Model AM1

Owner Operation
& Installation Manual

AM1 Control Specifications

Inlet/Outlet..... 1”
Cycles..... 3 - 6
Valve Material..... Noryl (1)

FLOW RATES

Service @ 15 psi drop (includes bypass and meter)..... 27 gpm
Backwash @ 25 psi drop (includes bypass and meter)..... 27 gpm
Cv Service..... 7.0
Cv Backwash..... 5.4

OPERATING PRESSURES

Minimum/Maximum..... 20 psi - 125 psi

OPERATING TEMPERATURES

Minimum/Maximum..... 40° - 110° F
Regenertion..... downflow

METER

Accuracy..... ± 5%
Flow Rate Range..... 0.25 - 27 GPM
Gallon Range..... 20 - 50,000

DIMENSIONS

Distributor Pilot..... 1” (1.050) OD Pipe
Drain Line..... ¾” or 1” NPT
Brine Line..... ⅜” or ½” OD Poly tube
Mounting Base..... 2 ½” - 8 NPSM
Height From Top Of Tank..... 7 ⅜”
Weight..... 4.5 lbs.
Current Draw and Voltage..... 0.5A 110v

TANK APPLICATIONS

Water Softener..... 6” - 21” diameter
Water Filter (2)..... 6” - 21” diameter

CYCLES OF OPERATION *(Softener Downflow)*

Cycle	***Range of times min.***
1. Backwash 1st (upflow)	6 - 12
2. Regenerate Draw (downflow)	45 - 75
3. Backwash 2nd (upflow)	3 - 12
4. Rinse (downflow)	3 - 8
5. Regenerant Refill (in service with treated water)	As Programmed
6. Service	

Options: Backwash Filter, ¾” & 1” inlet/outlet, Bypass, Weather Cover

Compatible with the following regenerants or chemicals: Sodium Chloride, potassium chloride, potassium permanganate, sodium bisulfite, sodium hydroxide, hydrochloric acid, chlorine and chloramines

1. Noryl is a trademark of General Electric

Minimum/Maximum Operating Pressures	20 psi (138kPa or 1.4 bar) -125 psi (862 kPa or 8.6 bar)
Minimum/Maximum Operating Temperatures	Minimum/Maximum Operating Temperatures
Power Adapter: Supply Voltage Supply Frequency Output Voltage Output Current	See Drawings and Part Numbers page 1 for data
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.	

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 0-rings but is not necessary. **Avoid any type of lubricants, including silicone, on red or clear lip seals.**

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 screwdriver in slots on caps and/or tap with a hammer.

Do not use pipe dope or other sealants on threads. Teflon tape must be used on the threads of the 1” NPT elbow or the ¼” NPT connection and on the threads of the drain line connection. Teflon tape is not necessary on the nut connection or caps because of o-ring seals.

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack from the printed circuit board (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 (e.g. 154) and then reset the valve to the service position.

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 or length in excess of 20’ require ¾” 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 Function and Cycles of Operation

This glass filled Noryl[1] fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a water softener or filter. When the control valve is set up as a filter, the control valve can be set to perform down flow regeneration or simply backwash. The control valve can be set to regenerate on demand (consumption of a predetermined amount of water) and/or as a time clock (passage of a particular number of days). The control valve can be set so that a softener can meet the Water Quality Association (WQA) or NSF International efficiency rating.

The control valve is compatible with a variety of regenerates and resin cleaners. The control valve is capable of routing the flow of water in the necessary paths to regenerate or backwash water treatment systems. The injector regulates the flow of brine or other regenerates. The control valve regulates the flow rates for backwashing, rinsing, and the replenishing of treated water into a regenerate tank, when applicable.

The control valve is designed to deliver high service (27gpm @ 15 psig) and backwash (27 gpm @ 25 psig) flow rates when the bypass has straight fittings. 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, on 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 transformer power pack comes with a 15 foot power cord and is designed for use with the control valve. The transformer power pack is for dry location use only. The control valve remembers <u>all</u> settings for eight hours if the power goes out. After eight hours, the only item that needs to be reset is the time of day, all other values are permanently stored in the nonvolatile memory. If a power loss lasts less than eight hours and the time flashes on and off, the time of day should be reset and the non-rechargeable battery should be replaced.

For DIR Softeners, there are two options for setting the Gallons Capacity. The Gallons Capacity is automatically calculated if set to AUTO. Reserve Capacity is automatically estimated based on water usage if AUTO is used. The other option is to set the Gallons Capacity to a specific number. If a specific number is set, reserve capacity is zero, unless the value is manually set (i.e. the manufacturer intentionally sets the gallon capacity number below the calculated capacity of the system).

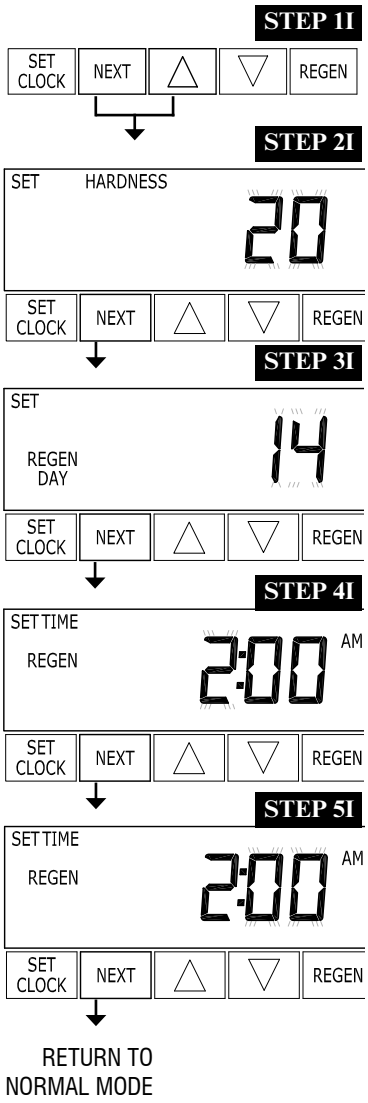
The control valve can also be set to regenerate immediately or at the next regeneration time by changing the Regeneration Time Option. There are three choices for settings:

1. "NORMAL" means regeneration will occur at the preset regeneration time.
2. "on 0 " means regeneration will occur when the gallons capacity reaches zero.
3. "NORMAL" and "on 0" means the regeneration will occur at the preset regeneration time unless the gallons capacity reaches zero. If the gallons capacity reaches zero the regeneration will begin 10 minutes after no water usage.

The user can initiate manual regeneration. The user has the option to request the manual regeneration at the delayed regeneration time or to have the regeneration occur immediately:

1. Pressing and releasing the REGEN button. "Regen Today" will flash on the display and the regeneration will occur at the delayed regeneration time. The user can cancel the request by pressing and releasing the REGEN button. This method of manually initiating regeneration is not allowed when the system is set to immediately regenerate when the gallon capacity reaches zero.
2. Pressing and holding the REGEN button for approximately 3 seconds will immediately start the regenerate tion. The user cannot cancel this request,except by resetting the control by pressing NEXT and REGEN buttons simultaneously for 3 seconds.

Installer Display Settings



STEP 1I - Press NEXT and ▲ simultaneously for 3 seconds.

STEP 2I – Hardness: Set the amount of hardness in grains of hardness as calcium carbonate per gallon using the ▼ or ▲ buttons. The default is 20 with value ranges from 1 to 150 in 1 grain increments. Note: The grains per gallon can be increased if soluble iron needs to be reduced. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

STEP 3I – Day Override: When gallon capacity is set to off, Day Override sets the number of days between regenerations. When gallon capacity is set to AUTO or to a number, Day Override sets the maximum number of days between regenerations. If value set to "oFF" regeneration initiation is based solely on gallons used. If value is set as a number (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 ▼ or ▲ buttons:

- number of days between regeneration (1 to 28); or
- "oFF".

Press NEXT to go to step 4I. Press REGEN to return to previous step.

STEP 4I – Next Regeneration Time (hour): Set the hour of day for regeneration using ▼ or ▲ buttons. AM/PM toggles after 12. The default time is 2:00 a.m. Press NEXT to go to step 5I. Press REGEN to return to previous step.

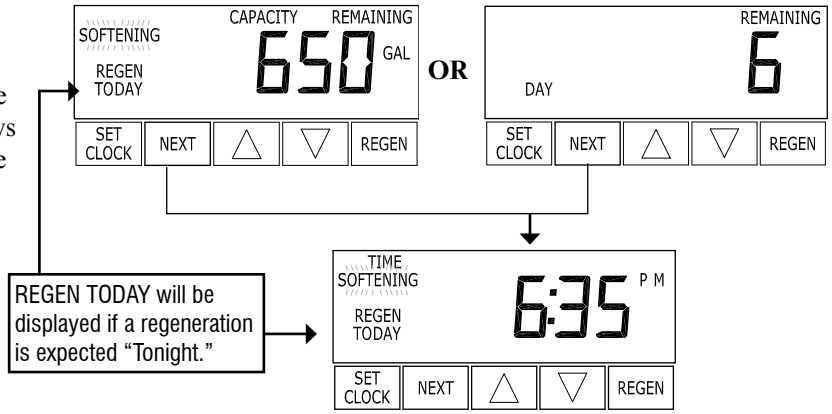
STEP 5I – Next Regeneration Time (minutes): Set the minutes of day for regeneration using ▼ or ▲ buttons. Press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

To initiate a manual regeneration immediately, press and hold the "REGEN" button for three seconds. The system will begin to regenerate immediately. The control valve may be stepped through the various regeneration cycles by pressing the "REGEN" button.

User Display Settings

General Operation

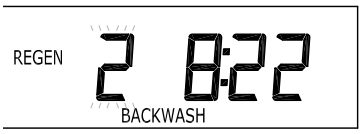
When the system is operating one of two displays will be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day. The second display is one of the following: days remaining or gallons remaining. Days remaining is the number of days left before the 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 user can scroll between the displays as desired.



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 if a water meter is installed.

Regeneration Mode

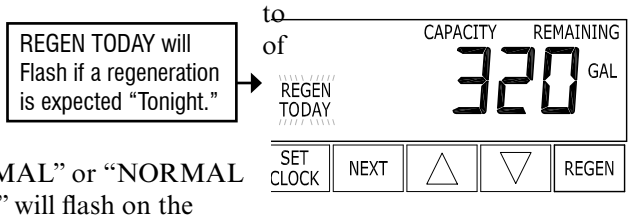


Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.

When the system begins to regenerate, the display will change to 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

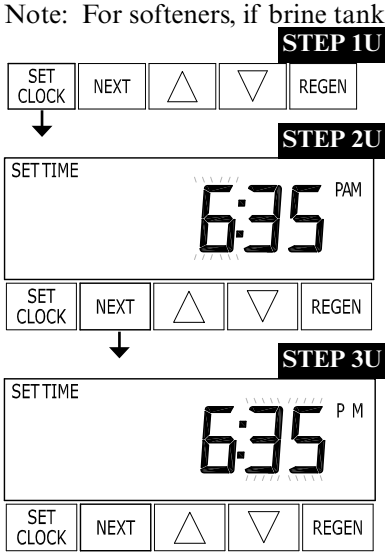
Sometimes there is a need to regenerate the system sooner than when the system calls for it, usually referred as manual regeneration. There may be a period heavy water usage because of guests or a heavy laundry day.



To initiate a manual regeneration at the preset delayed regeneration time, when the regeneration time option is set to "NORMAL" or "NORMAL + on 0", 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 request. Note: If the regeneration time option is 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 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.



Set Time of Day

The user can also set the time of day. Time of day should only need to be set after power outages lasting more than 8 hours, if the battery has been depleted and a power outage occurs, or when daylight saving time begins or ends. If a power outage lasting more than 8 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. If a power outage lasts less than 8 hours and the time of day flashes on and off, the time of day should be reset and the battery replaced.

STEP 1U – Press SET CLOCK.

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

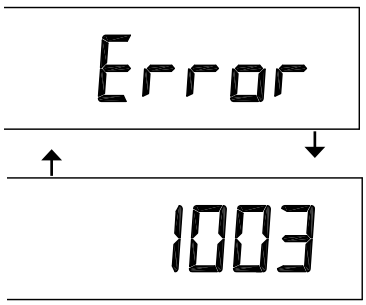
STEP 3U - Current Time (minutes): Set the minutes of the day using or buttons. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

Power Loss

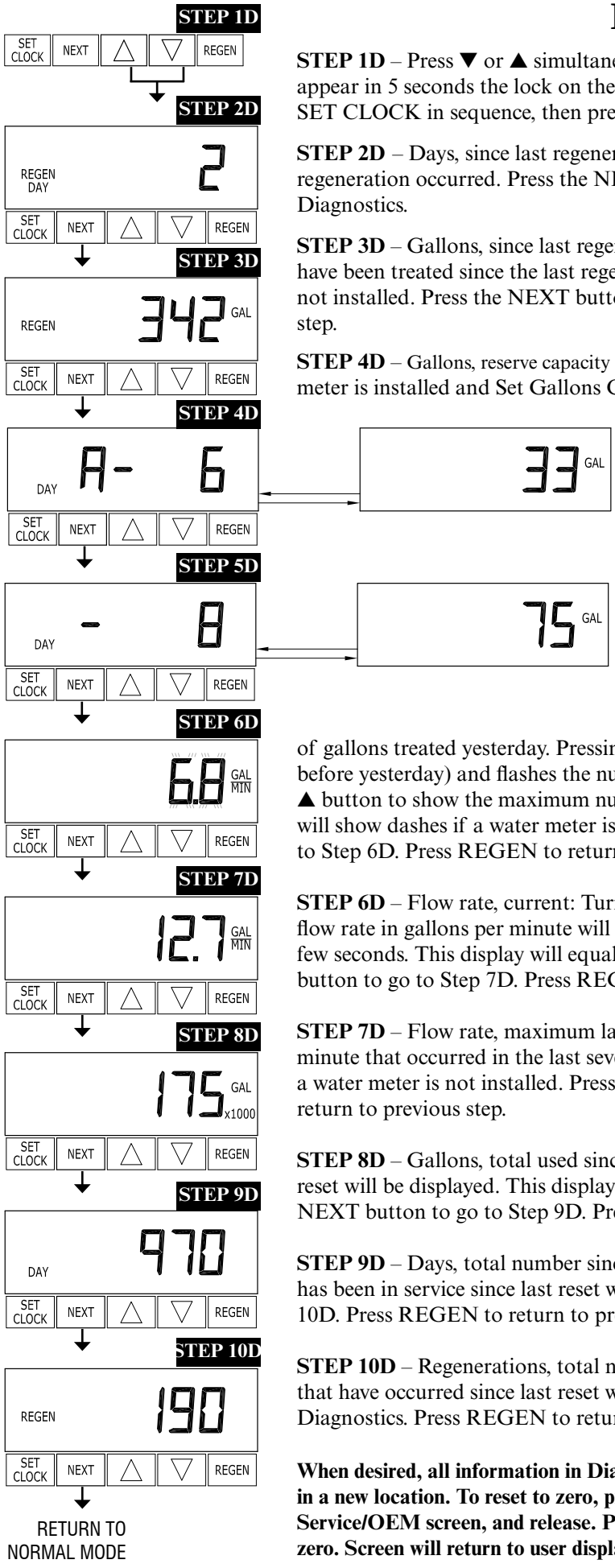
If the power goes out, the system will keep time for up to 8 hours or until the battery is depleted. If a power outage of more than 8 hours occurs, the time of day will flash on and off which indicates the time of day should be reset. The system will remember the rest. If a power outage lasts less than 8 hours and the time of day flashes on and off, the non rechargeable battery should be replaced.

Error Message

If the word "ERROR" and a number are alternately flashing on the display contact the OEM for help. This indicates that the valve was not able to function properly.



Diagnostics



STEP 1D – Press ▼ or ▲ simultaneously for three seconds. If screen in step 2D does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds.

STEP 2D – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press the NEXT button to go to Step 3D. Press REGEN to exit Diagnostics.

STEP 3D – Gallons, since last regeneration: This display shows the number of gallons that have been treated since the last regeneration. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 4D. Press REGEN to return to previous step.

STEP 4D – Gallons, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed and Set Gallons Capacity is set to "Auto," this display shows 0 day (for today) and flashes the reserve capacity. Pressing the ▲ button will show day 1 (which would be yesterday) and flashes the reserve capacity used. Pressing the ▲ button again will show day 2 (the day before yesterday) and the reserve capacity. Keep pressing the ▲ button to show the gallons for days 3, 4, 5 and 6. The ▼ button can be pressed to move backwards in the day series. Press the NEXT button at any time to go to Step 5D. Press REGEN to return to previous step.

STEP 5D - Gallons, 63 day usage history: This display shows day 1 (for yesterday) and flashes the number of gallons treated yesterday. Pressing the ▲ button will show day 2 (which would be the day before yesterday) and flashes the number of gallons treated on that day. Continue to press the ▲ button to show the maximum number of gallons treated for the last 63 days. This display will show dashes if a water meter is not installed. Press the NEXT button at any time to go to Step 6D. Press REGEN to return to previous step.

STEP 6D – Flow rate, current: Turn the water on at one or more taps in the building. The flow rate in gallons per minute will be displayed. If flow stops the value will fall to zero in a few seconds. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 7D. Press REGEN to return to previous step.

STEP 7D – Flow rate, maximum last seven days: The maximum flow rate in gallons per minute that occurred in the last seven days will be displayed. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 8D. Press REGEN to return to previous step.

STEP 8D – Gallons, total used since last reset: The total number of gallons used since last reset will be displayed. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 9D. Press REGEN to return to previous step.

STEP 9D – Days, total number since last reset: The total number of days the control valve has been in service since last reset will be displayed. Press the NEXT button to go to Step 10D. Press REGEN to return to previous step.

STEP 10D – Regenerations, total number since last reset: The total number of regenerations that have occurred since last reset will be displayed. Press the NEXT button to exit Diagnostics. Press REGEN to return to previous step.

When desired, all information in Diagnostics may be reset to zero when the valve is installed in a new location. To reset to zero, press NEXT and ▼ buttons simultaneously to go to the Service/OEM screen, and release. Press ▼ and ▲ simultaneously to reset diagnostic values to zero. Screen will return to user display.

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 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 and gently ease the top of the drive bracket towards your body. 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. 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 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 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 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 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 cove 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 (e.g. 154) and then reset the valve to the service position.

Drive Cap Assembly, Main Piston and Regenerant Piston

The drive 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 ¼" to ½" 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.

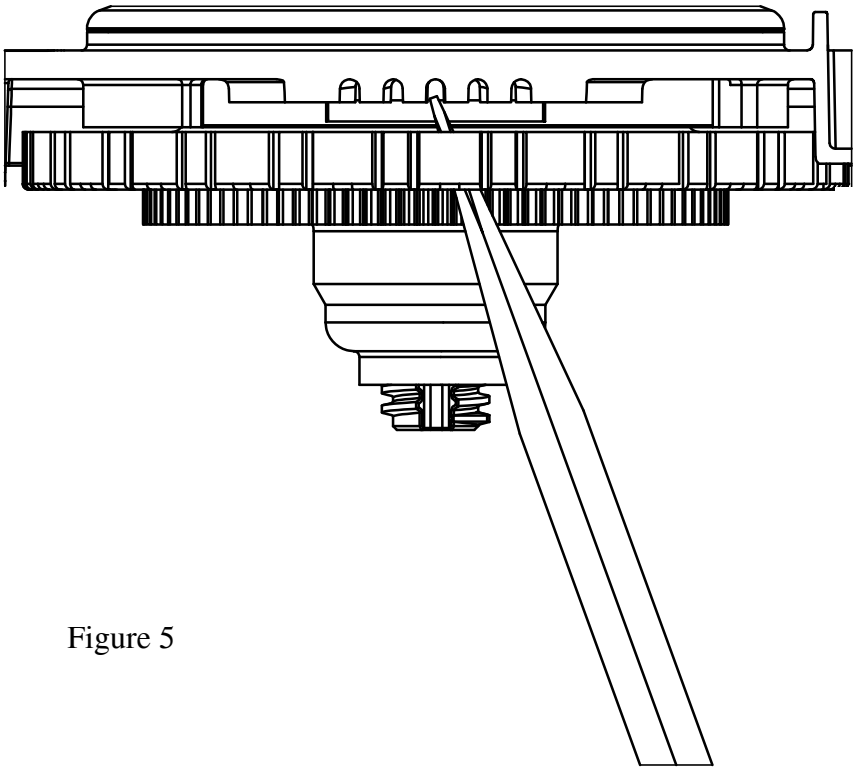


Figure 5

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 dissembled 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 (down flow or up flow) 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 un-snapping it from its latch. Chemically clean in dilute sodium bisulfite or vinegar or replace the regenerant piston if needed. To remove the main down flow or up flow 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.

Reattach the main piston to the drive cap assembly. Reattach the regenerant piston (if needed) to the main piston. Do not lubricate the piston rod, main piston or regenerant piston. Lubricant will adversely affect the red or clear lip seals. Reinsert the drive cap assembly and piston into the spacer sack 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, 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 soft ware version (e.g. 154) and then reset the valve to the service position.

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 to allow for easy insertion of the entire stack. Do not use silicone or any other type of lubricant on the red 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 hole 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 soft ware version (e.g. 154) and then reset the valve to the service position.

Injector Cap, Screen, Injector Plug and Injector

Unscrew the injector cap and lift off. Loosen cap with special plastic wrench 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. 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 down flow main piston and the regenerate piston;
b. for up flow systems, the appropriate size injector is located in he “UP” hole, a plug is in the “DN” hole and that the piston is a combination of the up flow main piston and the regenerant piston; or
c. for backwash only systems, a plug is in the “DN” hole and in the “UP” hole, and that the piston only has a down flow main piston (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 of Refill Port Plug

To clean or replace the refill flow control, pull out the elbow-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 bisulfate or vinegar. Do not use a wire brush. If necessary, replace the flow control, o-ring on the flow control retainer, or the o-ring on the elbow.

Reseat the flow control so the rounded end is visible in the flow control. Reseat the white flow control retainer by pushing the retainer into the elbow until the o-ring seats. Remove locking clip, push down on elbow to reseat and insert locking clip.

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicon lubricant may be used on the o-ring on the elbow or the white retainer.

Water Meter or Meter Plug

The water meter assembly is connected to the PC board by a wire. If the entire water mater assembly is to be replaced, remove the control valve cover and remove the power source and water meter plugs form 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 and the water meter and power plugs.

If no water meter wire is visible, then a plug is installed not a water meter.

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.

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, use your fingers to gently pull forward on the turbine to remove it 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 unacceptable lubricants on the o-ring. A silicon 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 pipe wrench to tighten nut.

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, make sure 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.

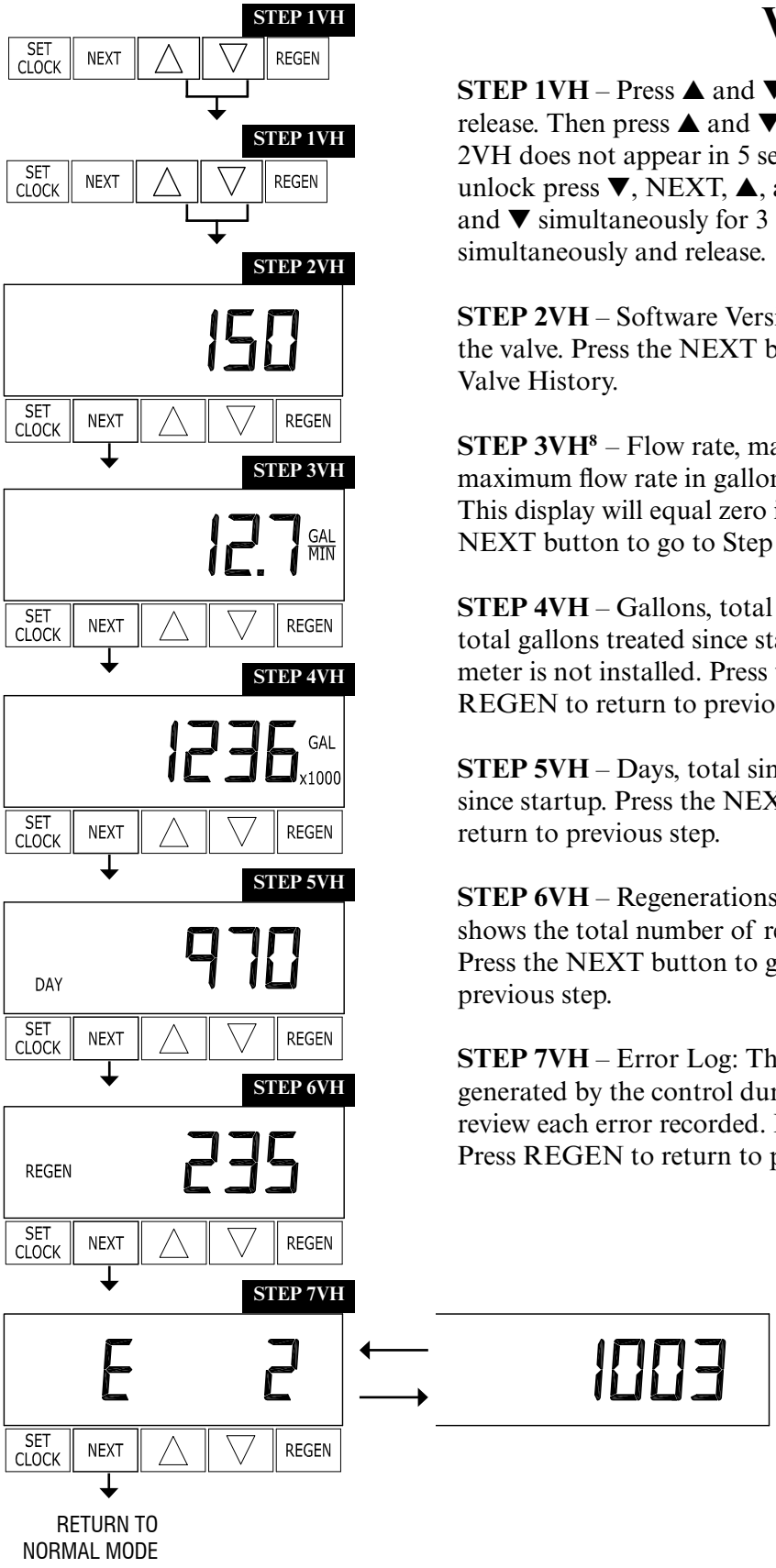
The nuts and caps are designed to be unscrewed or tightened by hand. If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place screwdriver in slots on caps and/or tap with a hammer. To access the rotor, unscrew the cap and lift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

When reinstalling the red arrow handles be sure that:

1. O-rings on both rotors face to the right when being viewed from the front of the control valve when the handle pointers are lined up with the control valve body arrows; or
2. Arrows point toward each other in the bypass position.

Since the handles can be pulled off, they could be accidentally reinstalled 180o from their orientation. To install the red arrow handles correctly, keep the handles pointed in the same direction as the arrows engraved on the control valve body while tightening the bypass valve caps.

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 (e.g. 154) and then reset the valve to the service position.



Valve History

STEP 1VH – Press ▲ and ▼ simultaneously for three seconds and release. Then press ▲ and ▼ simultaneously and release. If screen in step 2VH does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds and release. Then press ▲ and ▼ simultaneously and release.

STEP 2VH – Software Version: This display shows the software version of the valve. Press the NEXT button to go to Step 3VH. Press REGEN to exit Valve History.

STEP 3VH[8] – Flow rate, maximum since startup: This display shows the maximum flow rate in gallons per minute that has occurred since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 4VH. Press REGEN to return to previous step.

STEP 4VH – Gallons, total used since start-up: This display shows the total gallons treated since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 5VH. Press REGEN to return to previous step.

STEP 5VH – Days, total since start-up: This display shows the total days since startup. Press the NEXT button to go to Step 6VH. Press REGEN to return to previous step.

STEP 6VH – Regenerations, total number since start-up: This display shows the total number of regenerations that have occurred since startup. Press the NEXT button to go to Step 7VH. Press REGEN to return to previous step.

STEP 7VH – Error Log: This display shows a history of the last 10 errors generated by the control during operation. Press the ▲ or ▼ buttons to review each error recorded. Press the NEXT button to exit Valve History. Press REGEN to return to previous step.

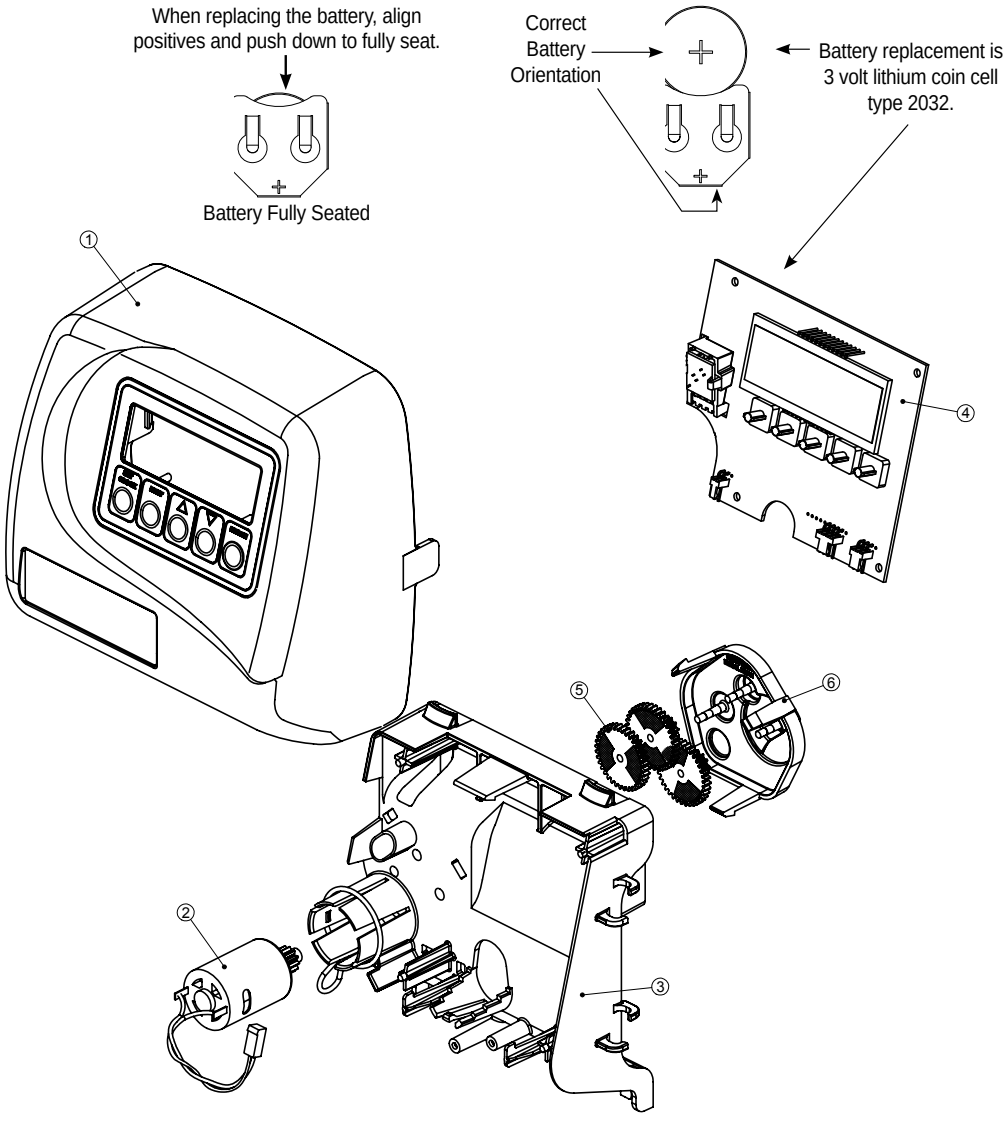
[8] Values in steps 3VH through 7VH cannot be reset.

Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175-01	AM1 Front Cover ASY	1
2	V3107-01	AM1 Motor	1
3	V3106-01	AM1 Drive Bracket&Spring Clip	1
4	V3108-09BOARD	AM1 PC Board with Battery REPLACE	1
5	V3110	AM1 Drive Reducing Gear 12x36	3
6	V3109	AM1 Drive Gear Cover	1
	V3002	AM1 Drive ASY	*
Not Shown	V3186	AM1 AC Adapter 110V-12V	1
Not Shown	V3186	AM1 AC ADAPTER 110V-12V	1
	V3186EU	AM1 AC ADAPTER 220-240V-12V EU	
	V3186UK	AM1 AC ADAPTER 220-240V-12V UK	
	V3186-01	AM1 AC ADAPTER CORD ONLY	

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

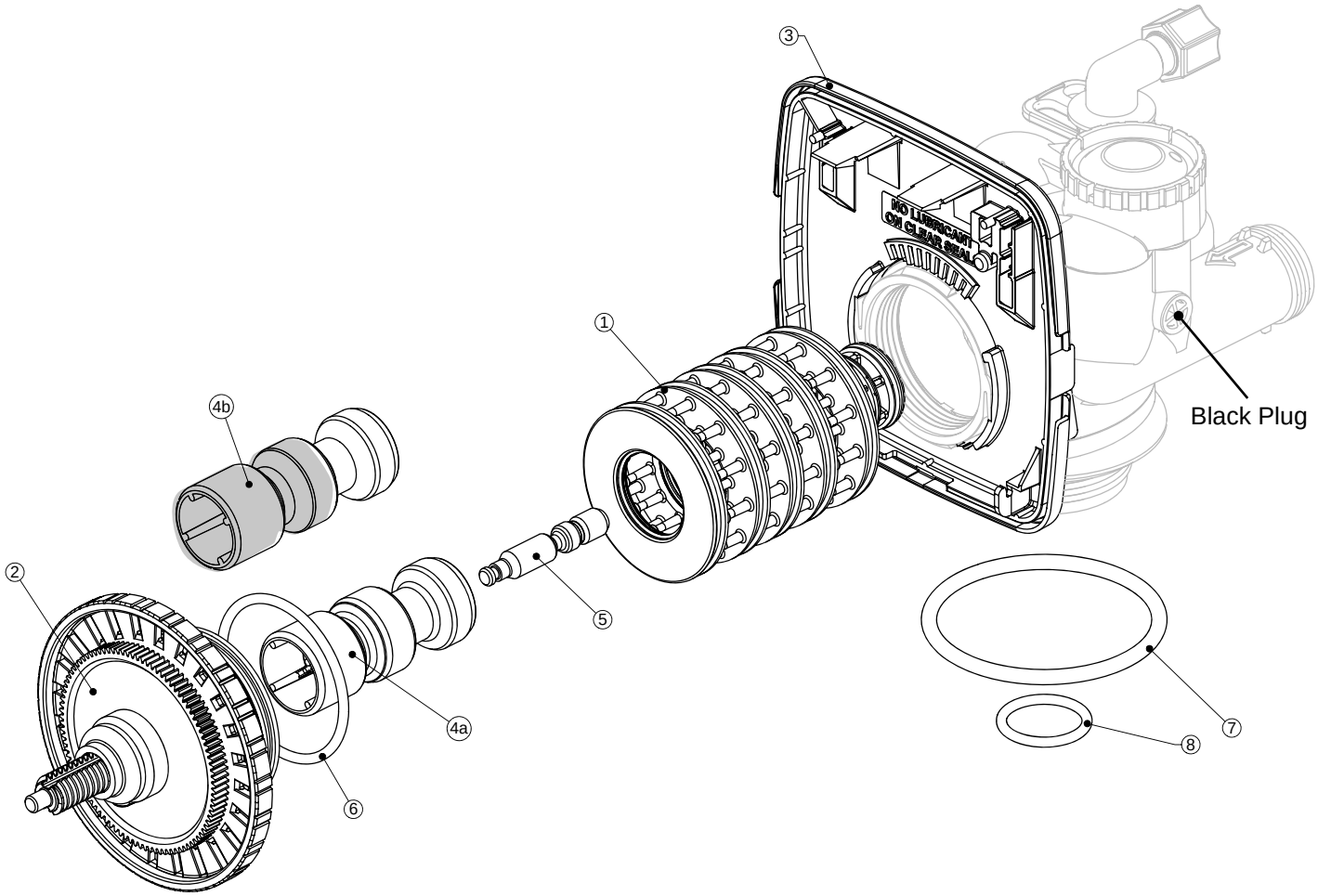
AC Adapter	U.S.	International
Supply Voltage	120 V AC	230V AC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 V AC	12 V AC
Output Current	500 mA	500 mA



WS1 Drive Cap Assembly, Downflow Piston, Upflow Piston, Regenerant Piston and Spacer Stack Assembly

Drawing No.	Order No.	Description	Quantity
1	V3005	AM1 Spacer Stack Assembly	1
2	V3004	Drive Cap ASY	1
3	Back Plate	Refer to Programming and Cover Drawing Manual	1
4a	V3011*	AM1 Piston Downflow ASY	1
4b	V3011-01*	AM1 Piston Upflow ASY	
5	V3174	AM1 Regenerant Piston	1
6	V3135	O-ring 228	1
7	V3180	O-ring 337	1
8	V3105	O-ring 215 (Distributor Tube)	1
Not Shown	V3001	AM1 Body ASY Downflow	1
	V3001-02	AM1 Mixing Valve Body ASY	
	V3001UP	AM1 Body ASY Upflow	
	V3001-02UP	AM1 Mixing Valve Body Upflow ASY	

*V3011 is labeled with DN and V3011-01 is labeled with UP. Upflow option is not applicable to EE, EI or TC control valves.
Note: The regenerant piston is not used in backwash only applications.

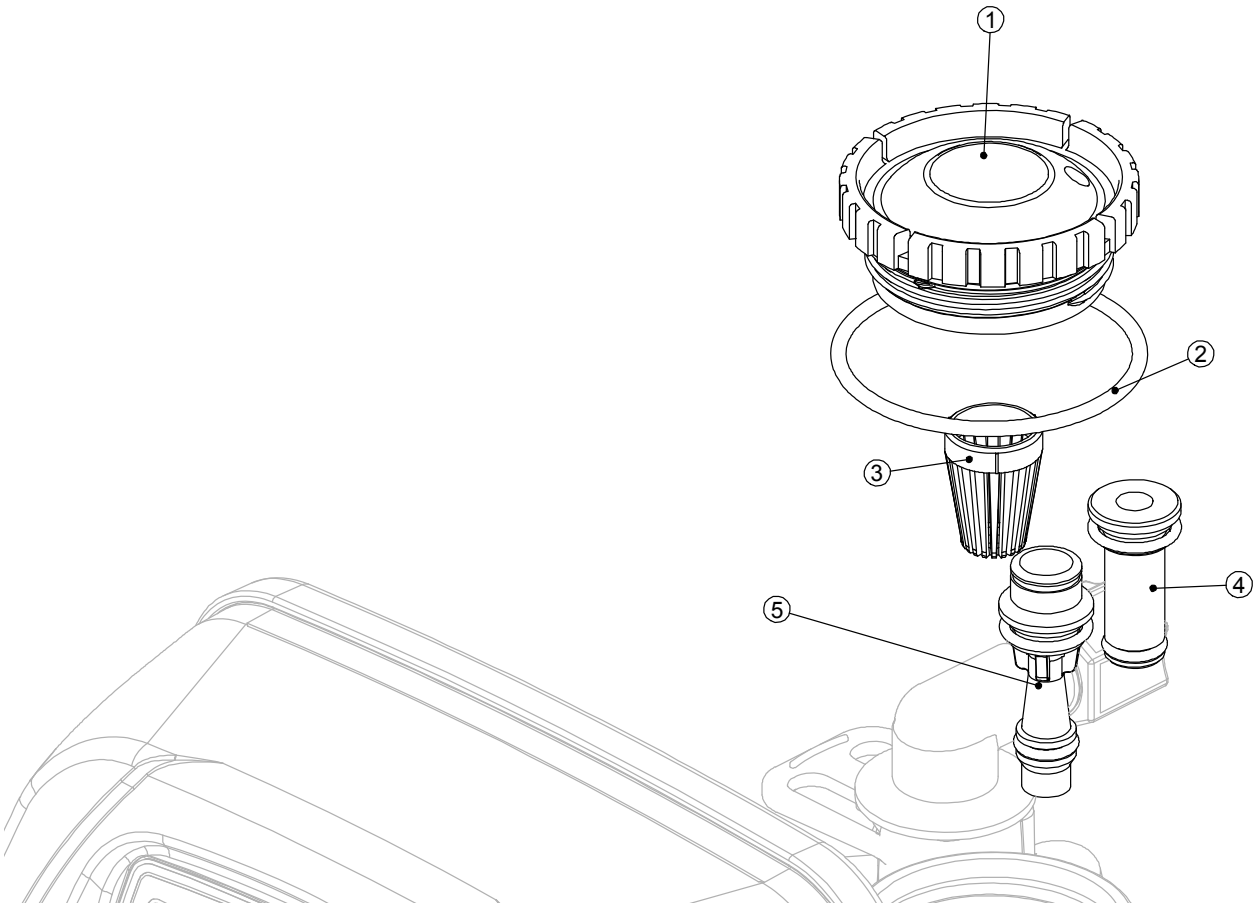


Injector Cap, Injector Screen, Injector, Plug and O-Ring

Drawing No.	Order No.	Description	Quantity
1	V3176	INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V3177-01	INJECTOR SCREEN CAGE	1
4	V3010-1Z	AM1 INJECTOR ASY Z PLUG	1
5	V3010-1A	AM1 INJECTOR ASY A BLACK	1
	V3010-1B	AM1 INJECTOR ASY B BROWN	
	V3010-1C	AM1 INJECTOR ASY C VIOLET	
	V3010-1D	AM1 INJECTOR ASY D RED	
	V3010-1E	AM1 INJECTOR ASY E WHITE	
	V3010-1F	AM1 INJECTOR ASY F BLUE	
	V3010-1G	AM1 INJECTOR ASY G YELLOW	
	V3010-1H	AM1 INJECTOR ASY H GREEN	
	V3010-1I	AM1 INJECTOR ASY I ORANGE	
	V3010-1J	AM1 INJECTOR ASY J LIGHT BLUE	
	V3010-1K	AM1 INJECTOR ASY K LIGHT GREEN	
Not Shown	V3170	O-RING 011	*
Not Shown	V3171	O-RING 013	*

* The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring.

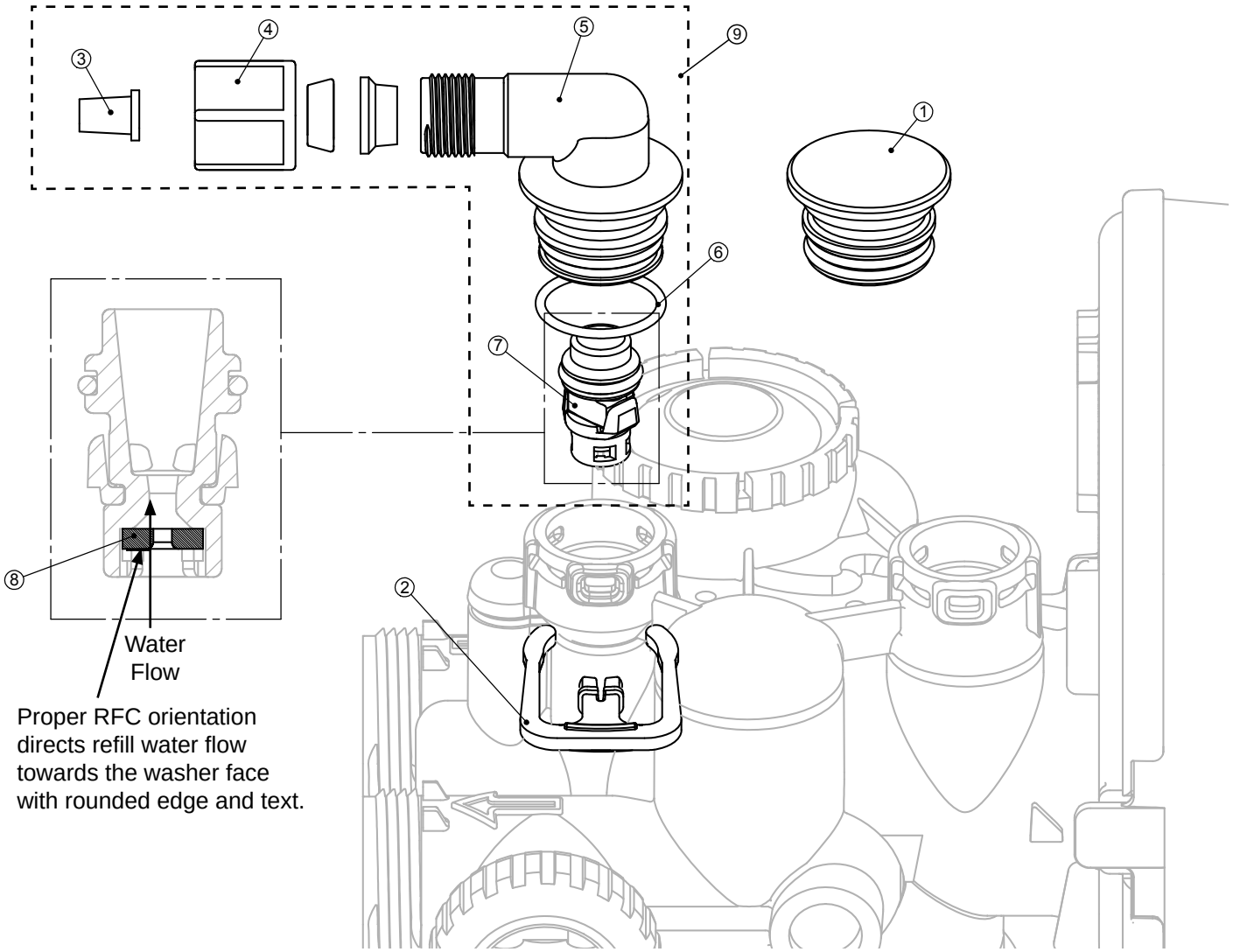
Note: For upflow position, injector is located in the up hole and injector plug is in the other hole.



Refill Flow Control Assembly and Refill Port Plug

Drawing No.	Order No.	Description	Quantity
1	V3195-01	AM1 Refill Port Plug Asy	This part is required for backwash only systems
2	H4615	Elbow Locking Clip	1
3	JCP-P-6	Polytube insert 3/8”	1
4	JCPG-6PBLK	Nut 3/8”	1
5	H4613	Elbow Cap 3/8”	1
6	V3163	0-ring 019	1
7	V3165-01*	AM1 RFC Retainer Asy (0.5 gpm)	1
8	V3182	AM1 RFC	1
9	V3330-01	AM1 Brine Elbow Asy w/RFC 3/8"	1
Not Shown	V3552	AM1 Brine Elbow Asy w/RFC 1/2"	Option
Not Shown	H4650	Elbow ½” with nut and insert	Option

*Assembly includes V3182 AM1 (0.5 gpm) RFC.

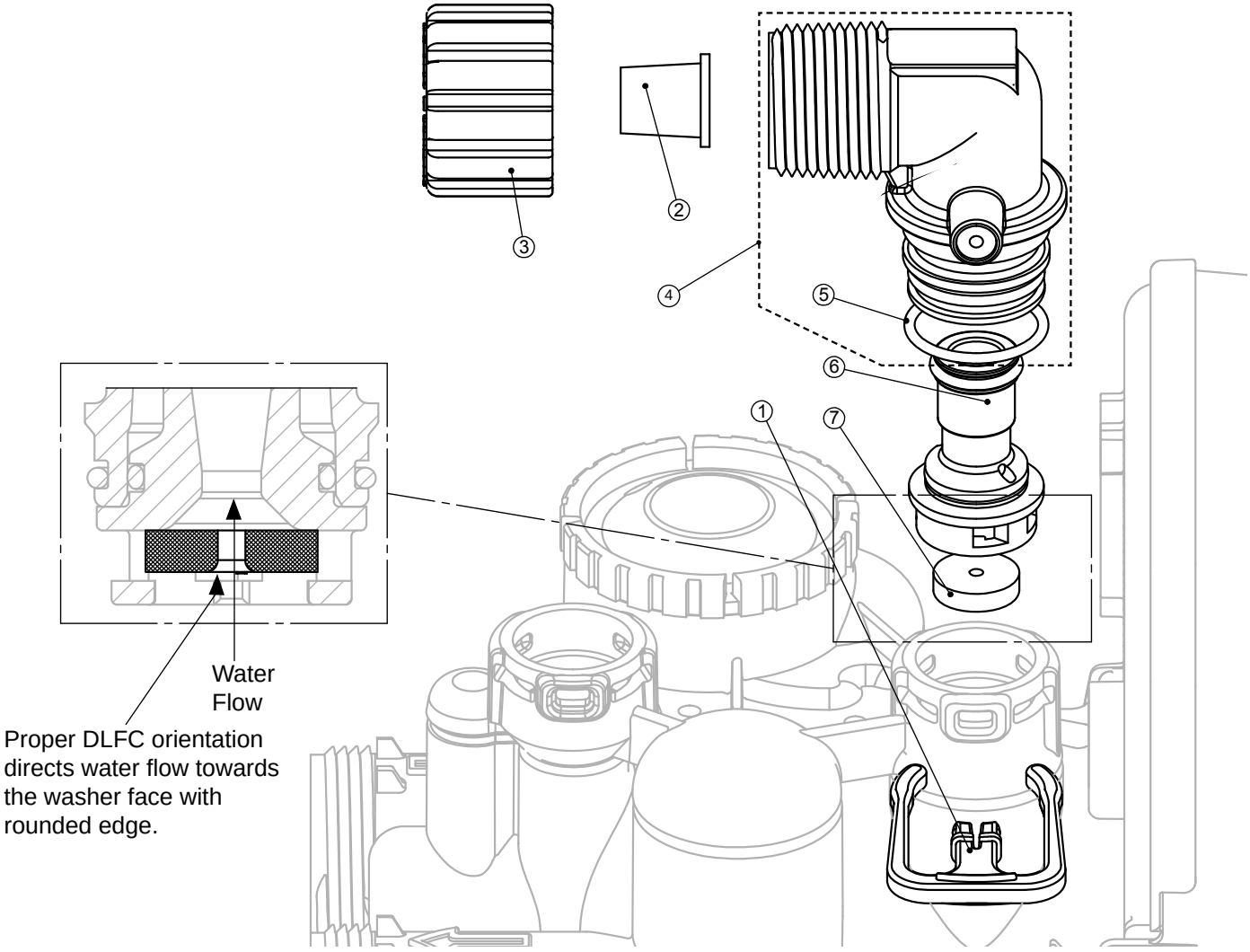


Drain Line – 3/4”

Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	PKP10TS8-BULK	Polytube insert 5/8	Option
3	V3192	AM1 Nut ¾ Drain Elbow	Option
4*	V3158-01	AM1 Drain Elbow ¾ Male	1
5	V3163	O-ring 019	1
6*	V3159-01	AM1 DLFC Retainer ASY	1
7	V3162-007	AM1 DLFC 0.7 gpm for ¾	One DLFC must be used if ¾ fitting is used
	V3162-010	AM1 DLFC 1.0 gpm for ¾	
	V3162-013	AM1 DLFC 1.3 gpm for ¾	
	V3162-017	AM1 DLFC 1.7 gpm for ¾	
	V3162-022	AM1 DLFC 2.2 gpm for ¾	
	V3162-027	AM1 DLFC 2.7 gpm for ¾	
	V3162-032	AM1 DLFC 3.2 gpm for ¾	
	V3162-042	AM1 DLFC 4.2 gpm for ¾	
	V3162-053	AM1 DLFC 5.3 gpm for ¾	
	V3162-065	AM1 DLFC 6.5 gpm for ¾	
	V3162-075	AM1 DLFC 7.5 gpm for ¾	
	V3162-090	AM1 DLFC 9.0 gpm for ¾	
	V3162-100	AM1 DLFC 10.0 gpm for ¾	

*4 and 6 can be ordered as a complete assembly - V3331 AM1 Drain Elbow and Retainer Asy

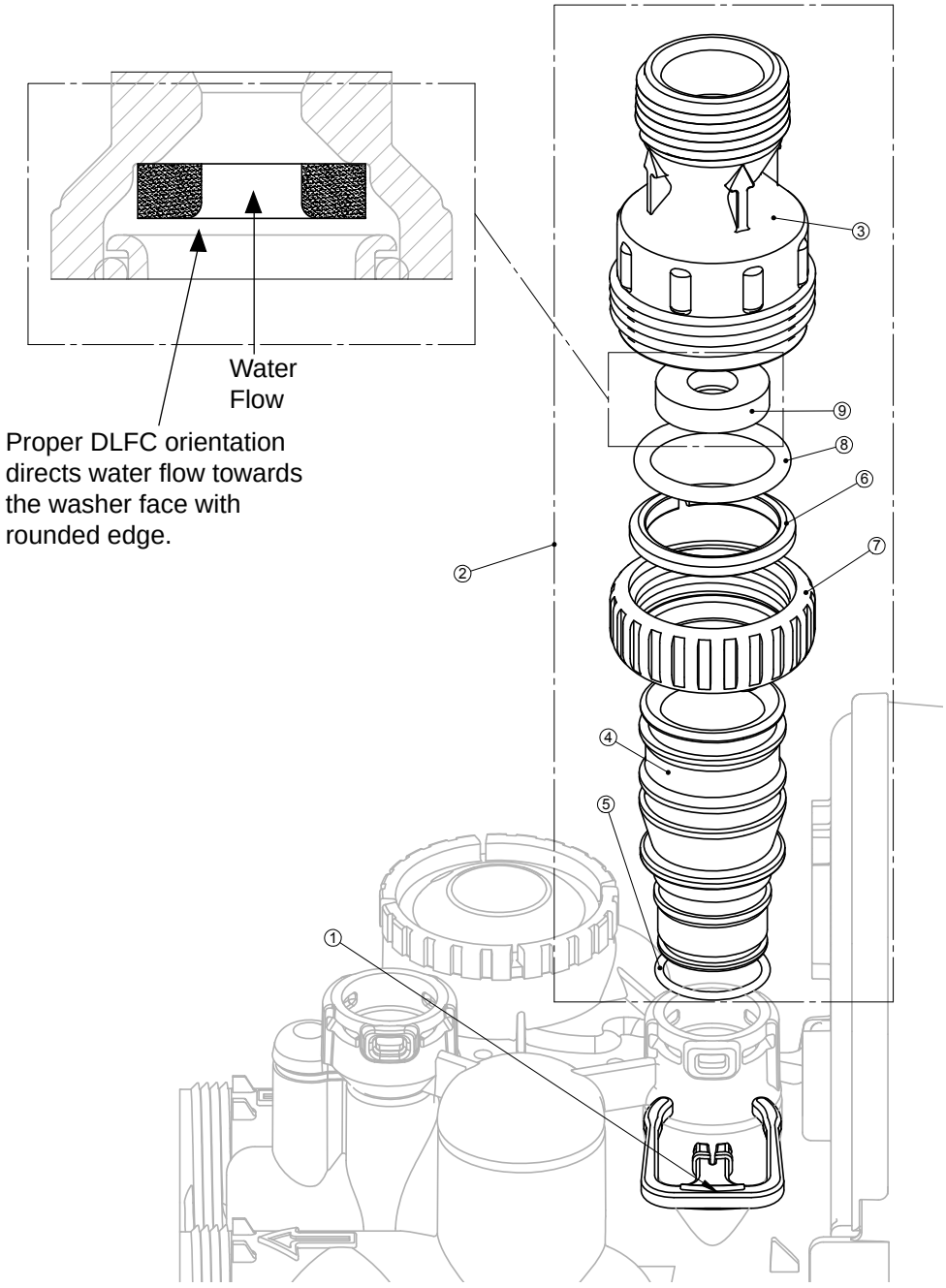
Valves are shipped without drain line flow control (DLFC) - install DLFC before using. Valves are shipped without ¾ nut for drain elbow (polytube installation only) and 5/8" polytube insert (polytube installation only).



Drain Line - 1”

Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	V3008-02	AM1 Drain FTG 1 Straight	1
3*	V3166	AM1 Drain FTG Body 1	1
4*	V3167	AM1 Drain FTG Adapter 1	1
5*	V3163	0-ring 019	1
6*	V3150	AM1 Split Ring	1
7*	V3151	AM1 Nut 1” QC	1
8*	V3105	O-ring 215	1
9	V3190-090	AM1 DLFC 9.0 gpm for 1	One DLFC must be used if 1” fitting is used
	V3190-100	AM1 DLFC 10.0 gpm for 1	
	V3190-110	AM1 DLFC 11.0 gpm for 1	
	V3190-130	AM1 DLFC 13.0 gpm for 1	
	V3190-150	AM1 DLFC 15.0 gpm for 1	
	V3190-170	AM1 DLFC 17.0 gpm for 1	
	V3190-200	AM1 DLFC 20.0 gpm for 1	
	V3190-250	AM1 DLFC 25.0 gpm for 1	

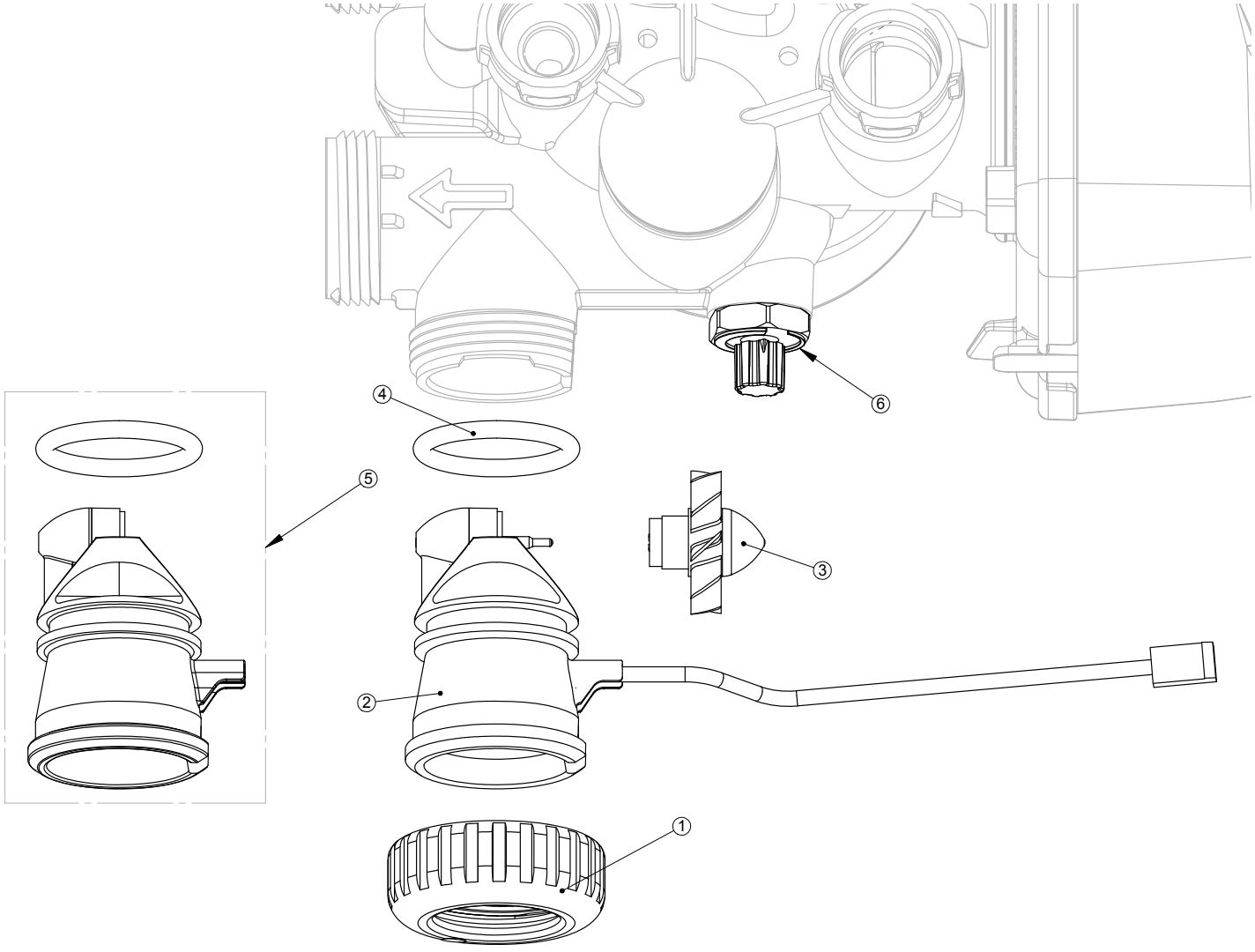
* Can be ordered as a set. Order number V3008-02, description: AM1 Drain FTG 1 Straight.



Water Meter, Meter Plug and Mixing Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1" QC	1
2	V3003*	AM1 Meter ASY	1
3	V3118-01	AM1 Turbine ASY	1
4	V3105	0-ring 215	1
5	V3003-01	AM1 Meter Plug ASY	1
6	V3013	Mixing Valve	Optional

*Order number V3003 includes V3118-01 AM1 Turbine ASY and V3105 O-ring



THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.

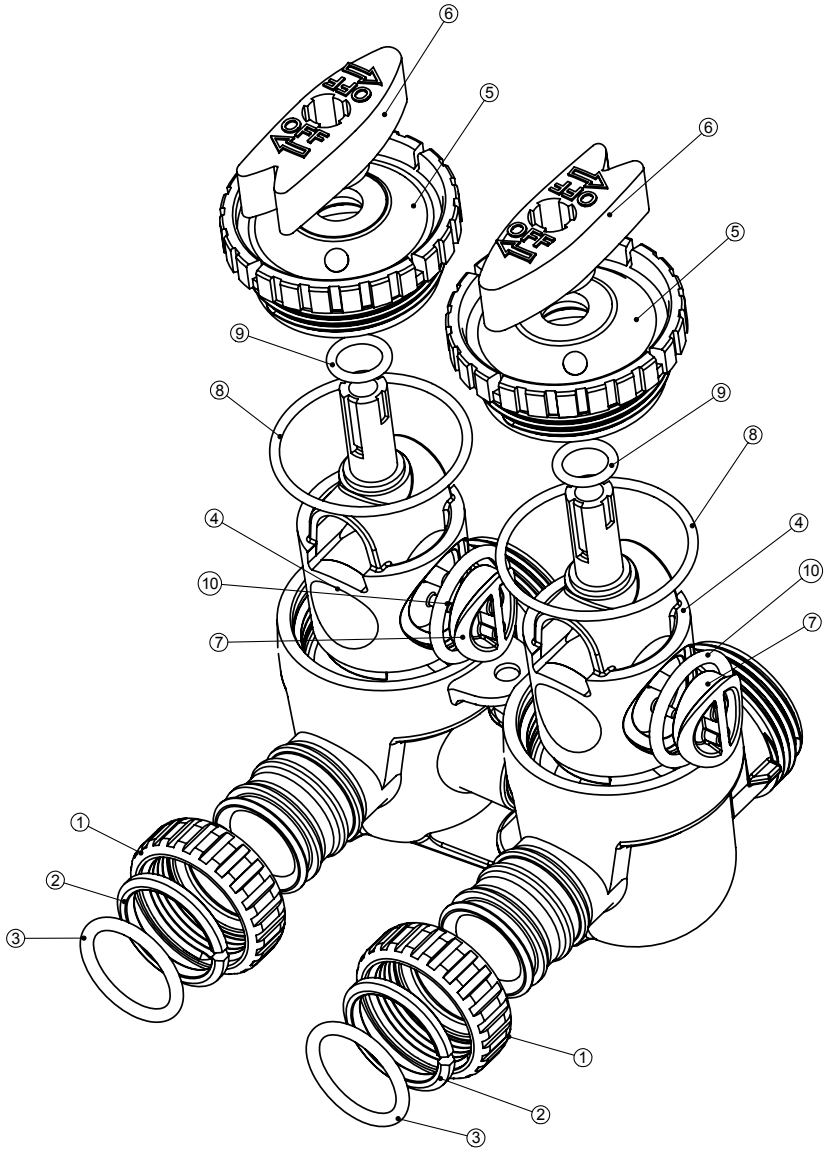
NOTE: A water meter is not applicable for a TC control valve.

Bypass Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1” Quick Connect	2
2	V3150	AM1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	AM1 Bypass 1” Rotor	2
5	V3146	AM1 Bypass Cap	2
6	V3147	AM1 Bypass Handle	2
7	V3148	AM1 Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

(Not Shown) Order No. V3191-01, Description: AM1 Bypass Vertical Adapter Assembly

Order No.	Description	Quantity
V3151	AM1 Nut 1” Quick Connect	2
V3150	AM1 Split Ring	2
V3105	O-Ring 215	2
V3191	AM1 Bypass Vertical Adapter	2



BYPASS VALVE OPERATION

Figure 1

NORMAL OPERATION

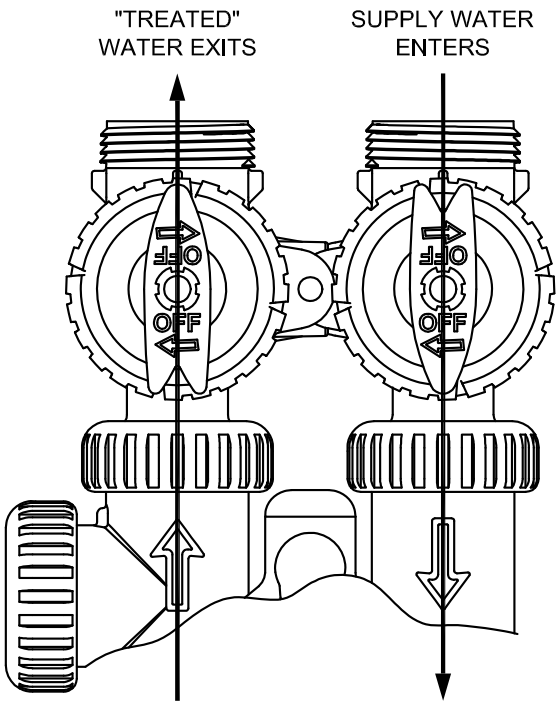


Figure 2

BYPASS OPERATION

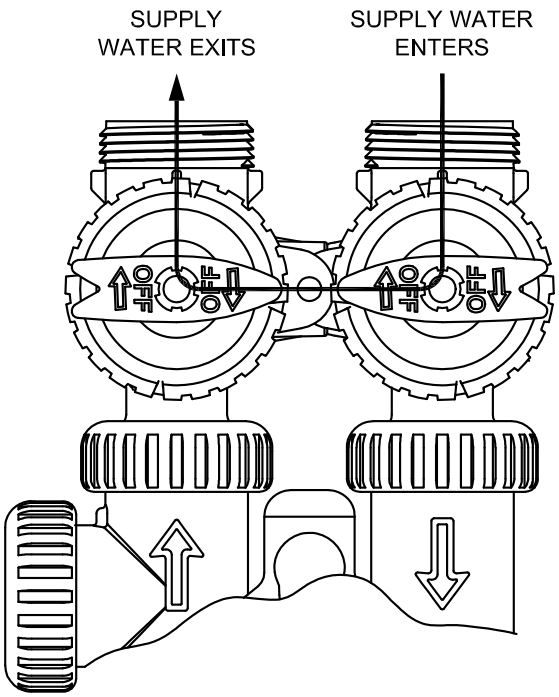


Figure 3

DIAGNOSTIC MODE

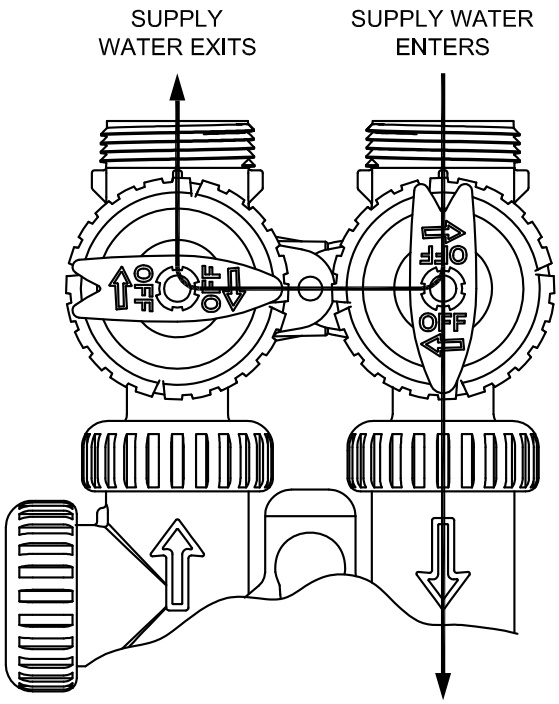
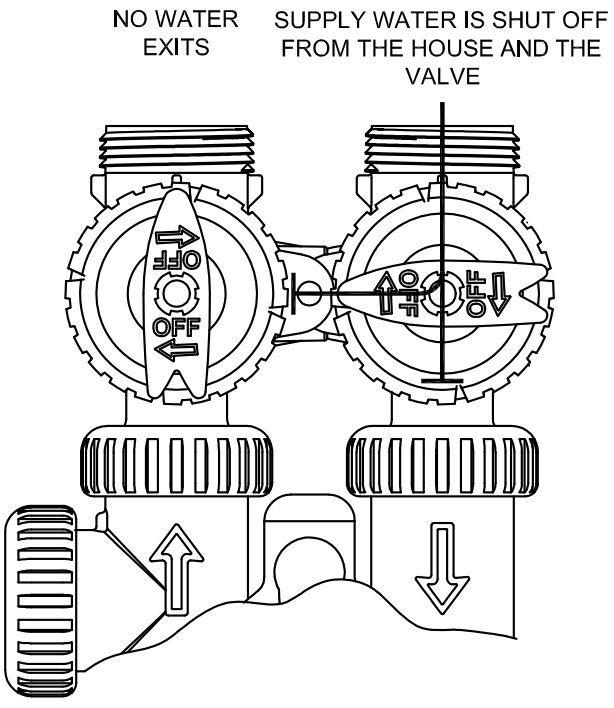


Figure 4

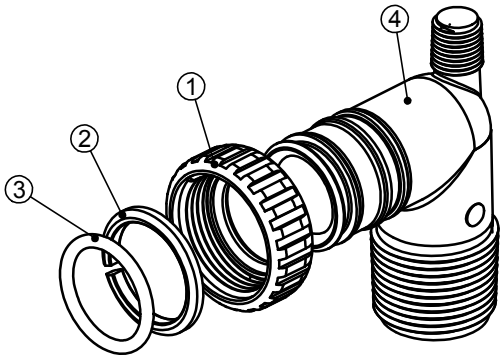
SHUT OFF MODE



Installation Fitting Assemblies

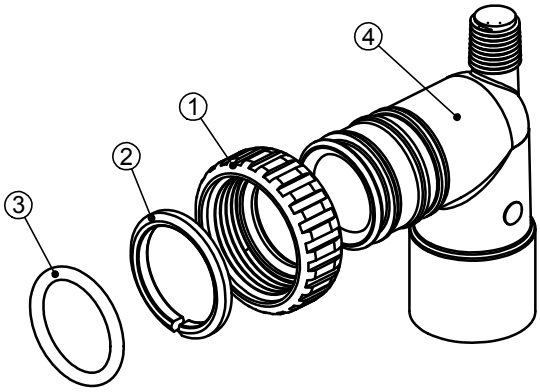
Order No: **V3007**
Description: **AM1 Fitting 1" PVC Male NPT Elbow Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1" Quick Connect	2
2	V3150	AM1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	AM1 Fitting 1 PVC Male NPT Elbow	2



Order No: **V3007-01**
Description: **AM1 Fitting ¾" & 1" PVC Solvent 90° ASY**

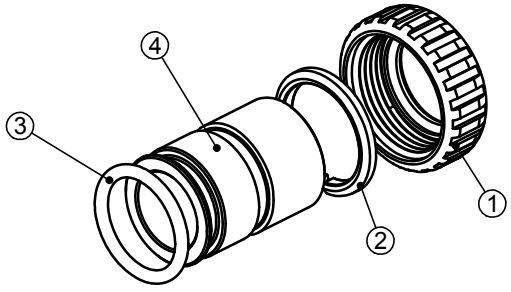
Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1" Quick Connect	2
2	V3150	AM1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3189	AM1 Fitting ¾&1 PVC Solvent 90	2



Order No: **V3007-02**
Description: **AM1 Fitting 1" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1" Quick Connect	2
2	V3150	AM1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3188	AM1 Fitting 1 Brass Sweat Assembly	2

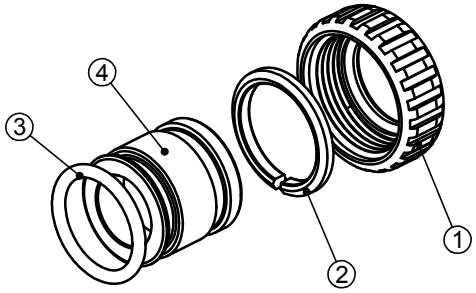
Do not install in California.



Order No: **V3007-03**
Description: **AM1 Fitting ¾" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	AM1 Nut 1" Quick Connect	2
2	V3150	AM1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3188-01	AM1 Fitting ¾ Brass Sweat	2

Do not install in California.



Troubleshooting

TC control valves do not have meters so shaded ares are not applicable for TC control valves

Problem	Possible Cause	Solution
1. No Display on PC Board	a. No power at electric outlet	a. Repair outlet or use working outlet
	b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	b. Plug Power Adapter into outlet or connect power cord end to PC Board connection
	c. Improper power supply	c. Verify proper voltage is being delivered to PC Board
	d. Defective Power Adapter	d. Replace Power Adapter
	e. Defective PC Board	e. Replace PC Board
2. PC Board does not display correct time of day	a. Power Adapter plugged into electric outlet controlled by light switch	a. Use uninterrupted outlet
	b. Tripped breaker switch and/or tripped GFI	b. Reset breaker switch and/ or GFI switch
	c. Power outage	c. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	d. Defective PC Board	d. Replace PC Board
3. Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to three pin connection labeled METER on PC Board
	c. Restricted/ stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Meter wire not installed securely into three pin connector	d. Verify meter cable wires are installed securely into three pin connector labeled METER
	e. Defective meter	e. Replace meter
	f. Defective PC Board	f. Replace PC Board
4. Control valve regenerates at wrong time of day	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration set incorrectly	c. Reset regeneration time
	d. Control valve set at “on 0” (immediate regeneration)	d. Check programming setting and reset to NORMAL (for a delayed regen time)
	e. Control valve set at “NORMAL + on 0” (delayed and/ or immediate)	e. Check programming setting and reset to NORMAL (for a delayed regen time)
5. Time of day flashes on and off	a. Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
6. Control valve does not regenerate automatically when the correct button(s) is depressed and held. For TC valves the buttons are ▲&▼. For all other valves the button is REGEN	a. Broken drive gear or drive cap assembly	a. Replace drive gear or drive cap assembly
	b. Broken Piston Rod	b. Replace piston rod
	c. Defective PC Board	c. Defective PC Board
7. Control valve does not regenerate automatically but **does** when the correct button(s) is depressed and held. For TC valves the buttons are ▲&▼. For all other valves the button is REGEN	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to three pin connection labeled METER on PC Board
	c. Restricted/ stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Incorrect programming	d. Check for programming error
	e. Meter wire not installed securely into three pin connector	e. Verify meter cable wires are installed securely into three pin connector labeled METER
	f. Defective meter	f. Replace meter
	g. Defective PC Board	g. Replace PC Board

Problem	Possible Cause	Solution
8. Hard or untreated water is being delivered	a. Bypass valve is open or faulty	a. Fully close bypass valve or replace
	b. Media is exhausted due to high water usage	b. Check program settings or diagnostics for abnormal water usage
	c. Meter not registering	c. Remove meter and check for rotation or foreign material
	d. Water quality fluctuation	d. Test water and adjust program values accordingly
	e. No regenerant or low level of regenerant in regenerant tank	e. Add proper regenerant to tank
	f. Control fails to draw in regenerant	f. Refer to Trouble Shooting Guide number 12
	g. Insufficient regenerant level in regenerant tank	g. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	h. Damaged seal/stack assembly	h. Replace seal/stack assembly
	i. Control valve body type and piston type mix matched	i. Verify proper control valve body type and piston type match
	j. Fouled media bed	j. Replace media bed
9. Control valve uses too much regenerant	a. Improper refill setting	a. Check refill setting
	b. Improper program settings	b. Check program setting to make sure they are specific to the water quality and application needs
	c. Control valve regenerates frequently	c. Check for leaking fixtures that may be exhausting capacity or system is undersized
10. Residual regenerant being delivered to service	a. Low water pressure	a. Check incoming water pressure – water pressure must remain at minimum of 25 psi
	b. Incorrect injector size	b. Replace injector with correct size for the application
	c. Restricted drain line	c. Check drain line for restrictions or debris and clean
11. Excessive water in regenerant tank	a. Improper program settings	a. Check refill setting
	b. Plugged injector	b. Remove injector and clean or replace
	c. Drive cap assembly not tightened in properly	c. Re-tighten the drive cap assembly
	d. Damaged seal/ stack assembly	d. Replace seal/ stack
	e. Restricted or kinked drain line	e. Check drain line for restrictions or debris and or un-kink drain line
	f. Plugged backwash flow controller	f. Remove backwash flow controller and clean or replace
	g. Missing refill flow controller	g. Replace refill flow controller
12. Control valve fails to draw in regenerant	a. Injector is plugged	a. Remove injector and clean or replace
	b. Faulty regenerant piston	b. Replace regenerant piston
	c. Regenerant line connection leak	c. Inspect regenerant line for air leak
	d. Drain line restriction or debris cause excess back pressure	d. Inspect drain line and clean to correct restriction
	e. Drain line too long or too high	e. Shorten length and or height
	f. Low water pressure	f. Check incoming water pressure – water pressure must remain at minimum of 25 psi

Problem	Possible Cause	Solution
13. Water running to drain	a. Power outage during regeneration	a. Upon power being restored control will finish the remaining regeneration time. Reset time of day.
	b. Damaged seal/ stack assembly	b. Replace seal/ stack assembly
	c. Piston assembly failure	c. Replace piston assembly
	d. Drive cap assembly not tightened in properly	d. Re-tighten the drive cap assembly
14. E1, Err – 1001, Err – 101 = Control unable to sense motor movement	a. Motor not inserted full to engage pinion, motor wires broken or disconnected	a. 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 NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. PC Board not properly snapped into drive bracket	b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Missing reduction gears	c. Replace missing gears
15. E2, Err – 1002, Err – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled	a. Foreign material is lodged in control valve	a. Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Main drive gear too tight	c. Loosen main drive gear. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Improper voltage being delivered to PC Board	d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.

Problem	Possible Cause	Solution
16. E3, Err – 1003, Err – 103 = Control valve motor ran too long and was unable to find the next cycle position	a. Motor failure during a regeneration	a. Check motor connections then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	b. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	c. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
17. Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position	a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	a. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
18. Err -1006, Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function	a. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting
	b. MAV/ NHBP motor wire not connected to PC Board	b. Connect MAV/ NHBP motor to PC Board two pin connection labeled DRIVE. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. MAV/ NHBP motor not fully engaged with reduction gears	c. Properly insert motor into casing, do not force into casing Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	d. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
19. Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Foreign material is lodged in MAV/ NHBP valve	a. Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV/ NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.