

Manual for Operation & Maintenance Of Manganese Greensand Iron Filter



for Model:
W-MFI1665GET

Model pictured on right is shown with optional Stainless Steel Tank Jacket



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Panel Operation Quick Reference Guide

Manual Regeneration (Backwash)

Note: . If you need to initiate a manual regeneration, either immediately, or tonight at the preprogrammed time (typically 2 a.m.), complete the following steps.

Arrow will point to Regen if a regeneration is expected "Tonight".



For Immediate Regeneration:

Press and hold and simultaneously until valve motor starts (typically 3 seconds).

For Regeneration Tonight:

Press and release and simultaneously (notice that arrow points to Regen).

Error Message

If the display shows "E1", "E2", "E3", or "E4" (for error), check the trouble shooting section to identify the error.

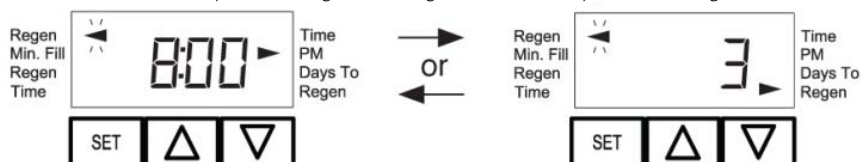


General Operation

When the system is operating one of two displays will be shown: time of day or days until the next regeneration.

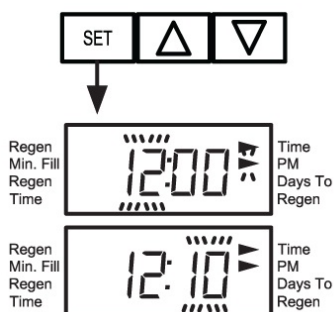
Pressing or button will toggle between the two choices.

Arrow will point to Regen if a regeneration is expected "Tonight".



To Set Time of Day

In the event of a prolonged power outage, time of day flashes, indicating that it needs to be reset. All other information will be stored in memory no matter how long the power outage. Please complete the steps as shown to the right. To access this mode, press "SET".



1. Accessed by pressing SET for approximately 3 seconds.
2. Adjust hour with or . With 60 Hz line frequency detection on power-up, timekeeping is 12 hour with PM indicator. With 50 Hz line frequency detection on power-up, timekeeping is 24 hour without the PM indicator. Press SET to go to the next step.
3. Adjust minutes with or .
4. Press SET to complete and return to normal operation.



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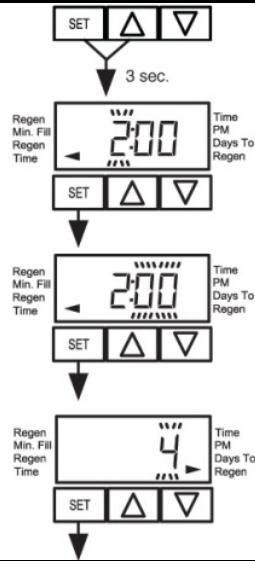
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
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To Set Time of Regeneration and Days Between Regeneration

For initial set-up or to make adjustments, please complete the steps as shown. Access this mode by pressing **SET** and  for approximately 3 seconds. The number of days between regenerations may need to be varied based on usage and water conditions.

(This step will not appear if the 7-day clock option is selected.)



1. Accessed by pressing **SET** and  simultaneously for about 3 seconds.
2. Set Regeneration Time Hour. Set the time for regeneration to start. Press **SET** to go to the next step.
3. Set Regeneration Time Minutes. Press **SET** to go to the next step.
4. Set number of Days between regeneration cycles.
5. Press **SET** to complete and return to normal operation.



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Design Basis & Specifications

Table 1 – Design Basis Specifications

Model No. *	Flow Rate** (GPM)	Backwash Flow** (GPM)	Volume of Media (ft ³)		Resin Tank (Dia" H")	Valve Size	In/Out Conn.
			Manganese Greensand (Only)	Total (Incl. Underbed)			
W-MFI1665GET	7	15	3.5	4.0	16 65	1"	1"

* Filters are available with USA or European style plugs and voltages. The voltage code is added to the end of the model.

W-MFI1665GET-US = 120V AC/60Hz with USA cord & plug.

W-MFI1665GET-EU = 220V AC with European cord & plug (EU plug is removable to convert into universal 220v cord)

** 5 gpm per sq. ft. of media is the best design condition for filtration. Backwash flow rate based on 25 psi pressure drop.

Operating Limits: Vessel rated at 150 psi max. operating pressure, 120 F max. operating temperature.

General Information and Safety

⚠ ADDITIONAL EQUIPMENT REQUIRED FOR PROPER OPERATION: Manganese greensand filters require KMnO₄ (Potassium Permanganate) to be injected into the feed water stream in order to regenerate the media bed. This is usually done with the use of a chemical injection system including a chemical tank, mixer and metering pump. This equipment is sold separately and should be designed and sized for each specific installation. The injection method and concentration of potassium permanganate required depends on the concentration of iron and manganese in the water as well as other factors. Please contact Applied Membranes, Inc. for assistance in sizing and purchasing the appropriate chemical injection system.

DISCLAIMER: The information contained in this document is subject to change without notice. Applied Membranes, Inc. shall not be liable for technical or editorial omissions made herein; nor for incidental or consequential damages resulting from the furnishing, performance, or use of this material.

READ THIS MANUAL: Prior to operating or servicing this unit, this manual must be read and understood. If anything is not clear, call for assistance before proceeding. Keep this and other associated manuals for future reference and for new operators or qualified service personnel.

⚠ CAUTION: Never let the filter freeze. Freezing can damage the media tank.

⚠ USE PROPER POWER CONNECTION methods to satisfy local electrical codes. **SHOCK HAZARD:** Connect this unit to a properly grounded connection in accordance with the National Electrical Code. **DO NOT**, under any circumstances, remove the ground wire or ground prong from any power plug. Do not use extension cords or an adapter without proper consideration.

⚠ SERVICE WARNING: To prevent electrical shock, disconnect power to the system prior to servicing.

⚠ WARNING: Do not make any alteration or modification in the wiring or plumbing of the system. This can result in damage to the system and cause injury to operators or users.

⚠ WARNING: Flush the system for at least 30 minutes before use to remove all chemicals present.

Installation

Unpack the filter. Inspect assemblies for damage (cracked couplings, broken or split pipes, loose straps, etc.).

Location

Select a location for the filter with adequate clearance from walls and other equipment to allow access on all sides of the tank.

The unit must be located near a drain able to accommodate the backwash flow rate of your unit (see the table on page 4). This is in addition to any other equipment sharing the drain.

A grounded power supply of the appropriate voltage and a local disconnect switch is required.



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Situate downstream from the potassium permanganate injection system (see note in general information and safety).

⚠ Caution: The unit must not be located near any corrosive chemicals, or in an area where the temperature may exceed 113 F (45 C).

⚠ Warning: The power supply must be properly grounded to avoid injury from electrical shock.

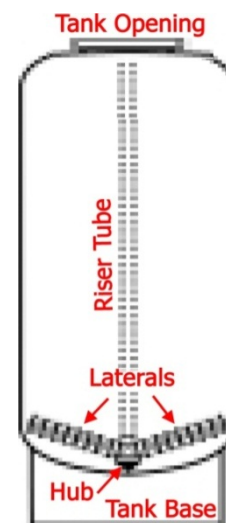
Loading the Media

If media shipped unloaded (packaged separately outside of the tank) then continue with the loading instructions. If the filter was shipped loaded, please skip to plumbing.

1. Place tank on a level, solid surface in the correct position for installation. Lift the riser tube from the tank, keeping the attached hub within the opening of the tank. Within the tank, assemble the laterals onto the hub, twisting each lateral into the hub to lock securely. Gently lower the assembly to the bottom of the tank. The top of the riser tube should be about level with the top of the tank.
2. The “riser tube” inside the media/resin tank delivers treated water to your control valve. It will need to be temporarily covered with tape on the top end to prevent anything from falling down inside the tube during loading.
3. Step back and look at the tank to make sure it is standing straight, and not tilted. The black base on the bottom of the tank should also be straightened before filling the tank. If your tank is tilted, simply pick up the tank 2-3 inches off the floor and drop it gently (but firmly) down, favoring the side of the base that needs to be adjusted.
4. Before loading the media, fill the tank with 2-3 feet of water (or 1/3 full, depending on the tank size), to soften the fall of the rocks and prevent damage to the distributor. To load the media, use a funnel in the top of the media tank with the riser tube still inside. Make sure the riser tube is covered with tape to keep media out.
5. Scoop the media into the funnel, slowly letting it fall down inside the media tank around the riser tube. Fill the tank with the media provided, pouring the media in the following order (1st will end up on the bottom of the tank, last will end up at the top of the tank, etc.). *Note: The tank will be approximately 1/2 - 2/3 full after loading is complete. Refer to “Table 2 – Resin Quantities per Model” for the proper quantities of each component.*

- I. Gravel – YMGRVL11618 – 0.5 CF (50 lbs) per bag
- II. Manganese Greensand – YMMNGS 1 CF (85 lbs) per bag

6. Remove the funnel from the top of the tank, and the tape from the end of the riser tube. Brush any loose media off the top opening of the tank.
7. The bottom of the control valve has an opening with O-rings inside; lubricate the O-ring with a non-petroleum based lubricant. Position the valve over the top of the media tank, making sure the top of the riser tube inserts inside the opening in the bottom of the valve.
8. Screw the valve down into the media tank. Another person should hold the tank as the valve is being snugly tightened onto the tank. **Do not over-tighten.** Tighten until snug, tighten a bit more, then STOP. The large o-ring will seal itself.



Media Quantity per Model

Table 2 – Media Quantity per Model

Model No.* (-US or -EU)	Gravel 1/16 x 1/8 I	Manganese Greensand II
W-MFI1665GET	0.5 CF (50 lbs)	3.5 CF (298 lbs)



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Plumbing

⚠ Note: All plumbing is to be done in accordance with state and local codes.

⚠ Caution: Before placing wall anchors to support piping ensure that no electrical conduit or wiring is located behind the intended mounting location.

⚠ Note: The control valve, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

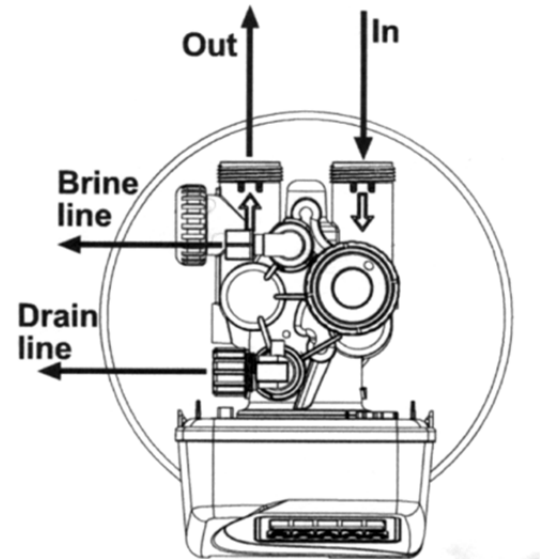
1. Install connecting piping between raw water source and input pipe on control valve.

The installation fittings connect to the control valve or the bypass valve using nuts that only require hand tightening. Do not use a pipe wrench to tighten nuts on installation fittings. The split ring design, incorporated into the installation fittings allows approximately 2 degrees off axis alignment to the plumbing system. The installation fittings are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

When assembling the installation fitting package, connect the fitting to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring and o-ring. Avoid getting primer and solvent cement on any part of the orings, split rings, bypass valve or control valve. Solvent cements and primers should be used in accordance with the manufacturer's instructions.

Slip the nut onto the fitting first, then the split ring second and the o-ring last. Hand tighten the nut. If the fitting is leaking tightening the nut will not stop the leak. Remove the nut, remove the fitting, and check for damage or misalignment of the o-ring.

Do not use pipe dope or other sealant on threads. Use teflon tape on threaded inlet, outlet and drain fittings. Teflon tape is not necessary on the nut connection or caps because of o-ring seals.



2. Install drain line from control valve to a free flowing drain.

If the drain line is a $\frac{3}{8}$ " flexible polytube, slide the nut onto the polytube, then place the polytube insert into the end of the polytube and tighten the nut on to the $\frac{1}{2}$ " drain line fitting. The nut is only designed for use with flexible polytube. Use other nuts if attaching different materials. (To access the drain line flow control, remove the locking clip by pulling it straight out. Pull fitting out and replace the locking clip so that it is not misplaced. The drain line fitting is pressed in and has an o-ring seal.)

3.

4. Install piping between valve output and point of use. The installation fittings connect to the control valve or the bypass valve using nuts that only require hand tightening.

See step 1 for handling details.

Initial Start-Up

For detailed programming and operating information, please refer to the control valve section of this manual.

1. Check all piping connections and make sure feed valves are open. Inspect plumbing for leaks.
2. Check that control valve is connected to electrical source.
3. Open Raw Water source valve.



Note: Check for leaks throughout system as pressure is applied.

Note: For detailed information on the control valve operation, see the valve manual enclosed.

4. Fully open a cold water faucet downstream of the system. Allow water to run until clear. Close the cold water faucet.
5. Turn off the supply water.
6. Initiate manual regeneration of the control valve to regenerate: simultaneously press and for three seconds. Press the button to advance the unit into the backwash cycle. Wait until the motor stops and the backwash time begins to count down.
7. Open the inlet water supply valve very slowly, allowing the water to fill the tank in order to expel air.



Caution: If water flows too rapidly, there will be a loss of media out the drain.

8. When water is flowing steadily to the drain without the presence of air, press the button again to advance the When water is flowing steadily to the drain without the presence of air, fully open the water supply inlet valve. Press the REGEN button again to advance to the rinse position and allow the water to run to drain for 2-3 minutes or until the drain runs clear.
9. Press the REGEN button to advance to the service position.
10. Review the control valve operations section of this manual and ensure settings are properly programmed before placing the filter in service.
11. Review the potassium permanganate feed injection system (supplied separately) to ensure proper configuration and dosing. *



*** ADDITIONAL EQUIPMENT REQUIRED FOR PROPER OPERATION:** Manganese greensand filters require KMnO_4 (Potassium Permanganate) to be injected into the feed water stream in order to regenerate the media bed. This is usually done with the use of a chemical injection system including a chemical tank, mixer and metering pump. This equipment is sold separately and should be designed and sized for each specific installation. The injection method and concentration of potassium permanganate required depends on the concentration of iron and manganese in the water as well as other factors. Please contact Applied Membranes, Inc. for assistance in sizing and purchasing the appropriate chemical injection system.



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System Monitoring and Record Keeping

Monitor the filter daily and record all pertinent data. This data is needed to determine operating efficiency and for performing system maintenance. *The latter includes changing of the media, pressure drop across the mineral tank and control valve.*

Note: *Warranty Claims cannot be processed without adequate operating data and the filter history.*

Operating Conditions

For optimum filter performance, observe the following:

- Maintain a minimum of 25 psi during backwash cycle.
- Water pressure should not exceed 120 psi across mineral tank.
- Water temperature should not exceed 110 F.



CAUTION: *Hydrocarbons such as kerosene, benzene, gasoline, etc., may damage products that contain o-rings or plastic components. Exposure to such hydrocarbons may cause the products to leak. Do not use the product(s) contained in this document on water supplies that contain hydrocarbons such as kerosene, benzene, gasoline, etc.*

Operating Do's and Don'ts

DO:

- Monitor system and keep a daily log.
- Maintain proper water pressure for backwashing.

DON'T:

- Permit oils or fats in feed water.
- Shut down system for extended periods.
- Exceed operating pressures or temperatures.
- Backwash filter with insufficient water flow.



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Maintenance

Removal & Replacement of Media

Tools Needed:

- Wrench (to removing piping)
- Screwdriver wide blade
- Buckets (for materials)
- Wet and Dry Vacuum Cleaner or Tarp

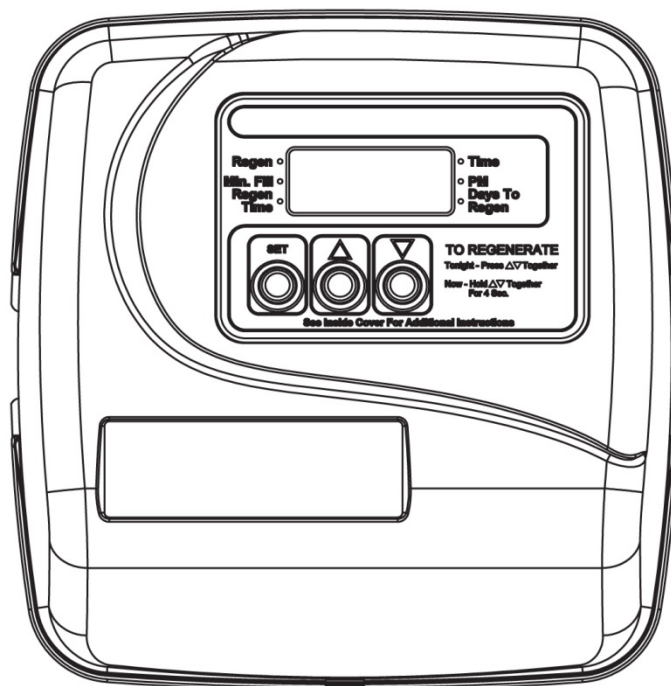
1. Turn off water to filter.
2. Relieve pressure in tank by either opening a downstream valve or cycling the control valve into the back wash position.
3. If a by-pass valve is installed, place it in the by-pass position.
4. Disconnect drain line.
5. Turn off electrical source and disconnect control valve. Remove any wiring connected to control valve.
6. Loosen plumbing from control valve.
7. Carefully move the filter forward until it clears plumbing.
8. Move the filter to an area where access is available to all sides.
9. Carefully loosen control valve on mineral tank top. Slowly unscrew valve being careful not to damage threads in top of tank.
10. When valve is loose from top of tank, slowly twist it back and forth to remove it from top of distributor tube inside tank.
11. To remove the filter from mineral tank choose one of the recommended methods below:
 - a. **Vacuum Removal:** Vacuum all material out of tank and then wash inside with clean water.
 - b. **Manual Removal:** Place a canvas on floor to catch media and other materials dumped from mineral tank. Lay tank on its side and tip it up to dump media and other materials out of tank. Slowly rotate tank as it is being dumped. When all material is out of tank wash it with clean water.

***Note:** Dispose of the media & underbedding by local procedures or laws.*

12. Replace media as per media loading instructions.
13. Perform start-up procedure.

Control Valve Operation & Service

CV1 Control Valves



Control Valve Specifications

- | | |
|---|---|
| • Minimum/Maximum Operating Pressures: | 20 psi (138 kPa, 1.4 bar) to 125 psi (862 kPa, 8.6 bar) |
| • Minimum/Maximum Operating Temperatures: | 40 F (4 C) to 110 F (43 C) |

⚠ No user serviceable parts are on the PC board, the motor, or the power adapter. The means of disconnection from the main power supply is by unplugging the power adapter from the wall.



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Panel Operation Quick Reference Guide

Manual Regeneration (Backwash)

Note: If you need to initiate a manual regeneration, either immediately, or tonight at the preprogrammed time (typically 2 a.m.), complete the following steps.

Arrow will point to Regen if a regeneration is expected "Tonight".



For Immediate Regeneration:

Press and hold and simultaneously until valve motor starts (typically 3 seconds).

For Regeneration Tonight:

Press and release and simultaneously (notice that arrow points to Regen).

Error Message

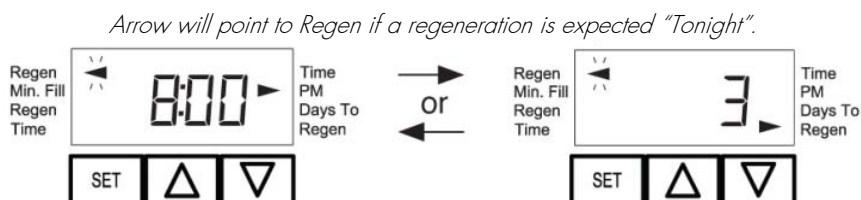
If the display shows "E1", "E2", "E3", or "E4" (for error), check the trouble shooting section to identify the error.



General Operation

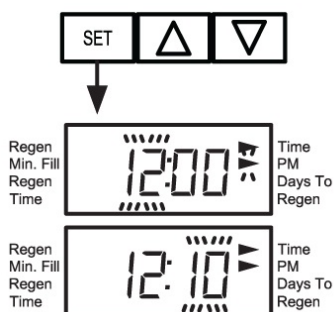
When the system is operating one of two displays will be shown: time of day or days until the next regeneration.

Pressing or will toggle between the two choices.



To Set Time of Day

In the event of a prolonged power outage, time of day flashes, indicating that it needs to be reset. All other information will be stored in memory no matter how long the power outage. Please complete the steps as shown to the right. To access this mode, press "SET".



5. Accessed by pressing SET for approximately 3 seconds.
6. Adjust hour with or . With 60 Hz line frequency detection on power-up, timekeeping is 12 hour with PM indicator. With 50 Hz line frequency detection on power-up, timekeeping is 24 hour without the PM indicator. Press SET to go to the next step.
7. Adjust minutes with or .
8. Press SET to complete and return to normal operation.



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
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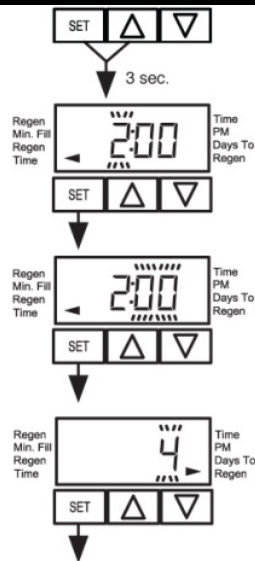
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
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To Set Time of Regeneration and Days Between Regeneration

For initial set-up or to make adjustments, please complete the steps as shown. Access this mode by pressing **SET** and  for approximately 3 seconds. The number of days between regenerations may need to be varied based on usage and water conditions.

(This step will not appear if the 7-day clock option is selected.)



6. Accessed by pressing **SET** and  simultaneously for about 3 seconds.
7. Set Regeneration Time Hour. Set the time for regeneration to start. Press **SET** to go to the next step.
8. Set Regeneration Time Minutes. Press **SET** to go to the next step.
9. Set number of Days between regeneration cycles.
10. Press **SET** to complete and return to normal operation.



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General Warnings

⚠ The control valve, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

⚠ Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary

⚠ The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in the slots on caps and/or tap with a hammer.

⚠ The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in the slots on caps and/or tap with a hammer.

⚠ After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold SET and DOWN buttons for 3 seconds. The cover button may have other names like "SET HOUR", "CLOCK" or "SET CLOCK" but the circuit board is labeled with SET.

This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.

⚠ Do not use pipe dope or other sealants on threads. Use Teflon tape on the threaded inlet, outlet and drain fittings. Teflon tape is not necessary on the nut connection or caps because of o-ring seals.

⚠ All plumbing should be done in accordance with local plumbing codes. The pipe size for the drain line should be a minimum of ½". Backwash flow rates in excess of 7 gpm (26.5 lpm) or length in excess of 20' (6.1 m) require " drain line.

⚠ Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line control fitting and solder joints when soldering pipes that are connected on the drain line control fitting. Failure to do this could cause interior damage to the drain line flow control fitting.

⚠ When assembling the installation fitting package (inlet and outlet), connect the fitting to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring and o-ring. Avoid getting primer and solvent cement on any part of the o-rings, split rings, bypass valve or control valve.

⚠ Plug into an electrical outlet. Note: All electrical connections must be connected according to local codes. (Be certain the outlet is uninterrupted.) Install grounding strap on metal pipes.

Control Valve General Features and Information

This fully automatic control valve is designed as the primary control center to direct and regulate all cycles of an automatic backwashing filter.

The time clock control for performing regeneration (backwash) has two calendar options for regeneration frequency:

- An option where the user can choose the number of days (1-99) between each regeneration; and
- A seven-day option where the user can choose which day(s) of the week a regeneration should occur.



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Installation and Service Manual – Manganese Greensand Iron Filter

The control valve regulates the flow rates for backwash and rinse cycles.

The control valve uses no traditional fasteners (e.g. screws); instead clips, threaded caps and nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screw driver, one large blade screw driver, pliers and a pair of hands. A plastic wrench is available which eliminates the need for screwdrivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market. Control valve installation is made easy because the distributor tube can be cut ½" above to ½" below the top of tank thread. The distributor tube is held in place by an o-ring seal and the control valve also has a bayonet lock feature for upper distributor baskets.

The AC adapter comes with a 15 foot power cord and is designed for use with the control valve. The AC adapter is for dry location use only. The control valve maintains timekeeping for up to 8 hours if the power goes out and the battery is not depleted. After 8 hours, the only item that needs to be reset is the time of day; valve status and programming are permanently stored in the nonvolatile memory. If a power loss lasts less than 8 hours and the time flashes on and off, the time of day should be reset and the non-rechargeable battery should be replaced.

Programming Control Valve Options

The control valve offers multiple procedures that allow the valve to be modified to suit the needs of the installation. These procedures are:

- System Setup
- Installer Displays & Settings (either 1-99 Days Between Regeneration option or 7-Day option)
- User Displays

These procedures can be accessed in any order. Details on each of the procedures are provided below and on the following pages.

When in operation, normal user displays show the time of day or days remaining before regeneration. When stepping through a procedure, if no buttons are pressed within five minutes the display returns to a normal user display. Any changes made prior to the five minute time out are incorporated.

To quickly exit programming modes, simultaneously press SET + . Any changes made prior to the exit are incorporated. To reinitialize the control valve, check to make sure the valve is in the User Display. Then simultaneously press SET + or unplug power source plug (4-pin connector) on the circuit board, wait 3 seconds and plug back in.

System Setup: Regeneration (Backwash) Cycle Programs

The below shows the time for the backwash and rinse cycles for the three available backwash filter programming options (P7 through P9).

▲ AMI Media Filters are programmed to P9 as default. This should work for most manganese greensand filter applications. If other programs are required, please check with a water treatment professional before adjusting the settings. Improper backwash will cause the filter system to be clogged or ineffective and may reduce the life of the media bed.



Table 4 – Regeneration (Backwash) Cycle Programs

Program	<i>All Times in Minutes</i>				
	C1 1 st Backwash	C2 Regenerate	C3 2 nd Backwash	C4 Rinse	C5 Fill
P7	6	<i>skipped</i>	<i>skipped</i>	4	<i>skipped</i>
P8	10	<i>skipped</i>	<i>skipped</i>	6	<i>skipped</i>
P9	14	<i>skipped</i>	<i>skipped</i>	8	<i>skipped</i>

Note: During regeneration the display will show C1, C2, etc. If the cycle is skipped, that cycle number will not be displayed.



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STEP 1SS

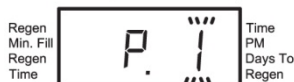
System Setup: Changing Regeneration Cycle Program



STEP 1SS – Enter OEM System Setup Mode

From normal mode, press SET + buttons simultaneously for 3 seconds and release. Then press SET + buttons simultaneously for 3 seconds and release.

STEP 2SS



STEP 2SS – Set Backwash Cycle Program

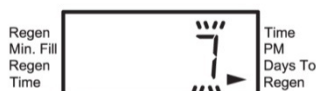
Set to "P9" by pressing or .

See "Table 4 – Regeneration Cycle Programs" on previous page for the cycle times of the programs available. Press SET button to go to Step 4SS.



(Note: Step 3SS, refill time, is skipped when P7, P8, or P9 is selected)

STEP 4SS



STEP 4SS – Select Backwash Frequency Mode

Use or to switch between:

- 1-99 Days Between Regeneration - Regeneration is determined by the number of days that have passed since the last regeneration scheduled.
- 7-Day - Regeneration is scheduled for specific days of the week.

Press SET to go to Step 5SS.

STEP 5SS – Differential Pressure Switch

If a differential pressure switch is installed and actuated for 2 minutes:

- a regeneration will occur immediately if no arrow points at Regen Time; or
- a regeneration will occur at the delayed regeneration hour if an arrow points at Regen Time.

Use or to switch between the two choices. If a differential switch is not installed the settings in this display are ignored. Press SET to exit OEM system setup.

STEP 5SS



Return to Normal Mode



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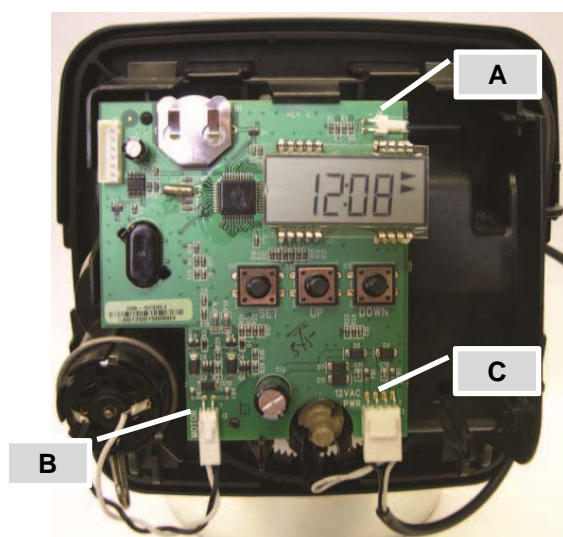


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NOTE: A regeneration will be initiated or scheduled after the control has received a signal for two minutes to the DP Input (Item A).

- A. Differential pressure switch connection
- B. Motor wire connection
- C. AC adapter wire connection



Installer Displays and Settings for Control Valve Options

<div><div>STEP 1ID</div><div><div>SET</div><div>▲</div><div>▼</div></div><div>STEP 2ID</div><div><div>Regen Min. Fill Regen Time</div><div>2:00</div><div>Time PM Days To Regen</div></div><div><div>SET</div><div>▲</div><div>▼</div></div><div>STEP 3ID</div><div><div>Regen Min. Fill Regen Time</div><div>2:00</div><div>Time PM Days To Regen</div></div><div><div>SET</div><div>▲</div><div>▼</div></div><div>STEP 4ID</div><div><div>Regen Min. Fill Regen Time</div><div>4</div><div>Time PM Days To Regen</div></div><div><div>SET</div><div>▲</div><div>▼</div></div><div>Return to Normal Mode</div></div>	<div>Regeneration Settings (1-99 Days Between Regeneration Option)</div> <div>STEP 1ID</div> <div>From normal mode, press SET + buttons simultaneously for 3 seconds and release.</div> <div>STEP 2ID</div> <div>Regeneration Time Hour: Set the time for regeneration to start using or . Press SET to go to the next step.</div> <div>STEP 3ID</div> <div>Regeneration Time Minutes: Set the time for regeneration to start using or . Press SET to go to the next step.</div> <div>STEP 4ID</div> <div>Days to Regen: Set the number of days between regenerations. The allowable range is 1 to 99. Press SET to exit Installer Displays and Settings.</div>															
	<div>Regeneration Settings (7 Day Option)</div> <div>STEP 1I7</div> <div>From normal mode, press SET + simultaneously for 3 seconds and release.</div> <div>STEP 2I7</div> <div>Regeneration Time Hour: Set the time for regeneration to start using or . Press SET to go to Step 3I7.</div> <div>STEP 3I7</div> <div>Regeneration Time Minutes: Set the time for regeneration to start using or . Press SET to go to Step 4I7.</div> <div>STEP 4I7</div> <div>Current Day of Week: Set the current day of the week by using or (See chart at right for date codes). Press SET to go to STEP 5I7.</div> <table><tr><th colspan="2">Display</th><th>Day of Week</th></tr><tr><td>day 1</td><td>d1</td><td>Sunday</td></tr><tr><td>day 2</td><td>d2</td><td>Monday</td></tr><tr><td>day 3</td><td>d3</td><td>Tuesday</td></tr><tr><td>day 4</td><td>d4</td><td>Wednesday</td></tr></table>	Display		Day of Week	day 1	d1	Sunday	day 2	d2	Monday	day 3	d3	Tuesday	day 4	d4	Wednesday
Display		Day of Week														
day 1	d1	Sunday														
day 2	d2	Monday														
day 3	d3	Tuesday														
day 4	d4	Wednesday														



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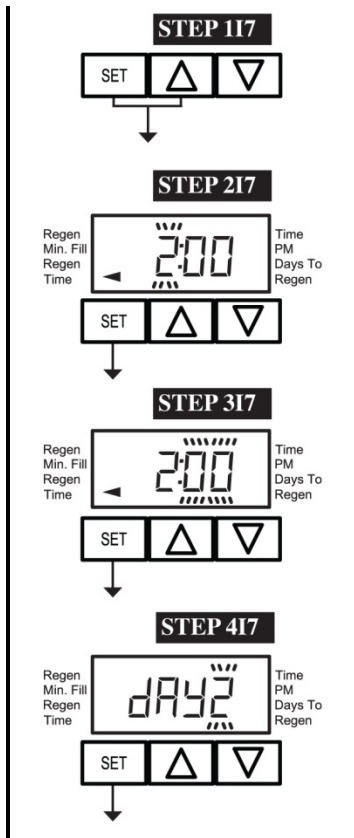


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day 5	d5	Thursday
day 6	d6	Friday
day 7	d7	Saturday



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Regeneration Settings (7 Day Option, Continued)

STEP 517



STEP 617



STEP 717



STEP 817



STEP 917



STEP 1017



STEP 1117

STEP 517 – Sunday Regeneration:

To regenerate on Sunday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Sunday.

Press SET to go to STEP 617.

STEP 617 – Monday Regeneration:

To regenerate on Monday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Monday.

Press SET to go to STEP 717.

STEP 717 – Tuesday Regeneration:

To regenerate on Tuesday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Tuesday.

Press SET to go to STEP 817.

STEP 817 – Wednesday Regeneration:

To regenerate on Wednesday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Wednesday.

Press SET to go to STEP 917.

STEP 917 – Thursday Regeneration:

To regenerate on Thursday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Thursday.

Press SET to go to STEP 1017.

STEP 1017 – Friday Regeneration:

To regenerate on Friday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Friday.

Press SET to go to STEP 1117.



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STEP 1117 – Saturday Regeneration:

Saturday Regeneration: To regenerate on Saturday use or until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Saturday.

Press SET to exit Installer Displays & Settings.

NOTE: If all arrows are turned off in d1-d7, the program will default to d7.



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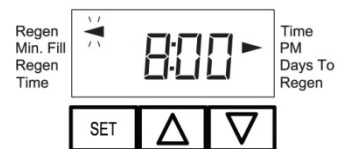
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User Displays



↓ or ↑



An arrow will point to the word Regen if a regeneration is expected "tonight."



General Operation

When the system is operating one of two displays will be shown.

Pressing or will alternate between the displays.

One of the displays is always the current time of day.

The second display is the days remaining until the next regeneration. If the days remaining is equal to one, a regeneration will occur at the next preset regeneration time.

The user can scroll between displays as desired. If the system has called for a regeneration that will occur at the pre-set time of regeneration, the arrow will point to Regen.

Regeneration Mode

Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.

When the system begins to regenerate, the display will change to the Regeneration Cycle Display to indicate the current regen cycle step and time remaining. An arrow will also point to Regen. The system will run through the steps automatically and will reset itself to provide treated water when the regeneration is completed.

Manual Regeneration

Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred to as a manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

To initiate a manual regeneration at the preset delayed regeneration time, simultaneously press and and release. The arrow will point to the word Regen if a regeneration is expected "tonight." To cancel the regeneration simultaneously press and and release.

To initiate a manual regeneration immediately, simultaneously press and for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled. Note: For softeners, if brine tank does not contain salt, fill with salt and wait at least two hours before regenerating.



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Set Time of Day

<p>STEP 1U</p> <p>SET [Up Arrow] [Down Arrow]</p> <p>STEP 2U</p> <p>Regen Min. Fill Regen Time 12:00 Time PM Days To Regen</p> <p>SET [Up Arrow] [Down Arrow]</p> <p>STEP 3U</p> <p>Regen Min. Fill Regen Time 12:10 Time PM Days To Regen</p> <p>SET [Up Arrow] [Down Arrow]</p>	<p>STEP 1U Press "SET"</p> <p>STEP 2U Current time: Adjust hour with or .</p> <p>With 60 Hz line frequency detection on power-up, timekeeping is 12 hour with PM indicator. With 50 Hz line frequency detection on power-up, timekeeping is 24 hour without the PM indicator.</p> <p>Press SET to go to Step 3U.</p> <p>STEP 3U Adjust minutes with or .</p> <p>Press SET to exit Set Time of Day.</p>
--	---

Power Loss

Only the current time of day will need to be reset if power is lost for greater than 8 hours. If power is lost while the system is regenerating, the control will complete regeneration at the point of interruption once power is restored.

Error Messages

If the display shows "E1", "E2", "E3", or "E4" (for error), check the trouble shooting section to identify the error.



Control Valve Drawings and Components

Front Cover & Drive Assembly

Dwg. No.	Item No.	Description	Qty. Per Valve
1	V3715TC-01	CV1TC Front Cover Assembly	1
2	V3107-01	CV1 Motor Assembly	1
3	V3106-01	CV1 Drive Bracket & Spring Clip	1
4	V3818TC	CV1TC PC Board – 4 Digit	1
5	V3110	CV1 Drive Reducing Gear 12 36	3
6	V3109	CV1 Drive Gear Cover	1
*	V3002TC	CV1 Drive Assembly	*
Not Shown	V3186	CV1 AC Adapter 120v – 12v, USA	1
	V3186EU	CV1 AC Adapter 220v-240v – 12v, EU	
	V3186UK	CV1 AC Adapter 220v-240v – 12v, UK	
	V3186-01	CV1 AC Adapter Cord Only	

*Drawing number parts 2 through 6 may be purchased as a complete assembly, part V3002.



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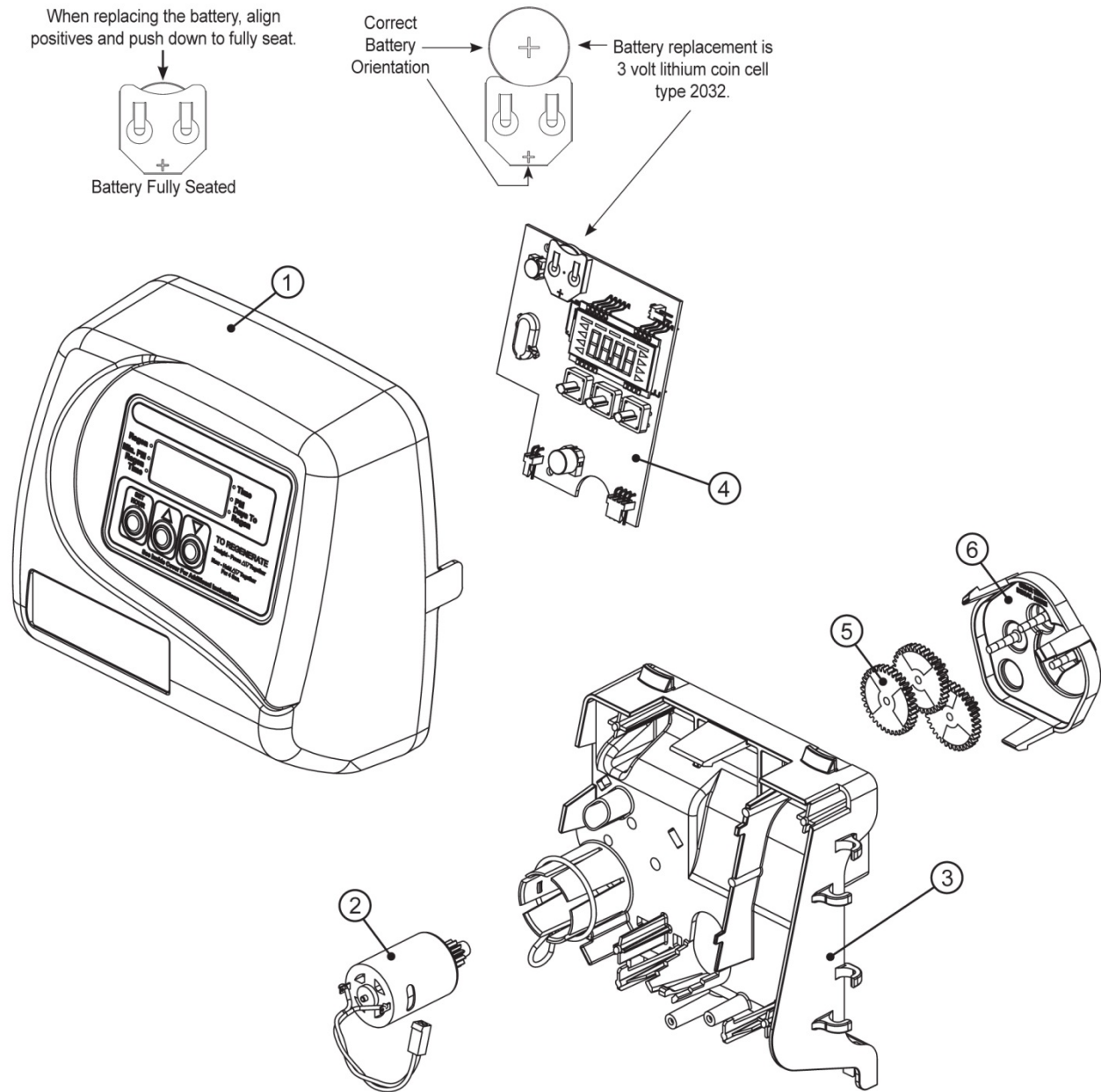


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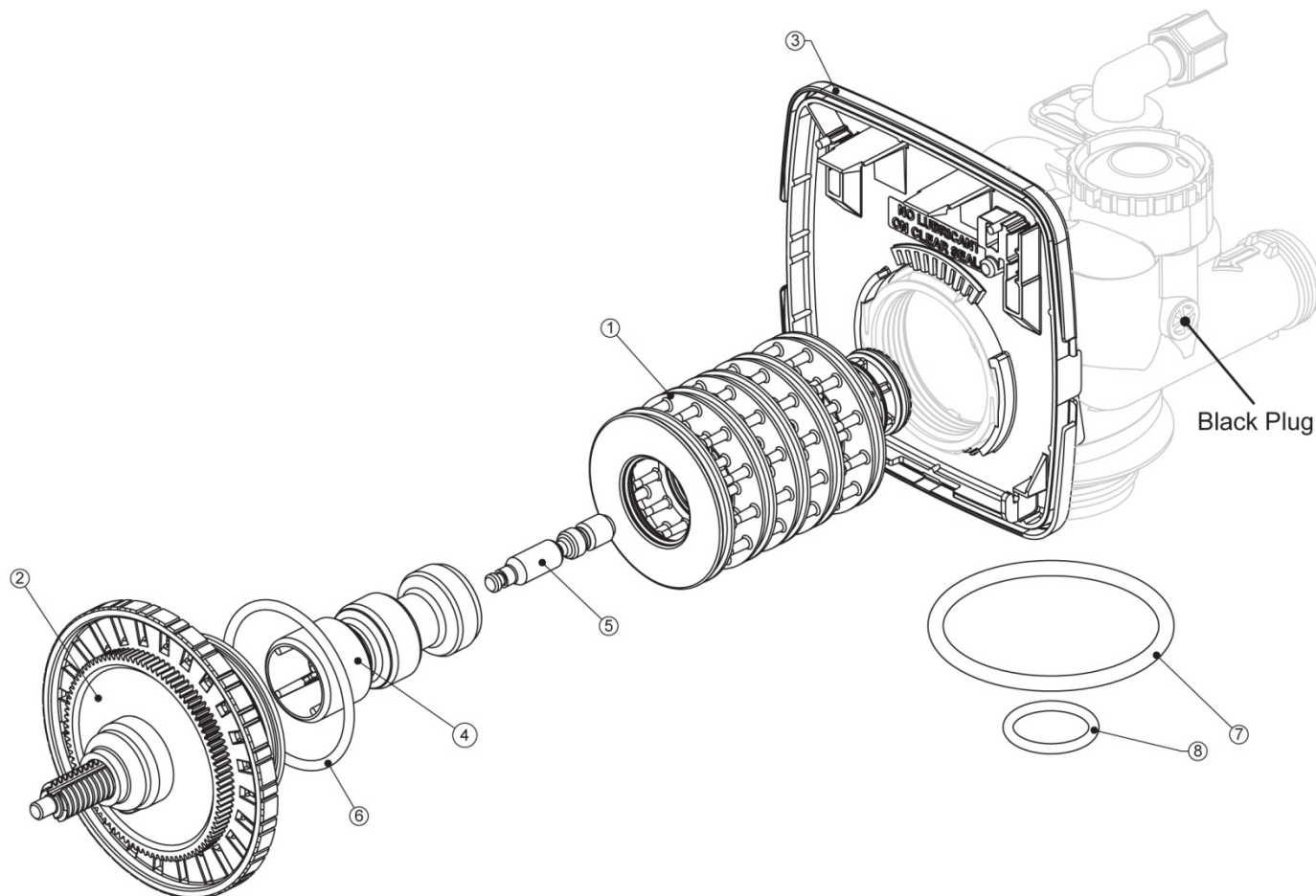
CV1TC Drive Cap Assembly, Downflow Piston,
Regenerate Piston & Spacer Stack Assembly

Dwg. No.	Item No.	Description	Qty. Per Valve
1	V3005	CV1 Spacer Stack Assembly	1
2	V3004	Drive Cap Assembly	1



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3	V3178	CV1 Drive Back Plate	1
4	V3011	CV1 Piston Downflow Assembly	1
5	V3174	CV1 Regenerant Piston	1
6	V3135	O-Ring 228	1
7	V3180	O-Ring 337	1
8	V3105	O-Ring 215 (Distributor Type)	1
Not Shown	V3001	CV1 Body Assembly, Downflow	1
	V3001-02	CV1 Mixing Valve Body Assembly	



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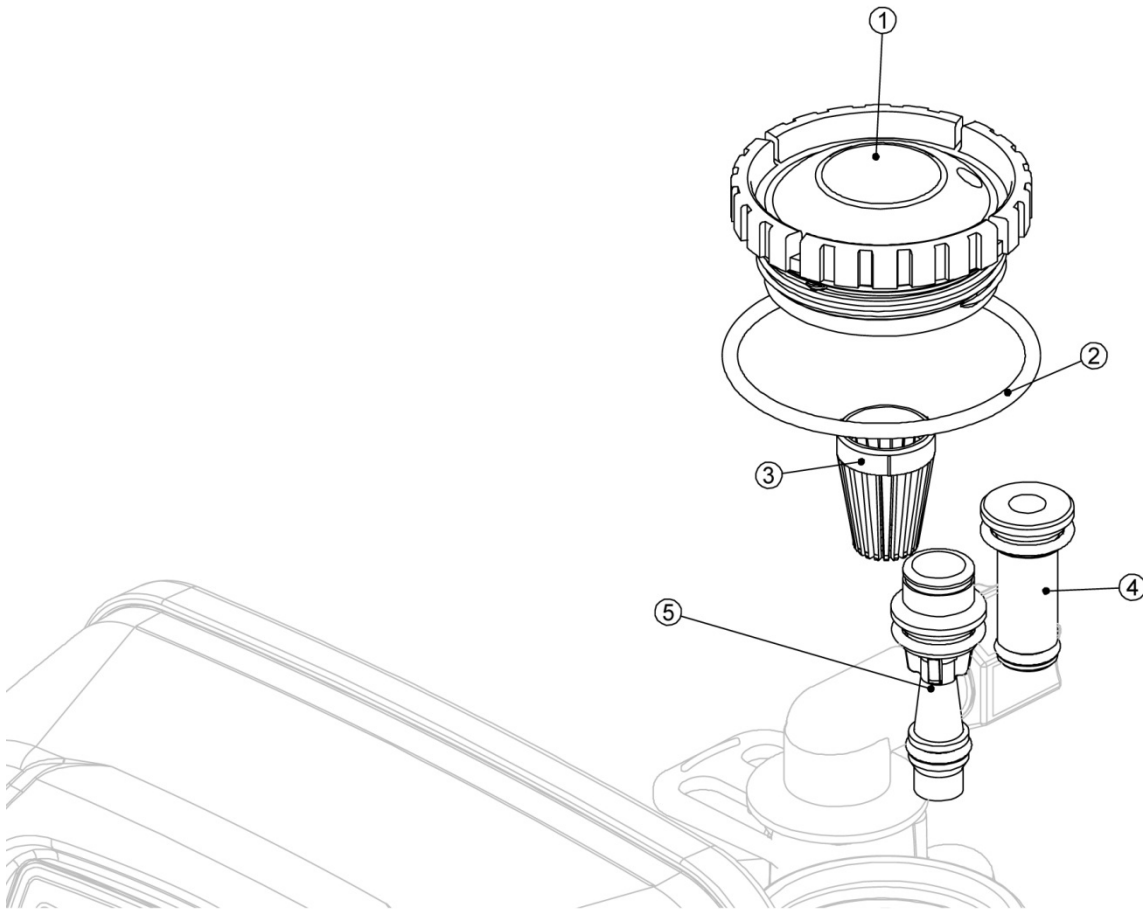
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Injector Cap, Injector Screen, Injector, Plug and O-Ring

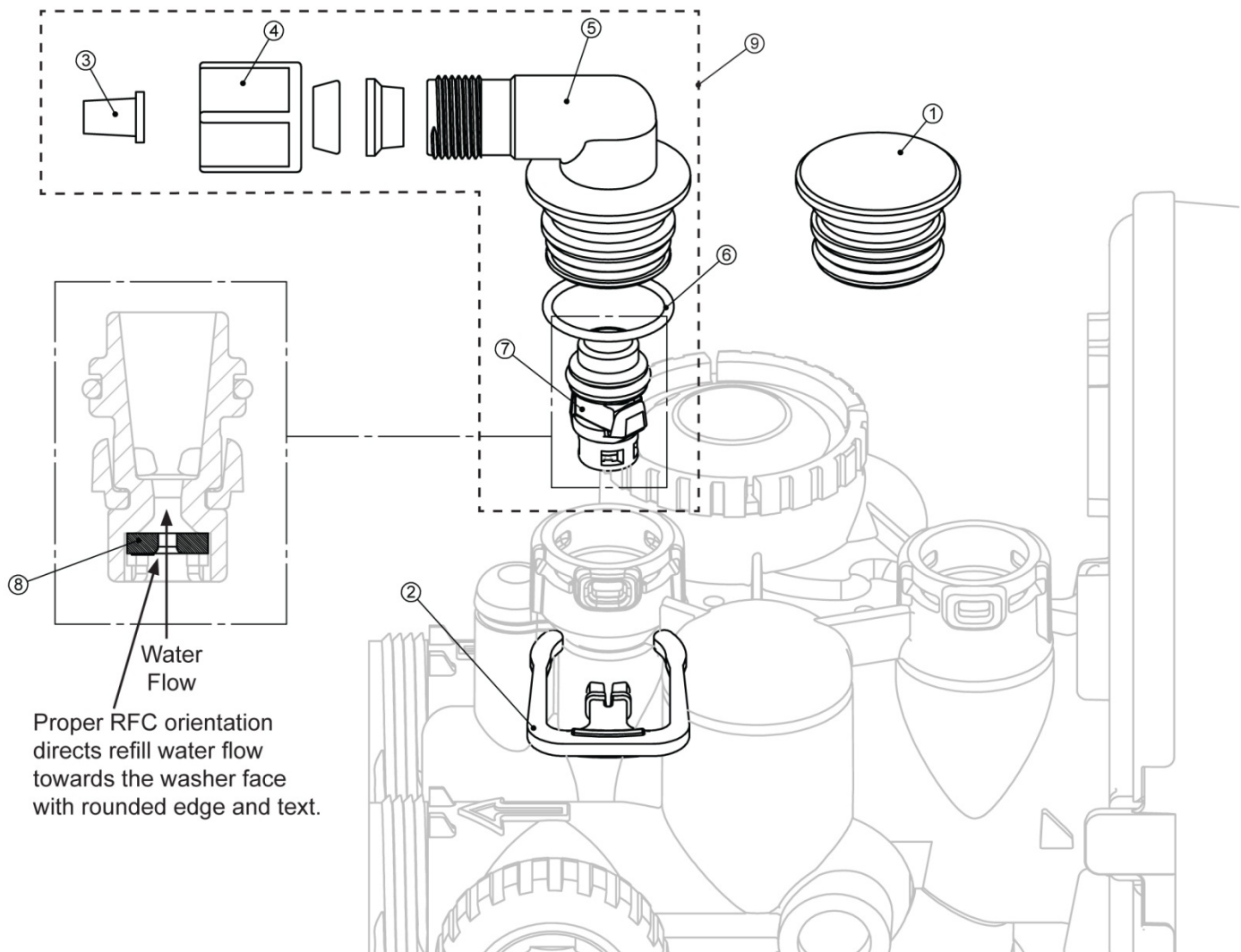
Dwg. No.	Item No.	Description	Qty. Per Valve
1	V3176	Injector Cap	1
2	V3152	O-Ring 315	1
3	V3177-01	Injector Screen Cage	1
4	V3010-1Z	CV1 Injector Assembly Z Plug	1
Not Shown	V3170	O-Ring 011	*
	V3171	O-Ring 013	*

* The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring. For a filter that only backwashes, injector plugs are located in both holes.



Refill Flow Control Assembly and Refill Port Plug

Dwg. No.	Item No.	Description	Qty. Per Valve
1	V3195-01	CV1 Refill Port Plug Assembly	1
2	H4615	Elbow Locking Clip	1
3	JCP-P-6	Polytube Insert $\frac{3}{8}$ "	Softener Only
4	JCPG-6PBLK	Nut $\frac{3}{8}$ "	Softener Only
5	H4613	Elbow Cap $\frac{3}{8}$ "	Softener Only
6	V3163	O-Ring 019	Softener Only
7	V3165-01 *	CV1 RFC Retainer Asy (0.5 gpm)	Softener Only
8	V3182	CV1 RFC	Softener Only
9	V3330-01	CV1 Brine Elbow Asy with RFC $\frac{3}{8}$ "	Softener Only



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Drain Line Flow Controls – 1"

Dwg. No.	Item No.	Description	Qty. Per Valve
1	H4615	Elbow Locking Clip	1
2	V3008-02	Drain Fitting, 1" Straight	1
3*	V3166	Drain Fitting Body	1
4*	V3167	Drain Fitting Adapter	1
5*	V3163	O-Ring 019	1
6*	V3150	Split Ring	1
7*	V3151	Nut, 1" QC	1
8*	V3108	O-Ring 215	1
9	V3190-150	CV1 DLFC Washer 15 gpm for 1"	1

*Can be ordered as a set. Order number V3008-02, description: WS1 drain Fitting 1" Straight.



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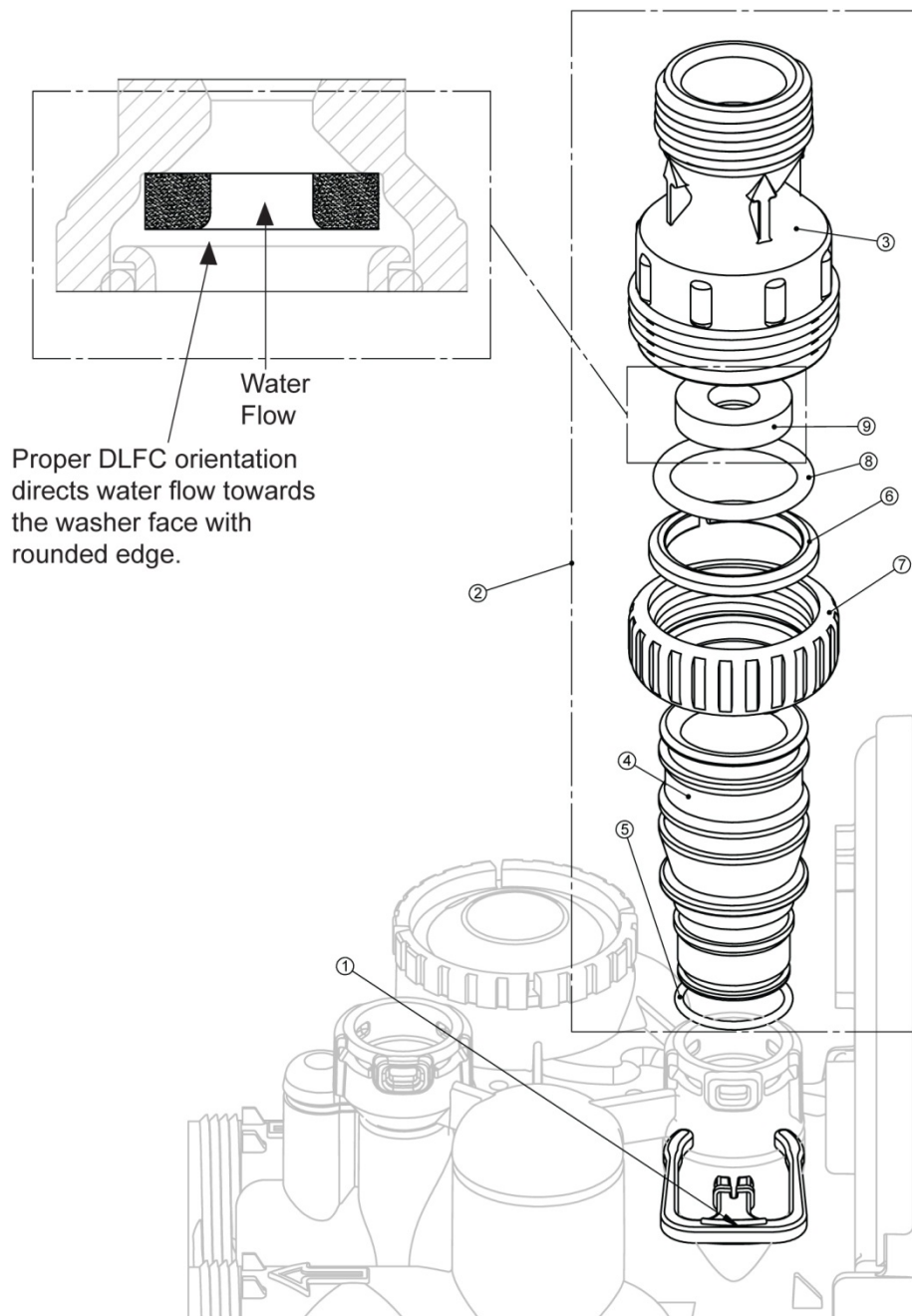


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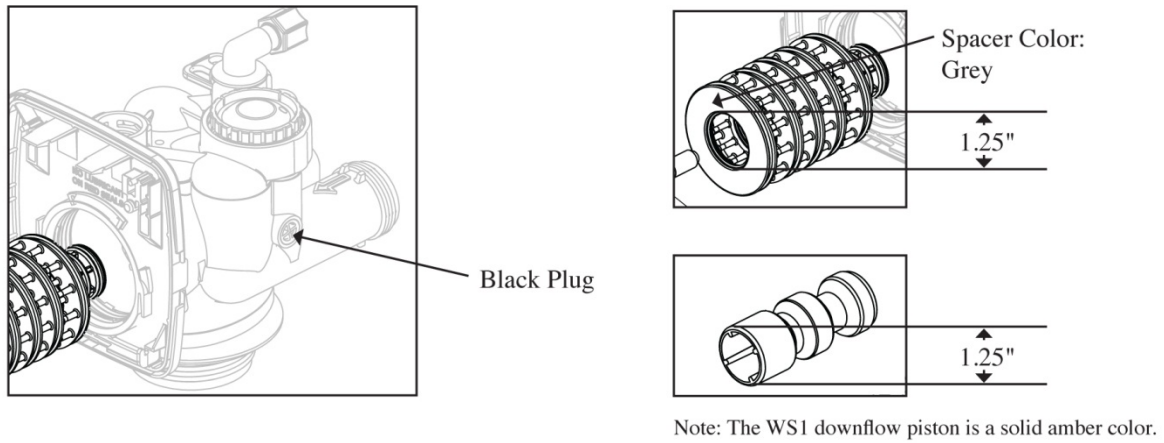
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CV1 with 1.050" Distributor Tube Opening Identification

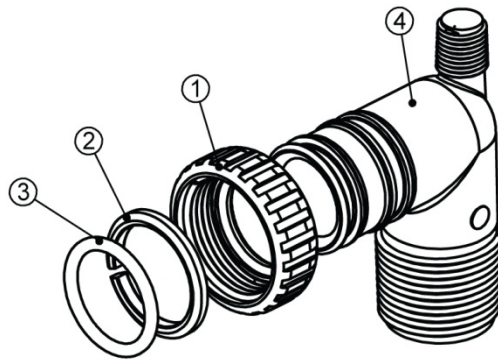


Installation Fitting Assembly

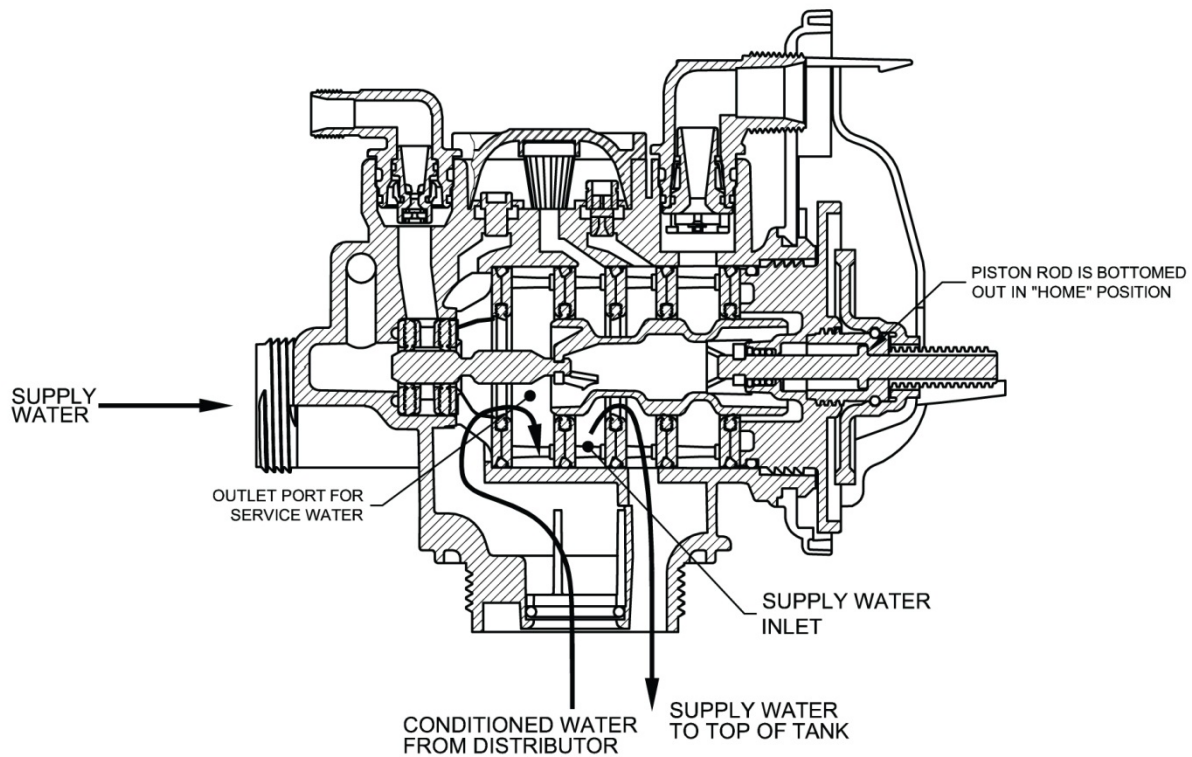
Assembly Model Number: V3007 – CV1 Fitting, 1" PVC Male NPT Elbow Assembly

Dwg. No.	Item No.	Description	Qty. Per Assembly
1	V3151	CV1 Nut 1" Quick Connect	2
2	V3150	CV1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	CV1 Fitting 1" PVC Male NPT Elbow	2





Flow Diagram, Service



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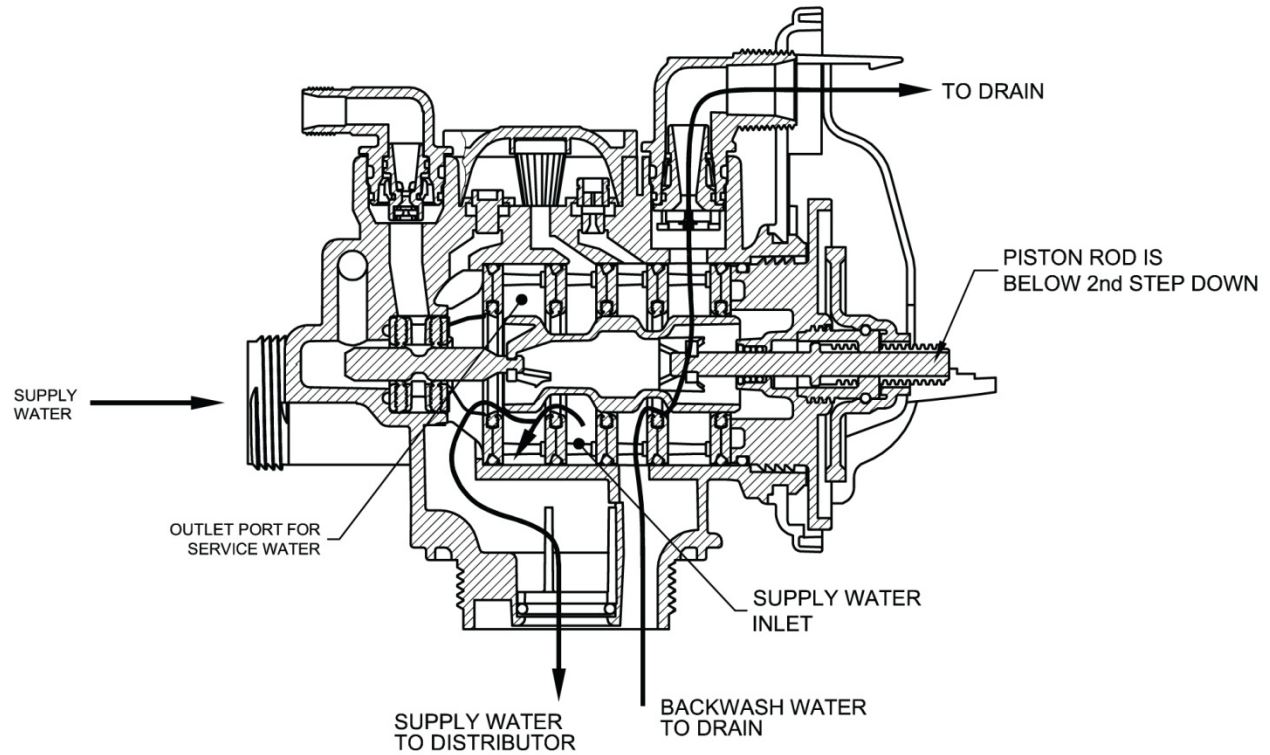
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Flow Diagram, Backwash



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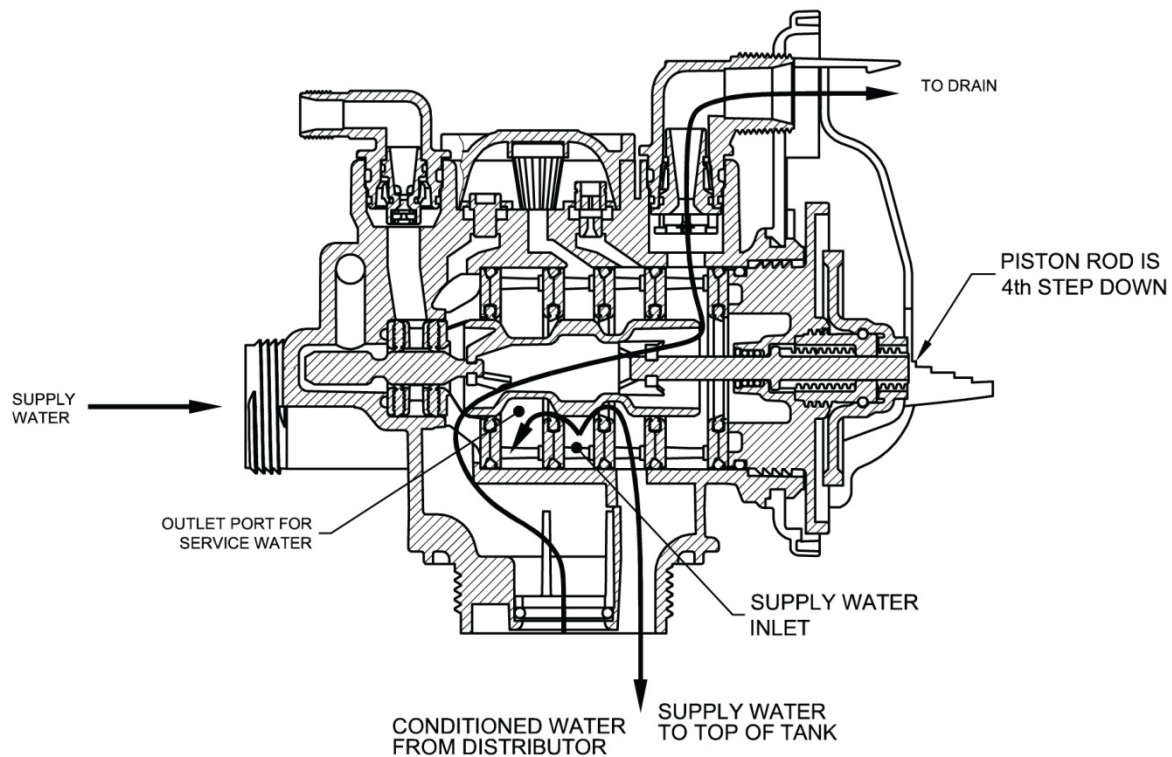
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Flow Diagram, Rinse



CV1 Service Spanner Wrench

Model No: V3193-02

Although no tools are necessary to assemble or disassemble the valve, the CV1 wrench (shown below in various positions on the valve) may be purchased separately to aid in assembly or disassembly of the control valve.



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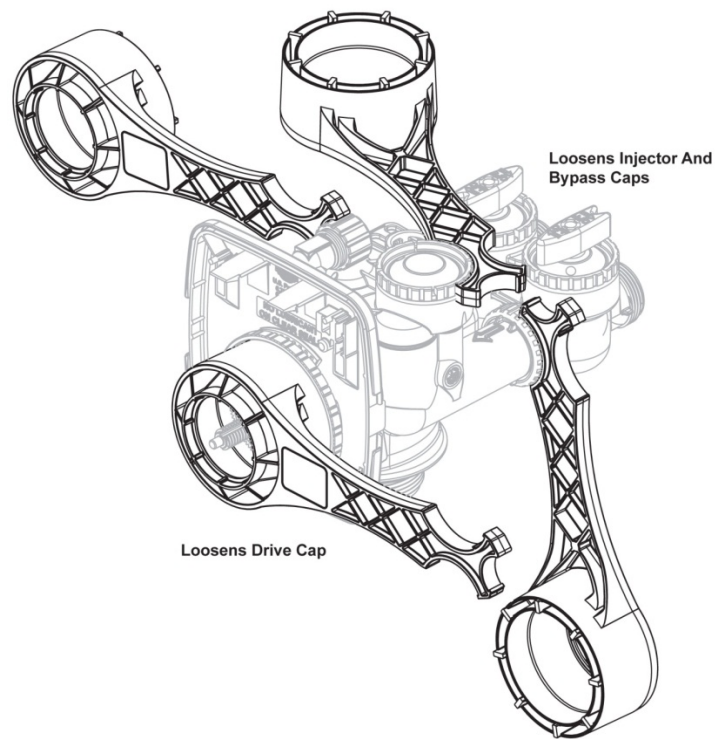
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Control Valve Components Description

The CV1 control valves consist of the following components:

1. Drive Assembly
2. Drive Cap Assembly, Main Piston and Regenerant Piston
3. Spacer Stack Assembly
4. Injector Cap, Screen, Injector Plug and Injector
5. Drain Line Flow Control
6. Water Meter or Meter Plug
7. Installation Fitting Assemblies

Drive Assembly

The drive assembly consists of the following parts:

- Drive Bracket
- Printed Circuit (PC) Board
- Motor
- Drive Gears
- Drive Gear Cover

The drive bracket holds the PC board, the motor, the drive gears and the drive gear cover in place.

The PC board receives and retains information, displays the information, determines when to regenerate and initiates regeneration. The display shows different types of information in the initial system set up, installer display settings, diagnostics, valve history, or user display settings.

The PC board powers the motor. The PC board's two-prong jack connects wires to the direct current (DC) motor. The motor is held in place on the drive bracket by a spring-loaded clip and a small bulge in the plastic, which fits in one of the slots on the motor housing. The motor turns drive gears that drive the piston to cycle positions for backwashing, regeneration, rinsing, refill or service. The motor is fully reversible (turns both ways) and changes direction of rotation to change the direction of piston motion. The motor is easily replaced if necessary.

There are three drive gears held in place by the drive gear cover. All three drive gears are the same size. A reflective coating is applied to the gears. As the center drive gear turns a light shines on the coating and a light sensing diode determines if a light pulse was returned. The PC board counts the pulses and determines when to stop driving the motor.

Drive Cap Assembly, Main Piston

The drive gears turn the main gear of the drive cap assembly, which moves the piston. The screw-driven, horizontally moving piston stops at specific positions to direct the flow of water to backwash, regenerate, rinse or refill. The PC board determines the position of the piston by counting pulses produced when the piston is moved. An optical sensor looking at one of the reduction drive gears generates these pulses. Each cycle position is defined by a number of pulses. The counter is zeroed each time the valve goes to the service position. The PC board finds the service position by noting the increase in current delivered to the motor when the mechanical stop at the service position is reached. This method of controlling piston position allows for greater flexibility and requires no switches or cams (U.S. Patent 6444127).

The valve included on your backwash filter includes a 1.25" diameter downflow piston.

Spacer Stack Assembly

The spacer stack assembly provides the necessary flow passage for water during the different cycles. The all-plastic spacer stack assembly (U.S. Patent 6402944) is a one-piece design which allows the stack to be removed using your fingers.



The exterior of the stack is sealed against the body bore with self-lubricating EPDM o-rings, while the interior surface is sealed against the piston using slippery self-cleaning directional (one-way) silicone lip seals. The lip seals are clear in color and have a special slippery coating so that the piston does not need to be lubricated.

Injector Plug and Refill Flow Plug

The screen, injector and/or injector plug(s) are installed under the injector cap in an easy to access location on top of the valve. The injector cap contains four slots so no water accumulates in the cap. The injector cap is designed to be hand tightened. The valves used for backwash filters have plugs (part # V3010-1Z) installed in both openings and refill plug (part # V3195-01) is present in place of the refill elbow.

Drain Line Flow Control and Fitting Assembly

The drain line flow control assembly includes a drain line flow control and a fitting. The drain line flow control allows proper media bed expansion by regulating the flow rate to the drain. The drain line flow control is a flexible washer-like part with an orifice and a precision molded contour. The flow rates are within $\pm 10\%$ over the pressure range of 20 psi to 125 psi (1.4 bar to 8.6 bar). See table for flow rate information.

Model No.*	Backwash Flow Rate		Drain Line Fitting	Drain Line Flow Control Order No.	Number on Drain Line Flow Control
	Gallons per minute	Liters per minute			
W-MFI1665GET	15	56.8	1"	V3190-150	150

A 1" straight drain line fitting is used for filters requiring drain line flow in excess of 10 gpm (3.79 lpm). This fitting is straight but still connects to the control valve using the same locking clip. The drain line flow control is located between two fitted parts. The nut is unscrewed to access the drain line flow control.

Installation Fitting Assemblies

Both elbow fittings have a unique drill out feature to allow a 1" NPT connection to the inlet and/or outlet which can be used for a RO feed, test ports, pressure tap ports, etc. The installation fitting assemblies are sold in pairs and consist of two fittings, two nuts, two split rings and two o-rings. The installation fitting assemblies and the bypass valve are sold separately from the control valve.

Control Valve Service Instructions

Drive Assembly

Remove the valve cover to access the drive assembly. Disconnect the power source plug (black wire) from the PC board prior to disconnecting the motor or water meter plugs from the PC board. The power source plug connects to the four-pin jack. The motor plug connects to the two-pin jack on the left-hand side of the PC board. The water meter plug (gray wire) connects to the three-pin jack on the far right-hand side of the PC board.



Installation and Service Manual – Manganese Greensand Iron Filter

The PC board can be removed separately from the drive bracket but it is not recommended. Do not attempt to remove the display panel from the PC board. Handle the board by the edges. To remove the PC board from the drive bracket, unplug the power, water meter and motor plugs from the PC board. Lift the middle latch along the top of the drive bracket while pulling outward on the top of the PC board. The drive bracket has two plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45° from the drive bracket it can be lifted off of these pins. To reinstall the PC board, position the lower edge of the PC board so that the holes in the PC board line up with the plastic pins. Push the top of the PC board towards the valve until it snaps under the middle latch, weave the power and water meter wires into the holders and reconnect the motor, water meter and power plugs.

The drive bracket must be removed to access the drive cap assembly and pistons or the drive gear cover. It is not necessary to remove the PC board from the drive bracket to remove the drive bracket. To remove the drive bracket start by removing the plugs for the power source and the water meter. Unweave the wires from the side holders. Two tabs on the top of the drive back plate hold the drive bracket in place. Simultaneously lift the two tabs and gently ease the top of the drive bracket forward. The lower edge of the drive bracket has two notches that rest on the drive back plate. Lift up and outward on the drive bracket to disengage the notches.

To reassemble, seat the bottom of the drive bracket so the notches are engaged at the bottom of the drive back plate. Push the top of the drive bracket toward the two latches. The drive bracket may have to be lifted slightly to let the threaded piston rod pass through the hole in the drive bracket. Maintain a slight engaging force on top of the drive bracket while deflecting the bracket slightly to the left by pressing on the side of the upper right corner. This helps the drive gears mesh with the drive cap assembly. The drive bracket is properly seated when it snaps under the latches on the drive back plate. If resistance is felt before latching, then notches are not fully engaged, the piston rod is not in hole, the wires are jammed between the drive bracket and drive back plate, or the gear is not engaging the drive cap assembly.

To inspect the drive gears, the drive gear cover needs to be removed. Before trying to remove the gear cover, the drive bracket must be removed from the drive back plate. (Refer to the instructions above regarding removing the drive bracket from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board.) The drive gear cover is held in place on the drive bracket by three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off the pegs in the cover. Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

The drive gear cover only fits on one way, with the large clip orientated towards the bottom. If all three clips are outside of the gear shroud on the drive bracket the drive gear cover slips easily into place.

The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. Move the spring clip loop to the right and hold. Rotate the motor at least a ¼ turn in either direction so the wires are vertical (up & down) before gently pulling on the wire connectors to remove the motor. Pulling directly on the wires without rotating the motor may break the wires off the motor.

Replace the motor if necessary. Do not lubricate the motor or the gears. To reinstall the motor, move the spring clip loop to the right and hold. Gently turn the motor while inserting so that the gear on the motor meshes with the gears under the drive gear cover. Release the spring clip loop and continue to rotate the motor until the wires are horizontal and the motor housing engages the small plastic bulge inside the drive bracket motor retainer. Reconnect the motor plug to the two-pronged jack on the lower left side of the PC board. If the motor will not easily engage with the drive gears when reinstalling, lift and slightly rotate the motor before reinserting. Reconnect the power plug.



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Replace the valve cover. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold SET and DOWN buttons for 3 seconds. (The cover button may have other names like "SET HOUR", "CLOCK" or "SET CLOCK" but the circuit board is labeled with SET.) This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.



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Drive Cap Assembly, Main Piston and Regenerant Piston

The drive assembly must be removed to access the drive cap assembly. The drive cap assembly must be removed to access the piston(s). The drive cap assembly is threaded into the control valve body and seals with an o-ring. To remove the drive cap assembly use the special plastic wrench or insert a 1/2" flat blade screwdriver into one of the slots around the top 2" of the drive cap assembly so it engages the notches molded into the drive back plate around the top 2" of the piston cavity. See Figure 5. The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counter clockwise. Once loosened unscrew the drive cap assembly by hand and pull straight out.

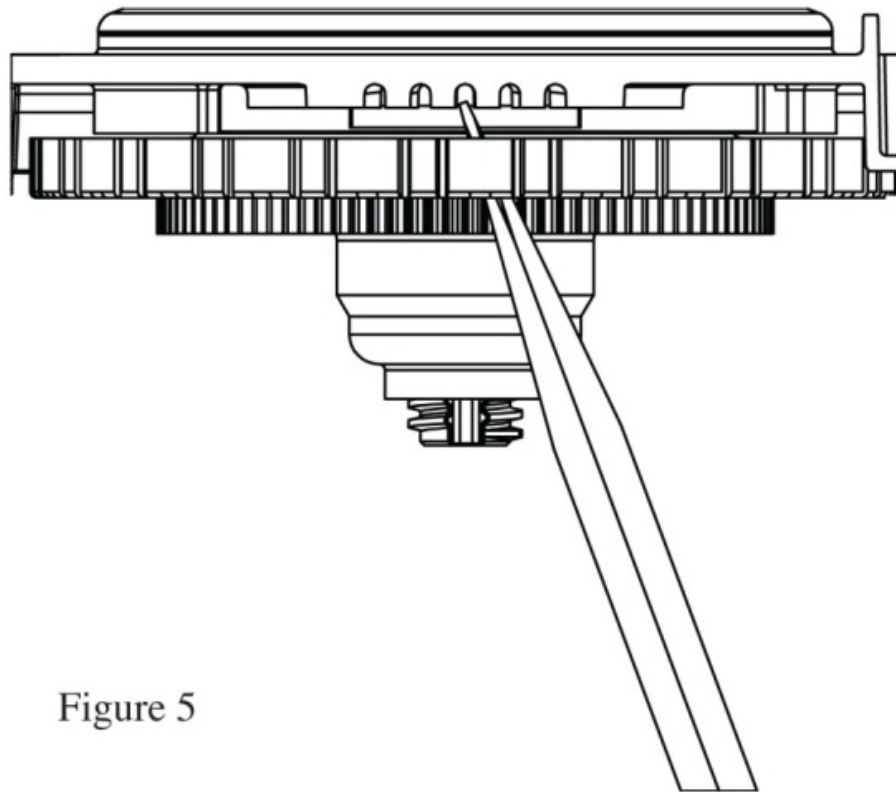


Figure 5

To remove the main piston fully extend the piston rod and then unsnap the main piston from its latch by pressing on the side with the number. Chemically clean in dilute sodium bisulfite or vinegar, or replace the main piston. The regenerate piston is not present on a backwash filter.

Reattach the main piston to the drive cap assembly. Reinsert the drive cap assembly and piston into the spacer stack assembly and hand tighten the drive cap assembly. Continue to tighten the drive cap assembly using a screwdriver as a ratchet until the black o-ring on the spacer stack assembly is no longer visible through the drain port. Excessive force can break the notches molded into the drive back plate. Make certain that the main drive gear still turns freely. The exact position of the piston is not important as long as the main drive gear turns freely.

Reattach the drive assembly to the control valve and connect all plugs. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold SET and DOWN buttons for 3 seconds. (The cover button may have other names like "SET HOUR", "CLOCK" or "SET CLOCK" but the circuit board is labeled with SET.) This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.



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Spacer Stack Assembly

For spacer stack identification refer to drawing in valve drawings section of this manual.

To access the spacer stack assembly remove the drive assembly, drive cap assembly and piston. The spacer stack assembly can be removed easily without tools by using thumb and forefinger. Inspect the black o-rings and clear lip seals for wear or damage. Replace the entire stack if necessary. Do not disassemble the stack.

The spacer stack assembly may be chemically cleaned (dilute sodium bisulfite or vinegar) or wiped with a soft cloth. The spacer stack assembly can be pushed in to the control valve body bore by hand. Since the spacer stack assembly can be compressed it is easier to use a blunt object ($\frac{5}{8}$ " to $1\frac{1}{8}$ " in diameter) to push the center of the assembly into the control valve body. The assembly is properly seated when at least four threads are exposed (approximately $\frac{5}{8}$ "). Do not force the spacer stack assembly in. The control valve body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

Reattach the drive cap assembly and piston(s) and the drive assembly.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold SET and DOWN buttons for 3 seconds. (The cover button may have other names like "SET HOUR", "CLOCK" or "SET CLOCK" but the circuit board is labeled with SET.) This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and then reset the valve to the service position.

Drain Line Flow Control

To access the drain line flow control remove the locking clip by pulling it straight out. Pull fitting out and replace the locking clip so that it is not misplaced. The drain line fitting is pressed in and has an o-ring seal.

In the fittings, the white flow control retainer is pressed in and has an o-ring seal. The retainer can be removed by rotating and pulling. The flow control can be removed by prying upward with a small blade flat screwdriver in one of the slots on the side. The drain line flow control and retainer can be chemically cleaned in dilute sodium bisulfite or vinegar, or replaced. Do not use a wire brush to clean the flow control or the washer. The washers are identified with three numbers, which correspond to the flow rate. When reinstalling make sure the identifying number and the rounded inside diameter on the washer is visible when seated in the retainer. The white flow control washer retainer can also be removed and cleaned. Push the retainer in firmly when reinstalling.



Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
Inlet pressure low	Low supply pressure	Correct incoming supply pressure
	Low flow from source	Remove blockage or other restrictions
Treated water flow low	Media/Resin bed fouled	Backwash Filter
	Valves closed	Check valves and fully open
Untreated water is being delivered	Bypass valve is open or faulty	Fully close bypass valve or replace
	Potassium Permanganate injection is not functioning properly.	Check potassium permanganate levels in chemical tanks and check chemical metering pump for settings and proper operation.
	Media is exhausted due to high water usage	Check program settings or diagnostics for abnormal water usage
	Water quality fluctuation	Test water and adjust program values accordingly
	Damaged seal/stack assembly	Replace seal/stack assembly
	Control valve body type and piston type mismatched	Verify proper control valve body type and piston type match
	Fouled media bed	Replace media bed
No Display on PC Board	No Power at electrical outlet	Repair outlet or use working outlet
	Control Valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	Plug Power Adapter into outlet or connect power cord end to PC Board connection
	Improper Power Supply	Verify power voltage is being delivered to the PC Board
	Defective Power Adapter	Replace Power Adapter
	Defective PC Board	Replace PC Board
PC Board does not display correct time of day	Power Adapter plugged into electric outlet controlled by light switch	Use uninterrupted outlet
	Tripped breaker switch and/or tripped GFI	Reset breaker switch and/ or GFI switch
	Power outage	Reset time of day. If PC Board has battery backup present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	Defective PC Board	Replace PC Board



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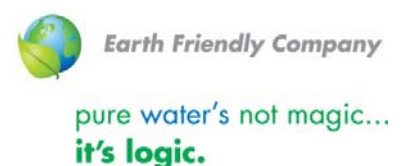
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PROBLEM	POSSIBLE CAUSE	SOLUTION
Control valve regenerates at wrong time of day	Power outage	Reset time of day. If PC Board has battery backup present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	Time of day not set correctly	Reset to correct time of day
	Time of regeneration set incorrectly	Reset regeneration time
Time of day flashes on and off	Power Outage	Reset time of day. If PC Board has battery backup present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
Control valve does not regenerate automatically when the & buttons are depressed and held	Broken drive gear or drive cap assembly	Replace drive gear or drive cap assembly
	Broken Piston Rod	Replace Piston Rod
	Defective PC Board	Replace PC Board
Control valve does not regenerate automatically but does when the & buttons are depressed and held	Bypass valve in bypass position	Turn bypass handles to place bypass in service position
	Defective PC Board	Replace PC Board
Water running to drain	Power outage during regeneration	Upon power being restored control will finish the remaining regeneration time. Reset time of day.
	Damaged seal/stack assembly	Replace seal/sack assembly
	Piston assembly failure	Replace piston assembly
	Drive cap assembly not tightened in properly	Re-tighten the drive cap assembly
E1 Error Message: Control unable to sense motor movement	Motor not inserted full to engage pinion, motor wires broken or disconnected	Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled MOTOR. Press and hold SET and DOWN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	PC Board not properly snapped into drive bracket	Properly snap PC Board into drive bracket and then press and hold SET and DOWN buttons for 3 seconds. to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Missing reduction gears	Replace missing gears



PROBLEM	POSSIBLE CAUSE	SOLUTION
E2 Error Message: Control valve motor ran too short and was unable to find the next cycle position and stalled	Foreign material is lodged in control valve	Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Mechanical binding	Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Main drive gear too tight	Loosen main drive gear. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 secs then reconnect.
	Improper voltage being delivered to PC Board	Verify that proper voltage is being supplied. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
E3 Error Message: Control valve motor ran too long and was unable to find the next cycle position	Motor failure during a regeneration	Check motor connections. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	Replace piston and stack assemblies. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
	Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	Snap drive bracket in properly. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.
E4 Error Message: Control valve motor ran too long and timed out trying to reach home position	Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	Snap drive bracket in properly. Press and hold SET and DOWN buttons for 3 seconds or disconnect power supply from PC Board for 5 seconds and then reconnect.

Notes: _____



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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