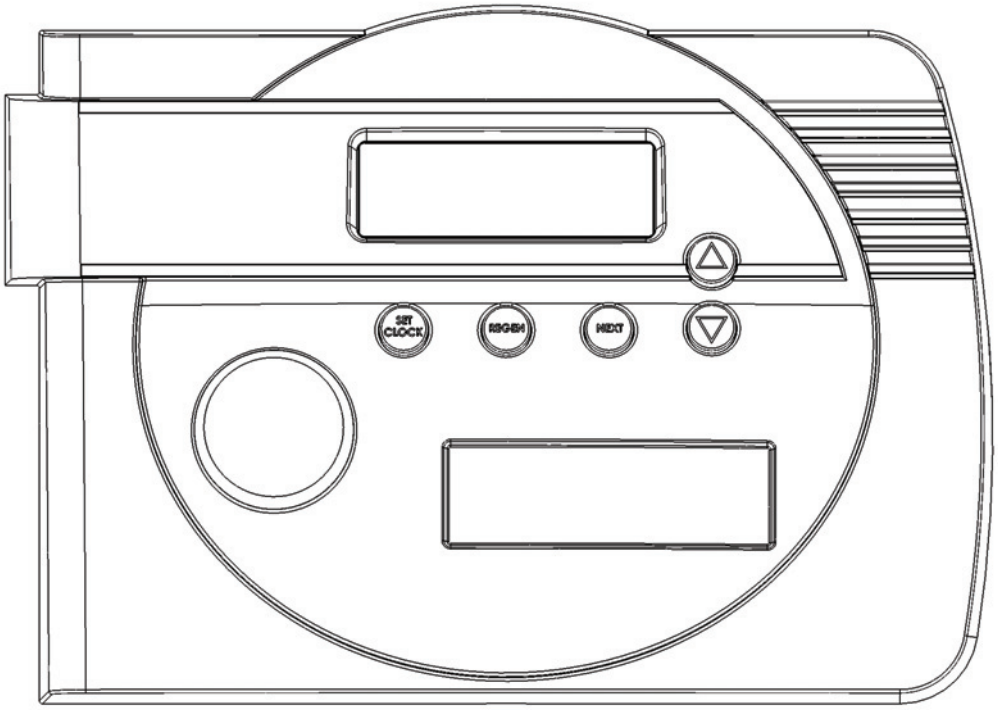
Great Lakes Water Solutions
The Right Source. The Right Solution.

Great Lakes Signature Series
ER Control Valve
Programming and Cover Drawing Manual



551 Bryne Drive, Unit A
Barrie, ON L4N973
866-396-0111

www.glws.ca

Table of Contents

ER Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3381-01EG	WS1ER FRONT COVER ASSEMBLY BLACK/GOLD	1
	V3381-01ES	WS1ER FRONT COVER ASSEMBLY BLACK/SILVER	
2	V3107-01	WS1 MOTOR	1
3	V3106-01	WS1 DRIVE BRACKET & SPRING CLIP	1
4	V3491ER-02BOARD	WS1 THRU 2 ER PC BOARD XMEGA REPLACE	1
5	V3110	WS1 DRIVE REDUCING GEAR 12X36	3
6	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3186	WS1 AC ADAPTER 120V-12V	1
	V3186EU	WS1 AC ADAPTER 220-240V-12V EU	
	V3186UK	WS1 AC ADAPTER 220-240V-12V UK	
	V3186-01	WS1 AC ADAPTER CORD ONLY	
Not Shown	V3382	WS1ER DRIVE BACK PLATE	1

For software revs E203.6 and lower

Relay Specifications: To insure proper fit and correct operation use either of the Idec relay/relay socket combinations or the exact equivalents.

	Manufacturer	Option 1	Option 2
Relay Socket	Idec	SR3P-05C	SY4S-05C
Relay	Idec	RR2KP-UAC12V / RR2KP-UCAC12V	RY2KS-UAC12V

The relay supplies 2 sets of dry contacts for user applications.
The wiring of these contacts is application specific.

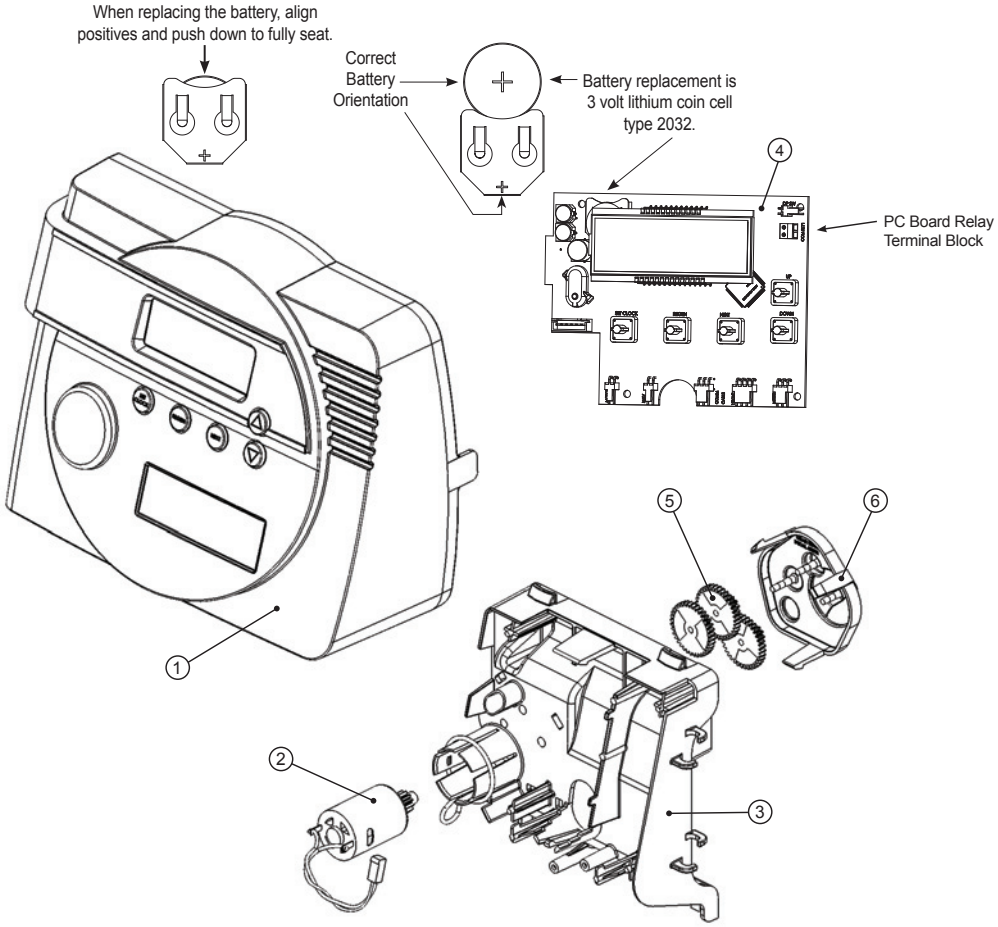
Wiring For Correct On/Off Operation		
PC Board Relay Terminal Block	Relay Socket Model	
	SR3P-05C	SY4S-05C
SET	#2	#13
COM	#6 and #10	#12 and #14
RES	#3	#9

For software revs E204.5 and higher

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

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

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



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

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

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

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

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

When desired, all programming and information in Diagnostics 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 Softening/Filtering screen. Press ▲ and ▼ simultaneously to reset programming and diagnostic values to defaults. Screen will return to User Display.

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

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

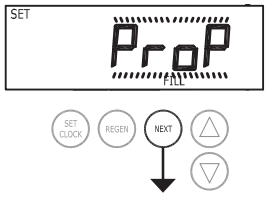
Once the valve has completed the immediate regeneration, the valve will regenerate one more time at the preset regeneration time.

For Valve Type 1.0T, 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.

<u>Proportional Brining</u>

If the system is set up as a prefill upflow softener, the control valve can also be set to normal or proportional brining.

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.



This step will appear after Step 8S and before Step9S if the system is set up as a prefill upflow softener. The following options can be selected:

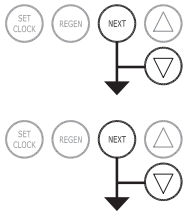
- NORMAL FILL - System always prefills with the salt level selected.
- ProP FILL - If proportional brining is selected, the actual salt fill time will be calculated by dividing the actual volume of treated water used by the full volumetric capacity, then multiplying this value by the maximum salt fill time.

Press NEXT to go to the next step. Press REGEN to return to the previous step.

OEM Setup

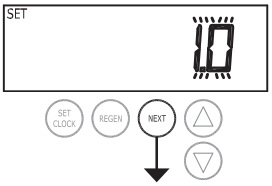
OEM Setup instructions allows the OEM to set meter size, dPswitch or alternating valve, pre or post fill and dn or up brine where applicable. Fill and brine values are ignored when the system is set up as a filter. The OEM Softener System Setup or the OEM Filter System Setup allow the OEM to set how long cycles will last.

STEP 1OS



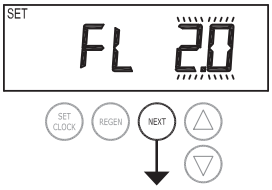
Step 1OS – Press NEXT and ▼ simultaneously for 3 seconds and release. Then press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2OS does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously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

STEP 2OS



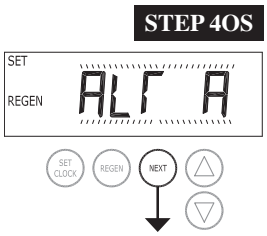
Step 2OS – Use ▲ or ▼ to select 1.0 for 1” valve, 1.25 for 1.25” valve, 1.5 for 1.5” valve, or 2.0 for 2” valve.

STEP 3OS



Step 3OS – When 2.0 is selected, an additional screen will appear. It is used to select which size flow meter is to be used with the valve, 1.5, 2.0 or 3.0. Variable meter pulses of 0.1-150.0 PPG can also be selected.

Press NEXT to go to Step 4OS. Press REGEN to return to previous step.

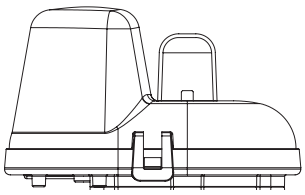


Step 4OS - Allows selection of one of the following using ▲ or ▼:
• the Control Valve to act as an alternator; or
• the Control Valve to have a no hard water bypass: or
• the Control Valve to have a Separate Source during the regeneration cycle; or
• the Control Valve to operate with the Clack System 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 function or separate source mode.

Selecting the Control Valve to act as an alternator:
E203.8 = Use 3-wire Interconnect Cable for all communication between units.
E204.0 = Use 2-wire Interconnect Cables for twin alternators with independent flow meters.

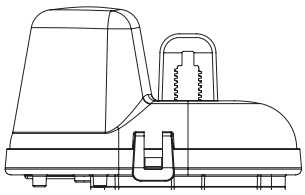
Prior to starting the programming steps, connect the interconnect cable to each control valve board's three pin connector labeled "COMM CABLE". Also connect the meter cord to either control valve to the three pin connector labeled "METER".			
		Softener valve programming steps	
OEM cycle sequence	Step 4OS	Set to ALT A Connect ALT A valve to the MAV's A port and connect the MAV's two pin wire connector to the two pin connector labeled "MAV" on the ALT A valve	Set to ALT B Connect ALT B valve to the MAV's B port. No connections between the ALT B valve and the MAV are made.
Softener System Setup	Step 8S	Set to "AUTO"	Set to "AUTO"
Softener System Setup	Step 9S	Set regeneration time option to "On 0".	Set regeneration time option to "On 0".
Installer Display Setting	Step 3I	Set Day Override to "OFF"	Set Day Override to "OFF"

If set up for a filter, in Step 7F set Volume Capacity in Gallons; in Step 8F select Regeneration Time Option "On 0"; and in Step 3I select Day Override "oFF".



Retracted

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



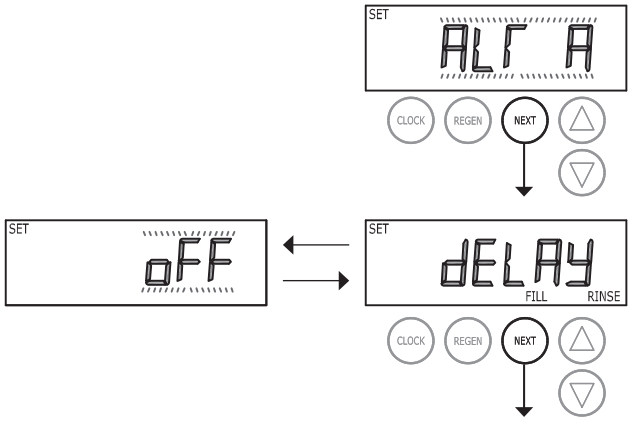
Extended

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.

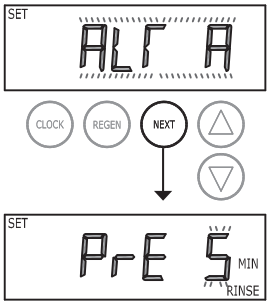
WS1, WS1.25, WS1.5, WS2L Valves

For Clack Corporation alternator systems using WS1, WS1.25, WS1.5, and WS2L 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. Once "Rinse" and "Fill" are completed, the valve will re-enter Standby mode until requested to come on-line for Service.



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.



Configuring the Control Valve for No Hard Water Bypass Operation:

Select "nHbP" for control operation. For no hard water bypass operation the three wire connector 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 remain in its current state until the error is corrected and reset.

Configuring the Control Valve for Separate Source Operation:

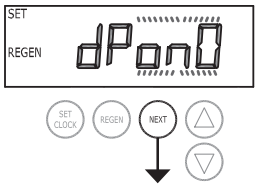
Select "SEPS" for control operation. For separate source operation, the three wire connector is not used. Selection requires that a connection to a Clack Motorized Alternator Valve (MAV) is made to the two pin connector labeled MAV located on the printed circuit board. The C port of the MAV must be connected 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 remain in its current state until the error is corrected and reset.

Configuring the Control Valve to operate with Clack System Controller:

Select System Controller Enabled to link the Control Valve to the Clack System Controller. For communication between the Control Valve and the System Controller a three wire communication cable is required.

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

STEP 5OS



Step 5OS – Allows selection of one of the following using ▲ or ▼:
• an outside signal to initiate a regeneration;
• an outside signal to prevent or delay 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.

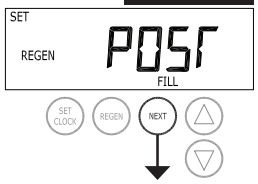
dPon0 – If the dP switch is closed for an accumulative time of 2 minutes a regeneration will be signaled to the unit. In a twin alternating system the MAV will transition first to switch units so that the signaled unit can start regeneration. After the MAV has fully transitioned, the regeneration begins immediately. Note: For WS1 – WS1.5 control valves programmed for twin alternating: if the dP function "dPon0" is set, the Delayed Rinse and Fill feature is not available.

dPdEL – 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 "dPdEL" 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 in conjunction with the "HoLd" if desired.

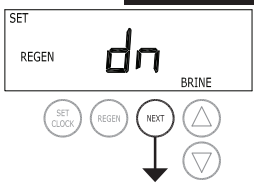
Press NEXT to go to Step 6OS. Press REGEN to return to previous step.

STEP 6OS



STEP 6OS – Set Refill option 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.
Press NEXT to go to Step 7OS. Press REGEN to return to previous step.

STEP 7OS

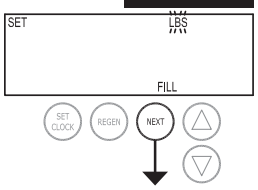


STEP 7OS – Set regenerant downflow or upflow using ▲ or ▼:
• "dn" if the regenerant is to flow downward through the media; or
• "UP" if the regenerant is to flow upward through the media.

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.

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

STEP 8OS



STEP 8OS – 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.

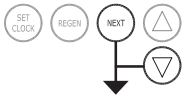
RETURN TO NORMAL MODE

OEM Softener System Setup

In OEM Softener System Setup the OEM chooses the value for the specified cycles (the order of which is specified by the selections for Step 6OS and Step 7OS in OEM Setup) and specifies other operating parameters for the system. If a cycle is present the value can be set to off. Fill is in pounds of salt and all other cycles are in minutes. **NOTE: Fill is in minutes when Step 2OS is set to 2.0, or when Step 8OS is set to MIN.**

Step 6OS	Step 7OS	Cycle Order
Post	dn	Backwash, Brine, Backwash, Rinse, Fill
Pre	dn	Fill, Service, Backwash, Brine, Backwash, Rinse
Post	UP	Brine, Backwash, Rinse, Fill
Pre	UP	Fill, Service, Brine, Backwash, Rinse

STEP 1S

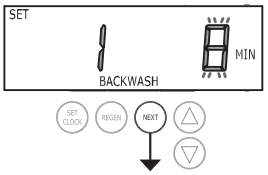


Step 1S – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2S does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

STEP 2S

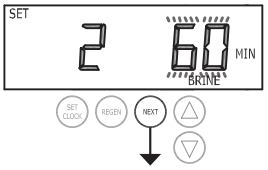
Step 2S – Choose SOFTENING using ▲ or ▼. Press NEXT to go to Step 3S. Press REGEN to exit OEM Softener System Setup.

STEP 3S



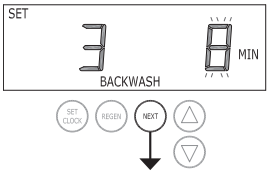
Step 3S – Select the time for the first cycle using ▲ or ▼. Press NEXT to go to Step 4S.
Press REGEN to return to previous step.

STEP 4S



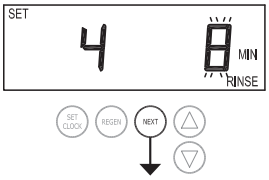
Step 4S – Select the time for the second cycle using ▲ or ▼. Press NEXT to go to Step 5S.
Press REGEN to return to previous step.
NOTE: The display will flash between cycle number and time, and brine direction (dn).

STEP 5S



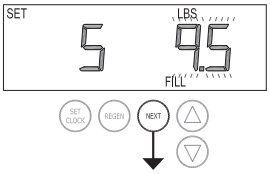
Step 5S – Select the time for the third cycle using ▲ or ▼. Press NEXT to go to Step 6S. Press REGEN to return to previous step.

STEP 6S



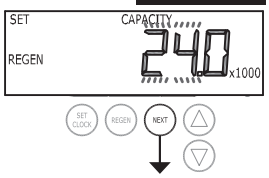
Step 6S – Select the time for the fourth cycle using ▲ or ▼. Press NEXT to go to Step 7S. Press REGEN to return to previous step.

STEP 7S



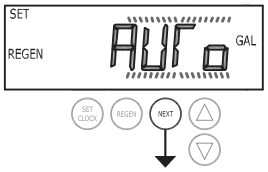
Step 7S – Select the LBS for the fifth cycle using ▲ or ▼. Fill is in minutes when Step 2OS is set to 2.0, or when Step 8OS is set to MIN. Press NEXT to go to Step 8S. Press REGEN to return to previous step.

STEP 8S



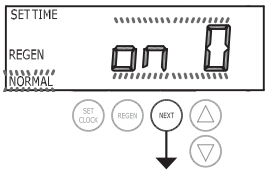
Step 8S –Set Grains Capacity using ▲ or ▼. The ion exchange capacity is in grains of hardness as calcium carbonate for the system based on the pounds of salt that will be used. Calculate the pounds of salt using the fill time previously selected. Grains capacity is affected by the fill time. The grains capacity for the selected fill time should be confirmed by OEM testing. The capacity and hardness levels entered are used to automatically calculate reserve capacity when gallon capacity is set to AUTO. Press NEXT to go to Step 9S. Press REGEN to return to previous step.

STEP 9S



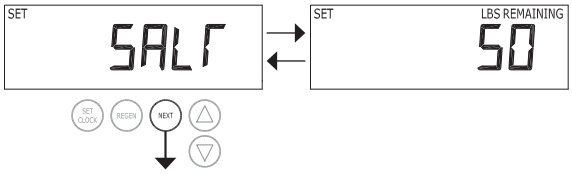
Step 9S – Set Volume Capacity using ▲ or ▼. If value is set to:
• "AUTO" capacity will be automatically calculated and reserve capacity will be automatically estimated;
• "oFF" regeneration will be based solely on the day override set (see Installer Display Settings Step 3I); or
• a number regeneration initiation will be based off the value specified.
If "oFF" or a number is used, 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 10S. Press REGEN to return to previous step.

STEP 10S



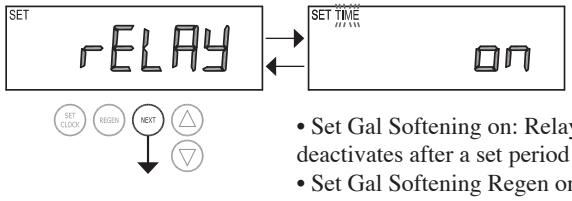
Step 10S – Set Regeneration Time Options using ▲ or ▼. If value is set to:
• "NORMAL" means regeneration will occur at the preset time;
• "on 0" means regeneration will occur immediately when the gallons capacity reaches 0 (zero); or
• "NORMAL + on 0" means regeneration will occur at one of the following:
— the preset time when the gallons capacity falls below the reserve or the specified number of days between regenerations is reached, whichever comes first; or
— after 10 minutes of no water usage when the gallons capacity reaches 0 (zero). See Setting Options Table for more detail.
"NORMAL" is the default if Step 4OS 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 1.0T, and "NORMAL + on 0" is not available.
Press NEXT to go to Step 11S. Press REGEN to return to previous step.

STEP 11S



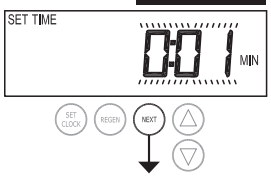
Step 11S – Set Low Salt Warning using ▲ or ▼. If value is set to:
• "oFF" no low salt level warning will appear for the user; or
• a specific value "FILL SALT" will flash on the display when the calculated remaining pounds of salt falls below that level.
Press NEXT to go to Step 12S. Press REGEN to return to previous step.

STEP 12S



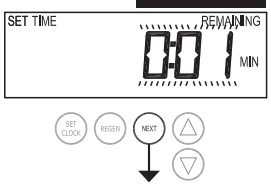
Step 12S: Set Relay operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Up (1" only) or Dn brine cycle, which ever comes first.
• Set Gal 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 Gal 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 control enters the Error Mode, and immediately deactivates when the error mode is exited.
• Set Off: If set to Off, Steps 13S and 14S will not be shown.
Press NEXT to go to Step 13S. Press REGEN to return to previous step.

STEP 13S



Step 13S: 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 which ever 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 when the valve is in the Service mode. Ranges from 1 to 50 gallons.
Press NEXT to go to Step 14S. Press REGEN to return to previous step.

STEP 14S



Step 14S: Set Relay Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 12S, the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set Gal Softening or Gal Softening Regen on is selected in Step 12S, 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.

RETURN TO NORMAL MODE

Setting Options Table

Filters should only use shaded options

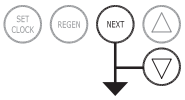
Volume Capacity	Regeneration Time Option	Day Override	Result[1]
AUTO	NORMAL	oFF	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time
AUTO	NORMAL	Any number	Reserve capacity automatically estimated. Regeneration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

In OEM Filter System Setup the order of the cycles is preset to Backwash, dn Brine, Backwash, Rinse and then Fill. All cycles except for Fill are in minutes and can be set to off. Fill for 1", 1.25", 1.5" and 1.0T is in gallons. Fill for 2.0" is in minutes.

STEP 1F

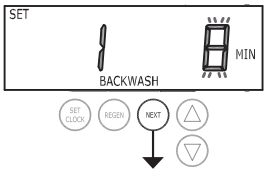


Step 1F – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2F does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press NEXT and ▼ simultaneously for 3 seconds and release.

STEP 2F

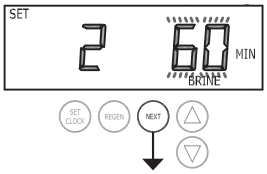
Step 2F – Choose FILTERING using ▲ or ▼. Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.

STEP 3F



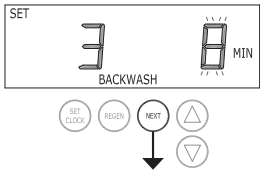
Step 3F – Select the time for the first cycle using ▲ or ▼. Press NEXT to go to Step 4F. Press REGEN to return to previous step.

STEP 4F



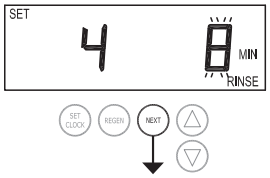
Step 4F – Select the time for the second cycle using ▲ or ▼. Press NEXT to go to Step 5F. Press REGEN to return to previous step.
NOTE: The display will flash between cycle number and time, and brine direction (dn or UP).

STEP 5F



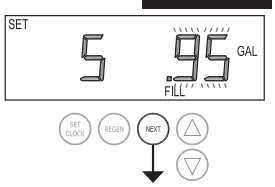
Step 5F – Select the time for the third cycle using ▲ or ▼. Press NEXT to go to Step 6F. Press REGEN to return to previous step.

STEP 6F



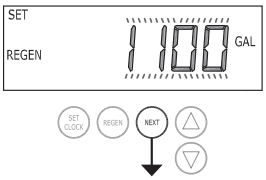
Step 6F – Select the time for the fourth cycle using ▲ or ▼. Press NEXT to go to Step 7F. Press REGEN to return to previous step.

STEP 7F



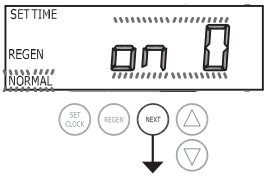
Step 7F – Select the volume in gallons for the fifth cycle using ▲ or ▼. When both 2.0 and 2.0L are options in Step 2OS, and 2.0 is selected, FILL is in minutes. Press NEXT to go to Step 8F. Press REGEN to return to previous step.

STEP 8F



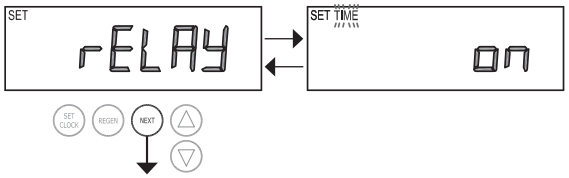
Step 8F – Set Volume Capacity using ▲ or ▼. If value is set to:
• "oFF" regeneration will be based solely on the day override set (see Installer Display/Settings Step 3I); or
• a number regeneration initiation will be based off the value specified.
See Setting Options Table for more detail. Press NEXT to go to Step 9F. Press REGEN to return to previous step.

STEP 9F



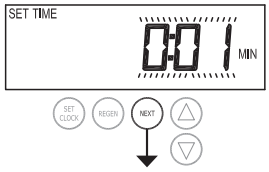
Step 9F – Set Regeneration Time Options using ▲ or ▼. If value is set to:
• "NORMAL" means regeneration will occur at the preset time;
• "on 0" means regeneration will occur immediately when the gallons capacity reaches 0 (zero); or
• "NORMAL + on 0" means regeneration will occur at one of the following:
— the preset time when the gallons capacity falls below the reserve or the specified number of days between regenerations is reached whichever comes first;
or
— after 10 minutes of no water usage when the gallon capacity reaches 0 (zero).
See Setting Options Table for more detail.
"NORMAL" is the default if Step 4OS 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 1.0T, and "NORMAL + on 0" is not available.
Press REGEN to return to previous step. Press NEXT to go to Step 10F.

STEP 10F



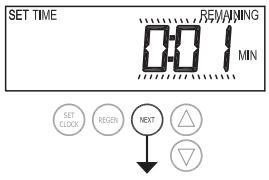
Step 10F: Set Relay operation using ▲ or ▼. The choices are:
• Set Time on: Relay activates after a set time at the beginning of a regeneration and then deactivates after a set period of time. The start of regeneration is defined as the first backwash cycle or Up (1" only) or Dn brine cycle, which ever comes first.
• Set Gal 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 Gal 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 control enters the Error Mode, and immediately deactivates when the error mode is exited.
• Set Off: If set to Off, Steps 11F and 12F will not be shown.
Press NEXT to go to Step 11F. Press REGEN to return to previous step.

STEP 11F



Step 11F: 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 which ever 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 when the valve is in the Service mode. Ranges from 1 to 50 gallons.
Press NEXT to go to Step 12F. Press REGEN to return to previous step.

STEP 12F

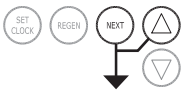


Step 12F: Set Relay Deactivate Time using ▲ or ▼.
• If Set Time on is selected in Step 10F, the relay will deactivate after the time set has expired. Ranges from 1 second to 200 minutes.
• If Set Gal Filtering or Gal Filtering Regen on is selected in Step 10F, the relay will deactivate after the time 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.

RETURN TO NORMAL MODE

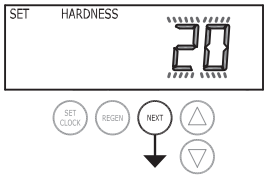
Installer Display Settings

STEP 1I



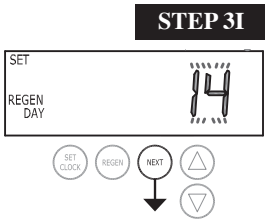
STEP 1I - Press NEXT and ▲ simultaneously for 3 seconds.

STEP 2I



STEP 2I – Hardness: Set the amount of hardness in grains of hardness as calcium carbonate per gallon using ▲ or ▼. Note: The grains per gallon can be increased if soluble iron needs to be reduced. This display will show "–nA–" if Filtering is selected in Step 2F or if AUTO is not selected in Set Volume Capacity in OEM Softener System Setup. Press NEXT to go to step 3I. Press REGEN to exit Installer Display Settings.

STEP 3I

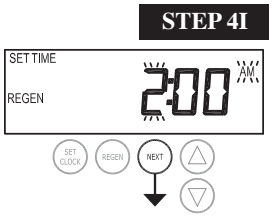


STEP 3I – Day Override: When volume capacity is set to oFF, sets the number of days between regenerations. When volume capacity is set to AUTO or to a number, sets the maximum number of days between regenerations. If value set to oFF, regeneration initiation is based solely on volume used. If value is set as a number a regeneration initiation will be called for on that day even if sufficient volume of water were not used to call for a regeneration. Set Day Override using ▲ or ▼:

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

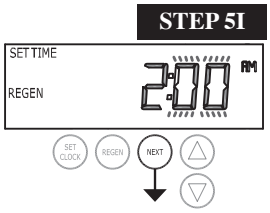
See Setting Options Table for more detail on setup. Press NEXT to go to step 4I. Press REGEN to return to previous step.

STEP 4I



STEP 4I – Next Regeneration Time (hour): Set the hour of day for regeneration using ▲ or ▼. AM/PM toggles after 12. The default time is 2:00 AM. This display will not appear 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



RETURN TO NORMAL MODE

STEP 5I – Next Regeneration Time (minutes): Set the minutes of day for regeneration using ▲ or ▼. This display will not appear 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.

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

User Display Settings

General Operation

When the system is operating, one of five displays may be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day.

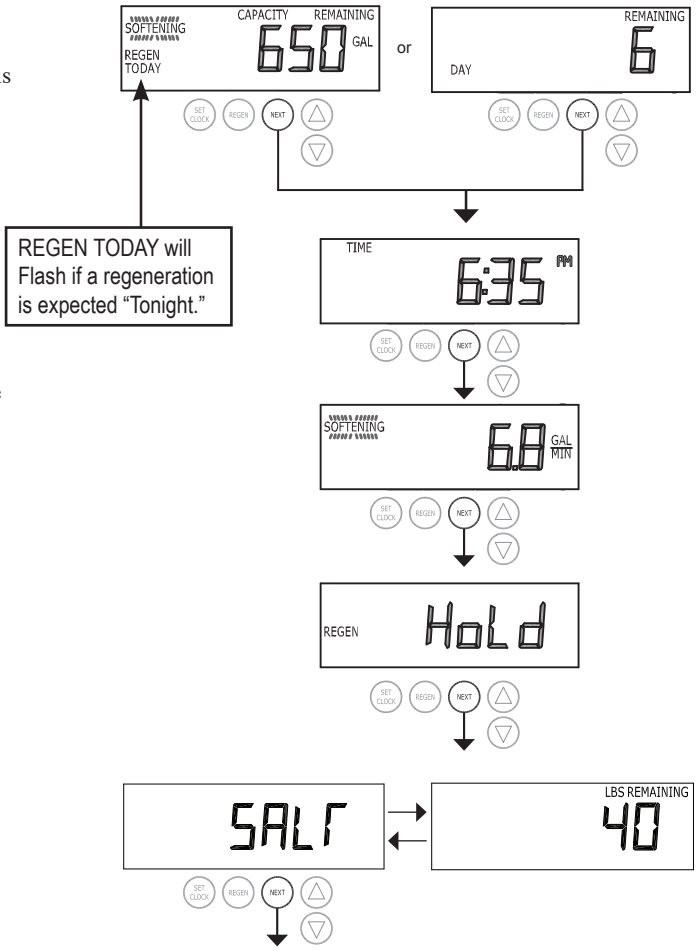
The second display is one of the following: days remaining or volume remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the gallons that will be treated before the system goes through a regeneration cycle. When set up as a softener, initial capacity remaining is equal to the (set in OEM Softener Setup) grains capacity divided by the hardness (set in Installer Display Settings) multiplied by 0.88. Pressing ▲ or ▼ while in the Capacity Remaining display will decrease the capacity remaining in 10 gallon increments and will also increase the volume used impacting the recorded values in Diagnostics Steps 3D, 4D and 5D and Valve History, Step 4VH.

The third display shows the current treated water flow rate through the system. The fourth display will show either dP or HoLd if the dP switch is closed.

The fifth display shows the pounds of salt remaining or flashes SALT FILL when the calculated pounds of salt falls below a safety level. The fifth display will not appear if the valve is set up as a filter or if the Set Low Salt Warning is set to off (see last step in OEM Softener System Setup). The user can scroll between the displays as desired.

If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will appear on the display.

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



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 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. Viewed only when Delayed Rinse and Fill is set to ON.

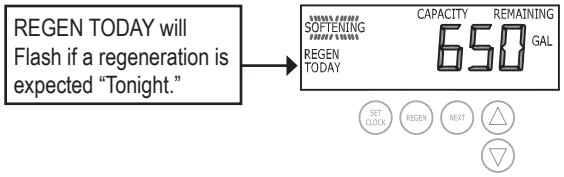
Regeneration Mode

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.



To initiate a manual regeneration at the preset delayed regeneration time, when the regeneration time option is set to "NORMAL" or "NORMAL + on 0", press and release REGEN. The words "REGEN TODAY" will flash on the display to indicate that the system will regenerate at the preset delayed regeneration time. If you pressed REGEN in error, pressing the button again will cancel the request. Note: If the regeneration time option is set to "on 0" there is no set delayed regeneration time so "REGEN TODAY" will not activate if REGEN button is pressed.

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

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

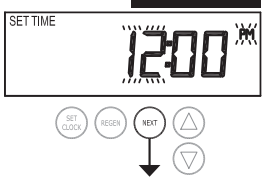
Set Time of Day

The user can also set the time of day. Time of day should only need to be set if the battery has been depleted because of extended power outages or when daylight saving time begins or ends. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset. The non rechargeable battery should also be replaced.

STEP 1U

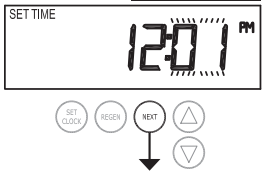
STEP 1U – Press SET CLOCK.

STEP 2U



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

STEP 3U

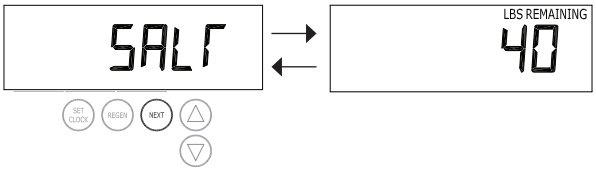


STEP 3U - Current Time (minutes): Set the minutes of the day using ▲ or ▼ buttons. Press NEXT to exit Set Time of Day. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

Salt Remaining or Adding Salt

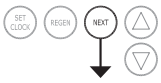
If the Low Salt Warning was activated in the last step of OEM Softener System Setup, the following screens will be viewed in the User Display. Note: The salt used per regeneration setting can be set in increments of 0.1 pounds, but the LBS REMAINING screen will round up or down to the closest whole number.



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

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

STEP 1US

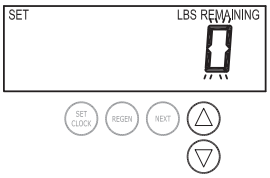


Step 1US – Press NEXT until SALT appears in the display. It does not matter if the SALT display alternates with the LBS REMAINING display.

STEP 2US

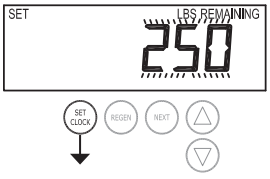
Step 2US – Press SET CLOCK.

STEP 3US



Step 3US – Set LBS REMAINING: Use ▲ or ▼ to adjust the pounds remaining in the brine tank.
NOTE: Estimate the pounds of salt in the brine tank and add it to the amount of salt added to the brine tank. The example at the left would indicate 200 lbs. of salt being added to a brine tank that has 50 lbs. remaining.

STEP 4US



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

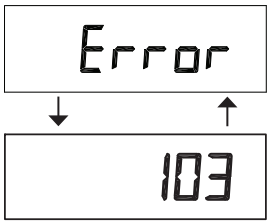
RETURN TO NORMAL MODE

Power Loss

If the power goes out the system will keep time until the battery is depleted. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset and the battery replaced. The system will remember the rest.

Error Message

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

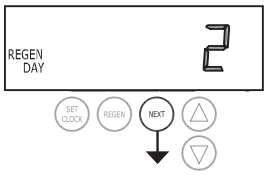


Diagnostics

STEP 1D

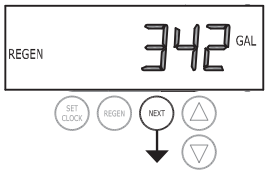
STEP 1D – Press ▲ and ▼ simultaneously for three seconds. If screen in step 2D does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds.

STEP 2D



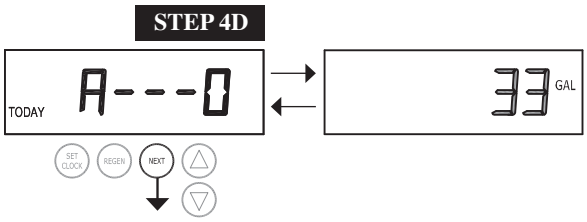
STEP 2D – Days, since last regeneration: This display shows the days since the last regeneration occurred. Press NEXT to go to Step 3D. Press REGEN to exit Diagnostics.

STEP 3D



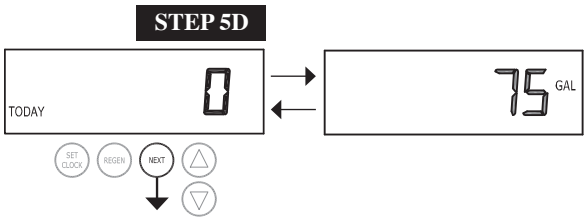
STEP 3D – Volume, since last regeneration: This display shows the volume of water that has been treated since the last regeneration. This display will equal zero if a water meter is not installed. Press NEXT to go to Step 4D. Press REGEN to return to previous step.

STEP 4D



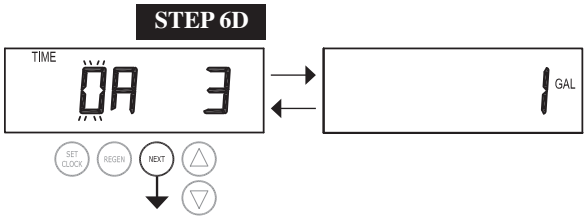
STEP 4D – Volume, reserve capacity used for last 7 days: If the valve is set up as a softener, a meter is installed and Set Volume Capacity is set to "Auto," this display shows 0 day (for today) and flashes the reserve capacity. Pressing ▲ will show day 1 (which would be yesterday) and flashes the reserve 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. Press NEXT at any time to go to Step 5D. Press REGEN to return to previous step.

STEP 5D

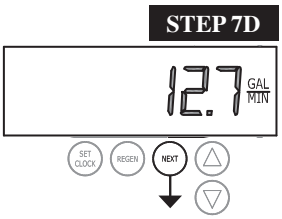


STEP 5D - Volume, 63-day usage history: This display shows day 1 (for yesterday) and flashes the volume of water treated yesterday. Pressing ▲ will show day 2 (which would be the day before yesterday) and flashes the volume of water treated on that day. Continue to press ▲ to show the maximum volume of water treated for the last 63 days. If a regeneration occured 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.

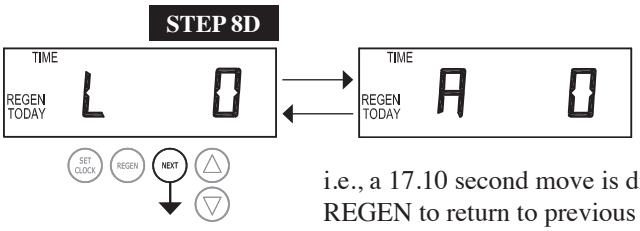
STEP 6D



STEP 6D - Twin Tank Valve Transfer History only displays when 1.0T was selected in Step 2OS. 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, if "b" the tank with the in/out head 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 7D. Press REGEN to return to previous step.

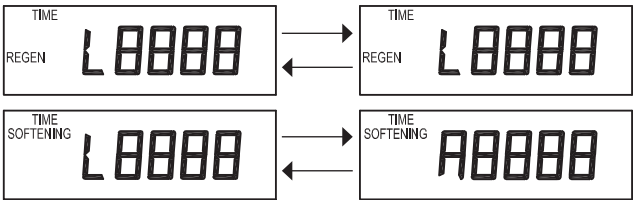


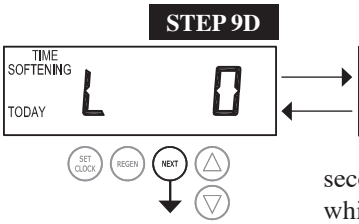
STEP 7D – Flow rate, maximum last seven days: The maximum flow rate in gallons per minute that occurred in the last seven days will be displayed. Press and hold ▲ and ▼ for 3 seconds to reset display to 0 gal. This display will equal zero if a water meter is not installed. Press NEXT at any time to advance display to Step 8D. Press REGEN to return to previous step.



STEP 8D – MAV Drive History in the direction of extended piston rod position. Display will only be shown if 1.0T is selected in Step 2OS, or OFF is not selected in Step 4OS. 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 9D. Press REGEN to return to previous step.

Press and hold ▲ and ▼ buttons 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.



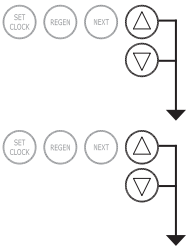


STEP 9D – Relative Drive History in the direction of retracted piston rod position. Display will only be shown if 1.0T is selected in Step 2OS, or OFF is not selected in Step 4OS. Up to a four digit number will appear after the "L" which stands for latest and "A" which stands for average. Drive time is measured in 1/100 of a second; i.e., a 19.34 second move is displayed as "1934". Press and hold ▲ and ▼ for 3 seconds while in Step 9D to reset the relative drive history in both the extended and retracted piston rod position. To view the old relative drive history data see Step 8D.
Press NEXT to exit Diagnostics. Press REGEN to return to previous step.

When desired, all programming and information in Diagnostics may be reset to defaults when the valve is installed in a new location. To reset to defaults, press NEXT and t simultaneously to go to the Softening/Filtering screen. Press s and t simultaneously to reset programming and diagnostic values to defaults. Screen will return to User Display.

Valve History

STEP 1VH

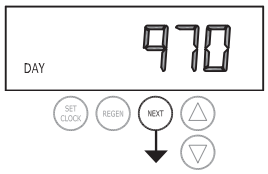


STEP 1VH – Press ▲ and ▼ simultaneously for three seconds and release. Then press ▲ and ▼ simultaneously and release. If screen in step 2VH does not appear in 5 seconds the lock on the valve is activated. To unlock press ▼, NEXT, ▲, and SET CLOCK in sequence, then press ▲ and ▼ simultaneously for 3 seconds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

STEP 2VH

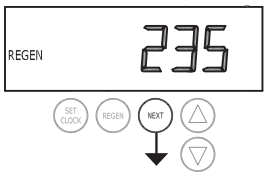
STEP 2VH – Software Version. Press NEXT to go to Step 3VH. Press REGEN to exit Valve History.

STEP 3VH



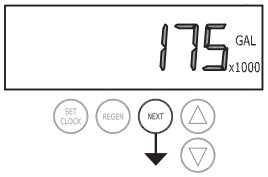
STEP 3VH[2] – Days, total since start-up: This display shows the total days since startup. Press NEXT to go to Step 4VH. Press REGEN to return to previous step.

STEP 4VH



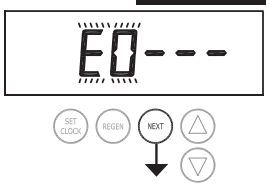
STEP 4VH – Regenerations, total number since start-up: This display shows the total number of regenerations that have occurred since startup. Press NEXT to go to Step 5VH. Press REGEN to return to previous step.

STEP 5VH



STEP 5VH – 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 NEXT to go to Step 6VH. Press REGEN to return to previous step.

STEP 6VH



STEP 6VH – Error Log: This display shows a history of the last 10 errors generated by the control during operation. Press ▲ or ▼ to view each error recorded. Press the NEXT button to exit Valve History. Press REGEN to return to previous step.

RETURN TO NORMAL MODE

[2] Values in steps 2VH through 6VH cannot be reset.

Revision History:

4/13/2012

PAGE 4

V3186	WS1 AC ADAPTER 120V-12V

12/10/2013

PAGE 4
V3491ER-02BOARD WS1 THRU 2 ER PC BOARD XMEGA REPLACE
New board drawing

PAGE 5
For Valve Type 1.0T, press and hold SET 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.

PAGE 6
Step 3OS - Variable meter pulses of 0.1-150.0 PPG can also be selected.
New drawings

PAGE 7
Step 4OS - the Control Valve to operate with the Clack System Controller.

PAGE 8
System Controller setup information

PAGE 9
Step 7OS - 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.
Added Step 8OS

PAGE 10
Step 7S - Fill is in minutes when Step 2OS is set to 2.0, or when Step 8OS is set to MIN.

PAGE 11
Step 10S - “On 0” is the default if Step 2CS is set to 1.0T, and NORMAL + on 0 is not available.
Step 12S - Error: Relay closes whenever the control enters the Error Mode, and immediately deactivates when the error mode is exited.
New drawings for Steps 13S and 14S

PAGE 14
Step 9F - “On 0” is the default if Step 2CS is set to 1.0T, and NORMAL + on 0 is not available.
Step 10F - Error: Relay closes whenever the control enters the Error Mode, and immediately deactivates when the error mode is exited.
New displays for 11F and 12F

PAGE 16
New displays for REGEN PENDING

PAGE 17
New display for Regeneration Mode
New displays for Set Time of Day

12/10/2013 - continued

PAGE 18
New displays for Salt Remaining
New display for Error Mode

PAGE 19
Steps 4D & 5D – New displays
Added Step 6D

PAGE 20
Added Steps 8D & 9D

PAGE 21
Added Step 2VH
New display for Step 6VH