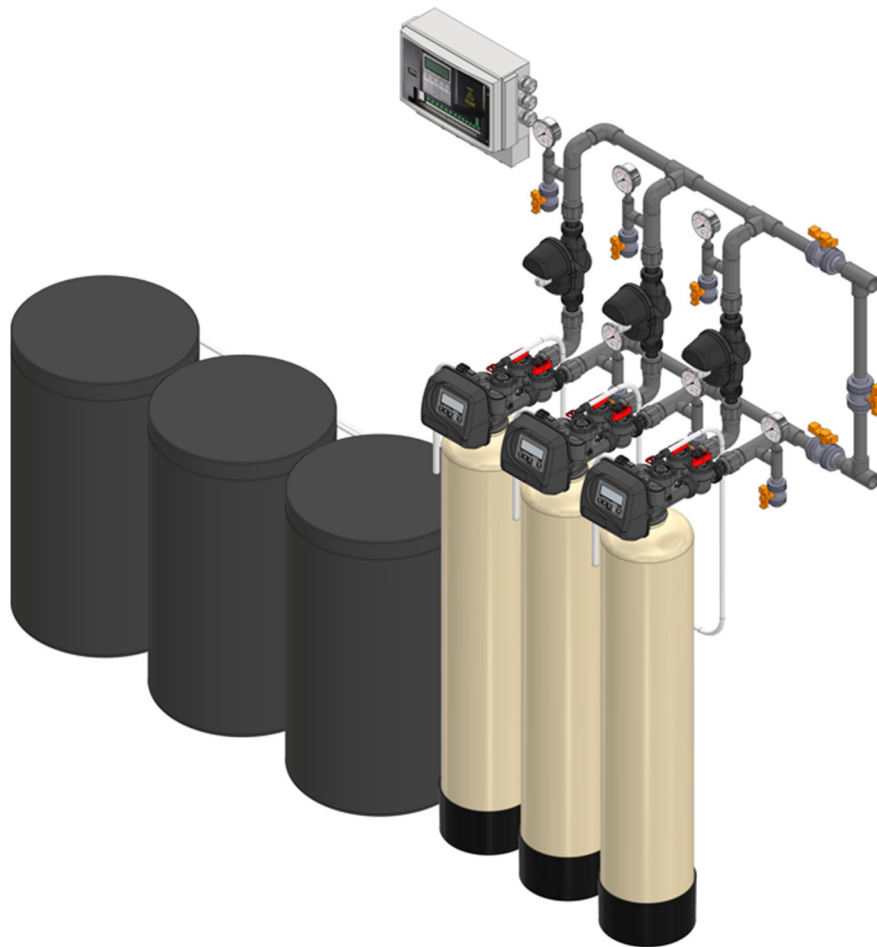




*Quality through innovation*

# **WATER SOFTENER 1" PROGRESSIVE INSTALLATION AND USER GUIDE**



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## 1) INSTALLATION

### 1.1) Pre-installation instructions

The cycle times, sequence of cycles, salt dose refill time and exchange capacity are preset to default by Excalibur. Installer must program the valve to recommended hardness, Day override and time of regeneration. Set time of day, read normal operating displays, read power loss and error displays if any.

#### WATER TEST

Hardness	_____	gpg
Iron	_____	ppm
pH	_____	number
*Nitrates	_____	ppm
Manganese	_____	ppm
Sulphur	_____	yes/no
Total Dissolved Solids	_____	

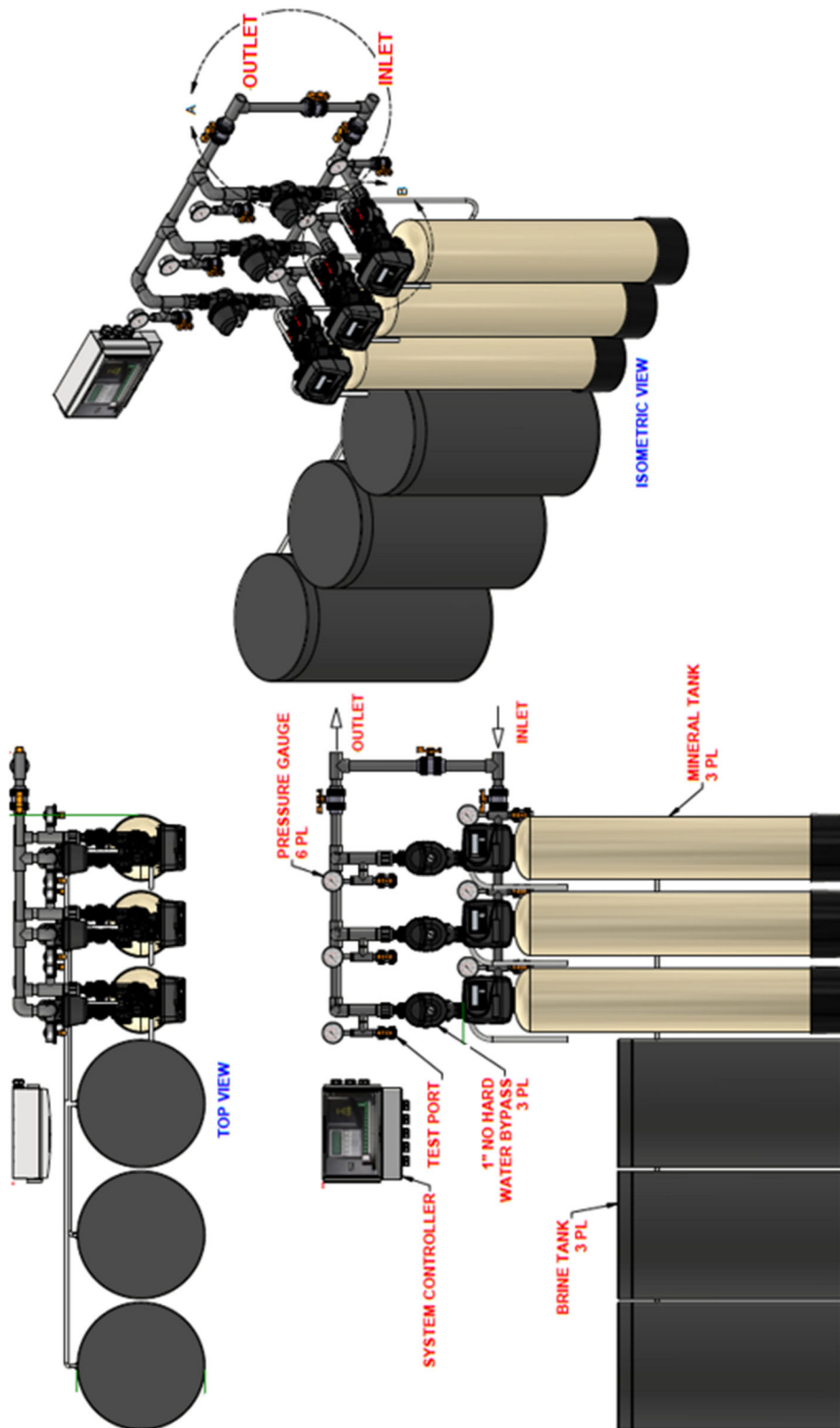
### 1.2) General Installation and Service Warnings

- The softener is designed so that it can be installed easily with minor plumbing changes on previous plumbing.
- The piping must be clamped properly and the weight of the plumbing must not be on the softener.
- Do not use any kind of lubricant including silicone. A silicone based lubricant can be only used on O-Rings but not necessary.
- The nuts and caps can be fastened and unfastened by hand or the plastic service wrench. Do not use pipe wrench to tighten the caps and nuts.

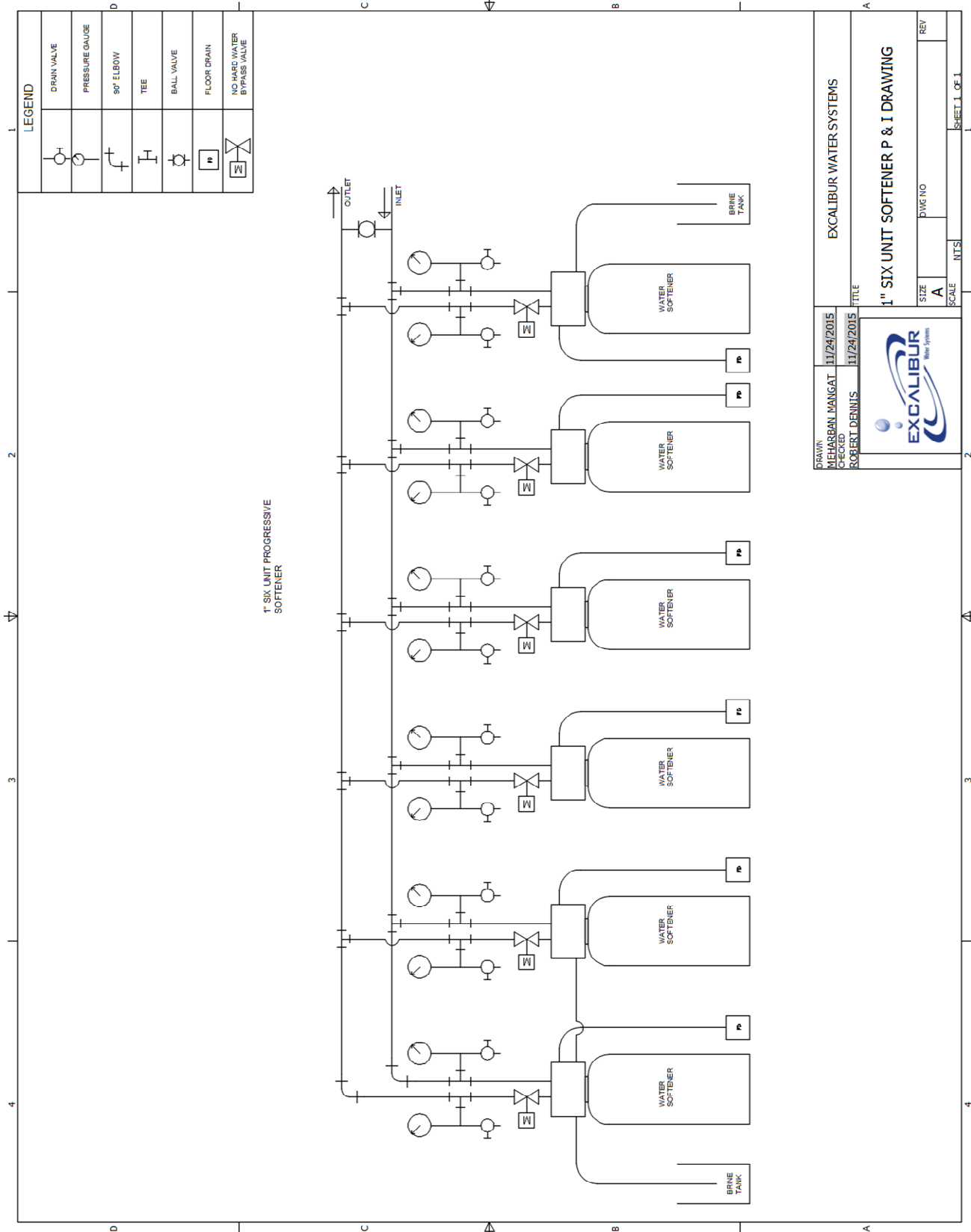
### 1.3) Site Requirements

- Water Pressure: - 40-110 psi
- Water Temperature: - 40-110°F (4.4-43°C)
- Electrical- 115/120 V, 60Hz Uninterrupted Outlet
- Current required is 0.5 Amperes
- The plug-in transformer is for dry locations only
- The tank should be on a firm level surface

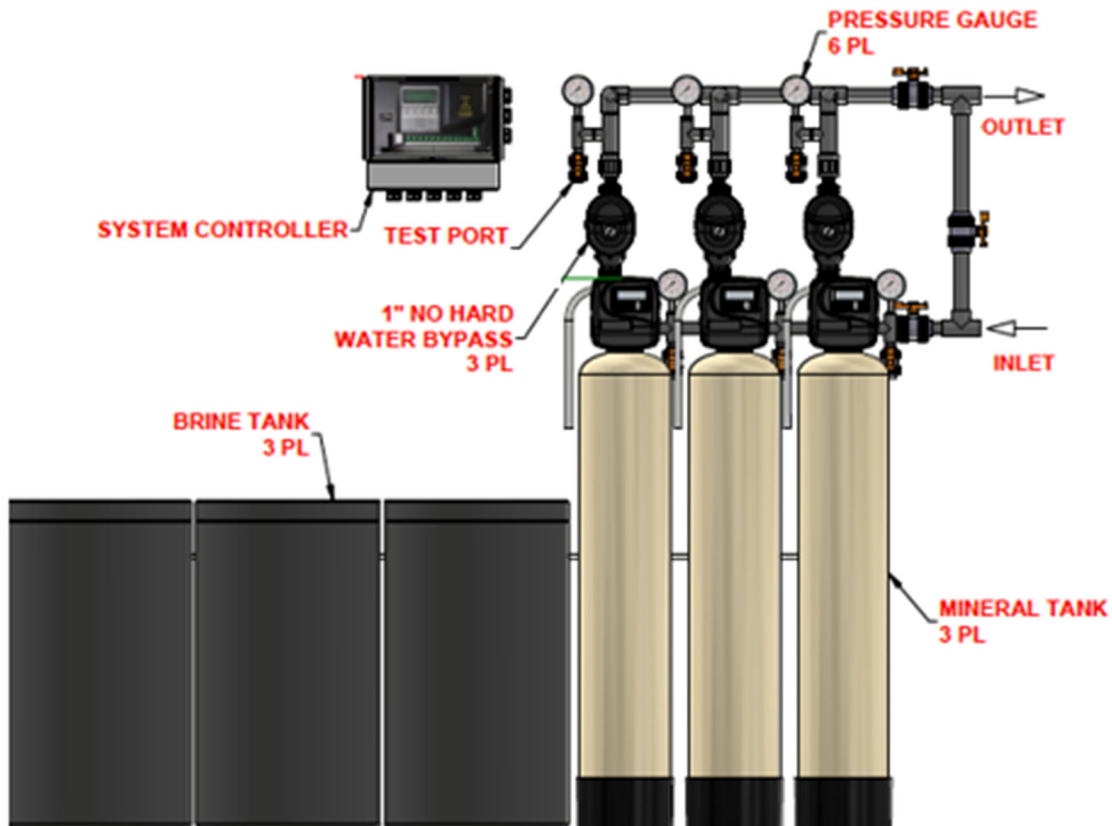
1.4) Installation Drawing



1.5) Piping and Instrumentation Drawing



## 1.6) System Drawing

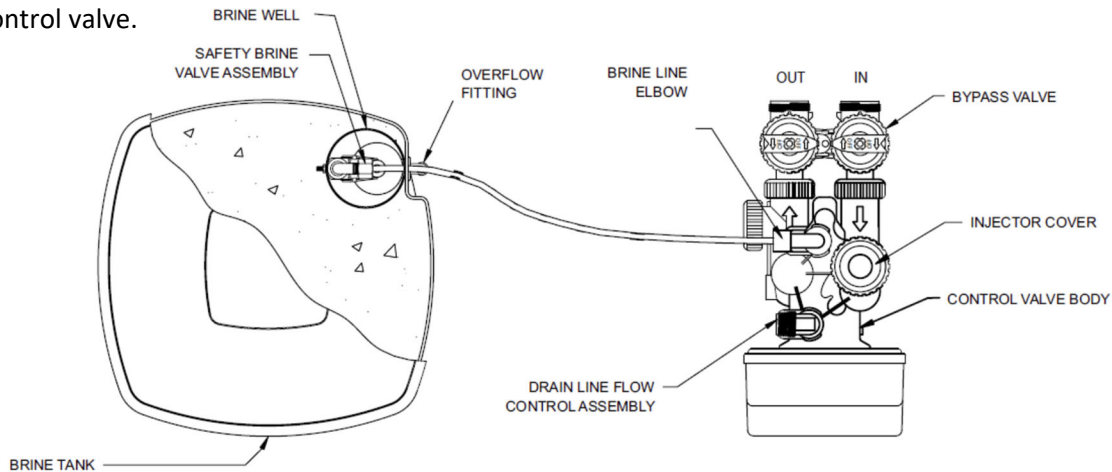


## 1.7) Plumbing

- The system must be close to drain as much as possible.
- The unit including the drain must be located in a room temperature above 33° F.
- The bypass valves must be installed on the control valves.
- The primer, solder or solder flux must not get on the O-rings.
- After soldering the lines must be cooled before installing the O-Rings, nuts and caps.
- If the electrical system is grounded to the plumbing than copper strap must be connected between inlet and outlet as shown in figure above.
- The plumbing must be done by following the local plumbing codes.
- Never let the vacuum occur in tank this may cause implosion and leakage. If vacuum occurrence is expected than vacuum breaker must be installed in inlet line.

### 1.8) Brine Line Connection

Install the 1/2" or 3/8" O.D. Polyethylene tube according to specification sheet from the brine tank to the control valve.

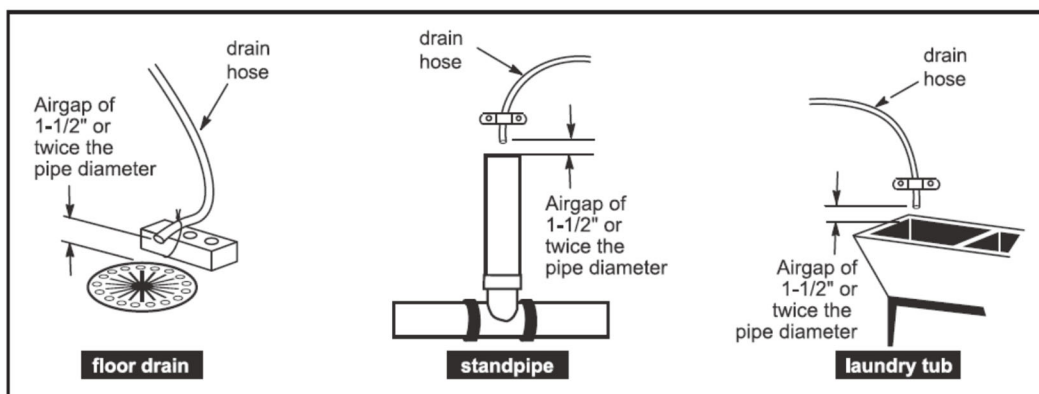


### 1.9) Brine Tank Overflow Line Connection

The overflow drain line is used where overflow of the brine tank can damage the floor finishing or structure. The brine tank line is equipped with safety float valve which prevents the overflow so, the overflow line is only used in case is overflow float valve fails. The overflow line will transfer fluid from brine tank to the drain hence prevents the spillage.

### 1.10) Drain Line

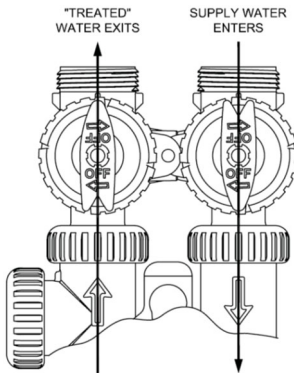
- The size of the drain must be according to the specifications.
- Leave minimum of 6" gap between flow control fitting and solder joints. The gap less than this can damage the flow control.
- Use 3/4" or 1" tubing for drain line according to the specifications.
- If the drain line is elevated and then emptied into the drain below the level the of control valve the 7" loop should make at the end of drain line.
- The air gap between the drain and the end of the drain line must be twice the diameter of the tube.
- The strap must be tied at the end to secure the line.





### 1.11) Bypass Valve

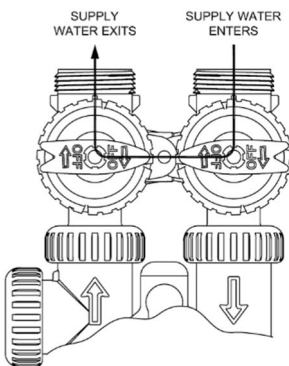
#### NORMAL OPERATION



#### NORMAL OPERATION

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 as a water softener.

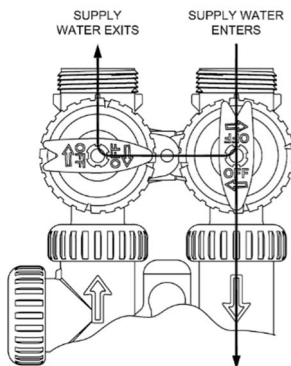
#### BYPASS OPERATION



#### BYPASS OPERATION

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.

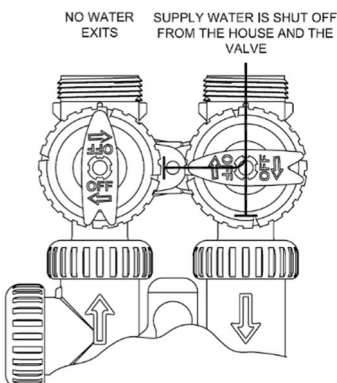
#### DIAGNOSTIC MODE



#### DIAGNOSTIC MODE

The inlet handle points in the direction of flow and the outlet handle points to the center of bypass valve, system water pressure is allowed to the control valve and the plumbing system while not allowing water to exit from the control valve to the plumbing.

#### SHUT OFF MODE



#### SHUT OFF MODE

The inlet handle points to the center of the bypass valve and the outlet handle points in the direction of flow, the water is shut off to the plumbing system. If water is available on the outlet side of the softener it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system).

## 1.12) Loading Instructions

**Step 1:** Check the product upon removal and remove from box packaging checking for any shipping damage or shortages that must be reported to Excalibur Water Systems immediately for confirmation.

**Step 2:** Insert distributor(s) inside of media mineral tank(s) so it is positioned properly in the bottom centre groove. If not already sized properly cut the top of the distributor pipe  $\frac{1}{2}$  -  $\frac{3}{4}$ " above top of tank opening and clean off and excess PVC materials with grit cloth.

**Step 3:** Plug the top inlet opening of the distributor (Hub & Lateral) or bottom stack with a clean cloth, rag, or tape to prevent any gravel or resin from entering into the distributor tube.

**Step 4:** Load the gravel under bedding onto the mineral tank using a funnel or some sort of loading device. If multiple layers of gravel with different sizes being utilized always load the largest gravel size in diameter to the smallest last.

**Step 5:** Load the water softening cation exchange resin also by the use of a funnel or some sort of loading device until all resin is inside of mineral tank.

**Step 6:** Remove top opening cover of the distributor carefully not to move or disturb the distributor tube not allowing any debris or materials to get inside of the now loaded softener(s).

**Step 7:** Thread on control valves onto top opening tanks be sure to check and verify that the O-ring on the bottom base of the control valve is present and properly lubricated with silicone. Tighten control valve(s) clockwise until you have reached the end of the thread and have secured a water tight seal.

**Step 8:** Precede now with the unit(s) in their proper installation locations to run piping and materials for all inlet, outlet, and drain connections properly with isolation valves and test ports for future water tests. Also unions should be included in installation materials for easy future servicing of the control valves when necessary on all inlet, outlet, and drain lines.

### 1.13) Start Up Instructions

- Keep the bypass valves in bypass operation by moving both the handles into the center direction of the bypass valves. Now the untreated water is being supplied. Open the faucet downstream of softener system until water comes clear out of it. The initial water can be dirty because of installation debris. Now inspect the leaks in plumbing.
- Manually add approximate 5 gallons of water to each brine tank so that level reaches air check valve. Press and hold the “REGEN” button down for 5 seconds to start manual regeneration. The drive motor will start the backwash cycle and countdown time begins. Turn the inlet bypass valve handles halfway into the direction of service operation. Once the steady water flows out of drain then fully open the bypass valve into the direction of service operation.
- When the water become clear in drain line then press the regen button to advance the regeneration in brine cycle. Fully open the faucet and check if water is being drawn from brine tank. Allow this cycle to run for 3 minutes.
- Press REGEN button to advance the regeneration to rinse cycle. The water will come through the drain. Allow this process until water coming through the drain becomes clear.
- Add salt to the tank and allow ample time to dissolve it in water to become brine solution.

## 2) CONTROL VALVE PROGRAMMING

### 2.1) Regeneration and Error Screens

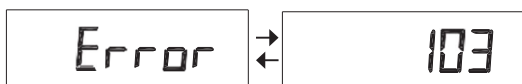


#### Regen Screen

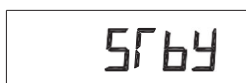
Displays the time remaining in the current cycle. Pressing REGEN advances to the next cycle.

#### Error Screen

Alternated flashing Error and error code every 3 seconds. Clear by disconnecting the power supply at the PC board and reconnecting, or press NEXT and REGEN simultaneously for 3 seconds.



In Alternator Systems when a unit is waiting to initiate the first cycle step of regeneration, "REGEN Pndg" is displayed.



"STby" is displayed in Alternator Systems when a valve is in Standby state.



"REGEN Pndg RINSE FILL" is displayed whenever a zero-capacity tank has transferred to an off-line state and is currently waiting to initiate the second portion of a regeneration cycle. Viewed only when Delayed Rinse and Fill is set to ON.

### 2.2) Button Operation



Scrolls to the next display.



- Pressing once and releasing will schedule a regeneration at the preset delayed regeneration time.
- Pressing again and releasing will cancel the regeneration.
- Pressing and holding for 3 seconds will initiate an immediate regeneration
- Pressing while in regeneration will advance to the next cycle.
- Pressing in the program levels will go backwards to the previous screen



Change Variable being displayed.



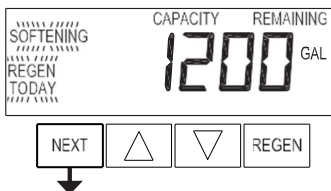
Key sequence to lock and unlock program settings



Holding for 3 seconds initiates a control reset. The software version is displayed and the piston returns to the home/service position, resynchronizing the valve.

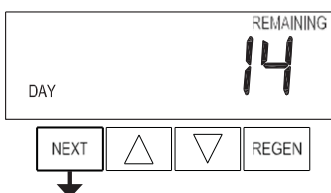
## 2.3) User Displays

When the system is operating, one of five displays may be shown. Pressing NEXT will alternate between the displays shown below.



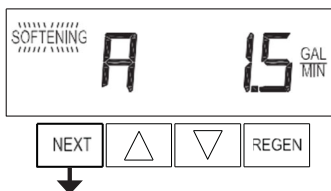
### User 1

Typical user display. Shows volume remaining to regeneration. This screen will not be viewed if the control is set for time-clock operation.



### User 2

Displays number of days to next regeneration.

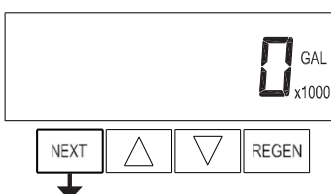


### User 3

Flow Rate.

Displays present flow rate.

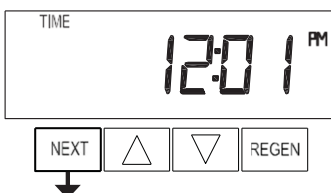
Not viewed (along with SOFTENING or FILTERING Icon) if ALT A or ALT b is set in CONFIGURATION 4 and the valve is currently in Standby. When 1.0 is set in CONFIGURATION 1, the display will indicate the tank currently in Service ("A" or "b") in the leftmost digit.



### User 4

Displays total volume in gallons since last reset. If a meter is not used this display will be shown but 0 will be displayed.

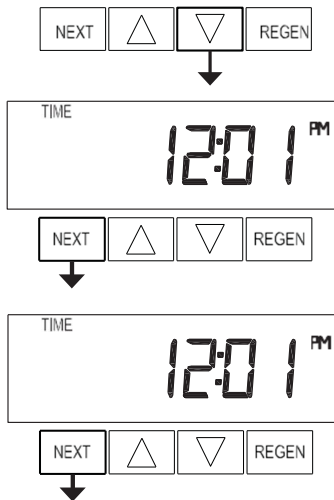
PRESS ▼ FOR 3 SECONDS TO RESET TO 0.



### User 5

Shows current time.

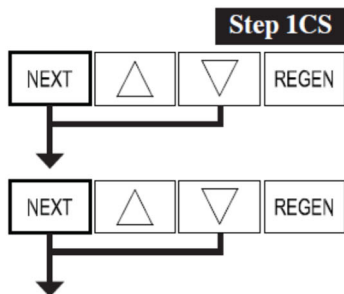
### 2.4) Setting Time of Day



- Push NEXT until time of day screen is displayed.
- Press ▼ button and release after when SET TIME is displayed and the hour flashes once. Press ▲ or ▼ until the correct hour is displayed.
- Then press NEXT. The minutes will flash. Press ▲ or ▼ until the correct minute is displayed.
- Press NEXT to return to the User Displays.

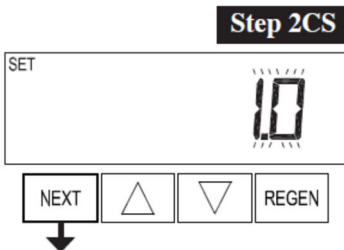
If a power outage lasts less than 8 hours and the time of day flashes on and off, the battery should be replaced and the time of day should be reset.

### 2.5) Configuration Settings



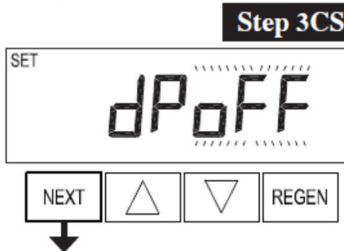
**Step 1CS**

**Step 1CS** – Press NEXT and ▼ simultaneously for 5 seconds and release. Press NEXT and ▼ simultaneously for 5 seconds and release. If the screen in Step 2CS does not appear, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲ and REGEN in sequence, then press NEXT and ▼ simultaneously for 5 seconds and release. Press NEXT and ▼ simultaneously for 5 seconds and release.



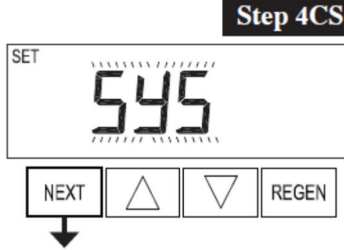
**Step 2CS**

**Step 2CS** – Use ▲ or ▼ to select 1.0 for 1" valve. Press NEXT to go to Step 3CS.



**Step 3CS**

**Step 3CS** – Select “dP oFF” - feature not used, by using ▲ or ▼ buttons. Press NEXT to go to Step 4CS. Press REGEN to return to previous step.



**Step 4CS**

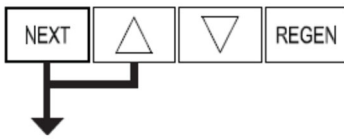
**Step 4CS** – Select “SYS” to link control valve to System Controller. For communication between control valve and System Controller, a three-wire communication cable is required. Selection requires that a connection to a Clack No Hard Water Bypass (V3070FF or V3070FM) be made to the two-pin connector labeled MAV located on the printed circuit board for WS1 and WS1.25 control valves.

Exit to Normal Screens

Press NEXT to go to normal Screens.

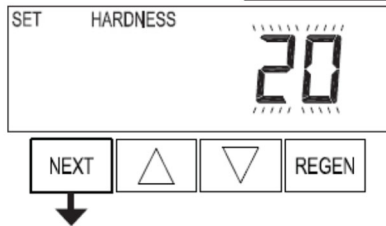
## 2.6) Installer Display Settings

### Step 1I



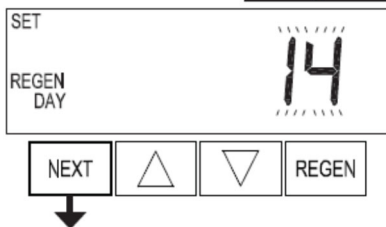
**Step 1I** - To enter Installer Display press NEXT and ▲ simultaneously for about 5 seconds and release.

### Step 2I



**Step 2I** – Hardness: Set the amount of influent hardness using ▲ or ▼. If “OFF” or a number was selected in Step 11S. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

### Step 3I



**Step 3I** – Day Override: Set “14” maximum number of days between regenerations. Set Day Override using ▲ or ▼: See Setting Options Table for more detail on setup. Press NEXT to go to step 4I. Press REGEN to return to previous step.

### Step 4I



**Step 4I** – Next Regeneration Time (hour): Set the hour of day for regeneration using ▲ or ▼. The default time is 2:00. Press NEXT to go to step 5I. Press REGEN to return to previous step.

### Step 5I



**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.

### Exit Installer Display Settings

## 2.7) OEM Softener System Setup

**Step 1S**

**Step 1S** - Press NEXT and ▼ simultaneously for 5 seconds and release.

**Step 2S**

**Step 2S** – Choose SOFTENING using ▲ or ▼. Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

**Step 3S**

**Step 3S** – Choose Downflow Brining Direction using ▲ or ▼. This screen is not viewed when Step 2S is set to Filtering. Press NEXT to go to Step 4S. Press REGEN to return to previous step.

**Step 4S**

**Step 4S** – Set “Post” Refill location using ▲ or ▼ to refill the brine tank after the final rinse.

Press NEXT to go to Step 5S. Press REGEN to return to previous step.

**Step 5S**

**Step 5S** – Select the time for the first backwash cycle using ▲ or ▼. Press NEXT to go to Step 6S. Press REGEN to return to previous step.

**Step 6S**

**Step 6S** – Select the time for the brine cycle using ▲ or ▼.

NOTE: The display will flash between cycle number and time, and brine direction (UP or dn).

Press NEXT to go to Step 7S. Press REGEN to return to previous step.



**Step 7S**

SET  
3 8 MIN  
BACKWASH  
NEXT ▲ ▼ REGEN

**Step 7S** – Select the time for second backwash cycle using ▲ or ▼.  
Press NEXT to go to Step 8S. Press REGEN to return to previous step.

**Step 8S**

SET  
4 8 MIN  
RINSE  
NEXT ▲ ▼ REGEN

**Step 8S** – Select the time for rinse cycle using ▲ or ▼.  
Press NEXT to go to Step 9S. Press REGEN to return to previous step.

**Step 9S**

SET  
5 9.5  
LBS  
FILL  
NEXT ▲ ▼ REGEN

**Step 9S** – Select the pounds of salt for fill cycle using ▲ or ▼.  
Press NEXT to go to Step 10S. Press REGEN to return to previous step.

**Step 10S**

SET  
CAPACITY  
240  
x1000  
NEXT ▲ ▼ REGEN

**Step 10S** – Set System Capacity using ▲ or ▼. The System Capacity setting should be based on the volume of resin and LBS of salt fill set in Step 9S. Press NEXT to go to Step 11S. Press REGEN to return to previous step.

**Step 11S**

SET  
REGEN  
AUTO 0 GAL  
NEXT ▲ ▼ REGEN

**Step 11S** – Set “AUTO” Volume Capacity using ▲ or ▼. “AUTO” means volume capacity will be calculated and reserve capacity will be automatically estimated.  
Press NEXT to go to Step 12S. Press REGEN to return to previous step.

**Step 12S**

SET  
RELAY  
OFF  
NEXT ▲ ▼ REGEN

**Step 12S** – Set Relay Operation “OFF” using ▲ or ▼. Relay will not energize.  
Press NEXT to exit to normal screens. Press REGEN to return to previous step.

## 2.8) Diagnostics

**Step 1D**

**Step 1D** - Press ▲ and ▼ simultaneously for 5 seconds and release.

**Step 2D**

**Step 2D** – Software Version. Press NEXT to go to Step 3D. Press REGEN to exit Diagnostics.

**Step 3D**

**Step 3D** – Volume, 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 4D. Press REGEN to return to previous step.

**Step 4D**

**Step 4D** – Days, total since start-up: This display shows the total days since startup. Press the NEXT button to go to Step 5D. Press REGEN to return to previous step.

**Step 5D**

**Step 5D** – 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 6D. Press REGEN to return to previous step.

**Step 6D**

**Step 6D** – Error Log: This display shows a history of the last 10 errors generated by the control during operation. Press ▲ or ▼ to view each recorded error.



Press NEXT to go to Step 7D. Press REGEN to return to previous step.

**Step 7D**

**Step 7D** – Days, since last regeneration: This display shows the days since the last regeneration occurred.



Press NEXT to go to Step 8D. Press REGEN to return to previous step.

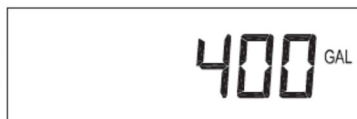
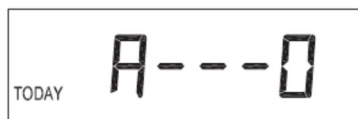


**Step 8D**



**Step 8D – Volume, since last regeneration:** This display shows the volume of water that has been treated since the last regeneration. This display will equal zero when a water meter is not installed. Press NEXT to go to Step 9D. Press REGEN to return to previous step.

**Step 9D**



**Step 9D – Volume, reserve capacity used for last 7 days.** This display shows day 0 (for today) and flashes the reserve capacity. Pressing ▲ will show day 1 (which would be pressed to move backwards in the day be yesterday) and flashes the reserve capacity used. Pressing ▲ again will show day 2 (the day before yesterday) and the reserve capacity. Keep pressing ▲ to show the capacity for days 3, 4, 5 and 6. ▼ can be series. Press NEXT at any time to go to Step 10D. Press REGEN to return to previous step.

**Step 9D – Volume, reserve capacity used for last 7 days.** This display shows day 0 (for today) and flashes the reserve capacity. Pressing ▲ will show day 1 (which would be pressed to move backwards in the day

**Step 10D**



**Step 10D – Volume, 63-day usage history:** This display shows day 0 (for today) and flashes the volume of water treated today. Pressing ▲ will show day 1 (which would be yesterday) and flashes the volume of water treated on that day. Continue to press ▲ to show the maximum volume of water treated for the last 63 days. If a regeneration occurred on the day, the word “REGEN” will also be displayed. This display will show dashes if a water meter is not installed.

**Step 10D – Volume, 63-day usage history:** This display shows day 0 (for today) and flashes the volume of water treated today. Pressing ▲ will show day 1 (which would be yesterday) and flashes the volume of water

**Step 11D**



**Step 11D – Retracted piston rod drive history.** L stand for latest and A stands for average. The time second is 1/100 of given number on display.

**Step 12D**



**Step 12D – Extended piston rod drive history.** L stand for latest and A stands for average. The time second is 1/100 of given number on display. Press and hold ▲ and ▼ buttons for 3 seconds to reset the extended and retracted drive history.

**Exit Diagnostics**

### 3) MODEL VARIABLE PROGRAMMING AND COMPONENTS

#### 3.1) Programming

OEM Softener System Setup								
Model* # ↓	Mineral Tank	Brine Tank	5S	6S	7S	8S	9S	10S
Step →			Backwash Mins	Brine Mins	2nd Backwash Mins	Rinse Mins	Salt LBS	System Capacity Kgr
EWS SC1N30	9x48	18x33	8	60	6	4	15 (10)	30.0 (27.0)
EWS SC1N45	10x54	18x33	8	60	6	4	22.5 (15)	45.0 (40.5)
EWS SC1N60	12x52	18x40	8	60	8	6	30 (20)	60.0 (54.0)
EWS SC1N75	13x54	18x40	8	60	8	6	37.5 (25)	75.0 (67.5)
EWS SC1N90	14x65	24x50	8	60	8	8	45 (30)	90.0 (81.0)
EWS SC1N120	16x65	24x50	8	60	8	8	60 (40)	120.0 (108.0)
EWS SC1N150	18x65	24x50	8	60	10	8	75 (50)	150.0 (135.0)
EWS SC1N180	18x65	24x50	10	60	10	8	90 (60)	180.0 (162.0)
EWS SC1N210	21x62	24x50	10	60	10	8	105 (70)	210.0 (189.0)

Configuration Settings			
Step #	2CS	3CS	4CS
Option	1.0	oFF	SYS

These options will be similar for all 1" Simplex Water Softeners

OEM Softener System Setup						
Step #	2S	3S	4S	11S	12S	13S
Option	Softening	Down	Post	Auto	on 0	Off

#### 3.2) Flow Controls and Injectors

Model* #	Mineral Tank	Brine Tank	Injector		Drain Flow Control		
			Color	Order #	Flow GPM	Drain Line Size	Order #
EWS SC1N30	9x48	18x33	Red	V3010-1D	2.2	3/4"	V3162-027
EWS SC1N45	10x54	18x33	White	V3010-1E	2.7		V3162-027
EWS SC1N60	12x52	18x40	Blue	V3010-1F	3.2		V3162-032
EWS SC1N75	13x54	18x40	Yellow	V3010-1G	4.2		V3162-042
EWS SC1N90	14x65	24x50	Green	V3010-1H	5.3		V3162-053
EWS SC1N120	16x65	24x50	Orange	V3010-1I	6.5		V3162-065
EWS SC1N150	18x65	24x50	Light Blue	V3010-1J	9.0		V3162-090
EWS SC1N180	18x65	24x50	Light Blue	V3010-1J	9.0	V3162-090	
EWS SC1N210	21x62	24x50	Light Green	V3010-1K	11.0	1"	V3190-110

\* Model Number: - N must be replaced by the number of units in a system. (2= Duplex, 3= Triplex, 4= Quadplex, 5= Fiveplex and 6 = Sixplex)

## 4) SYSTEM CONTROLLER PROGRAMMING

### 4.1) General Button Operation and Other Displays



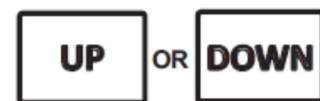
Set clock from any user screen. Exit & save from setup or program screens.



Move to the next display



Used in initiating a manual regeneration. Moves back one display while in program mode.



Change variable being displayed



Key sequence to lock and unlock software

### System Controller LED Functions

**Blue LED (ONLINE):** - Indicates which unit is the current “Lead” unit in the system. If the blue LED is flashing, then that Lead unit has lost communication with the system controller. The Blue LED will also transfer to the unit that has the least capacity remaining with RANDOM and SERIES system types.

**Green LED (ONLINE):** - Indicates which unit that is currently On-line in the system. If the green LED is flashing, then that unit has lost communication with the System Controller.

**Orange LED (STANDBY):** - Indicates which unit that is currently in Stand-by in the system. If the Orange LED is flashing, then that unit is detecting flow rate through this meter.

**Red LED (REGEN):** - Indicates which unit is currently in regeneration in the system. If the Red LED is flashing, then that unit is in error.

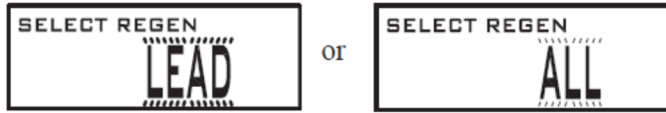
**Green & Orange LED's:** - Indicates that a unit is transferring between On-line and Stand-by.

**Orange & Red (flashing) LED's:** - Indicates that a unit is in error and the MAV / NHWBP valve is closed.

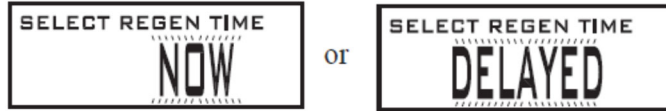
**Green & Red (flashing) LED's:** - Indicates that a unit is in error and the MAV / NHWBP valve is open.



After a flash reprogramming, select the US format to show 12 hour AM/PM timekeeping and Gallons for volume units.

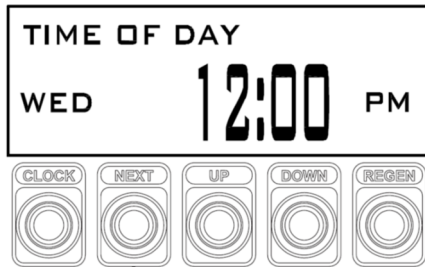


Press and hold Regen button. Use “UP” and “DOWN” button to select “LEAD” or “ALL”. Lead will regenerate the lead unit but all will regenerate all the unit in sequence. Press Next.

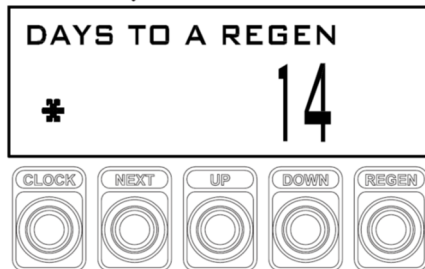


Use “UP” and “DOWN” button to select “NOW” or “DELAYED”. “Now” will regenerate immediately but delayed regenerated will occur at scheduled regeneration.

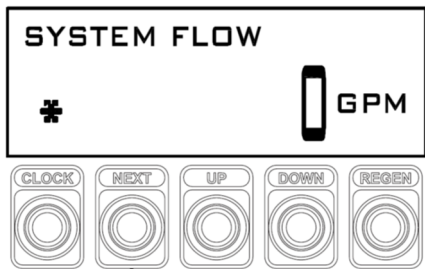
4.1) User Displays



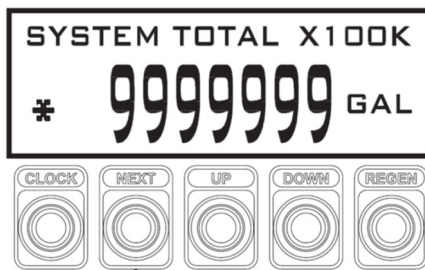
Displays Time of the day



Displays the number of days between regeneration

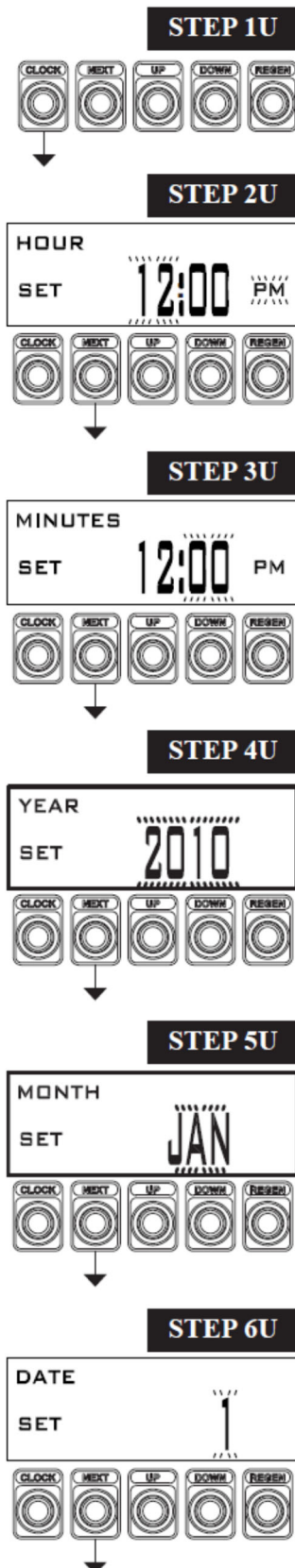


Displays the total system current flow rate



Displays the total flow in gallons since start up

## 4.2) Set Time of Day and Day of Week



STEP 1U: - Press CLOCK.

STEP 2U: - Current Time (hour): Set the hour using UP or DOWN buttons. Press NEXT to go to Step 3U. With metric units set, AM/PM indication will not appear and timekeeping will be shown in the 24-hour format.

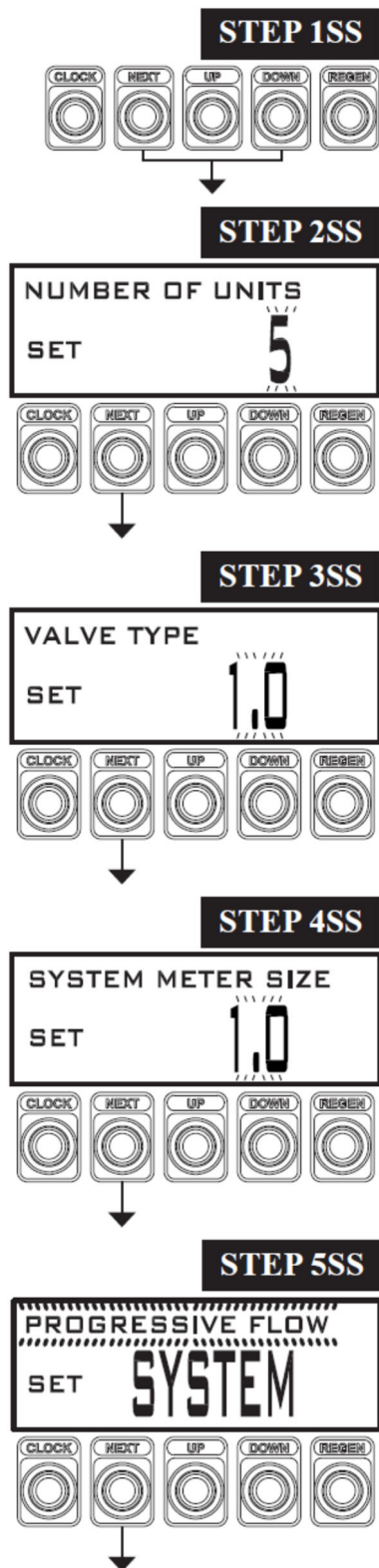
STEP 3U: - Current Time (minutes): - Set the minutes using the UP or DOWN buttons. Press NEXT to go to Step 4U.

STEP 4U: - Current day of the year: Set the year using the UP or DOWN buttons. Press NEXT to step 5U.

STEP 5U: - Current Month: - Set the month using the UP or DOWN buttons. Press NEXT to step 6U.

STEP 6U: - Current day of the month: - Set the day using the UP or DOWN buttons. Press NEXT to exit.

## 4.3) System Setup Displays



**STEP 1SS:** - Press NEXT and DOWN simultaneously for three seconds and release.

**STEP 2SS:** - Select the total number of units in a system using UP and DOWN buttons.

(Duplex=2; Triplex=3; Quadplex=4; Fiveplex=5 and Sixplex=6)

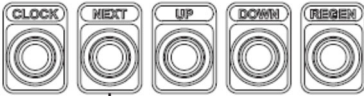
**STEP 3SS:** -Select valve type "1.0". Press NEXT to go to Step 4SS.

**STEP 4SS:** - Select "1.0" meter size. Press NEXT to go to Step 5SS.

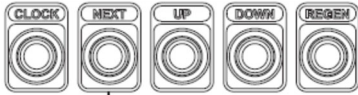
**Step 5SS:** - Select the "PROGRESSIVE FLOW" system type. Press NEXT to go to Step 5SSA.



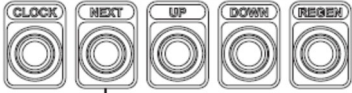
**STEP 5SSA**



**STEP 6SS**



**STEP 7SS**



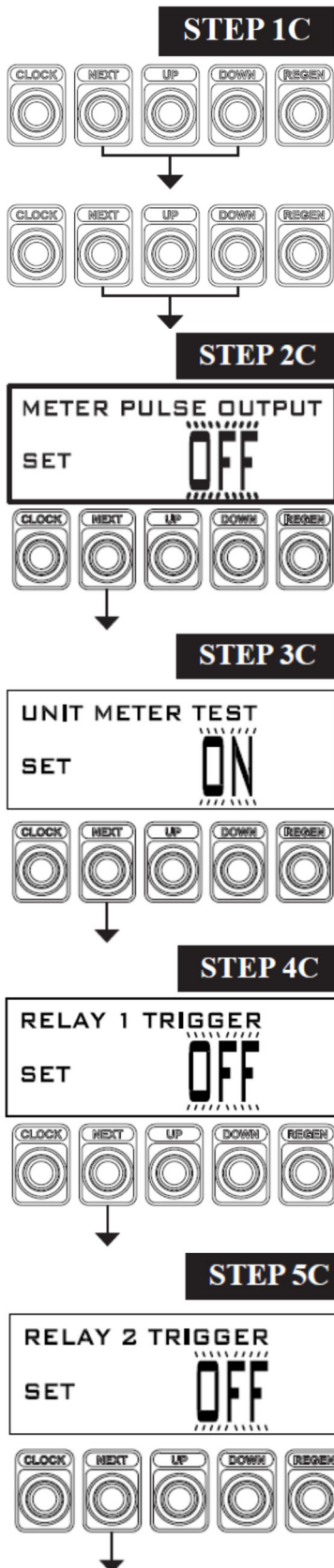
RETURN TO NORMAL MODE

**Step 5SSA:** - Adjust the unit add point in GPM as specified on the specifications of the system model. Press NEXT to go to Step 6SS.

**Step 6SS:** - Set the regeneration to start "IMMEDIATE" when the capacity falls below reserve.

**Step 7SS:** - Set the maximum number of days to be "14" between regenerations.

## 4.4) Configuration Displays



**STEP 1C:** - Press NEXT and DOWN simultaneously for approximately three seconds, then release. Press NEXT and DOWN again simultaneously for 3 seconds and release.

**STEP 2C:** - Set "OFF" Meter Pulse Output operation using UP or DOWN.

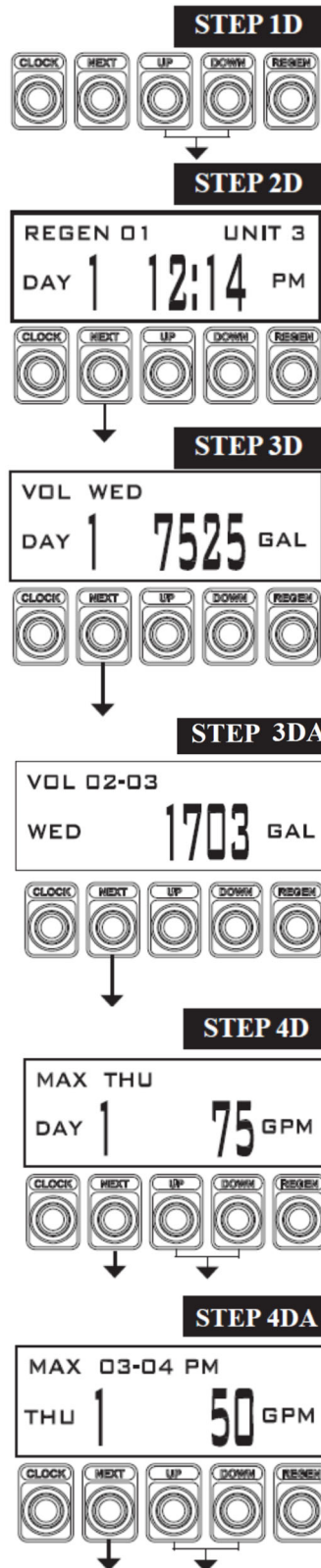
**STEP 3C:** - Set Unit Meter Test "ON" using UP or DOWN. Press NEXT to go to Step 4C.

**STEP 4C:** - Set Relay 1 trigger "OFF" using UP or DOWN buttons. Press NEXT to go to Step 5C.

**STEP 5C:** - Set Relay 2 Trigger "OFF" using UP or DOWN. Press NEXT to exit configuration displays.

Press NEXT to save and exit to normal mode.

## 4.5) Diagnostic Displays



**STEP 1D:** - Press UP and DOWN buttons simultaneously for three seconds and release.

**STEP 2D:** - Press UP and DOWN to scroll through the last 60 regenerations. Information displayed includes the unit, day and time of the regeneration. Press NEXT to go to Step 3D.

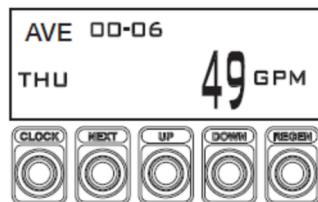
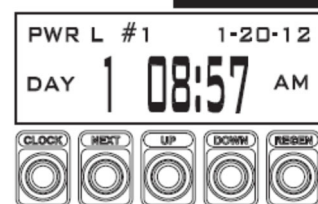
**STEP 3D:** - Press UP or DOWN to view the daily treated water usage for the last 99 days.

Press and hold UP and DOWN on the day's usage to view each day's hourly system usage to go to step 3DA or Press NEXT to go to Step 4D.

**STEP 3DA:** - Press UP or DOWN to scroll through the treated water usage for each hour of the day selected. Press NEXT to go back to Step 3D.

**STEP 4D:** - Press UP or DOWN to view the maximum flow rate recorded for the last 99 days. Press UP and DOWN simultaneously to go to Step 4DA or Press NEXT to go to Step 5D.

**STEP 4DA:** - Press UP or DOWN to scroll through the maximum flow rate for each hour of the day selected. Press UP and DOWN buttons simultaneously on the hour selected to go to next Step 4DB.

**STEP 4DB****STEP 5D****STEP 6D**

**STEP 4DB:** - Press UP or DOWN to scroll through the average system flow rate for the selected hour, in 6-minute interval. Press NEXT to return to Step 4DA.

**STEP 5D:** - This display shows the error log with last 20 valve errors and communication losses are stored in it. Use UP and DOWN buttons to scroll through the log.

DAY XX = Indicates the number of days ago

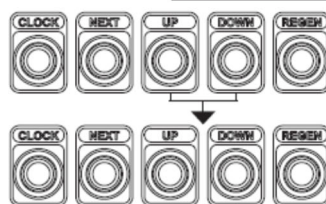
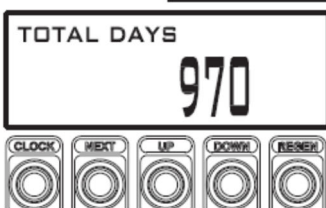
COM- = Communication lost error

RPTD = Indicates the valve error was not reset

CLRD = Indicates the valve error was finally reset

**STEP 6D:** - Press UP or DOWN to view the last 20 power events. Press NEXT to exit Diagnostics. Press REGEN to return to previous step.

## 4.6) History Displays

**STEP 1HD****STEP 2HD****STEP 3HD**

**STEP 1HD:** - Press UP and DOWN simultaneously for three seconds and release. Again press UP and DOWN buttons simultaneously for three seconds and release.

**STEP 2HD:** - Displays software rev level. Press NEXT to go to Step 3HD.

**STEP 3HD:** - Displays total days since startup. Press NEXT to exit to normal model.

#### 4.7) Data Extraction

**Step 1:** - Ensure the USB memory device is formatted for FAT32 file system and that the allocation unit size is set for 4096 bytes.

**Step 2:** - Ensure that the System Controller is powered on.

**Step 3:** - Plug the USB memory device into the System Controller USB port.

**Step 4:** - During the extraction process, a series of status displays will appear. When the “USB COMPLETE” message appears, remove the USB device from the System Controller. This could take several minutes.



**Step 5:** - The extracted data can then be imported into the Clack Data Extraction spreadsheet.

#### 4.8) Flash Programming of System Controller

**Step 1:** - Ensure the USB memory device is formatted for the FAT32 file system. If not, consult the manufacturer of the USB memory device for the latest in formatting instructions.

**Step 2:** - Ensure that System Controller is switched off.

**Step 3:** - Plug the USB memory device into the System Controller USB port.

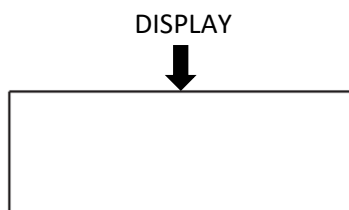
**Step 4:** - Apply power to the System Controller.

**Step 5:** - The LCD backlight will appear blue which means working. The LCD will show no characters and all LED's will remain off for the duration of programming. When the LCD turns green, the process is complete and successful.

**Step 6:** - Remove the power from the System Controller.

**Step 7:** - Remove the USB memory device from the System Controller.

**Step 8:** - Reapply power to the System Controller. Normal functionality should be present.



Flash Reprogramming Status Display

**Blue Display** = Control is being reprogrammed

**Green Display** = Control has been reprogrammed

**Red Display** = An error occurred during control reprogramming, and the reprogramming process has failed

#### 4.9) Network Webpage Setup Procedure

**Step 1:** - Open the WEB.zip file.

**Step 2:** - Copy the “Web” folder to a USB memory device.

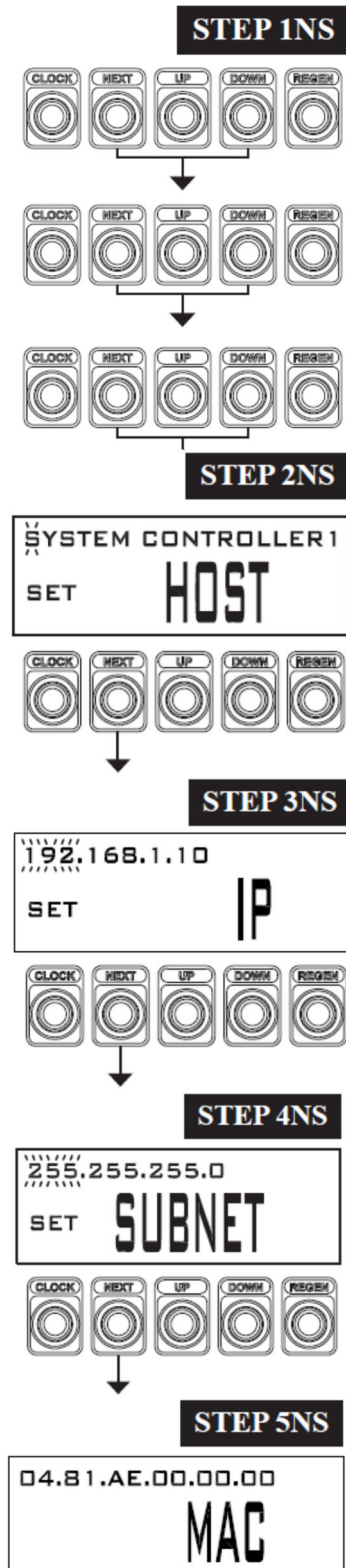
**Step 3:** - Ensure that the System Controller is powered on.

**Step 4:** - Plug the USB memory device into the System Controller USB port.

**Step 5:** - During the network web page setup process, a series of status displays will appear. When the “USB COMPLETE” message appears, remove the USB device from the System Controller.



## 4.10) Network Configuration Displays



**STEP 1NS:** - Press NEXT and DOWN buttons simultaneously and release after 3 seconds. Repeat this step for another two times.

**STEP 2NS:** - Set the desired Host Name to identify this controller on the network. Pressing CLOCK will select the first letter, use UP or DOWN to change each letter. Press NEXT to forward to the next character. Press NEXT to go to Step 3NS. Press REGEN to go to previous character or step.

**STEP 3NS:** - IP Addressing – Set the proper static IP address. Each IP address has four sections separated by decimal points. Pressing CLOCK will select the first section of the address to be changed. Press UP or DOWN to adjust each section, using NEXT to advance to the next section and to Step 4NS.

**STEP 4NS:** - Subnet Masking – Set the proper Subnet Mask. Each Subnet Mask has four sections separated by decimal points. The System Controller will only be able to communicate with other devices within the same subnet. Pressing CLOCK will select the first section of the address to be changed by pressing UP or DOWN buttons to adjust each section. Pressing NEXT will advance to the next section and to the Step 5NS.

**STEP 5NS:** - MAC address – The controller's unique ID code that is set at the factory. This information is read-only for information purposes. Press NEXT to exit Network Configuration. Press REGEN to return to the previous step.

## 4.11) System Controller Programming Summary

<b>System Setup</b>		
<b>Step #</b>	<b>Value</b>	<b>Description</b>
2SS	2,3,4,5 or 6	Number of Units in System
3SS	1.0	1" Control Valves
4SS	1.0	1" Meter Size
5SS	PROGRESSIVE	All units online only one can regenerate at a time
6SS	IMMEDIATE REGEN	Regen starts immediately without delay
7SS	14	Maximum number of days between regeneration

<b>Configuration Settings</b>		
<b>Step #</b>	<b>Value</b>	<b>Description</b>
2C	OFF	Meter Output
3C	ON	Meter Logic Test
4C	OFF	Relay 1 will always be off
5C	OFF	Relay 2 will always be off

<b>Network Configuration Settings</b>		
<b>Step #</b>	<b>Value</b>	<b>Description</b>
2NS	SYSTEM CONTROLLER	Name of System Controller on network
3NS	XXX.XXX.X.XX	Set Proper Static IP address
4NS	XXX.XXX.XXX.X	Set Proper Subnet Masking
5NS	04.81.AE.00.00.00	Unique MAC Address

## 5) CONTROL VALVE

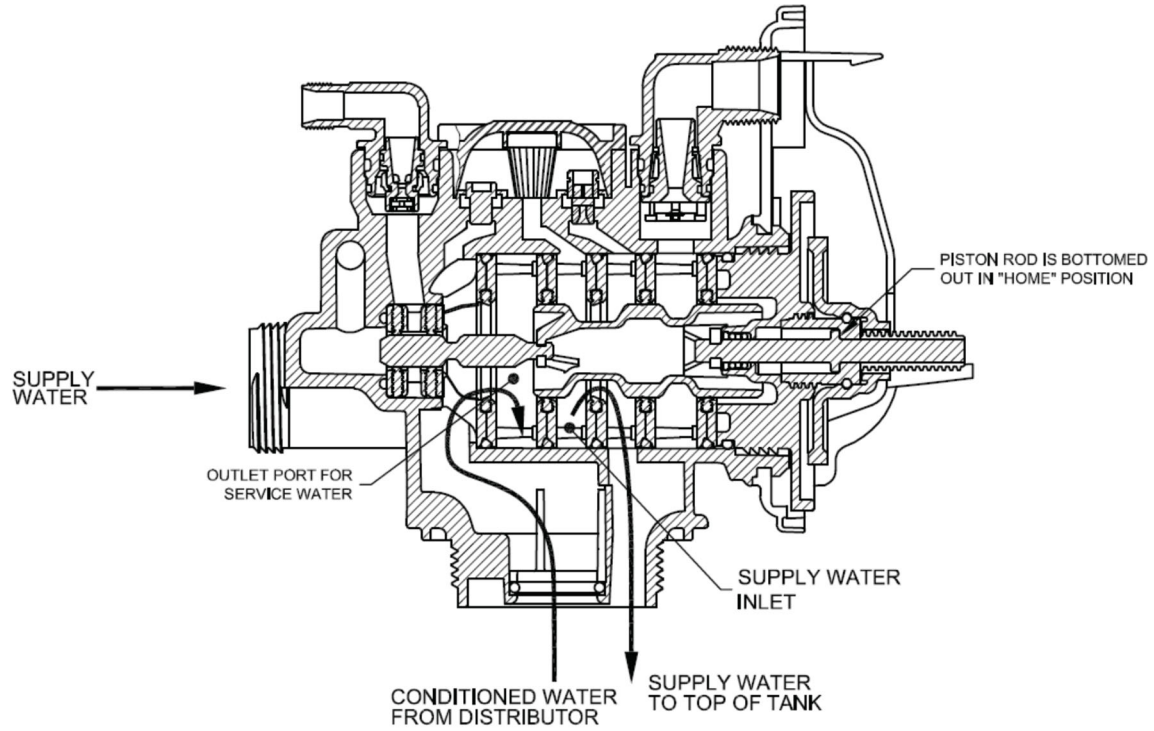
### 5.1) Valve Specifications

Minimum/Maximum Operating Pressures	20 psi (138 kPa or 1.4 bar) -125 psi (862 kPa or 8.6 bar)
Minimum/Maximum Operating Temperatures	40°F (4°C) - 110°F (43°C)
Power Adapter:	
Supply Voltage	110VAC
Supply Frequency	60Hz
Output Voltage	12VAC
Output Current	500mA
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.	

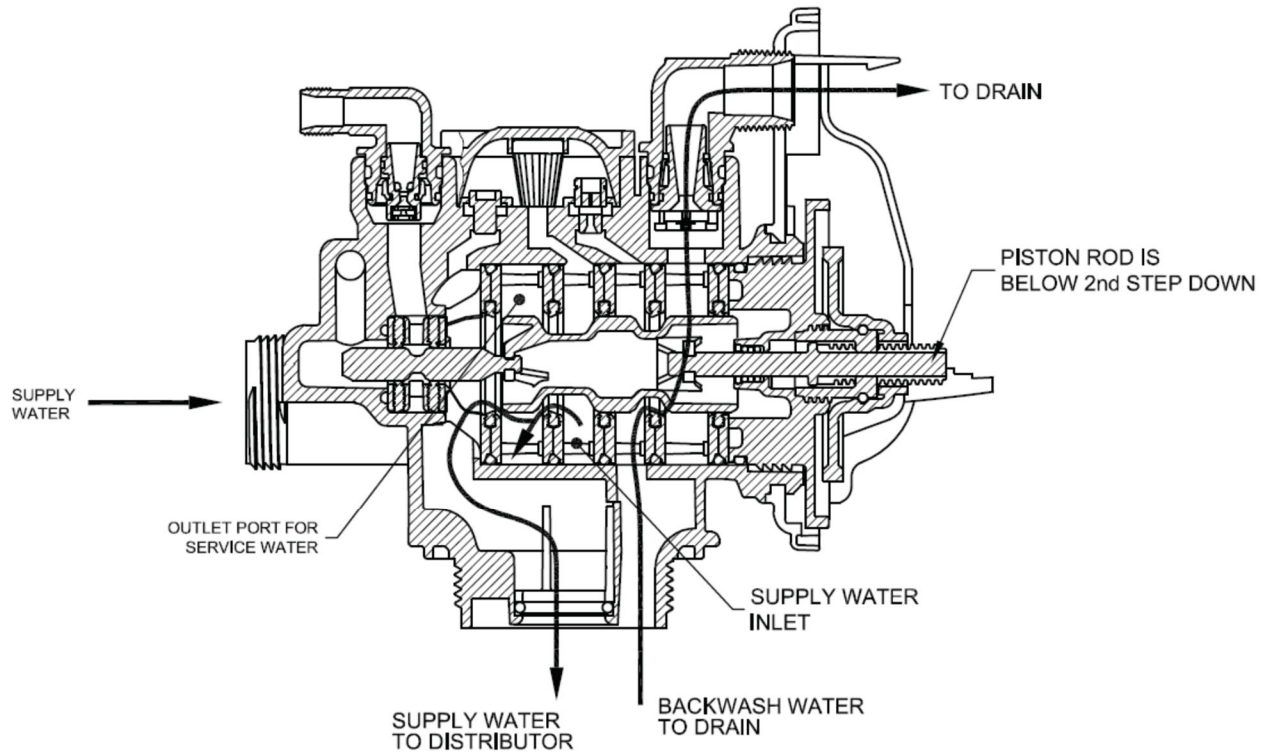
Service flow rate 1" (includes bypass and meter)	27 gpm (102.2 lpm, 6.1 m3/h) @15 psig (103 kPa) drop
Backwash flow rate 1" (includes bypass)	27 gpm (102.2 lpm, 6.1 m3/h) @25 psig (172 kPa) drop
Minimum/Maximum Operating Pressures	20 psi (138 kPa) -125 psi (862 kPa)
Minimum/Maximum Operating Temperatures	40°F (4°C) - 110°F (43°C)
Drain Line Flow Controls	1" DLFC (V3190-XX)
Inlet / Outlet Fitting Options	See Drawings and Part Numbers
Distributor Tube Opening WS1 Valve	1.05" outside diameter (¾" NPS)
Tank Thread	2½" - 8 NPSM
Control Valve Weight	4.5 lbs. (2.0 kg)
PC Board Memory	Nonvolatile EEPROM (electrically erasable programmable read only memory)
Compatible with regenerants/chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine and chloramines



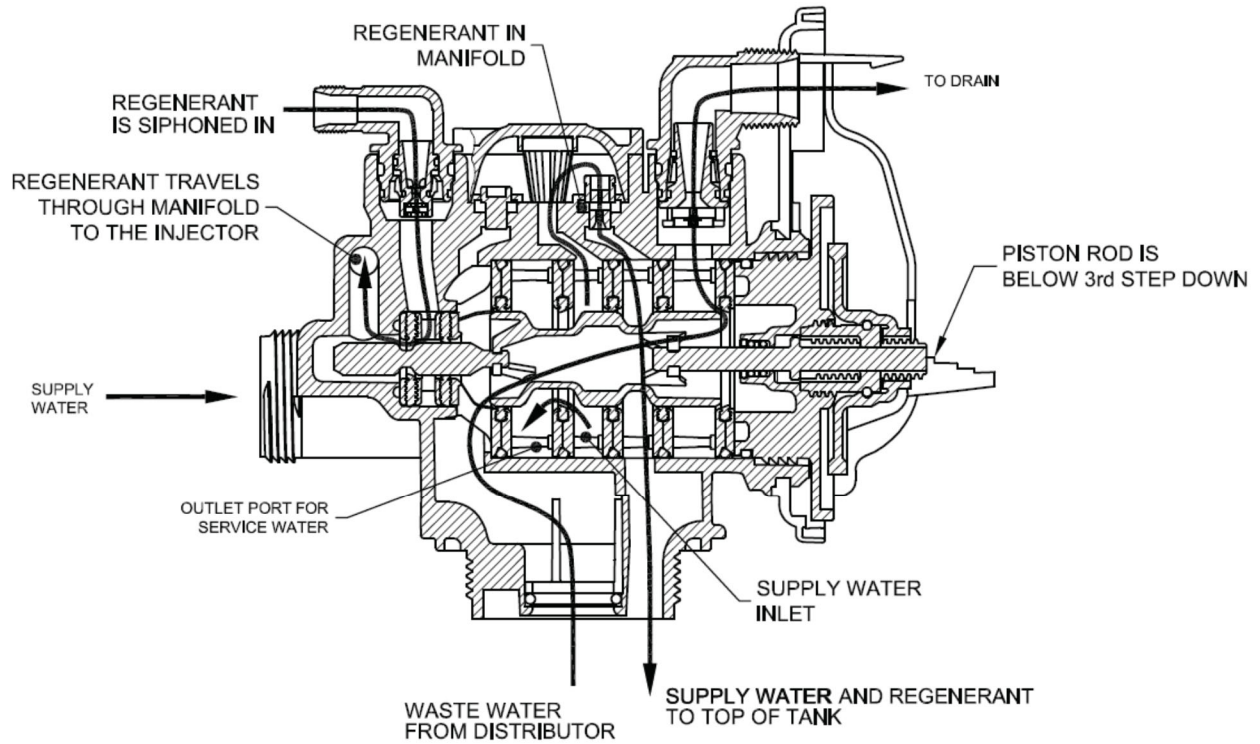
5.2) Flow Diagrams



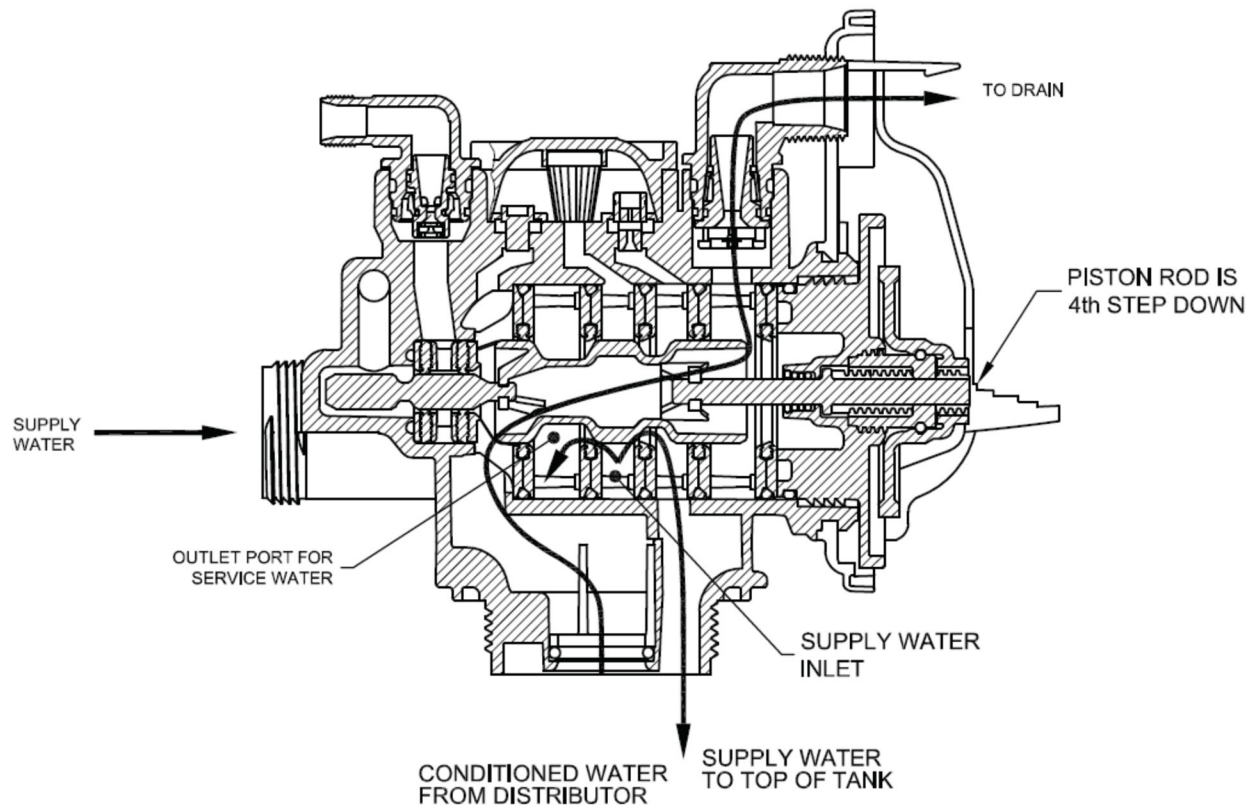
**SERVICE**



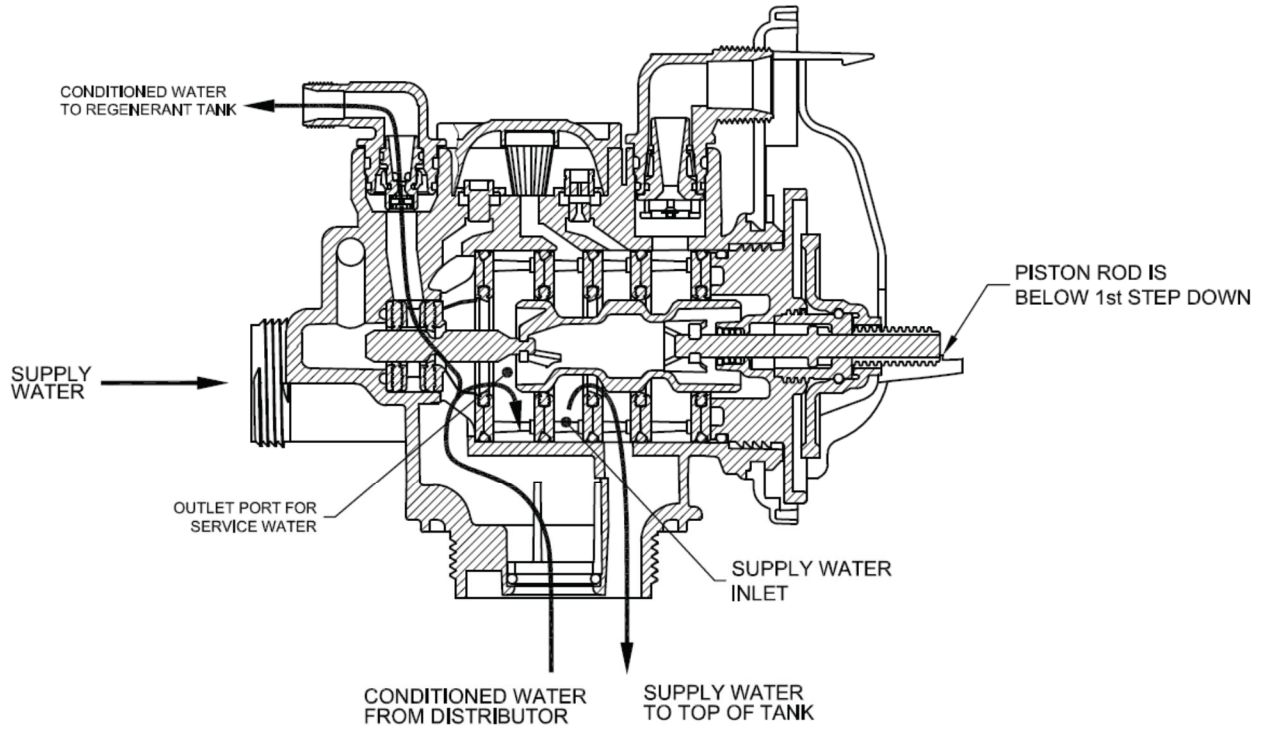
**BACKWASH CYCLE**



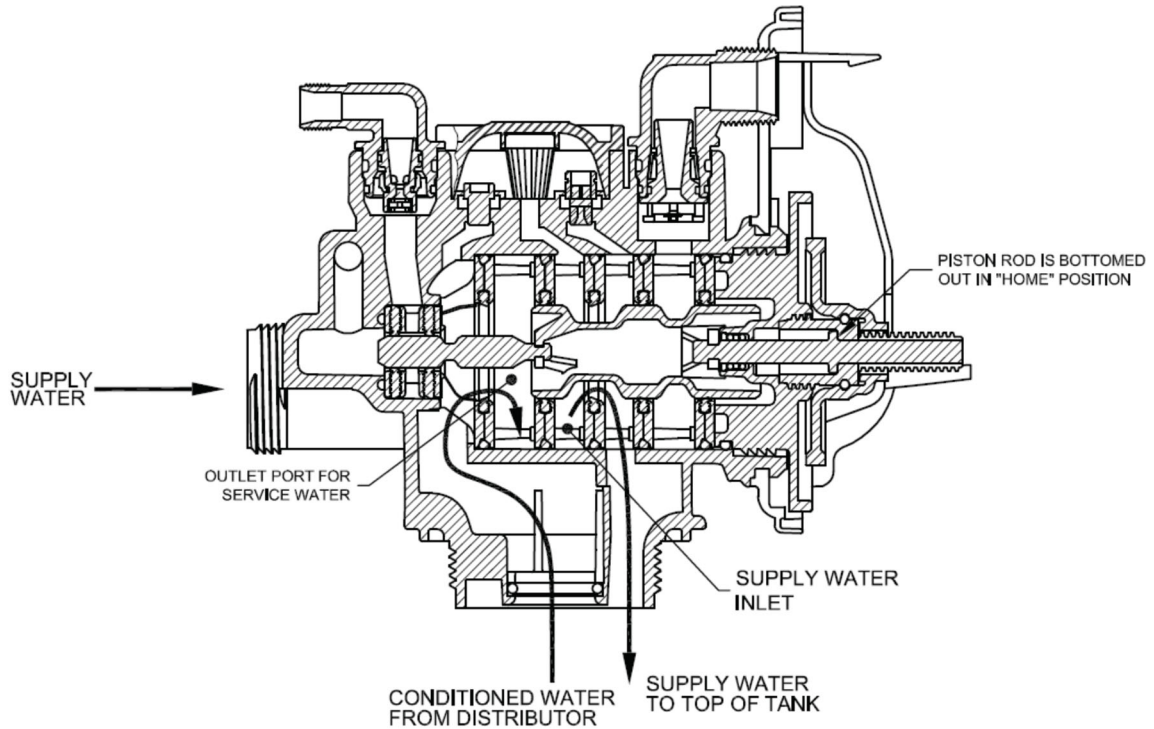
**BRINE CYCLE**



**RINSE CYCLE**



**FILL CYCLE**



**SERVICE**

### 5.3) Components of Control Valve

#### 5.3.1) Front Cover and PC Board

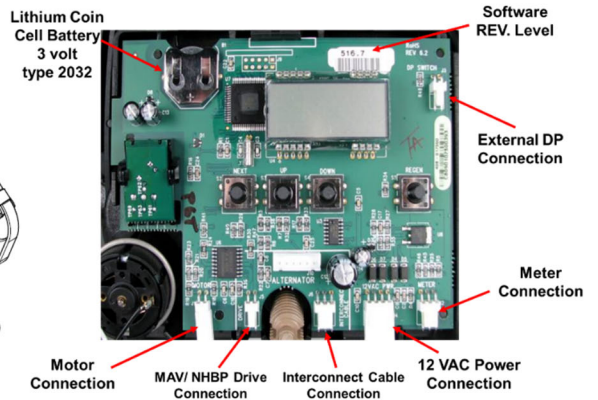
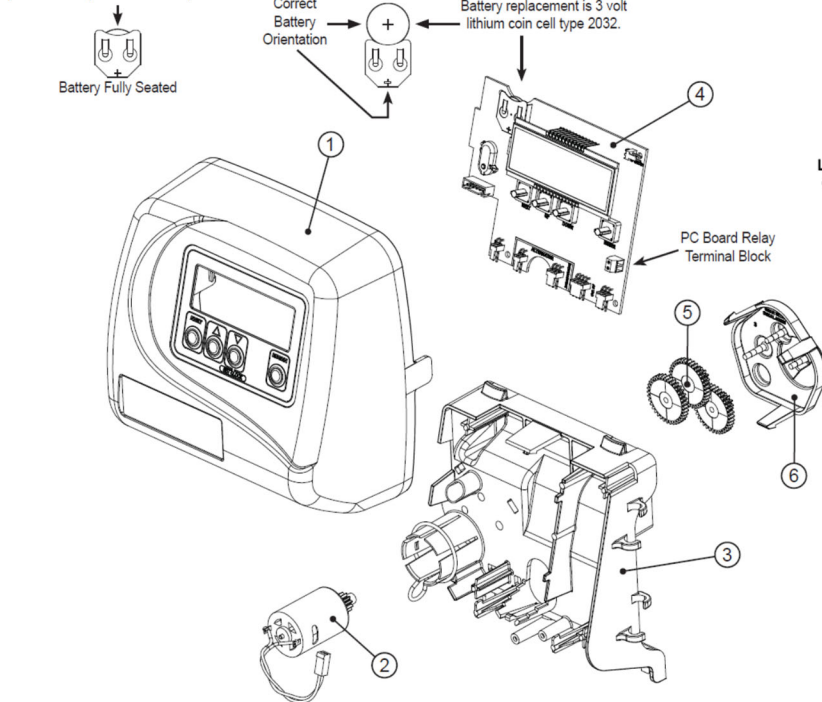
Drawing No.	Order No.	Description	Quantity
1	V3175EE-01	WS1EE FRONT COVERASSEMBLY	1
2	V3107-01	WS1 MOTOR	1
3	V3106-01	WS1 DRIVE BRACKET & SPRING CLIP	1
4	V3408EE-04BOARD	WS1THRU/2 EE PCB 5 DIGIT REPL	1
5	V3110	WS1 DRIVE GEAR 12X36	3
6	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3186	WS1 AC ADAPTER 120V-12V	1
	V3186-01	WS1 AC ADAPTER CORDONLY	
Not Shown	V3178	WS1 Drive Back Plate	1

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

Wiring for Correct On/Off Operation	
PC Board Relay Terminal Block	Relay
RLY 1	Coil -
+ COM	Coil +

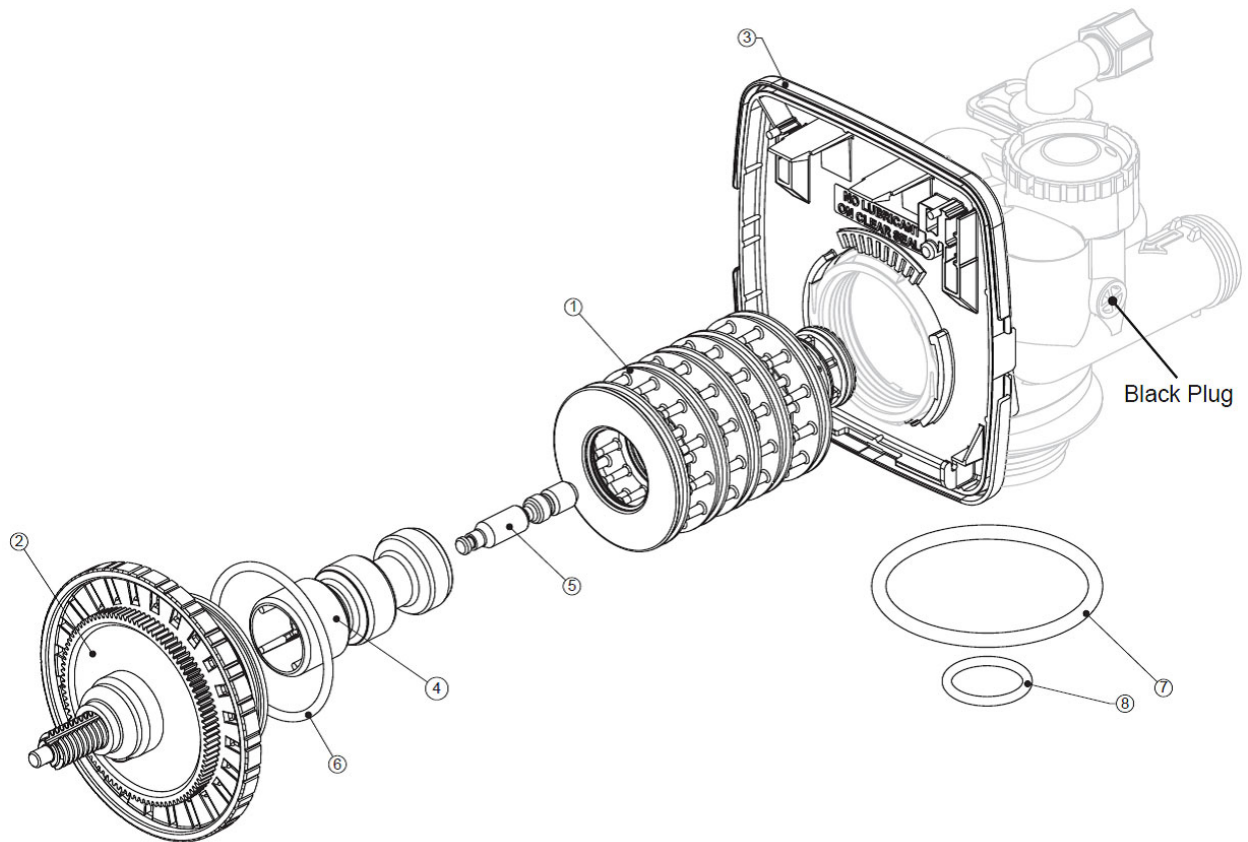
Relay Specifications: 12V DC Relay with a coil resistance not less than 80 ohms. If mounting relay under the cover check for proper mounting dimensions on the backplate.

When replacing the battery, align positives and push down to fully seat.



## 5.3.2) Drive assembly, Piston and Spacer stack

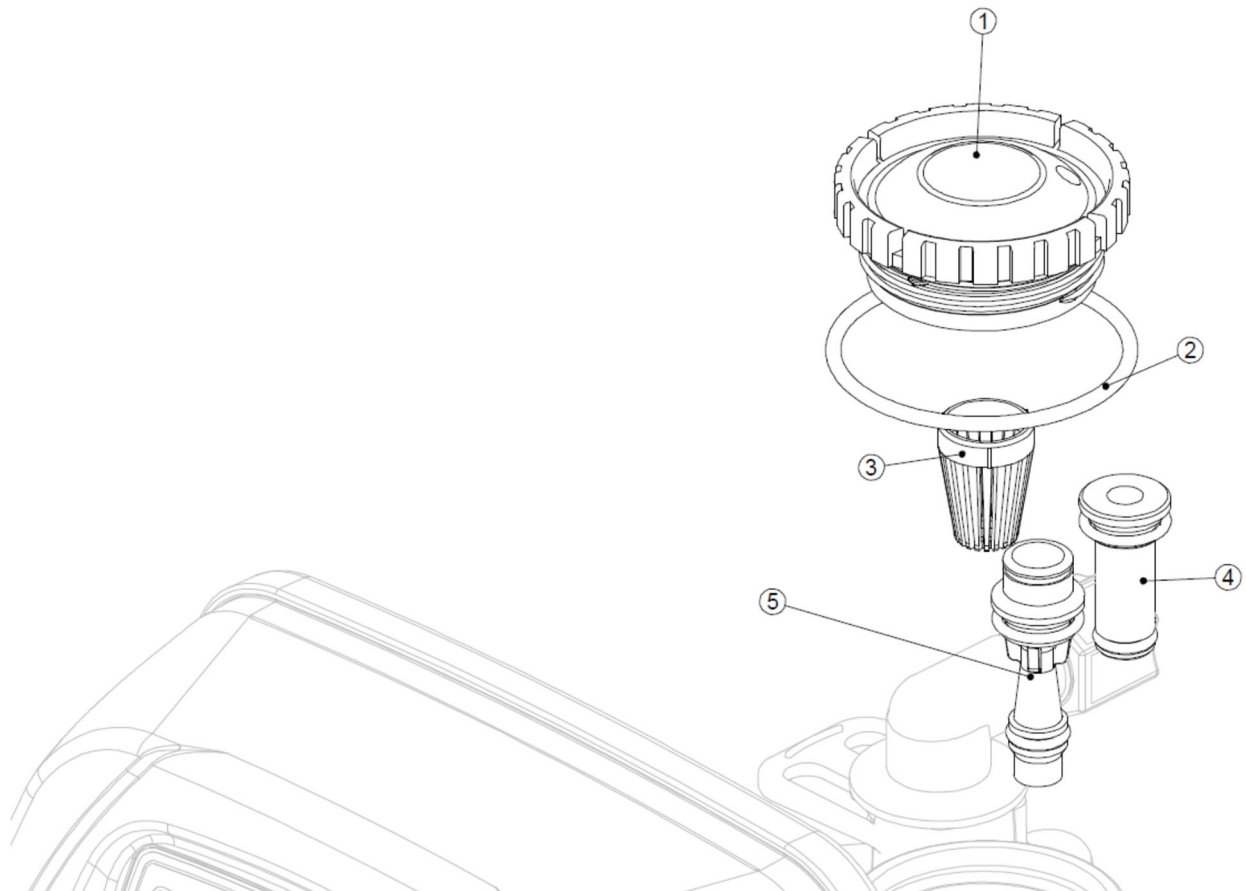
Drawing No.	Order No.	Description	Quantity
1	V3005	WS1 Spacer Stack Assembly	1
2	V3004	Drive Cap ASY	1
3	V3178	WS1 Drive Back Plate	1
4	V3011*	WS1 Piston Downflow ASY	1
5	V3174	WS1 Regenerant Piston	1
6	V3135	O-ring 228	1
7	V3180	O-ring 337	1
8	V3105	O-ring 215 (Distributor Tube)	1
Not Shown	V3001	WS1 Body ASY Downflow	1



### 5.3.3) Injector Assembly

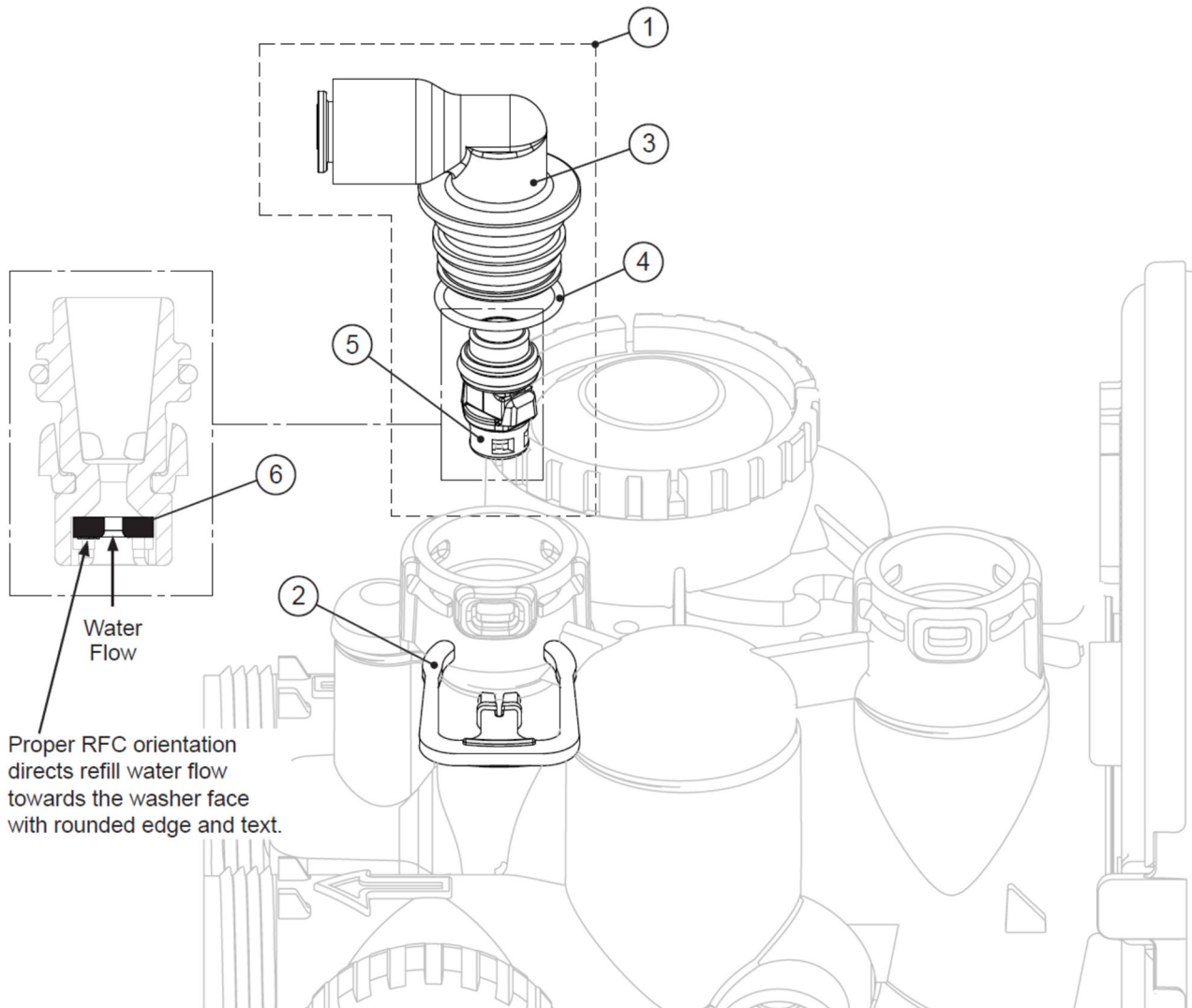
Drawing No.	Order No.	Description	Quantity
1	V3176	INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V3177-01	INJECTOR SCREEN CAGE	1
4	V3010-1Z	WS1 INJECTOR ASY Z PLUG	1
5	V3010-1A	WS1 INJECTOR ASY A BLACK	1
	V3010-1B	WS1 INJECTOR ASY B BROWN	
	V3010-1C	WS1 INJECTOR ASY C VIOLET	
	V3010-1D	WS1 INJECTOR ASY D RED	
	V3010-1E	WS1 INJECTOR ASY E WHITE	
	V3010-1F	WS1 INJECTOR ASY F BLUE	
	V3010-1G	WS1 INJECTOR ASY G YELLOW	
	V3010-1H	WS1 INJECTOR ASY H GREEN	
	V3010-1I	WS1 INJECTOR ASY I ORANGE	
	V3010-1J	WS1 INJECTOR ASY J LIGHT BLUE	
V3010-1K	WS1 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.



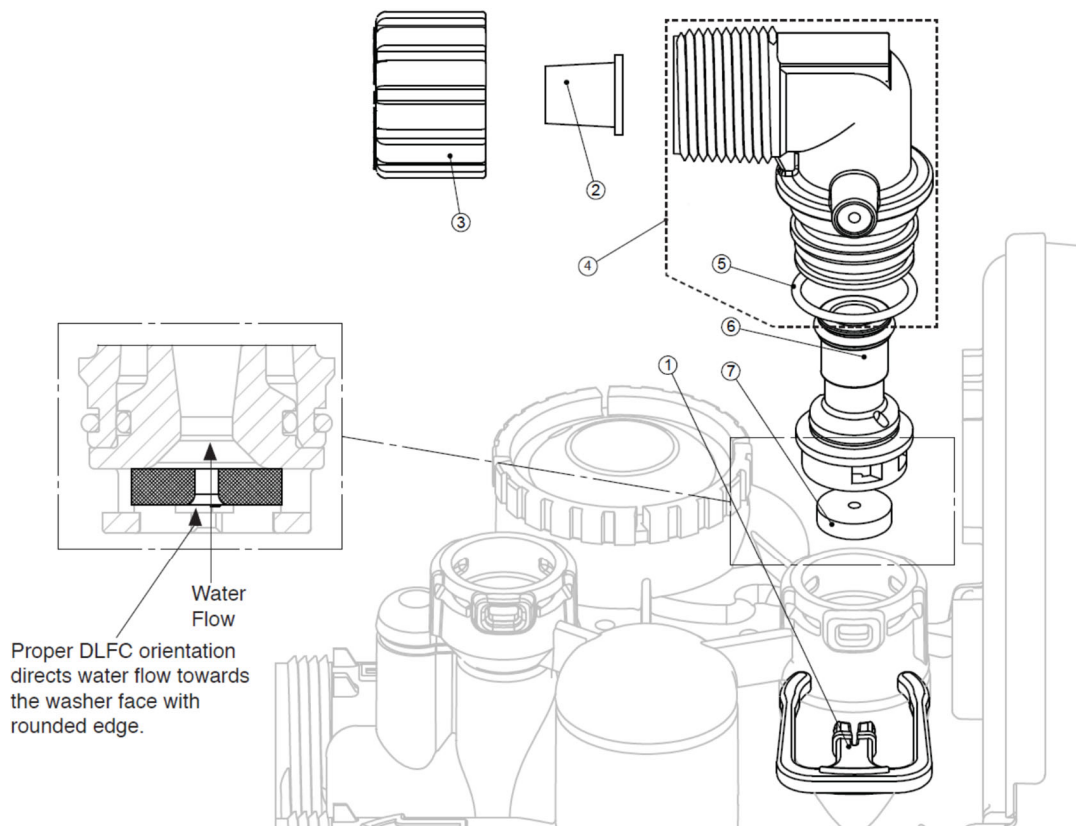
## 5.3.4) Brine Tank Line Flow Control

Drawing No.	Order No.	Description	Quantity
1	V4144-01	Elbow 3/8 Liquifit Asy w/RFC	1
2	H4615	Elbow Locking Clip	1
3	H4628	Elbow 3/8" Liquifit	1
4	V3163	O-ring 019	1
5	V3165-01*	WS1 RFC Retainer Asy (0.5 gpm)	1
6	V3182	WS1 RFC	1
Not Shown	V3552	WS1 Brine Elbow Asy w/RFC	Option
Not Shown	H4650	Elbow ½" with nut and insert	Option



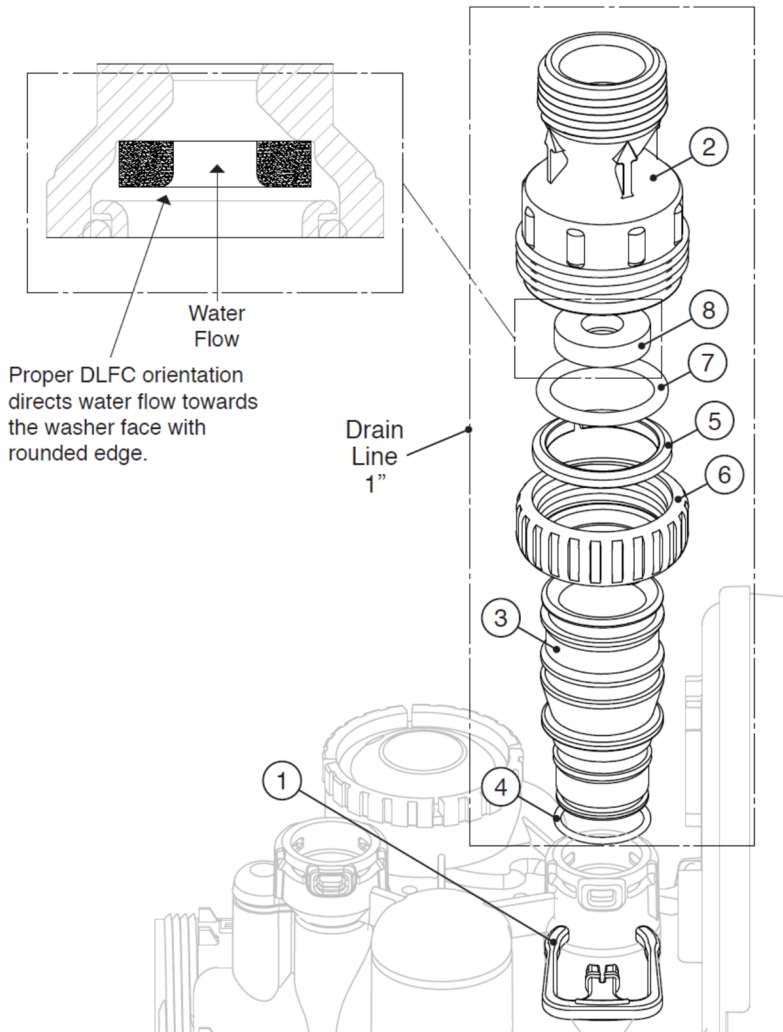
5.3.5) Drain Line Flow Control

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	WS1 Nut 3/4 Drain Elbow	Option
4	V3158-01	WS1 Drain Elbow 3/4 Male	1
	V3158-02	WS1 Drain Elbow 3/4 Male No Silencer	
5	V3163	O-ring 019	1
6	V3159-01	WS1 DLFC Retainer ASY	1
7	V3162-007	WS1 DLFC 0.7 gpm for 3/4	One DLFC must be used if 3/4 fitting is used
	V3162-010	WS1 DLFC 1.0 gpm for 3/4	
	V3162-013	WS1 DLFC 1.3 gpm for 3/4	
	V3162-017	WS1 DLFC 1.7 gpm for 3/4	
	V3162-022	WS1 DLFC 2.2 gpm for 3/4	
	V3162-027	WS1 DLFC 2.7 gpm for 3/4	
	V3162-032	WS1 DLFC 3.2 gpm for 3/4	
	V3162-042	WS1 DLFC 4.2 gpm for 3/4	
	V3162-053	WS1 DLFC 5.3 gpm for 3/4	
	V3162-065	WS1 DLFC 6.5 gpm for 3/4	
	V3162-075	WS1 DLFC 7.5 gpm for 3/4	
	V3162-090	WS1 DLFC 9.0 gpm for 3/4	
V3162-100	WS1 DLFC 10.0 gpm for 3/4		



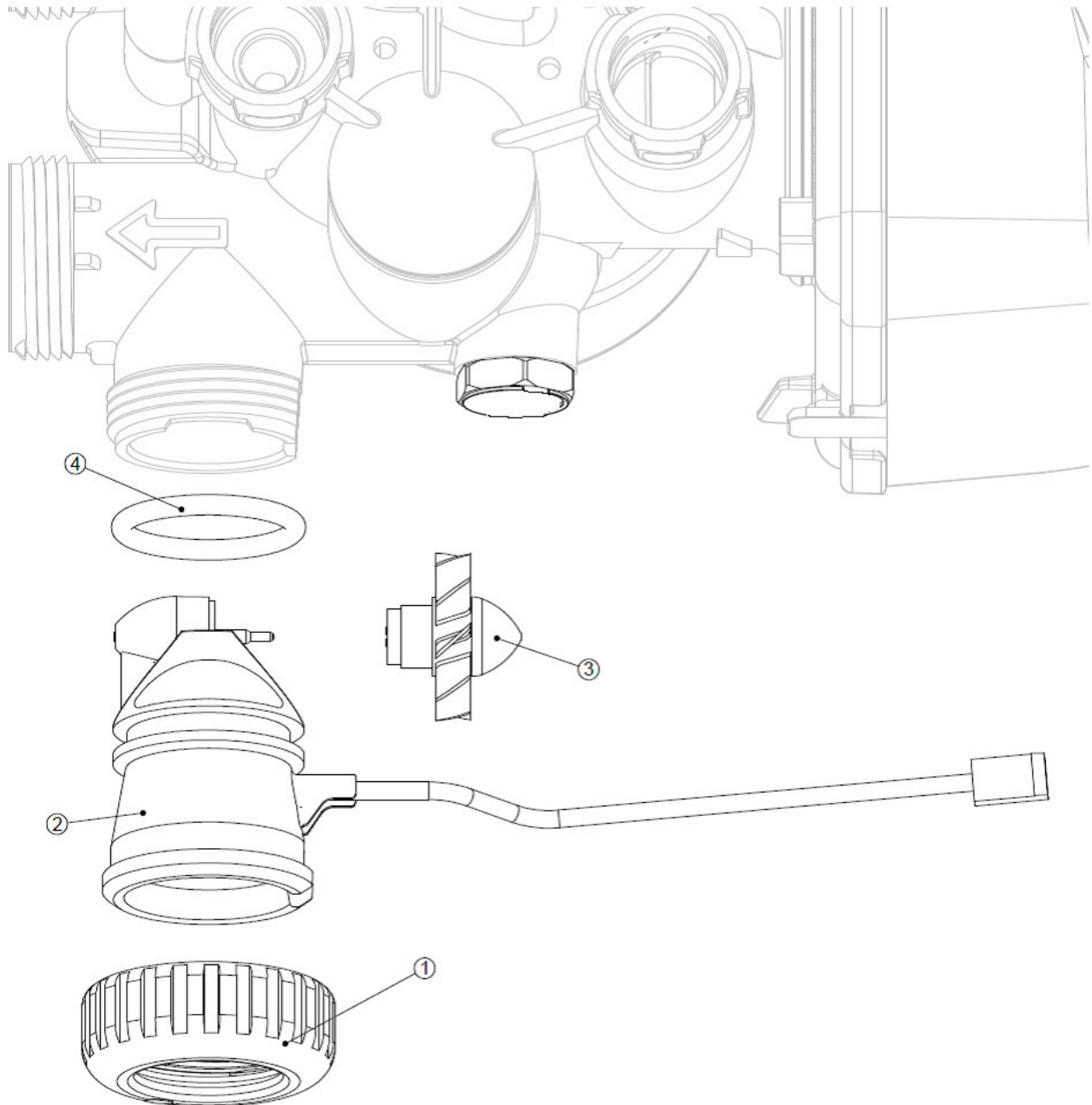


Drain Line 1"			
Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	V3166	WS1 Drain FTG Body 1	1
	V3166-01	FTG Flow Control Body Female 1	
3	V3167	WS1 Drain FTG Adapter 1	1
4	V3163	O-ring 019	1
5	V3150	WS1 Split Ring	1
6	V3151	WS1 Nut 1" QC	1
7	V3105	O-ring 215	1
8	V3190-090	WS1 DLFC 9.0 gpm for 1	One DLFC must be used if 1" fitting is used
	V3190-100	WS1 DLFC 10.0 gpm for 1	
	V3190-110	WS1 DLFC 11.0 gpm for 1	
	V3190-130	WS1 DLFC 13.0 gpm for 1	
	V3190-150	WS1 DLFC 15.0 gpm for 1	
	V3190-170	WS1 DLFC 17.0 gpm for 1	
	V3190-200	WS1 DLFC 20.0 gpm for 1	
	V3190-250	WS1 DLFC 25.0 gpm for 1	



## 5.3.6) Outlet Meter Assembly

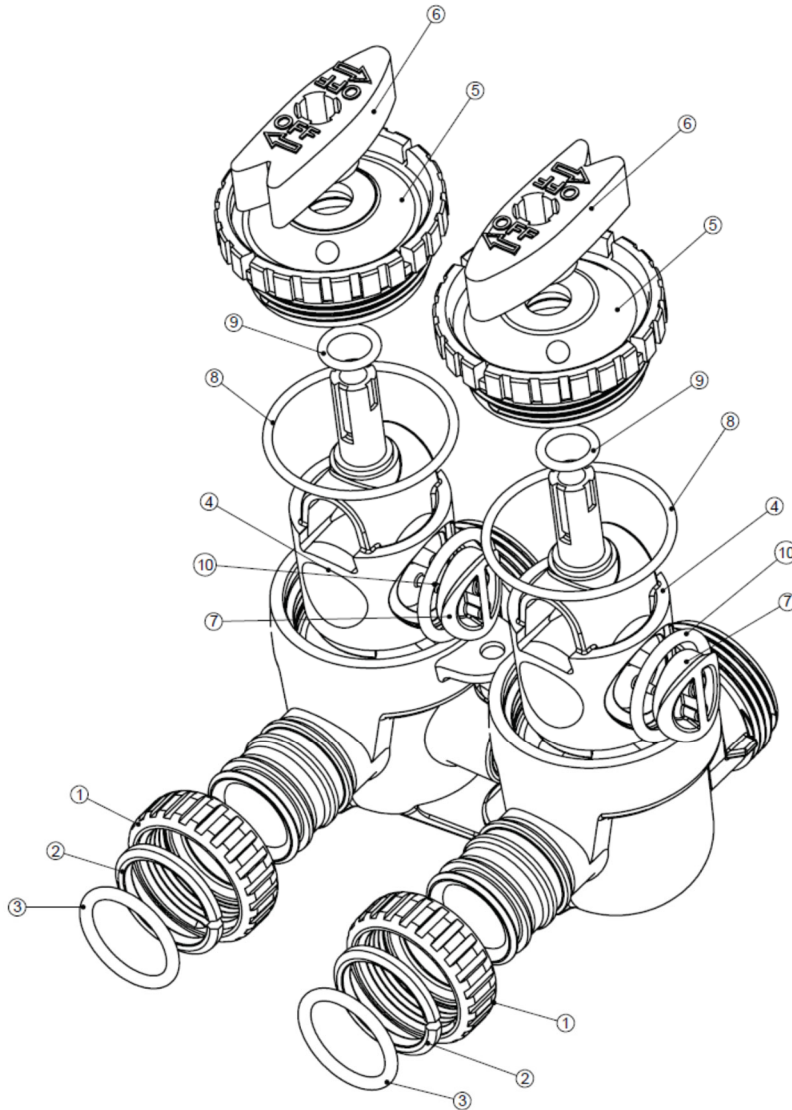
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" QC	1
2	V3003*	WS1 Meter ASY	1
3	V3118-01	WS1 Turbine ASY	1
4	V3105	O-ring 215	1



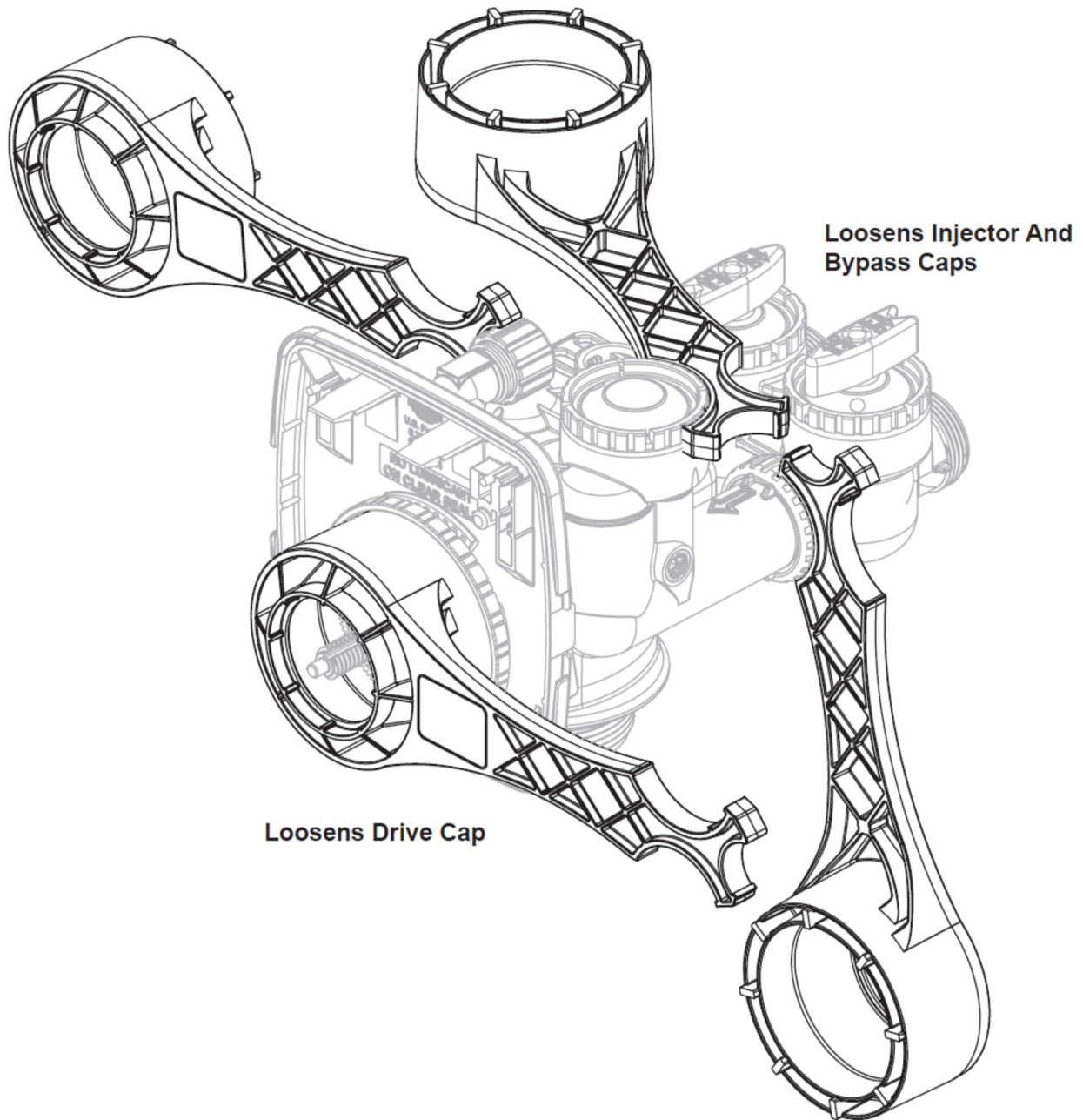
**THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.**

### 5.3.7) Bypass Valve Components

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	WS1 Bypass 1" Rotor	2
5	V3146	WS1 Bypass Cap	2
6	V3147	WS1 Bypass Handle	2
7	V3148	WS1 Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

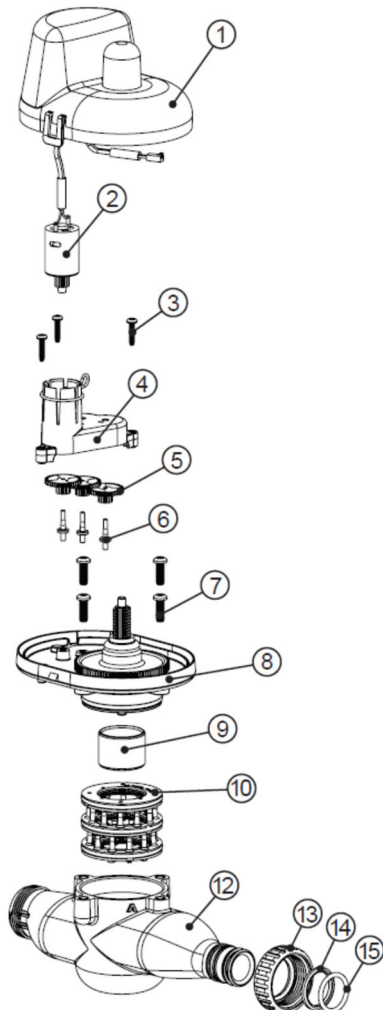


### 5.3.8) Service Spanner Wrench

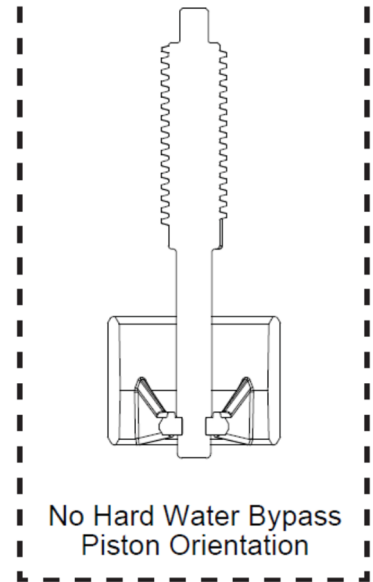


5.4) No Hard Water Bypass

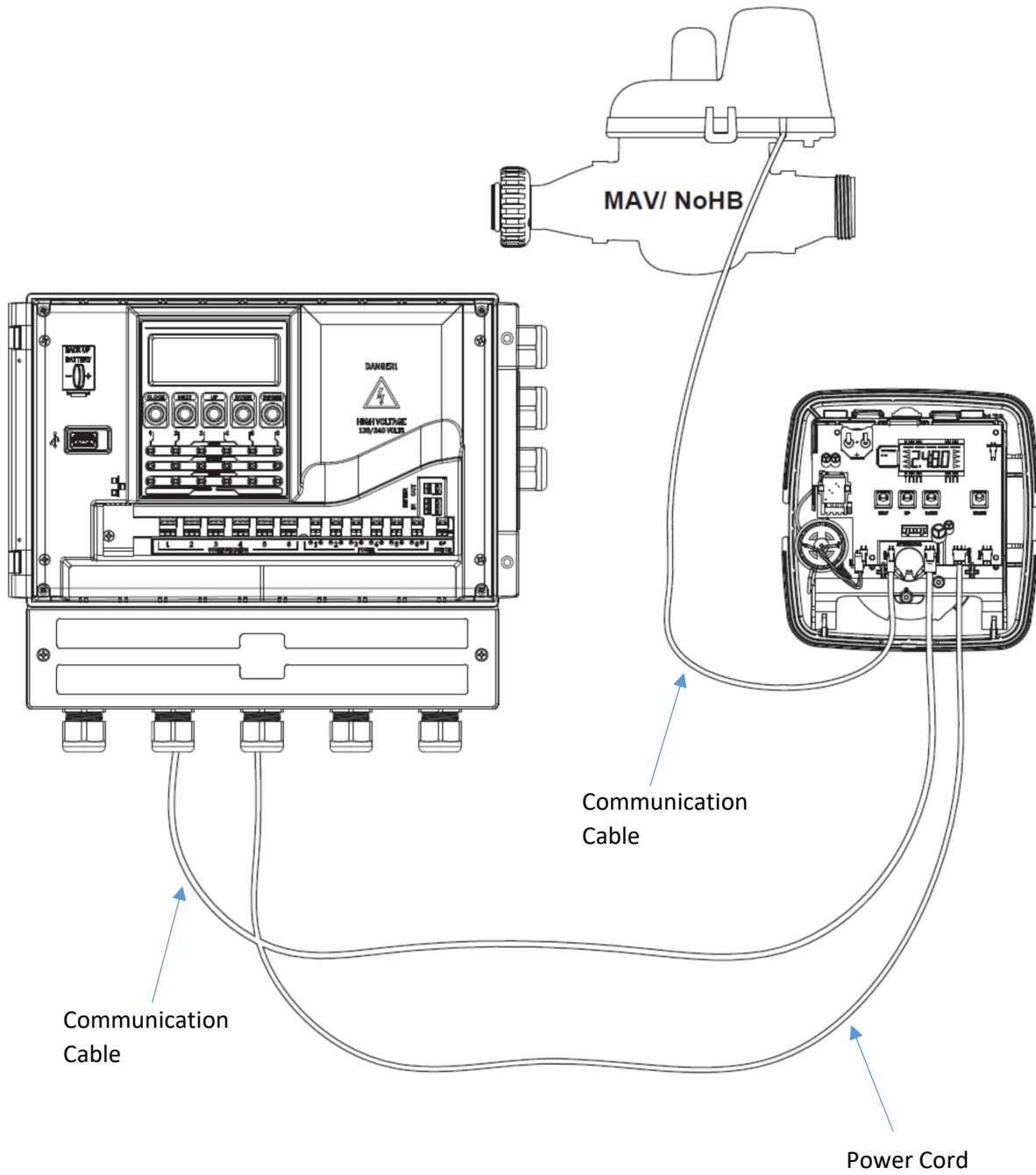
Drawing No.	Order No.	Description	Quantity	
			V3070FF	V3070FM
1	V3073	MAV/NOHWBY COVER ASY	1	1
2	V3476	WS MOTOR ASY 8 FT	1	1
3	V3592	SCREW #8-3/4 PHPN T-25 SS	3	3
4	V3262-01	WS1.5&2ALT/2BY REDUCGEARCVRASY	1	1
5	V3110	WS1 DRIVE REDUCING GEAR 12X36	3	3
6	V3264	WS2 BYPASS REDUCTION GEAR AXLE	3	3
7	V3527	SCREW 1/4-20 X 3/4 BHSCS SS	4	4
8	V3072	MAV/NOHWBY 1/125/15 DRIVE ASY	1	1
9	V3506-01	MAV/NOHRD 1/125/15 PISTON	1	1
10	V3074	MAV/NOHWBY 1/125/15 STACKASY	1	1
11	V3521FF	NOHRD WTR BYPASS BODY ASY F-F	1	N/A
12	V3521FM	NOHRD WTR BYPASS BODY ASY F-M	N/A	1
13	V3151	WS1 NUT 1 QC	N/A	1
14	V3150	WS1 SPLIT RING	N/A	1
15	V3105	O-RING 215	N/A	1



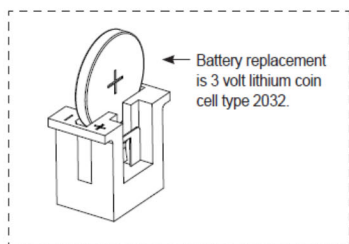
•Operating Pressures:  
 20 PSI Minimum / 125 PSI  
 Maximum  
 •Operating Temperatures:  
 40°F Minimum / 110°F Maximum



### 5.5) System Controller

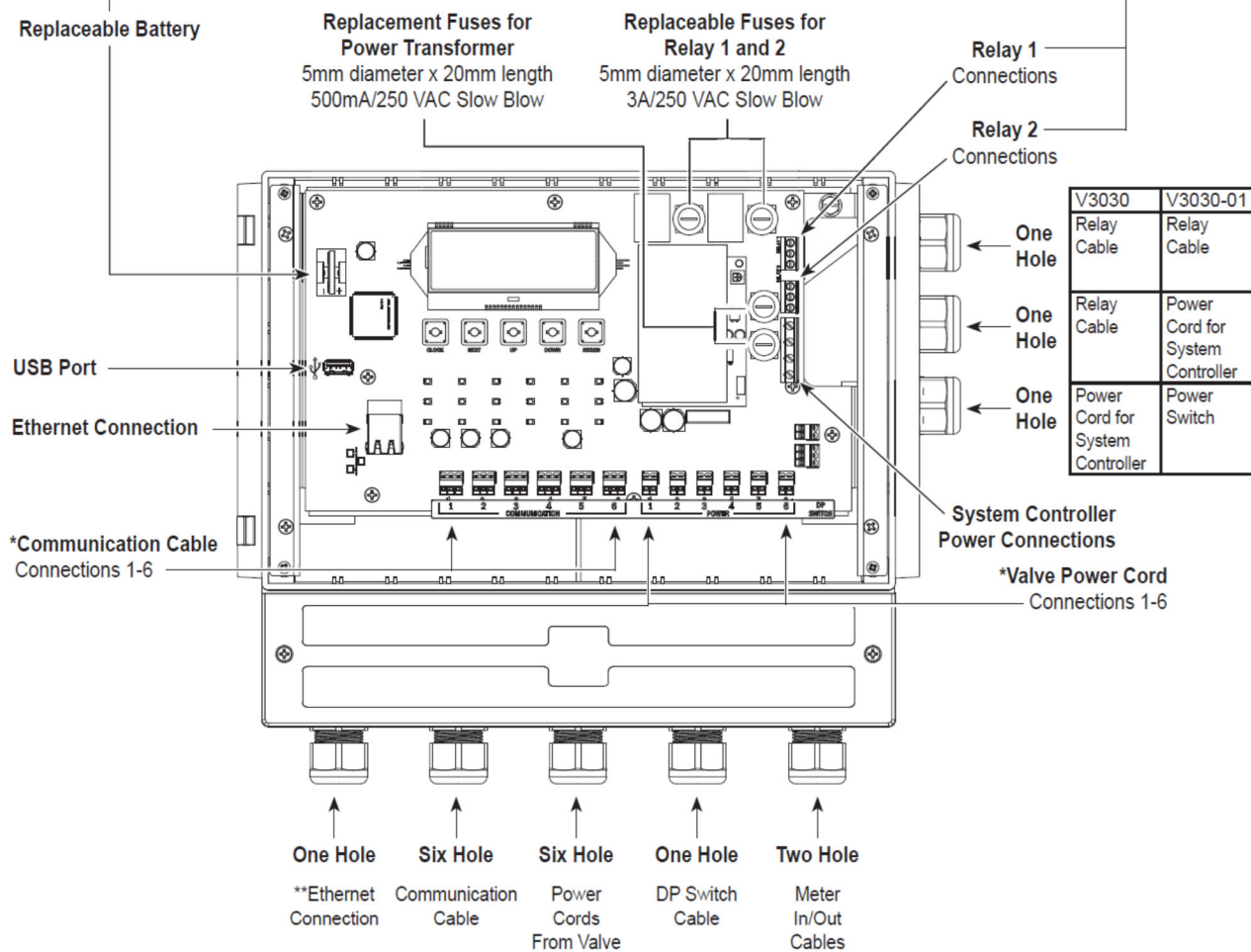


### Electrical Layout



Typical Relay Output Wiring		
	Relay Energized Load Energized	Relay Not Energized Load Energized
N.C.		AC Load
COM	AC Line (Hot)	AC Line (Hot)
N.O.	AC Load	

Equipment connected to Relay Terminals must not exceed a maximum AC load of 1.5A at 250VAC. Relay's are non-latching (i.e. if power is lost, returns to non-energized position).

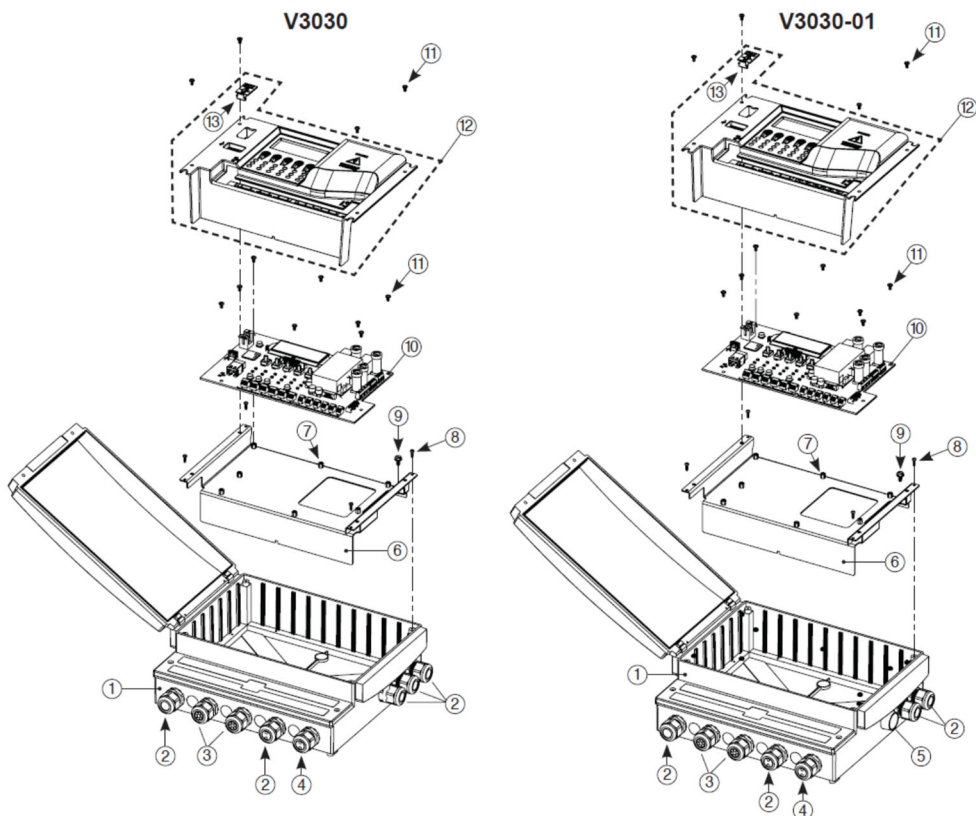


\*Use Communication Cable and Power Cord Connections in consecutive ascending order, starting with 1.  
\*\*If using Ethernet Cable remove strain relief. V4096 SC ETHERNET ADAPTER may be used to provide strain relief.

Use 8" length of wire for plugging unused 6 hole or 2 hole strain relief openings. Use red plugs for plugging unused 1 hole strain relief openings.

## SOFTENER INSTALLATION AND USER GUIDE

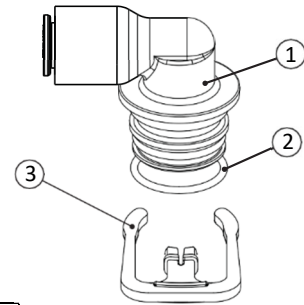
Drawing No.	Order No.	Description	Quantity	
			V3030	V3030-01
1	V3858-01	SC FIBOX PC 30/25-3 MACHINED (does not include strain reliefs)	1	1
2	V3866	STRAINRELIEF 1HOLE ASY	5	4
3	V3865	STRAINRELIEF 6HOLE ASY	2	2
4	V3867	STRAINRELIEF 2HOLE ASY	1	1
5	V4026	PUSHBUTTON ACTUATOR		1
	V4027	CONTACT BLOCK DPST-NO, SCREW TERMINAL		1
6	V3827	SC BRACKET SHEET METAL (does not include standoffs)	1	1
7	V3860	STANDOFF #6-32X1/4 MXF SS	8	8
8	V3859	SCREW #4-24X1/2 TYPE 25 SS TC	4	4
9	V3861	SCREW #10-32X3/8 GREEN ZINC	1	1
10	V3870-02BOARD	SC PCB REPLACE	1	1
11	V3917	SCREW PANHD 6-32X1/4-BR STGR	12	12
12	V4068-01	SC BEZEL HSYELLOW ASY	1	1
13	V4069	DC BATTERY COVER FOR BEZEL	1	1
Not Shown	V3864-01	SC POWER CORD 7FT ASY	1	N/A
Not Shown	V3868-01*	SC JUMPER WIRE BROWN, 2IN	N/A	1
Not Shown	V3869-01*	SC JUMPER WIRE BLUE, 2IN	N/A	1
Not Shown	V3868-02	SC SWITCH POWER WIRE BROWN, 5IN	N/A	1
Not Shown	V3869-02	SC SWITCH POWER WIRE BLUE, 5IN	N/A	1
Not Shown	V3186-01	WS1 AC ADAPTER CORD ONLY 15FT	Separate Purchase	
Not Shown	V3186-36	WS1 AC ADAPTER CORD ONLY 36FT	Separate Purchase	
Not Shown	V3474	WS ALT CONNECT CORD 8 FT BLK	Separate Purchase	
Not Shown	V3475-12	WS2H/3 SYSCONNECTCORD 12FT RED	Separate Purchase	
Not Shown	V3475-24	WS2H/3 SYSCONNECT CORD 24FT BL	Separate Purchase	
Not Shown	V3475-36	WS2H/3 SYSCONNECTCORD 36FT YEL	Separate Purchase	
Not Shown	V3819**	POWER SWITCH RETROFIT KIT	Separate Purchase	



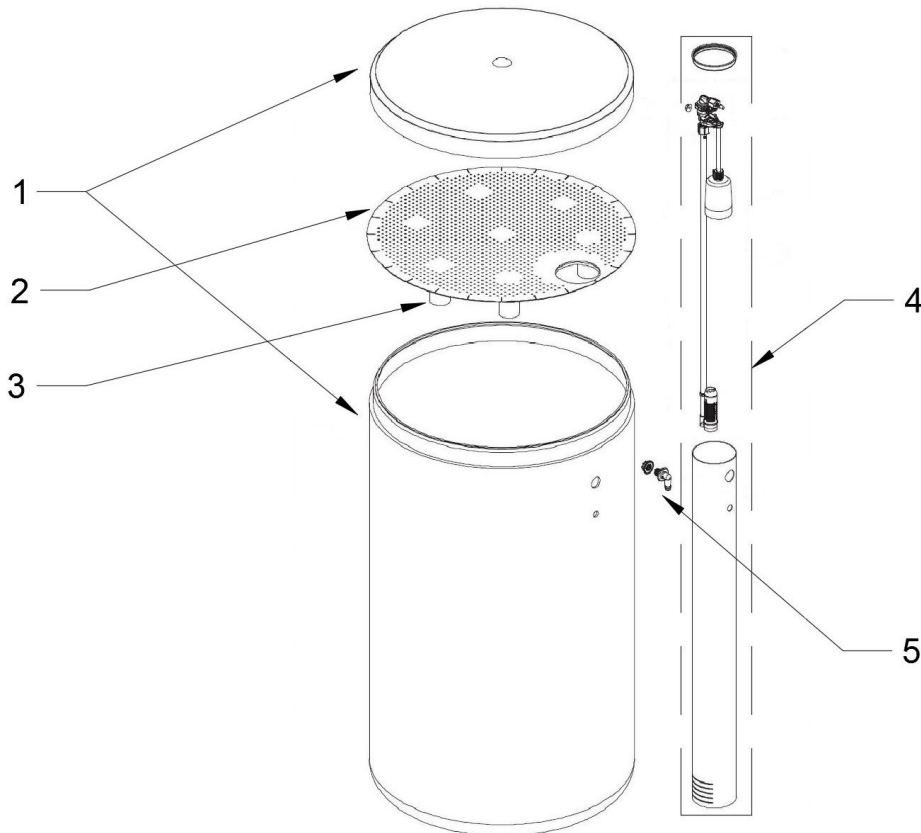


### 5.6) Brine Tank Assembly

SAFETY FLOAT BRINE ELBOW			
Item No.	Part No.	Description	Qty.
1		Quick Connect Elbow	1
2	CV3163	O-Ring 019	1
4	CH4615	Elbow locking clip	1

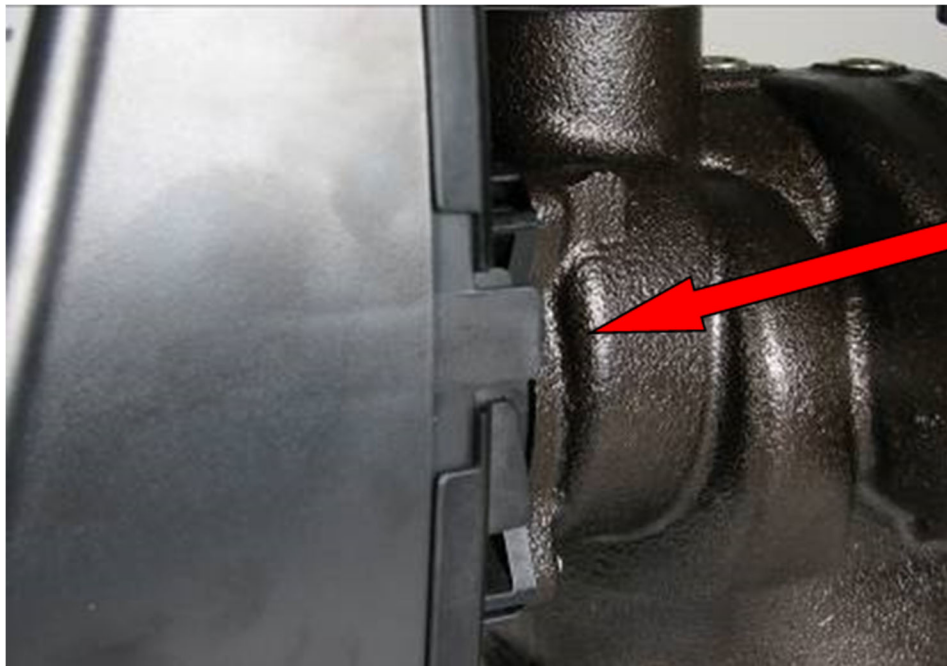


BRINE TANK ASSEMBLY				
Item No.	Part No.	Description	Models	Qt
1	CLK BT 1833	Brine Tank with Cover	18" x33"	1
	CLK BT 1840B		18" x40"	1
	CLK BT 2450BR		24" x50"	1
	CLK BT 2450BKR		24" x50"	1
2	CLK H 107202	Salt Grid Platform with legs	18" x33" & 18" x40"	1
	CLK H 1080	Salt Grid Platform without legs	24" x41" & 24" x50"	1
3	CLK H 1089	24" Salt Grid Legs		7
4	CLK H 470028	Float Brine Valve Assembly	18" x33"	1
	CLK H 470036		18" x40"	1
	CLK H		24" x50"	1
	CLK H 4900BVK			1
5	CLK V3007	2 Piece Overflow Set	24" x50"	1
	1.0 X 0.75 RB PVC			1
	CLK H 1018		18" x33", 18" x40" & 24" x50"	1



## 6) SERVICE INSTRUCTIONS

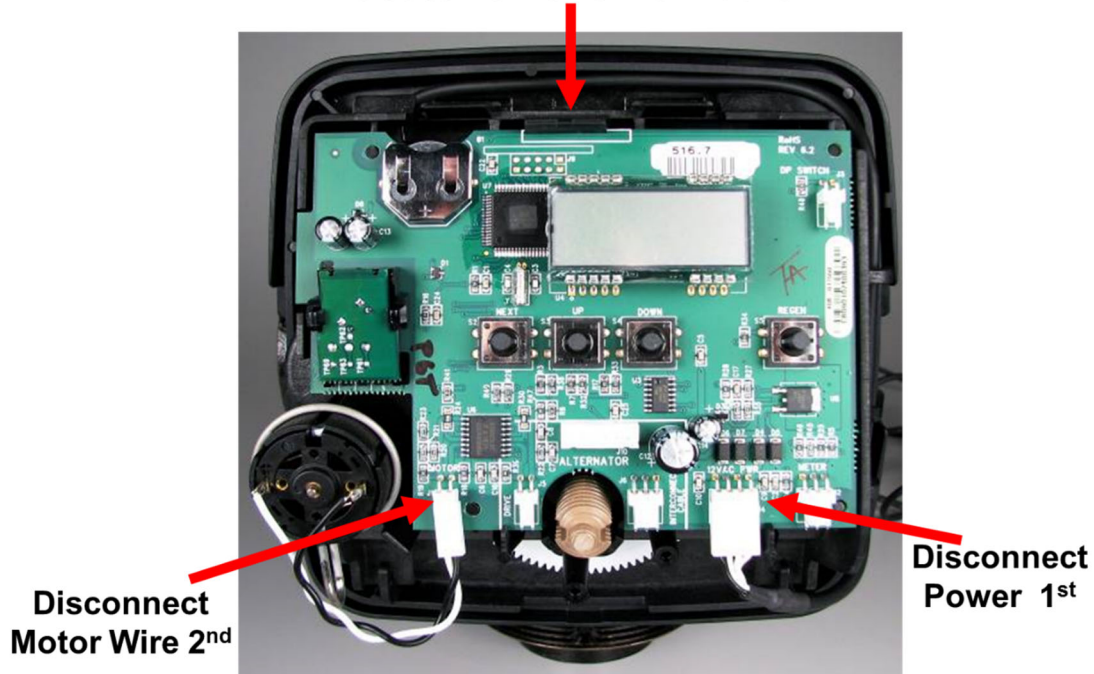
### 6.1) Front Cover Removal



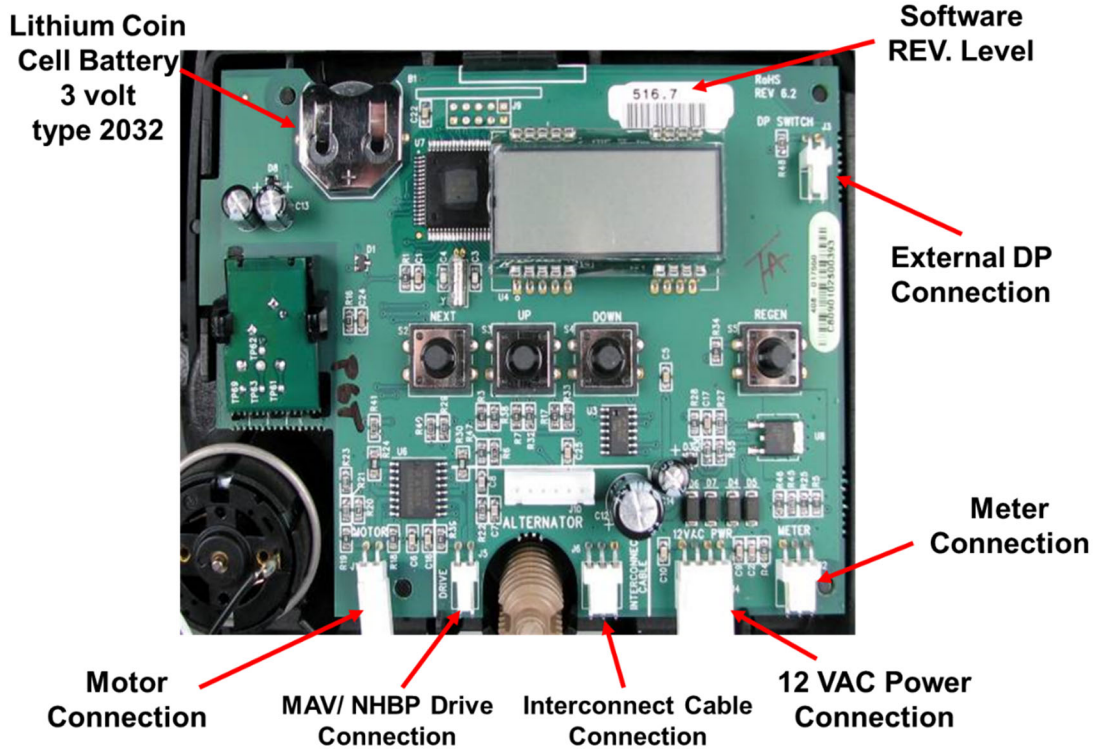
Pull out on each side of the covers locking tabs

6.2) PC Board Removal

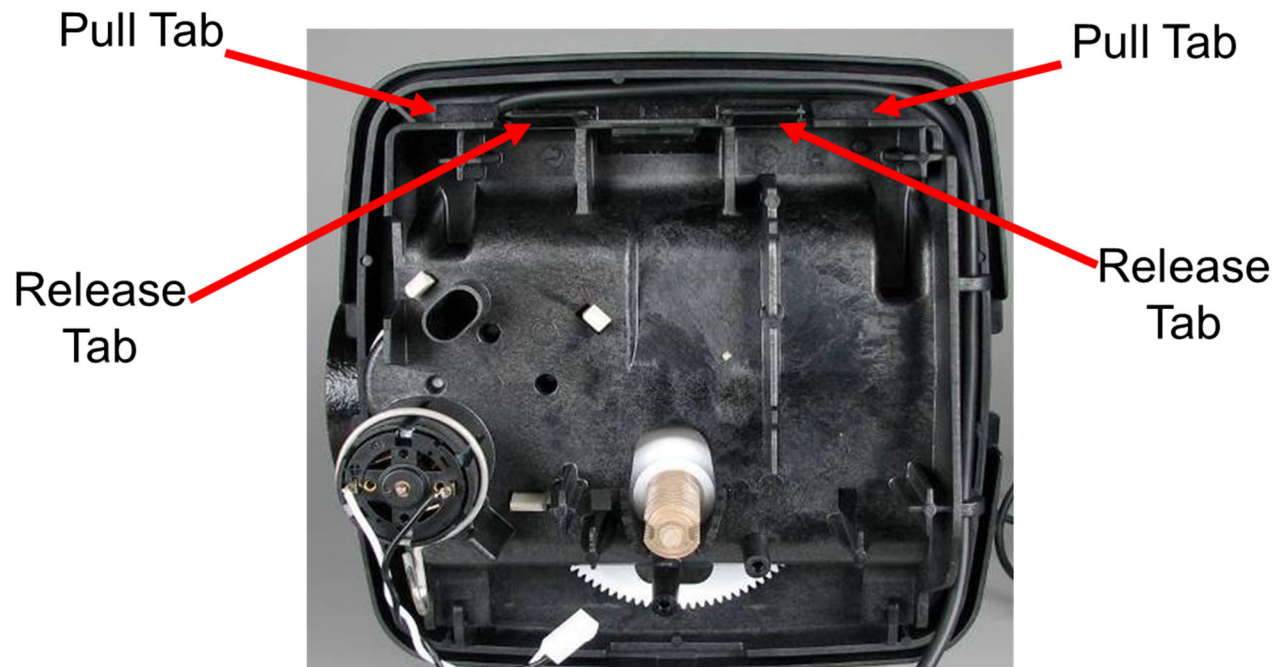
**Lift up on PC Board locking tab  
Last to remove PC Board**



1. Lift up the locking tab and then pull out the PC board from top.
2. Disconnect the power cable first and then disconnect other cables.



6.3) Drive Bracket Removal



Lift up both release tabs with thumbs and use index fingers to pull out the pull tab



Motor can be removed by pressing the locking spring to the right and then pull the motor out.  
Gearbox can be removed by pushing the beige colored locking tabs inwards.

### 6.4) Drive Cap Removal



Turn the drive cap counter clockwise with service wrench to loosen the cap.

Pull the drive cap out with the main piston and brine piston

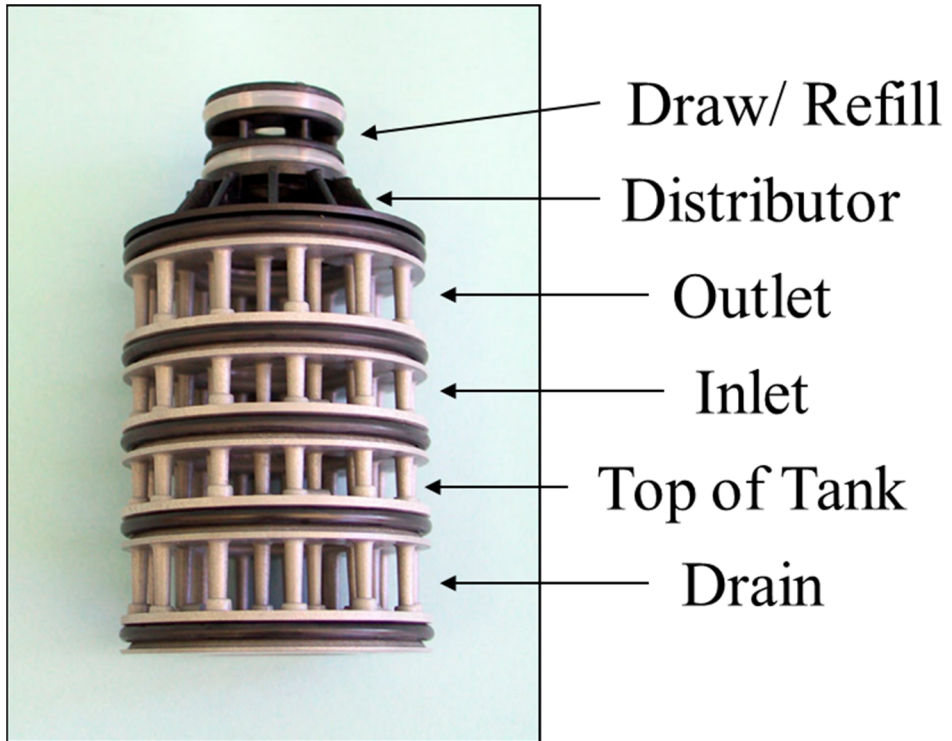


Snap off the brine piston from the main piston's horseshoe connection by putting side pressure towards the cavity

### 6.5) Spacer Stack Removal



Spacer Stack assembly can be removed by simply pulling out

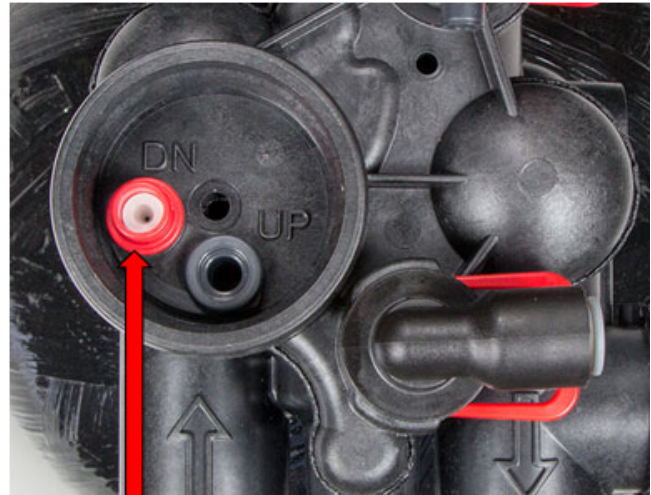


Spacer Stack assembly is a single piece replaceable assembly

## 6.6) Injector Cap Removal



With closed end of WS1 service wrench drive cap can be removed by turning counter clockwise.



• **Downflow set up**

Injector must be installed in DN hole and UP hole must be plugged.



To remove injector use injector cap and scoop the top rim of injector with the bottom of the injector cap

## 7) TROUBLESHOOTING

### 7.1) Control Valve Troubleshooting

#### 7.1.1) Possible Error Codes

Possible Errors	
Code	Description
E1	Control unable to sense motor movement
Err-1001	
Err-101	
E2	Control Valve motor ran too short
Err-1002	
Err-102	
E3	Control Valve motor ran too long and unable to find next cycle
Err-1003	
Err-103	
Err-1004	Control Valve ran too long and timed out
Err-104	
Err-1006	MAV/NHWP motor ran too long
Err-106	
Err-1007	MAV/NHWP motor ran too short and stalled
Err-107	



## 7.1.2) Troubleshooting Procedures

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. PC Board 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	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. PC Board 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	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. PC Board battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
6. Control valve does not regenerate automatically when the REGEN button(s) is depressed and held.	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 <b>does</b> when the REGEN button is depressed and held.	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	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

## SOFTENER INSTALLATION AND USER GUIDE

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
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	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	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
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	d. Re-tighten the drive cap assembly

## SOFTENER INSTALLATION AND USER GUIDE

Problem	Possible Cause	Solution
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.
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.

## SOFTENER INSTALLATION AND USER GUIDE

Problem	Possible Cause	Solution
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 without 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.

## 7.2) System Controller Troubleshooting Procedures

	Possible Causes	Solutions
1. No display on System Controller and/or on system valves	a. No power at electric outlet	a. Repair outlet or use another outlet that is working properly
	b. System Controller power cord not plugged into outlet or power cord end not connected to System Controller PC board power terminal block	b. Plug power cord into outlet and verify proper power cord wiring to the circuit board
	c. Power supply On/ Off push button is in OFF position	c. Make sure On/ Off push button is in the ON position
	d. Improper power supply wiring to system valves	d. Verify proper voltage is being delivered to System Controller
	e. Improper power supply voltage	e. Verify proper voltage is being delivered to system valves
	f. Defective system controller circuit board	f. Replace circuit board
2. System Controller display does not indicate that water is flowing. Refer to user instructions for how the system controller display indicates water flow	a. Bypass/isolation valve in bypass position	a. Turn bypass/ isolation handles to place in service position
	b. A flow meter is not wired into the meter input located on the System Controller, if the system type is set for "Series".	b. Wire flow meter into the meter input located on the System Controller
	c. System valves are not properly programmed and/or their meters are not properly connected.	c. Verify that all system valves are properly programmed and all required meter cables are installed securely into the proper 3-pin connector located on each board.
	d. Restricted/stalled meter turbine	d. Remove meter and check for rotation and foreign material
	e. Defective flow meter	e. Replace flow meter
	f. Defective system controller circuit board	f. Replace system controller circuit board
3. System Controller not displaying proper flow rate	a. System Controller meter size not set properly.	a. Verify actual meter size, and then re-program System Controller to match.
4. System valve regenerates at the wrong time of day	a. Time of Day is not set correctly	a. Reset Time of Day
	b. Regeneration Time is not set correctly	b. Reset Regeneration Time
	c. Control valve set to Immediate Regeneration or equivalent.	c. Reset control valve programming to Delayed Regeneration or equivalent.

Problems	Possible Causes	Solutions
5. System valves do not automatically regenerate when a manual regeneration is initiated	a. The System Controller will not allow more than one valve to be in regeneration at the same time.	a. Wait for the system valve in regeneration to finish
	b. In some cases, the System Controller will not allow Regen when a Valve Error has been detected by the System Controller	b. Reset valve error on system valve
	c. In some cases, the System Controller will not allow a Regen when a communication error (Error 412) has been detected.	c. Verify communication wiring to system valves
	d. Defective System Controller circuit board	d. Replace system controller circuit board
6. Connected control valves <u>do not</u> regenerate automatically but <u>does</u> when a manual regeneration is initiated.	a. Bypass/isolation valves in bypass position	a. Turn bypass/isolation valves handles to place in service position
	b. Meter(s) is(are) not connected to the proper system valve(s)	b. Connect meter(s) to the proper 3-pin connection on system valves
	c. Restricted/stalled meter turbine(s)	c. Remove meter(s) and check for rotation and foreign material
	d. Incorrect programming of system valve(s).	d. Verify system valve programming
	e. Meter wire not installed securely into system valve 3-pin connector	e. Verify that all required meter cables are installed securely into the proper 3-pin connector located on each system valve board
	f. Defective flow meter(s)	f. Replace malfunctioning meter
	g. Defective system valve boards	g. Replace malfunctioning system valve board(s)
7. 402 Error (Water Usage Memory)	a. Corrupt water usage information is stored in the memory of the System Controller	a. Contact your OEM
8. 403 Error (Program Memory)	a. Corrupt program settings are stored in the memory of the System Controller	a. Contact your OEM
	b. Can occur when flash programming new software	b. If this error occurs due to programming new software then just unplug the System Controller from electrical outlet and plug the power cord back into the outlet to clear the error.
9. 404 Error (Diagnostic Memory)	a. Corrupt diagnostic display information is stored in the memory of the System Controller	a. Contact your OEM
10. 405 Error (Units Memory)	a. Corrupt memory was stored for the display format and the System Controller does not know if it is "US" or "Metric"	a. Power cycle the System Controller and then the "Display Format" screen will appear and then set the controller to either "US" or "Metric" for your application

Problems	Possible Causes	Solutions
11. 406 Error (Network Memory)	a. Corrupt network settings were stored and the System Controller lost the settings that allow it to be part of the network.	a. Power cycle the System Controller and then re-configure all network settings
12. 410 Error (Version Mismatch of Configuration File)	a. Occurs when downloading a invalid configuration file	a. Contact your OEM
	b. Can occur when flash programming new software	b. If this error occurs due to programming new software then just unplug the System Controller from electrical outlet and plug the power cord back into the outlet to clear the error.
13. 411 Error (No External Memory)	a. Occurs if external memory cannot be found by the System Controller microprocessor, flash or SD card is not installed.	a. Contact your OEM
14. 412 Error (Communication Error) Or (Valve Error)	a. Loss of communication between System Controller and system valves	a. Verify wiring connections from system controller to system valves <ul style="list-style-type: none"> <li>• Check for poor connections, such as a loose wires</li> <li>• Check for broken or cut communication cable</li> <li>• Check programming on control valves to make sure they are set for System Controller</li> <li>• Check System Controller programming to make sure proper number of units is set</li> </ul>
	b. One of the connected control valves has an error	b. The display on the System Controller will alert you to which unit is in error. Locate corresponding unit's control valve to see which valve error is being displayed then look to trouble shooting that specific error from the control valve manual
	c. Pressing the "NEXT" and "REGEN" buttons in at the same time to perform a Next/Regen Reset to clear error codes causes this error to flash quickly and then it goes away	c. The display normally appears as part of the Next/Regen Reset process then quickly disappears. OK to ignore in this case.
15. 413 Error (MAC Undefined)	a. MAC address for network operation is not defined	a. Contact your OEM
16. 414 Error (Valve X No Flow)	a. Bypass valve in bypass position	a. Turn bypass/isolation valves handles to place in service position
	b. Meter wire not connected to control valve	b. Connect meter(s) to the proper 3-pin connection on system valves
	c. Restricted / Clogged meter turbine	c. Remove meter(s) and check for rotation and foreign material. Once meter is fixed, manually regenerate the unit in error to clear the No Flow error
	d. Incorrect programming	d. Verify system valve programming
	e. Meter connected to another control valve	e. Verify that all required meter cables are installed securely into the proper 3-pin connector located on each system valve board
	f. Defective meter	f. Replace malfunctioning meter
	g. Defective control valve PC board	g. Replace malfunctioning system valve board(s)

## 8) 5 YEAR WARRANTY

### Commercial Progressive Water Softener

Thank you for your purchase of our COMMERCIAL PROGRESSIVE WATER SOFTENER. For proof of purchase, please retain your Invoice/Sales Order Copy.

#### **Warranty ~ Offered**

Excalibur Water Systems warrants its products to be free from defect in materials and workmanship to the original owner from the date on the proof of purchase as described below.

#### **Warranty ~ Working Procedures**

If during the suitable warranty period, a part is defective, then Excalibur Water Systems will repair or replace that part at no charge to the original owner, with the exception of charges for nominal shipping, service and/or installation.

#### **Warranty ~ Coverage Outlined**

Excalibur Water Systems guarantees, to the original owner, a period of 5 years, the CONTROL BODY to be free of defects in materials and workmanship and to perform its proper functions. To the original owner, a period of 5 years, the ELECTRONIC CONTROL VALVES as well as all parts to be free of defects in materials and workmanship and to perform their normal functions. To the original owner, the SALT TANK and the MINERAL TANKS will not rust, corrode, leak, burst or in any other form fail to perform their proper functions for a period of 10 YEARS.

#### **Warranty ~ Service**

In the event you require service, Excalibur Water Systems Dealer will provide all necessary service and installation for your Commercial Water Softener. To obtain warranty service within 30 days of discovery of the defect, notification must be given to Excalibur Water Systems.

#### **General Provisions**

The above warranties are effective provided the WATER SOFTENER is operated at water pressures not exceeding 125psi and at water temperatures not exceeding 120°F; also provided that the water softener is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the water softener is not damaged as the result of any unusual force of nature such as, but not limited to flood, hurricane, tornado or earthquake. Excalibur Water Systems is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages or other circumstances beyond its control.

THERE ARE NO WARRANTIES ON THE WATER SOFTENER BEYOND THOSE SPECIFICALLY DESCRIBED ABOVE. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED TO THE EXTENT THEY MIGHT EXTEND BEYOND THE ABOVE PERIODS. THE SOLE OBLIGATION OF EXCALIBUR WATER SYSTEMS UNDER THESE WARRANTIES IS TO REPLACE OR REPAIR THE COMPONENT OR PART PROVES TO BE DEFECTIVE WITHIN THE SPECIFIED TIME PERIOD AND EXCALIBUR WATER SYSTEMS IS NOT LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. NO DEALER, AGENT, REPRESENTATIVE OR OTHER PERSON IS AUTHORIZED TO EXTEND OR EXPAND THE WARRANTIES EXPRESSED ABOVE.

Certain provinces or states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damage, therefore limitations and exclusions in this warranty may not apply to you. This warranty extends you specific legal rights as you may have other rights which vary from province to province or state to state.

Excalibur Water Systems is a manufacturer of water treatment products.

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