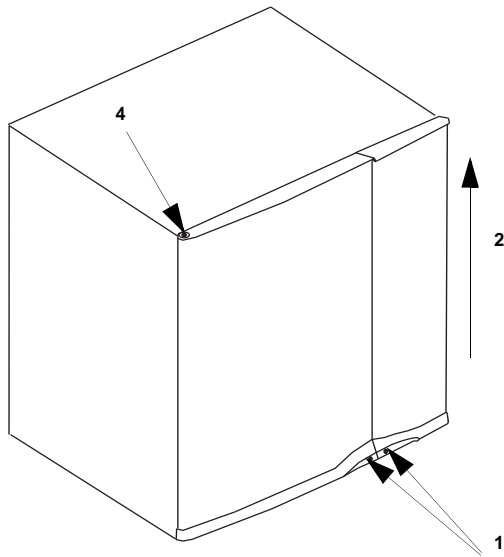
Step 21 Install the removed parts, restore power and place the toggle switch in the ICE position.

ADDITIONAL COMPONENT REMOVAL

The following components may be removed for easier access in some installations or they may need to be removed and cleaned to correct an operational problem.

Door Removal

1. Use a phillips screwdriver to loosen the two screws securing the left and right doors. Do not remove they are secured to prevent loss.
2. 30 Inch and 48 Inch Models: To remove right front door lift up and remove (22 inch ice machines have a single door, lift to remove entire door).

**Door Removal**

3. Open left front door to 45 degrees.
4. Support with right hand, depress top pin, tilt top of door forward and lift out of bottom pin to remove.

Water Inlet Valve

The water inlet valve normally does not require removal for cleaning. Refer to Section 5 for a list of causes for “No Water Entering Water Trough” or “Water Overflows Water Trough”.

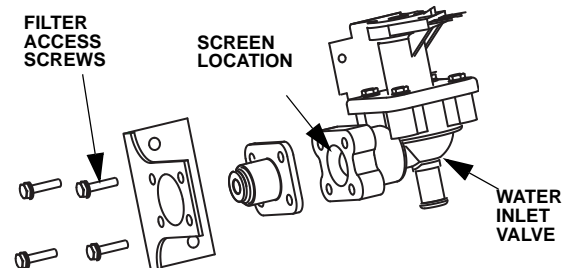
1. When the ice machine is off, the water inlet valve must completely stop water flow into the machine.
2. When the ice machine is on, the water inlet valve must allow the proper water flow through it. Set the toggle switch to ON. Watch for water flow into the ice machine. If the water flow is slow or only trickles into the ice machine, refer to Section 5.

Follow the procedure below to remove the water inlet valve.

Warning

Disconnect the electric power to the ice machine and dispenser at the electric service switch box and turn off the water supply before proceeding.

1. Remove the 1/4" hex head screws.
2. Remove, clean, and install the filter screen.



Water Dump Valve

The water dump valve normally does not require removal for cleaning. To determine if removal is necessary:

1. Set the toggle switch to ICE.
2. Verify the water trough fills with water at the beginning of the freeze cycle.
3. While the ice machine is in the freeze mode, check the water trough to determine if the dump valve is leaking. If there is no or little water in the water trough (during the freeze cycle) the dump valve is leaking.
 - A. If the dump valve is leaking, remove, disassemble and clean it.
 - B. If the dump valve is not leaking, do not remove it. Instead, follow the "Ice Machine Cleaning Procedure".

Follow the procedure below to remove the dump valve.

Warning

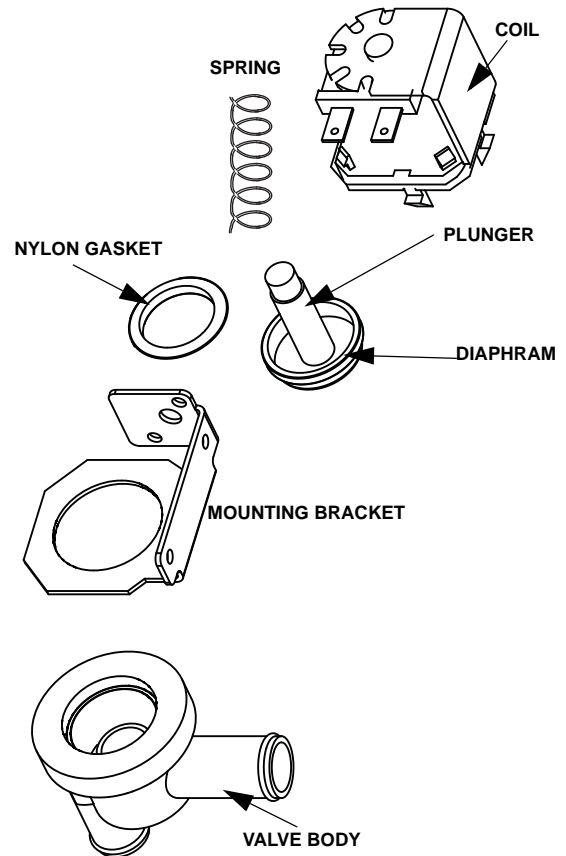
Disconnect the electric power to the ice machine at the electric service switch box and turn off the water supply before proceeding.

1. Leaving the wires attached, twist coil and rotate it counter-clockwise 1/4 turn.
2. Lift the coil assembly off the valve body.
3. Remove the spring, plunger, and nylon gasket from the valve body.

NOTE: At this point, the water dump valve can easily be cleaned. If complete removal is desired, continue with step 4.

NOTE: During cleaning, do not stretch or damage the spring.

4. Remove the tubing from the dump valve by twisting the clamps off.
5. Twist the valve body to remove from mounting bracket.



Dump Valve Disassembly

Water-Cooled Condenser and Water Regulating Valve CVD1486 Only

Symptoms of restrictions in the condenser water circuit include:

- Low ice production
- High water consumption
- High operating temperatures
- High operating pressures

If the ice machine is experiencing any of these symptoms, the water-cooled condenser and water regulating valve may require cleaning due to scale build-up.

Because the cleaning procedures require special pumps and cleaning solutions, qualified maintenance or service personnel must perform them.

Ice Machine Inspection

Check all water fittings and lines for leaks. Also, make sure the refrigeration tubing is not rubbing or vibrating against other tubing, panels, etc.

Do not put anything (boxes, etc.) on the sides or back of the ice machine. There must be adequate airflow through and around the ice machine to maximize ice production and ensure long component life.

Exterior Cleaning

Clean the area around the ice machine as often as necessary to maintain cleanliness and efficient operation. Use cleaners designed for use with stainless steel products.

Sponge any dust and dirt off the outside of the ice machine with mild soap and water. Wipe dry with a clean, soft cloth.

Heavy stains should be removed with stainless steel wool. Never use plain steel wool or abrasive pads. They will scratch the panels.

Cleaning the Condenser

GENERAL

Warning

Disconnect electric power to the ice machine head section and the remote condensing unit at the electric service switches before cleaning the condenser.

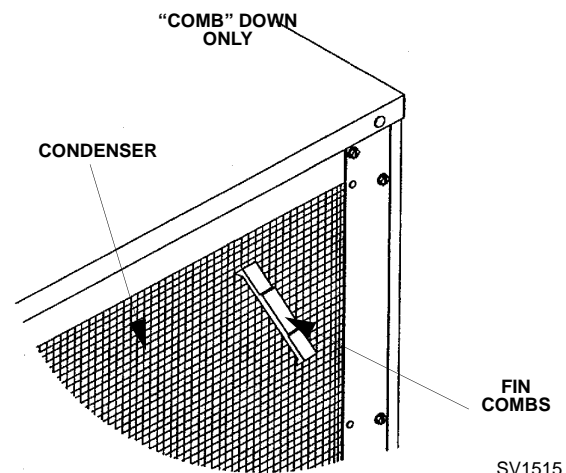
A dirty condenser restricts airflow, resulting in excessively high operating temperatures. This reduces ice production and shortens component life. Clean the condenser at least every six months. Follow the steps below.

Warning

The condenser fins are sharp. Use care when cleaning them.

Shine a flashlight through the condenser to check for dirt between the fins. To remove dirt:

- A. Blow compressed air or rinse with water from the inside out (opposite direction of airflow). Be careful not to bend the fan blades.
 - B. Use a commercial condenser coil cleaner if required to remove dirt/grease. Follow the directions and cautions supplied with the cleaner.
6. Straighten any bent condenser fins with a fin comb. Straighten any bent condenser fins with a fin comb.



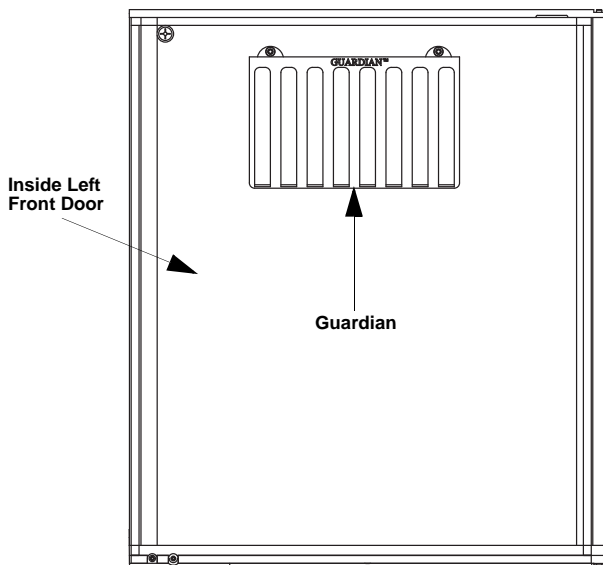
Straighten Bent Condenser Fins

Guardian

This product can be used on models S600C/S850C/S1000C/S1200C/S1470C/S1870C/S2070C - this product cannot be used on IB600C/IB800C/IB1000C due to space constraints. Slime is a leading cause of ice machine breakdowns and biological growth is a health concern. The Guardian system releases chlorine dioxide on a controlled basis to inhibit the growth of bacteria and fungi that form slime and cause malodors in the food zone of ice machines.

The Guardian will not control mineral or other water borne buildup. Your water quality will determine the length of time before mineral buildup affects ice machine performance. Mineral buildup must be removed as often as necessary to ensure trouble-free operation of the ice machine.

The Guardian sachet holder is included with the sachet packets. Refer to installation/replacement procedure to install/change sachet holder/ packet.



Guardian Location

GUARDIAN SACHET REPLACEMENT FREQUENCY

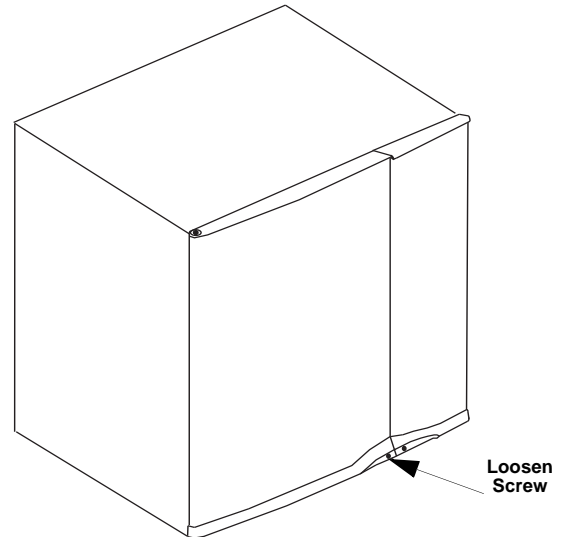
Sachet packet(s) require replacement every thirty (30) days or whenever they come in direct contact with water. Refer to chart below for requirements.

Ice Machine	Sachet Use
S600C	1
S850C/S1000C/S1200C/S1470C	1 or 2*
*Although one sachet is recommended, extreme conditions may necessitate using two sachet packets.	

Guardian sachet packets are available through your local Manitowoc ice machine dealer.

SACHET INSTALLATION/REPLACEMENT PROCEDURE

1. Loosen the left screw and open the left front door. The right front panel does not need to be removed.



Screw Location

2. Inside the front panel there are two pegs for mounting the sachet holder. *S1470C/S1870C/S2070C Only* - The sachet holder mounts to the front top support (mounting holes may be covered by insulation).
3. Attach the sachet holder to the front panel by hanging on the pegs. *S1470C/S1870C/S2070C Only* - Attach sachet holder with reusable ties.
4. Remove the new sachet packet from foil package and install into holder. Removing the foil package allows moisture in the air to activate the sachet contents.
5. Close the left front door and tighten the screw.
6. Discard the used sachet packet in the trash.

CLEAN UP PROCEDURE FOR DAMAGED SACHET PACKET

1. Remove all ice from bin/dispenser and discard.
2. Initiate a cleaning and sanitizing sequence on the ice machine.
3. Clean the bin/dispenser. Flush the drain thoroughly to prevent future drain blockage.
4. Sanitize the bin/dispenser.
5. Install a replacement sachet packet and reinstall all panels.

Removal from Service/Winterization

GENERAL

Special precautions must be taken if the ice machine is to be removed from service for an extended period of time or exposed to ambient temperatures of 32°F (0°C) or below.

Caution

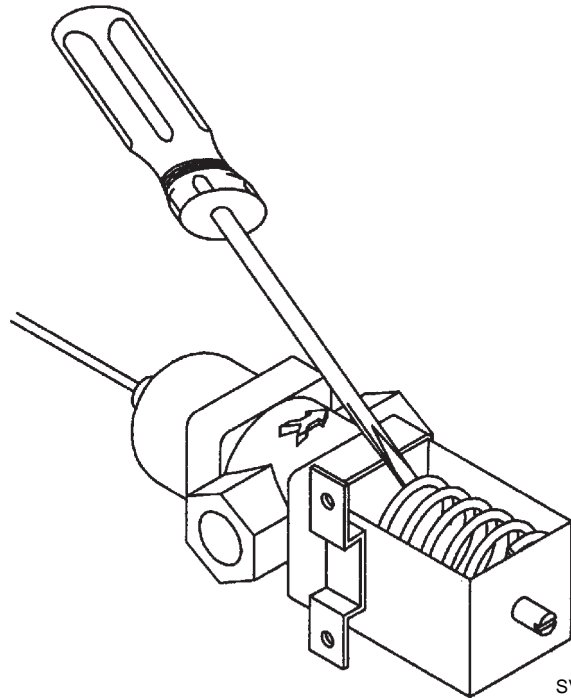
If water is allowed to remain in the ice machine in freezing temperatures, severe damage to some components could result. Damage of this nature is not covered by the warranty.

Follow the procedure below.

1. Clean and sanitize the ice machine.
2. Move the ICE/OFF/CLEAN switch to OFF.
3. Disconnect the electric power at the circuit breaker or the electric service switch.
4. Turn off the water supply.
5. Remove the water from the water trough.
6. Disconnect and drain the incoming ice-making water line at the rear of the ice machine.
7. Energize the ice machine and wait one minute for the water inlet valve to open.
8. Blow compressed air in both the incoming water and the drain openings in the rear of the ice machine until no more water comes out of the inlet water lines or the drain.
9. Make sure water is not trapped in any of the water lines, drain lines, distribution tubes, etc.
10. Fill spray bottle with sanitizer and spray all interior food zone surfaces. Do not rinse and allow to air dry.
11. "Frontseat" (shut off) the receiver service valves. Hang a tag on the switch as a reminder to open the valves before restarting.

CVD 1486 WATER COOLED CONDENSING UNIT

1. Perform steps 1-11 in previous column.
2. Disconnect the incoming water and drain lines from the water-cooled condenser.
3. Insert a large screwdriver between the bottom spring coils of the water regulating valve. Pry upward to open the valve.



SV1624

Pry Open the Water Regulating Valve

4. Hold the valve open and blow compressed air through the condenser until no water remains.

Section 5 Before Calling For Service

Checklist

If a problem arises during operation of your ice machine, follow the checklist below before calling service. Routine adjustments and maintenance procedures are not covered by the warranty.

Problem	Possible Cause	To Correct
Ice machine does not operate.	No electrical power to the ice machine and/or condensing unit.	Replace the fuse/reset the breaker/turn on the main switch.
	High pressure cutout tripping.	Clean condenser coil. (See Section 4)
	ICE/OFF/CLEAN toggle switch set improperly.	Move the toggle switch to the ICE position.
	Water curtain stuck open.	Water curtain or ice damper must be installed and swinging freely. (See Section 4)
	Remote receiver service valve and/or Liquid/suction line shut off valves are closed.	Open the valve(s). (See Section 2)
	IB Only - Dispenser level thermostat open.	Adjust thermostat to maintain correct dispenser level.
Ice machine stops, and can be restarted by moving the toggle switch to OFF and back to ICE.	Safety limit feature stopping the ice machine.	Refer to "Safety Limit Feature" on the next page.
Ice machine does not release ice or is slow to harvest.	Ice machine is dirty.	Clean and sanitize the ice machine. (See Section 4)
	Ice machine is not level.	Level the ice machine. (See Section 2)
	Low air temperature around ice machine head section.	Air temperature must be at least 35°F (1.6°C).
	Fan cycling control does not de-energize condenser fan motor.	Verify pressure is below cut-out setpoint, replace fan cycling control.
	CVD1486 - Water regulating valve incorrectly adjusted or will not close.	Check for water at condenser water drain outlet. Contact a qualified service company to adjust/replace valve.
Ice machine does not cycle into harvest mode.	The six-minute freeze time lock-in has not expired yet.	Wait for the freeze lock-in to expire.
	Ice thickness probe is dirty.	Clean and sanitize the ice machine. (See Section 4)
	Ice thickness probe is disconnected.	Connect the wire.
	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (See Section 3)
	Uneven ice fill (thin at the top of evaporator).	Verify sufficient water level in sump trough. Contact a qualified service company to check refrigeration system.
Ice quality is poor (soft or not clear).	Poor incoming water quality.	Contact a qualified service company to test the quality of the incoming water and make appropriate filter recommendations.
	Water filtration is poor.	Replace the filter.
	Ice machine is dirty.	Clean and sanitize the ice machine. (See Section 4)
	Water dump valve is not working.	Disassemble and clean the water dump valve. (See Section 4)
	Water softener is working improperly (if applicable).	Repair the water softener.

Problem	Possible Cause	To Correct
Ice machine produces shallow or incomplete cubes, or the ice fill pattern on the evaporator is incomplete.	Ice thickness probe is out of adjustment.	Adjust the ice thickness probe. (See Section 3)
	Water trough level is too high or too low.	Check the water level probe for damage. (See Section 3)
	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen. (See Section 4)
	Water filtration is poor.	Replace the filter.
	Hot incoming water.	Connect the ice machine to a cold water supply. (See Section 2)
	Water inlet valve is not working.	Clean or replace the water inlet valve. (See Section 4)
	Incorrect incoming water pressure.	Water pressure must be 20-80 psi (137.9 - 551.5 kPA)
	Ice machine head section is not level.	Level the ice machine head section. (See Section 2)
Low ice capacity.	Water inlet valve filter screen is dirty.	Remove the water inlet valve and clean the filter screen. (See Section 4)
	Incoming water supply is shut off.	Open the water service valve.
	Water inlet valve stuck open or leaking.	Replace the water inlet valve.
	The condenser is dirty.	Clean the condenser. (See Section 4)
	High air temperature entering condenser.	Air temperature must not exceed 130°F (54°C) CVD675/CVD2075 - 120°F (49°C) CVD1486 - 110°F (43°C)
	The harvest assist air compressor is not functioning.	Call for service.

Safety Limit Feature

In addition to the standard safety controls, such as the high pressure cutout, your Manitowoc ice machine features built-in safety limits which will stop the ice machine if conditions arise which could cause a major component failure.

Before calling for service, re-start the ice machine using the following procedure:

1. Move the ICE/OFF/CLEAN switch to OFF and then back to ICE.
 - A. If the safety limit feature has stopped the ice machine, it will restart after a short delay. Proceed to step 2.
 - B. If the ice machine does not restart, see “Ice machine does not operate” on the previous page.
2. Allow the ice machine to run to determine if the condition is recurring.
 - A. If the ice machine stops again, the condition has recurred. Call for service.
 - B. If the ice machine continues to run, the condition has corrected itself. Allow the ice machine to continue running.

EC DECLARATION OF CONFORMITY

We hereby declare that our products, ice machines and Multiplex refrigeration equipment comply with all the essential requirements of the listed EC - directives.

Manufacturer:

*Manitowoc Ice, Inc.
2110 S. 26th Street, P.O. Box 1720
Manitowoc, Wisconsin 54221-1720 USA*

European Distributor:

Representative of Manitowoc Ice, Inc.:

Engineering Manager, (Printed name)

Representative of European Distributor:

Signature

Model and Serial No.

Applied EC Directives:

Applied Standards:

EN60335-1 Safety of household and similar electrical appliances
EN60335-2-24 Particular requirements refrigerators, food freezers and ice makers

EN55014 Electrical Motor Operated Appliances (Emissions)
EN55014 Electro Magnetic Compatibility (Immunity)
EN378 -1 to -4 Refrigeration Plants

Low Voltage 73/23/EEC
EMC 89/336/EEC
Pressure Equipment 97/23/EC



8201043
08/25/03



Manitowoc Ice, Inc.
2110 South 26th Street
P.O. Box 1720
Manitowoc, WI 54221-1720
Phone: (920) 682-0161
Service Fax: (920) 683-7585
Web Site - www.manitowocice.com

Manitowoc Foodservice International
S.A.S.
18 Chemin de Charbonnières
F-69132 Ecully Cedex
Téléphone : +33 (0)4 72 18 22 50
Fax : +33 (0)4 72 18 22 60
Site Web – www.manitowocice.com

Manitowoc (China) International Refrigeration
Company, LTD
No. 151 Jian Ye Road
Hangzhou Hi-Tech Industry Development Zone
(Bin Jiang)
Hangzhou, Zhejiang 310052
P.R. China
Telephone: 86-571-86888688
Service Fax: 86-571-86622707
Web Site – www.manitowoc.com.cn

MANITOWOC ICE, INC.
Web Site - www.manitowocice.com

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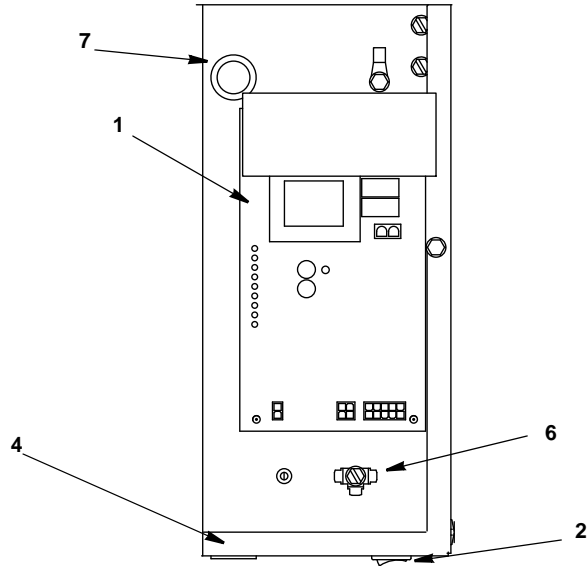
Ice Machine Parts List for Series S2070C Models

SD2072C

CVD2075

SD2074C

S2070C CONTROL BOX



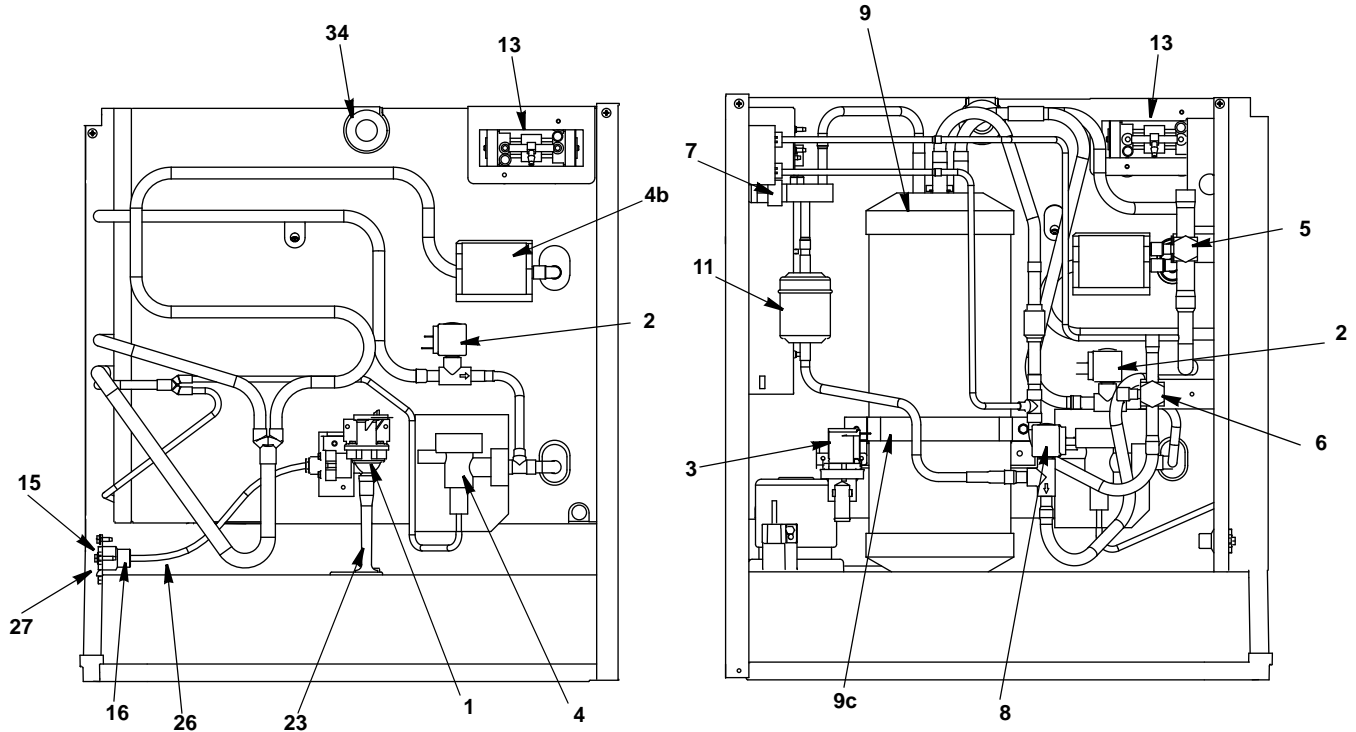
DESCRIPTION

	PART NO.
1 Control Board (for use with all voltages)	20-0619-9
a. 7 Amp Fuse – Mounted on Control Board	25-1100-3
2 Toggle Switch Only	20-0793-9
a. Toggle Switch Wiring Harness	000001927
3 Refrigeration Service Valve Assembly (not shown)	83-7326-3

Miscellaneous – Brackets, Screws, etc.

4 Control Box	000001811
a. Control Box Cover (Not shown)	000001812
5 Control Board Mounting Supports (Not shown)	43-0225-3
6 Screw, #10-24 x .50 Ground	52-0216-9
a. Star Washer	55-7320-9
7 Bushing	25-0016-3
8 Control Box Wiring Harness (Not shown)	
a. 115V/60Hz/1Ph	000001930
b. 230V/50Hz/1Ph	000001931

S2070C REFRIGERATION COMPARTMENT – COMMON PARTS



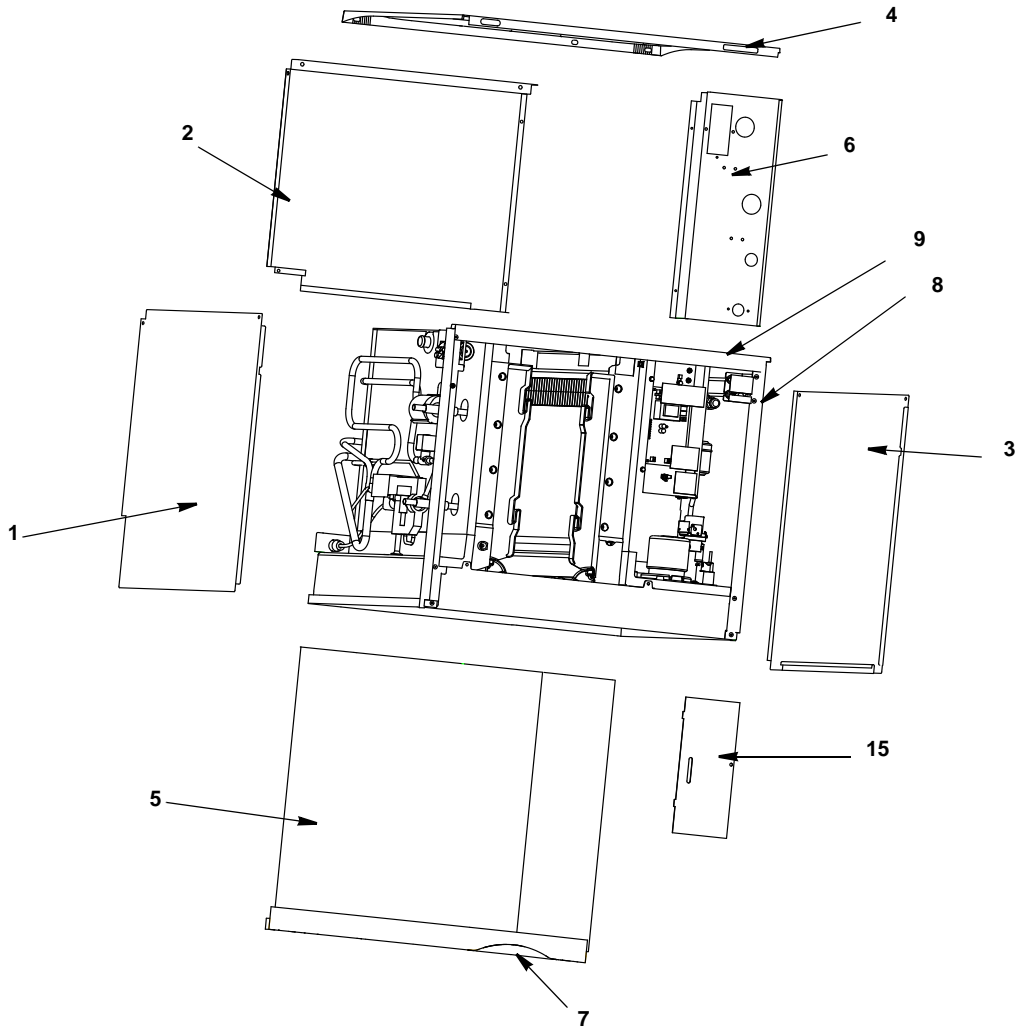
DESCRIPTION

		PART NO.
1	Water Dump Valve	
	a. 115V/60 Hz	000001767
	b. 208/230V / 50 Hz	000001768
2	Harvest Valve	
	a. Solenoid Valve with Electrical Coil (115V)	
	b. Solenoid Valve with Coil (208/230V)	
	c. 115V/60 Hz Electrical Coil Only	000002048
	d. 208/230V 50 Hz Electrical Coil Only	000002049
3	Water Inlet Valve	
	a. Water Inlet Valve Including 115V/60 Hz Coil	000000377
	b. Water Inlet Valve Including 208/230V 50 Hz Electrical Coil	000000378
4	Expansion Valve	
	a. Expansion Valve Body Insulation Boot	76-0225-3
	b. Expansion Valve Bulb Insulation Boot	40-0040-3
5	Manual Shut-off Valve Suction Line	
	a. Bracket	40-0092-3
	b. Lockwasher	83-7328-3
	c. Screw	603626-1
6	Manual Shut-off Valve Liquid Line	
	a. Bracket	55-4510-9
	b. Lockwasher	50-3345-9
	c. Screw	83-7327-3
7	Receiver Service Valve	
	a. Valve Cap	† 83-7316-9
	b. Bracket	56-5075-3
8	Liquid Line Solenoid Valve	
	a. Liquid Line Solenoid Valve Including 115V/60 Hz Coil (Danfoss)	
	b. 115V/60 Hz Coil Only Danfoss	000002048
	c. Liquid Line Solenoid Valve Including 208/230V 50 Hz Electrical Coil (Danfoss)	76-3012-1
	d. 208/230V 50 Hz Coil Only Danfoss	000002049
9	Receiver	
	a. Bracket (bottom)	76-2959-3
	b. Bracket (top)	000001779
	c. Strap	000001780
	d. Pushnut, Bolt Retainer	630721-4
10	Check Valve	54-7488-9
11	Drier	83-7315-9
12	Strain Relief (not shown)	89-3027-9
13	Air Compressor	
	a. Air Compressor Pump 115V	25-0228-3
	b. Air Compressor Pump 230V	76-0352-9
	c. Manifold Tee (air pump tubing outlet)	000000444
	d. Bracket	40-1173-9
		000001496

Miscellaneous – Brackets, Screws, etc.

14	Dump Valve Mounting Bracket	000001911
15	Water Inlet Valve Wing Adapter	87-0609-3
16	Water Inlet Valve Wing Adapter Plastic Fitting	13-6096-1
17	Water Drain Female Wing Adapter	87-0608-3
18	Water Drain Tubing	000002340
19	Clamp, Water Drain	56-5070-9
20	Clamp, Expansion Valve Bulb	56-5052-9
21	Strap, Expansion Valve Bulb	30-0050-3
22	Screw, #10-24 x .50	52-0206-9
23	Water Inlet Valve Tubing (molded)	40-1043-9
24	Mylar Shield, water inlet valve	000002250
25	Bracket, manual shut-off valve liquid line	603672-1
26	Water Inlet Tubing	44-2029-1
27	Water Inlet Bracket	000002064 & 000001980
28	Service Valve Bracket	000002251
29	Vinyl Tubing (0.25 ID)	44-2088-3
30	Wiring Harness	000001932
31	Thumbscrew	50-0001-3
32	Screw (Slot Hex)	000002466
33	Compression Nut	56-5072-3
34	Clamp .799/.899 ID	56-5070-3

S2070C PANELS



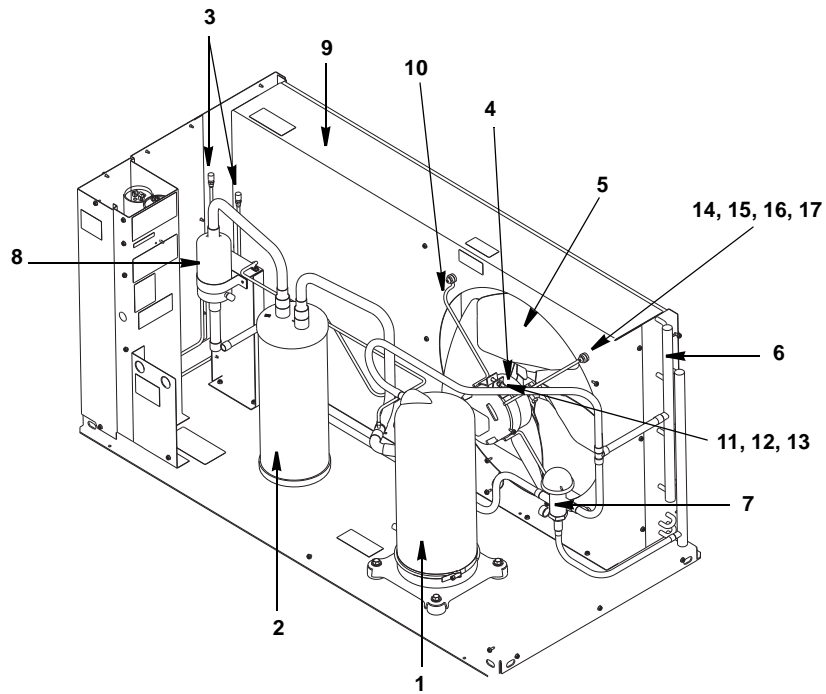
DESCRIPTION

DESCRIPTION	PART NO.
1 Left Side Panel	000002464
2 Back Panel	000002462
3 Right Side Panel	000002463
4 Top Cover	40-1548-3
5 Front Door	000002190
6 Coupling Panel	000002016

Miscellaneous – Brackets, Screws, etc.

7 Front Door Screw	50-0559-3
a. Shoulder Screw	000000260
b. Nut (for shoulder screw)	000000305
8 Front Vertical Angle	000001139
9 Front Top Support	000001447
a. Mounting Screw	52-0209-9
b. Plastic Dome Head Plug	000002246
10 Bottom Front Angle	000001138
a. Mounting Screw	50-0509-9
11 Screw, Top Cover, Side & Back Panels	50-0037-3
12 Spacer, Top Cover	000002288
13 Terminal Block 3 Pole 50 Hz	20-0614-9
14 Electrical Connection Box Cover	
a. 60 Hz	606398-9
b. 50 Hz	000002317
15 Control Box	
a. 60 Hz	000002230
b. 50 Hz	000002316

CVD2075 CONDENSING UNIT



pt1305

DESCRIPTION

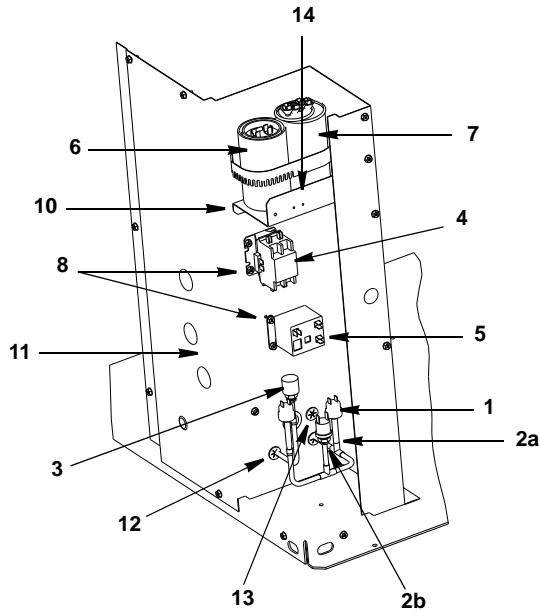
		PART NO.
1	Compressor	
	a. 208-230V/60 Hz/1 Ph	† 76-0059-3
	b. 208-230V/60 Hz/3 Ph	† 76-0060-3
	c. 220-240V/50 Hz/1 Ph	76-0061-3
	d. Crankcase Heater	82-5096-3
2	Accumulator	82-5047-3
3	Access Valve	83-7325-3
4	Fan Motor	
	a. 208-230V/60 Hz/1 Ph	† 20-0018-9
	b. 208-230V/50 Hz/1 Ph	† 20-0058-3
5	Fan Blade	82-5008-3
6	Air Condenser	88-5141-3
7	Head Pressure Control Valve	82-5007-3
8	Suction Line Filter	† 82-5055-9

Miscellaneous – Brackets, Screws, etc.

9	Fan Shroud	603870-1
10	Fan Motor Mounting Bracket	30-0025-3
11	Fan Motor Mounting Screw	† 50-3358-9
12	Fan Motor Mounting Lockwasher	† 55-4511-9
13	Fan Motor Mounting Hexnut	† 54-2952-9
14	Fan Bracket Mounting Screw	† 50-3358-9
15	Fan Bracket Mounting Lockwasher	† 55-4511-9
16	Fan Bracket Mounting Flatwasher	† 55-7305-9
17	Fan Bracket Mounting Rubber Wellnut	† 54-2955-9

† Refer to Cross Reference Guide

CVD2075 CONDENSING UNIT



pt1302

DESCRIPTION

	PART NO.
1 High Pressure Cut-Out Control	† 20-0124-3
2 Fan Cycling Control	
a.	† 20-0127-3
b.	† 20-0126-3
3 Low Pressure Cut-Out Control	20-0222-9
4 Contactor	
a. 208-230V/50-60/1 Ph	20-0030-3
b. 208-230V/50-60/3 Ph	24-1031-3

Start Components Copeland

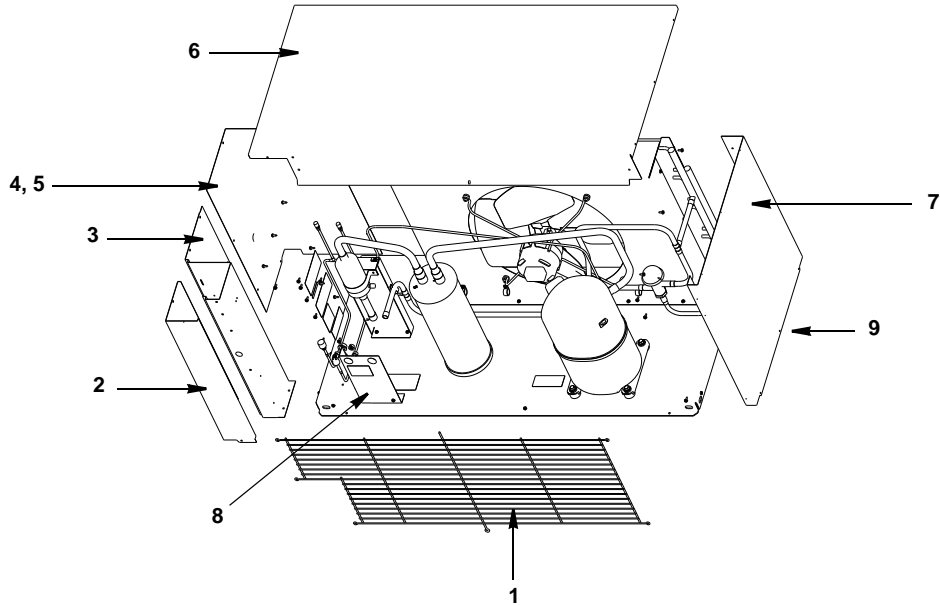
5 Start Relay 208-230V/60 Hz/1 Ph	20-0757-9
a. Start Relay 230V/50 Hz/1 Ph	20-0757-9
6 Start Capacitor 208-230V/60 Hz/1 Ph	000000021
a. Start Capacitor 230V/50 Hz/1 Ph	85-0552-3
7 Run Capacitor 208-230V/60 Hz/1 Ph	82-5024-3
a. Run Capacitor 230V/50 Hz/1 Ph	85-0449-3

Miscellaneous – Brackets, Screws, etc.

8 Screw, #10-24 x .50	† 52-0206-9
9 Capacitor Mounting Strap	602160-1
10 Capacitor Mounting Bracket	603498-1
11 Ground Screw	† 52-0216-9
12 Bushing	† 25-0016-9
13 Bushing	† 25-0002-9
14 Tenninal Block 230V/50 Hz/1 Ph Only (location only shown)	20-0614-3
15 Wiring Harness (Not shown)	
a. 208-230V/60 Hz/1 Ph	20-0024-9
b. 230/50 Hz/1 Ph	20-0059-3

† Refer to Cross Reference Guide

CVD2075 CONDENSING UNIT PANELS



pt1303

DESCRIPTION

	PART NO.
1 Condenser Fan Guard	30-0014-3
2 Control Box Cover	† 604017-1
3 Control Box Panel	603707-1
4 Left Side Panel 1875	603876-1
5 Left Side Panel 2075	603877-1
6 Cover Top	603875-1
7 Right Side Panel	603874-1
8 Tubing Shield	† 604226-1

Miscellaneous – Brackets, Screws, etc.

9 Screw, #10-24 x .50 Hex	† 52-0206-9
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Texas Health Regulations

1. Texas Regulations For Vended Water Through A Machine

Texas Administrative Code

<u>TITLE 25</u>	HEALTH SERVICES
<u>PART 1</u>	DEPARTMENT OF STATE HEALTH SERVICES
<u>CHAPTER 229</u>	FOOD AND DRUG
<u>SUBCHAPTER F</u>	PRODUCTION, PROCESSING, AND DISTRIBUTION OF BOTTLED AND VENDED DRINKING WATER
RULE §229.86	Processing of Vended Water
(a) Water dispensing device requirements are as follows:	
(1) Any device from which any operator or consumer dispenses servings of water in bulk shall comply with Title 21, Code of Federal Regulations (CFR), §129.40, Equipment and Procedures, and §165.110, Requirements for Specific Standardized Beverages. Except §129.40, the provision pertaining to the cleaning, sanitizing, filling, and capping or sealing of containers shall not apply to containers furnished by the consumer.	
(2) Water dispensing devices shall:	
(A) be designed and constructed to permit thorough cleaning, sanitization, and maintenance of all exterior and interior surfaces and component parts;	
(B) have all parts and surfaces that come into contact with the water constructed of corrosion-resistant, and nonabsorbent material acceptable to the department and capable of withstanding repeated cleaning and sanitizing treatment;	
(C) be designed so all treatment of the water by distillation, ion-exchange, filtration, ultraviolet light, reverse osmosis, mineral addition, or any other acceptable process is done in an effective manner;	
(D) have an effective system of collection and handling of drip, spillage, and overflow of water;	
(E) have a backflow prevention device approved by the department or local authority for all connections with the water supply;	
(F) disinfect water by ultraviolet light or other method approved by the department immediately prior to delivery into the customer's container;	
(G) comply with the American Water Works Association (AWWA) specifications for granular activated carbon if used in the treatment of potable water (AWWA B604-74);	
(H) be maintained in a clean and sanitary condition; and	
(I) be free from dirt and vermin.	
(b) Vending machines, in addition to requirements in subsection (a) of this section, shall:	
(1) have a recessed or guarded corrosion-resistant dispensing spout;	
(2) be equipped with monitoring devices designed to shut down operation of the machine when the disinfection unit fails to function;	
(3) be equipped with a self-closing, tight-fitting door on the vending compartment;	
(4) be located in an area that can be maintained in clean condition and in a manner that avoids insect and rodent harborage; and	
(5) display in a position clearly visible to customers, the following information:	
(A) the name and address of the operator;	
(B) a statement to the effect that the water is obtained from an approved source; and	
(C) a local or toll-free telephone number that may be called for further information, service, or complaints.	



MR. ZIPPY'S ICE & WATER MACHINE

- (c) Service, sampling and records shall meet the following requirements:
- (1) All parts and surfaces of the water dispensing device shall be maintained in clean condition by the vended water operator. The dispensing chamber and dispensing nozzle shall be cleaned and sanitized each time the device is serviced; whereas, all surfaces in contact with the vended water shall be maintained as a deposit free, visibly clean system. A record of cleaning and maintenance operations shall be kept by the operator for each water dispensing device for a period of two years and be available for inspection upon request.
 - (2) The vended water from each water dispensing device shall have a bacteriological analysis conducted a minimum of once every 90 calendar days and if required by the department, shall also be analyzed for other physical, chemical, or microbiological parameters.
 - (A) Sample results reported as coliform positive or unsuitable for analysis shall be submitted by facsimile to the department within 24 hours of receipt of the sample results from a laboratory acceptable to the department. The person shall submit the results to the Foods Group, Policy/Standards/Quality Assurance Unit by facsimile at (512) 834-6681, or by e-mail at Feedback.MFD@dshs.state.tx.us.
 - (B) The person operating a water dispensing device shall maintain the original of all sample results for a period of two years. The drinking water analyses shall be performed by a laboratory acceptable to the department. A copy of the analysis shall be available for review and copying during inspections.
 - (3) Each person operating a water dispensing device shall maintain a written maintenance program. The written maintenance program shall include written servicing instructions for the operator; technical manuals for the machine and water treatment appurtenances involved; and records of service. The written maintenance program shall be available for inspection by the department.
 - (4) The vended water operator shall clean and perform servicing of the water vending machine a minimum of once per month.
 - (A) More frequent cleaning and servicing may be required to maintain sanitation or as required by the manufacturer of the equipment.
 - (B) Sampling results of positive coliform or unsuitable for analysis are indications that servicing of machine may be required at a higher frequency than once per month as detailed in paragraph (5) of this subsection.
 - (5) Methods of testing for maximum contaminant levels (MCLs) for microbiological contaminants in water dispensed from water dispensing devices shall be performed as follows:
 - (A) if any sample collected from a water dispensing device is determined to be unsatisfactory for any reason (i.e. coliform positive or unsuitable for analysis), the operator shall notify the department in accordance with paragraph (2)(A) of this subsection; and
 - (B) the water dispensing device shall be cleaned, sanitized and resampled immediately. Until the sample results are known the device shall remain out of service; and
 - (C) if after being cleaned and sanitized, the vended water is determined to be unsatisfactory, the machine shall remain out of service until the source of the contamination has been located and corrected and a negative sample obtained. The negative sample result shall be maintained in accordance with paragraph (2)(B) of this subsection.

Source Note: The provisions of this §229.86 adopted to be effective July 3, 2003, 28 TexReg 4908; amended to be effective June 4, 2006, 31 TexReg 4432



MR. ZIPPY'S ICE & WATER MACHINE

If your machine is not in the State of Texas then consult the state where the machine is located for specific regulations. You will need to comply with your state regulations. This section of the manual briefly covers the state of Texas regulations. However, for a detailed manual, go to the website www.tdh.state.tx.us/bfdfs/foods/bvw/index.html

What does the Texas law require of water vending machines?

- A. Texas law requires a state water vending license issued by the state. (See attached copy of license application). You will need a license for each location you operate.
- B. Also Texas law requires the distribution of vended water to be performed by or under the guidance and control of a bottled water and vendor operator who holds a certificate of Competency. This test will certify the individual and this individual can operate many vending machines(See attached copy of application to take test)
- C. Texas laws also require a water sample to be tested for Bacteriological tests every 90 days. The results of the test must be submitted to the state of Texas and a copy kept for two years. If the machine ever fails the test the machine must be shut down and cleaned and sanitized until the machine passes the Bacteriological test. (See vended water sampling section)
- D. Texas law requires copies of the written maintenance program to be available for inspection.(see record keeping section)
- E. Texas law also requires copies of cleaning and Maintenance records to be available for inspection. (see record keeping section)
- F. Texas law requires a water vending unit to be inspected and cleaned monthly. However JCC recommends weekly testing and cleaning not monthly.(See Maintenance log sheet)



Section 1 Introductory Information

VENDED WATER OPERATOR CERTIFICATION REQUIREMENTS

The Texas Health and Safety Code Chapter 441 requires a bottled water operator to hold a certificate of competency issued by the Department of State Health Services (DSHS) in order to furnish or distribute bottled water to the public. Furthermore, Title 25, Texas Administrative Code, Section 229.88 prohibits a person from furnishing bottled water to the public or for distribution to the public unless the processing, bottling, and distribution of the bottled water is performed by or under the full-time supervision of a bottled and vended water operator who holds a certificate of competency. Additionally, a person may not furnish vended water to the public or for distribution to the public unless the processing, bottling, and distribution of the vended water is performed by or under the guidance and control of a bottled and vended water operator who holds a certificate of competency

The law authorizes DSHS to issue a certificate of competency to a qualified bottled and vended water operator who files an application, pays a \$110 certification fee, and passes an examination with a score of 70 or higher. All certificates are valid for two years. After filing the application and paying the fee, the applicant will be notified by DSHS in writing that they are eligible to take the exam. At that time the applicant must contact the regional DSHS office selected on the application (within 90 days of the date on the confirmation letter) and schedule a mutually convenient time to take the examination. DSHS examination sites and contacts are identified on the following page. If an applicant fails the exam, the applicant must reapply and pay a re-application fee of \$50. Renewal certificates are \$110 and are valid for two years.



MR. ZIPPY'S ICE & WATER MACHINE

BOTTLED AND VENDED WATER OPERATOR CERTIFICATION EXAMINATION SITES

For further information contact the Foods Group at (512) 834-6670; FAX (512) 834-6681.

For an appointment to take the Bottled and Vended Water Operator certification examination after receiving an approval notice, contact:

Jane Nichols, R.S.
4601 South First
Suite L
Abilene, TX 79605
(325) 795-5865

Gary Fromlath
601 W. Sesame Dr.
Harlingen, TX 78550
(956) 423-0130 x620

Kathy McKeon
1301 South Bowen Rd.
Suite #200
Arlington, TX 76013
(817) 264-4682

Dana Cotton, R.S.
5425 Polk Avenue, Ste J
Houston, TX 77023
(713) 767-3242

Denette Plessala
8407 Wall Street
Austin, TX 78754
(512) 834-6670

Patrick Moore
1109 Kemper
Lubbock, Texas
(806) 744-3577

Deborah Runk, R.S.
1233 Agnes St.
Corpus Christi, TX 78401
(361) 889-3435

Joe Collie, R.S.
622 South Oaks, Suite 8
San Angelo, TX 76903
(915) 659-7850

Sherry Jackson, R.S.
401 E. Franklin Ste 200
El Paso, TX 79901
(915) 834-7712

David Sueltenfuss, R.S.
7430 Louis Pasteur Dr.
San Antonio, TX 78229
(210) 949-2117



MR. ZIPPY'S ICE & WATER MACHINE

OBJECTIVES

The objectives of this manual are to assist operators:

- 1) Identify hazards that are reasonably likely to occur in bottled and vended water
- 2) Understand the processes and equipment that prevent, eliminate, or reduce hazards
- 3) Understand and comply with bottled and vended water regulations

RESPONSIBILITIES AND DUTIES OF OPERATORS

It is the responsibility of the Certified Vended Water Operator to provide water that is produced under good manufacturing practices and that complies with standards of quality and identity.

The duties of vended water operators frequently include:

- .. Supervising equipment maintenance and operation
- .. Supervising plant sanitation
- .. Monitoring processes
- .. Collecting samples
- .. Maintaining and reviewing records
- .. Coordinating corrective actions
- .. Training and supervising employees
- .. Working with regulatory agencies



MR. ZIPPY'S ICE & WATER MACHINE

A. Vended Water Sampling

Bacteriological Quality:

The vended water from each water vending machine shall be analyzed a minimum of once every 90 calendar days by a laboratory acceptable to DSHS. The locations of acceptable laboratories in Texas may be obtained by contacting the DSHS Bureau of Laboratories at (512) 458-7318. The sample shall be submitted in sterilized containers. The sterilized containers may be obtained from your local laboratory.

Sample Results:

There are several testing methods that laboratories use to conduct bacteriology tests on vended water.

Routine industry bacteriology testing: Any method conducted by an approved laboratory that is equivalent to those specified in 21 CFR 165** can be used for routine testing. This includes Colilert, Multiple Tube Fermentation, and Membrane Filtration (there may be others)

If any sample collected is determined to be unsatisfactory for any reason (i.e. coliform positive or unsuitable for analysis):

(1) The operator shall notify the department within 24 hours of receipt of the sample results by facsimile or e-mail.

(2) The water dispensing device shall be cleaned, sanitized and resampled immediately. Until the sample results are known, the machine shall remain out of service

(3) If after being cleaned and sanitized, the vended water is determined to be unsatisfactory, the machine shall remain out of service until the source of the contamination has been located and corrected and a negative sample obtained.

These samples must be tested by either Multiple Tube Fermentation or Membrane Filtration methods. The Manufactured Foods Division WILL NOT accept Colilert or Colilert quanti trays for these follow up samples.



MR. ZIPPY'S ICE & WATER MACHINE

B. Sample Results

The laboratory will report bacteriological sample results as either “Coliforms Found” or “Coliforms Not Found”. A good sample is when coliforms are NOT found. A bad sample is when coliforms ARE found because coliform organisms indicate the water may be contaminated. If coliforms are found, the bottled and vended water operator should initiate corrective action. This usually includes removing contaminated product from distribution, identifying and correcting the cause, and re-sampling. Operators are encouraged to contact the TDH regional office for guidance. Failure to take appropriate corrective action may lead to public notification, recall, or legal remedy.

If a sample is “Unsuitable for Analysis”, the sample is not valid and another sample must be submitted. For a water bottler, this sample should preferably come from the same lot as the original sample. This is why it is a good practice to hold reserve samples of each production until sample results are returned from the laboratory. If available, multiple tube fermentation test methods are less susceptible to interference than the membrane filter test method.

If results for chemical or radiological samples exceed the standards in 21 CFR 165, contact the Public Health Region Office in your area for guidance. A list of all Regional offices is located in Appendix G.

When the microbiological, physical, chemical, or radiological quality of bottled water is below standards, the label shall bear a statement of substandard quality. Bottled water containing a substance at a level considered injurious to health is deemed adulterated regardless of whether the water bears a label statement of substandard quality.

Sample Result Submission to the Department of State Health Services

Samples reported Coliform Positive or Unsuitable for Analysis:

Must be sent to the Foods Group, Policy/Standards/Quality Assurance Unit with 24 hours of receipt from the laboratory either by fax at 512-834-6681 or by email to Feedback.MFD@dshs.state.tx.us



MR. ZIPPY'S ICE & WATER MACHINE

C. Record Keeping

All records required for Bottled and Vended Water facilities must be kept for 2 years and available for review by Department of State Health Services investigators.

Vended Water

*TAC - Texas Administrative Code

<u>Record Type</u>	<u>Rule or Regulation</u>
Certificate of Competency	*TAC 229.88 – A person may not furnish vended water to the public or for distribution to the public unless the processing, bottling, and distribution of the vended water is performed by or under the guidance and control of a bottled and vended water operator who holds a certificate of competency under this chapter.
Cleaning and Maintenance Records	*TAC 229.86(c)(1) – A record of cleaning and maintenance operations shall be kept by the operator for each water dispensing device for a period of two years and be available for inspection upon request.
Sampling Records	*TAC 229.86(c)(2) – The vended water from each water dispensing device shall have a bacteriological analysis conducted a minimum of once every 90 calendar days and if required by the department, shall also be analyzed for other physical, chemical, or microbiological parameters. All records shall maintained for a period of two years. The analysis shall be performed by a laboratory acceptable to the department to perform drinking water analysis, and a copy of the analysis shall be available for inspection. NOTE: See new sample result submission requirements Section 3.5
Written Maintenance Program	*TAC 229.86(c)(3) – Each person operating a water dispensing device shall maintain a written maintenance program. The written maintenance program shall include written servicing instructions for the operator; technical manuals for the machine and water treatment appurtenances involved; and records of service. The written maintenance program shall be available for inspection by the department.



**DEPARTMENT OF STATE HEALTH SERVICES
MANUFACTURED FOODS DIVISION**

**Production, Processing, and Distribution of
Bottled and Vended Drinking Water**

'229.81. General Provisions.

(a) Purpose. These sections establish definitions and standards for the processing and bottling of drinking and vended water. The sections also will supplement "229.181-229.184 of this title (relating to Licensure of Manufacturers of Food and Wholesale Distributors of Food--Including Good Manufacturing Practices) and federal regulations in Title 21, Code of Federal Regulations, Part 165 concerning standards of quality, and Part 129 concerning processing and bottling of bottled drinking water.

(b) Requirements for specific standardized beverages. The department adopts by reference Title 21 Code of Federal Regulations, '165.110 concerning the identity, nomenclature, other label statements and label declarations for both bottled and vended water, except as modified by the Texas Board of Health in '229.85(b) of this title (relating to Labeling and Advertising).

(c) Definitions. The following words and terms, when used in this chapter, shall pertain to both bottled and vended water and shall have the following meanings unless the context clearly indicates otherwise.

(1) Approved source (when used in reference to a plant's product water or operations water)--A source of water and the water there from, whether it be from a spring, artesian well, drilled well, municipal water supply, or any other source, that has been inspected and the water sampled, analyzed, and found to be of a safe and sanitary quality according to applicable laws and regulations of State and local government agencies having jurisdiction. The presence in the plant of current certificates or notifications of approval from the government agency or agencies having jurisdiction constitutes approval of the source and the water supply.

(2) Artesian water--Water from a well tapping a confined aquifer in which the water level stands at some height above the top of the aquifer is "artesian water" or "artesian well water."

(3) Bottled water--Water that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients except that it may optionally contain safe and suitable antimicrobial agents.

(4) Department--Department of State Health Services.

(5) Distilled water--Water which has been produced by a process of distillation and meets the definition of purified water in the United States Pharmacopeia, 23rd revision, January 1, 1995, which the department adopts by reference. (Copies may be obtained from the United States Pharmacopial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852).

(6) Drinking water--All water from the point of the approved source intended for the purpose of human consumption or which may be used in the preparation of foods or beverages.

(7) Fluoridated water--Water containing added fluoride.



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(8) Ground water--Water from a subsurface saturated zone that is under a pressure equal to or greater than atmospheric pressure.

(9) Mineral water--Water containing not less than 250 parts per million (ppm) total dissolved solids (TDS), coming from a source tapped at one or more bore holes or springs, originating from a geologically and physically protected underground water source.

(10) Person--Includes individual, partnership, corporation, or association.

(11) Purified water--Water that has been produced by distillation, deionization, reverse osmosis, or other suitable processes and that meets the definition of "purified water" in the United States Pharmacopoeia, 23rd revision, January 1, 1995, which the department adopts by reference. (Copies may be obtained from the United States Pharmacopial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852).

(12) Sparkling bottled water--Water that after treatment and possible replacement of carbon dioxide, contains the same amount of carbon dioxide that it had at emergence from the source.

(13) Spring water--Water derived from an underground formation from which water flows naturally to the surface of the earth.

(14) Sterile water or sterilized water--Water that meets requirements under "Sterility Tests" in the United States Pharmacopoeia, 23rd revision, January 1, 1995, which the department adopts by reference. (Copies may be obtained from the United States Pharmacopial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852).

(15) Vended water--Vended water is:

(A) water dispensed from any vending machine; or

(B) servings of water dispensed in bulk by any operator or consumer from any water dispensing device.

(16) Vending machine--Any self-service device which upon insertion of a coin, coins, or token, or upon receipt of payment by other means, dispenses servings of water in bulk, without the necessity of refilling the machine between each operation.

(17) Water dispensing device--Any water unit that dispenses water in bulk without the necessity of refilling the machine between operations. This term includes stores that are manned by an operator at all times in which consumers bring containers to be filled by the operator, facilities that are not manned by an operator and where consumers dispense their own water, and vending machines. A water dispensing device may have several dispensing faucets in the case of a store. However, each vending machine is considered a separate water dispensing device.

(18) Well water--Water taken from a hole bored, drilled, or otherwise constructed in the ground which taps the water of an aquifer.

(d) Other requirements for specific standardized beverages.

(1) Artesian water may be collected with the assistance of external force to enhance the natural underground pressure. On request, a bottler or vendor shall demonstrate to the department that the water level stands at some height above the top of the aquifer.



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(2) For bottled water or drinking water, fluoride may be optionally added within the limitations established in 21 Code of Federal Regulations (CFR) Part 165.110(b)(4)(ii). Bottled water may be used as an ingredient in beverages (e.g., diluted juices, flavored bottled waters). It does not include those food ingredients that are declared in ingredient labeling as "water," "carbonated water," "disinfected water," "filtered water," "seltzer water," "soda water," "sparkling water," and "tonic water." The processing and bottling of bottled water shall comply with applicable regulations in 21 CFR, Part 129.

(3) For fluoridated water, the total fluoride content levels cannot exceed levels contained in 21 CFR 165.110(b)(4)(ii).

(4) Ground water must not be under the direct influence of surface water as defined in 40 CFR 141.2.

(5) Mineral water shall be distinguished from other types of water by its constant level and relative proportions of minerals and trace elements at the point of emergence from the source, due account being taken of the cycles of natural fluctuations. No minerals may be added to this water.

(6) Water processed by demineralization that meets the purified water definition may alternatively be called "demineralized water." Alternatively, water that has been processed by deionization may be called "deionized water," and water processed by distillation may be called "distilled water," and water that has been processed by reverse osmosis may be called "reverse osmosis water." Also, if the water has been processed by either of the previously listed methods the water may be called "(blank) drinking water," with the blank being filled in with one of the defined terms describing the method of processing.

(7) Spring water shall be collected only at the spring or through a bore hole tapping the underground formation feeding the spring. There shall be a natural force causing the water to flow to the surface through a natural orifice. The location of the spring shall be identified. Spring water collected with the use of an external force shall be from the same underground stratum as the spring, as shown be a measurable hydraulic connection using a hydrogeologically valid method between the bore hole and the natural spring, and shall have all the physical properties, before treatment, and be of the same composition and quality, as the water that flows naturally to the surface of the earth. If spring water is collected with the use of an external force, water must continue to flow naturally to the surface of the earth through the spring's natural orifice.

'229.82. Sampling. Bottled water must be sampled in accordance with the compliance procedures of Title 21, Code of Federal Regulations, Part 129. All required analyses must be performed by a laboratory acceptable to the department, certified by the U.S. Environmental Protection Agency (EPA) or certified by the primacy enforcement authority in any state which has been granted primacy by EPA, or certified by a third party organization acceptable to a primacy state.

'229.83. Water Hauling.

(a) Water that is distributed by truck or trailer in lieu of distribution piping, shall comply with the Health and Safety Code, Chapter 431, Subchapter C, concerning drinking water standards and rules adopted thereunder by the Texas Commission on Environmental Quality, 30 Texas Administrative Code (TAC), §§290.44(i) (relating to Water Distribution).

(b) A person receiving water transported by truck or trailer shall test and record the chlorine



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residual for compliance with the required minimum chlorine residual (30 TAC, §290.44(i)(2)(K)). (c) Operational records detailing the amount of water received, the source of the water, and the chlorine residual readings, shall be maintained by the person receiving water that has been transported by truck or trailer. The records shall be kept at the receiving facility for a period of two years and be available for inspection upon request.

'229.84. Standards for Microbiological Control. Bottled and vended water production including transporting, processing, packaging, and storage, shall be conducted under such standards and controls as are necessary to minimize the potential for microbiological contamination of the finished product. These standards and controls shall include the following.

(1) Bottled and vended water shall be subject to effective germicidal treatment by ozonation, chlorination, exposure to ultraviolet light, or other equivalent disinfection approved by the department.

(2) Bottled and vended water shall not be transported or stored in bulk tanks or processed through equipment or lines used for any non-food product.

(3) In order to minimize the potential for microbiological contamination of the finished product, non-carbonated bottled water shall not be transported, stored, processed, or bottled in or through lines through which has passed milk, fruit juice, or other food products likely to contribute nutrients for microbial growth. However, multifold fillers may be used for the filling of bottled water as long as the fillers are properly cleaned and sanitized prior to the bottling of water, and provided that they are in compliance with Title 21, Code of Federal Regulations, '129.80. Any parts which are not designed to be cleaned-in-place shall be disassembled and removed, and shall be cleaned and sanitized prior to reassembly.

'229.85. Labeling and Advertising.

(a) Claims of medicinal and health-giving properties shall not be placed on labels and references shall not be made to bacterial purity or to laboratory examinations which may have been made by department laboratories.

(b) The label must state the source of all artesian water, spring water, mineral water, well water, or drinking water sold. Source refers to the point of origin. Examples: Brook Hollow Spring Water from Buck Hollow, Arkansas; drinking water obtained from Austin municipal water supply, Austin, Texas; well water from Bandera, Texas. Except that water processed by distillation, deionization, reverse osmosis, or other suitable process that alters the water's physical properties enabling it to meet the definition of purified as defined in '229.81(c)(11) of this title (relating to General Provisions) is not required to state the source. This exception only applies if all the water used in the finished product is processed to meet the definition of purified.

(c) Other label statements.

(1) If the Total Dissolved Solids (TDS) content of Mineral water is below 500 ppm, or if it is greater than 1,500 ppm, the statement "low mineral content" or the statement "high mineral content," respectively, shall appear on the principal display panel following the statement of identity in type size at least one-half the size of the statement of identity but in no case less than one-sixteenth of an inch. If the TDS of mineral water is between 500 and 1,500 ppm, no additional statement need appear.



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(2) When the label or labeling of a bottled water product states or implies (e.g., through label statements or vignettes with reference to infants) that the bottled water is for use in feeding infants, and the product is not commercially sterile, the product label shall bear conspicuously and on the principal display panel the statement "Not sterile. Use as directed by physician or by labeling directions for use of infant formula."

'229.86. Processing of Vended Water.

(a) Water dispensing device requirements are as follows.

(1) Any device from which any operator or consumer dispenses servings of water in bulk shall comply with Title 21, Code of Federal Regulations (CFR), §129.40, Equipment and Procedures, and §165.110, Requirements for Specific Standardized Beverages. Except §129.40, the provision pertaining to the cleaning, sanitizing, filling, and capping or sealing of containers shall not apply to containers furnished by the consumer.

(2) Water dispensing devices shall:

(A) be designed and constructed to permit thorough cleaning, sanitization, and maintenance of all exterior and interior surfaces and component parts;

(B) have all parts and surfaces that come into contact with the water constructed of corrosion-resistant, and nonabsorbent material acceptable to the department and capable of withstanding repeated cleaning and sanitizing treatment;

(C) be designed so all treatment of the water by distillation, ion-exchange, filtration, ultraviolet light, reverse osmosis, mineral addition, or any other acceptable process is done in an effective manner;

(D) have an effective system of collection and handling of drip, spillage, and overflow of water;

(E) have a backflow prevention device approved by the department or local authority for all connections with the water supply;

(F) disinfect water by ultraviolet light or other method approved by the department immediately prior to delivery into the customer's container;

(G) comply with the American Water Works Association (AWWA) specifications for granular activated carbon if used in the treatment of potable water (AWWA B604-74);

(H) be maintained in a clean and sanitary condition; and

(I) be free from dirt and vermin.

(b) Vending machines, in addition to requirements in subsection (a) of this section, shall:

(1) have a recessed or guarded corrosion-resistant dispensing spout;

(2) be equipped with monitoring devices designed to shut down operation of the machine when the disinfection unit fails to function;

(3) be equipped with a self-closing, tight-fitting door on the vending compartment;



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(4) be located in an area that can be maintained in clean condition and in a manner that avoids insect and rodent harborage; and

(5) display in a position clearly visible to customers, the following information:

(A) the name and address of the operator;

(B) a statement to the effect that the water is obtained from an approved source; and

(C) a local or toll-free telephone number that may be called for further information, service, or complaints.

(c) Service, sampling and records shall meet the following requirements.

(1) All parts and surfaces of the water dispensing device shall be maintained in clean condition by the vended water operator. The dispensing chamber and dispensing nozzle shall be cleaned and sanitized each time the device is serviced; whereas, all surfaces in contact with the vended water shall be maintained as a deposit free, visibly clean system. A record of cleaning and maintenance operations shall be kept by the operator for each water dispensing device for a period of two years and be available for inspection upon request.

(2) The vended water from each water dispensing device shall have a bacteriological analysis conducted a minimum of once every 90 calendar days and if required by the department, shall also be analyzed for other physical, chemical, or microbiological parameters.

(A) Sample results reported as coliform positive or unsuitable for analysis shall be submitted by facsimile to the department within 24 hours of receipt of the sample results from a laboratory acceptable to the department. The person shall submit the results to the Foods Group, Policy/Standards/Quality Assurance Unit by facsimile at (512) 834-6681, or by e-mail at Feedback.MFD@dshs.state.tx.us.

(B) The person operating a water dispensing device shall maintain the original of all sample results for a period of two years. The drinking water analyses shall be performed by a laboratory acceptable to the department. A copy of the analysis shall be available for review and copying during inspections.

(3) Each person operating a water dispensing device shall maintain a written maintenance program. The written maintenance program shall include written servicing instructions for the operator; technical manuals for the machine and water treatment appurtenances involved; and records of service. The written maintenance program shall be available for inspection by the department.

(4) The vended water operator shall clean and perform servicing of the water vending machine a minimum of once per month.

(A) More frequent cleaning and servicing may be required to maintain sanitation or as required by the manufacturer of the equipment.

(B) Sampling results of positive coliform or unsuitable for analysis are indications that servicing of machine may be required at a higher frequency than once per month as detailed in paragraph (5) of this subsection.



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(5) Methods of testing for maximum contaminant levels (MCLs) for microbiological contaminants in water dispensed from water dispensing devices shall be performed as follows.

(A) If any sample collected from a water dispensing device is determined to be unsatisfactory for any reason (i.e. coliform positive or unsuitable for analysis), the operator shall notify the department in accordance with paragraph (2)(A) of this subsection; and

(B) The water dispensing device shall be cleaned, sanitized and resampled immediately. Until the sample results are known the device shall remain out of service; and

(C) If after being cleaned and sanitized, the vended water is determined to be unsatisfactory, the machine shall remain out of service until the source of the contamination has been located and corrected and a negative sample obtained. The negative sample result shall be maintained in accordance with paragraph (2)(B) of this subsection.

'229.87. Requirements for Approved Sources. Sources in Texas shall comply with the following requirements.

(1) Public water systems. Sources in Texas which are public water systems shall comply with the Texas Health and Safety Code, Chapter 341, Subchapter C, concerning drinking water standards and rules adopted by the Texas Commission on Environmental Quality, at 30 Texas Administrative Code (TAC) "290.101-290.121 (relating to Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Supply Systems), and "290.38-290.47 (relating to Rules and Regulations for Public Water Systems).

(2) Other sources. Any other sources in Texas shall comply with 30 TAC "290.101-290.121 concerning drinking water standards, and 30 TAC "290.38-290.43 and 290.46 concerning rules and regulations for public water systems, except where variances are permitted in '229.81 of this title (relating to General Provisions).

(3) Compliance with these sections is required as if the source were a public water system.

'229.88. Certificates of Competency. A person may not furnish bottled or vended water to the public or for distribution to the public unless the bottled or vended water operator holds a certificate under this chapter.

(1) A person may not furnish bottled water to the public or for distribution to the public unless the processing, bottling and distribution of the bottled water is performed by or under the full-time supervision of a bottled and vended water operator who holds a certificate under this chapter.

(2) A person may not furnish vended water to the public or for distribution to the public unless the processing, bottling, and distribution of the vended water is performed by or under the guidance and control of a bottled and vended water operator who holds a certificate of competency under this chapter. '229.89. Examination.

(a) After payment of the required fee, an applicant shall pass a written examination prescribed by the department. To pass the examination for a certificate, the applicant must achieve a score of 70% or more on the examination.

(1) The examination must be taken within 90 days of the date the department receives the fee. If the 90-day time frame lapses without the applicant taking the examination, the applicant must submit a new application and fee in order to take the examination.

(2) If the applicant fails the examination, the applicant may repeat the examination 30 days after the failed examination. The applicant must reapply and pay a reapplication fee of \$50.



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(b) An instructor may administer the department=s examination provided the instructor signs and complies with the department=s security agreement.

'229.90. Certification and Renewal Fees. The fees for certification shall be established as follows.

(a) This subsection applies to all new and renewal applications.

(1) Certification fee--\$100.

(2) Renewal fee--\$100.

(3) A certificate can be obtained by submitting an application with the \$100 certification fee and receiving a passing score on the examination. Certificates can be renewed by submitting a completed application with the \$100 renewal fee. Certificates are valid for two years from the date of issuance or renewal. Certificates expire two years from the date of issuance. Fees will not be prorated. If the department has not received a completed application for renewal within 60 days following the expiration date, the certificate holder shall submit a new application and retake the examination.

(b) An applicant or holder of a certificate shall pay the required fee before taking the examination or receiving a certificate.

(c) All fees shall be made payable to the Department of State Health Services and are not refundable.

(d) All applicants shall be in compliance with §1.301 of this title (relating to Suspension of License for Failure to Pay Child Support).

'229.91. Suspension, Denial, or Revocation of Certificate.

(a) Basis for suspension. The certificate shall be suspended if the operator practices fraud or deceit against the department or the public; or fails to use reasonable care, judgment or application of knowledge in the performance of their duties.

(b) Basis for denial. The certificate shall be denied if it is found:

(1) that the application is incomplete or false;

(2) that the operator obtained the certificate through fraud or deceit; or

(3) that the operator practiced fraud or deceit; or failed to use reasonable care, judgment or application of knowledge in the performance of their duties.

(c) Basis for revocation. The certificate shall be revoked if it is found:

(1) that the certificate was issued in error; or

(2) that the operator obtained the certificate through fraud, deceit or through the submission of incorrect data on the application; or

(3) that the operator practiced fraud and deceit, or failed to use reasonable care, judgment or



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application of knowledge in the performance of their duties.

(d) Examination of charges. When the department has reason to believe that charges against an operator may be valid, the department shall notify the operator by personal service or certified mail at his last known address:

(1) of the charges;

(2) that it intends to conduct an examination of the charges; and

(3) that the operator may request a formal hearing.

(e) Formal hearings. The department shall conduct hearings in accordance with the Administrative Procedure Act, Texas Government Code "2001.051 - 2001.902; and the department=s formal hearing procedures in "1.21, 1.23, 1.25, and 1.27 of this title (relating to Formal Hearing Procedures).



MR. ZIPPY'S ICE & WATER MACHINE



Mr. Zippy's Express Ice and Water Limited Warranty

The Manufacturer warrants any component or part of the Mr. Zippy's Express Ice and Water equipment to be free from defects in material and workmanship for a period of one year from date of shipment, with the exception of such parts as are commonly recognized to be subject to wear in normal usage, such as decals, which are warranted for ninety (90) days. Electrical motors shall be covered under manufacturer's warranty for a period of one year, unless otherwise specified. Jim Coleman Company electronic controls, such as timers, coin acceptors and computer monitoring equipment, carry a one-year warranty. Claims under this warranty must be asserted in writing within the one-year period covered by this warranty.

The Obligation of Jim Coleman Company and the rights and remedies of the owner/user under this warranty are exclusively limited to, the repair or replacement of parts or assemblies that in Jim Coleman Company opinion are defective within one year after original date of installation. This warranty does not include any labor warranty.

Any component or part alleged to be defective in material or workmanship shall, at option of Manufacturer, be returned with shipping cost prepaid. All parts must be returned within 15 days to be eligible for parts warranty coverage. If, upon examination, such component or part is found to be defective in workmanship or materials, Manufacturer, at its option, will either repair or replace such component or part, and shall ship such repaired or replaced component or parts F.O.B. factory, Houston, Texas. Manufacturer reserves the right to use "Like New" or Remanufactured parts in repair of warranty items that exceed 6 months in service. The cost of such replacement or repair shall be the exclusive remedy for any breach of any warranty and Manufacturer shall not be liable to any person for consequential damages for injury or commercial loss resulting from any breach of any warranty. This warrant does not cover any labor installation cost, either with respect to the original equipment, the repaired or replaced component, or part defective in workmanship or materials. Jim Coleman Company does not warrant loss of income should there be any during such time repairs are being made.

This warranty does not apply to components or parts which have been misused, altered, neglected, not installed, adjusted, maintained, or used in accordance with applicable codes and ordinances and in accordance with Manufacturer's recommendations as to such factors.

This warranty does not include Parts or Labor for components failure or other damage resulting from:

- External electrical power failure or miswiring to product for any reason.
- Lightning strikes causing damage to electronic or electrical components.
- Incoming voltage that exceeds the manufacturer's recommendation of 240 v.
- Incoming voltage that is too low and does not meet the minimum recommendation of 208v.

World Class Manufacturing of Car Wash Equipment

5842 West 34th Street • Houston, TX 77092

800-999-9878 • 713-683-9878 • Fax: 713-683-9624

info@jcolemanco.com • www.jcolemanco.com • www.hannacarwash.com

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The Manitowoc ice makers are covered under the warranty from Manitowoc. Manitowoc offers a separate warranty on the ice makers please refer to that warranty for information regarding the ice makers and condensers.

Jim Coleman Company is not responsible for the operation of the unit and it meeting the local or state health codes or standards. Jim Coleman Company has designed the unit to meet the federal guidelines but careful testing and monitoring by the owner operator is required to ensure clean bacteria free water and/or ice is being delivered to the customer.

Compliance with any local governmental laws or regulations relating to the location, use or operation of the equipment, or its use in conjunction with other equipment, shall be the responsibility of the purchaser. The rights and obligations of the parties shall be governed by the State of Texas.

LIMITATION OF LIABILITY AND OTHER WARRANTIES

Jim Coleman Company assumes no liability for misuse or inadequate maintenance of this product. In no event shall the owner/user be entitled to recover incidental or consequential damages, including but not limited to, damages for inconvenience, loss of profits, water damage or any other commercial loss.

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, OF EITHER MANUFACTURER OR SELLER, AND MAKES NO WARRANTY AGAINST INFRINGEMENT OF THE LIKE, MAKES NO WARRANTY OF MERCHANTABILITY, MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTY ARISING FROM COURSE OF DEALING OR USAGE OF TRADE.

World Class Manufacturing of Car Wash Equipment

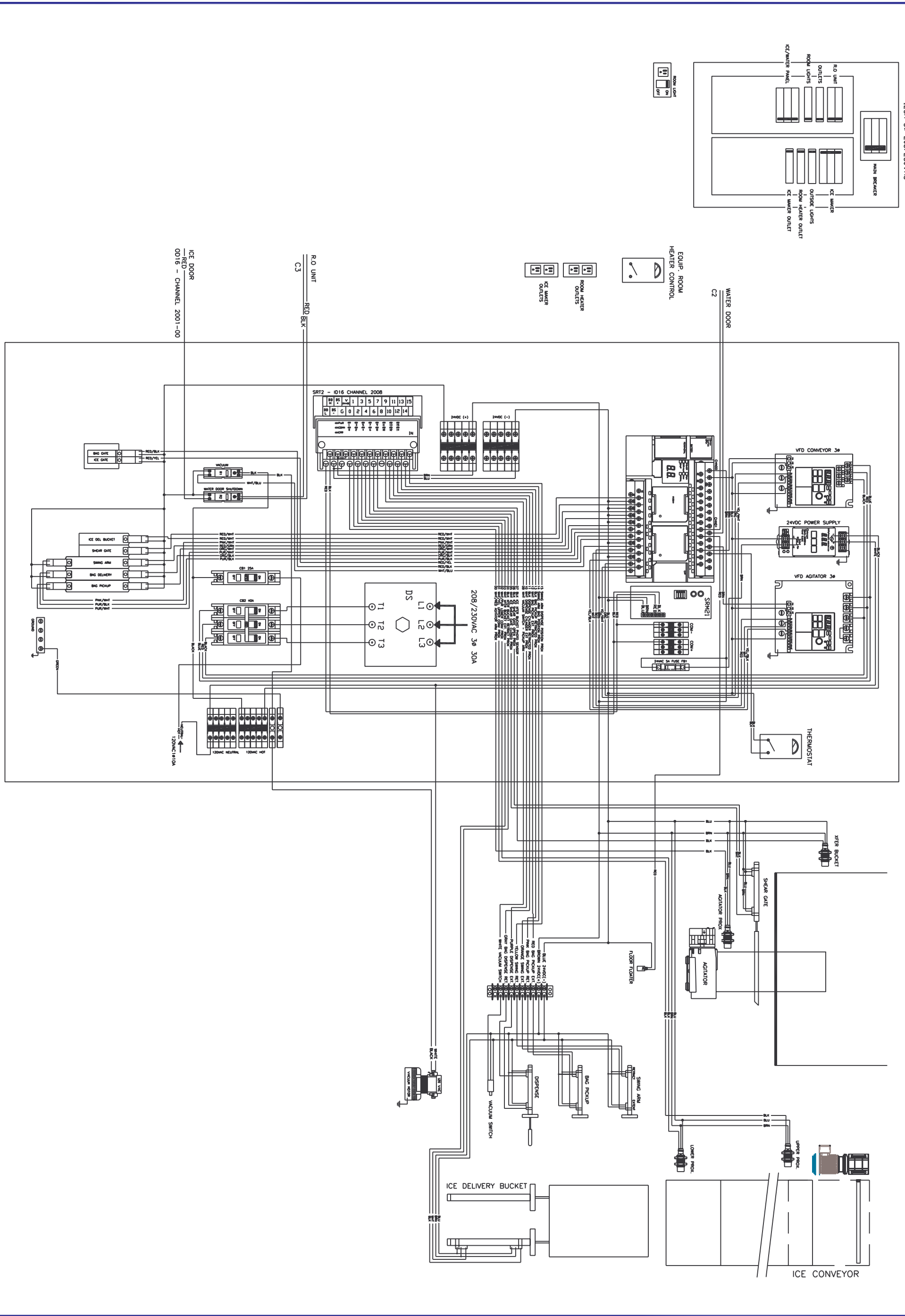
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ICE & WATER ELECTRICAL CONTROL PANEL



CIRCUIT BREAKER PANEL
125A 3Ø 208/230VAC

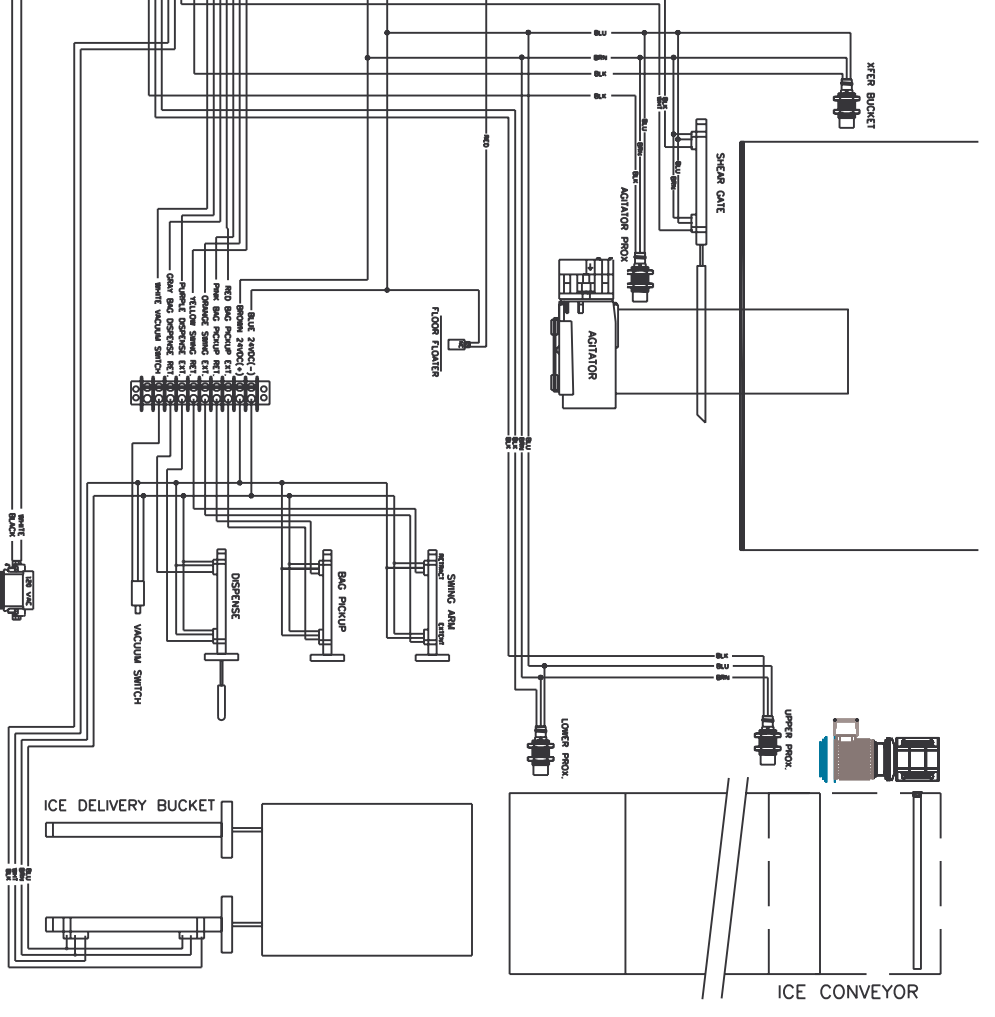
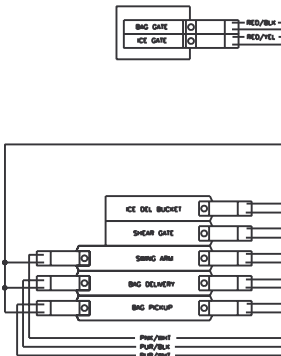
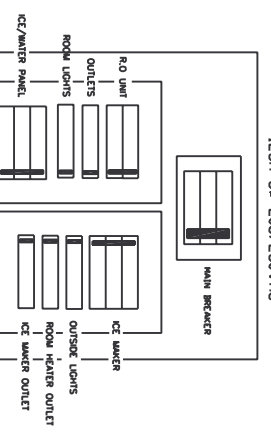
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RED - CHANNEL 2001-00

R.O. UNIT
RED BLK
C3

WATER DOOR
C2

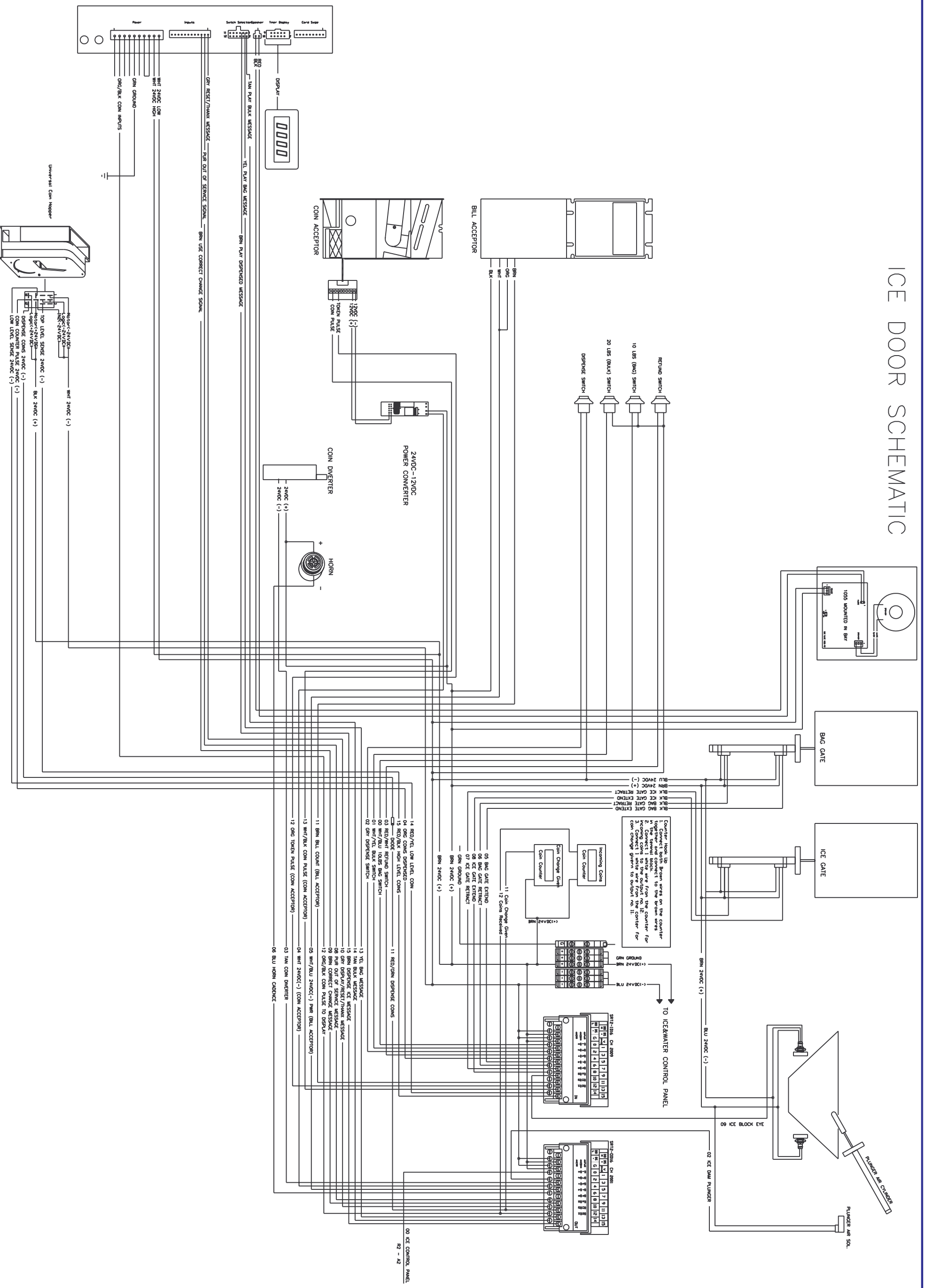
EQUIP. ROOM
HEATER CONTROL

ROOM WATER
OUTLETS
ICE WATER
OUTLETS



ENGINEER SEAL OR APPROVAL:	OWNER: JIM COLEMAN COMPANY 5842 WEST 34TH ST HOUSTON, TX 77092				
	SHEET NAME: MR ZIPPY Control Panel SCHEMATIC				
	SCALE: N/A	DATE: 03/15/08	DRAWN BY: BKEITH		APPROVED BY: BKEITH
	DRAWING AKD: N/A	EQUIPMENT AKD: N/A	FILE NAME: T:\BLOCK\ELECTRICAL\ZIPPY.RD		
SHEET: ZR.D.A	World Class Manufacturing in Car Wash Equipment			HOME OFFICE: 5842 WEST 34th STREET HOUSTON, TEXAS 77092 PH: 1-800-959-9878 FAX: 713-683-9624 www.jcolemanco.com	

ICE DOOR SCHEMATIC



JIM COLEMAN COMPANY
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HOUSTON, TEXAS 77092
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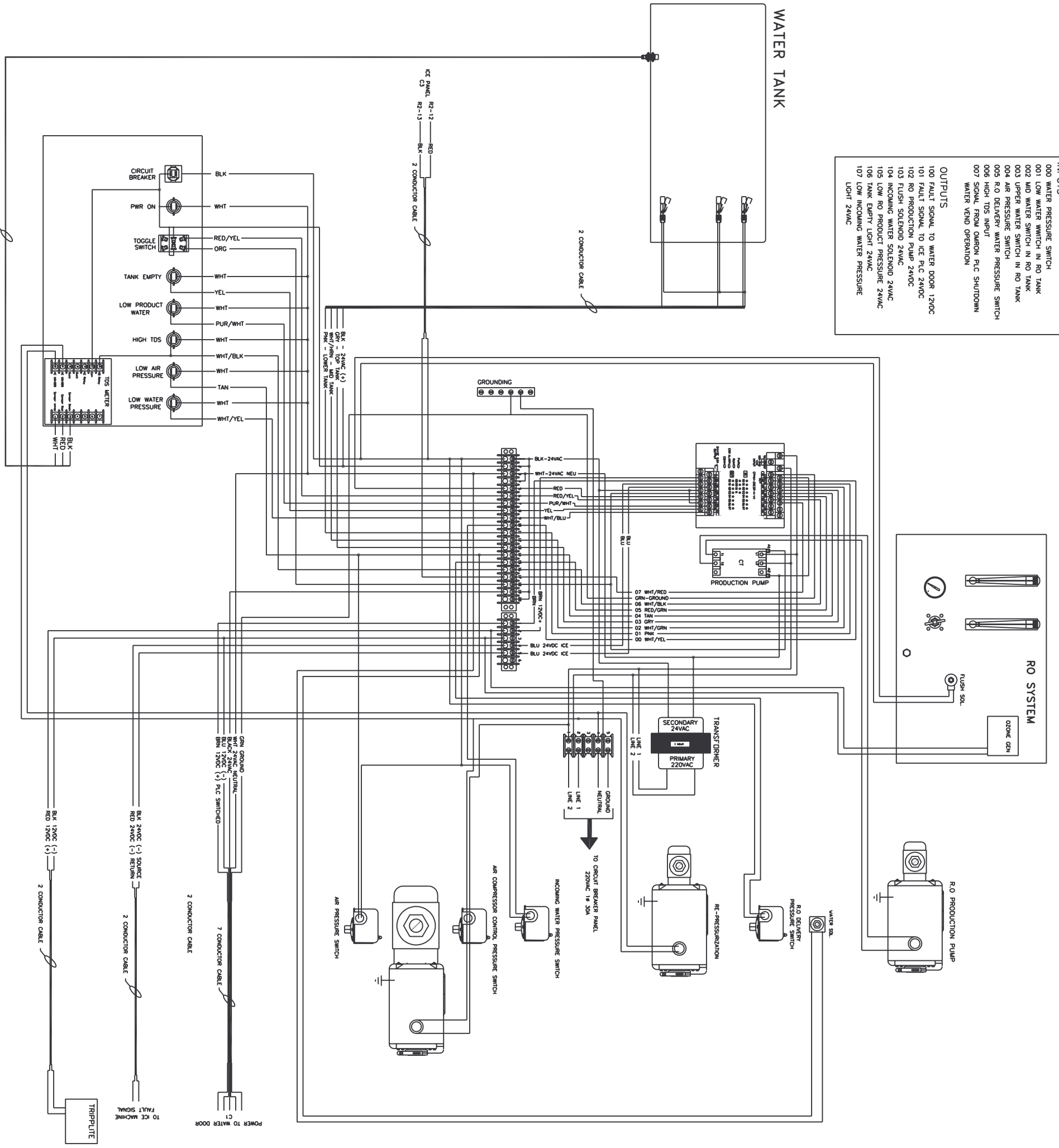
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SHEET NAME: MR ZIPPY ICE DOOR SCHEMATIC			
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REVISIONS	ENGINEER SEAL OR APPROVAL:

SHEET:
ZRD.A

SINGLE R.O STAND

- INPUTS**
- 000 WATER PRESSURE SWITCH
 - 001 LOW WATER SWITCH IN RO TANK
 - 002 MID WATER SWITCH IN RO TANK
 - 003 UPPER WATER SWITCH IN RO TANK
 - 004 AIR PRESSURE SWITCH
 - 005 R.O DELIVERY WATER PRESSURE SWITCH
 - 006 HIGH TDS INPUT
 - 007 SIGNAL FROM OMRON PLC SHUTDOWN WATER VEND OPERATION
- OUTPUTS**
- 100 FAULT SIGNAL TO WATER DOOR 120VAC
 - 101 FAULT SIGNAL TO ICE PLC 24VDC
 - 102 RO PRODUCTION PUMP 24VDC
 - 103 FLUSH SOLENOID 24VAC
 - 104 INCOMING WATER SOLENOID 24VAC
 - 105 LOW RO PRODUCT PRESSURE 24VAC
 - 106 TANK EMPTY LIGHT 24VAC
 - 107 LOW INCOMING WATER PRESSURE LIGHT 24VAC

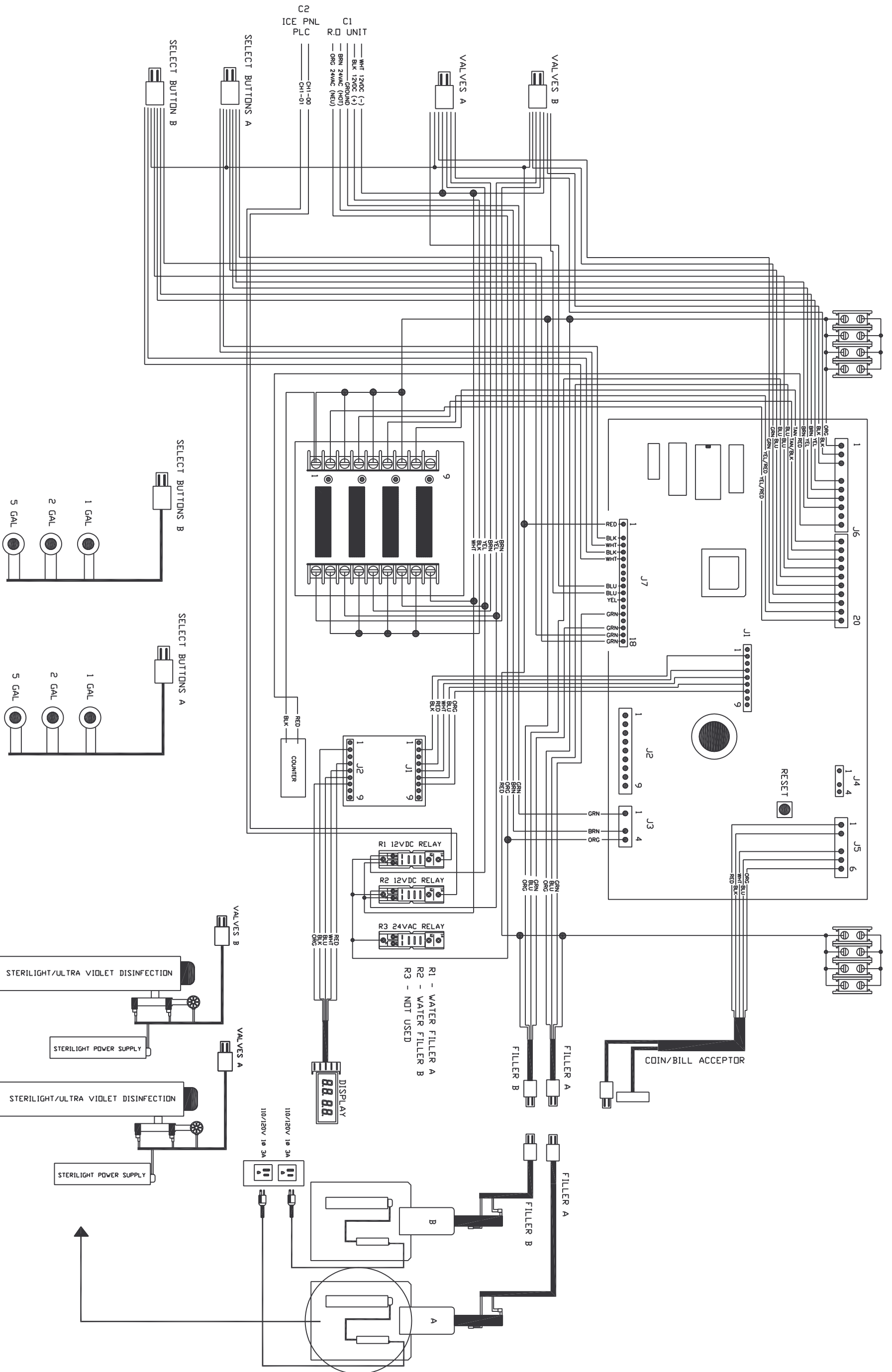


SHEET:	ZRD.A	ENGINEER SEAL OR APPROVAL:	OWNER:	JIM COLEMAN COMPANY 5842 WEST 34TH ST HOUSTON, TX 77092		
			REVISIONS	SHEET NAME:	MR ZIPPY R.O SCHEMATIC	
			SCALE:	DATE:	DRAWN BY:	APPROVED BY:
			N/A	03/15/08	BKEITH	BKEITH
			DRAWING AKD:	EQUIPMENT AKD:	FILE NAME:	
			N/A	N/A	T:\BLOCK\ELECTRICAL\ZIPPY\R.D	

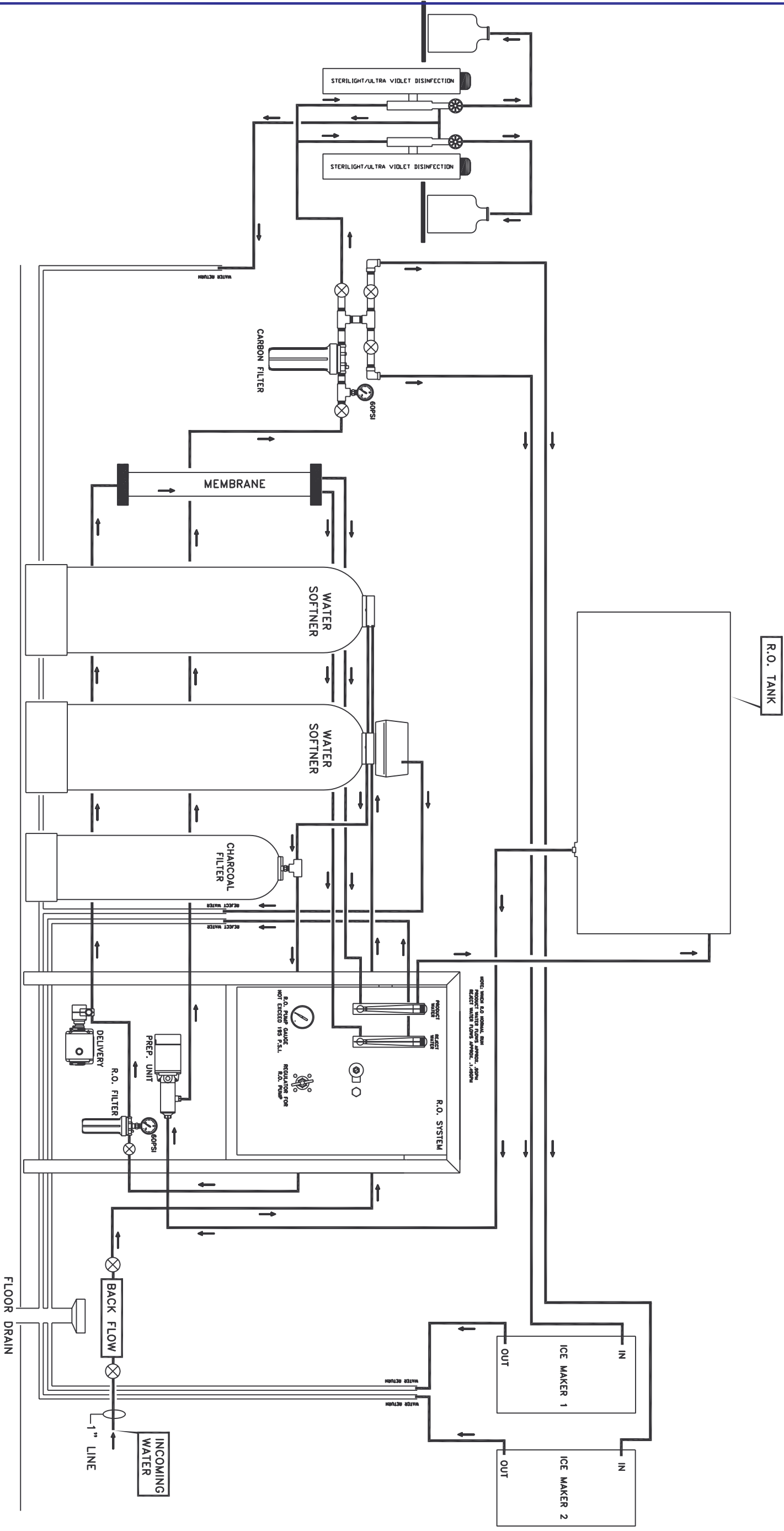
World Class Manufacturing in Car Wash Equipment

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 HOUSTON, TEXAS 77092
 PH: 1-800-999-9878 FAX: 713-683-9624
 www.jcolemanco.com

WATER DOOR SCHEMATIC



SHEET:	ZRD.A		OWNER: JIM COLEMAN COMPANY 5842 WEST 34TH ST HOUSTON, TX 77092			
			SHEET NAME: MR ZIPPY WATER DOOR SCHEMATIC			
			SCALE: N/A	DATE: 03/15/08	DRAWN BY: BKEITH	APPROVED BY: BKEITH
			DRAWING AKD: N/A	EQUIPMENT AKD: N/A	FILE NAME: T:\BLOCK\ELECTRICAL\ZIPPY.RD	
ENGINEER SEAL OR APPROVAL:		<p>World Class Manufacturing in Car Wash Equipment</p> <p>HOME OFFICE: 5842 WEST 34th STREET HOUSTON, TEXAS 77092 PH: 1-800-999-9878 FAX: 713-683-9624 www.jcolemanco.com</p>				



SHEET: ZIP.A	OWNER: JIM COLEMAN COMPANY 5842 WEST 34TH ST HOUSTON, TX 77092	SHEET NAME: MR.ZIPPY ICE PLUMBING SYSTEM		
	SCALE: N/A	DATE: 04/30/08	DRAWN BY: BKEITH	APPROVED BY: BKEITH
	DRAWING AKD: N/A	EQUIPMENT AKD: N/A	FILE NAME: T:\BLOCK\ELECTRICAL\ZIPPY\ICECONTROL	
	ENGINEER SEAL OR APPROVAL:			



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