



# **Fusion<sup>2</sup>**

by Waterite Technologies

***Advanced Water Conditioners***  
*featuring the Custom Control F2CC Valve*

## **OWNER'S MANUAL**

***FOR ALL FUSION<sup>2</sup> F SERIES AND FCA SERIES WATER CONDITIONERS***

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THIS MANUAL IS TO BE LEFT WITH THE OWNER OF THE EQUIPMENT FOR REFERENCE PURPOSES AND TECHNICAL GUIDANCE. IT IS STRONGLY RECOMMENDED THAT QUALIFIED DEALER SERVICE PERSONNEL BE CONTACTED IN THE EVENT OF AN UNKNOWN INTERRUPTION OF SERVICE OR APPARENT PRODUCT MALFUNCTION. AN ANNUAL PREVENTATIVE MAINTENANCE INSPECTION BY A WATER PROFESSIONAL IS RECOMMENDED TO ENSURE TROUBLE-FREE AND CONTINUOUS OPERATION.



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## PREINSTALLATION INSTRUCTIONS

This unit has a control valve which enables the setting of not only the length of each regeneration cycle but also the order in which cycles (steps of regeneration) occur. The following pages instruct how to set the treatment unit's sequence of cycles, cycle times, salt dose, exchange capacity, and gallon capacity/regeneration time. A salt warning option may also be included.

## THE DEALER...

1. Read this page, GENERAL INSTRUCTIONS, INSTALLER SETTINGS, NORMAL OPERATING DISPLAYS, and LOW SALT WARNING.
2. Complete the CYCLE SEQUENCE SETTINGS.
3. Complete the SOFTENER SYSTEM SETUP.
  - a. Cycle Times
  - b. Choose Softener or Filter
  - c. Set Salt Dose
  - d. Set Capacity
  - e. Set How Gallon Capacity Will be Calculated
  - f. Set Regeneration Time Option
  - g. Select or Turn Off Low Salt Warning

## THE INSTALLER...

1. Read Bypass Valve page.
2. Read GENERAL INSTRUCTIONS, NORMAL OPERATING DISPLAYS, and RESETTING LOW SALT WARNING (if applicable).
3. Be sure CYCLE SEQUENCE SETTINGS and SOFTENER SYSTEM SETUP are done before leaving for installation.
4. Follow INSTALLATION INSTRUCTIONS, INSTALLER SETTINGS, TIME OF DAY, and RESETTING SALT AMOUNT (if applicable).
5. Follow START UP INSTRUCTIONS.

# CONTROL VALVE SPECIFICATIONS

SERVICE FLOW RATE & PRESSURE LOSS (valve only, including bypass valve, but not including mineral, etc.)	27 gpm (102.2 lpm) @ 15 psi (103 kPa) $\Delta P$
BACKWASH FLOW RATE & PRESSURE LOSS (whole conditioner...including bypass valve)	27 gpm (102.2 lpm) @ 25 psi (172 kPa) $\Delta P$
MINIMUM & MAXIMUM OPERATING PRESSURE	20 psi (138 kPa) - 125 psi (862 kPa)
MINIMUM & MAXIMUM OPERATING TEMPERATURE	40°F (4°C) - 110°F (38°C)
CURRENT DRAW & VOLTAGE	0.5 amperes                      110 volts
REGENERANT TANK REFILL RATE	0.5 gpm (1.9 lpm)
INLET / OUTLET FITTING TYPES	(a) 1" NPT elbow (b) 3/4" & 1" PVC solvent weld socket (c) 1" straight brass sweat fitting (d) 3/4" straight brass sweat fitting
DISTRIBUTOR TUBE	1.05" O.D. (3/4" U.S. PVC Pipe Size)
TANK THREAD	2" - 8 NPSM
PC BOARD MEMORY	Nonvolatile EEPROM (electrically erasable programmable read only memory)
COMPATIBLE REGENERANTS	sodium chloride, potassium chloride, potassium permanganate, sodium hydroxide, hydrochloric acid
COMPATIBLE CHEMICALS	sodium bisulfite, sodium hydrosulfite, chlorine, chloramines

## GENERAL INSTRUCTIONS

During operation, the normal user displays such as time of day, gallons or days remaining before regeneration (optional), and salt warning (optional), are shown. Each of these can be viewed by pressing NEXT to scroll through them. When moving through any displays or programming, if no buttons are pressed within five minutes, the display returns to normal operating displays. Any changes made prior to the five minute time out are incorporated.

To quickly exit any Programming, Installer Settings, etc., press SET CLOCK. Any changes made prior to the exit are incorporated.

If desired, two regenerations within 24 hours are possible with a return to the preset program. To do a double regeneration if the control valve is factory set to "NORMAL" or "NORMAL + on 0" (see Step 9S under SOFTENER SYSTEM SETUP):

1. Press the "REGEN" button once. REGEN TODAY will flash on the display.
2. Press and hold the "REGEN" button for three seconds until a regeneration begins.

Once the valve has completed the immediate regeneration, the valve will regenerate one more time at the preset regeneration time.

# CYCLE SEQUENCE

CYCLE SEQUENCE instructions allows the setting of the order of the cycle. There are 9 cycles which can be arranged in any order. Later in this book the INSTALLER SETTINGS allow the setting of how long cycles will last.

CYCLE OPTIONS			
BACKWASH	DN BRINE	FILL	END
RINSE	UP BRINE	SOFTENING OR FILTERING	

END must be used as the last cycle option. The SERVICE cycle should only be used in brine prefill applications.

If using upflow brine verify that the valve is configured as follows:

1. upflow piston is installed; and
2. injector is located in up hole and injector plug is in down hole.

The following is an example of how to set a valve so that when regeneration is initiated BACKWASH occurs first, dn BRINE occurs second, RINSE occurs third, and FILL occurs fourth.

**STEP 1CS**

Step 1CS – Press NEXT and simultaneously for 3 seconds until SOFTENING or FILTERING appears on the display and release. If SOFTENING doesn't appear, use the or Δ button to display it. Then press NEXT and again for 3 seconds and release. If screen in Step 2CS does not appear in 5 seconds the lock on the valve is activated. To unlock press , NEXT, Δ, and SET CLOCK in sequence, then press NEXT and simultaneously for 3 seconds and release. Then press NEXT and again for 3 seconds and release.

**STEP 2CS**

Step 2CS – Press the or Δ, buttons until BACKWASH appears. Press NEXT to go to Step 3CS. Press REGEN if you need to return to the previous step.

**STEP 3CS**

Step 3CS - Press the or Δ buttons until dn BRINE appears. Press NEXT to go to Step 4CS. Press REGEN if you need to return to the previous step.

**STEP 4CS**

Step 4CS - Press the or Δ buttons until RINSE appears. Press NEXT to go to Step 5CS. Press REGEN if you need to return to the previous step.

**STEP 5CS**

Step 5CS - Press the or Δ buttons until FILL appears. Press NEXT to go to Step 6CS. Press REGEN if you need to return to the previous step.

**STEP 6CS**

Step 6CS - Press the or Δ buttons until END appears. Press NEXT to exit CYCLE SEQUENCE. Press REGEN if you need to return to the previous step.

RETURN TO NORMAL MODE

# SOFTENER SYSTEM SETUP

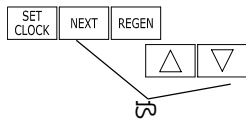
In SOFTENER SYSTEM SETUP you choose the duration for the cycles selected in CYCLE SEQUENCE and specify other operating parameters for the system. The upper and lower limits of the allowable values for the cycles are as follows:

CYCLE SETTING LIMITS			
CYCLE OPTIONS	UNITS	LOWER/UPPER LIMIT	DEFAULT
Backwash	minutes	1 to 1200	8
Rinse (fast rinse)			6
dn Brine (brine and slow rinse)			6.0
UP Brine (brine and slow rinse)			6.0
Fill (regenerant tank refill)	Lbs.	0.1 to 120.0	6.0
Service	minutes	1 to 1200	240

Since no time is associated with the END cycle, the END cycle will not appear in the SOFTENER SYSTEM SETUP sequence.

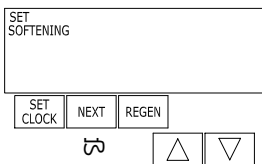
Note: Fill is in pounds of salt.

## STEP 1S



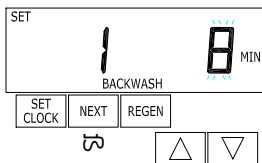
Step 1S – Press NEXT and simultaneously for 3 seconds and release. If screen in Step 2S does not appear in 5 seconds the lock on the valve is activated. To unlock press , NEXT, Δ, and SET CLOCK in sequence, then press NEXT and Δ simultaneously for 3 seconds and release.

## STEP 2S



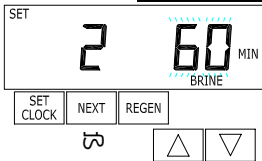
Step 2S – Choose SOFTENING using the or Δ button. Press NEXT to go to Step 3S. Press REGEN if you want to exit SOFTENER SYSTEM SETUP.

## STEP 3S



Step 3S – Select the time for the first cycle (which in this example is BACKWASH) using the or Δ button. Press NEXT to go to Step 4S. Press REGEN if you need to return to previous step.

## STEP 4S



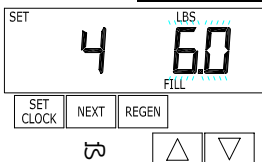
Step 4S – Select the time for the second cycle (which in this example is dn BRINE) using the or Δ button. Press NEXT to go to Step 5S. Press REGEN if you need to return to previous step. NOTE: The display will flash between cycle number and time, and brine direction (dn or UP).

## STEP 5S



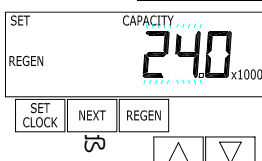
Step 5S – Select the time for the third cycle (which in this example is RINSE) using the or Δ button. Press NEXT to go to Step 6S. Press REGEN if you need to return to the previous step.

## STEP 6S



Step 6S – Select the Lbs. for the fourth cycle (which in this example is FILL) using the or Δ button. Press NEXT to go to Step 7S. Press REGEN if you need to return to the previous step.

## STEP 7S



Step 7S – Set Grains Capacity using the or Δ button. The ion exchange capacity is in grains of hardness as calcium carbonate for the system based on the pounds of salt that will be used. Calculate the pounds of salt using the fill time previously selected. The allowable grains capacity range varies from 5000 to 200,000 grains. The increment increase is 500 for the range from 5000 to 30,000, 1000 for the range of 30,000 to 100,000, and 2000 for the range of 100,000 to 200,000. Grains capacity is affected by the fill time. The grains capacity for the selected fill time should be confirmed by testing. The capacity and hardness levels entered are used to automatically calculate reserve capacity when gallon capacity is set to AUTO. Press NEXT to go to Step 8S. Press REGEN if you need to return to previous step.

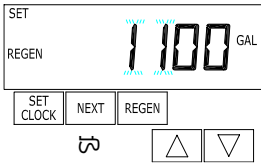
# SOFTENER SETUP DETAIL TABLE

This table is to be used as a guide or shortcut to the settings made in Step 3I, 8S, and 9S. For quick programming use the recommended settings shown in row 3 below in bold italic type.

Gallons Capacity	Regeneration Time Option	Day Override	Result
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when gallons capacity falls below the reserve capacity at the Time.
<b><i>AUTO</i></b>	<b><i>NORMAL</i></b>	<b><i>Any number or 14 day default</i></b>	<b><i>Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when gallons capacity falls below capacity... or the specified number of days between regenerations is reached.</i></b>
Any number	NORMAL	oFF	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when gallons capacity reaches 0
oFF	NORMAL	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached.
Any number	NORMAL	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when gallons capacity reaches 0 number of days between regenerations is reached.
AUTO	On O	oFF	Reserve capacity automatically estimated. Regeneration occurs immediately when gallons capacity reaches 0. Time of regeneration is not allowed to be set because regeneration will always occur when gallons capacity reaches 0.
Any number	On O	oFF	Reserve capacity not automatically estimated. Regeneration occurs immediately when gallons capacity reaches 0. Time of regeneration is not allowed to be set because regeneration will always occur when gallons capacity reaches 0.
AUTO	NORMAL on O	oFF	Reserve capacity automatically estimated. Regeneration occurs when gallons capacity falls below the reserve capacity at the Time or regeneration occurs immediately after 10 minutes of no water usage when gallons capacity reaches 0.
AUTO	NORMAL on O	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when gallons capacity falls below reserve capacity or the specified number of days between regenerations is reached, or regeneration occurs immediately after 10 minutes of no water usage when gallon capacity reaches 0.
Any number	NORMAL on O	Any number	Reserve capacity not automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached, or regeneration occurs immediately after 10 minutes of no water usage when gallon capacity reaches 0.

# SOFTENER SYSTEM SETUP

## STEP 8S



Step 8S – Set Gallons Capacity using the or button. If value is set to:

- “AUTO” ...the gallon capacity will be automatically calculated and reserve capacity will be automatically estimated.

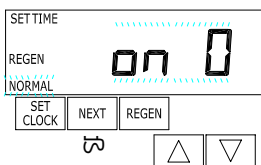
- “oFF” ...the regeneration will be based on the day override set (see Installer Settings Step 3I).

- a specific number (allowable range 20 to 50,000)...the regeneration initiation will be based on the value specified. The settable increment is 20 for the range 20 to 1000, 50 for the range of 1000 to 10,000 and 100 for the range of 10,000 to 50,000.

If “oFF” or a specific number is used, hardness display will not be allowed to be set in Installer Displays Step 2I. Press NEXT to go to Step 9S.

Press REGEN if you need to return to the previous step.

## STEP 9S



Step 9S – Set Regeneration Time Options using the or button. If value is set to:

- “NORMAL” ...the regeneration will occur at the preset time.

- “on O” ...the regeneration will occur immediately when the gallons capacity reaches 0 (zero).

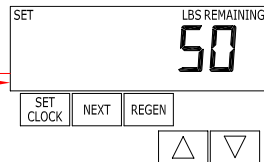
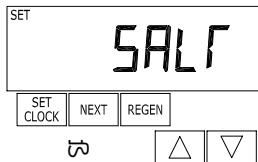
- “NORMAL + on O” ...the regeneration will occur at one of the following:

- the preset time when the gallons capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first; or,

- immediately after 10 minutes of no water usage when the gallon capacity reaches 0 (zero).

Press NEXT to go to Step 10S. Press REGEN if you need to return to the previous step.

## STEP 10S



Step 10S – Set Low Salt Warning using the or button. If the value is set to:

- “oFF” ...no low salt level warning will appear for the user.

- a specific value...“FILL SALT” will flash on the display when the calculated remaining pounds of salt falls below that level. Allowable values range form 10 to 400 pounds in 10 pound increments.

Press NEXT to exit SOFTENER SYSTEM SETUP.

Press REGEN if you ned to return to the previous step.

RETURN TO  
NORMAL MODE

# BYPASS VALVE

The bypass valve is typically used to isolate the control valve from the plumbing system's water pressure in order to perform control valve repairs or maintenance. The 1" full flow bypass valve incorporates four positions including a diagnostic position that allows a service technician to have pressure to test a system while providing untreated bypass water to the building.

The bypass body and rotors are glass filled Noryl and the nuts and caps are glass filled polypropylene. All seals are self-lubricating EPDM to help prevent valve seizing after long periods of non-use. Internal o-rings can easily be replaced if service is required.

The bypass consists of two interchangeable plug valves that are operated independently by red arrow shaped handles. The handles identify the direction of flow. The plug valves enable the bypass valve to operate in four positions.

1. **Normal Operation Position:** The inlet and outlet handles point in the direction of flow indicated by the engraved arrows on the control valve. Water flows through the control valve for normal operation of a water softener or filter. During the regeneration cycle this position provides regeneration water to the unit, while also providing untreated water to the distribution system. (See Figure 1)
2. **Bypass Position:** The inlet and outlet handles point to the center of the bypass. The system is isolated from the water pressure in the plumbing system. Untreated water is supplied to the building. (See Figure 2)
3. **Diagnostic Position:** The inlet handle points toward the control valve and the outlet handle points to the center of bypass valve. Untreated supply water is allowed to flow to the system and to the building, while not allowing water to exit from the system to the building (See Figure 3).  
This allows the service technician to draw brine and perform other tests without the test water going to the building.  
**NOTE:** The system must be rinsed before returning the bypass valve to the normal position.
4. **Shut Off Position:** The inlet handle points to the center of the bypass valve and the outlet handle points away from the control valve. The water is shut off to the building.  
The water treatment system will depressurize upon opening a tap in the building. A negative pressure in the building combined with the softener being in regeneration could cause a siphoning of brine into the building.  
If water is available on the outlet side of the softener or filter it is an indication of water bypassing the system (i.e. a plumbing cross-connection somewhere in the building). (See Figure 4)

Figure 1

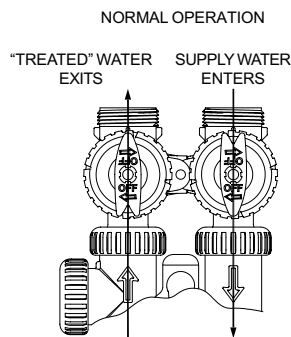


Figure 2

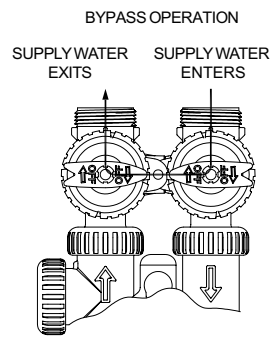


Figure 3

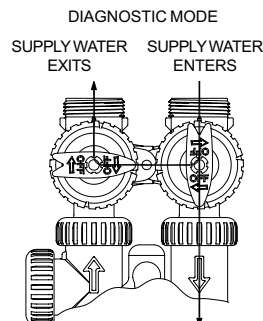
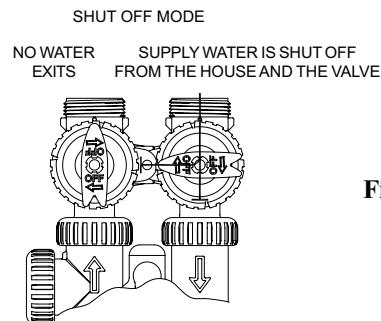
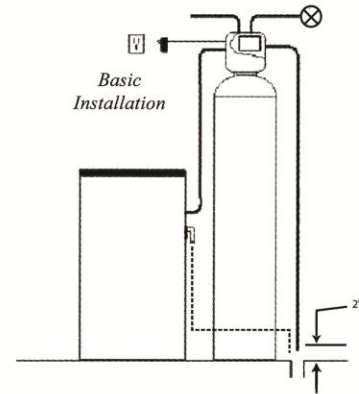
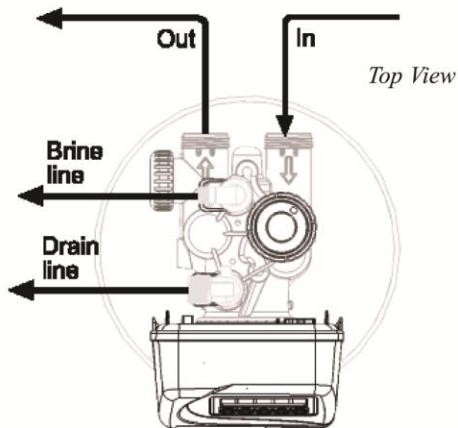


Figure 4





# INSTALLATION



## GENERAL INSTALLATION & SERVICE 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. Avoid any type of lubricants, including silicone, on red or clear lip seals.

Do not use pipe dope or other sealants on threads. Teflon tape must be used on the threads of the 1" NPT elbow, its "M" NPT connection, and on the threads for the drain line connection. Teflon tape is not used on the nut connections or caps because o-ring seals are used. The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic Service Wrench, #V3193. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten nuts or caps. Do not place screwdriver in slots on caps and/or tap with a hammer.

## SITE REQUIREMENTS

- Water Pressure, 20-125 psi (138-862 kPa)
- Water temperature, 40° -110° F (4° - 38° C)
- The tanks should be on a firm level surface
- Electrical: Use a 115/120V, 60Hz uninterrupted outlet.
- Current draw is 0.5 amperes
- A 15 ft power cord is furnished.
- The plug-in transformer is for dry locations only.
- Batteries are not used.

1. The distance between the drain and the water conditioner should be as short as possible.
2. Since salt must be periodically added to the brine tank, it should be located where it is easily accessible.
3. Do not install any water conditioner with less than 10 feet (3m) of piping between its outlet and the inlet of a water heater. Water heaters sometimes overheat to the extent that they will transmit heat or backflow from their inlet back to the water conditioner control. Hot water can severely damage the conditioner. Allowing the 10 foot (3m) distance will permit most heat to dissipate before reaching the water conditioner. A more positive way of insuring against backflow is to install a high temperature check valve. The heater should also have a properly rated temperature and pressure relief valve. Also, be certain that local codes are not violated.
4. Do not locate unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures under 34° F (49° C).
5. The use of resin cleaners in an unvented enclosure is not recommended.

SERIAL NUMBER: Record the serial number on the installer's and customer's records.

# INSTALLATION

**INLET/OUTLET PLUMBING:** Connect to a supply line downstream of outdoor spigots. Install an inlet shutoff valve and plumb to the unit's bypass valve inlet located at the right rear as you face the unit. There are a variety of installation fittings available. They are listed under Installation Fitting Assemblies. 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 solder flux, primer, and solvent cement on any part of the o-rings, split rings, bypass valve or control valve. If the building's electrical system is grounded to the plumbing, install a copper grounding strap from the inlet to the outlet pipe. Plumbing must be done in accordance with all applicable local codes.

**DRAIN LINE:** First, be sure that the drain can handle the backwash rate of the system. 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 flow control fitting and solder joints. Failure to do this could cause interior damage to the flow control. Install a 1/2" I.D. flexible plastic tube to the Drain Line Assembly or discard the tubing nut and use the 1/2" NPT fitting for rigid pipe. If the backwash rate is greater than 7 gpm, use a 1/2" drain line. Where the drain line is elevated but empties into a drain below the level of the control valve, form a 7" (18 cm) loop at the discharge end of the line so that the bottom of the loop is level with the drain connection on the control valve. This will provide an adequate anti-siphon trap. Where the drain empties into an overhead sewer line, a sink-type trap must be used. Run drain tube to its discharge point in accordance with plumbing code. Pay special attention to codes for air gaps and anti-siphon devices.



**IMPORTANT:**

Never insert a drain line directly into a drain, sewer line, or trap. Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the conditioner.

**BRINE TANK CONNECTION:** Install a 3/8" O.D. polyethylene tube from the Refill Elbow to the Brine Valve in the brine tank.

**OVERFLOW LINE CONNECTION:**

**AN OVERFLOW DRAIN LINE IS RECOMMENDED WHERE A BRINE OVERFLOW COULD DAMAGE FURNISHINGS OR THE BUILDING STRUCTURE.**

Your softener is equipped with a brine tank safety float which greatly reduces the chance of an accidental brine overflow. In the event of a malfunction, however, an OVERFLOW LINE CONNECTION will direct the "overflow" to the drain instead of spilling on the floor where it could cause considerable damage. This fitting should be on the side of the cabinet or the brine tank.

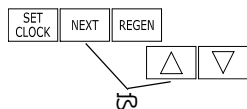
To connect overflow fitting, locate hole in side of brine tank. Insert overflow fitting into tank and tighten with plastic thumb nut and gasket from the inside. Attach a length of 1/2" (1.3 cm) I.D. tubing (not supplied) to fitting and run to drain. Do not elevate overflow line higher than 3" (7.6 cm) below bottom of overflow fitting. Do not "tie" this tube into the drain line of the control valve. Overflow line must be a direct, separate line from overflow fitting to drain, sewer, or tub. Allow an air gap as per the drain line instructions.



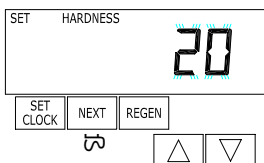
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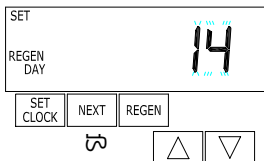
### STEP 1I



### STEP 2I



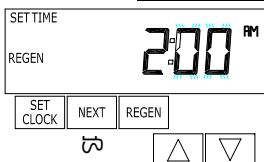
### STEP 3I



### STEP 4I



### STEP 5I



RETURN TO NORMAL MODE

## INSTALLER SETTINGS

NOTE: What follows assumes that AUTO is set for regeneration mode in Step 8S, meaning gallons are automatically calculated.

STEP 1I - Press NEXT and  $\Delta$  simultaneously for 3 seconds.

STEP 2I – Hardness: Set the amount of hardness in grains per gallon (default 20) using the  $\Delta$  or  $\nabla$  buttons. The allowable range is from 1 to 150 in 1 grain increments. Note: Increase the grains per gallon if soluble iron is present. This display will show “–nA–” if “FILTER” is selected or if “AUTO” is not selected previously. Press NEXT to go to step 3I. Press REGEN if you want to exit.

STEP 3I – Day Override: When gallon capacity is set to off, this sets the number of days between regenerations. When gallon capacity is factory set to AUTO or to any number, this sets the maximum number of days between regenerations. If this is set to “oFF”, regeneration initiation is based solely on gallons used. If any number is set (allowable range from 1 to 28), a regeneration initiation will be called for on that day even if sufficient number of gallons were not used to call for a regeneration. Set Day Override using  $\Delta$  or  $\nabla$  buttons (14 recommended):

- set number of days between regeneration (1 to 28, default 14); or
- set to “oFF”.

Press NEXT to go to step 4I. Press REGEN if you need to return to previous step.

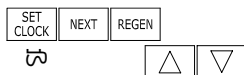
STEP 4I – Next Regeneration Time (hour): Set the hour of day for regeneration using  $\Delta$  or  $\nabla$  buttons. AM/PM toggles after 12. The default time is 2:00 a.m. (recommended).

This display will show “REGEN on 0 GAL” if immediate regeneration was factory set. Press NEXT to go to step 5I. Press REGEN if you need to return to previous step.

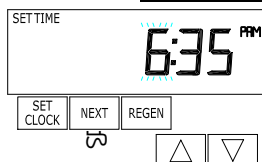
STEP 5I – Next Regeneration Time (minutes): Set the minutes using  $\Delta$  or  $\nabla$  buttons. This display will not be shown if “on 0” is selected in step 9S. Press NEXT to exit Installer Settings. Press REGEN to return to previous step. To initiate a manual regeneration immediately, press and hold the “REGEN” button for three seconds. The system will begin to regenerate immediately. The control may be manually stepped through the regeneration cycles by pressing “REGEN”.

## SET TIME OF DAY

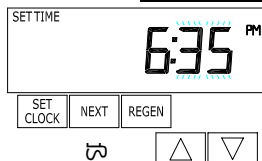
### STEP 1U



### STEP 2U



### STEP 3U



RETURN TO  
NORMAL MODE

### TIME OF DAY

Time of day should only need to be set after extended power outages or when daylight saving time begins or ends. If an extended power outage occurs, the time of day will flash on and off indicating that the time should be reset.

STEP 1U – Press SET CLOCK.

STEP 2U - Current Time (hour): Set the hour of the day using  $\Delta$  or  $\nabla$  buttons. AM/PM toggles after 12. Press NEXT to go to step 3U.

STEP 3U - Current Time (minutes): Set the minutes using  $\Delta$  or  $\nabla$  buttons. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

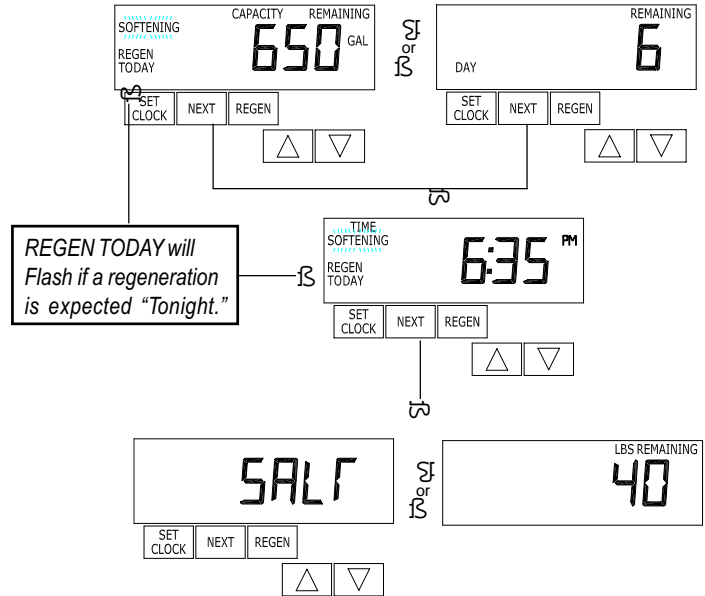
# NORMAL OPERATING DISPLAYS

## GENERAL OPERATION

When the system is operating one of three displays will be shown. Pressing NEXT will alternate between the displays. One of the displays is the current time of day. Depending the system configuration, the second display is one of the following: days remaining or gallons remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the number of gallons that will be treated before the system goes through a regeneration cycle. The third display is an option and, if used, will show the number of pounds of salt remaining in the brine tank. The user can scroll between the displays as desired using NEXT.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will appear on the display.

When water is being treated (i.e. water is flowing through the system) the word "Softening" or "Filtering" flashes on the display.



## REGENERATION MODE

Typically a system is set to regenerate at a time of low water usage. If there is a demand for water when the system is regenerating, untreated water will be delivered.

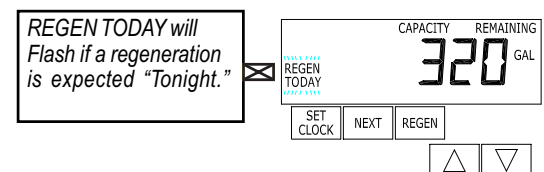
When the system begins to regenerate, the display will change to include information about the step of the regeneration process and the time remaining for that step to be completed. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.



## MANUAL REGENERATION

Sometimes there is a need to regenerate before the control valve calls for it, usually referred to as manual regeneration. This is needed when a period of heavy water usage is anticipated or when the system has been operated without salt.

- To initiate a manual regeneration at the preset delayed regeneration time, press and release "REGEN". The words "REGEN TODAY" will flash on the display to indicate that the system will regenerate at the preset delayed regeneration time.
- If you pressed the "REGEN" button in error, pressing the button again will cancel the command. Note: If the regeneration time is factory set to "on 0" there is no set delayed regeneration time so "REGEN TODAY" will not activate if "REGEN" button is pressed.
- To initiate a manual regeneration immediately, press and hold the "REGEN" button for three seconds. The system will begin to regenerate immediately. The command cannot be cancelled.



# POWER LOSS & ERROR DISPLAY

## POWER LOSS

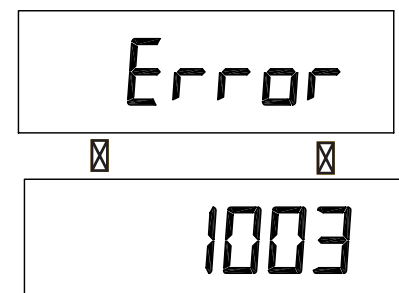
If the power goes out for less than two hours, the system will automatically reset itself. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset.

The system will remember the rest.

## ERROR MESSAGE

If the word "ERROR" and a number are alternately flashing on the display record the number and contact the dealer or manufacturer for help.

This indicates that the control valve was not able to function properly.

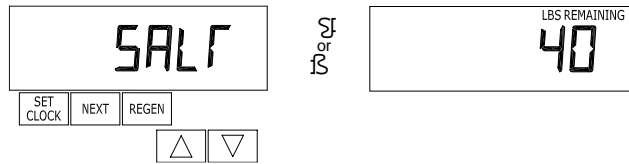


# LOW SALT WARNING (optional)

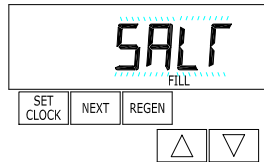
## Salt Remaining or Adding Salt

If the Low Salt Warning option was factory installed the following screens will be viewed in the User Display.

Note: The salt used per regeneration setting was set in increments of 0.1 pounds, but the LBS REMAINING screen will round up or down to the closest whole number.



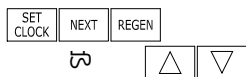
Once the salt remaining has gone below the set point, the display will automatically flash "Salt Fill".



## RESETTING THE SALT AMOUNT AFTER ADDING

When adding salt to the brine tank (if the salt remaining option is used) the following steps must be completed:

### STEP 1US



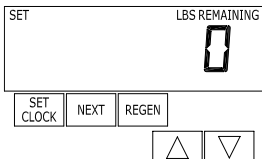
Step 1US – Press the NEXT button until SALT appears in the display. It does not matter if the SALT display alternates with the LBS REMAINING display.

### STEP 2US



Step 2US – Press SET CLOCK.

### STEP 3US

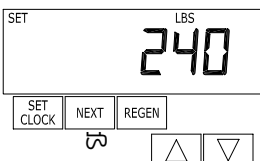


Step 3US – Set LBS REMAINING: Use the or  $\Delta$  button to adjust the pounds remaining in the brine tank.

NOTE: Estimate the pounds of salt in the brine tank and add it to the amount of salt added to the brine tank. The example at the left would indicate 200 lbs. of salt being added to a brine tank that has 40 lbs. remaining.



### STEP 4US



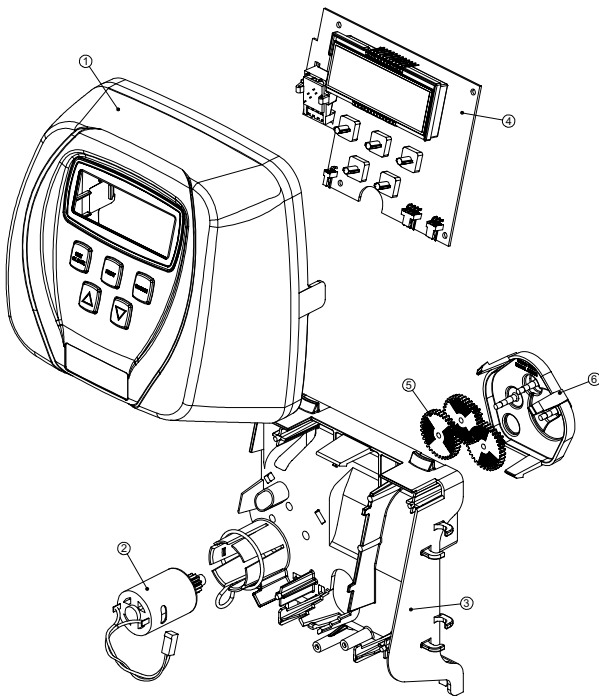
Step 4US – Press SET CLOCK to exit Adding Salt. The control is now in one of its three normal operating displays. Press NEXT to view GAL CAPACITY REMAINING or TIME OF DAY.

RETURN TO NORMAL MODE

# START UP INSTRUCTIONS

- After installation is completed rotate the bypass handles to the bypass position (see bypass valve diagram page ).
  - Turn on water and check for leaks.
  - Fully open a cold water faucet.
  - Allow water to run until clear to rid pipes of debris which may have occurred during installation.
  - The system is now ready for filling with water and for testing.
1. With the bypass valve in the bypass position, manually pour enough water into the brine tank to reach the top of the air check valve.
  2. Press and hold the REGEN button until the motor starts. Release button. Wait until the display reads "BACK-WASH" and the remaining time is counting down. Unplug transformer to prevent valve from moving to the next cycle.
  3. Open the inlet handle of the bypass valve very slightly allowing water to fill the tank slowly in order to expel air. CAUTION: If water flows too rapidly there will be a loss of media.
  4. When the water is flowing steadily to the drain without the presence of air, restore power and momentarily press the REGEN button to advance the control to the "BRINE" position.
  5. Fully open the inlet bypass valve handle (bypass is now in the diagnostic position). Check to verify that water is being drawn from brine tank. There should be a slow flow to the drain. Allow two minutes for the media bed to settle.
  6. Momentarily press REGEN again until the display reads "2 BACKWASH" and the "time remaining" numbers are counting down. The "2" flashes.
  7. Momentarily press REGEN again until the display reads "RINSE". Unplug transformer. There should be a rapid flow to the drain. Allow to run until steady, clear, and without air. Restore power.
  8. Set bypass valve handles to the normal operating position
  9. Momentarily press REGEN again until the display reads "FILL". Allow the brine tank to fill automatically. It will fill with the proper volume of water for the first regeneration after the unit will automatically return to the service position. If not filling automatically, press REGEN to advance the valve to service.
  10. While the brine tank is filling, load it with water softener salt.

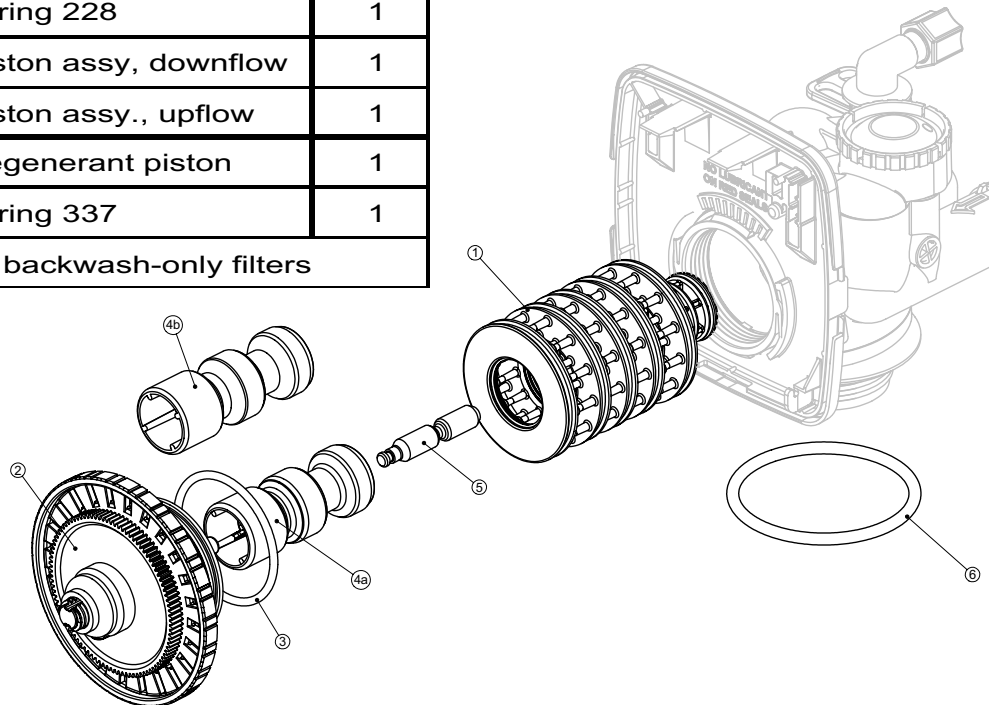
# REPLACEMENT PARTS



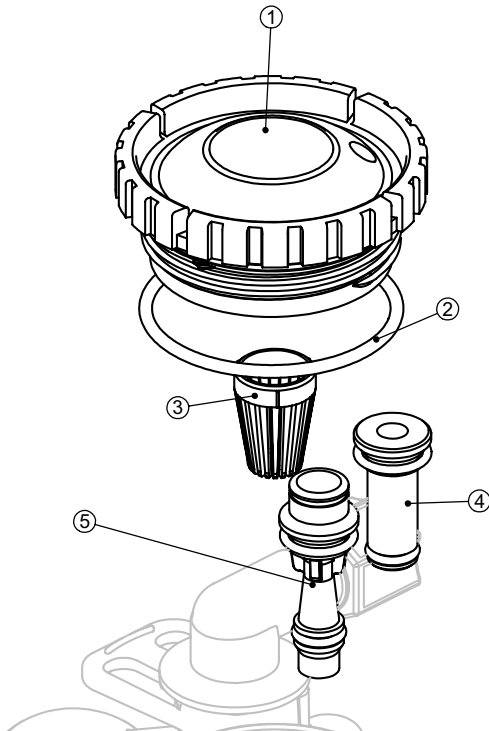
Front Cover and Drive Assembly			
Item No.	Part No.	Description	Qty.
1	V3175CC-01	Front cover assy., CC	1
2	V3107-1	Motor	1
3	V3106-01	Drive bracket & spring clip	1
4	V3108CC	PC board, CC	1
5	V3110	Drive gear, 12x36	3
6	V3109	Drive gear cover	1
2-6	V3002CC	Drive assy., CC	-
not shown	V3186	Transformer, 110V-12V	1

Piston Assembly			
Item No.	Part No.	Description	Qty.
1	V3005	Spacer stack assy.	1
2	V3004	Drive cap assy.	1
3	V3135	O-ring 228	1
4a	V3011	Piston assy, downflow	1
4b	V3011-01	Piston assy., upflow	1
5	V3174	Regenerant piston	1
6	V3180	O-ring 337	1

\*Item 5 is NOT used with backwash-only filters



# REPLACEMENT PARTS



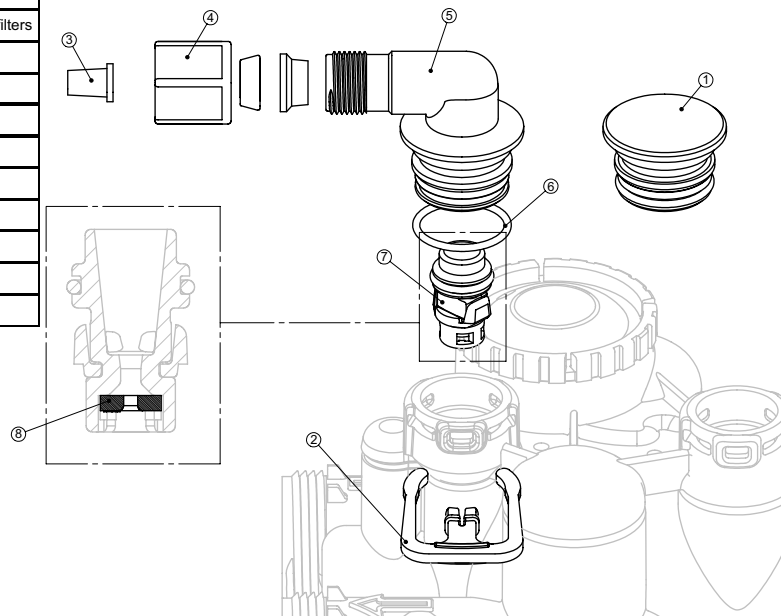
Injector assembly with Cap, Plug, Screen and O-Ring			
Item No.	Part No.	Description	Qty.
1	V3176	Injector cap	1
2	V3152	O-ring 135	1
3	V3177	Injector screen	1
4	V3010-1Z	Injector assy. plug	1
5	V3010-1A	A injector assy., BLACK	1
	V3010-1B	B injector assy., BROWN	
	V3010-1C	C injector assy., VIOLET	
	V3010-1D	D injector assy., RED	
	V3010-1E	E injector assy., WHITE	
	V3010-1F	F injector assy., BLUE	
	V3010-1G	G injector assy., YELLOW	
	V3010-1H	H injector assy., GREEN	
	V3010-1I	I injector assy., ORANGE	
	V3010-1J	J injector assy., DARK BLUE	
	V3010-1K	K injector assy., DARK GREEN	
not shown	V3170	O-ring 011 (lower)	*
not shown	V3171	O-ring 013 (upper)	*

\* The injector plug and the injector each use one lower and one upper o-ring

Note: For a backwash-only filter, item 3 is used in both holes.

Refill Port Assembly			
Item No.	Part No.	Description	Qty.
1	V3195-01	Refill port plug assy.	Req'd. for backwash-only filters
2	H4615	Elbow locking clip	1
3	JCP-P-6	Tube insert, 3/8	1
4	JCPG-6PBLK	Nut, 3/8	1
5	H4613	Elbow cap, 3/8	1
6	V3163	O-ring 019	1
7	V3165-01*	Refill flow control retainer assy.	1
8	V3182	Refill flow control (specify size)	1
not shown	H4650	Elbow, 1/2" w nut and insert	Optional

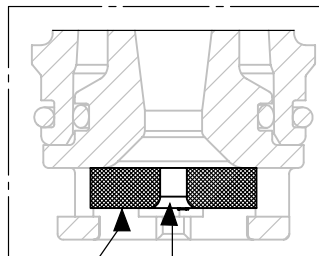
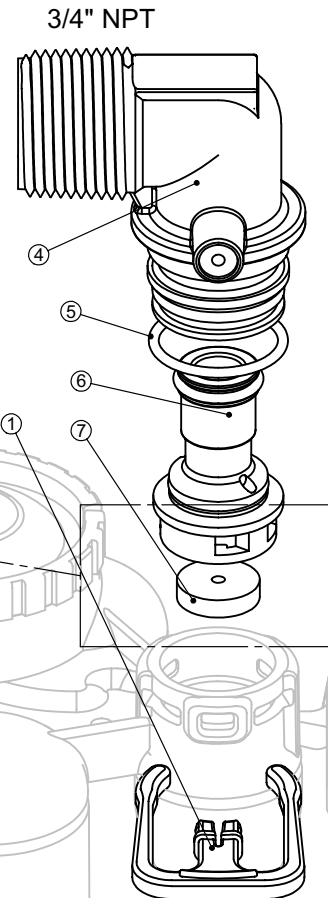
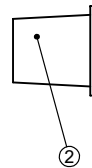
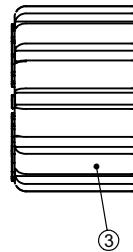
\*Assembly includes refill flow control (specify size)





# REPLACEMENT PARTS

Drain Line Assembly, 3/4"			
Item No.	Part No.	Description	Qty.
1	H4615	Locking clip, elbow	1
2	PKP10TS8-BULK	Insert, 5/8" tube	Optional
3	V3192	Nut, æ" drain elbow	Optional
4	V3158-01	Drain elbow assy., æ" NPT	1
5	V3163	O-ring 019	1
6	V3159-01	DLFC Retainer assy.	1
7	V3162-007	0.7 DLFC for æ" elbow	One DLFC must be used if æ" fitting is used.
	V3162-010	1.0 DLFC for æ" elbow	
	V3162-013	1.3 DLFC for æ" elbow	
	V3162-017	1.7 DLFC for æ" elbow	
	V3162-022	2.2 DLFC for æ" elbow	
	V3162-027	2.7 DLFC for æ" elbow	
	V3162-032	3.2 DLFC for æ" elbow	
	V3162-042	4.2 DLFC for æ" elbow	
	V3162-053	5.3 DLFC for æ" elbow	
Items 2 and 3, nut and insert, are only used with 5/8" I.D. by 1/2" O.D. polytubing. For other piping materials the æ" NPT is used.			

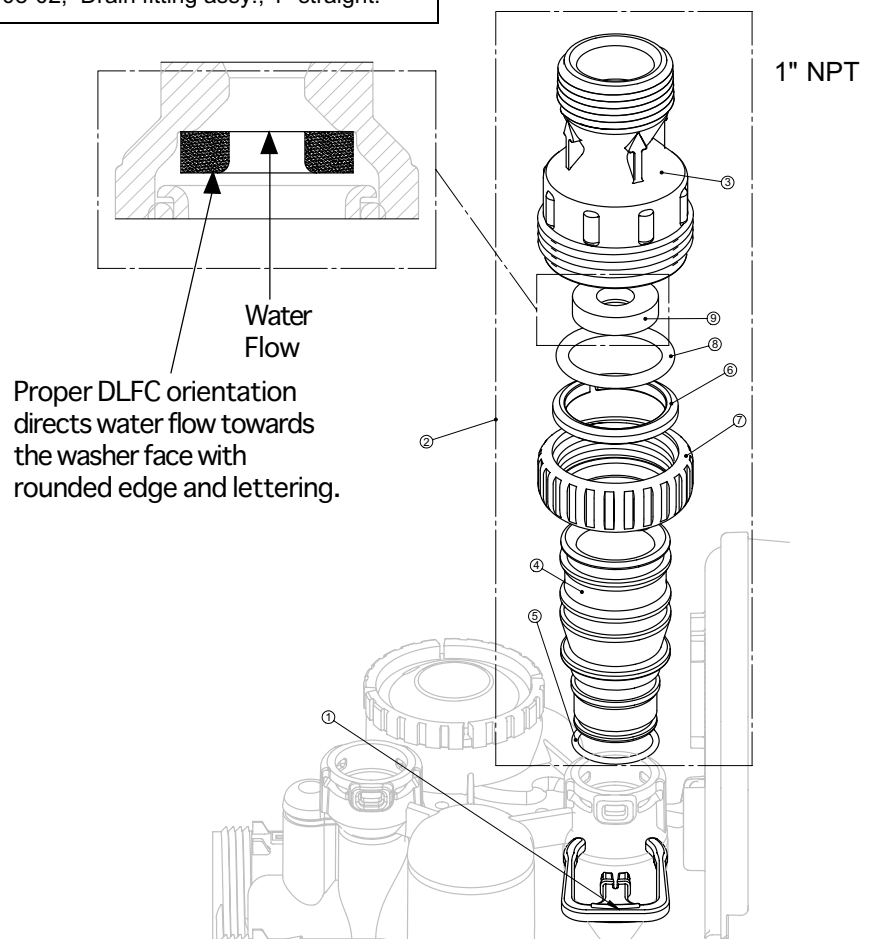


Proper DLFC orientation directs water flow towards the washer face with rounded edge and lettering.

Water Flow

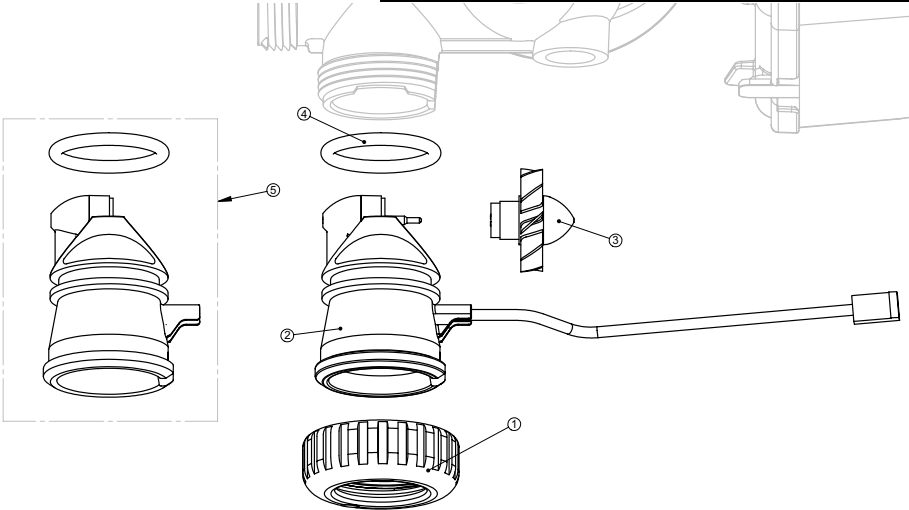
Drain Line Assembly, 1"			
Item No.	Part No.	Description	Qty.
1	H4615	Locking clip, elbow	1
2	V3008-02	Drain fitting, 1" straight	1
3*	V3166	Drain fitting body, 1"	1
4*	V3167	Drain fitting adapter, 1"	1
5*	V3163	O-ring 019	1
6*	V3150	Split ring	1
7*	V3151	Nut, 1" QC	1
8*	V3105	O-ring 215	1
9	V3190-065	6.5 gpm DLFC for 1" fitting	One DLFC must be used if 1" fitting is used.
	V3190-075	7.5 gpm DLFC for 1" fitting	
	V3190-090	9.0 gpm DLFC for 1" fitting	
	V3190-110	11.0 gpm DLFC for 1" fitting	
	V3190-130	13.0 gpm DLFC for 1" fitting	
	V3190-170	17.0 gpm DLFC for 1" fitting	
	V3190-200	20.0 gpm DLFC for 1" fitting	
	V3190-250	25.0 gpm DLFC for 1" fitting	
*Items 3-8 can be ordered as No. V3008-02, Drain fitting assy., 1" straight.			

## REPLACEMENT PARTS



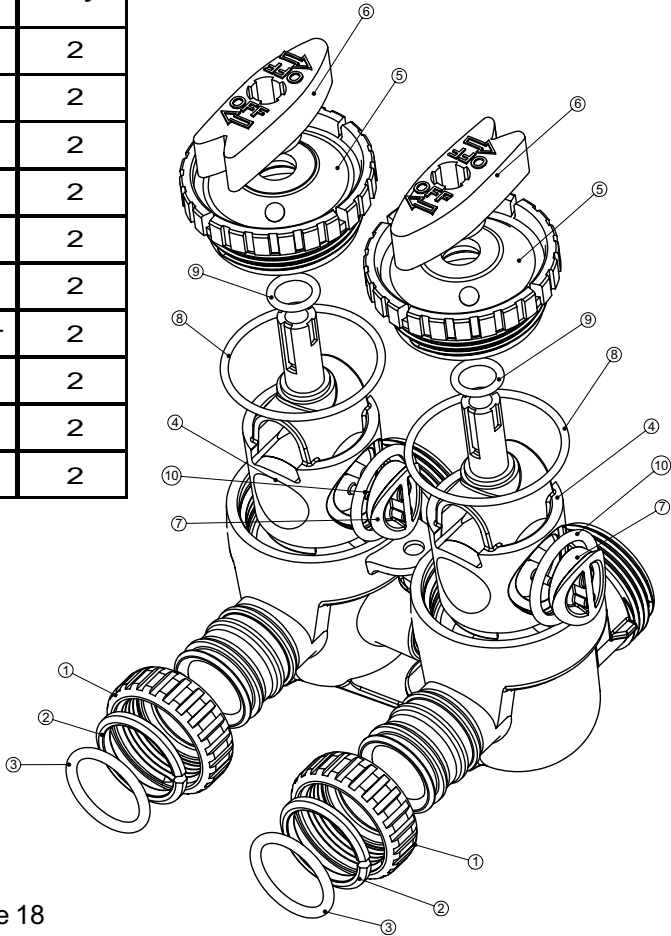
REPLACEMENT  
PARTS

Water Meter and Meter Plug			
Item No.	Part No.	Description	Qty.
1	V3151	Nut, 1" QC	1
2	V3003	Meter assy., includes Items 3 and 4	1
3	V3118-01	Turbine assy.	1
4	V3105	O-ring 215	1
5	V3003-01	Meter plug assy.	1



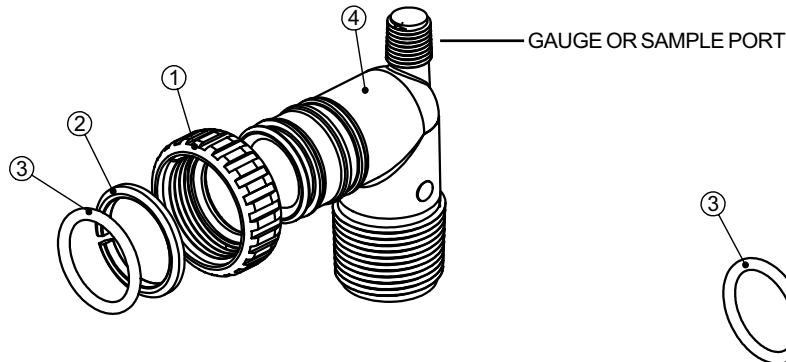
Bypass Valve			
Item No.	Part No.	Description	Qty.
1	V3151	Nut, 1" Quick Connect	2
2	V3150	Split ring	2
3	V3105	O-ring 215	2
4	V3145	Bypass rotor, 1"	2
5	V3146	Bypass cap	2
6	V3147	Bypass handle	2
7	V3148	Bypass rotor seal retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

90° Vertical elbow adapter assy. for bypass valve ( not shown )		
Part No. V3191-01		
Part No.	Description	Qty.
V3151	Nut, 1" quick connect	2
V3150	Split ring	2
V3105	O-ring 215	2

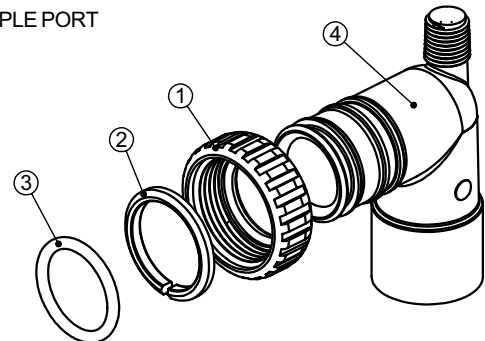


# INSTALLATION FITTING ASSEMBLIES

Description: Fitting 1" PVC Male NPT Elbow Assembly  
 Assembly Part No: V3007, 2 req'd.  
 Item No. 4, Fitting only Part No. V3149, 2 req'd.



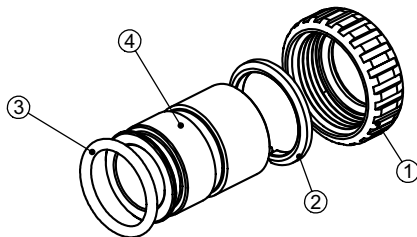
Description: Fitting 1/2" & 1" PVC Solvent Elbow Assembly  
 Assembly Part No: V3007-01, 2 req'd.  
 Item No. 4, Fitting only Part No. V3189, 2 req'd.



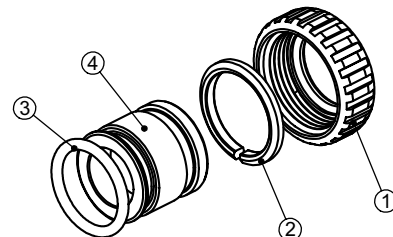
Common Parts For all Fittings

Item No.	Part No.	Description	Qty.
1	V3151	Nut, 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2

Description: Fitting 1" Brass Sweat Assembly  
 Assembly Part No: V3007-02, 2 req'd.  
 Item No. 4, Fitting only Part No. V3188, 2 req'd.



Description: Fitting 3/4" Brass Sweat Assembly  
 Assembly Part No: V3007-03, 2 req'd.  
 Item No. 4, Fitting only Part No. V3188-01, 2 req'd.

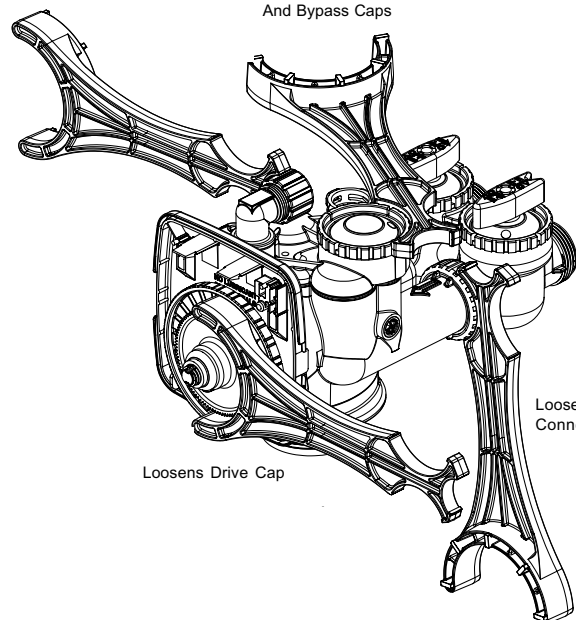


## SERVICE WRENCH (Part No. V3193)

Although no tools are necessary to assemble or disassemble the valve, the Service Wrench, Part No. V3193, (shown in various positions on the valve) is available to aid in assembly or disassembly.

Loosens Drain  
Nut In Polytube  
Applications

Loosens Injector  
And Bypass Caps



Loosens Quick  
Connect Nuts

Loosens Drive Cap

# Service Instructions

## DRIVE ASSEMBLY

Remove the valve cover to access the drive assembly by pulling out slightly on the two tabs centered on the side.

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 motor plug connects to the two-pin jack on the left-hand side of the PC board. The power source plug connects to the four-pin jack. The four-pin jack is between the two-pin and three-pin jacks. The water meter plug (gray wire) connects to the three-pin jack on the far right-hand side of the PC board.

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 with thumbs and gently ease the top of the drive bracket forward using the finger tabs on the upper corners of the bracket. 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 towards 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. Pressing to the left 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 drive gears, the drive gear cover needs to be removed. 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. Before trying to remove the drive gear cover, the drive bracket must be removed from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board. Simultaneously, push in and down on the large clip at the bottom and the clip on the left-hand side of the drive bracket behind the PC board. Keep your other fingers behind the drive gear cover so the drive gears do not drop on the ground.

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 1/2 turn in either direction 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. When reinstalling the motor gently turn the motor while inserting so that the gear on the motor meshes with the gears under the drive gear cover and the small plastic bulge engages one of the slots on the motor housing. Reconnect the motor plug to the two pronged jack on the lower left hand side of the PC board. If motor will not easily engage with drive gear when reinstalling, lift and slightly rotate motor before reinserting.

Replace the valve cover. After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and the cycle number, (e.g. 164) and then reset the valve to the service position.

#### 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 Service Wrench, V3193, or insert a 3/16" to 5/16" flat bladed 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.

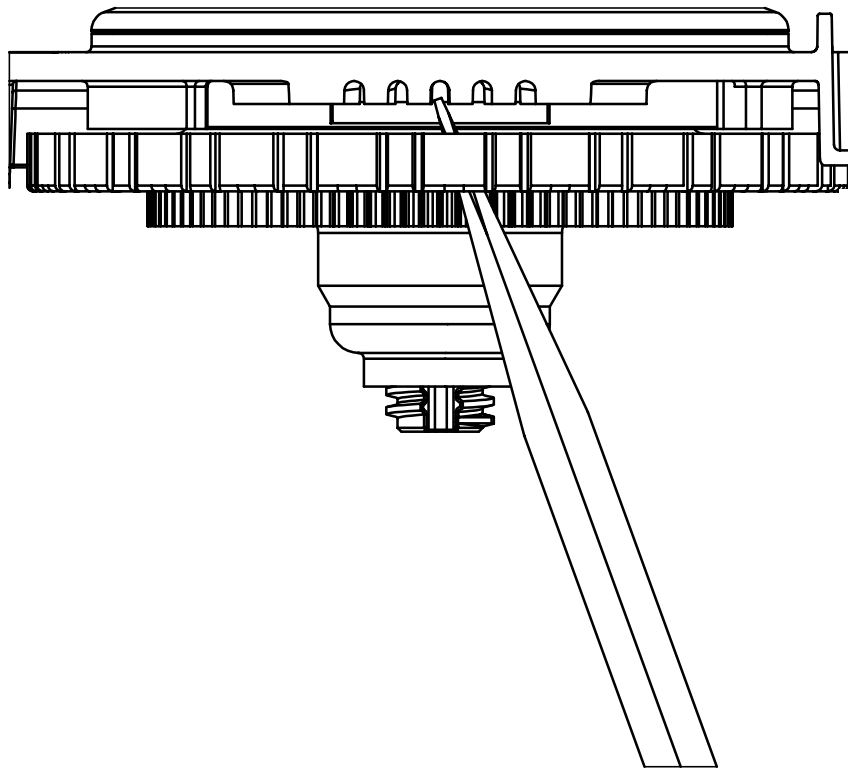


figure 5

The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the o-ring. Attached to the drive cap assembly is the main piston and if a regenerant is used, a regenerant piston.

The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by pressing straight sideways to unsnap it from its latch. Chemically clean in dilute sodium bisulfite or vinegar or replace the regenerant piston if needed. To remove the main piston, fully extend the piston rod by turning the main drive gear counterclockwise, and then unsnap the main piston from its latch by pressing on the numbered side. Chemically clean in dilute sodium bisulfite or vinegar or replace the main piston.

Reattach the main piston to the drive cap assembly. Reattach the regenerant piston (if needed) to the main piston. 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. Avoid any type of lubricants, including silicone, on red or clear lip seals. 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 drive cap bottoms out. Excessive force can break the notches molded into the drive back plate. To be sure that the drive cap is fully "home" remove the drain port fitting and verify that the spacer edge is no longer visible through the drain port. 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, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. Now reset the time of day.

#### SPACER STACK ASSEMBLY

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 red or clear lip seals for wear or damage. Replace the entire stack if necessary. The spacer stack assembly has been 100% tested at the factory to insure proper orientation of one way seals. 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 (5/8" to 1-1/8" 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 5/8"). Do not force the spacer stack assembly in. The control valve body bore interior can be lubricated with silicone grease to allow for easy insertion of the entire stack. Do not use silicone or any other type of lubricant on the red or clear lip seals or the piston?

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

After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or momentarily unplug power source jack (black wire). This resets the electronics and establishes the service piston position. The display should flash text, software version (e.g. 164), and cycle number before resetting the valve to the service position.

#### INJECTOR CAP, SCREEN, INJECTOR PLUG AND INJECTOR

Unscrew the injector cap and lift off. Loosen cap with Service Wrench, V3193, or pliers if necessary. Attached to the injector cap is a screen. Remove the screen and clean if fouled.

The plug and/or injector can be pried out with a small screwdriver. The plug can be wiped clean. If the plug leaks replace the entire plug. The injector consists of a throat and a nozzle. Replace o-rings. Chemically clean the injector with vinegar or sodium bisulfite. The holes can be blown out with air. Both pieces have small diameter holes that control the flow rates of water to insure that the proper concentration of regenerant is used. Sharp objects, which can score the plastic, should not be used to clean the injector. Scoring the injector or increasing the diameter of the hole could change the operating parameters of the injector.

Two holes are labeled DN and UP. Check for compliance with one of the following:

- a. for down flow systems, the appropriate size injector is located in the “DN” hole, a plug is in the “UP” hole and that the piston is a combination of the main piston and the regenerant piston;
- b. for backwash only systems, a plug is in the “DN” hole and in the “UP” hole, and that only the main piston exists (the regenerant piston must be removed) and a plug is in the refill flow control position. Push the plug(s) and/or injectors firmly in place, replace the screen and hand tighten the injector cap.

#### REFILL FLOW CONTROL ASSEMBLY OR REFILL PORT PLUG

To clean or replace the refill flow control, pull out the locking clip and then pull straight up on the elbow. Replace the elbow locking clip in the slot so that it is not misplaced. Twist to remove the white flow control retainer. The flow control can be removed by prying upward through the side slots of the retainer with a small blade flat screwdriver.

Chemically clean the flow control or the white flow control retainer using dilute sodium bisulfite or vinegar. Do not use a wire brush. If necessary, replace the flow control, flow control retainer o-ring, or the elbow o-ring.

Reseat the flow control so the rounded end with lettering is visible in the flow control retainer. Reseat the white flow control retainer by inserting the retainer into the elbow until the o-ring seats. Remove locking clip, insert elbow into valve body to reseat, and insert locking clip.

Do not use Vaseline or other petroleum based oils on o-rings. A silicone lubricant may be used on the the elbow o-ring or the white retainer.

#### WATER METER OR METER PLUG

The water meter wire does not need to be removed from the PC board if the water meter is only being inspected and cleaned. To remove the water meter assembly, unscrew the meter cap on the left side of the control valve. Pliers may be used to unscrew the nut if necessary.

The water meter assembly is connected to the PC board by a wire. If the entire water meter assembly is to be replaced, remove the control valve cover and remove the power source and water meter plugs from the PC board. Unlatch the drive assembly and lean it forward. Unthread the water meter wire from the side of the drive assembly and through the drive back plate. To reinstall, rethread the water meter wire through the drive back plate and the side of the drive assembly. Reattach the drive assembly, water meter, and power plugs.

If there is no water meter wire visible, then a plug should be found in the meter location.

With the nut removed, a slot at the top of the water meter is visible. Twist a flat blade screwdriver in the slot between the control valve body and the meter. When the meter is part way out it is easy to remove the water meter from the housing. Once the water meter is removed from the control valve body check that the turbine spins freely. If it does not, use two fingers behind the blades to gently pull the turbine from the shaft.

Do not use a wire brush to clean. Wipe with a clean cloth or chemically clean in dilute sodium bisulfite or vinegar. The turbine can be immersed in the chemical. Do not immerse electronics. If the turbine is scored or damaged or the bearings on the turbine are worn replace the turbine.

Do not lubricate the turbine shaft. The turbine shaft bearings are prelubricated. Do not use Vaseline, oils, or other lubricants on the o-ring. A silicone lubricant may be used on the black o-ring.

Snap the turbine on the shaft and reinsert the water meter into the side slot. Hand tighten the nut. Do not use a wrench.



## BYPASS VALVE

The working parts of the bypass valve are the rotor assemblies that are contained under the bypass valve caps. Before working on the rotors, be sure that there is a closed shut-off valve ahead of the unit and the system is depressurized. Turn the red arrow shaped handles towards the center of the bypass valve and back to the arrow direction several times to ensure rotor is turning freely.

The nuts and caps are designed to be unscrewed or tightened by hand or with the Service Wrench, V3193. If necessary a pliers can be used to unscrew the nut or cap. Do not use a standard wrench to tighten or loosen nuts or caps. Do not place screwdriver in slots on caps and/or tap with a hammer. To access the rotor, unscrew cap and lift the cap, rotor and handle out as one assembly. Rotating the assembly as you pull it out will enable it to be removed more easily. There are three o-rings: one under the rotor cap, one on the rotor stem and one on the rotor seal. Replace worn o-rings. Clean rotor. Reinstall rotor.

Before reinstalling the red arrow handles be sure that o-rings on both rotors face to the right when being viewed from the front when the handle pointers are pointing in the same direction as the control valve body arrows. Keep the handles pointed this way while tightening the valve caps.

Caution: Since the handles can be pulled off, they could be accidentally reinstalled 180 degrees from their correct orientation.

After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or momentarily unplug power source jack (black wire). This resets the electronics and establishes the service piston position. The display should flash text, the software version (e.g. 164), and the cycle number before resetting the valve to the service position.

# TROUBLESHOOTING PROCEDURES 1

Problem	Cause	Solution
1. Timer does not display time of day	a. Transformer unplugged	a. Reconnect transformer
	b. No power at outlet	b. Repair or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
2. Timer does not display correct time of day	a. Outlet is on a switch	a. Use unswitched outlet
	b. Power outage	b. Reset time of day
	c. Defective PC board	c. Replace PC board
3. No softening/filtering display when water is flowing	a. Bypass valve in bypass position	a. Put bypass in Service position
	b. Meter cable disconnected	b. Reconnect to PC board
	c. Restricted/stalled meter turbine	c. Remove meter and check for debris
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
4. Unit regenerates at wrong time of day	a. Past power outage	a. Reset time of day
	b. Wrong time of day displayed	b. Reset time of day
	c. Time of regeneration set wrong	c. Reset time of regeneration
	d. Control set at "on 0"	d. Check with regen time option in programming
	e. Control set at NORMAL + on 0	e. Check with regen time option in programming
5. ERROR followed by a code number  ERROR code 1001- Unable to recognize start of regeneration  ERROR code 1002-Unexpected stall  ERROR code 1003-Motor ran too long. Timed out trying to reach next cycle position  If other codes appear contact factory	a. Valve has just been serviced	a. Press NEXT and REGEN for 3 seconds or momentarily unplug power source from PC board
	b. Foreign material stuck in valve	b. Check piston and spacer stack for obstruction
	c. Excessive piston resistance	c. Replace piston(s) and spacer stack
	d. Piston not in home position	d. Press NEXT and REGEN or momentarily unplug PC board power
	e. Motor gears not fully engaged. Motor wires broken. Failed motor.	e. Check motor and wiring
	f. Center drive gear reflector dirty or damaged. Missing or broken gear.	f. Replace or clean drive gear(s)
	g. Drive bracket incorrectly aligned on backplate	g. Reset drive bracket
	h. PC board is damaged or defective	h. Replace PC board
	i. PC board incorrectly aligned on drive bracket	i. Reset PC board onto drive bracket

## TROUBLESHOOTING PROCEDURES 2

Problem	Cause	Solution
6. Valve stalled in regeneration	a. Motor not operating	a. Replace motor
	b. No power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
	e. Broken drive gear or drive cap assy	e. Replace gear or drive cap assy
	f. Broken piston retainer	f. Replace drive cap assembly
	g. Broken main or regenerant piston	g. Replace main or regenerant piston
7. Valve does not regenerate automatically when REGEN button is depressed	a. Transformer unplugged	a. Connect transformer and PC board power
	b. No power at outlet	b. Restore power
	c. Broken drive gear or drive cap assembly	c. Replace gear or drive cap assembly
	d. Defective PC board	d. Replace board
8. Valve does not regenerate automatically but does when REGEN is depressed	a. Bypass valve not in Normal Operating Mode	a. See bypass diagrams
	b. Meter disconnected	b. Reconnect to PC board
	c. Obstructed meter turbine	c. Clear obstruction
	d. Defective meter	d. Replace meter
	e. Programming error	e. Review programming
	f. Defective PC board	f. Replace board
9. Time of day flashes on and off	a. Power has been out more than two hours. Transformer was unplugged from either wall outlet or from PC board. NEXT and REGEN were pressed to reset the valve.	a. Reset time of day