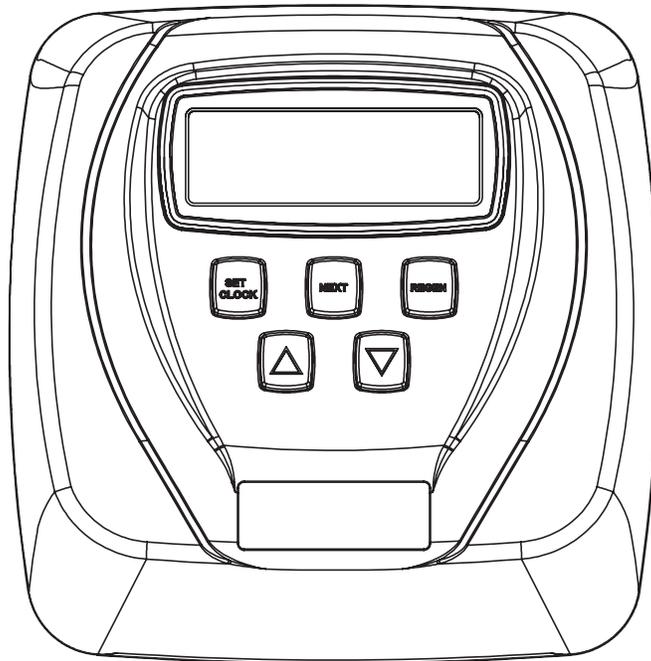


# Water Specialist 1.5" CC Control Valve Programming and Drawings Manual





## OEM General Instructions

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

- OEM Cycle Sequence
- OEM Softener System Setup
- OEM Filter System Setup
- Installer Display Settings
- User Display Settings
- Diagnostics
- Valve History

Once the OEM Cycle Sequence has been set, the other procedures can be accessed in any order. Details on each of the procedures are provided on the following pages.

To “lock out” access to diagnostic and valve history displays and modifications to settings except hardness, day override, time of regeneration and time of day by anyone but the manufacturer, press ▼, NEXT, ▲, and SET CLOCK in sequence after settings are made. To “unlock”, so other displays can be viewed and changes can be made, press ▼, NEXT, ▲, and SET CLOCK in sequence.

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

To quickly exit OEM Softener Setup, OEM Filter Setup, Installer Display Settings, Diagnostics or Valve History press SET CLOCK. Any changes made prior to the exit are incorporated.

**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 for 3 seconds and release. Press ▲ and ▼ simultaneously for 3 seconds to reset diagnostic values to zero.**

Sometimes it is desirable to have the valve initiate and complete two regenerations within 24 hours and then return to the preset regeneration procedure. It is possible to do a double regeneration if the control valve is set to “NORMAL” or “NORMAL + on 0” in OEM Softener System Setup or OEM Filter System Setup. To do a double regeneration:

1. Press the “REGEN” button once. REGEN TODAY will flash on the display.
2. Press and hold the “REGEN” button for three seconds until the valve regeneration initiates.

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

### OEM Cycle Sequence

OEM Cycle Sequence instructions allows the OEM to set the order of the cycle. The OEM Softener System Setup or the OEM Filter System Setup allow the OEM to set how long cycles will last. The OEM may choose up to 9 cycles in any order.

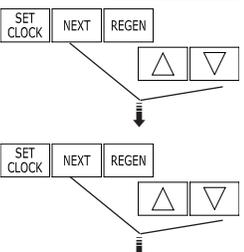
Cycle Options		
BACKWASH	DN BRINE	FILL
RINSE	SOFTENING OR FILTERING	END

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

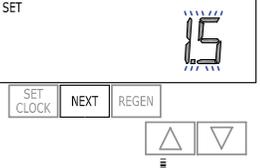
The upflow cycle may not be used on the WS1.25 or WS1.5 control valves, because the V3407 piston is designed for downflow use only.

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

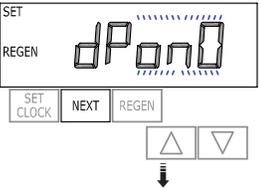
**STEP 1CS**



**STEP 2CS**



**STEP 3CS**



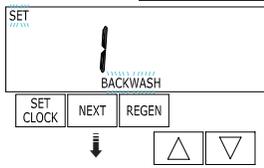
**Step 1CS** – Press NEXT and ▼ simultaneously for 3 seconds and release. Then press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2CS does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼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

**Step 2CS** – Use the ▲ or ▼ to select 1.5 for WS1.5CC valve. Press NEXT to go to Step 3CS. Press REGEN to exit OEM cycle sequence.

**Step 3CS** – Selection only matters if a connection is made to the two pin connector labeled DP SWITCH located on the printed circuit board. Following is an explanation of the options:

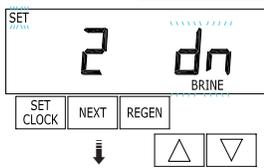
- dPon0 - If the dP switch is closed for an accumulative time of 2 minutes a regeneration will occur immediatly.
- dPdEL - If the dP switch is closed for an accumulative time of 2 minutes a regeneration will occur at the scheduled regeneration time.
- HoLd - If the dP switch is closed a regeneration will be prevented from occurring. Press NEXT to go to Step 4CS. Press REGEN to return to previous step.

**STEP 4CS**



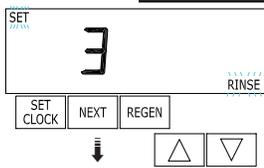
**Step 4CS** – Press the ▼ or ▲ buttons until BACKWASH appears. Press NEXT to go to Step 5CS. Press REGEN to return to previous step.

**STEP 5CS**



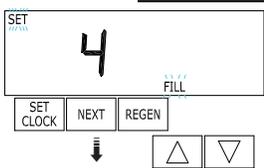
**Step 5CS** - Press the ▼ or ▲ buttons until dn BRINE appears. Press NEXT to go to Step 6CS. Press REGEN to return to previous step.

**STEP 6CS**



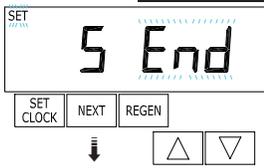
**Step 6CS** - Press the ▼ or ▲ buttons until RINSE appears. Press NEXT to go to Step 7CS. Press REGEN to return to previous step.

**STEP 7CS**



**Step 7CS** - Press the ▼ or ▲ buttons until FILL appears. Press NEXT to go to Step 8CS. Press REGEN to return to previous step.

**STEP 8CS**



**Step 8CS** - Press the ▼ or ▲ buttons until END appears. Press NEXT to exit OEM Cycle Sequence. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

## OEM Softener System Setup

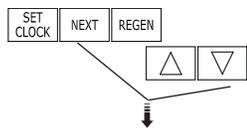
In OEM Softener System Setup the OEM chooses the time for the cycles selected in OEM Cycle Sequence and specifies other operating parameters for the system. The upper and lower limits of the allowable values for the cycles are as follows:

Cycle Options	Units	Lower/Upper Limit	Default
Backwash	Minutes	1 to 120	8
Rinse (fast)	Minutes	1 to 120	4
dn Brine (combination of brining and slow rinse)	Minutes	1 to 180	60
Fill	LBS	0.01 to 200	9.5
Service	Minutes	1 to 480	240

Note: Fill is in pounds of salt.

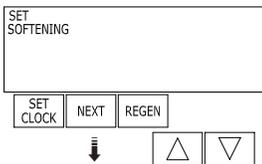
Since no time is associated with the END cycle, the END cycle will not appear in the OEM Softener System Setup sequence.

### STEP 1S



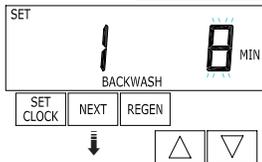
**Step 1S** – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2S does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

### STEP 2S



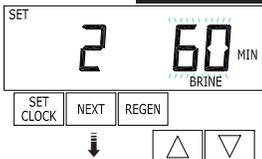
**Step 2S** – Choose SOFTENING using the ▼ or ▲ button. Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

### STEP 3S



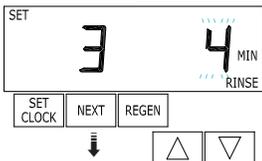
**Step 3S** – Select the time for the first cycle (which in this example is BACKWASH) using the ▼ or ▲ button. Press NEXT to go to Step 4S. Press REGEN to return to previous step.

### STEP 4S



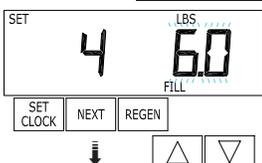
**Step 4S** – Select the time for the second cycle (which in this example is dn BRINE) using the ▼ or ▲ button. Press NEXT to go to Step 5S. Press REGEN to return to previous step.  
NOTE: The display will flash between cycle number and time, and brine direction (dn).

### STEP 5S



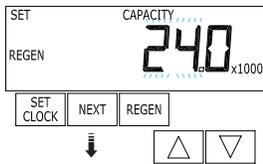
**Step 5S** – Select the time for the third cycle (which in this example is RINSE) using the ▼ or ▲ button. Press NEXT to go to Step 6S. Press REGEN to return to previous step.

### STEP 6S



**Step 6S** – Select the LBS for the fourth cycle (which in this example is FILL) using the ▼ or ▲ button. Press NEXT to go to Step 7S. Press REGEN to return to previous step.

**STEP 7S**



**Step 7S** –Set Grains Capacity using the ▼ or ▲ button. The ion exchange capacity is in grains of hardness as calcium carbonate for the system based on the pounds of salt that will be used. Calculate the pounds of salt using the fill time previously selected. The allowable grains capacity range varies from 5000 to 500,000 grains. The increment increase is 500 for the range from 5000 to 50,000; 2000 for the range of 50,000 to 200,000; and 5000 for the range of 200,000 to 500,000. Grains capacity is affected by the fill time. The grains capacity for the selected fill time should be confirmed by OEM testing. The capacity and hardness levels entered are used to automatically calculate reserve capacity when gallon capacity is set to AUTO. Press NEXT to go to Step 8S. Press REGEN to return to previous step.

**STEP 8S**

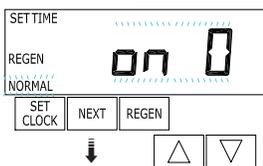


**Step 8S** – Set Volume Capacity using the ▼ or ▲ button. If value is set to:

- “AUTO” capacity will be automatically calculated and reserve capacity will be automatically estimated;
- “oFF” regeneration will be based solely on the day override set (see Installer Display Settings Step 3I); or
- as a number (allowable range 20 to 250,000) regeneration initiation will be based off the value specified. Increment increase is 20 for the range 20 to 2000, 100 for the range of 2000 to 10,000, 500 for the range 10,000 to 50,000 and 2000 for the range of 50,000 to 250,000.

If “oFF” or a number is used, hardness display will not be allowed to be set in Installer Display Settings Step 2I. See Table 1 for more detail. Press NEXT to go to Step 9S. Press REGEN to return to previous step.

**STEP 9S**



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

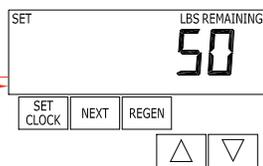
- “NORMAL” means regeneration will occur at the preset time;
- “on O” means regeneration will occur immediately when the volume capacity reaches 0 (zero); or
- “NORMAL + on 0” means regeneration will occur at one of the following:
  - the preset time when the volume capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first; or
  - immediately after 10 minutes of no water usage when the volume capacity reaches 0 (zero).

See Table 1 for more detail. Press NEXT to go to Step 10S. Press REGEN to return to previous step.

**STEP 10S**



RETURN TO NORMAL MODE



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

- “oFF” no low salt level warning will appear for the user; or
- a specific value “FILL SALT” will flash on the display when the calculated remaining pounds of salt falls below that level. Allowable values range form 10 to 400 pounds in 10 pound increments.

Press NEXT to exit OEM Softener System Setup. Press REGEN to return to previous step.

**Table 1**  
**Softener Setting Options**

Volume Capacity	Regeneration Time Option	Day Override	Result <sup>1</sup>
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time
AUTO	NORMAL	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached.
Any number	NORMAL	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0.
oFF	NORMAL	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached.
Any number	NORMAL	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0 or the specified number of days between regenerations is reached.
AUTO	On 0	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur when volume capacity reaches 0.
Any number	On 0	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur on 0.
AUTO	NORMAL on 0	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.
AUTO	NORMAL on 0	Any number	Reserve capacity automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity falls below the reserve capacity or the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.
Any number	NORMAL on 0	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.

<sup>1</sup> Reserve capacity estimate is based on history of water usage

OEM Filter System Setup

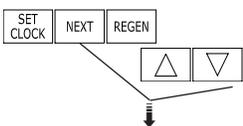
In OEM Filter System Setup the OEM chooses the time for the cycles selected in OEM Cycle Sequence and specifies other operating parameters for the system. The upper and lower limits of the allowable values for the cycles are as follows:

Cycle Options	Units	Lower/Upper Limit	Default
Backwash	Minutes	1 to 120	8
Rinse (fast)	Minutes	1 to 120	4
dn Brine (combination of regenerant and slow rinse)	Minutes	1 to 180	60
Fill	Gallons	0.01 to 20.00	.95
Service	Minutes	1 to 480	240

NOTE: Fill is in gallons.

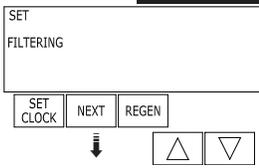
Since no time is associated with the END cycle, the END cycle will not appear in the OEM Filter System Setup sequence.

**STEP 1F**



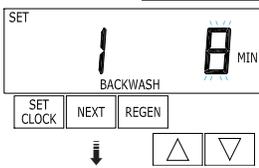
**Step 1F** – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2F does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

**STEP 2F**



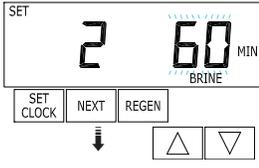
**Step 2F** – Choose FILTERING using the ▼ or ▲ buttons. Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.

**STEP 3F**



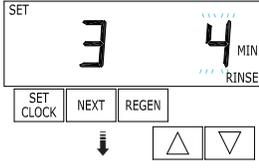
**Step 3F** – Select the time for the first cycle (which in this example is BACKWASH) using the ▼ or ▲ button. Press NEXT to go to Step 4F. Press REGEN to return to previous step.

**STEP 4F**



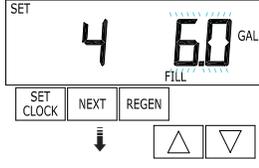
**Step 4F** – Select the time for the second cycle (which in this example is dn BRINE) using the ▼ or ▲ button. Press NEXT to go to Step 5F. Press REGEN to return to previous step.  
NOTE: The display will flash between cycle number and time, and brine direction (dn Brine).

**STEP 5F**

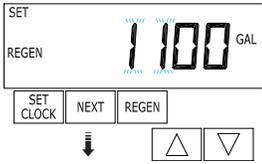


**Step 5F** – Select the time for the third cycle (which in this example is RINSE) using the ▼ or ▲ button. Press NEXT to go to Step 6F. Press REGEN to return to previous step.

**STEP 6F**

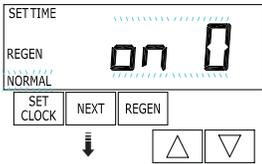


**Step 6F** – Select the gallons for the fourth cycle (which in this example is FILL) using the ▼ or ▲ button. Press NEXT to go to Step 7F. Press REGEN to return to previous step.

**STEP 7F**

**Step 7F** – Set Volume Capacity using the ▼ or ▲ button. If value is set to:

- “oFF” regeneration will be based solely on the day override set (see Installer Display/Settings Step 3D); or
  - as a number (allowable range 20 to 250,000) regeneration initiation will be based off the value specified. Increment increase is 20 for the range 20 to 2,000, 1,000 for the range of 2,000 to 10,000, 10,000 for the range 10,000 to 50,000 and 2,000 for the range of 50,000 to 250,000.
- See Table 2 for more detail. Press NEXT to go to Step 8F. Press REGEN to return to previous step.

**STEP 8F**

RETURN TO NORMAL MODE

**Step 8F** – Set Regeneration Time Options using the ▼ or ▲ button. If value is set to:

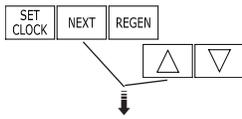
- “NORMAL” means regeneration will occur at the preset time;
  - “on 0” means regeneration will occur immediately when the volume capacity reaches 0 (zero); or
  - “NORMAL + on 0” means regeneration will occur at one of the following:
    - the preset time when the volume capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first;
    - or
    - immediately after 10 minutes of no water usage when the volume capacity reaches 0 (zero).
- See Table 2 for more detail. Press NEXT to exit OEM Filter System Setup. Press REGEN to return to previous step.

**Table 2**  
**Filter Setting Options**

Volume Capacity	Regeneration Time Option	Day Override	Result
oFF	NORMAL	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached.
Any number	NORMAL	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0.
Any number	NORMAL	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when volume capacity reaches 0 or the specified number of days between regenerations is reached.
Any number	On 0	oFF	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs immediately when volume capacity reaches 0. Time of regeneration will not be allowed to be set because regeneration will always occur on 0.
Any number	NORMAL on 0	Any number	Reserve capacity <u>not</u> automatically estimated. Regeneration occurs at the next Regen Set Time when the specified number of days between regenerations is reached or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0.

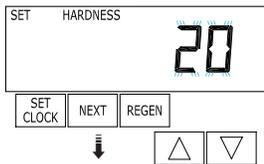
Installer Display Settings

**STEP 1I**



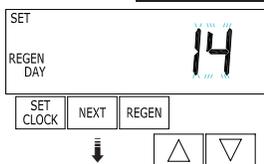
**STEP 1I** - Press NEXT and ▲ simultaneously for 3 seconds.

**STEP 2I**



**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. This display will show “-nA-” if “FILTER” is selected in Step 2F or if ‘AUTO’ is not selected in Set Gallons Capacity in OEM Softener System Setup. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

**STEP 3I**



**STEP 3I** – Day Override: When volume capacity is set to off, sets the number of days between regenerations. When volume capacity is set to AUTO or to a number, sets the maximum number of days between regenerations. If value set to “oFF” regeneration initiation is based solely on volume 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 volume of water were not used to call for a regeneration. Set Day Override using ▼ or ▲ buttons:

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

See Table 1 for more detail on softener setup and Table 2 for more detail on filter 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 ▲ buttons. AM/PM toggles after 12. The default time is 2:00 AM. This display will show “on 0” if “on 0” is selected in Set Regeneration Time Option in OEM Softener System Setup or OEM Filter System Setup. 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. This display will not be shown if “on 0” is selected in Set Regeneration Time Option in OEM Softener System Setup or OEM Filter System Setup. Press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

RETURN TO  
NORMAL MODE

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.

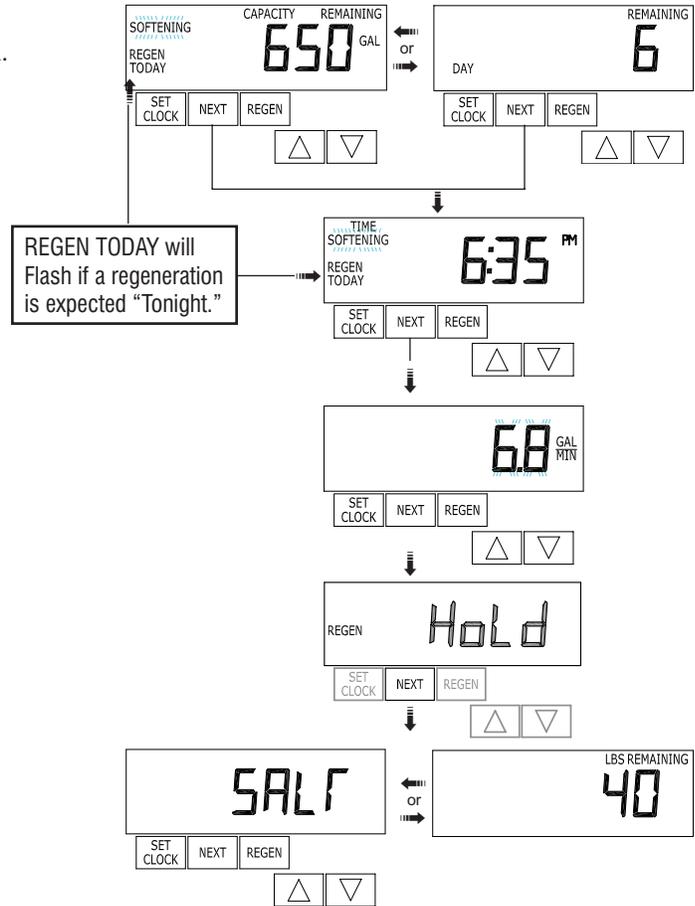
**Installer Display Settings**

**General Operation**

When the system is operating, one of five displays may 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 volume remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the cubic meters that will be treated before the system goes through a regeneration cycle. The third display shows the current treated water flow rate through the system. The fourth display will show either dP or hold if the dP switch is closed. The fifth display shows the pounds of salt remaining or flashes “SALT” fill when the calculated pounds of salt falls below a safety level. The fifth display will not appear if the valve is set up as a filter or if the Set Low Salt Warning is set to off (see last step in OEM Softener System Setup). 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.

If a water meter is installed, the word “Softening” or “Filtering” flashes on the display when water is being treated (i.e. water is flowing through the system).



**Regeneration Mode**

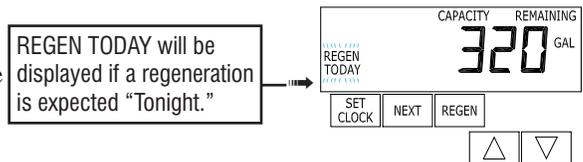
Typically a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.



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 to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.



To initiate a manual regeneration at the preset delayed regeneration time, 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.

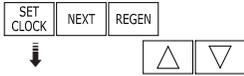
To initiate a manual regeneration immediately, press and hold the “REGEN” button for three seconds. The system will begin to regenerate immediately. The request cannot be cancelled.

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**

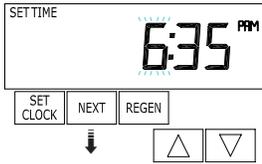
The user can also set the time of day. Time of day should only need to be set after extended power outages or when daylight saving time begins or ends. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset.

**STEP 1U**



**STEP 1U** – Press SET CLOCK.

**STEP 2U**



**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**



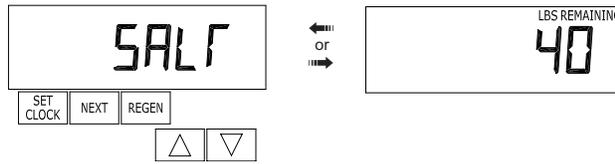
**STEP 3U** - Current Time (minutes): Set the minutes of the day using ▼ or ▲ buttons. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

**Salt Remaining or Adding Salt**

If the Low Salt Warning was activated in the last step of OEM Softener System Setup the following screens will be viewed in the User Display.

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



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



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

**STEP 1US**



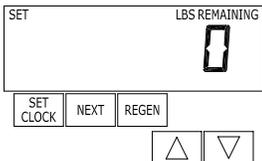
**Step 1US** – Press the NEXT button until SALT appears in the display. It does not matter if the SALT display alternates with the LBS REMAINING display.

**STEP 2US**



**Step 2US** – Press SET CLOCK.

**STEP 3US**



**Step 3US** – Set LBS REMAINING: Use the ▼ or ▲ button to adjust the lbs. remaining in the brine tank.



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

**STEP 4US**



**Step 4US** – Press SET CLOCK to exit Adding Salt.

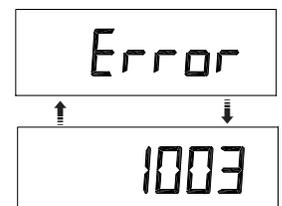
RETURN TO NORMAL MODE

**Power Loss**

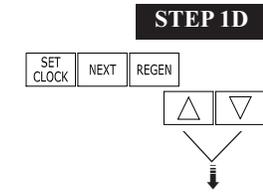
If the power goes out for less than two hours, the system will automatically reset itself. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset. The system will remember the rest.

**Error Message**

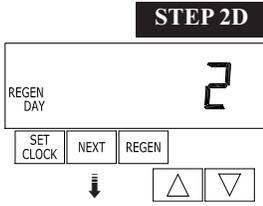
If the word “ERROR” and a number are alternately flashing on the display contact the OEM for help. This indicates that the valve was not able to function properly.



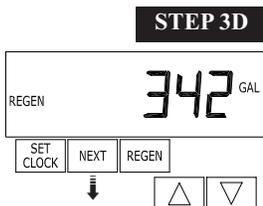
Diagnostics



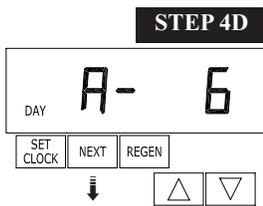
**STEP 1D** – Press ▲ and ▼ simultaneously for three seconds. If screen in step 2D does not appear in 5 seconds the lock on the valve is activated. To unlock press ▲, NEXT, ▼, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds.



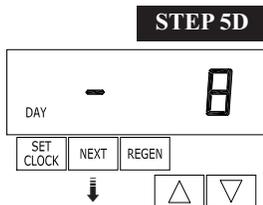
**STEP 2D<sup>2</sup>** – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press the NEXT button to go to Step 3D. Press REGEN to exit Diagnostics.



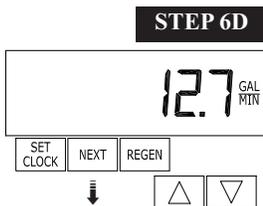
**STEP 3D** – Volume, since last regeneration: This display shows the volume of water that has been treated since the last regeneration. This display will equal zero if a water meter is not installed. Press the NEXT button to go to Step 4D. Press REGEN to return to previous step.



**STEP 4D** – Volume, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed and Set Volume 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 capacity 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** - Volume, 63-day usage history: This display shows day 1 (for yesterday) and flashes the volume of water treated yesterday. Pressing the ▲ button will show day 2 (which would be the day before yesterday) and flashes the volume of water treated on that day. Continue to press the ▲ button 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. Press the NEXT button at any time to go to Step 6D. Press REGEN to return to previous step.



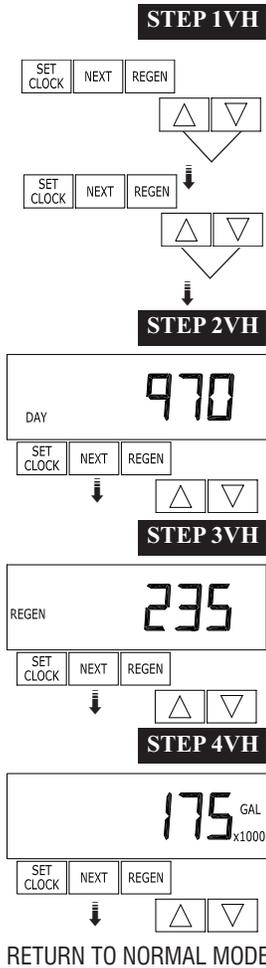
**STEP 6D** – Flow rate, maximum last seven days: The maximum flow rate in gallons per minute that occurred in the last seven days will be displayed. This display will equal zero if a water meter is not installed. Press the NEXT button to exit Diagnostics. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

**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 for 3 seconds and release. Press ▲ and ▼ simultaneously for 3 seconds to reset diagnostic values to zero.**

<sup>2</sup> The values in steps 2D through 6D can be reset to zero. Resetting one value resets them all. See OEM General Instructions for resetting procedure.

### 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<sup>3</sup>** – Days, total since start-up: This display shows the total days since startup. Press the NEXT button to go to Step 3VH. Press REGEN to return to previous step.

**STEP 3VH** – 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 4VH. Press REGEN to return to previous step.

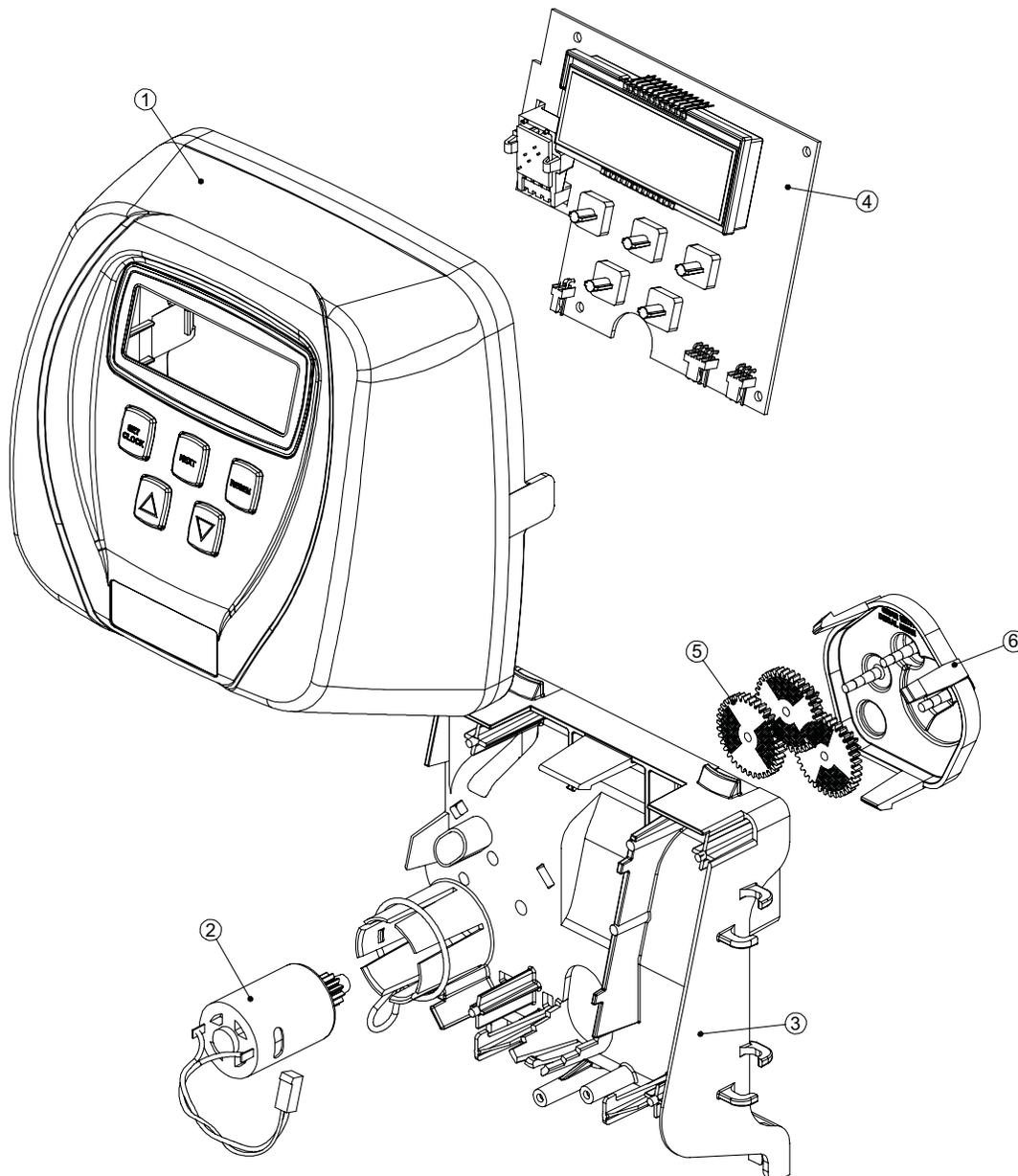
**STEP 4VH** – Volume, total used since start-up: This display shows the total gallons treated since startup. This display will equal zero if a water meter is not installed. Press the NEXT button to exit Valve History. Press REGEN to return to previous step.

<sup>3</sup> Values in steps 2VH through 4VH cannot be reset.

# Drawings and Part Numbers

**WS1.5CC Front Cover and Drive Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3175CC-01	WS1CC Front Cover Assembly	1
2	V3107-01	WS1 Motor	1
3	V3106-01	WS1 Drive Bracket & Spring Clip	1
4	V3108CC-01	WS1/1.5 CC PC Board Rev 213	1
5	V3110	WS1 Drive Gear 12x36	3
6	V3109	WS1 Drive Gear Cover	1
Not Shown	V3186	WS1 AC ADAPTER 110V-12V	1
	V3186EU	WS1 AC ADAPTER 220-240V-12V EU	
	V3186UK	WS1 AC ADAPTER 220-240V-12V UK	
	V3186-01	WS1 AC ADAPTER CORD ONLY	



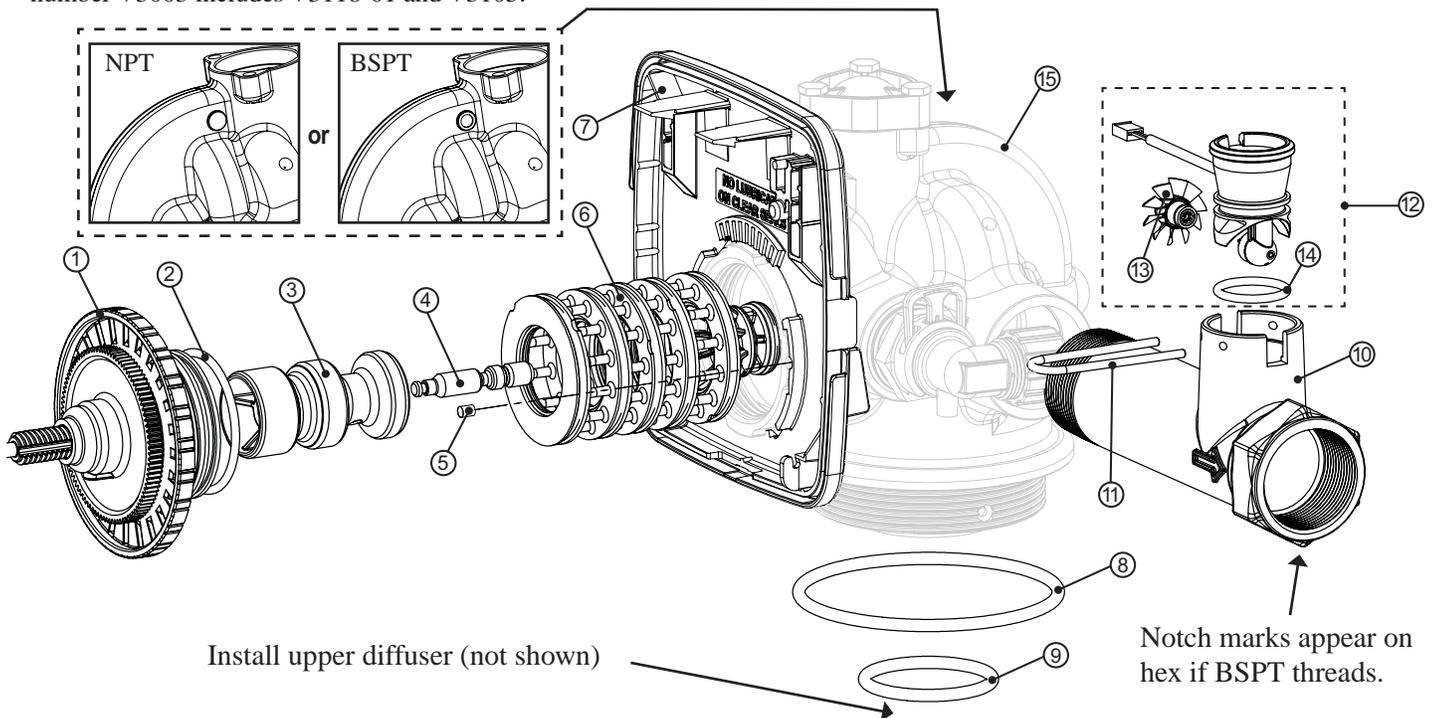
**Drive Cap Assembly, Downflow Piston, Regenerant Piston, Spacer Stack Assembly,  
Drive Back Plate, Main Body and Meter**

Drawing No.	Order No.	Description	Quantity
1	V3004	WS1 Drive Cap Asy	1
2	V3135	O-ring 228	1
3	V3407	WS1.5 Piston Downflow Asy	1
4	V3174*	WS1 Regenerant Piston	1
5	V3423	WS1.5 Backplate Dowel	1
6	V3430	WS1.5 Spacer Stack Asy	1
7	V3178	WS1 Drive Back Plate	1
8	V3419	O-ring 347	1
9	V3418	O-ring 328 for valve bodies with NPT threads	1
	V3441	O-ring 226 for valve bodies with BSPT threads	
Not Shown	V3437	WS1.5 Flow Straightener (located inside meter housing)	1
10	V3401-01	WS1.5 Meter Housing	1
	V3401BSPT-01	WS1.5 Meter Housing BSPT	
11	V3223	WS2 Meter Clip	1
12	V3003**	WS1 Meter Asy	1
13	V3118-01	WS1 Turbine Asy	1
14	V3105	1	
15	V3400-01	WS1.5 Valve Body Downflow	1
	V3400BSPT-01	WS1.5 Valve Body Downflow BSPT	

BSPT threads on inlet and outlet ports on the V3400BSPT-01 and V3401BSPT-01. NPT threads on drain and injector ports on V3400BSPT-01.

\*V3174 WS1 Regenerant Piston not used for backwash only valves. V3010-15Z Injector Plug and V3195-01 WS1 Refill Port Plug ASY must be used for backwash only valves.

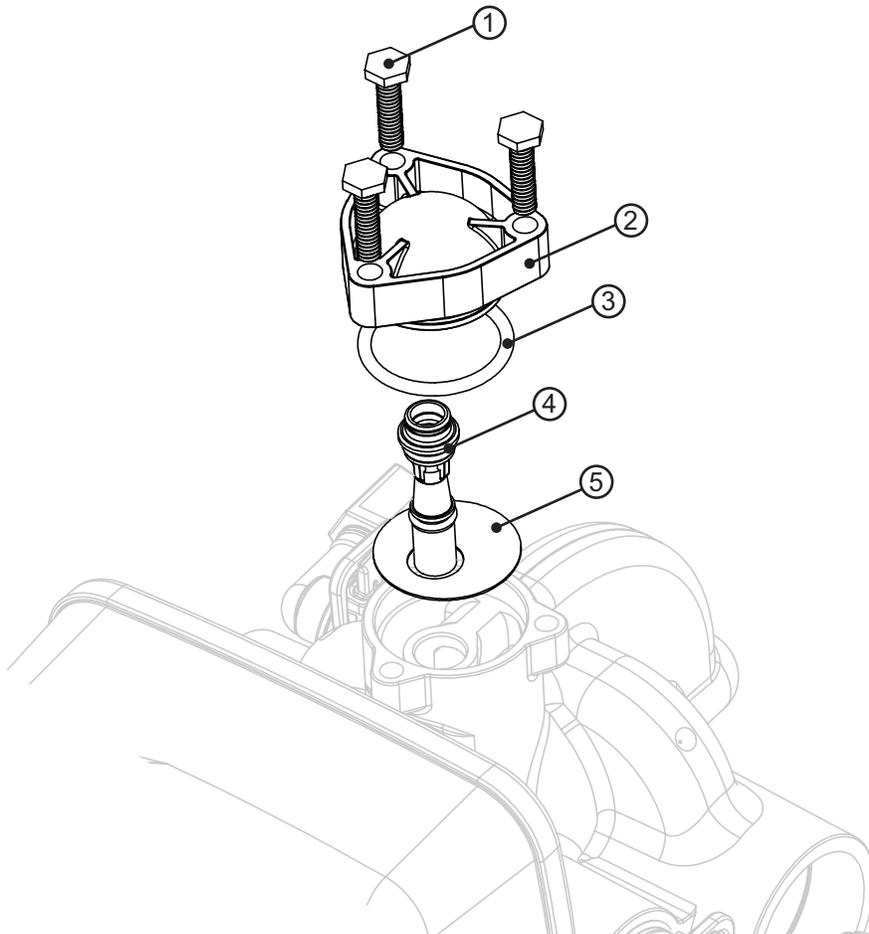
\*\*After attaching the meter housing to the valve, break out the tab in the back plate and thread the meter cord through. Order number V3003 includes V3118-01 and V3105.



### Injector Cap, Injector Screen, Injector, Plug, Bolts and O-Ring(s)

Drawing No.	Order No.	Description	Quantity
1	V3422	Bolt	3
2	V3403	WS1.5 Injector Cap	1
3	V3417	O-ring 220	1
4	V3010-15A	WS1.5 Injector Asy A Black	1
	V3010-15B	WS1.5 Injector Asy B Violet	
	V3010-15C	WS1.5 Injector Asy C Red	
	V3010-15D	WS1.5 Injector Asy D White	
	V3010-15E	WS1.5 Injector Asy E Blue	
	V3010-15F	WS1.5 Injector Asy F Yellow	
	V3010-15G	WS1.5 Injector Asy G Green	
	V3010-15Z	WS1.5 Injector Plug	
5	V3404	WS1.5 Injector Screen	1
Not Shown	V3171	O-ring 013	*
Not Shown	V3416	O-ring 012	*

\*The injector or the injector plug each contain one V3416 o-ring 012 (lower) and one V3171 o-ring 013 (upper).

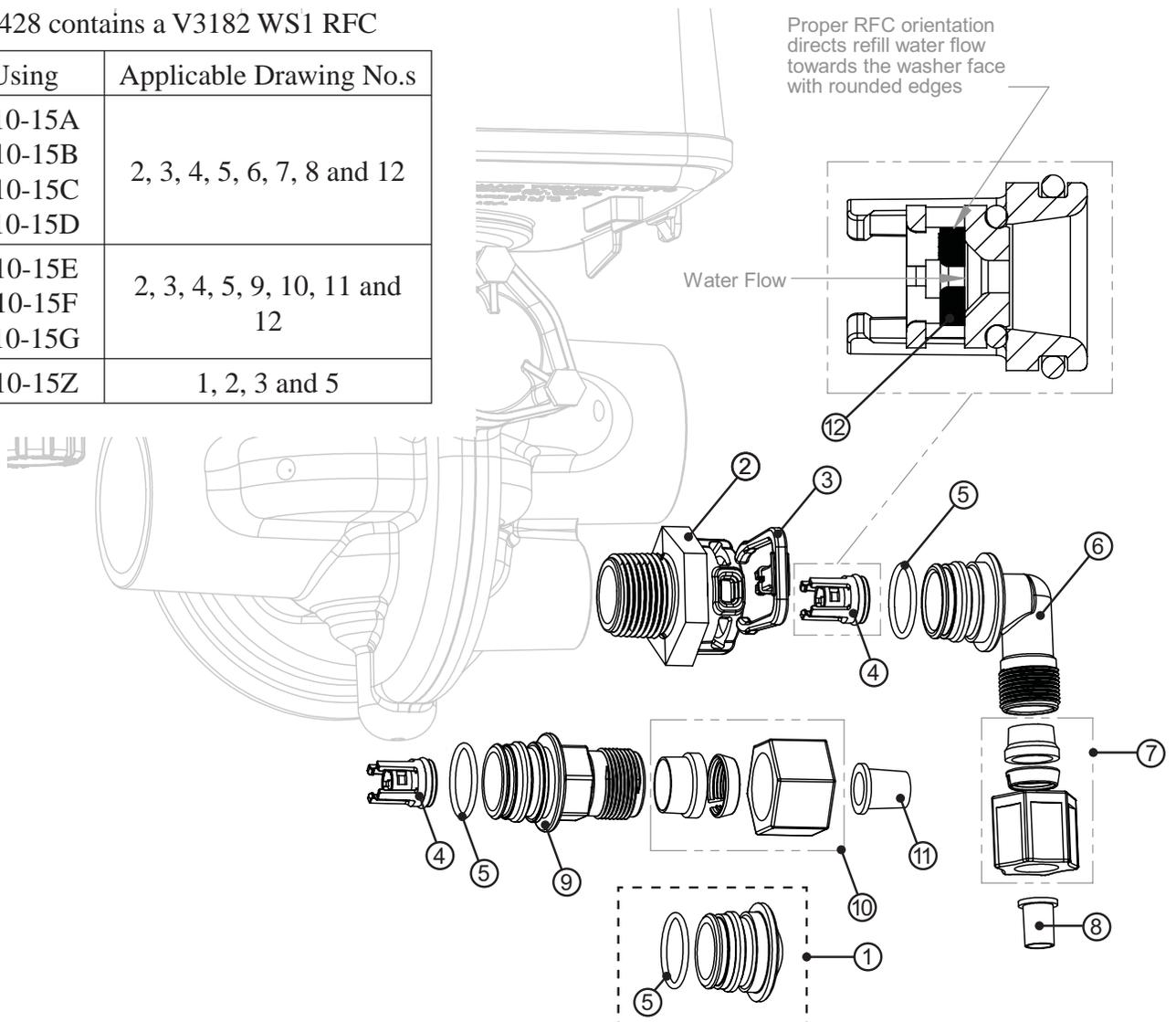


**Refill Flow Control Assembly and Refill Port Plug**

Drawing No.	Order No.	Description	Quantity
1	V3195-01	WS1 Refill Port Plug Asy	1
2	V3415	WS1.5 BLFC Adapter	1
3	H4615	Locking Clip	1
4	V3428*	WS1.5 Refill Retainer ASY	1
5	V3163	O-ring 019	1
6	H4612	Elbow Cap 1/2" (12.7 mm)	1
7	JCPG-8PBLK	Nut Compression 1/2" (12.7 mm)Black	1
8	JCP-P-8	Insert Polytube 1/2" (12.7 mm)	1
9	V3434	WS1.5 Refill Adapter 5/8" (15.9 mm)	1
10	JCP-PG-10BLK	Nut Compression 5/8" (15.9 Mm) Black	1
11	PKP10TS8-BULK	Polytube Insert 5/8" (15.9 Mm)	1
12	V3182	WS1 RFC	1

\*V3428 contains a V3182 WS1 RFC

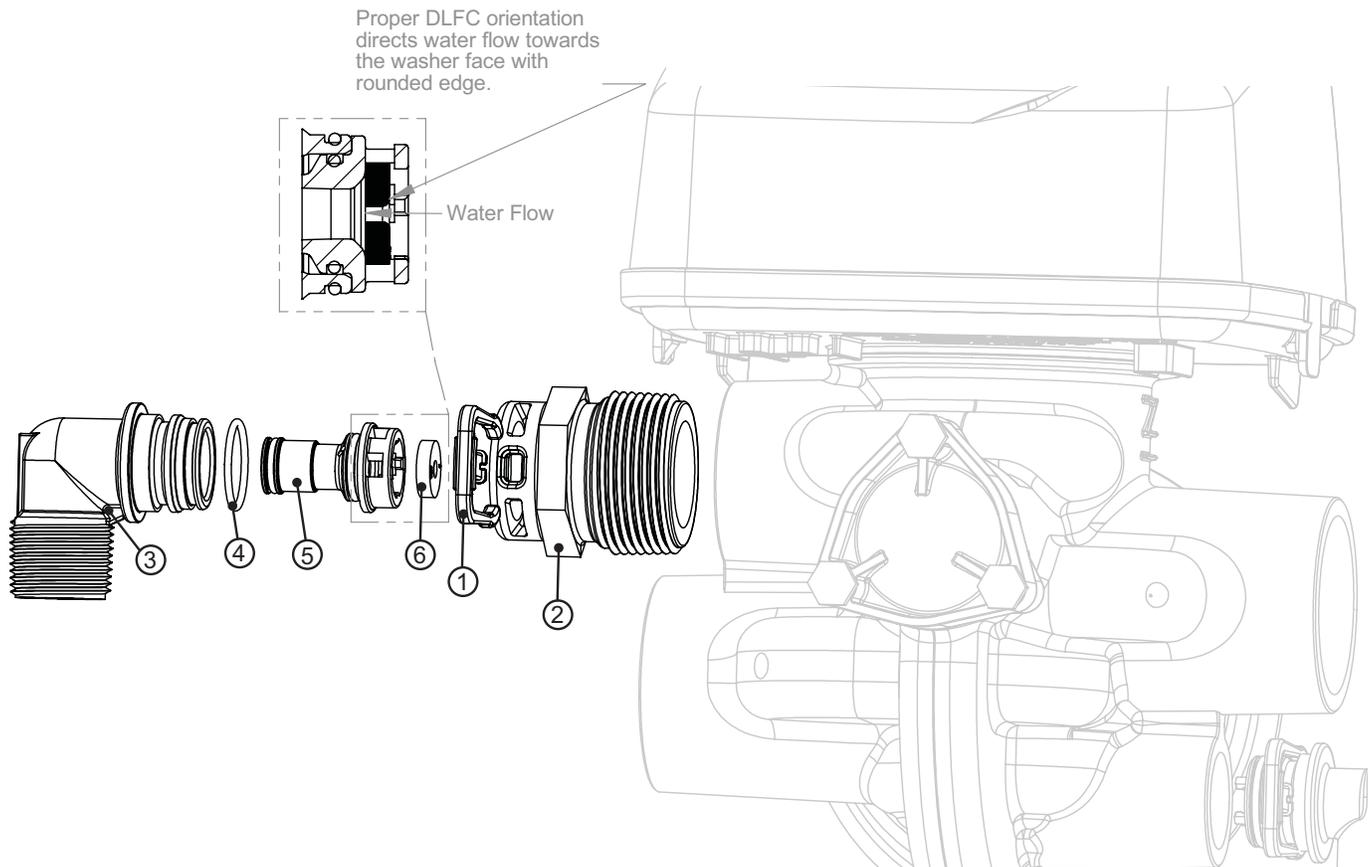
If Using	Applicable Drawing No.s
V3010-15A V3010-15B V3010-15C V3010-15D	2, 3, 4, 5, 6, 7, 8 and 12
V3010-15E V3010-15F V3010-15G	2, 3, 4, 5, 9, 10, 11 and 12
V3010-15Z	1, 2, 3 and 5



**Drain Line 3/4" (19.1 mm)**

Drawing No.	Order No.	Description	Quantity
1	H4615	Locking Clip	1
2	V3414	WS1.5 DLFC Adapter	1
3	V3158-01	WS1 Drain Elbow 3/4" (19.1 mm) Male Asy	1
4	V3163	O-ring 019	1
5	V3159-01	WS1 DLFC Retainer Asy	1
6	V3162-032	WS1 DLFC 3.2 gpm (12.1 lpm) for 3/4" (19.1 mm)	One DLFC must be used if 3/4" (19.1 mm) fitting is used
	V3162-042	WS1 DLFC 4.2 gpm (15.9 lpm) for 3/4" (19.1 mm)	
	V3162-053	WS1 DLFC 5.3 gpm (20.1 lpm) for 3/4" (19.1 mm)	
	V3162-065	WS1 DLFC 6.5 gpm (24.6 lpm) for 3/4" (19.1 mm)	
	V3162-075	WS1 DLFC 7.5 gpm (28.4 lpm) for 3/4" (19.1 mm)	
	V3162-090	WS1 DLFC 9.0 gpm (34.1 lpm) for 3/4" (19.1 mm)	
	V3162-100	WS1 DLFC 10.0 gpm (37.9 lpm) for 3/4" (19.1 mm)	

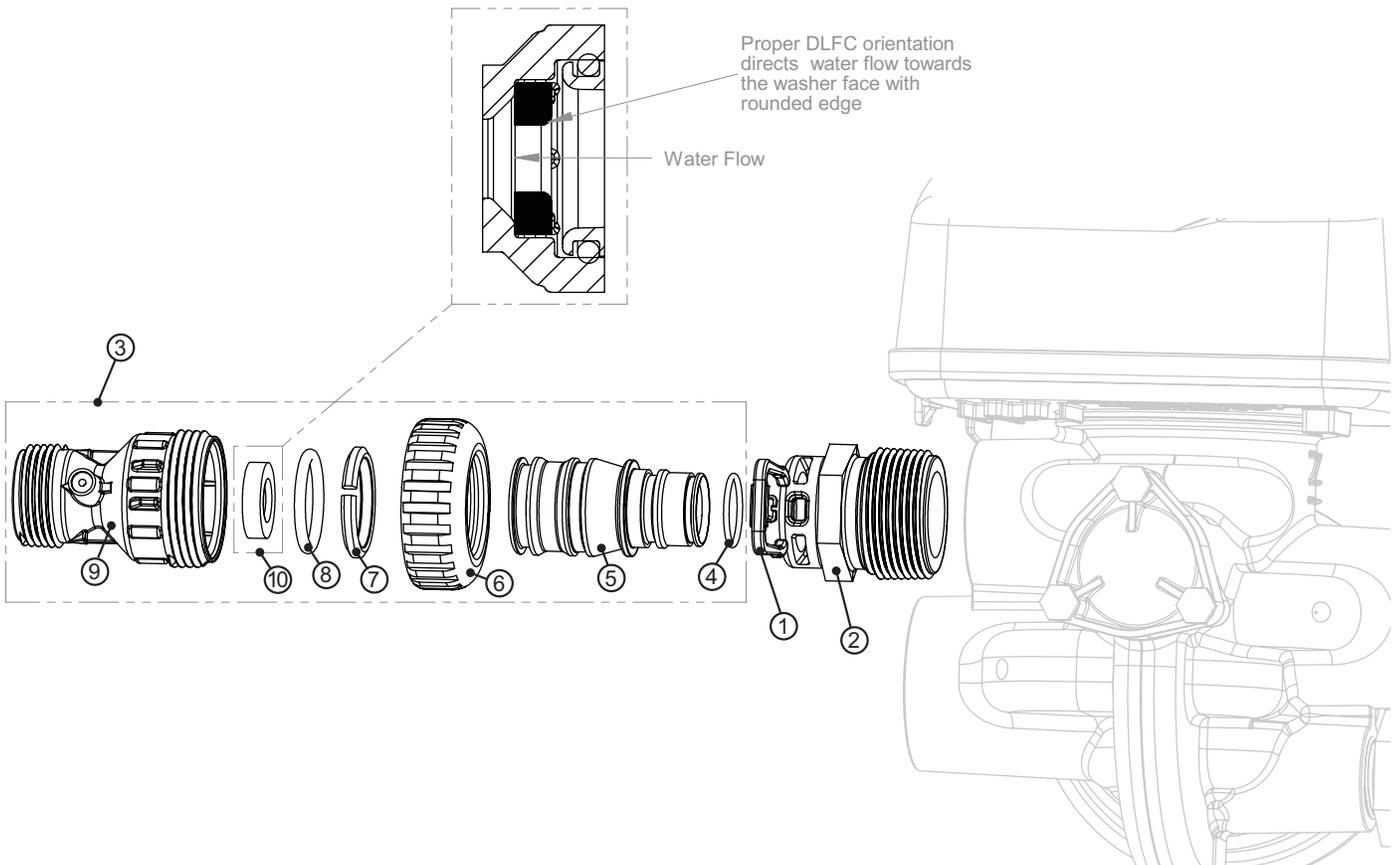
Valves are shipped without drain line flow control (DLFC) – install DLFC before using. Use a minimum drain line size of 3/4".



**Drain Line 1" (25.4 mm)**

Drawing No.	Order No.	Description	Quantity
1	H4615	Locking Clip	1
2	V3414	WS1.5 DLFC Adapter	1
3	V3008-02	WS1 Drain Ftg 1" (25.4 mm) Straight	1
4*	V3163	O-ring 019	1
5*	V3167	WS1 Drain Ftg Adapter 1" (25.4 mm)	1
6*	V3151	WS1 Nut 1" (25.4 mm) QC	1
7*	V3150	WS1 Split Ring	1
8*	V3105	O-ring 215	1
9*	V3166	WS1 Drain Ftg Body 1" (25.4 mm)	1
10	V3190-090	WS1 DLFC 9.0 gpm (34.1 lpm) for 1" (25.4 mm)	One DLFC must be used if 1" (25.4 mm) fitting is used
	V3190-100	WS1 DLFC 10.0 gpm (37.9 lpm) for 1" (25.4 mm)	
	V3190-110	WS1 DLFC 11.0 gpm (41.6 lpm) for 1" (25.4 mm)	
	V3190-130	WS1 DLFC 13.0 gpm (49.2 lpm) for 1" (25.4 mm)	
	V3190-150	WS1 DLFC 15.0 gpm (56.8 lpm) for 1" (25.4 mm)	
	V3190-170	WS1 DLFC 17.0 gpm (64.4 lpm) for 1" (25.4 mm)	
	V3190-200	WS1 DLFC 20.0 gpm (75.7 lpm) for 1" (25.4 mm)	
	V3190-250	WS1 DLFC 25.0 gpm (94.6 lpm) for 1" (25.4 mm)	

\* Can be ordered as a set, order number V3008-02 WS1 Drain Ftg 1" (25.4 mm) Straight





# **Water Specialist 1.5" Control Valve Service Manual**



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## Installation Summary

Installation Date: \_\_\_\_\_

Installation Location: \_\_\_\_\_

Installer(s): \_\_\_\_\_

Phone Number: \_\_\_\_\_

Application Type: (Softener) \_\_\_\_\_ Other: \_\_\_\_\_

**Water Source:** \_\_\_\_\_

### Water Test Results:

Hardness: \_\_\_\_\_ Iron: \_\_\_\_\_ pH: \_\_\_\_\_

Other: \_\_\_\_\_

### Misc:

Service Flow Rates: min. \_\_\_\_\_ max. \_\_\_\_\_

Tank Size: Diameter \_\_\_\_\_ Height: \_\_\_\_\_

Resin or Media Volume: \_\_\_\_\_

Resin or Media Type: \_\_\_\_\_

Capacity: \_\_\_\_\_

Salt or Fill Setting per Regeneration: \_\_\_\_\_

Brine Tank Size: \_\_\_\_\_

### Control Valve Configuration:

Valve Type: \_\_\_\_\_

Valve Part Number: \_\_\_\_\_

Valve Serial Number: \_\_\_\_\_

Regenerant Refill Control: \_\_\_\_\_ gpm/lpm

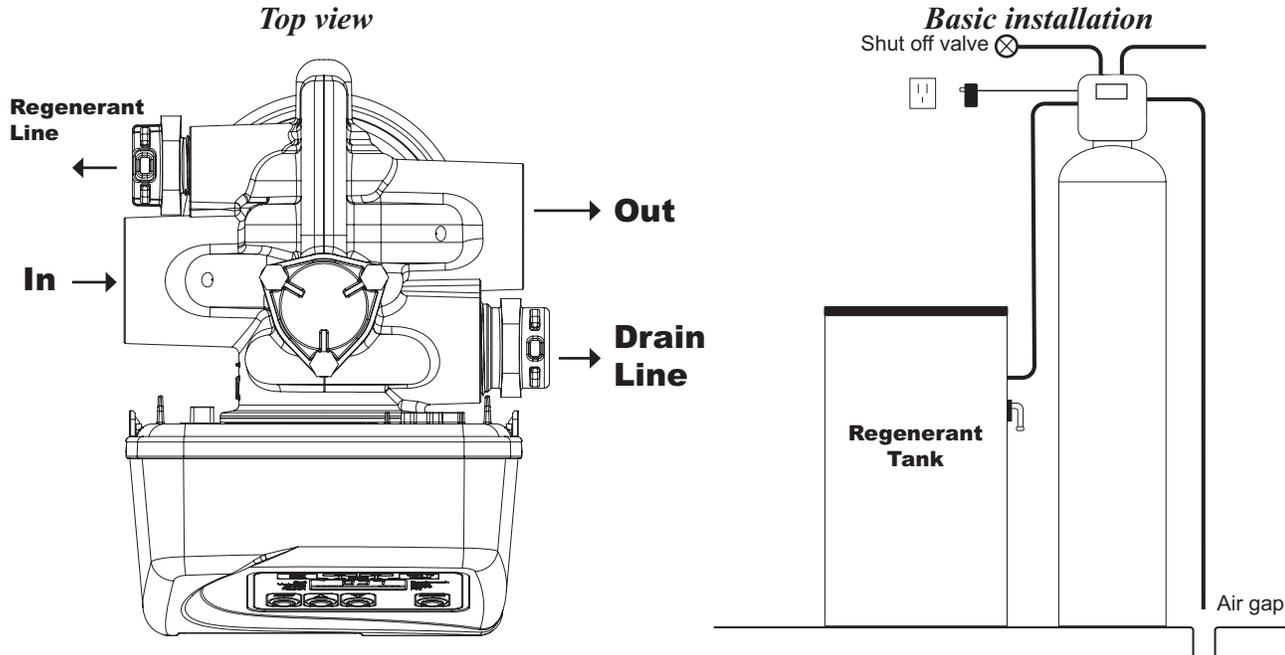
Injector Size: \_\_\_\_\_

Drain Line Flow Control: \_\_\_\_\_ gpm/lpm

### General Specifications and Pre-Installation Checklist

Minimum/Maximum Operating Pressures	20 psi (138 kPa) -125 psi (862 kPa)	
Minimum/Maximum Operating Temperatures	40°F (4°C) - 110°F (43°C)	
AC Adapter:	<u>U.S.</u>	<u>International</u>
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
No user serviceable parts are on the PC board, the motor, or the AC adapter. The means of disconnection from the main power supply is by unplugging the AC adapter from the wall.		
Service flow rate (includes bypass)	60 gpm (227 lpm) @ 15 psig (103 kPa) drop	
Backwash flow rate (includes bypass)	50 gpm (189 lpm) @ 25 psig (172 kPa) drop	
CV Service	15.5	
CV Backwash	10.0	
Meter:		
Accuracy	± 5%	
Flow Range	0.5 - 70 gpm (1.9 - 265 lpm)	
Regenerant Refill Rate	0.5 gpm (1.9 lpm)	
Injectors	See Injector Graphs	
Inlet / Outlet	1.5" NPT or BSPT	
Drain Line	1.25" NPT	
Distributor Tube Opening	1.5" PVC Pipe for valve bodies with NPT threads 50 mm PVC Pipe for valve bodies with BSPT threads	
Tank Thread	4 ½" - 8 NPSM	
Control Valve and Meter Shipping Weight	21 lbs.	10 kg
PC Board Memory	Nonvolatile EEPROM (electrically erasable programmable read only memory)	
Compatible with the following typical concentrations of regenerants/chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine and chloramines	

## Installation



### GENERAL INSTALLATION & SERVICE WARNINGS

The control valve and fittings are not designed to support the weight of the system or the plumbing.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on clear lip seals.**

**Do not use pipe dope or other sealants on threads.** Teflon tape is recommended to be used on all threads. Use of pipe dope may break down the plastics in the control valve.

### SITE REQUIREMENTS:

- The plug-in AC adapter is for dry locations only
- The tanks should be on a firm, level surface
- Electrical: Use an uninterrupted outlet installed within 15 feet (4.57 meters) of the water conditioner.

**All plumbing should be done in accordance with local codes.**

1. Locate the water conditioner so the distance between the drain and the water conditioner is as short as possible.
2. Regenerant tanks that must be refilled should be located where they are easily accessible. It is recommended a safety brine valve be used.
3. Do not install any water conditioner with less than 10 feet of piping between its outlet and the inlet of a water heater.
4. Do not locate unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures under 40° F (4° C).
5. The use of resin cleaners in an unvented enclosure is not recommended.

**6. INLET/OUTLET PLUMBING:** Connect to a supply line downstream of outdoor spigots. Install an inlet shutoff valve and plumb to the unit's inlet located at the left front as you face the unit. Installation of a bypass valve is recommended. If using plastic fittings ground the water conditioner per local electric codes. If a water meter is used, install the water meter parallel to the floor on the outlet side of the control valve. The turbine assembly may be orientated in any direction, but is usually orientated pointing up to reduce drainage out of the pipes during service. Remove the cover and drive bracket and thread the water meter cord through the hole in the back plate. Reinstall the drive bracket. Weave the cord through the hooks on the right hand side of the drive bracket and connect the end to the three prong connector labeled METER on the printed circuit board. Replace the cover.

**7. Drain:** Verify that the drain can handle the backwash rate of the water conditioner. Correctly size the drain line and install an appropriately sized drain line flow control. An adapter fitting is supplied with a valve that can connect to a ¾" fitting that can be used with drain line flow controls up to 10 gpm, or an optional 1" fitting that can be used with drain line flow controls up to 25 gpm. If necessary the adapter can be removed and the 1 ¼" threaded drain outlet may be used. Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" (152.4 mm) between the drain line flow control fitting and solder joints to prevent heat from damaging the flow control. Avoid elevating the drain line above the control valve where possible. Discharge the drain line through an air gap to a receptacle in accordance with local plumbing codes.

**IMPORTANT: Never insert a drain line directly into a drain, sewer line, or trap. Always allow an air gap between the drain line and the receptacle to prevent back siphonage.**

**8. Regeneration:** If the control valve is to be used to regenerate the water conditioner with brine (saturated salt solution) or other regenerants, use a polyethylene tube to connect the brine valve contained in the regenerant tank to the regenerant port on the control valve. It is recommended the brine valve contain a safety float. The control valve regenerant port has a ½" (12.7 mm) fitting or 5/8" (15.9 mm) straight fitting. The polyethylene tube diameter should be sized appropriately for the fitting to insure unrestricted draw to the injector. See the Refill Flow Control Assembly diagram for fittings to be used with different injector sizes.

An overflow drain line from the regenerant tank that discharges into an acceptable drain is recommended, as a regenerant overflow could damage furnishings or the building structure. Connect a line to the overflow fitting on the regenerant tank. If an overflow fitting is not already installed on the regenerant tank, install one. Do not elevate the overflow drain line. Discharge the overflow drain line through an air gap to a receptacle in accordance with local plumbing codes.

**9. AC Adapter:** If an AC Adapter is already connected to the control valve, plug the AC Adapter into an uninterrupted outlet. If the AC Adapter cord has not yet been connected to the control valve, remove the control valve cover and the drive bracket and thread AC Adapter cord through the hole in the back plate. Reinstall the drive bracket. Weave the cord through the hooks on the right hand side of the drive bracket and connect the end to the four prong connector labeled 12VAC PWR on the printed circuit board. Replace the cover. Plug the AC Adapter into an uninterrupted outlet.

**10. Program the control valve:** It is very important to program the control valve for the type of system (e.g. water softener or filter) and the end use application. Check the program used prior to testing the system.

#### Systems with a Regenerant Tank

- After installation is completed, check for leaks.
- Fully open a cold water faucet down stream of the system.
- Allow water to run until clear.
- Close the cold water faucet and water supply valve.
- The system is now ready for testing:
  1. Manually pour enough water into the regenerant tank to reach the top of the air check valve.
  2. Press and hold the REGEN button for three seconds until the drive motor starts. Wait until the motor stops and the display reads "Backwash." The backwash time will begin to count down.
  3. Open the inlet water supply valve very slowly allowing water to fill the tank in order to expel air. CAUTION: If water flows too rapidly, there will be a loss of media out of the drain.
  4. When the water is flowing steadily to the drain without the presence of air, press the REGEN button to advance the control to the brine position. The brine time will begin to count down.
  5. Fully open the water supply inlet valve.
    - Check to verify that water is being drawn from the regenerant tank
    - There should be a slow flow to the drain
    - Allow three minutes for the media bed to settle

6. Press the REGEN button again to advance to the next position and allow water to run to drain for 2-3 minutes. The display will read "backwash" or "rinse" depending on the program used. If "backwash" is displayed, press the REGEN button to advance the control to the rinse position. Allow water to run to drain until clear.
7. Press the REGEN button to advance to the next position. The display should read "fill". Allow water to run into the regenerant tank and prepare it for the next regeneration. Allow the regenerant tank to fill automatically.
8. While the regenerant tank is filling, load it with regenerant.
9. SANITIZE! Add a sanitizer to the regenerant tank brine well following dosage recommendations specified by the media manufacturer. Press and hold the REGEN button for three seconds to begin regeneration. Allow the system to complete the regeneration automatically. The system will now be sanitized and producing treated water. Be sure to check for local codes, which may also specify sanitization methods.

#### Systems without a Regenerant Tank

- After installation is completed, check for leaks.
- Fully open a cold water faucet down stream of the system.
- Allow water to run until clear.
- Close the cold water faucet and water supply valve.
- The system is now ready for testing:
  1. Press and hold the REGEN button for three seconds until the drive motor starts. Wait until the motor stops and the display reads "Backwash." The backwash time will begin to count down.
  2. Open the inlet water supply valve very slowly allowing water to fill the tank in order to expel air. CAUTION: If water flows too rapidly, there will be a loss of media out of the drain.
  3. When the water is flowing steadily to the drain without the presence of air, fully open the water supply inlet valve.
  4. Press the REGEN button again to advance to the next position and allow water to run to drain for 2-3 minutes. The display will read "backwash" or "rinse" depending on the program used. If "backwash" is displayed, press the REGEN button to advance to the rinse position. Allow water to run to drain until clear.
  5. Press the REGEN button to advance to the service position.
  6. SANITIZE! Add a sanitizer to the media following dosage recommendations specified by the media manufacturer. Be sure to check for local codes, which may also specify sanitization methods.

## 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 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. Before trying to remove the gear cover, the drive bracket must be removed from the drive back plate. (Refer to the instructions above regarding removing the drive bracket from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board.) The drive gear cover is held in place on the drive bracket by three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off of the pegs in the cover.

Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

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

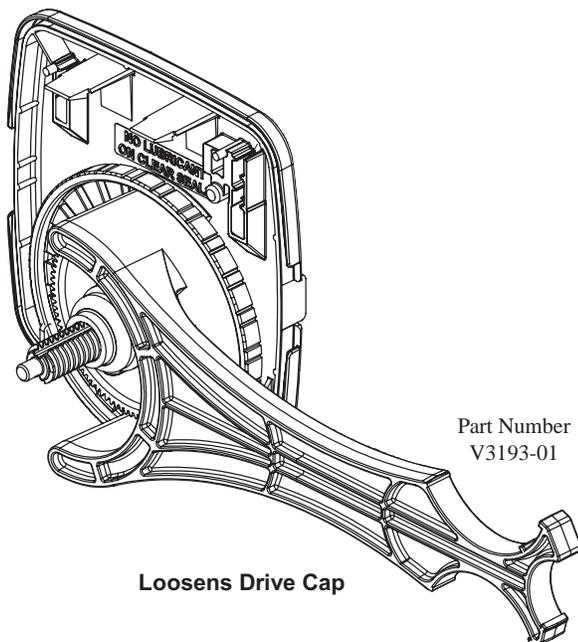
The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. Move the spring clip loop to the right and hold. Rotate the motor at least a ¼ turn in either direction before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

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

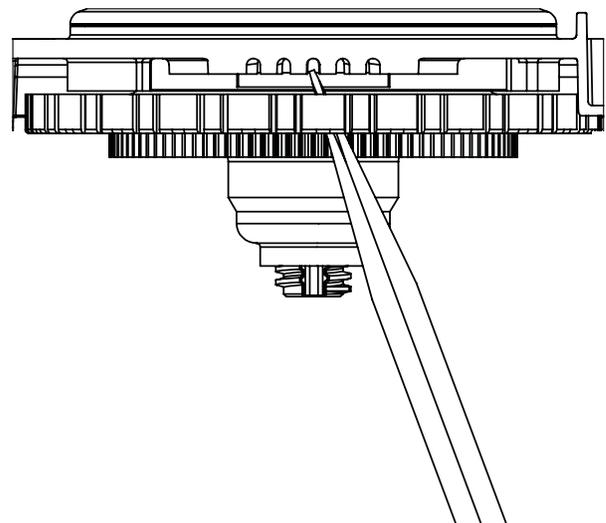
Replace the valve cover. After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the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

#### Drive Cap Assembly, Main Piston and Regenerant Piston

The drive assembly must be removed to access the drive cap assembly. The drive cap assembly must be removed to access the piston(s). The drive cap assembly is threaded into the control valve body and seals with an o-ring. To remove the drive cap assembly use the special plastic wrench (V3193-01 Figure 1) 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 2. 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: 1**



**Figure: 2**

The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the o-ring. Attached to the drive cap assembly is the main piston (down 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 unsnapping 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 piston fully extend the piston rod and then unsnap the main piston from its latch by pressing on the side with the number. Chemically clean in dilute sodium bisulfite or vinegar, or replace the main piston. The main piston is teflon coated. If the teflon coating is abraded, 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 clear lip seals. Reinsert the drive cap assembly and piston into the spacer stack assembly and hand tighten the drive cap assembly. Continue to tighten the drive cap assembly using a screwdriver as a ratchet or the V3193-01 wrench 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 software version 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 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 into 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 clear lip seals or the piston.

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

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

#### Injector Cap, Screen, Injector Plug and Injector

Remove the three bolts from the injector cap and lift off. Remove the screen and clean if fouled.

The injector can be pried out with a small screwdriver. 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.

If a valve does not use a regenerant the injector plug should not need to be cleaned.

#### Refill Flow Control Assembly or Refill Port Plug

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

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

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 fitting until the o-ring seats. Remove locking clip, push on the fitting to reseat and insert locking clip.

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

Note: The nut, gripper and retainer sleeve is a three piece assembly that can come apart if removed from the refill flow control fitting. Parts must be reassembled exactly as shown in the refill flow control assembly drawing to function properly. If the nut is completely removed from the body, slip the nut, plastic gripper and gripper sleeve on the tube, then tighten on to the fitting.

Refill port plugs should not need to be serviced. If necessary the locking clip can be removed and the port plug removed to replace the o-ring.

### Water Meter

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

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, remove the meter clip and using a small screwdriver pry up on the meter assembly.

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 meter 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 silicone lubricant may be used on the black o-ring.

Snap the turbine on the shaft and reinsert the water meter into the meter body. Insert the meter clip.

**Table 15**  
**Troubleshooting Procedures**

Problem	Possible Cause	Solution
1. Timer does not display time of day	a. AC adapter unplugged	a. Connect power
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective AC adapter	c. Replace AC adapter
	d. Defective PC board	d. Replace PC board
2. Timer does not display the correct time of day	a. Switched outlet	a. Use uninterrupted outlet
	b. Power outage	b. Reset time of day
	c. Defective PC board	c. Replace PC board
3. No softening/filtering display when the water is flowing	a. Bypass valve in bypass position	a. Put bypass valve in service position
	b. Meter connection disconnected	b. Connect meter to PC board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
4. Control valve regenerates at wrong time of day	a. Power outages	a. Reset control valve to correct time of day
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration incorrect	c. Reset regeneration time
	d. Control valve set for immediate regeneration	d. Check control valve set-up procedure regeneration time option
5. Error followed by code number  Error Code 1001 or E1 - Unable to recognize start of regeneration  Error Code 1002 or E2 - Unexpected stall  Error Code 1003 or E3 - Motor ran too long, timed out trying to reach next cycle position  Error Code 1004 - Motor ran too long, timed out trying to reach home position  If other Error Codes display contact the factory.	a. Control valve has just been serviced	a. Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
	b. Foreign matter is lodged in control valve	b. Check piston and spacer stack assembly for foreign matter
	c. High drive forces on piston	c. Replace piston(s) and spacer stack assembly
	d. Control valve piston not in home position	d. Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
	e. Motor not inserted fully to engage pinion, motor wires broken or disconnected, motor failure	e. Check motor and wiring. Replace motor if necessary
	f. Drive gear label dirty or damaged, missing or broken gear	f. Replace or clean drive gear
	g. Drive bracket incorrectly aligned to back plate	g. Reseat drive bracket properly
	h. PC board is damaged or defective	h. Replace PC board
	i. PC board incorrectly aligned to drive bracket	i. Ensure PC board is correctly snapped on to drive bracket

Problem	Possible Cause	Solution
6. Control valve stalled in regeneration	a. Motor not operating	a. Replace motor
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective AC adapter	c. Replace AC adapter
	d. Defective PC board	d. Replace PC board
	e. Broken drive gear or drive cap assembly	e. Replace the drive gear or drive cap assembly
	f. Broken piston retainer	f. Replace drive cap assembly
	g. Broken main or regenerant piston	g. Replace main or regenerant piston
7. Control valve does not regenerate automatically when REGEN button is depressed and held	a. AC adapter unplugged	a. Connect AC adapter
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Broken drive gear or drive cap assembly	c. Replace drive gear or drive cap assembly
	d. Defective PC board	d. Replace PC board
8. Control valve does not regenerate automatically but does when REGEN button is depressed	a. Bypass valve in bypass position	a. Put bypass valve in normal operation position
	b. Meter connection disconnected	b. Connect meter to PC board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign matter
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
	f. Set-up error	f. Check control valve set-up procedure
9. Time of day flashes on and off	a. Power has been out more than two hours, AC adapter was unplugged and then plugged back into the wall outlet, the AC adapter plug was unplugged and then plugged back into the board or the NEXT and REGEN buttons were pressed to rest the valve.	a. Reset the time of day



**CLACK CORPORATION  
FIVE-YEAR SOFTENER AND FILTER CONTROLS  
LIMITED WARRANTY**

Clack Corporation (“Clack”) warrants to OEM that its Softener and Filter Control Valves will be free from defects in material and workmanship under normal use and service for a period of five years from the date of shipment of such Valves from Clack’s plant in Windsor, Wisconsin when installed and operated within recommended parameters. No warranty is made with respect to defects not reported to Clack within the warranty period and/or defects or damages due to neglect, misuse, alterations, accident, misapplication, physical damage, or damage caused by fire, acts of God, freezing or hot water or similar causes. For outdoor installations where the Softener and Filter Control Valves are not under cover, the weather cover must be utilized for the warranty to be valid.

Clack’s obligation to OEM under this Limited Warranty shall be limited, at its option, to replacement or repair of any Softener and Filter Control valve covered by this Limited Warranty. Prior to returning a Control Valve, OEM must obtain a return goods authorization number from Clack and return the Control Valve freight prepaid. If any Control Valve is covered under this Limited Warranty, Clack shall return the Control Valve repaired, or its replacement, prepaid to the original point of shipment.

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