



Aqua Treatment Service, Inc.

TTV Series

Softening Water System

Installation, Operation and Maintenance Manual

CAUTION: Read and Follow all safety rules and
operating instructions before first use of product.

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DEALER NAME:	_____
DEALER PHONE #:	_____
MODEL #:	_____
SERIAL #:	_____
DATE INSTALLED:	_____

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Softener Settings

Gallons until Regeneration _____

Water Hardness _____

Backwash Minutes _____

Brine Draw Minutes _____

2nd Backwash _____

Rapid Rinse _____

Brine Tank Fill _____

Model # _____

Capacity per Unit _____

General Installation Instructions

Pre Installation Check List

Water Pressure — A minimum of 30 psi is required for regenerated of the unit. If the water pressure is over 100 psi, a pressure reducing valve must be installed before the equipment and set at 85 psi

Electrical — A grounded electrical outlet with a continuous supply of 110 to 120 volt - 60 hertz current should be located at installation site of the equipment.

A drain, must be available within 20 feet of the equipment.

Location of the equipment must be where it is not subject of freezing, direct sunlight or room Temperature over 120°F.

A minimum of 4 gallons per minute must be available for proper backwash/regeneration.

The equipment must be installed in the cold water line after the well pressure tank or water meter and before it branches off to the water heater.

Installation

1. All plumbing must conform to local codes

2. Location Selection

- If it is likely that supplementary water treatment equipment will be required, make certain adequate additional space is available.
- Since salt must be added periodically to the equipment, the location should be easily accessible.
- Do not install any equipment closer to a water heater than a total run of 10 feet of piping between the outlet of the equipment and the inlet to the heater.

3. Water Line Connection

- A by-pass valve system must be installed since there will be occasions when the equipment must be by-passed for raw water or for servicing.
- Temporarily attach by-pass to back of control valve.
- Close main water supply valve.
- Open faucets to relieve water pressure and drain system.
- Move the equipment into installation position.
- After taking all measurements for required piping, disconnect by-pass from control and move the equipment to a safe location.
- Cut, fit and solder plumbing.
- Solder plumbing to by-pass valve, raw water line to inlet, house line to outlet.
- Move equipment back into position and connect by-pass valve.
- Fill brine tank with Solar Salt.

4. Drain Line Connection

- Thread taped drain fitting into by-pass drainport.
- Connect 1/2" I.D. plastic tubing to drain fitting with clip.
- Do not exceed 6ft. elevation or 20ft. Run to drain.
- Leaving 1/2" air gap run drain to floor drain, laundry tray or septic/sewer line with trap.

5. Brine Line Connection

- Install air check on threaded connection.
- Run tubing from compression fitting on air check to compression fitting on brine tank.

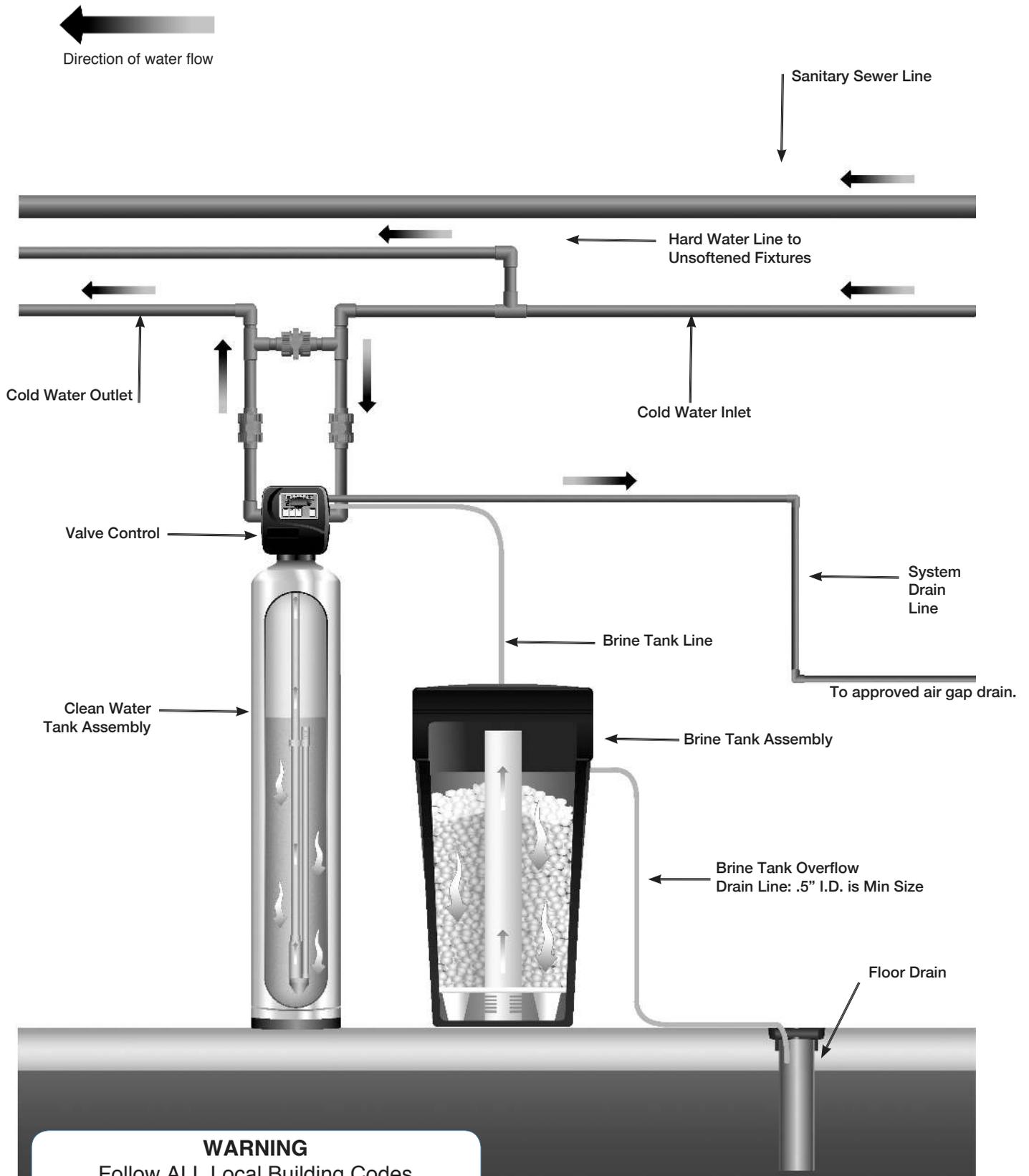
6. Overflow Line Connection

- Attach length of 1/2-inch (1.3) I.D. tubing (not supplied) to fitting and run to drain. Do not elevate overflow line higher than 3 inches (7.6cm) below bottom of overflow fitting. Do not tie drain line of the equipment control. Overflow line must be a direct, separate line from overflow fitting to drain. Allow an air gap as per drain line instructions.

7. Electrical Connection

- Remove twist tie from cord set and extend cord to its full length. Plug into socket that will accept 3-prong. Be sure the electrical outlet is not controlled by a wall switch. Set timer to current time of day.

Installation Diagram



WARNING

Follow ALL Local Building Codes when installing systems

Control Valve

EE Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175EE-01	WS1EE FRONT COVER ASSEMBLY	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 CORD ONLY	
Not Shown	V3178	WS1 Drive Back Plate	1

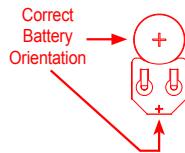
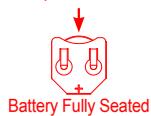
Refer to Control Valve Service Manual for other drawings and part numbers.

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

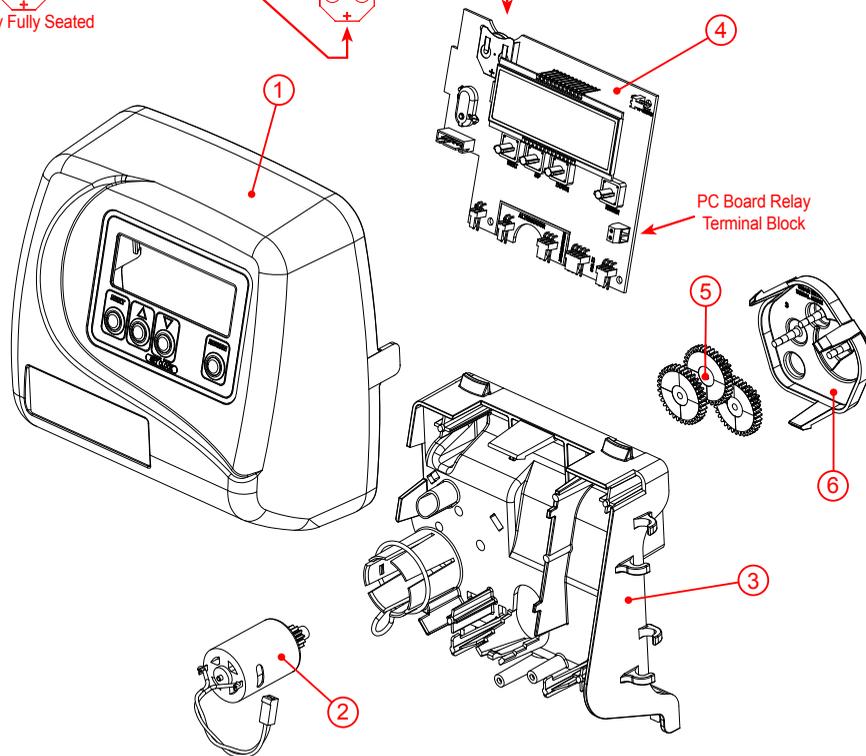
Relay Specifications: 12V DC Relay with a coil resistance not less than 80 ohms. If mounting relay under the cover check for proper mounting dimensions on the backplate.

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

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



Battery replacement is 3 volt lithium coin cell type 2032.



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 Err 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.

Button Operation and Function



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



Changes 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.



Used with valve type 1.0Γ, holding for at least 3 seconds causes a switch in the tank in Service without cycling the regeneration valve. After tank switch, days remaining and capacity remaining status is retained for each tank until the next regeneration.

Regeneration Cycles and Times

Cycle	Range		
	Softening	Filtering Regen	Filtering Backwash
Backwash	1-120 minutes	1-120 minutes	1-120 min.
Regenerant Draw/Slow Rinse (UP or DN)	1-180 minutes	1-180 minutes	NA
Fast Rinse	1-120 minutes	1-120 minutes	1-120 min.
Regenerant Refill	0.1-200.0 lbs.	1-99.0 GAL	NA
Regenerant Refill 2.0 or 1.5 set to MIN (softening only)	0.1-99.0 minutes	0.1-99.0 minutes	NA
Service	1-480 minutes	NA	NA

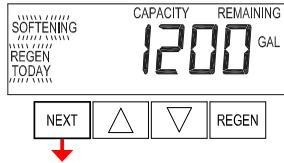
If 1.5 or 2.0 is selected in Step 2CS, cycles can be set to "oFF".

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

1. Pressing and releasing the REGEN button. "REGEN TODAY" will flash on the display and the regeneration will occur at the delayed regeneration time. The user can cancel the request by pressing and releasing the REGEN button.
2. Pressing and holding the REGEN button for approximately 3 seconds will immediately start the regeneration. The user cannot cancel this request, except by resetting the control by pressing NEXT and REGEN simultaneously for 3 seconds.

User Displays

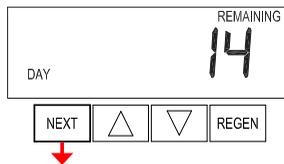
General Operation



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

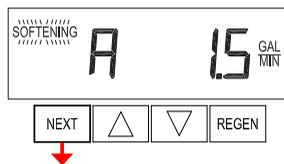
User 1

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.

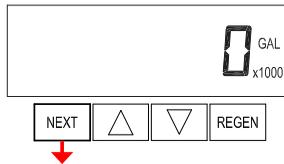


User 3

Flow Rate.

Displays present flow rate.

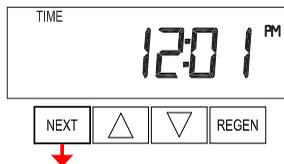
Not viewed (along with SOFTENING or FILTERING Icon) if ALT A or ALT b is set in CONFIGURATION 4 and the valve is currently in Standby. When 1.0Γ is set in CONFIGURATION 1, the display will indicate the tank currently in Service ("A" or "b") in the leftmost digit.



User 4

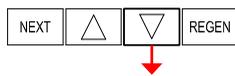
Displays total volume in gallons since last reset. If a meter is not used this display will be shown but 0 will be displayed.

PRESS ▼ FOR 3 SECONDS TO RESET TO 0.



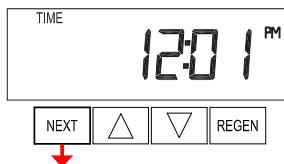
User 5

Shows current time.

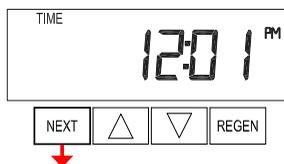


Setting Time of Day

Push NEXT until time of day screen is displayed. Press and hold ▼ until SET TIME is displayed and the hour flashes once. Press ▲ or ▼ until the correct hour is displayed.

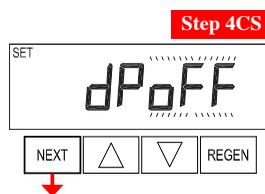
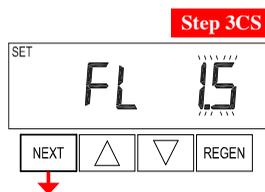
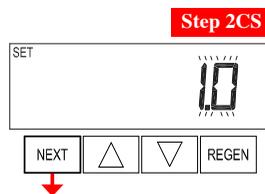
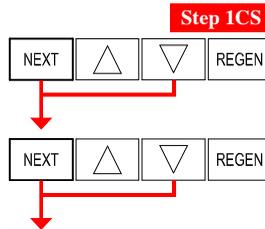


Then press NEXT. The minutes will flash. Press ▲ or ▼ until the correct minute is displayed.



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

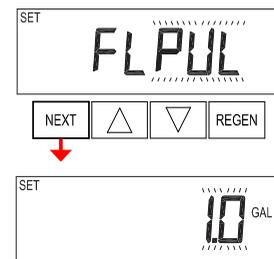
Configuration Settings



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 – Use ▲ or ▼ to select 1.0 for 1” valve, 1.25 for 1.25” valve, 1.5 for 1.5” valve, 2.0 for 2” valve or 1.0Γ for twin valve. If 1.0, 1.25 or 1.0Γ are selected, press NEXT to go to Step 4CS. If 1.5 or 2.0 are selected, press NEXT to go to Step 3CS. Press REGEN to exit Configuration Settings.

Step 3CS – Use ▲ or ▼ to select meter size. Settings available are 1.5, 2.0, 3.0, 1.0r (1.0 Remote Meter) or PUL (Variable Meter Calibration). Variable meter pulses of 0.1-150.0 PPG can be selected. Press NEXT to go to Step 4CS. Press REGEN to return to previous step.



Step 4CS – Selecting the use of an outside signal to initiate a regeneration: 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:

oFF - feature not used

NOTE: In a twin alternating system each control must have a separate dP signal or dP switch. One dP signal or one dP switch cannot be used for both controls.

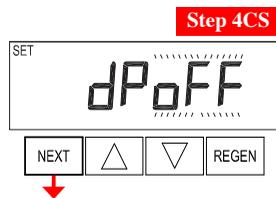
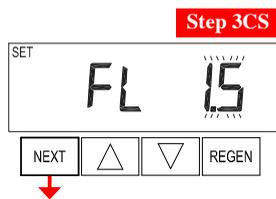
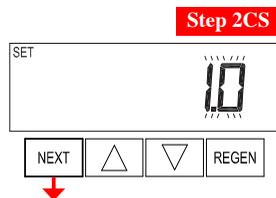
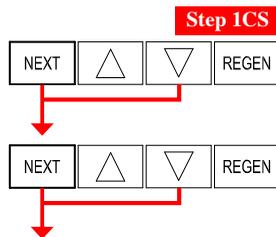
on0 – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will be signaled to the unit. In a twin alternating system the MAV will transition first to switch units so that the signaled unit can start regeneration. After the MAV has fully transitioned, the regeneration begins immediately. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “on0” is set, the Delayed Rinse and Fill feature is not available.

dEL – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will occur at the scheduled delayed regeneration time. In a twin alternating system once the dP switch is triggered the PC Board will display “REGEN TODAY” and when the delayed regen time comes the control will switch tanks and the triggered unit will then go into regeneration. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “dEL” is set, the Delayed Rinse and Fill feature is not available.

HoLd – If the dP switch is closed a regeneration will be prevented from occurring while there is switch closure. In a twin alternating system the regeneration of a unit can be prevented upon switch closure. If the unit depletes the capacity down to zero, it will not be allowed to switch tanks to regenerate until the switch is open. Note: For WS1 – WS1.5 control valves programmed for twin alternating the Delayed Rinse and Fill feature can be set.

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

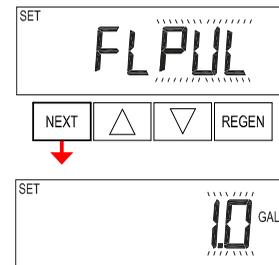
Configuration Settings



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Following is an explanation of the options:

oFF - feature not used

NOTE: In a twin alternating system each control must have a separate dP signal or dP switch. One dP signal or one dP switch cannot be used for both controls.

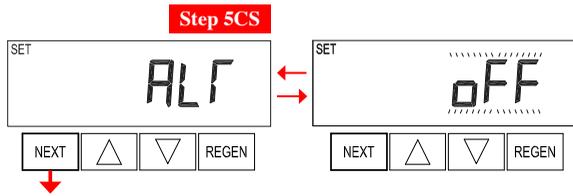
on0 – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will be signaled to the unit. In a twin alternating system the MAV will transition first to switch units so that the signaled unit can start regeneration. After the MAV has fully transitioned, the regeneration begins immediately. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “on0” is set, the Delayed Rinse and Fill feature is not available.

dEL – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will occur at the scheduled delayed regeneration time. In a twin alternating system once the dP switch is triggered the PC Board will display “REGEN TODAY” and when the delayed regen time comes the control will switch tanks and the triggered unit will then go into regeneration. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function “dEL” is set, the Delayed Rinse and Fill feature is not available.

HoLd – If the dP switch is closed a regeneration will be prevented from occurring while there is switch closure. In a twin alternating system the regeneration of a unit can be prevented upon switch closure. If the unit depletes the capacity down to zero, it will not be allowed to switch tanks to regenerate until the switch is open. Note: For WS1 – WS1.5 control valves programmed for twin alternating the Delayed Rinse and Fill feature can be set.

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

Control Valve cont:



Step 5CS – This display will not appear if 1.0Γ was selected in Step 2CS. Allows selection of one of the following using ▲ or ▼:

- the Control Valve to have no hard water bypass;
- the Control Valve to act as an alternator;
- the Control Valve to have a separate source during the regeneration cycle; or
- the Control Valve to operate with the System Controller.

Select OFF when none of these features are used.

Only use Clack No Hard Water Bypass Valves or Clack Motorized Alternating Valves (MAV) with these selections. Clack No Hard Water Bypass Valves (1” or 1.25” V3070FF or V3070FM) are not designed to be used with the alternator or separate source functions.

Configuring the Control Valve for No Hard Water Bypass Operation:

Select nHbP for control operation. For no hard water bypass operation the three wire communication cable is not used.



Selection requires that a connection to MAV or a Clack No Hard Water Bypass Valve is made to the two pin connector labeled MAV located on the printed circuit board. If using a MAV, the A port of the MAV must be plugged and the valve outlet connected to the B port. When set to nHbP the MAV will be driven closed before the first regeneration cycle that is not FILL or SOFTENING or FILTERING, and be driven open after the last regeneration cycle that is not FILL.

NOTE: If the control valve enters into an error state during regeneration mode, the no hard water bypass valve will return to the open Position, if not already there.

Configuring the Control Valve for Separate Source Operation:

Select SEPS for control operation. For separate source operation the three wire communication cable is not used.



Selection requires that a connection to a Clack Motorized Alternator Valve (MAV) is made to the two pin connector labeled MAV located on the printed circuit board. The C port of the MAV must be connected to the valve inlet and the A port connected to the separate source used during regeneration. The B port must be connected to the feed water supply.

When set to SEPS the MAV will be driven closed before the first regeneration cycle, and be driven open after the last regeneration cycle.

NOTE: If the control valve enters into an error state during regeneration mode, the MAV will return to the open position, if not already there.

Selecting the Control Valve to act as an alternator:

519.0 and higher = Use 3-wire Interconnect Cables for all communication between units.

518.3 and lower = Use 2-wire Interconnect Cables for twin alternators with independent flow meters.

Prior to starting the programming steps, connect the communication cable to each control valve board's three pin connector labeled 'COMM CABLE'. Also connect the meter cord to either control valve to the three pin connector labeled 'METER'.			
Softener Valve Programming Steps			
Configuration Settings	Step 5CS	Set to ALT A Connect the outlet plumbing of ALT A valve to the MAV's A port and connect the MAV's two pin wire connector to the two pin connector labeled "DRIVE" on the ALT A valve	Set to ALT b Connect the outlet plumbing of ALT b valve to the MAV's B port. No electrical connections are required between the ALT b valve and the MAV.
Softener System Setup	Step 10S	Set System Capacity	Set System Capacity
Softener System Setup	Step 11S	Set to 'AUTO'	Set to 'AUTO'
Softener System Setup	Step 12S	Set regeneration time option to 'on 0'.	Set regeneration time option to 'on 0'.
Installer Display Settings	Step 3I	Set Day Override to "oFF"	Set Day Override to "oFF"

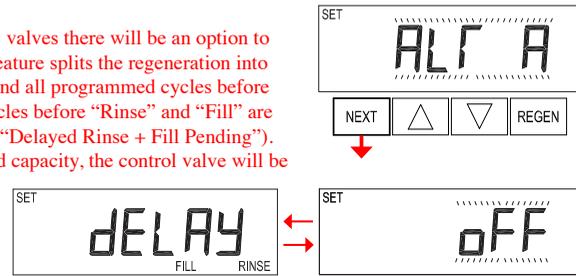
If set up for a filter, in Step 5F set Volume Capacity in Gallons; in Step 6F select Regeneration Time Option "on 0"; and in Step 3I select Day Override "oFF".

NOTE: If the control valve is in an error state during regeneration mode the MAV will close the B port and keep open the A port until the error is corrected and reset.

Control Valve cont:

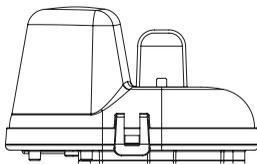
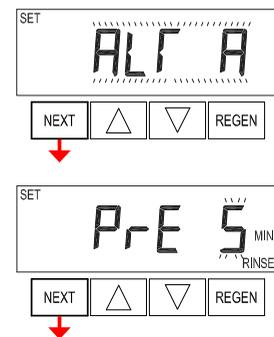
WS1, WS1.25 and WS1.5 Valves

For Clack Corporation alternator systems using WS1, WS1.25 and WS1.5 valves there will be an option to delay the last two cycles of regeneration (only "Rinse" and "Fill"). This feature splits the regeneration into two portions. The first portion of the regeneration will start immediately and all programmed cycles before the "Rinse" and "Fill" cycles will be performed. After all programmed cycles before "Rinse" and "Fill" are completed the control valve will drive to the service position (displaying "Delayed Rinse + Fill Pending"). When the volume of the on-line unit is depleted to 10% of its programmed capacity, the control valve will be triggered to finish the second portion of the regeneration and complete the "Rinse" and "Fill" cycles and return to Service and be placed into Standby mode, and wait to come on-line for service. Set to OFF to deactivate this feature.



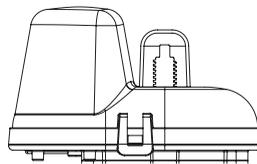
WS2 Valve

For Clack Corporation alternator systems using the WS2 valve, when NEXT is pressed after selecting ALT A or ALT B, a display will allow the user to set the amount of pre-service rinse time for the stand by tank just prior to returning to service. Set to OFF to deactivate this feature. With 1.0Γ set, the same display appears and is set in a similar manner.



Retracted

Valve "A" in Service Position =
MAV piston rod Retracted



Extended

Valve "B" in Service Position =
MAV piston rod Extended

Note: Clack Twin Alternator Operations

- Twin alternating systems can be programmed with a day override setting combined with the normal volume-based regeneration programming. A twin alternating system in this configuration will then regenerate based on the volume used or the day override if there is a period of low water usage.
- Twin alternating systems can be programmed as a time clock only based regenerating system. In this configuration, the days remaining are counted only on the unit that is in service. The unit in Stand-by Mode only notes days in diagnostics, which results in time clock only twin regeneration initiation.
- Twin alternating systems can be programmed for a delayed regeneration time. The system will allow an immediate transfer of the MAV to switch tanks and place a fully regenerated unit in service once a unit becomes exhausted. The exhausted unit will then be placed into Stand-by Mode and allowed to have a delayed regeneration at the pre-set time.

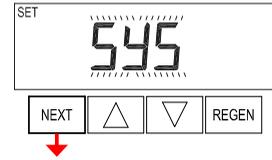
Control Valve cont:

Configuring the Control Valve for System Controller Operation:

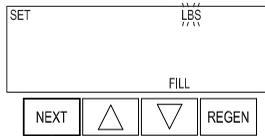
Select "SYS" to link control valve to System Controller. For communication between control valve and System Controller, a three-wire communication cable is required.

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. For valve types WS1.5 and WS2, a connection from a Clack No Hard Water Bypass (V3097/BSPT or V3098/BSPT) to the two pin connector labeled MAV located on the printed circuit board is required.

Press NEXT to go to Step 6CS. Press REGEN to return to previous step.



Step 6CS

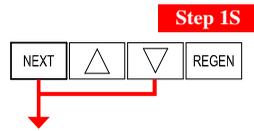


EXIT TO DISPLAY SCREENS

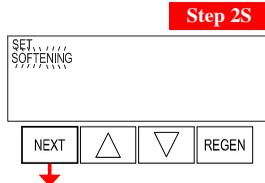
Step 6CS – Fill Units: If set as a softener, if Step 2CS is set to 1.5, and FILL is part of the Regeneration Cycle Sequence, FILL UNITS of MIN or LBS can be selected. Press NEXT to exit OEM Configuration Setup. Press REGEN to return to previous step.



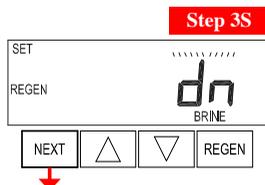
OEM Softener System Setup



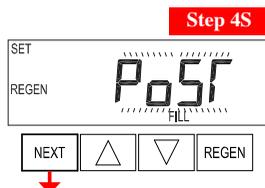
Step 1S - Press NEXT and ▼ simultaneously for 5 seconds and release. If screen in Step 2S does not appear, the lock on valve programming has been activated. To unlock press ▼, NEXT, ▲, REGEN in sequence, then press NEXT and ▼ simultaneously for 5 seconds and release.



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



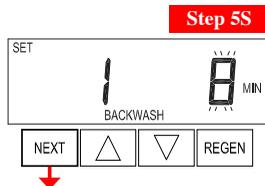
Step 3S - Choose Brining Direction using ▲ or ▼. This screen is not viewed when Step 2S is set to Filtering. Press NEXT to go to Step 4S. Press REGEN to return to previous step.



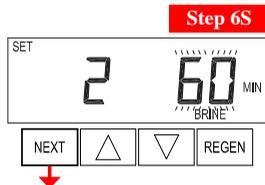
Step 4S - Set Refill location using ▲ or ▼:

- “PoST” to refill the brine tank after the final rinse; or
- “PrE” to refill the brine tank four hours before the regeneration time set.

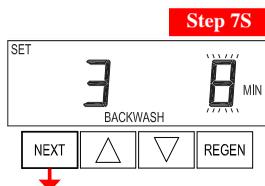
This screen is not viewed when Step 2S is set to Filtering.
Press NEXT to go to Step 5S. Press REGEN to return to previous step.



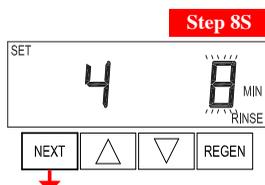
Step 5S - Select the time for the first cycle using ▲ or ▼. For valve types 1.5 and 2.0, “oFF” is also available.
Press NEXT to go to Step 6S. Press REGEN to return to previous step.



Step 6S - Select the time for the second cycle using ▲ or ▼. For valve types 1.5 and 2.0, “oFF” is also available.
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.

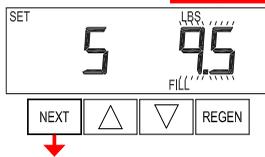


Step 7S - Select the time for the third cycle using ▲ or ▼. For valve types 1.5 and 2.0, “oFF” is also available.
Press NEXT to go to Step 8S. Press REGEN to return to previous step.



Step 8S - Select the time for the fourth cycle using ▲ or ▼. For valve types 1.5 and 2.0, “oFF” is also available.
Press NEXT to go to Step 9S. Press REGEN to return to previous step.

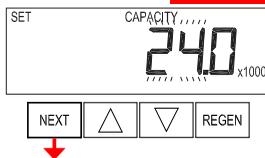
Step 9S



Step 9S – Select the pounds for the fifth cycle using ▲ or ▼. For valve types 1.5 and 2.0, “oFF” is also available.

NOTE: if Step 2CS is set to 2.0 or Step 7CS is set to MIN, Fill will be in minutes. Press NEXT to go to Step 10S. Press REGEN to return to previous step.

Step 10S



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

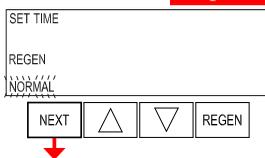


Step 11S – Set Volume Capacity using ▲ or ▼. If value is set to:

- “AUTO” capacity will be automatically calculated and reserve capacity will be automatically estimated;
- “oFF” regeneration will be triggered solely by the day override setting (see Installer Display/Settings Step 4I);
- a number, regeneration will be triggered by the value specified (in Gallons).

If “oFF” or a volume is used, the hardness display will not be allowed to be set in Installer Display Settings Step 2I. See Setting Options Table for more detail. Press NEXT to go to Step 12S. Press REGEN to return to previous step.

Step 12S



Step 12S – Set Regeneration Time Options using ▲ or ▼. If value is set to:

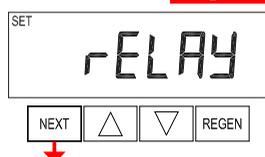
- “NORMAL” means regeneration will occur at the preset time;
 - “on 0” means regeneration will occur immediately when the volume capacity reaches 0 (zero); or
 - “NORMAL + on 0” means regeneration will occur at one of the following:
 - the preset time when the volume capacity falls below the reserve 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).
- “NORMAL” is the default if Step 5CS is set to ALT A or ALT B, and “NORMAL + on 0” is not available.

“on 0” is the default if Step 2CS is set to 1.0F, and “NORMAL + on 0” is not available.

This step will not appear if Step 11S is set to oFF or Step 5CS is set to “SYS”.

See Setting Options Table for more detail. Press NEXT to go to Step 13S. Press REGEN to return to previous step.

Step 13S



Step 13S – Set Relay Operation using ▲ or ▼. The choices are:

- Set Time on: Relay activates after a set time at the beginning of a regeneration and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first.
- Set Gallons Softening on: Relay activates after a set number of gallons

have been used while in service and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.

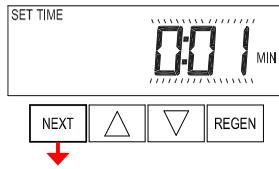
- Set Gallons Softening Regen on: Relay activates after a set number of gallons have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.

•ERROR: Relay closes whenever the valve enters error mode, and immediately deactivates when error mode is exited. If set to ERROR, Steps 14S and 15S will not be shown.

• Set Off: If set to Off, Steps 14S and 15S will not be shown.

Press NEXT to go to Step 14S. Press REGEN to return to previous step.

Step 14S

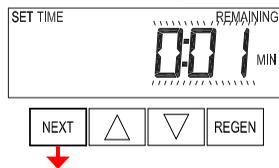


Step 14S – Set Relay Actuation Time or Gallons using ▲ or ▼. The choices are:

- Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle, Dn brine cycle or UP brine cycle whichever comes first. Ranges from 1 second to 200 minutes.
- Relay Actuation Gallons: Relay activates after a set number of gallons has passed through the meter. Ranges from 1 to 200 gallons.

Press NEXT to go to Step 15S. Press REGEN to return to previous step.

Step 15S



Step 15S – Set Relay Deactivate Time using ▲ or ▼.

- If Set Time on is selected in Step 13S the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
- If Set Gallons Softening on or Set Gallons Softening Regen on is selected in Step 13S the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.

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

EXIT OEM SOFTENER SYSTEM SETUP

Setting Options Table

Filters should only use shaded options

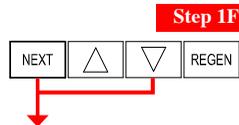
Volume Capacity	Regeneration Time Option	Day Override	Result ¹
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time.
AUTO	NORMAL	Any number	Reserve capacity automatically estimated. Regeneration 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 when volume capacity reaches 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.

¹ Reserve Capacity estimate is based on history of water usage. Reserve Capacity estimate is not available with alternator systems or Twin Tank Valve.

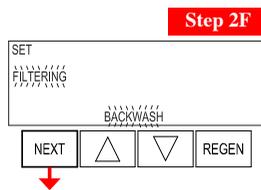
OEM Filter System Setup

Cycle Sequence, Adjustable Default Times (minutes)						
Type	Backwash	Draw	Backwash	Rinse	Backwash*	Fill
Filtering Backwash	8			4		
Filtering Regen	8	60	8	8	0:30	.95 GAL
Filtering Regen (2.0")	8	60	8	8	0:30	6

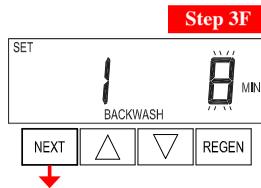
*Cycle is non-adjustable, not shown in cycle sequence programming.



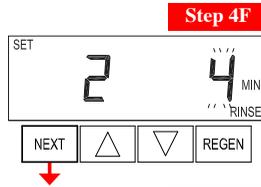
Step 1F - Press NEXT and ▼ simultaneously for 5 seconds and release. If screen in Step 2CS does not appear, the lock on the valve is activated. To unlock press ▼, NEXT, ▲, REGEN in sequence, then press NEXT and ▼ simultaneously for 5 seconds and release.



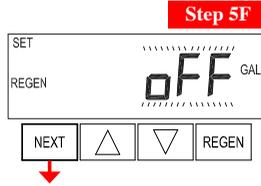
Step 2F - Choose FILTERING BACKWASH or FILTERING REGEN (see table) using ▲ or ▼. Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.



Step 3F - Select the time for the first cycle using ▲ or ▼. Press NEXT to go to Step 4F. Press REGEN to return to previous step.



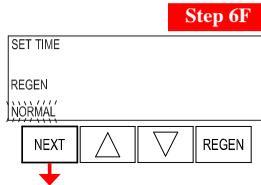
Step 4F - Select the time for the second cycle using ▲ or ▼. If Step 2F is set to FILTERING REGEN, press NEXT to program the rest of the cycle times. If Step 2F is set to FILTERING BACKWASH, press NEXT to go to Step 5F. Press REGEN to return to previous step.



Step 5F - Set Regeneration trigger using ▲ or ▼. If value is set to:

- “oFF” regeneration will be triggered solely by the day override setting (see Installer Display/Settings Step 4I);
- a number, regeneration will be triggered by the value specified (in gallons).

See Setting Options Table for more detail. Press NEXT to go to Step 6F. Press REGEN to return to previous step.

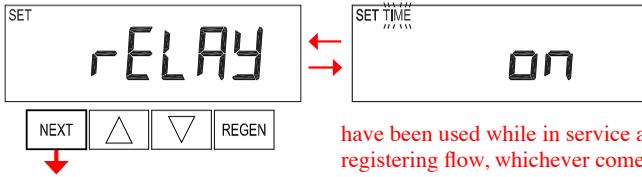


Step 6F - Set Regeneration Time Options using ▲ or ▼. If value is set to:

- “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).

“NORMAL” is the default if Step 5CS is set to ALT A or ALT B, and “NORMAL + on 0” is not available. “on 0” is the default if Step 2CS is set to 1.0Γ, and “NORMAL + on 0” is not available. This step will not appear if Step 5F is set to off or Step 5CS is set to “SYS”. See Setting Options Table for more detail. Press NEXT to go to Step 7F. Press REGEN to return to previous step.

Step 7F



Step 7F – Set Relay Operation using ▲ or ▼. The choices are:

- Set Time on: Relay activates after a set time at the beginning of a regeneration and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Dn brine cycle, whichever comes first.
- Set Gallons Filtering on: Relay activates after a set number of gallons

have been used while in service and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.

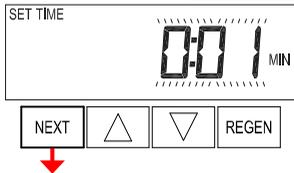
- Set Gallons Filtering Regen on: Relay activates after a set number of gallons have been used while in service or during regeneration and then deactivates after a set period of time or after the meter stops registering flow, whichever comes first.

- ERROR: Relay closes whenever the valve enters error mode, and immediately deactivates when error mode is exited. If set to ERROR, Steps 8F and 9F will not be shown.

- Set Off: If set to Off, Steps 8F and 9F will not be shown.

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

Step 8F



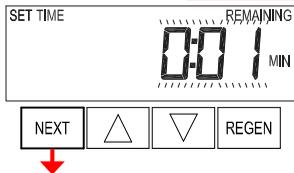
Step 8F – Set Relay Actuation Time or Gallons using ▲ or ▼. The choices are:

- Relay Actuation Time: After the start of a regeneration the amount of time that should pass prior to activating the relay. The start of regeneration is defined as the first backwash cycle or brine cycle, whichever comes first. Ranges from 1 second to 200 minutes.

- Relay Actuation Gallons: Relay activates after a set number of gallons has passed through the meter. Ranges from 1 to 200 gallons.

Press NEXT to go to Step 9F. Press REGEN to return to previous step.

Step 9F



Step 9F – Set Relay Deactivate Time using ▲ or ▼.

- If Set Time on is selected in Step 7F the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.

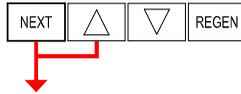
- If Set Gallons Filtering on or Set Gallons Filtering Regen on is selected in Step 7F the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first. Ranges from 1 second to 20 minutes.

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

EXIT OEM FILTER SYSTEM SETUP

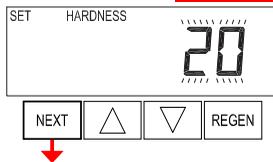
Installer Display Settings

Step 1I



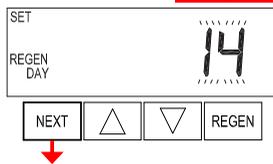
Step 1I - To enter Installer Display press NEXT and ▲ simultaneously for about 5 seconds and release.

Step 2I



Step 2I – Hardness: Set the amount of influent hardness using ▲ or ▼. This display will not be viewed if FILTERING BACKWASH or FILTERING REGEN is selected in Step 2F or if “oFF” or a number was selected in Step 1IS. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

Step 3I



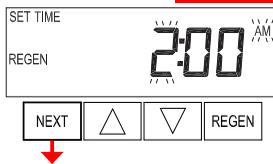
Step 3I – Day Override: When volume capacity is set to “oFF”, sets the number of days between regenerations. When volume capacity is set to AUTO or to a volume, sets the maximum number of days between regenerations. If value set to “oFF”, regeneration initiation is triggered solely by volume used. If value is set in days (allowable range from 1 to 28) regeneration initiation will be called for on that day regardless of actual water usage. Set Day Override using ▲ or ▼:

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

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. This display will show “REGEN on 0 GAL” 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 ▼. 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.

EXIT INSTALLER DISPLAY SETTINGS

Diagnostics

Step 1D



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



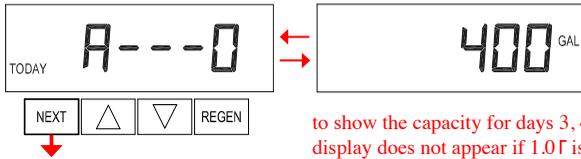
Step 7D – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press NEXT to go to Step 8D. Press REGEN to return to previous step.

Step 8D



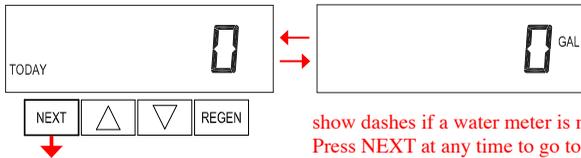
Step 8D – Volume, since last regeneration: This display shows the volume of water that has been treated since the last regeneration. This display will equal zero when a water meter is not installed. Press NEXT to go to Step 9D. Press REGEN to return to previous step.

Step 9D



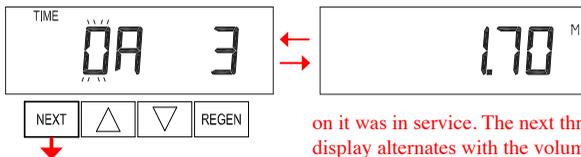
Step 9D – Volume, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed, and Set Volume Capacity is set to “Auto,” this display shows day 0 (for today) and flashes the reserve capacity. Pressing ▲ will show day 1 (which would be yesterday) and flashes the reserve 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 pressed to move backwards in the day series. This display does not appear if 1.0Γ is set in Step 2CS, if ALT A or ALT B are selected in Step 5CS, or anytime the reserve capacity is not determined by the control. Press NEXT at any time to go to Step 10D. Press REGEN to return to previous step.

Step 10D



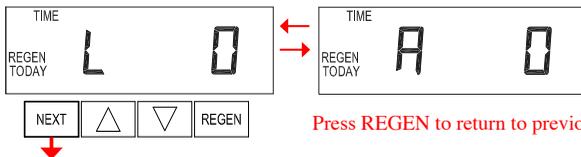
Step 10D – Volume, 63-day usage history: This display shows day 0 (for today) and flashes the volume of water treated today. Pressing ▲ will show day 1 (which would be yesterday) and flashes the volume of water treated on that day. Continue to press ▲ to show the maximum volume of water treated for the 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. Press NEXT at any time to go to Step 11D. Press REGEN to return to previous step.

Step 11D



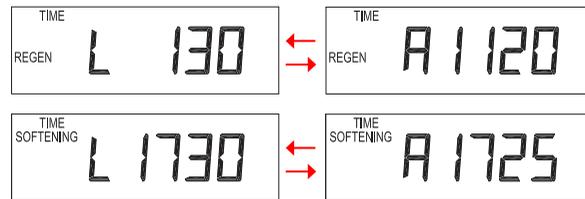
Step 11D – Twin Tank Valve transfer history: only displays when 1.0Γ was selected in Step 2CS. Use ▲ or ▼ to scroll through the last 10 tank transfers. The first position in the display ranges from 0 to 9 with the lowest number being the most recent transfer. The second position in the display will be either “A” or “b”. If “A” then the tank with the valve on it was in service. The next three digits represent the number of hours ago that the transfer occurred. The display alternates with the volume that was treated before the tank transferred. Press NEXT at any time to go to Step 12D. Press REGEN to return to previous step.

Step 12D

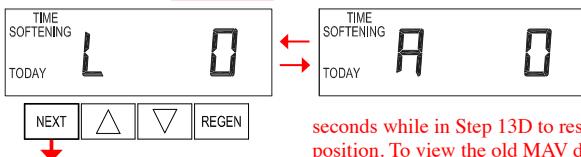


Step 12D – MAV Drive History in the direction of retracted piston rod position. Display will only be shown if 1.0Γ is selected in Step 2CS, or OFF is not selected in Step 5CS. Up to a four digit number will appear after the “L” which stands for latest and “A” which stands for average. Drive time is measured in 1/100 of a second; i.e., a 17.10 second move is displayed as “1710”. Press NEXT at any time to go to Step 13D. Press REGEN to return to previous step.

Press and hold ▲ and ▼ buttons for 3 seconds while in Step 12D to reset the MAV drive history in both the retracted and extended piston rod position. To view the old MAV drive history data for retracted and extended rod position press and hold REGEN and ▲ while in Step 12D. Press NEXT to advance display to the old MAV drive history.



Step 13D

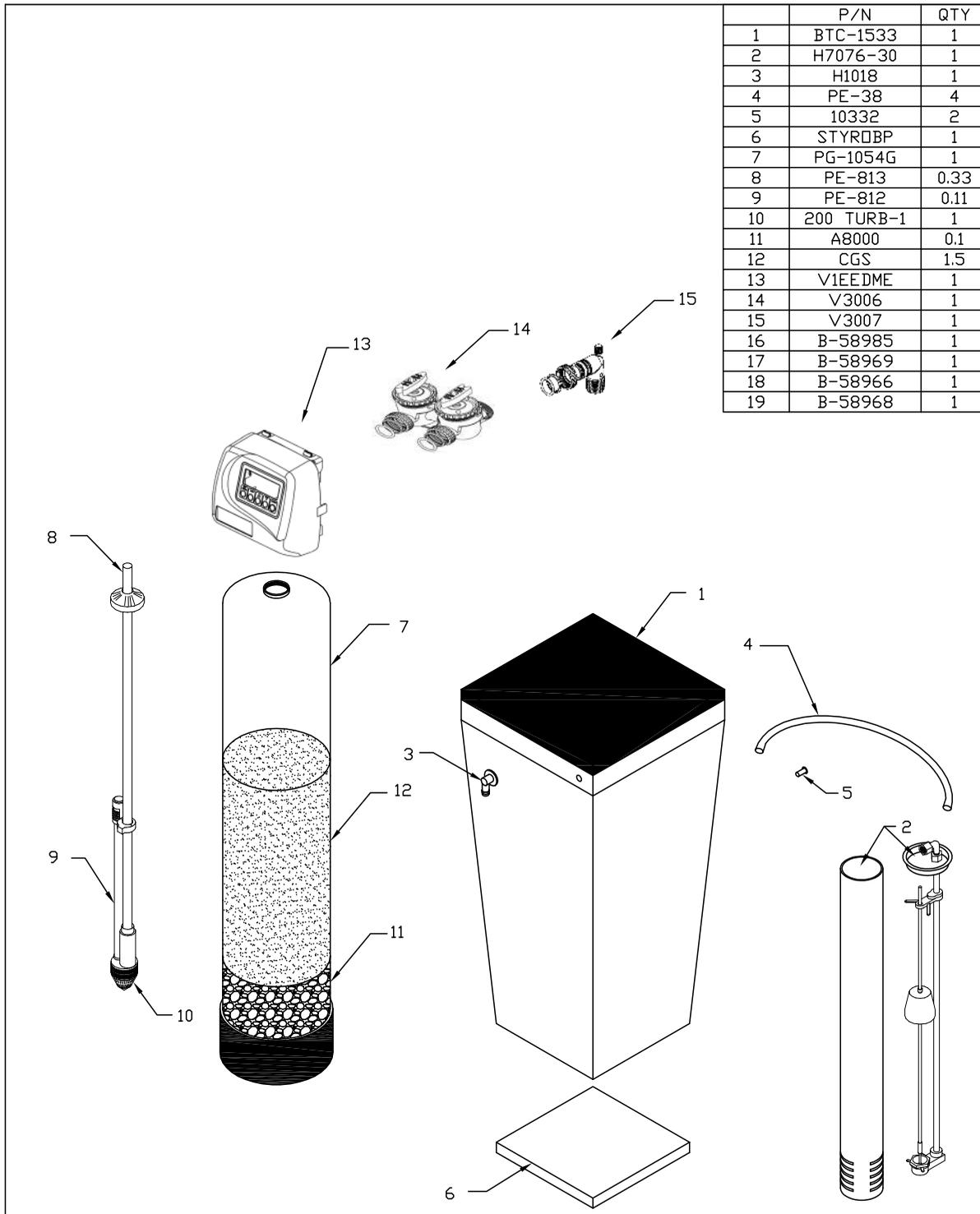


Step 13D – MAV Drive History in the direction of extended piston rod position. Display will only be shown if 1.0Γ is selected in Step 2CS, or OFF is not selected in Step 4CS. Up to a four digit number will appear after the “L” which stands for latest and “A” which stands for average. Drive time is measured in 1/100 of a second; i.e., a 17.15 second move is displayed as “1715”. Press and hold ▲ and ▼ for 3 seconds while in Step 13D to reset the MAV drive history in both the extended and retracted piston rod position. To view the old MAV drive history data see Step 12D. Press NEXT at any time exit Diagnostics. Press REGEN to return to previous step.

EXIT DIAGNOSTICS

Parts Breakdown

	P/N	QTY
1	BTC-1533	1
2	H7076-30	1
3	H1018	1
4	PE-38	4
5	10332	2
6	STYROBP	1
7	PG-1054G	1
8	PE-813	0.33
9	PE-812	0.11
10	200 TURB-1	1
11	A8000	0.1
12	CGS	1.5
13	V1EEDME	1
14	V3006	1
15	V3007	1
16	B-58985	1
17	B-58969	1
18	B-58966	1
19	B-58968	1



nat'l code	tolerances unless otherwise specified	CDPY	 AQUA TREATMENT SERVICE, INC. 194 HEMPT ROAD MECHANICSBURG, PA 17050 (717) 697-4998 FAX (800) 787-0197
tr/ecn no	dr date	1	
	linear .XX +/- .125	CUSTOMER	P/N TTVIEEM-5T
	.XXX +/- .075		SOFTENER
	angle# 0° +/- .3°		
	dr T.GARLICK 12/19/12		
	engr		
	chr		
	hpd		

Q/Graphics folder/Drawings/Shop Drawings/Fiberglass Tank Systems/Softeners

Parts Breakdown cont:

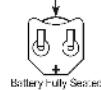
EE Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175EE-01	WS1EE FRONT COVER ASSEMBLY	1
2	V3107-01	WS1 MOTOR	1
3	V3106-01	WS1 DRIVE BRACKET & SPRING CLIP	1
4	V3408EE-02BOARD	WS1 THRU2L EEPBRD MAV/ALT REPL	1
5	V3110	WS1 DRIVE GEAR 12X36	3
6	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3186	WS1 AC ADAPTER 110V-12V	1
	V3186-01	WS1 AC ADAPTER CORD ONLY	
Not Shown	V3178	WS1 Drive Back Plate	1

Refer to Control Valve Service Manual for other drawings and part numbers.

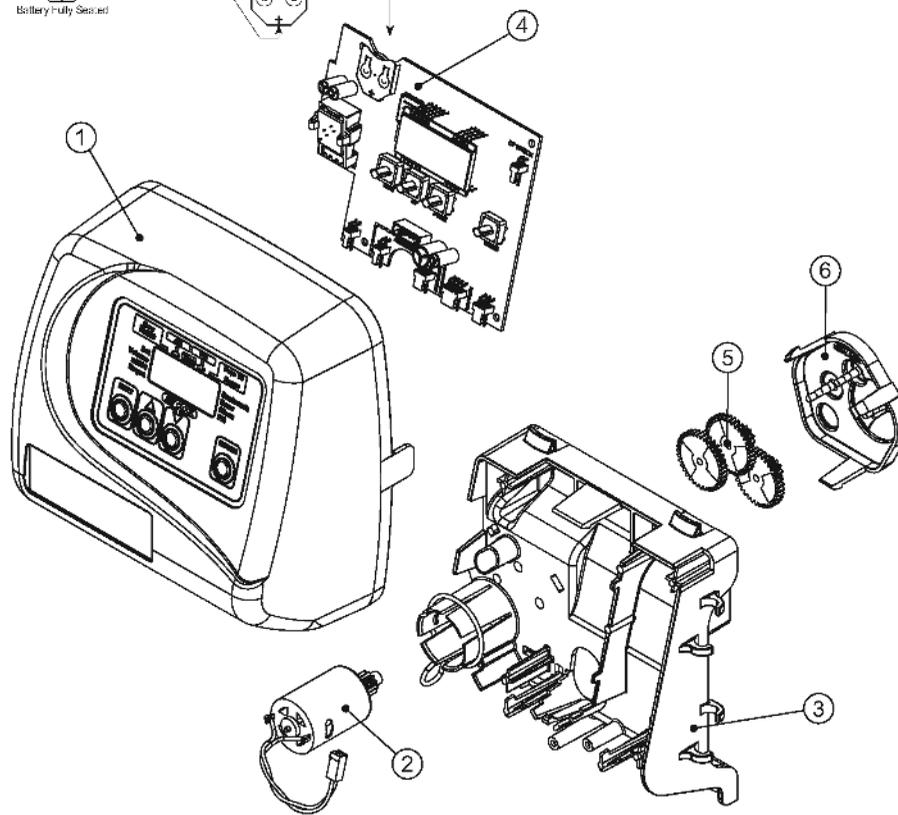
AC Adapter	U.S.	International
Supply Voltage	120 V AC	230V AC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 V AC	12 V AC
Output Current	500 mA	500 mA

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



Correct Battery Orientation

Battery replacement is 5 volt lithium coin cell type 2032.

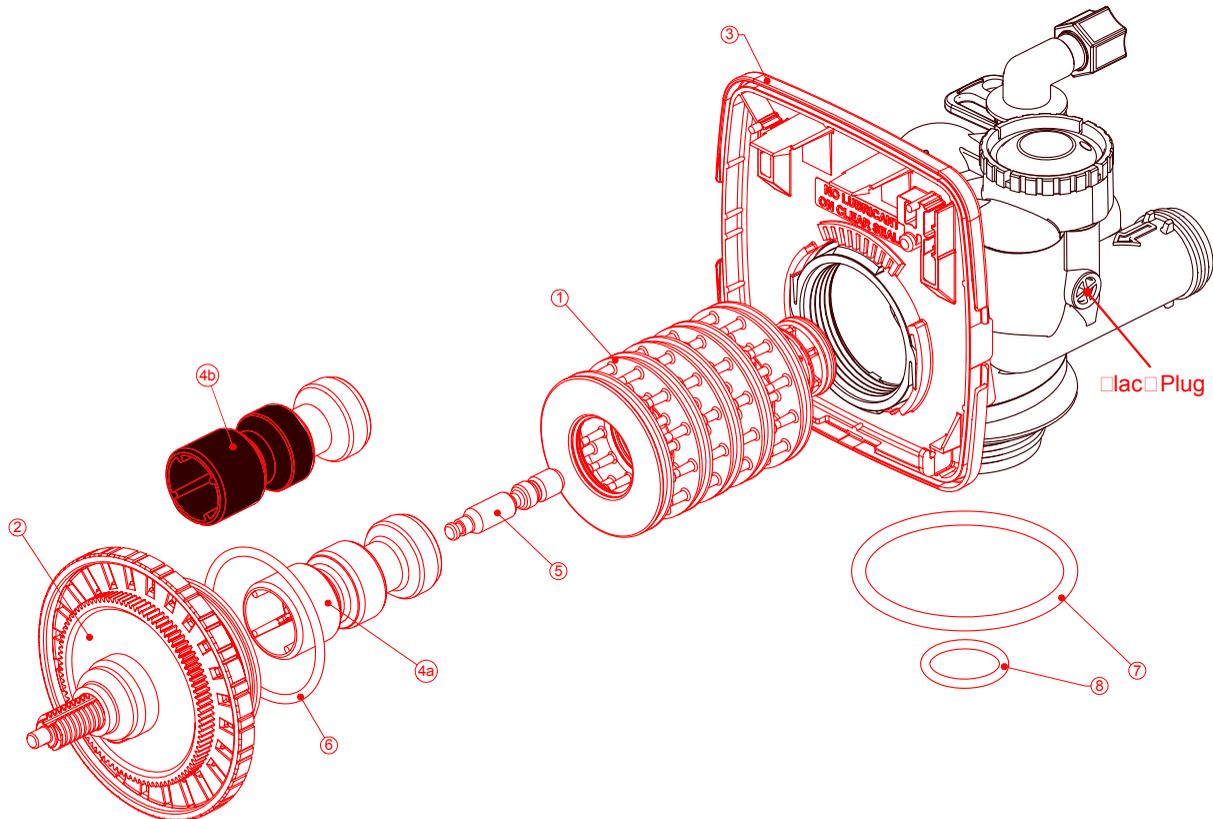


Parts Breakdown cont:

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

Drawing No.	Order No.	Description	Quantity
1	V3005	WS1 Spacer Stack Assembly	1
2	V3004	Drive Cap ASY	1
3	Back Plate	Refer to Programming and Cover Drawing Manual	1
4a	V3011*	WS1 Piston Downflow ASY	1
4b	V3011-01*	WS1 Piston Upflow ASY	
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
	V3001-02	WS1 Mixing Valve Body ASY	
	V3001UP	WS1 Body ASY Upflow	
	V3001-02UP	WS1 Mixing Valve Body Upflow ASY	

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



Parts Breakdown cont:

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

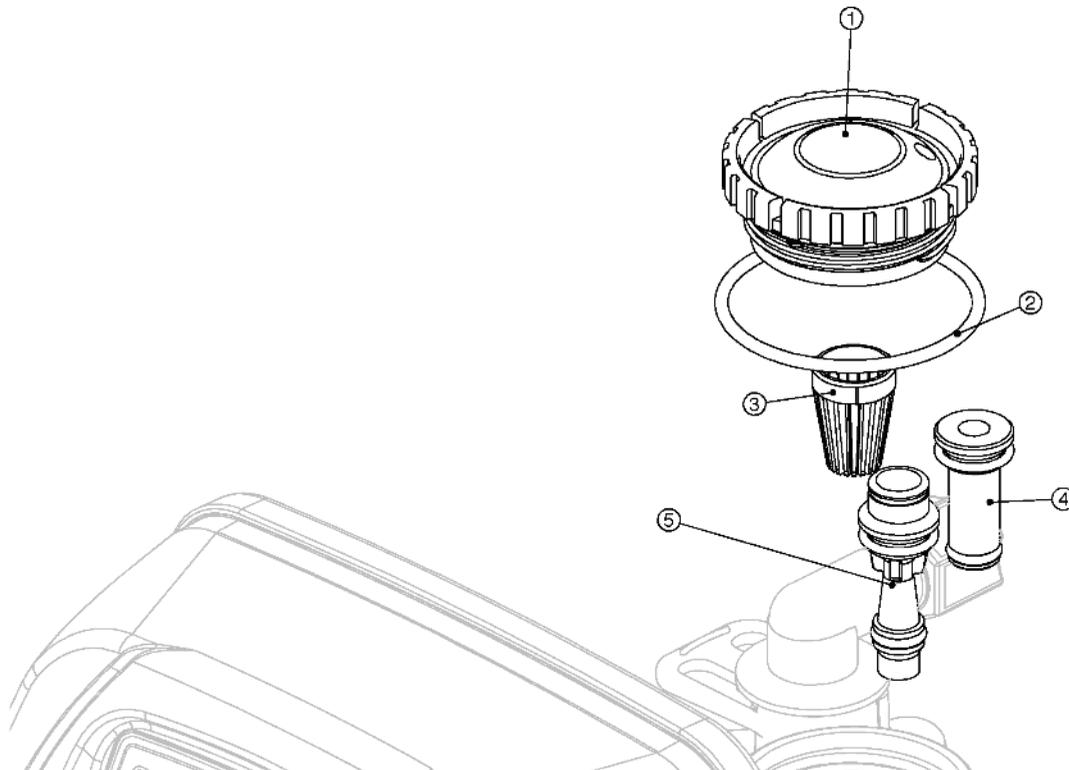
Drawing No.	Order No.	Description	Quantity
1	V3176	INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V3177-01	INJECTOR SCREEN CAGE	1
4	V3010-1Z	WS1 INJECTOR ASY Z PLUG	1
5	V3010-1A	WS1 INJECTOR ASY A BLACK	1
	V3010-1B	WS1 INJECTOR ASY B BROWN	
	V3010-1C	WS1 INJECTOR ASY C VIOLET	
	V3010-1D	WS1 INJECTOR ASY D RED	
	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.

Note: For upflow position, injector is located in the up hole and injector plug is in the other hole. WS1 upflow bodies are identified by having the DN marking removed.

Upflow option is not applicable to EE, EI, or TC control valves.

For a filter that only backwashes, injector plugs are located in both holes.

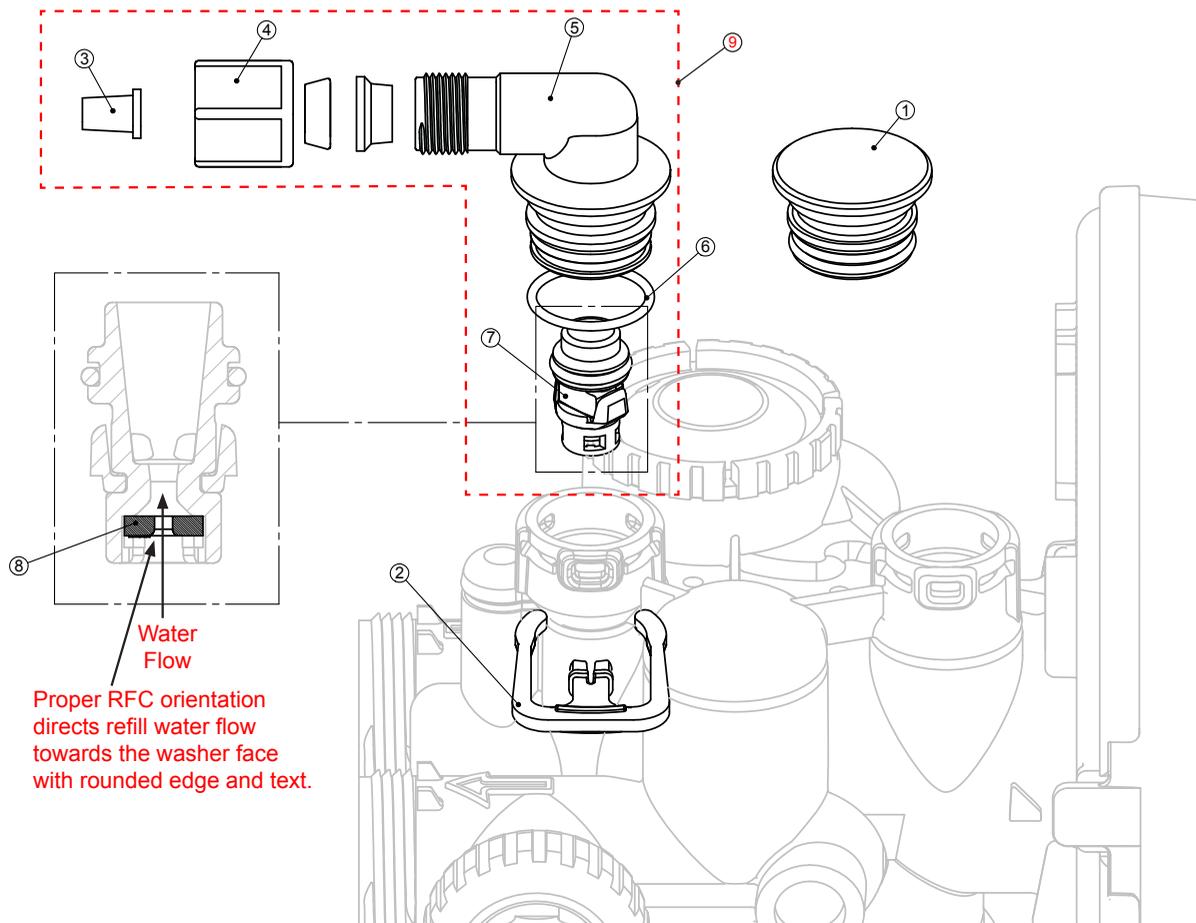


Parts Breakdown cont:

Refill Flow Control Assembly and Refill Port Plug

Drawing No.	Order No.	Description	Quantity
1	V3195-01	WS1 Refill Port Plug Assy	This part is required for backwash only systems
2	H4615	Elbow Locking Clip	1
3	JCP-P-6	Polytube insert 3/8"	1
4	JCPG-6PBLK	Nut 3/8"	1
5	H4613	Elbow Cap 3/8"	1
6	V3163	O-ring 019	1
7	V3165-01*	WS1 RFC Retainer Assy (0.5 gpm)	1
8	V3182	WS1 RFC	1
9	V3330-01	WS1 Brine Elbow Assy w/RFC 3/8"	1
Not Shown	V3552	WS1 Brine Elbow Assy w/RFC 1/2"	Option
Not Shown	H4650	Elbow 1/2" with nut and insert	Option

*Assembly includes V3182 WS1 (0.5 gpm) RFC.



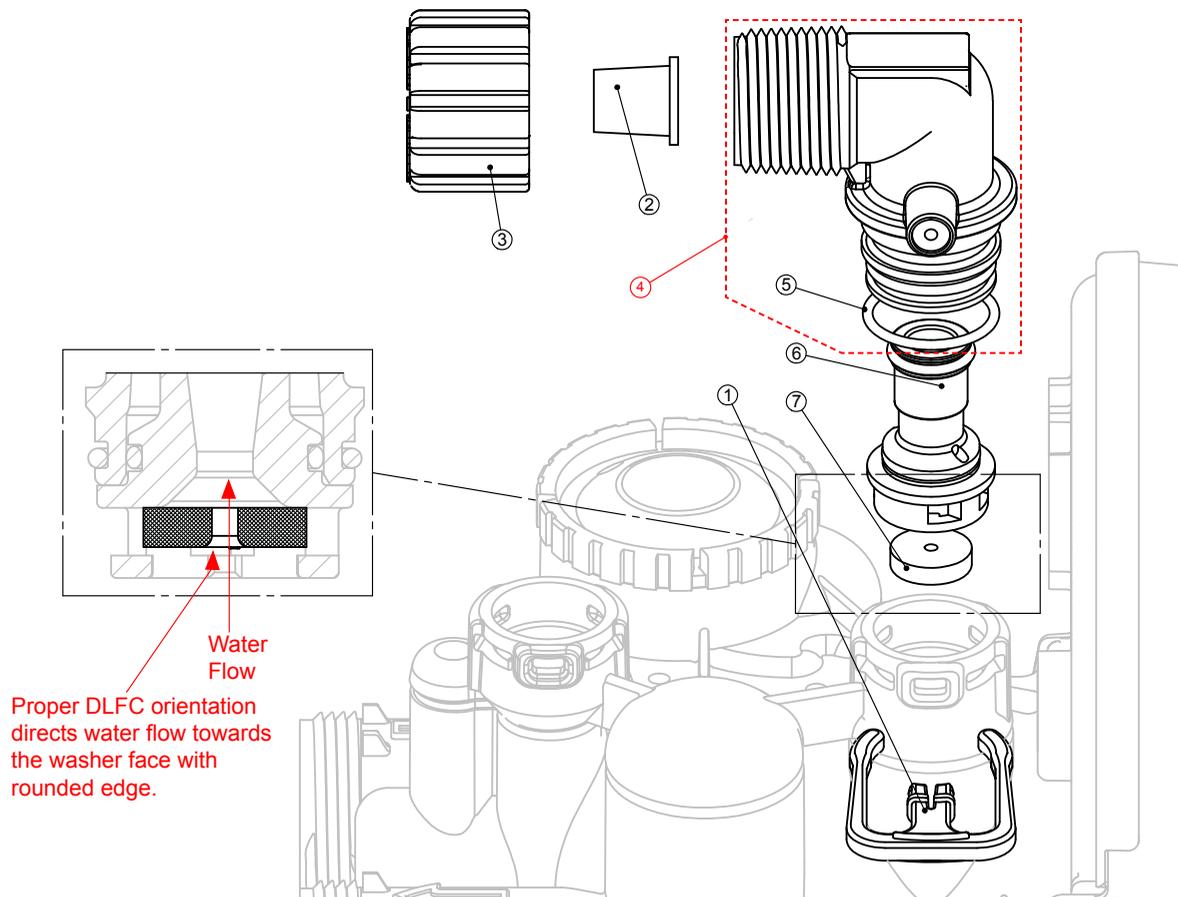
Parts Breakdown cont:

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
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		

*4 and 6 can be ordered as a complete assembly - V3331 WS1 Drain Elbow and Retainer Asy

Valves are shipped without drain line flow control (DLFC) - install DLFC before using. Valves are shipped without 3/4 nut for drain elbow (polytube installation only) and 5/8" polytube insert (polytube installation only).

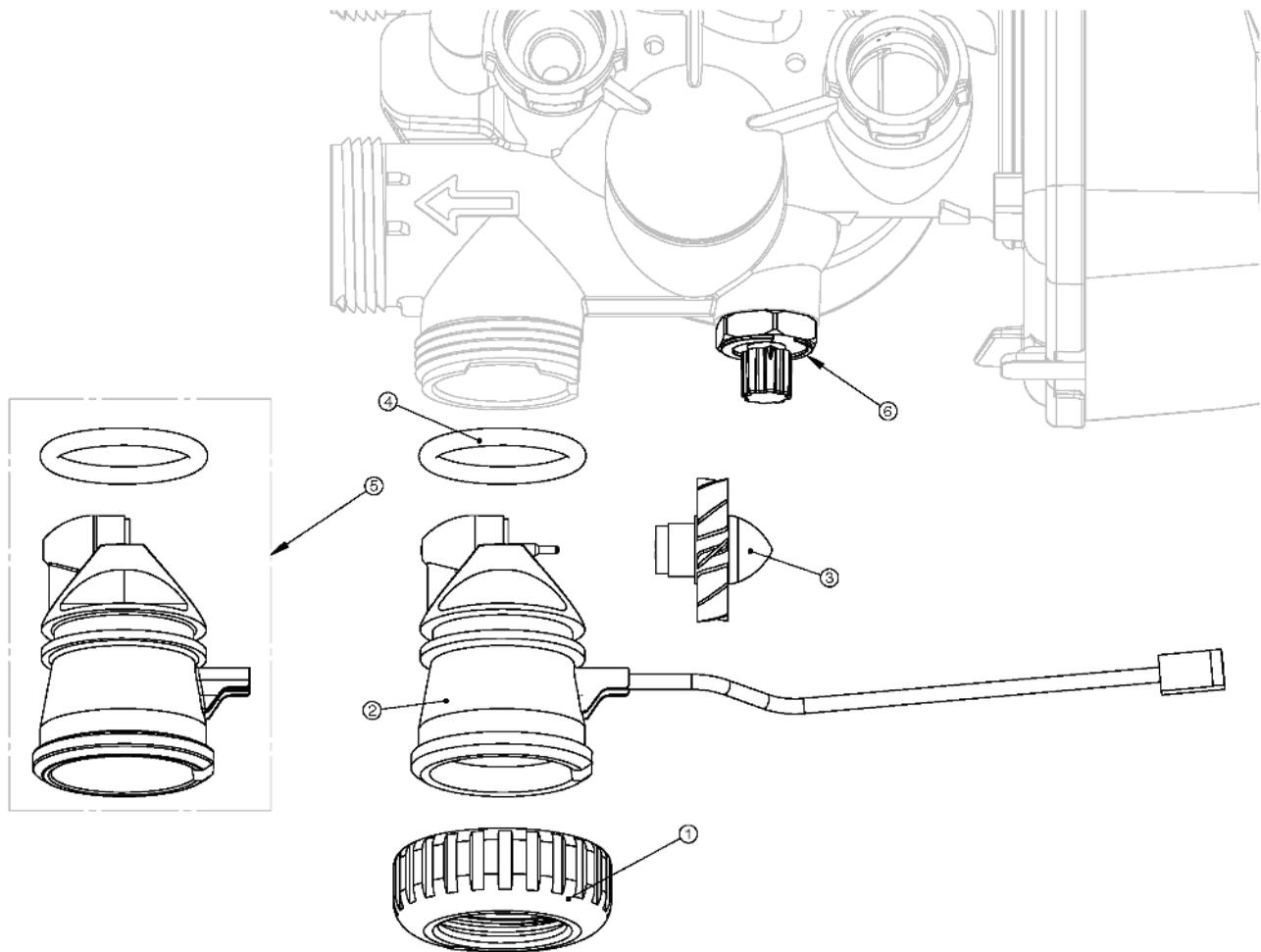


Parts Breakdown cont:

Water Meter, Meter Plug and Mixing Valve

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

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



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

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

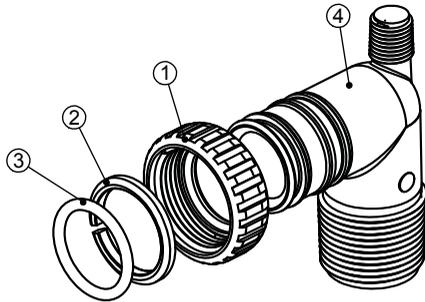
Parts Breakdown cont:

Installation Fitting Assemblies

Order No: V3007

Description: WS1 Fitting 1" PVC Male NPT Elbow Assembly

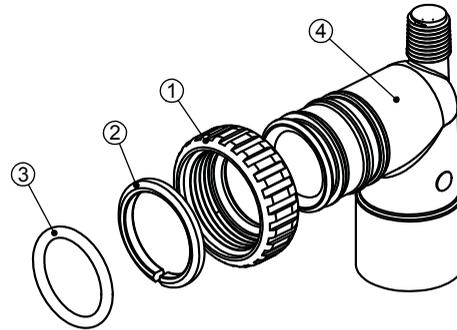
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	WS1 Fitting 1" PVC Male NPT Elbow	2



Order No: V3007-01

Description: WS1 Fitting 3/4" & 1" PVC Solvent 90° ASY

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	V3189	WS1 Fitting 3/4" & 1" PVC Solvent 90	2

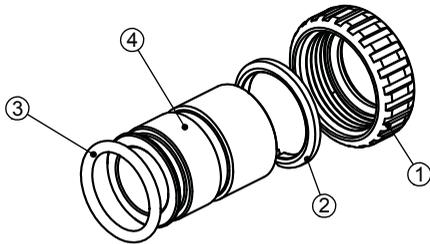


Order No: V3007-02

Description: WS1 Fitting 1" Brass Sweat Assembly

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	V3188	WS1 Fitting 1" Brass Sweat Assembly	2

Do not install in California.

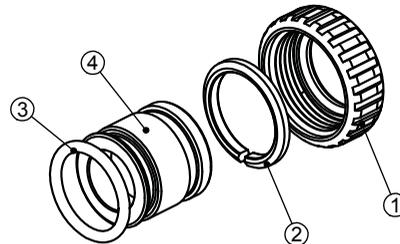


Order No: V3007-03

Description: WS1 Fitting 3/4" Brass Sweat Assembly

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	V3188-01	WS1 Fitting 3/4" Brass Sweat	2

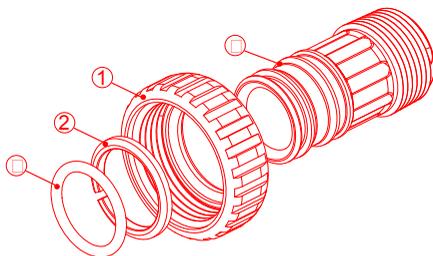
Do not install in California.



Order No: V3007-04

Description: WS1 Fitting 1" Plastic Male NPT Assembly

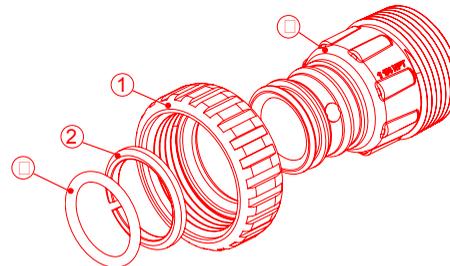
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3164	WS1 Fitting 1" Plastic Male NPT	2



Order No: V3007-05

Description: WS1 Fitting 1-1/4" Plastic Male NPT Assembly

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	V3317	WS1 Fitting 1-1/4" Plastic Male NPT	2

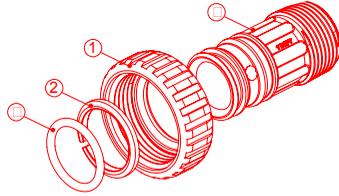


Parts Breakdown cont:

Installation Fitting Assemblies

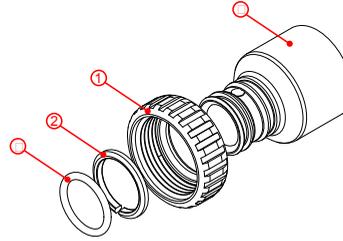
Order No. V3007-06
Description: WSI Fitting 1" Plastic Male BSPT Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3316	WSI Fitting 1" Plastic Male BSPT	2



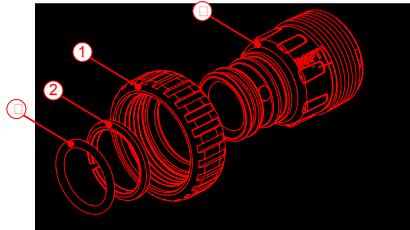
Order No. V3007-07
Description: WSI Fitting 1/4" & 1/2" PVC Solvent Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3352	WSI Fitting 1/4" & 1/2" PVC Solvent	2



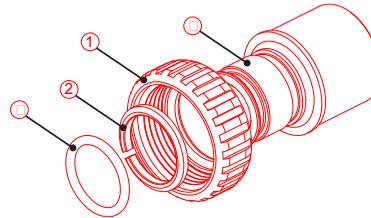
Order No. V3007-08
Description: WSI Fitting 1-1/4" Plastic Male BSPT Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3361	WSI Fitting 1-1/4" Plastic Male BSPT	2



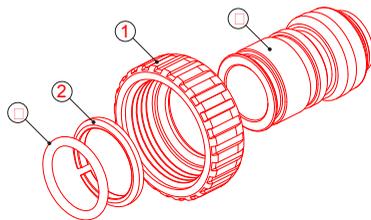
Order No. V3007-09
Description: WSI Fitting 1/4" & 1/2" Brass Sweat Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3375	WSI Fitting 1/4" & 1/2" Brass Sweat	2



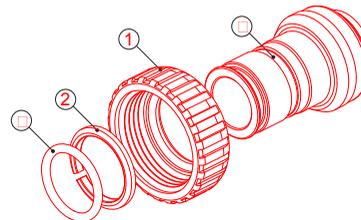
Order No. V3007-12
Description: WSI Fitting 3/4" Brass SharkBite Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3628	WSI Fig 3/4" Brass SharkBite	2



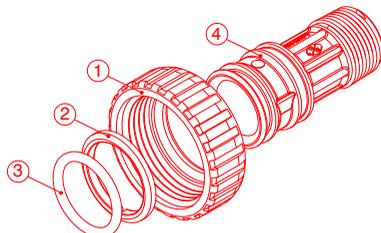
Order No. V3007-13
Description: WSI Fitting 1" Brass SharkBite Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3629	WSI Fig 1" Brass SharkBite	2



Order No. V3007-14
Description: WSI Fitting 3/4" Plastic Male BSPT Assembly

Drawing No.	Order No.	Description	Quantity
1	V3151	WSI Nut 1" Quick Connect	2
2	V3150	WSI Split Ring	2
3	V3105	O-Ring 215	2
4	V3594	WSI Fitting 3/4" Plastic Male BSPT	2



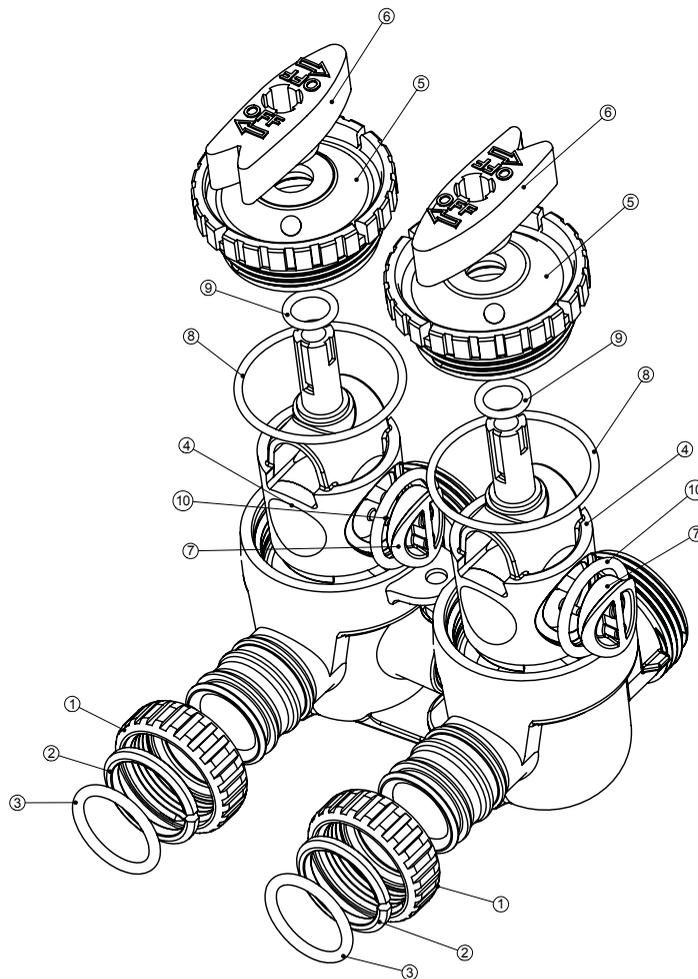
Parts Breakdown cont:

Bypass Valve

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

(Not Shown) Order No. V3191-01, Description: WS1 Bypass Vertical Adapter Assembly

Order No.	Description	Quantity
V3151	WS1 Nut 1" Quick Connect	2
V3150	WS1 Split Ring	2
V3105	O-Ring 215	2
V3191	WS1 Bypass Vertical Adapter	2



Specifications

SPECIFICATIONS:

Meter Model#	Service Flow GPM	Brine Tank Lbs.	Min. Salt Per	Max. Salt Per	Pipe Size	Tank Size	Min. Grains Capacity	Max. Grains Capacity	Weight Lbs.
TTV1EEM-3T	8	275	8	15	1"	10" x 40"	20,000	32,000	108
TTV1EEM-5T	9	275	9	22	1"	10" x 54"	30,000	48,000	140

OPTIONS:

H1071-02 SALT GRID

Floor Dimensions



NOTES:

Overall Depth of Unit: 24"

All Dimensions are of the Unit only.

Size will vary depending on plumbing used for installation of the system.

Please check ALL Local building codes to insure installation meets these standards.

Troubleshooting

Troubleshooting

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

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

Troubleshooting cont:

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

Troubleshooting cont:

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

Troubleshooting cont:

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

Warranty



MANUFACTURER'S LIMITED WARRANTY

In accordance with the Manufacturer's warranty, and subject to the conditions hereinafter set forth, ATS will repair or replace to the original user or consumer, equipment, parts or components found to be defective in manufacturing or workmanship.

WARRANTY PERIODS:

		Residential	Commercial Industrial	Hot Water
ATS Stainless Steel Tanks*♦	10 yrs.	5 yrs.	20 mos.	
Structural Polyglass & FRP Mineral Tanks (6"-13" dia.)*	10 yrs.	5 yrs.	5 yrs.	1 yr.
Structural Polyglass & FRP Mineral Tanks (14"+ dia.)*	5 yrs.	5 yrs.	5 yrs.	
			1 yr.	
Polyethylene Brine Tanks	5 yrs.	5 yrs.		

* Vessels must be operated within the prescribed pressure and temperature ratings stated on tank labels.

Stainless Steel Tanks Warranty is void if the serial # is removed, tank is exposed to electrolysis, or is buried.

WARRANTIES NOT APPLICABLE: To defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions; failure to use ATS authorized replacement parts, to failures resulting from shipment or handling, abuse, accident, negligence, freezing, fire or heat, direct exposure to weather or sunlight, water temperatures and pressures exceeding specifications, flooding or other acts of God not considered normal operating condition; to normal maintenance services and the parts used in connection with such service; to units which are not installed in accordance with applicable local codes, ordinances and good trade practices; if the unit is moved from its original installation location; or if unit is used for purposes other than for what it was designed and manufactured.

LABOR COSTS, LIABILITY: Aqua Treatment Service, Inc., shall **IN NO EVENT** be responsible or liable for the cost of field labor or other charges incurred by any customer in installing, removing and/or reaffixing any ATS, part or component thereof, or be liable for any injury, loss or damage, direct or indirect, special or consequential, arising out of the use of, misuse, or the inability to use such product. Before use, Distributor, Dealer or User shall determine the suitability of the product for his/her intended purposes, and shall assume all risk and liability in connection therewith.

RETURNS: A **RETURN MERCHANDISE AUTHORIZATION NUMBER (RMA #)** is required on **ALL RETURNS**. Contact ATS to obtain this number. The RMA # **MUST** be clearly written on the outside of the package. Address shipments to the Return Department ATS, 194 Hempt Road, Mechanicsburg, PA, 17050, and freight prepaid. All returns should be accompanied with a written description of mode or reason of failure.

The customer must order ATS replacement parts if required as a standard purchase until the defective part is received and evaluated by the factory. ATS will inspect, test, and determine the cause of defective components or parts. ATS at its sole discretion will make necessary repairs to or replace components. ATS will determine the extent of the warranty coverage and the proper warranty credit to be applied. The return freight will be credited to the customer for warranty repairs or replacements. For your warranty protection, the warranty card must be completed and returned to ATS within 10 days of installation. In the absence of other suitable proof of installation date, the effective date of this warranty will be based on the date of manufacture plus 30 days. This warranty gives you specific legal rights and you may also have other rights, which vary, from state to state.

WARRANTY REGISTRATION CARD

NAME: _____

ADDRESS: _____

CITY & STATE: _____ ZIP _____

PURCHASED FROM: _____

ADDRESS: _____

CITY & STATE: _____ ZIP _____

INSTALLATION DATE: _____

MODEL NO: _____ SERIAL NO: _____