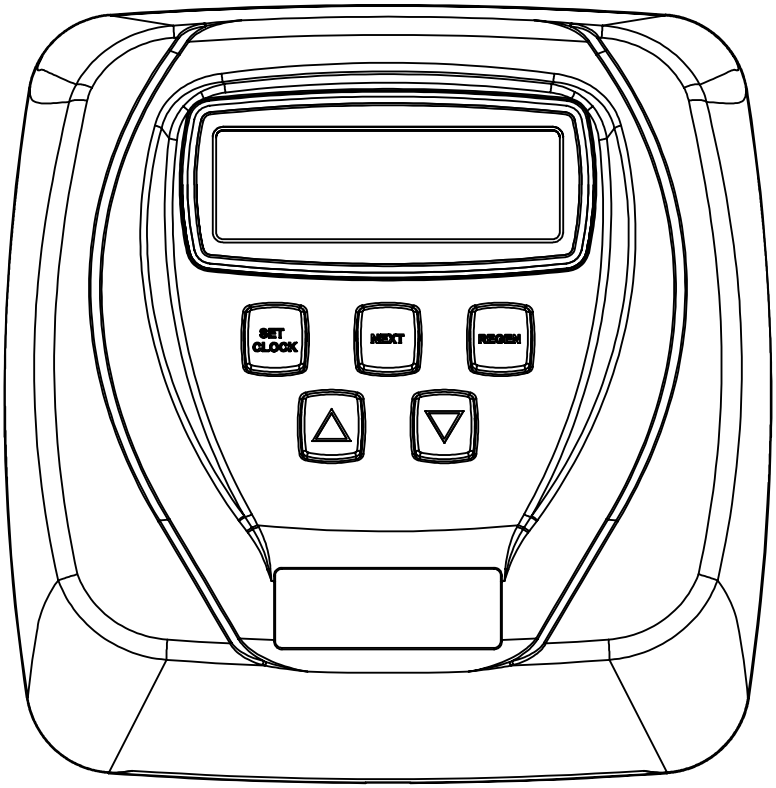
# Water Specialist CI
# Control Valve
# Programming Manual



# Table of Contents

## Front Cover and Drive Assembly

| Drawing No. | Order No. | Description | Quantity |
|---|---|---|---|
| 1 | V3175CI-01 | WS1CI FRONT COVER ASSEMBLY | 1 |
| 2 | V3107-01 | WS1 MOTOR | 1 |
| 3 | V3002 | WS1 DRIVE BRACKET ASY W/ MOTOR | 1 |
| 4 | V3108CI-07BOARD | WS1THRU2 CI PCB W/CARD EDGE RPLC | 1 |
| 5 | V3110 | WS1 DRIVE REDUCING GEAR 12X36 | 3 |
| 6 | V3109 | WS1 DRIVE GEAR COVER | 1 |
| Not Shown | V3186-06 | WS1 POWER SUPPLY US 15VDC HOCP | 1 |
| | V3186EU-06 | WS1 POWER SUPPLY EU 15VDC HOCP | |
| | V3186UK-06 | WS1 POWER SUPPLY UK 15VDC HOCP | |
| | V3186-01 | WS1 POWER CORD ONLY | |
| Not Shown | V3178 | WS1 DRIVE BACKPLATE | 1 |

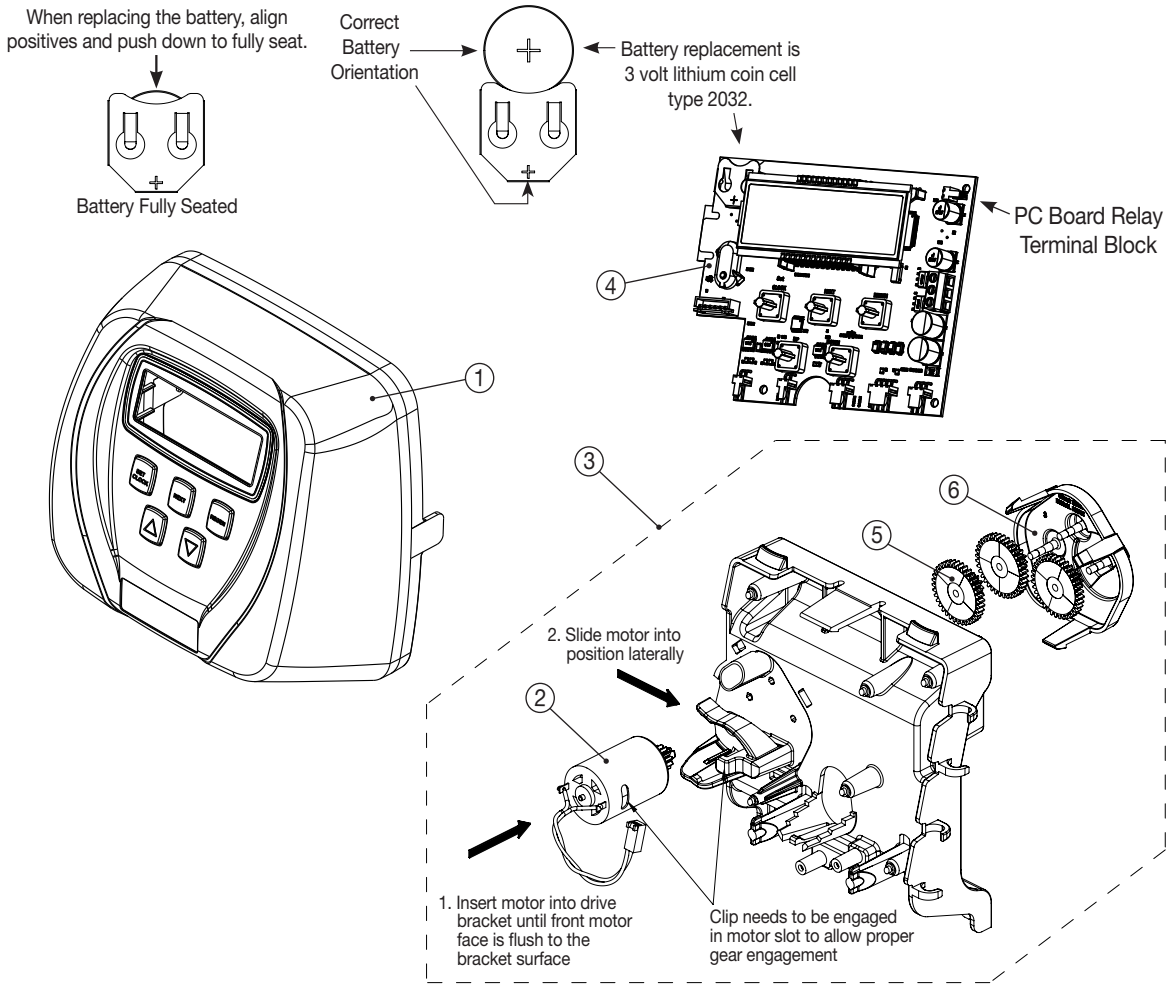
Relay Driver Output Type: Dual Solid-State 12 VDC wet contacts - N.O.
Relay Driver Output Capacity: 12 VDC @100 mA per relay output (total current through both outputs not to exceed 200 mA).

*Note:* Check for proper mounting dimensions on valve backplate prior to mounting an external relay under control cover.

We recommend that each externally wired relay contain a suppressor diode, which is normally placed across the relay coil in order to protect the control against back EMF at relay coil deactivation.

| Power Supply | U.S. | International |
|---|---|---|
| Supply Voltage | 100 – 120 VAC | 100 – 240 VAC |
| Supply Frequency | 50/60 Hz | 50/60 Hz |
| Output Voltage | 15 VDC | 15 VDC |
| Output Current | 500 mA | 500 mA |

| Wiring For Correct On/Off Operation | |
|---|---|
| PC Board Relay Terminal Block | Relay |
| RELAY1 | Coil - |
| COM | Coil + |
| RELAY2 | Coil - |



## 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 diagnostics, valve history, and settings modifications (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 5 minutes, the display returns to a normal user display. Any changes made prior to the 5 minute time-out are incorporated.

To quickly exit OEM Softener System Setup, OEM Filter System 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 and programming may be reset to defaults when the valve is installed in a new location. To reset to defaults, press NEXT and ▼ simultaneously to go to the Treatment Type display. Press ▼ and ▲ simultaneously to reset diagnostic and programming values to defaults. Screen will return to User Display.**

Sometimes, it is desirable to have the valve initiate and complete 2 regenerations within 24 hours and then return to the preset regeneration procedure. It is possible to do a double regeneration if the Regeneration Time Option is set to *NORMAL* or *NORMAL + on 0*. To do a double regeneration:

1. Press REGEN once. *REGEN TODAY* will flash on the display.
2. Press and hold REGEN for 3 seconds until the valve regeneration initiates.

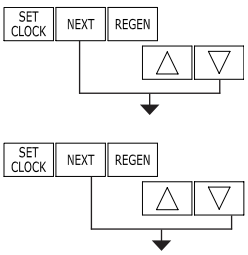
Once the valve has completed the immediate regeneration, the valve will regenerate one more time at the preset regeneration time.

For Valve Types 1.0T and 1.5T, press and hold SET CLOCK and ▲ for about 3 seconds to initiate an exchange of 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.

Prior to selecting the upflow regeneration cycle, verify that the correct body, main piston, regenerant piston, and stack are being used and that the injector plug(s) are in the correct location. Refer to the Service Manual for drawings and part numbers.

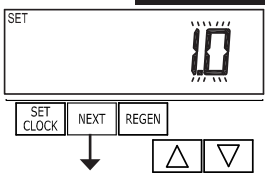
## OEM Cycle Sequence

**STEP 1CS**



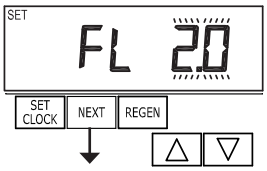

**Step 1CS –** Press NEXT and ▼ simultaneously for 3 seconds and release. Then, press NEXT and ▼ simultaneously for 3 seconds again and release. If screen in Step 2CS does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and SET CLOCK in sequence, and try again.

**STEP 2CS**

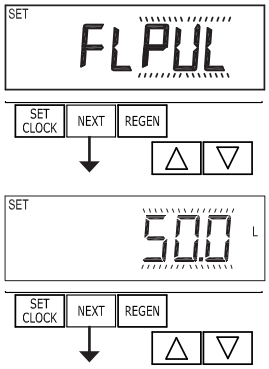



**Step 2CS** – Valve Type: Use ▼ or ▲ to select *1.0* for WS1 valve, *1.25* for WS1.25 valve, *1.5* for WS1.5 valve, *2.0* for WS2 valve, *1.0T* for 1.0" twin valve, or *1.5T* for 1.5" twin valve.
Press NEXT to go to Step 3CS. Press REGEN to return to previous step.

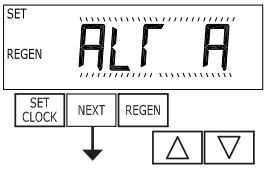
**STEP 3CS**




**Step 3CS –** Meter Size: Use ▼ or ▲ to select which size flow meter is to be used with the valve: 1.0r, 1.5, 2.0, or 3.0. Variable meter pulses of 0.1 – 150 PPG can also be selected.
This display will only appear if Step 2CS is set to *1.5* or *2.0*.
Press NEXT to go to Step 4CS. Press REGEN to return to the previous step.




**STEP 4CS**




**Step 4CS –** ALT MAV Output: Use ▼ or ▲ to select one of the following options:
- *nHbP*: The control valve operates with a no hard water bypass.
- *SYS:* The control valve operates with a Clack system controller.
- *SEPS*: The control valve has a separate source during the regeneration cycle.
- *ALT A* or *ALT b*: The control valve acts as an alternator.
- *OFF*: None of these features are used.

This display will not appear if Step 2CS is set to *1.0T* or *1.5T*.

Only use Clack no hard water bypass valves or Clack motorized alternating valves (MAVs) 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.

**<u>Configuring the Control Valve for No Hard Water Bypass Operation:</u>**


Select *nHbP* for control operation. For no hard water bypass operation, the 3-wire communication connector is not used.
Selection requires that a connection to a MAV or Clack no hard water bypass valve is made to the 2-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 B port connected to the valve outlet. When set to *nHbP*, the MAV will be driven closed before the first regeneration cycle that is not Fill, 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 remain in its current state until the error is corrected and reset.

**<u>Configuring the Control Valve to operate with Clack System Controller:</u>**


Select *SYS* to link the control valve to the Clack system controller. For communication between the control valve and the system controller, a 3-wire communication cable is required.

## Configuring the Control Valve for Separate Source Operation:


Select *SEPS* for control operation. For separate source operation, the 3-wire communication connector is not used.

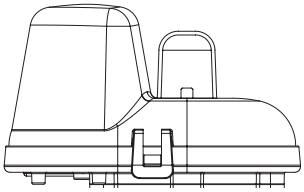
Selection requires that a connection to a Clack motorized alternating valve (MAV) is made to the 2-pin connector labeled *MAV* located on the printed circuit board. The C port of the MAV must be connected to the valve inlet, the A port connected to the separate source used during regeneration, and the B port 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.

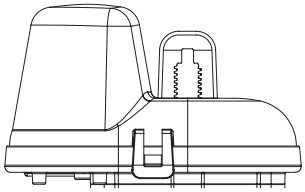
*Note:* If the control valve enters into an error state during regeneration, the MAV will remain in its current state until the error is corrected and reset.

## Configuring the Control Valve to act as an Alternator:

| Prior to starting the programming steps, connect the interconnect cable to each control valve board's 3-pin connector labeled *COMM CABLE*. Also connect the meter cord to the 3-pin connector labeled *METER* on either control valve. | | | |
|---|---|---|---|
| | | Softener Valve Programming Steps | |
| OEM Cycle Sequence | Step 4CS | Set to *ALT A*. Connect ALT A valve to the MAV's A port and connect the MAV's 2-pin wire connector to the 2-pin connector labeled *DRIVE* on ALT A valve. | Set to *ALT b*. Connect ALT b valve to the MAV's B port. No connections are required between the ALT b valve and the MAV. |
| Softener System Setup | Step 4S | Set Ionic Capacity. | Set Ionic Capacity. |
| Softener System Setup | Step 5S | Set to *AUTO*. | Set to *AUTO*. |
| Softener System Setup | Step 6S | Set Regeneration Time Option to *on 0*. | Set Regeneration Time Option to *on 0*. |
| Installer Display Setting | Step 4I | Set Day Override to *oFF*. | Set Day Override to *oFF*. |
| If set up for a filter, set Volume Capacity in Step 4F; set Regeneration Time Option in Step 5F to *on 0*; and set Day Override in Step 4I to *oFF*. | | | |



**Retracted**
Valve A in service position =
MAV piston rod retracted

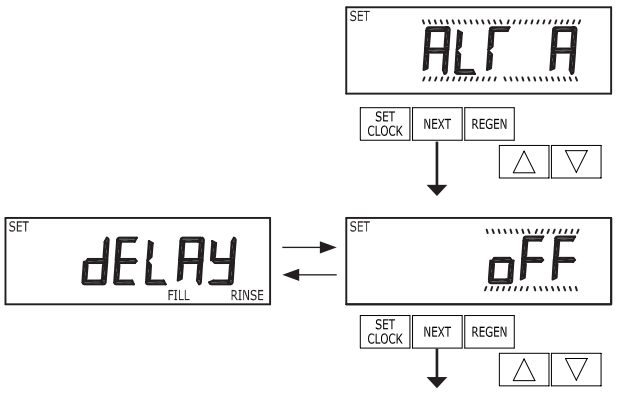


**Extended**
Valve B in service position =
MAV piston rod extended

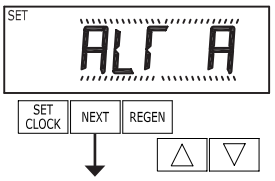
**Clack Twin Alternator Operations:**

- 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 standby 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 standby mode and allowed to have a delayed regeneration at the pre-set time.

For Clack alternator systems using WS1, WS1.25, and WS1.5 valves, there will be an option to delay the last 2 cycles of regeneration (Rinse and Fill). This feature splits the regeneration into 2 portions. The first portion of the regeneration will start immediately and all programmed cycles before Rinse and Fill 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 online unit is depleted to 10% of its programmed capacity, the control valve will be triggered to finish the second portion of the regeneration. Once Rinse and Fill are complete, the valve will re-enter standby mode until requested to come online for service.

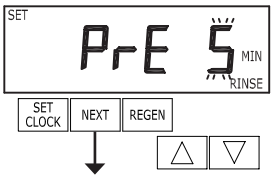


For Clack alternator systems using the WS2 valve, press NEXT after selecting *ALT A* or *ALT b* to set the length of pre-service rinse time for the standby tank just prior to returning to service. If Step 2CS is set to *1.0T* or *1.5T*, this same display appears and is set in a similar manner.

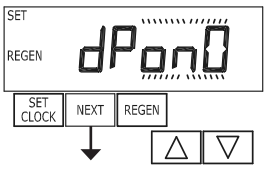



*Note:* If the control valve is in an error state during regeneration, the MAV will close the B port and keep open the A port until the error is corrected and reset.

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




**STEP 5CS**



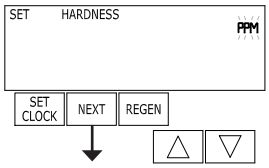

**Step 5CS –** Auxiliary Input: Allows for the use of an outside signal to control the initiation of a regeneration. Selection only needed if a connection is made to the 2-pin connector labeled *DP SWITCH* located on the printed circuit board. Use ▼ or ▲ to select one of the following options:

- *OFF*: Feature not used.
- *dPon0*: Regeneration will occur immediately if the dP switch is closed for 2 uninterrupted minutes. In a twin alternating system, the MAV will transition first to switch units so that the signaled unit can start regeneration. After the MAV is fully transitioned, the regeneration begins immediately. The Delayed Rinse and Fill feature will not be available for WS1 – WS1.5 control valves programmed for twin alternating if this option is selected.
- *dPdEL*: Regeneration will occur at the scheduled delayed regeneration time if the dP switch is closed for 2 uninterrupted minutes. In a twin alternating system, once the dP switch is triggered, the PC board will display *REGEN TODAY* and switch tanks immediately. At the delayed regeneration time, the triggered unit will regenerate. The Delayed Rinse and Fill feature will not be available for WS1 – WS1.5 control valves programmed for twin alternating if this option is selected.
- *HoLd*: Regeneration will be prevented from occurring while the dP switch is closed. 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. The Delayed Rinse and Fill feature can be set in conjunction with this option if desired.

*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.

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

**STEP 6CS**



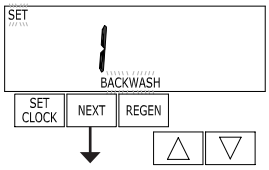

**Step 6CS –** Water Hardness Units: Use ▼ or ▲ to select the unit to calculate volumetric capacity:

- *ppm*: Parts per million
- *FH*: French degrees
- *dH*: German degrees

*Note:* If control is going to be used in a filter application, none of these settings can be used.

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

**STEP 7CS**

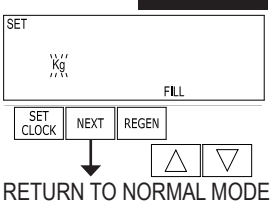



**Step 7CS –** Regeneration Cycle Sequence: Use ▼ or ▲ to select the first cycle, then press NEXT to select the next cycle. The available cycle options include *BACKWASH*, *SOFTENING* or *FILTERING*, *FILL*, *UP BRINE* or *DN BRINE*, *RINSE*, and *END*. Up to 9 cycles may be selected in any order. ***END* must be used as the last cycle option.**

*Note:* Prior to selecting the upflow regeneration cycle, verify that the correct body, main piston, regenerant piston, and stack are being used and that the injector plug(s) are in the correct location. Refer to the Service Manual for drawings and part numbers.

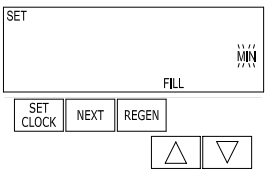
After selecting *END*, press NEXT to go to Step 8CS. Press REGEN to return to previous step.

**STEP 8CS**



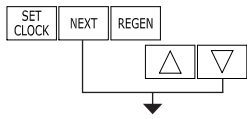

**Step 8CS –** Fill Units: If set as a softener, if Step 2CS is set to *1.5* or *1.5T*, and Fill is part of the Regeneration Cycle Sequence, fill units of *MIN* or *kg* can be selected.

Press NEXT to exit OEM Cycle Sequence. Press REGEN to return to previous step.



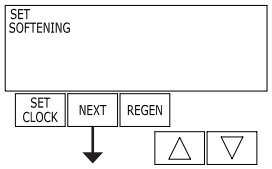
## OEM Softener System Setup

**STEP 1S**



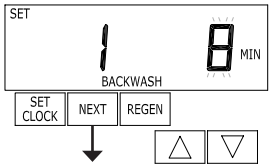

**Step 1S –** Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2S does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and SET CLOCK in sequence, and try again.

**STEP 2S**




**Step 2S –** Treatment Type: Use ▼ or ▲ to select *SOFTENING*.
Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

**STEP 3S**

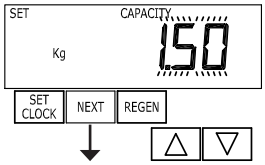



**Step 3S –** Cycle Durations: Use ▼ or ▲ to set the value for the first cycle selected in Step 7CS. Value ranges and units will vary depending on the cycle, see Table 1 for more detail. Press NEXT to set the value for the next cycle. Repeat for all cycles. The End cycle does not have a value and will not appear. Once a value is set for all cycles, press NEXT to go to Step 4S. Press REGEN to return to previous step.

**Table 1**
**Cycle Options Value Ranges (Softening)**

| Cycle Options | Units | Lower/Upper Limit |
|---|---|---|
| Backwash | Minutes | 1 – 120 |
| Rinse (fast) | Minutes | 1 – 120 |
| dn Brine (combination of brining and slow rinse) | Minutes | 1 – 180 |
| up Brine (combination of brining and slow rinse) | Minutes | 1 – 180 |
| Fill for 1", 1.25", and 1.5" | kg | 0.05 – 90 |
| Fill for WS2 valves or WS1.5 set to *MIN* | Minutes | 0.1 – 99 |
| Service | Minutes | 1 – 480 |

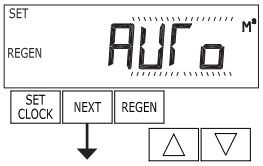
**STEP 4S**




**Step 4S –** Ionic Capacity: Use ▼ or ▲ to set the ionic capacity. The ionic capacity is based on the volume of resin and kg of salt fill previously selected. The capacity and hardness levels entered are used to automatically calculate reserve capacity when Volume Capacity is set to *AUTO*.
Press NEXT to go to Step 5S. Press REGEN to return to previous step.

| Setting | Units |
|---|---|
| ppm | kg of $CaCO_3$ |
| dH or FH | $m^3$ |

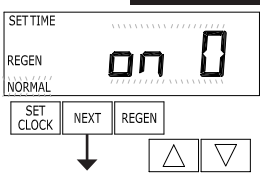
**STEP 5S**




**Step 5S –** Volume Capacity: Use ▼ or ▲ to select one of the following options:
- *AUTO*: Capacity will be automatically calculated and reserve capacity will be automatically estimated.
- *oFF*: Regeneration will be based solely on Day Override set in Step 4I.
- A number: Regeneration initiation will be based on the value specified.

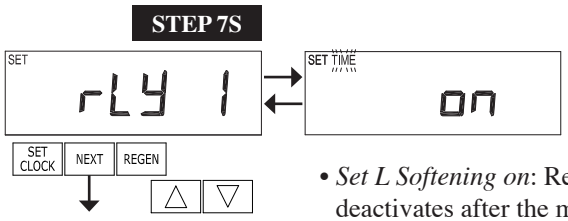
See Setting Options Table for more detail.
Press NEXT to go to Step 6S. Press REGEN to return to previous step.

**STEP 6S**




**Step 6S –** Regeneration Time Option: Use ▼ or ▲ to select one of the following options:
- *NORMAL*: Regeneration will occur at the preset time.
- *on 0*: Regeneration will occur immediately when the volume capacity reaches 0 (zero).
- *NORMAL + on 0*: 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). This option will not be available if Step 4CS is set to *ALT A* or *ALT b* or Step 2CS is set to *1.0T* or *1.5T*.

This display will not appear if Step 5S is set to *oFF* or Step 4CS is set to *SYS*.
See Setting Options Table for more detail.
Press NEXT to go to Step 7S. Press REGEN to return to previous step.




**Step 7S –** Relay 1 Output: Use ▼ or ▲ to select one of the following options:

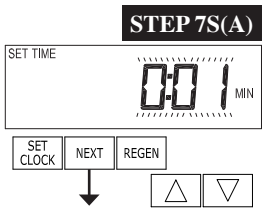
• *Set Time on*: Relay activates a set time after the start of regeneration and deactivates after a set period of time. The start of regeneration is defined as the first Backwash cycle or Dn Brine/Up Brine cycle, whichever comes first.

• *Set L Softening on*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.

• *Set L Softening Regen on*: Relay activates after a set volume has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.

• *Set Off*: Feature not used. Step 7S(A) and Step 7S(B) will not appear if this option is selected.

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

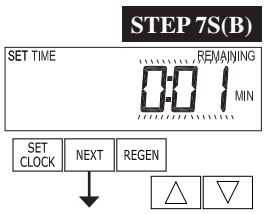



**Step 7S(A) –** Relay 1 Setpoint Actuation: Use ▼ or ▲ to select one of the following options:

• *Relay Actuation Time*: Set the length of time after the start of regeneration prior to relay activation (Range: 1 second – 200 minutes). The start of regeneration is defined as the first Backwash cycle or Dn Brine cycle, whichever comes first.

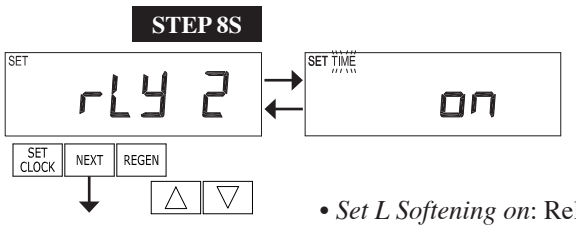
• *Relay Actuation Liters*: Set the number of liters that will be treated prior to relay activation (Range: 1 – 200).

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




**Step 7S(B) –** Relay 1 Duration: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation. If Step 7S is set to *Set Time on*, value range is 1 second – 200 minutes. If Step 7S is set to *Set L Softening on* or *Set L Softening Regen on*, value range is 1 second – 20 minutes.

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




**Step 8S –** Relay 2 Output: Use ▼ or ▲ to select one of the following options:

• *Set Time on*: Relay activates a set time after the start of regeneration and deactivates after a set period of time. The start of regeneration is defined as the first Backwash cycle or Dn Brine/Up Brine cycle, whichever comes first.

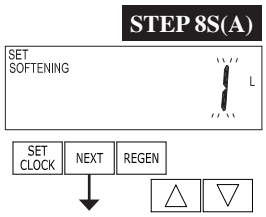
• *Set L Softening on*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.

• *Set L Softening Regen on*: Relay activates after a set volume has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.

• *Error*: Relay activates when the control enters an error state and immediately deactivates when the control exits the error state. Step 8S(A) and Step 8S(B) will not appear if this option is selected.

• *Set Off*: Feature not used. Step 8S(A) and Step 8S(B) will not appear if this option is selected.

Press NEXT to go to Step 8S(A). Press REGEN to return to previous step.

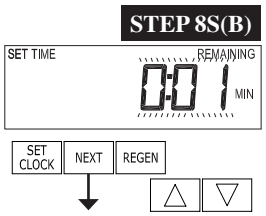



**Step 8S(A) –** Relay 2 Setpoint Actuation: Use ▼ or ▲ to select one of the following options:

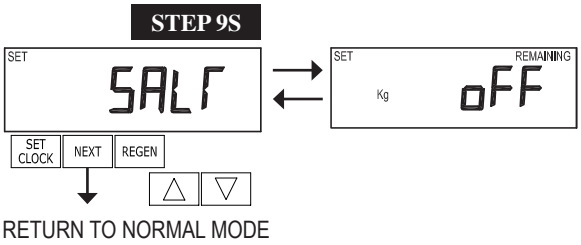
• *Relay Actuation Time*: Set the length of time after the start of regeneration prior to relay activation (Range: 1 second – 200 minutes). The start of regeneration is defined as the first Backwash cycle or Dn Brine cycle, whichever comes first.

• *Relay Actuation Liters*: Set the number of liters that will be treated prior to relay activation (Range: 1 – 200).

Press NEXT to go to Step 8S(B). Press REGEN to return to previous step.




**Step 8S(B) –** Relay 2 Duration: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation. If Step 8S is set to *Set Time on*, value range is 1 second – 200 minutes. If Step 8S is set to *Set L Softening on* or *Set L Softening Regen on*, value range is 1 second – 20 minutes. Press NEXT to go to Step 9S. Press REGEN to return to previous step.




**Step 9S –** Salt Alarm: Use ▼ or ▲ to select one of the following options:

- *oFF*: No low salt level warning will appear for the user.
- A number: *FILL SALT* will flash on the display when the calculated remaining kg of salt falls below that level (Range: 5 – 400 kg).

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

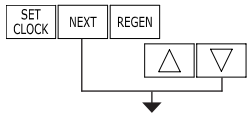
## Setting Options Table[1]

| System Type | Regeneration Option | Regeneration Type | Day Override | |
|---|---|---|---|---|
| Softening | Auto | Normal | 1 – 28 days | Regeneration occurs at the next regeneration time when volume capacity falls below the reserve capacity or the specified number of days is reached, whichever comes first. |
| Softening | Auto | Normal | OFF | Regeneration occurs at the next regeneration time when volume capacity falls below the reserve capacity. |
| Softening or Filtering | 0.02 – 5700.0 $m^3$ | Normal | 1 – 28 days | Regeneration occurs at the next regeneration time when volume capacity reaches 0 or the specified number of days is reached, whichever comes first. |
| Softening or Filtering | 0.02 – 5700.0 $m^3$ | Normal | OFF | Regeneration occurs at the next regeneration time when volume capacity reaches 0. |
| Softening or Filtering | OFF | Normal | 1 – 28 days | Time Clock operation. Regeneration occurs at the next regeneration time when the specified number of days is reached. |
| Softening | Auto or 0.02 – 5700.0 $m^3$ | on 0 | 1 – 28 days | Regeneration occurs immediately when volume capacity reaches 0 or the specified number of days is reached, whichever comes first. |
| Softening or Filtering | 0.02 – 5700.0 $m^3$ | on 0 | OFF | Regeneration occurs immediately when volume capacity reaches 0. |
| Softening | Auto | Normal + on 0 | 1 – 28 days | Regeneration occurs at the next regeneration time when volume capacity falls below the reserve capacity or the specified number of days is reached, or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0. |
| Softening or Filtering | 0.02 – 5700.0 $m^3$ | Normal + on 0 | 1 – 28 days | Regeneration occurs at the next regeneration time when the specified number of days is reached, or regeneration occurs after 10 minutes of no water usage when volume capacity reaches 0. |
| Softening | Auto | Normal + on 0 | OFF | Regeneration occurs at the next regeneration time when volume capacity falls below the reserve capacity, 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.

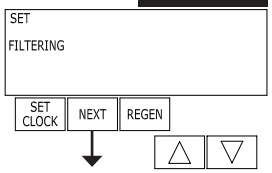
## OEM Filter System Setup

**STEP 1F**



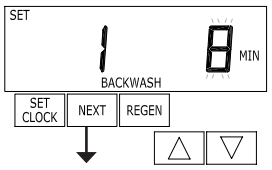

**Step 1F –** Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2F does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and SET CLOCK in sequence, and try again.

**STEP 2F**




**Step 2F –** Use ▼ or ▲ to select *FILTERING*.
Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.

**STEP 3F**

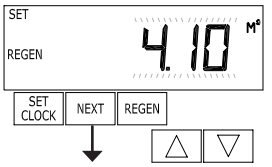



**Step 3F –** Cycle Durations: Use ▼ or ▲ to set the value for the first cycle selected in Step 7CS. Value ranges and units will vary depending on the cycle, see Table 2 for more detail. Press NEXT to set the value for the next cycle. Repeat for all cycles. The End cycle does not have a value and will not appear.
Once a value is set for all cycles, press NEXT to go to Step 4F. Press REGEN to return to previous step.

**Table 2**
**Cycle Options Value Ranges (Filtering)**

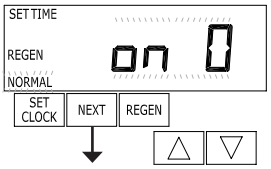
| Cycle Options | Units | Lower/Upper Limit |
|---|---|---|
| Backwash | Minutes | 1 – 120 |
| Rinse (fast) | Minutes | 1 – 120 |
| dn Brine (combination of regenerant and slow rinse) | Minutes | 1 – 180 |
| Fill for all valves except WS2 | Liters | 0.2 – 76 |
| Fill for WS2 Valves | Minutes | 0.1 – 99 |
| Service | Minutes | 1 – 480 |

**STEP 4F**



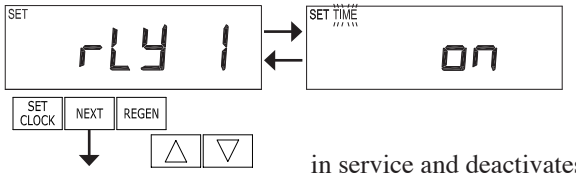

**Step 4F –** Volume Capacity: Use ▼ or ▲ to select one of the following options:
• *oFF*: Regeneration will be based solely on Day Override set in Step 4I.
• A number: Regeneration initiation will be based on the value specified.
See Setting Options Table for more detail.
Press NEXT to go to Step 5F. Press REGEN to return to previous step.

**STEP 5F**




**Step 5F** – Regeneration Time Option: Use ▼ or ▲ to select one of the following options:
• *NORMAL*: Regeneration will occur at the preset time.
• *on 0*: Regeneration will occur immediately when the volume capacity reaches 0 (zero).
• *NORMAL + on 0*: 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).
This option will not be available if Step 4CS is set to *ALT A* or *ALT b* or Step 2CS is set to *1.0T* or *1.5T*.
This display will not appear if Step 4F is set to *oFF*.
See Setting Options Table for more detail.
Press NEXT to go to Step 6F. Press REGEN to return to previous step.

**STEP 6F**







**Step 6F –** Relay 1 Output: Use ▼ or ▲ to select one of the following options:

• *Set Time on*: Relay activates a set time after the start of regeneration and 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.

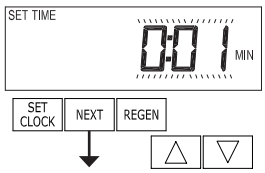
• *Set L Filtering on*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.

• *Set L Filtering Regen on*: Relay activates after a set volume has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.

• *Set Off*: Feature not used. Step 6F(A) and Step 6F(B) will not appear if this option is selected.

Press NEXT to go to Step 6F(A). Press REGEN to return to previous step.

**STEP 6F(A)**



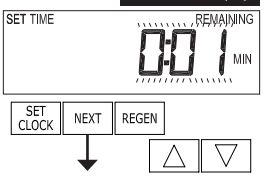

**Step 6F(A) –** Relay 1 Setpoint Actuation: Use ▼ or ▲ to select one of the following options:

• *Relay Actuation Time*: Set the length of time after the start of regeneration prior to relay activation (Range: 1 second – 200 minutes). The start of regeneration is defined as the first Backwash cycle or Dn Brine cycle, whichever comes first.

• *Relay Actuation Liters*: Set the number of liters that will be treated prior to relay activation (Range: 1 – 200).

Press NEXT to go to Step 6F(B). Press REGEN to return to previous step.

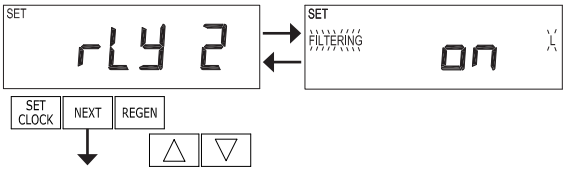
**STEP 6F(B)**




**Step 6F(B) –** Relay 1 Duration: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation. If Step 6F is set to *Set Time on*, value range is 1 second – 200 minutes. If Step 6F is set to *Set L Filtering on* or *Set L Filtering Regen on*, value range is 1 second – 20 minutes.

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

**STEP 7F**




**Step 7F –** Relay 2 Output: Use ▼ or ▲ to select one of the following options:

• *Set Time on*: Relay activates a set time after the start of regeneration and 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 L Filtering on*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.

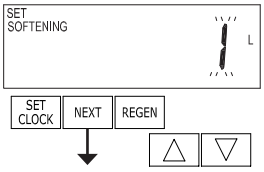
• *Set L Filtering Regen on*: Relay activates after a set volume has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.

• *Error*: Relay activates when the control enters an error state and immediately deactivates when the control exits the error state. Step 7F(A) and Step 7F(B) will not appear if this option is selected.

• *Set Off*: Feature not used. Step 7F(A) and Step 7F(B) will not appear if this option is selected.

Press NEXT to go to Step 7F(A). Press REGEN to return to previous step.

**STEP 7F(A)**



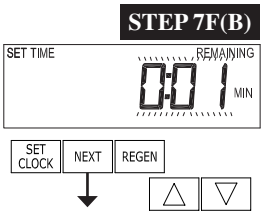

**Step 7F(A) –** Relay 2 Setpoint Actuation: Use ▼ or ▲ to select one of the following options:

• *Relay Actuation Time*: Set the length of time after the start of regeneration prior to relay activation (Range: 1 second – 200 minutes). The start of regeneration is defined as the first Backwash cycle or Dn Brine cycle, whichever comes first.

• *Relay Actuation Liters*: Set the number of liters that will be treated prior to relay activation (Range: 1 – 200).

Press NEXT to go to Step 7F(B). Press REGEN to return to previous step.

**STEP 7F(B)**



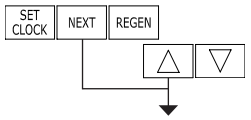

**Step 7F(B) –** Relay 2 Duration: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation. If Step 7F is set to *Set Time on*, value range is 1 second – 200 minutes. If Step 7F is set to *Set L Filtering on* or *Set L Filtering Regen on*, value range is 1 second – 20 minutes.

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

RETURN TO NORMAL MODE

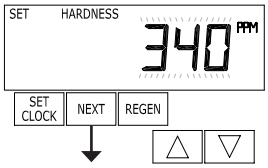
## Installer Display Settings

**STEP 1I**




**Step 1I –** Press NEXT and ▲ simultaneously for 3 seconds.

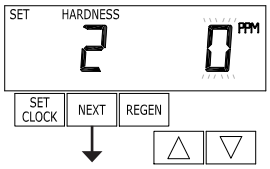
**STEP 2I**




**Step 2I –** Inlet Water Hardness: Use ▼ or ▲ to set the amount of influent hardness. This display will only appear if Step 5S is set to *AUTo*.
Press NEXT to go to Step 3I. Press REGEN to exit Installer Display Settings.

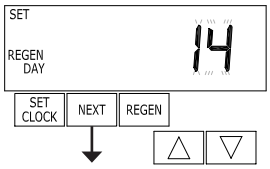
| Units Available |
|---|
| ppm |
| FH |
| dH |

**STEP 3I**




**Step 3I –** Service Water Hardness: If a mixing valve is installed in the valve, service hardness needs to be set. Setting range is always less than the setting in Step 2I.
This display will only appear if Step 5S is set to *AUTo*.
Press NEXT to go to Step 4I. Press REGEN to return to previous step.

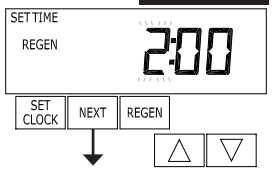
**STEP 4I**




**Step 4I –** Day Override: When Volume Capacity is set to *oFF*, sets the number of days between regenerations. When Volume Capacity is set to *AUTO* or a number, sets the maximum number of days between regenerations. Use ▼ or ▲ to select one of the following options:
- A number (1 – 28): Regeneration initiation will be called for on that day even if sufficient volume of water was not used to call for a regeneration.
- *oFF*: Regeneration initiation is based solely on volume used.

See Setting Options Table for more detail.
Press NEXT to go to Step 5I. Press REGEN to return to previous step.

**STEP 5I**




**Step 5I –** Next Regeneration Time: Use ▼ or ▲ to set the hour of day for regeneration. The default time is 2:00. This display will show *REGEN on 0 m³* if Regeneration Time Option is set to *on 0*.
Press NEXT to set the minutes.
Once the minutes are set, press NEXT to exit Installer Display Settings. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

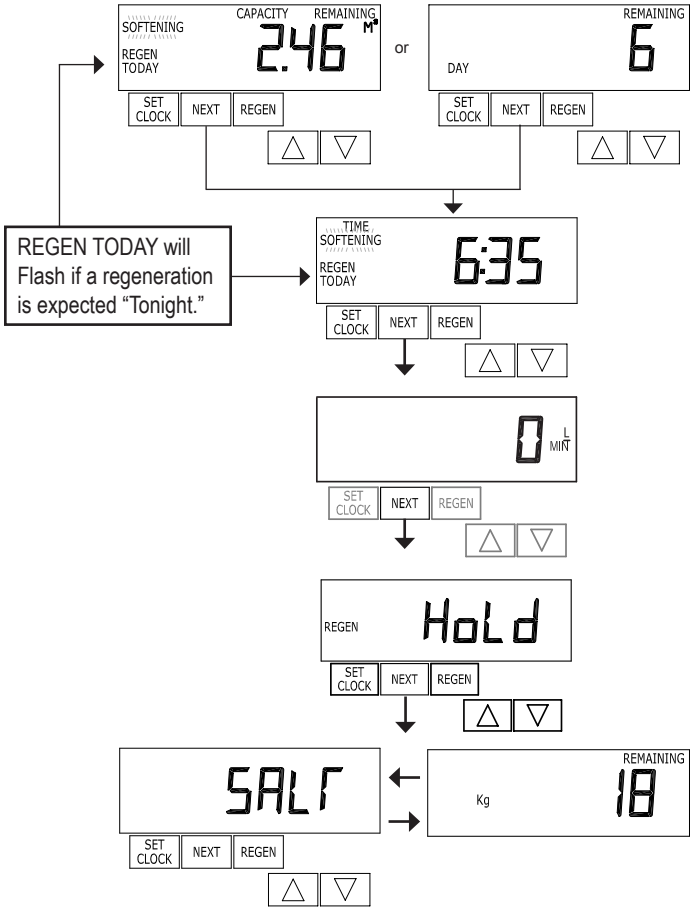
## User Display Settings

**General Operation:**

When the system is operating, one of 5 displays may be shown. Press NEXT to scroll 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 capacity 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 rate treated water is flowing through the system. An *A* or *b* indicating which tank is in service will be shown on this display if Step 2CS is set to *1.0T* or *1.5T*. The fourth display will show either *dP* or *hold* if the dP switch is closed. The fifth display shows the kg of salt remaining or flashes *SALT* when the calculated kg of salt falls below a safety level. The fifth display will not appear if the valve is a WS2, set up as a filter, or if the Salt Alarm in Step 9S is set to *oFF*.

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.

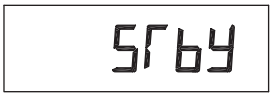
If a water meter is installed, the word *Softening* or *Filtering* flashes on the display when water is being treated (i.e., water is flowing through the system).




**Additional Displays:**

*REGEN Pndg* is displayed in alternator systems when a unit is waiting to initiate the first cycle step of regeneration.


*STbY* is displayed in alternator systems when a valve is in standby mode.




*REGEN Pndg FILL RINSE* 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. Shown only when Delayed Rinse and Fill is set to *ON*.

## Regeneration Mode:

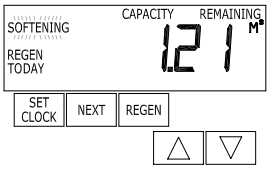
Typically, a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.


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.

REGEN TODAY will be displayed if a regeneration is expected "Tonight."



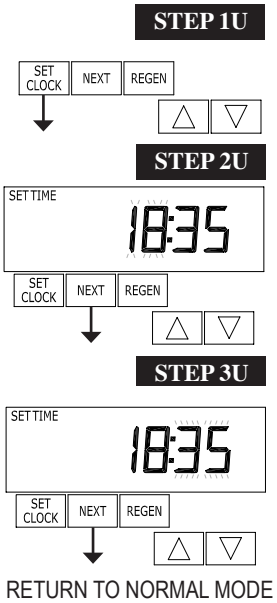

To initiate a manual regeneration at the preset delayed regeneration time when the Regeneration Time Option is set to *NORMAL* or *NORMAL + on 0*, press and release REGEN. The words *REGEN TODAY* will flash on the display to indicate that the system will regenerate at the preset delayed regeneration time. Press REGEN again to 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 is pressed.

To initiate a manual regeneration immediately, press and hold REGEN for 3 seconds. The system will begin to regenerate immediately. The request cannot be canceled.

*Note:* For softeners, if brine tank does not contain salt, fill with salt and wait at least 2 hours before regenerating.

## Set Time of Day:

The user can also set the time of day. Time of day should only need to be set after power outages lasting more than 24 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 24 hours occurs, the time of day will flash ,which indicates the time of day should be reset. If a power outage lasts less then 24 hours and the time of day flashes, the time of day should be reset and the non-rechargeable battery replaced.




**Step 1U –** Press SET CLOCK.

**Step 2U –** Current Time (hour): Use ▼ or ▲ to set the hour of the day. Press NEXT to go to Step 3U.

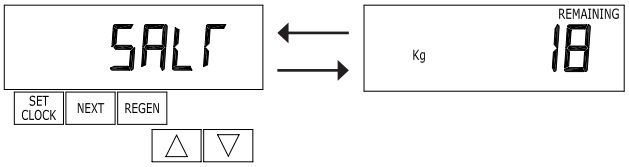
**Step 3U –** Current Time (minutes): Use ▼ or ▲ to set the minutes of the day. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

## Power Loss:

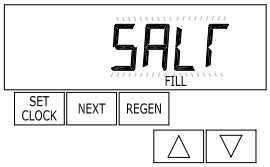
If the power goes out, the system will keep time for 24 hours or until the battery is depleted. If a power outage of more than 24 hours occurs, the time of day will flash, which indicates the time of day should be reset. The system will remember the rest. If a power outage lasts less then 24 hours and the time of day flashes, the time of day should be reset and the non-rechargeable battery replaced.

**Salt Remaining or Adding Salt (not available for WS2 valves):**

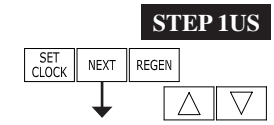
If the Low Salt Warning was activated in Step 9S, the following screens will be viewed in the User Display.
*Note:* The salt used per regeneration setting can be set in increments of 0.05 kg, but the *kg REMAINING* screen will round up or down to the closest whole number.



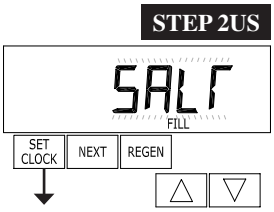

Once the salt remaining has gone below the set point, the display will automatically flash *Salt Fill*.



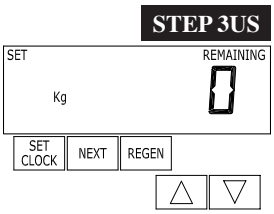

When adding salt to the brine tank (if the salt remaining feature is activated), the following steps must be completed:



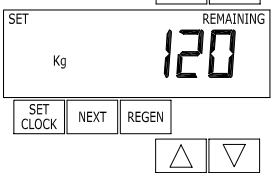

**Step 1US –** Press NEXT until *SALT* appears in the display. It does not matter if the Salt display alternates with the kg REMAINING display.



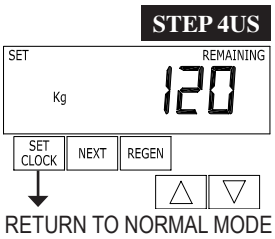

**Step 2US –** Press SET CLOCK.




**Step 3US –** kg Remaining: Use ▼ or ▲ to adjust the kg remaining in the brine tank.



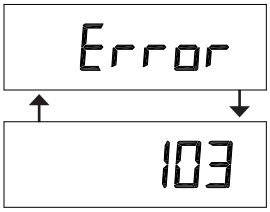

*Note:* Estimate the kg of salt in the brine tank and add it to the amount of salt added to the brine tank. The example on the left would indicate 100 kg of salt being added to a brine tank that has 20 kg remaining.



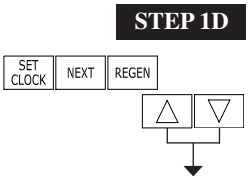

**Step 4US –** Press SET CLOCK or NEXT to exit Adding Salt.

**Error Message:**

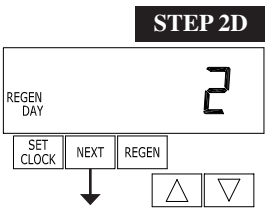
If the word *ERROR* and a number are alternately flashing on the display, contact the OEM for help. This indicates that the valve was not able to function properly.



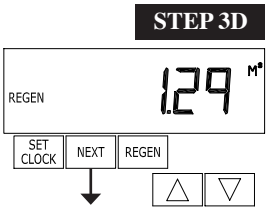
## Diagnostics



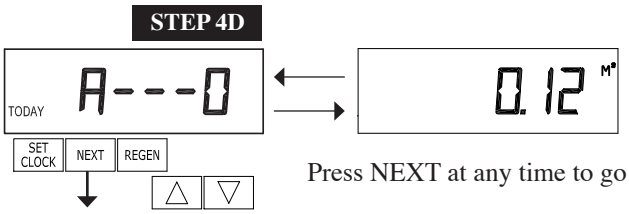

**Step 1D –** Press ▼ and ▲ simultaneously for 3 seconds. If screen in Step 2D does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and SET CLOCK in sequence, and try again.



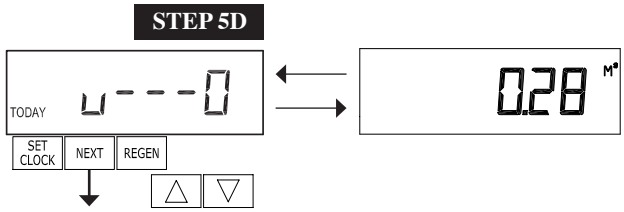

**Step 2D –** Days Since Last Regeneration.
Press NEXT to go to Step 3D. Press REGEN to exit Diagnostics.



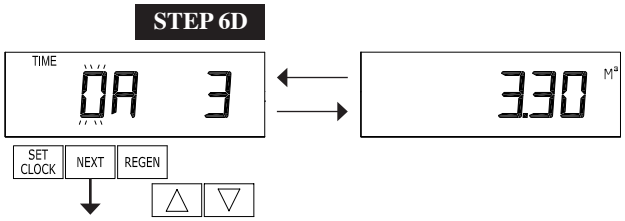

**Step 3D –** Volume Since Last Regeneration: This display will show zero if a water meter is not installed.
Press NEXT to go to Step 4D. Press REGEN to return to previous step.



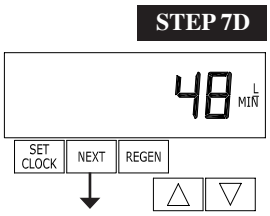

**Step 4D –** Reserve History, Last 7 Days: If the valve is set up as a softener, a meter is installed, and Volume Capacity is set to *AUTo*, this display shows the reserve capacity for each of the last 7 days. Use ▼ or ▲ to scroll. Day 0 is today, day 1 is yesterday, etc. This display will not appear if Step 2CS is set to *1.0T* or *1.5T*.
Press NEXT at any time to go to Step 5D. Press REGEN to return to previous step.



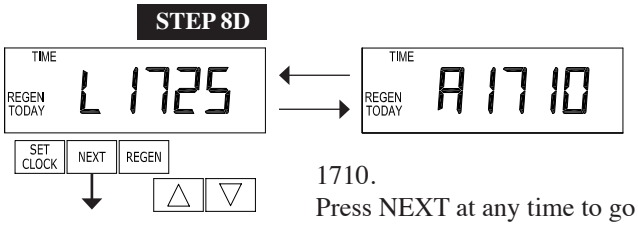

**Step 5D –** Usage History, Last 63 Days: This display shows the volume of water treated on each of the last 63 days. Use ▼ or ▲ to scroll. Day 1 is yesterday, day 2 is the day before yesterday, etc. If a regeneration occurred on the day, the word *REGEN* will also be displayed. This display will show dashes if a water meter is not installed.
Press NEXT at any time to go to Step 6D. Press REGEN to return to previous step.




**Step 6D –** Tank Transfer History: This display will only appear if Step 2CS is set to *1.0T* or *1.5T*. Use ▼ or ▲ to scroll through the last 10 tank transfers. This display shows, from left to right:
• The transfer number (0 – 9) with 0 being the most recent transfer.
• The tank transferring (A or b).
• How many hours ago the transfer occurred (999 hour maximum).
The display alternates with the volume that was treated before the tank transferred.
Press NEXT at any time to go to Step 7D. Press REGEN to return to previous step.

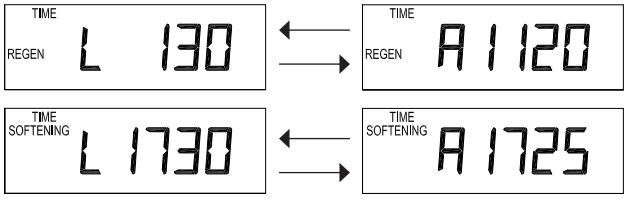


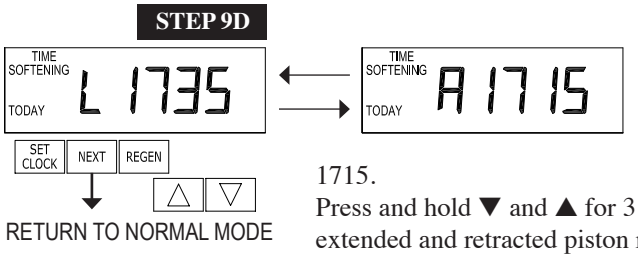

**Step 7D –** Maximum Flow Rate, Last 7 Days: This display shows the maximum flow rate in liters per minute that occurred in the last 7 days. Use ▼ or ▲ to scroll. This display will show zero if a water meter is not installed.
Press NEXT to go to Step 8D. Press REGEN to return to previous step.




**Step 8D –** MAV Drive History (Extended): This display shows the history of MAV output to drive the piston rod out of the valve. This display will only appear if the MAV Output is active. *L* is the latest drive time and *A* is the average drive time. Drive time is measured in 1/100 of a second; meaning a 17.10 second move is displayed as 1710.
Press NEXT at any time to go to Step 9D. Press REGEN to return to previous step.

Press and hold ▼ and ▲ for 3 seconds while in Step 8D 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 SET CLOCK and ▲ while in Step 8D.
Press NEXT to advance display to the old MAV drive history.

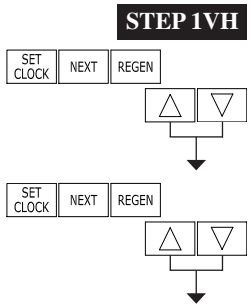


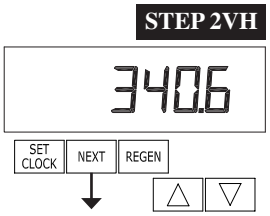

**Step 9D –** MAV Drive History (Retracted): This display shows the history of MAV output to drive the piston rod into the valve. This display will only appear if the MAV Output is active. *L* is the latest drive time and *A* is the average drive time. Drive time is measured in 1/100 of a second; meaning a 17.15 second move is displayed as 1715.
Press and hold ▼ and ▲ for 3 seconds while in Step 9D 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 8D.
Press the NEXT button at any time exit Diagnostics. Press REGEN to return to previous step.

**When desired, all information in diagnostics and programming may be reset to defaults when the valve is installed in a new location. To reset to defaults, press NEXT and ▼ buttons simultaneously to go to the Treatment Type display. Press ▼ and ▲ simultaneously to reset diagnostic and programming values to defaults. Screen will return to user display.**

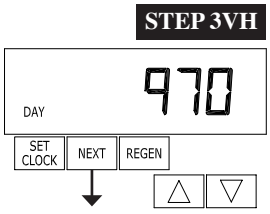
## Valve History



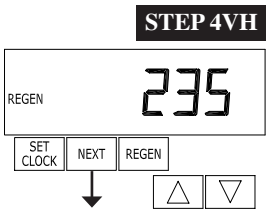

**Step 1VH –** Press ▼ and ▲ simultaneously for 3 seconds and release. Then, press ▼ and ▲ simultaneously again and release. If screen in Step 2VH does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and SET CLOCK in sequence, and try again.



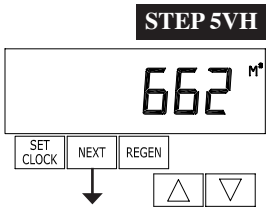

**Step 2VH[2] –** Software Version.
Press NEXT to go to Step 3VH. Press REGEN to exit Valve History.



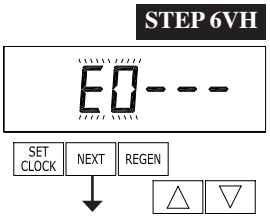

**Step 3VH –** Total Days Since Startup.
Press NEXT ton to go to Step 4VH. Press REGEN to return to previous step.




**Step 4VH –** Total Regenerations Since Startup.
Press NEXT to go to Step 5VH. Press REGEN to return to previous step.




**Step 5VH –** Total Volume Used Since Startup: This display will show zero if a water meter is not installed.
Press NEXT to go to Step 6VH. Press REGEN to return to previous step.




**Step 6VH –** Error Log: Use ▼ or ▲ to scroll through the last 10 error codes generated by the control during operation.
Press NEXT to exit Valve History. Press REGEN to return to previous step.

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[2] Values in Step 2VH – Step 6VH cannot be reset.

# Revision History:

## 4/23/2020

**PAGE 4:**
Removed #7 V3106-01 from table and drawing.

| | | | |
|---|---|---|---|
| Not Shown | V3186-06 | WS1 POWER SUPPLY US 15VDC HOCP | 1 |
| | V3186EU-06 | WS1 POWER SUPPLY EU 15VDC HOCP | |
| | V3186UK-06 | WS1 POWER SUPPLY UK 15VDC HOCP | |
| | V3186-01 | WS1 POWER CORD ONLY | |

## 9/20/2021

**PAGE 4:**

| | | | |
|---|---|---|---|
| 4 | V3108CI-07BOARD | WS1THRU2 CI PCB W/EDGE CARD RPLC | 1 |

**PAGE 6:**
Update Step 3CS

**PAGE 7-8:**
Update Step 4CS

**PAGE 11:**
Removed Step12CS

**PAGE 15:**
Update Setting Options Table

**PAGE 23:**
Update Step 5D display

**PAGE 25:**
Update Step 2VH display

## 1/16/2024

**PAGE 4:**

| | | | |
|---|---|---|---|
| 3 | V3002 | WS1 DRIVE BRACKET ASY W/ MOTOR | 1 |

Update drawing

We recommend that each externally wired relay contain a suppressor diode, which is normally placed across the relay coil in order to protect the control against back EMF at relay coil deactivation.

**PAGE 6:**

Update Step 2CS

Update Step 4CS

**PAGE 21:**
Update Step 2VH display

Various grammatical and formatting changes throughout.