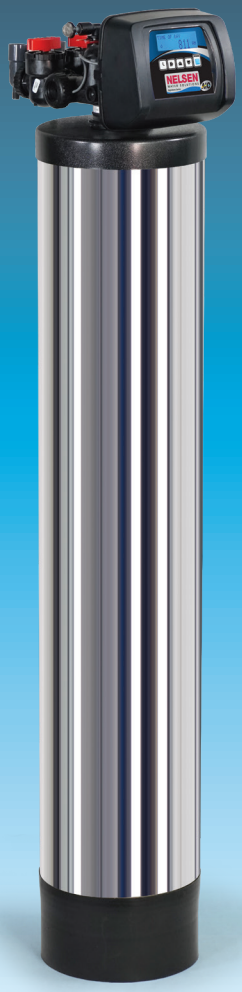
NELSEN™
WATER SOLUTIONS
Since 1954

Dealer Programming Guide

Single Tank

Twin Tank



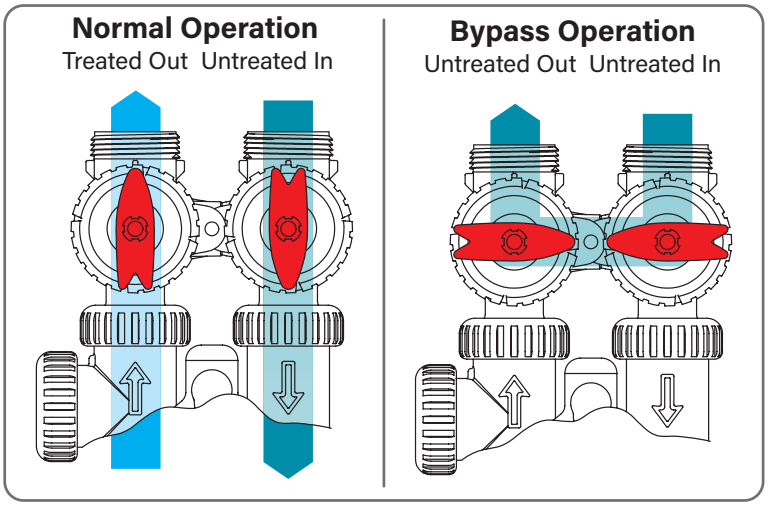
AIO

1", 1-1/4", 1-1/2", 2" & Twin Control Valves

Table of Contents

ByPass Operation

To shut off water to the system, please position arrow handles as shown in the bypass operation diagram to the right.



Cycle Sequence/Adjustable Default Times

Type	Brining	Location	Fill	Softening	Backwash	*Rinse**	Draw	Backwash	Rinse	Fill	*Fill**
Softening, 1.0"/1.25"/1.5"/1.0T" Valves	dn	Post			8		60	8	8	9.5 lbs	
Softening, 1.0"/1.25"/1.5"/1.0T" Valves	dn	Pre	9.5 lbs	240	8		60	8	8		*0:05*
Softening, 1.0"/1.25"/1.5"/1.0T" Valves	Up	Post				*0:30*	60	8	8	9.5 lbs	
Softening, 1.0"/1.25"/1.5"/1.0T" Valves	Up	Pre	9.5 lbs	240		*0:30*	60	8	8		*0:05*
Softening, 2.0" Valves	dn	Post			8		60	8	8	6.0 min	
Softening, 2.0" Valves	dn	Pre	6.0 min	240	8		60	8	8		*0:05*
Softening, 2.0" Valves	Up	Post				*0:30*	60	8	8	6.0 min	
Softening, 2.0" Valves	Up	Pre	6.0 min	240		*0:30*	60	8	8		*0:05*
Filtering Backwash, All Valves	N/A	N/A			8				8		
Filter Regen, 1.0"/1.25"/1.5"/1.0T Valves	dn	Post			8		60	8	8	.95 gal	
Filtering Regen 2.0" Valves	dn	Post			8		60	8	8	6.0 min	

Default duration in minutes, fill amounts in pounds of salt or gallons. *Italic = Cycles are non-adjustable, do not show in cycle sequence programming and are in seconds. 1.5" Valve may be set to LBS Fill (Default = 9.5 LBS) or MIN Fill (Default = 6.0 Min)

Air Cycle Sequence/Default Durations (Min)

Type	Air Release (Fill)	Backwash	AirCharge (Draw)	Rinse
Air Cycle	4.0	14	40	OFF

Control Operation While In Error Mode

1. The regeneration valve itself will complete regeneration only if already in regeneration and the current Error Code# generated is not 101/102/103/104.

2. The regeneration valve itself will not enter regeneration if the control is already in Error Mode, regardless of the Error Code # generated.

3. All relays will deactivate immediately, and remain deactivated until control reset, once any Error Code # has been generated by the control. This excludes relays set to non-regeneration related functions -Gallons, Regen Gallons, and Error where they should continue to function as set.

4. With the generation of any valve motor related error codes (101/102/103/104), regeneration is immediately canceled, and all MAVs are then either kept in the Service Position or returned sequentially to Service, remaining there until control reset. This excludes the Alt MAV in alternator systems (with Alt MAV set to Alt A or Alt B), which should remain in its current position, and System Controller applications whenever the ALT MAV has already transitioned to Bypass during regeneration, and an Error Code # was then generated sometime later on that same control. The Alt MAV in this case should remain in Bypass until the control is reset.

5. With the generation of any MAV errors (106/107/116/117) before regeneration is entered, regeneration is immediately canceled, with the regeneration valve and any remaining functional MAVs either kept in the Service Position or returned sequentially to Service, remaining there until control reset. This excludes the Alt MAV in alternator systems (with Alt MAV set to Alt A or Alt B), which should remain in its current position, and System Controller applications whenever a ALT MAV generates an error (106/107) during a non-regeneration transition, the ALT MAV valve in this case should remain in whatever position it is currently in until the control is reset. While in this state, service flow will still be monitored by that same control.

6. With the generation of any MAV errors (106/107116/117) during regeneration, the regeneration valve will continue to proceed normally with regeneration. However, all remaining scheduled MAV drives will be immediately canceled and all remaining functional MAVs returned sequentially to Service, remaining there until the control is reset. This excludes the Alt MAV in alternator systems (with Alt MAV set to Alt A or Alt B), which should remain in its current position.

Operation of Regeneration Cycle with Alternator Systems

When Step 2S is set to Softening XX Post, Configuration 1 to 1.0, 1.25, or 1.5, Configuration 3CS set to Valve A or B, and Configuration 2ALT MAV set to ON. Regeneration will advance and complete all steps normally, except for the last two (which should be programmed for Rinse and Fill). Once the valve reaches the point in regeneration where all but the last two steps are complete, it will immediately return to the Service Position (Standby Mode with Alt MAV in Bypass). These last two steps of the regeneration cycle (Rinse and Fill) will then be completed once the capacity of the Online Unit falls below 10%. Once the capacity of the Online Unit falls below 10%, the valve will advance from the Service Position to Rinse, then Fill, before returning to the Service Position (Standby Mode with Alt MAV in Bypass) and remaining there until the unit online is fully depleted and requesting regeneration.

In alternator systems with one of the following settings - Step 2F set to FILTERING XXX, Configuration 5CS (DP Input) set to IMMED REG or DELAY REG, Step 5F Filtering is set to OFF, Step 8F is set to OFF, RINSE and FILL are not the last two steps of regen, regeneration will proceed normally, without the delayed completion of regeneration described above. If the valve has been requested to be brought online, but has not yet completed Rinse, then the tank in service alternation will be delayed until it has. Whenever the delayed Rinse and Fill feature is active, a manually initiated immediate regeneration will force the immediate Rinse and Fill of the Standby Unit, regardless the present capacity of the unit online, prior to tank in service alternation and regeneration.

Regen & Error Screens

Regen Screen

Displays the time remaining in the current cycle. 2nd backwash cycle will flash.

Pressing **REGEN** advances to the next cycle.

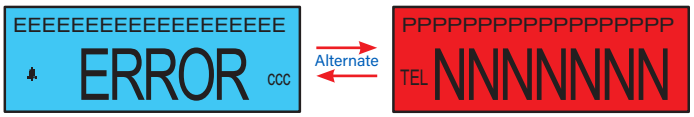
In Alternator Systems when a unit is waiting to initiate the first cycle step of regeneration, "REGEN PENDING" is displayed. "STAND BY" is displayed in Alternator Systems when a valve is in Standby state.

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

Error Screens

ERROR Screen displays when error occurs and no Dealer Information is present. Top line will display specific error while the 3 digits in the lower right side will display specific error code. Top line error display longer than 18 characters will scroll across display from right to left.

Alternating ERROR and Dealer Contact Information will display



when an error occurs and Dealer Contact Information is present.

Button Operation & Functions

Button Operation and Function

Scrolls to the next display.

Pressing once and releasing will schedule a regeneration at the preset delayed regeneration time.

Pressing again and releasing will cancel the regeneration.

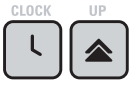
Pressing and holding for 3 seconds will initiate an immediate regeneration

Pressing and release while in regeneration will advance to the next cycle.

Pressing in the program levels will go backwards to the previous screen.

Changes variable being displayed.

Holding **NEXT** and **REGEN** simultaneously for 3 seconds initiates a control reset. The software version is displayed and the piston returns to the home/service position re-synchronizing the valve.



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

Holding ▲ and ▼ simultaneously for 3 seconds in Control Programming initiates a master reset. Resets programming and diagnostic level. Displays back to factory defaults. Retains current history level displays.

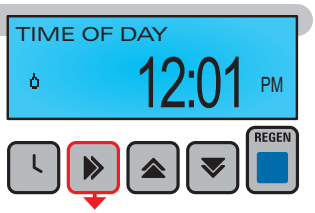
Key Sequence to lock and unlock program settings.

User Displays

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

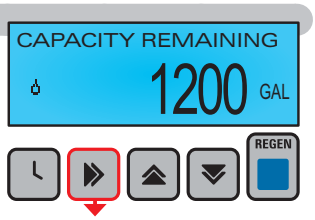
User 1

Typical user display. Shows Time of Day and droplet of water indicates water flow.



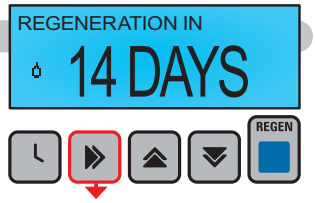
User 2

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



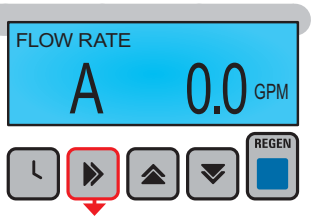
User 3

Displays number of days to next regeneration. Not shown when day override set to off.



User 4

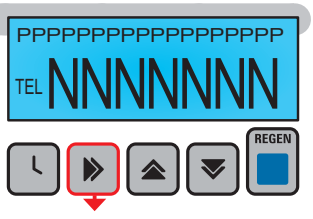
Flow Rate. Displays the current flow rate of treated water through the valve. If Configuration 3CS is set to ALT A or B and the valve is in Standby, this display and the flashing Flow Indicator viewed in other User Screens will not be viewed.



A Tank In Service Indicator (A or B) is active whenever 1.0T Mode is set in Configuration 2CS.

User 5

Displays dealer contact name and number when programmed in the Installer Level. Steps 7IL & 8IL.



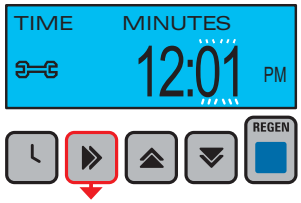
Setting Time of Day

Press and hold **CLOCK** until **TIME HOUR** is displayed and the Hour and AM/PM flashes. Press ▲ or ▼ until the correct hour is displayed.

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

Press **NEXT** to return to the Time of Day screen.

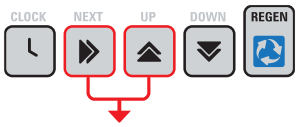
Time of day should only need to be set after power outages lasting more than 8 hours, if the battery has been depleted and a power outage occurs, or when daylight savings time begins or ends. If a power outage lasting more than 8 hours occurs, the time of day will flash on and off which indicates the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



Installer Level

Step 1IL

Press any button to activate display. Press **NEXT** and ▲ simultaneously for 3 seconds and release. If the screen in **Step 2IL** does not appear, the Valve Lock is activated.



Valve is locked. To unlock, press ▼, **NEXT**, ▲ and **CLOCK** in sequence.

Step 2IL

Press ▲ or ▼ to adjust the inlet water hardness.

Does not show in Filter mode.

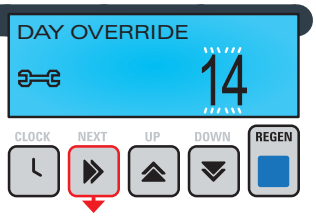
Press **NEXT** to go to Step 3IL.

Step 3IL

Press ▲ or ▼ to adjust the Day Override. 1 - 28 days or "OFF" is selectable.

Press **NEXT** to go to Step 4IL.

Press **REGEN** to return to previous step.

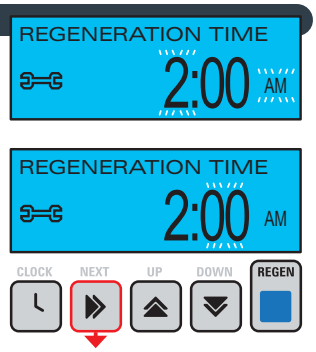


Step 4IL

Press ▲ or ▼ to adjust the Regeneration Time Hours and AM/PM. Press **NEXT** to adjust Time Minutes.

Press **NEXT** to go to Step 5IL.

Press **REGEN** to return to previous step.



Step 5IL

Press ▲ or ▼ to turn Light On or Off.

Press **NEXT** to **EXIT** or to set **MINIMUM REGEN.**

Press **REGEN** to return to previous step.

Set Dealer Info

From Step 5IL, press **CLOCK** and ▲ simultaneously for 3 seconds and release to enter your dealer contact phone number. Press ▲ or ▼ to adjust the number. Press **NEXT** to go to the next digit position. Repeat until the dealer phone number is complete.

Continue to Press **NEXT** to go to Set Dealer Name.

Press **REGEN** to return to previous step.

Set Dealer Name

Press ▲ or ▼ to adjust the dealer contact name. Press **NEXT** to go to the next digit position. Repeat until the dealer name is complete.

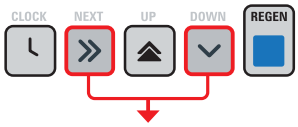
Press **NEXT** to **EXIT** Installer Level Settings.

Press **REGEN** to return to previous step.

Softeners w/Brine Down Post Fill

Step 1S

Press any button to activate display. Press **NEXT** and ▼ simultaneously for 3 seconds and release. If the screen in **Step 2SS** does not appear, the lock on the valve is activated. To unlock see **Step 1IL, Page 4**.

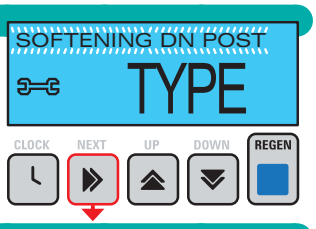


Step 2S

Choose SOFTENING DN POST using ▲ or ▼.

Press **NEXT** to go to Step 3S.

Press **REGEN** to exit Softener System Setup.



Step 3S

Press the ▲ or ▼to adjust the duration of the first Backwash cycle.

Press **NEXT** to go to Step 4S.

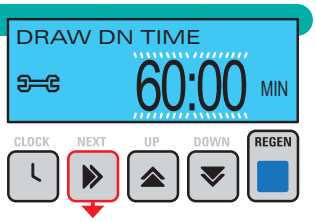
Press **REGEN** to return to previous step.

Step 4S

Press the ▲ or ▼to adjust the duration of Draw Down Time.

Press **NEXT** to go to Step 5S.

Press **REGEN** to return to previous step.



Step 5S

Press the ▲ or ▼to adjust the duration of the second Backwash cycle.

Press **NEXT** to go to Step 6S.

Press **REGEN** to return to previous step.

Step 6S

Press the ▲ or ▼to adjust the duration of the Rinse cycle.

Press **NEXT** to go to Step 7S.

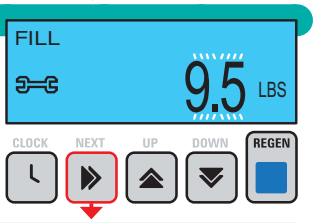
Press **REGEN** to return to previous step.

Step 7S

Press the ▲ or ▼to select the pounds of your salt setting.

Press **NEXT** to go to Step 8S.

Press **REGEN** to return to previous step.

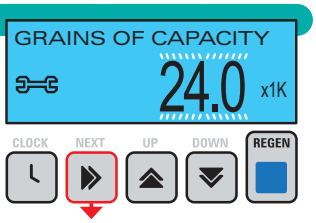


Step 8S

Press the ▲ or ▼to set the system capacity. The System Capacity setting should be based on the volume of resin and LBS of salt fill set in Step 7S.

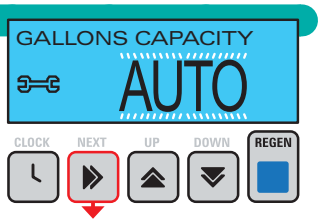
Press **NEXT** to go to Step 9S.

Press **REGEN** to return to previous step.



Step 9S

Set the Volume Capacity using the ▲ or ▼. If value is set to:



- "AUTO" = The control will automatically determine softening capacity and daily reserve
- "GAL" = The end user will manually determine softening capacity (less any fixed reserve) and enter it in this display
- "OFF" = Time clock regeneration

AUTO will not be an option with a filter sequence set in Step 2S. OFF will not be an option if 3IL is already set to OFF.

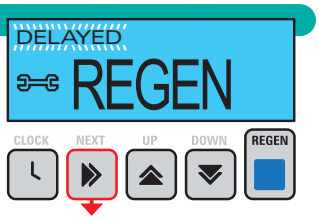
- "AUTO" is the Default.

Press **NEXT** to go to Step 10S.

Press **REGEN** to return to previous step.

Step 10S

Set Regeneration Type Options using ▲ or ▼. If value is set to:



- "DELAYED" = Means regeneration at a specified time;
- "IMMEDIATE" = Immediate regeneration at 0 capacity;
- "DELAY + IMMEDIATE" = Means delayed regeneration with override at 0 capacity. 10 minutes without water usage will trigger this override at 0 capacity, 1 hour maximum wait "DELAY + IMMEDIATE" setting is not available with 1.0T set in Configuration 2CS, Valve A, Valve B or System Controller set in Configuration 3CS.
- "DELAY" is the Default.

Press **NEXT** to go to Step 11S.

Press **REGEN** to return to previous step.

Step 11S

Set Relay 1 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 12S.

Press **REGEN** to return to previous step.

Softeners w/Brine Down Post Fill - Continued

Step 12S

Set Relay 2 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "ERROR" = Relay closes whenver the control enters the Error Mode and immediately reactivating once power is restored;
- "OFF" is the Default.

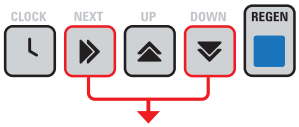
See Page 16 for Relay Settings.

Press **NEXT** to go to Step 13S.

Press **REGEN** to return to previous step.

Softeners w/Brine Up Pre Fill Setup

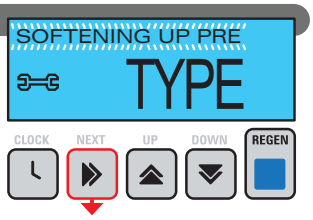
Step 1SS



Press any button to activate display. Press **NEXT** and ▼ simultaneously for 3 seconds and release. If the screen in **Step 2SS** does not appear, the lock on the valve is activated. To unlock see **Step 1IL, Page 4.**

See Dealer Lockout instructions on page 6 to enter password.

Step 2SS

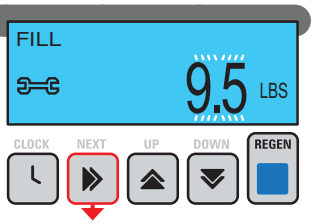


Choose SOFTENING UP PRE using ▲ or ▼.

Press **NEXT** to go to Step 3SS.

Press **REGEN** to exit Softener System Setup.

Step 3SS



Press the ▲ or ▼to select the pounds salt being used.

Press **NEXT** to go to Step 4SS.

Press **REGEN** to return to previous step.

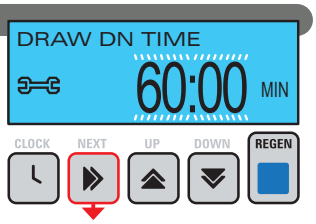
Step 4SS

Press the ▲ or ▼to select the duration of time prior to regeneration the brine tank is to be filled.

Press **NEXT** to go to Step 5SS.

Press **REGEN** to return to previous step.

Step 5SS



Press the ▲ or ▼to adjust the duration of Draw Down Time.

Press **NEXT** to go to Step 6SS.

Press **REGEN** to return to previous step.

Step 6SS

Press the ▲ or ▼to adjust the duration of the Backwash cycle.

Press **NEXT** to go to Step 7SS.

Press **REGEN** to return to previous step.

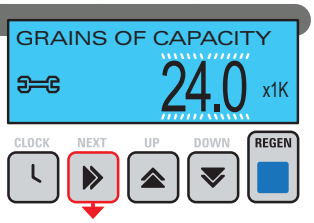
Step 7SS

Press the ▲ or ▼to adjust the duration of the Rinse cycle.

Press **NEXT** to go to Step 8SS.

Press **REGEN** to return to previous step.

Step 8SS

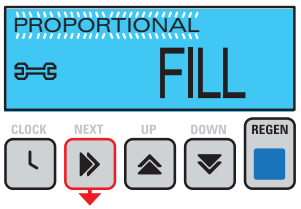


Press the ▲ or ▼to set the system capacity. The System Capacity setting should be based on the volume of resin and LBS of salt fill set in Step 3SS.

Press **NEXT** to go to Step 9SS.

Press **REGEN** to return to previous step.

Step 9SS



Using the ▲ or ▼adjust your fill setting. If the system is set up as a Up-flow Prefill softener the control valve can be set to normal or proportional brining.

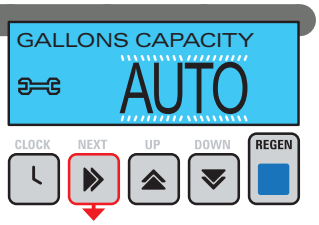
- **NORMAL FILL** - System always prefills with the salt level selected.
- **PROPORTIONAL FILL** - If proportional brining is selected, the actual salt fill time will be calculated by dividing the actual volume of treated water used by the full volumetric capacity, then multiplying this value by the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

Press **NEXT** to go to Step 10SS.

Press **REGEN** to return to previous step.

Softeners w/Brine Up Pre Fill Setup - Continued

Step 10SS



Set the Volume Capacity using the ▲ or ▼. If value is set to:

- "AUTO" = The control will automatically determine softening capacity and daily reserve
- "GAL" = The end user will manually determine softening capacity (less any fixed reserve) and enter it in this display
- "OFF" = Time clock regeneration

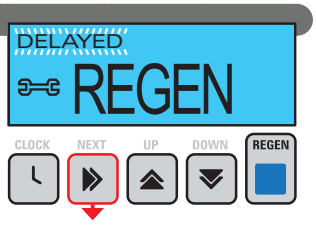
AUTO will not be an option with a filter sequence set in Step 2S. OFF will not be an option if 3IL is already set to OFF.

- "AUTO" is the Default.

Press **NEXT** to go to Step 11SS.

Press **REGEN** to return to previous step.

Step 11SS



Set Regeneration Type Options using ▲ or ▼. If value is set to:

- "DELAYED" = Means regeneration at a specified time;
- "IMMEDIATE" = Immediate regeneration at 0 capacity;
- "DELAY + IMMEDIATE" = Means delayed regeneration with override at 0 capacity. 10 minutes without water usage will trigger this override at 0 capacity, 1 hour maximum wait "DELAY + IMMEDIATE" setting is not available with 1.0T set in Configuration 2CS, Valve A, Valve B or System Controller set in Configuration 3CS.
- "DELAY" is the Default.

Press **NEXT** to go to Step 12SS.

Press **REGEN** to return to previous step.

Step 12SS

Set Relay 1 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 13SS.

Press **REGEN** to return to previous step.

Step 13SS

Set Relay 2 Options using ▲ or ▼. If value is set to:

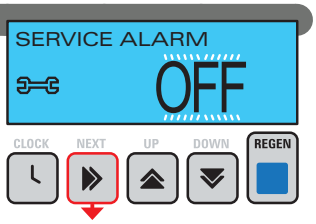
- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "ERROR" = Relay closes whenver the control enters the Error Mode and immediately reactivating once power is restored;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 14SS.

Press **REGEN** to return to previous step.

Step 14SS



Set Service Alarm 1 Trigger using ▲ or ▼. Select between TIME, GALLONS or BOTH.

- "OFF" is the Default.

See Page 17 for Alarm Settings.

Press **NEXT** to **EXIT** Softener Pre Fill Settings.

Press **REGEN** to return to previous step.

Salting Capacity Chart Per ft³				
Resin Volume Cubic Foot	**6#**	**9#**	**12#**	**15#**
1.0	20,000	24,000	27,000	30,000
1.5	30,000	36,000	40,500	45,000
2.0	40,000	48,000	54,000	60,000
2.5	50,000	60,000	67,500	75,000
3.0	60,000	72,000	81,000	90,000
4.0	80,000	96,000	108,000	120,000
5.0	100,000	120,000	135,000	150,000
6.0	120,000	144,000	162,000	180,000
7.0	140,000	168,000	189,000	210,000
8.0	160,000	192,000	216,000	240,000
9.0	180,000	216,000	243,000	270,000
10.0	200,000	240,000	270,000	300,000
12.0	240,000	288,000	324,000	360,000
15.0	300,000	360,000	405,000	450,000
20.0	400,000	480,000	540,000	600,000
25.0	500,000	600,000	675,000	750,000
30.0	600,000	720,000	810,000	900,000
35.0	700,000	840,000	945,000	1,050,000
40.0	800,000	960,000	1,080,000	1,200,000

Setting Options Table

Filters should only use shaded options

Mode	Volume Capacity	Regen Time Option	Day Override	Result[1]
Softening	Auto	Normal	1-28 days	Reserve capacity automatically estimated. Regeneration occurs when volume capacity falls below the reserve capacity at the next Regen Set Time.
Softening	Auto	Normal	OFF	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.
Softening or Filtering	20-1,500,000 Gallons	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	20-1,500,000 Gallons	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 the specified number of days is reached.
Softening	Auto 20-1,500,000 Gallons	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	20-1,500,000 Gallons	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	20-1,500,000 Gallons	Normal + On 0	1-28 Days	Regeneration occurs at the next regeneration time 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.

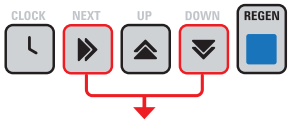
Regeneration Cycles & Times

	RANGE		
Cycle	Softening	Filtering Regen	Filtering Backwash
Backwash	0ff-120 minutes	0ff-120 minutes	0ff-120 min.
Regenerant Draw/Slow Rinse (UP or DN)	0ff-180 minutes	0ff-180 minutes	NA
Fast Rinse	0ff-120 minutes	0ff-120 minutes	0ff-120 min.
Regenerant Refill	0.1-200.0 lbs.	0ff-99.0 GAL	NA
Regenerant Refill 2.0 or 1.5 set to MIN (softening only)	0.1-99.0 minutes	0.1-99.0 minutes	NA
Service	1-480 minutes	NA	NA

Filter System Setup

Step 1F

Press any button to activate display. Press **NEXT** and ▼ simultaneously for 3 seconds and release. If the screen in **Step 2F** does not appear, the lock on the valve is activated.



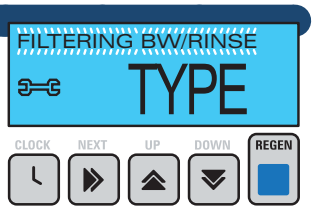
To unlock see **Step 1IL, Page 4**.

Step 2F

Choose FILTERING BACKWASH or FILTERING DOWN POST (see table) using ▲ or ▼.

Press **NEXT** to go to Step 3F.

Press **REGEN** to exit Filter System Setup.



Step 3F

Select the Backwash Time for the first cycle using ▲ or ▼.

Press **NEXT** to go to Step 4F.

Press **REGEN** to return to previous step.

Step 4F

Select the Rinse Time for the second cycle using ▲ or ▼.

If Step 2F is set to FILTERING REGEN, press **NEXT** to program the rest of the cycle times/gallons.

If Step 2F is set to FILTERING BACKWASH, press **NEXT** to go to Step 5F.

Press **REGEN** to return to previous step.

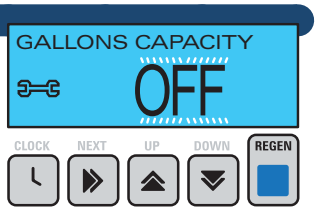
Step 5F

Set Regeneration trigger using ▲ or ▼. If value is set to:

- "GAL" = The end user will manually determine trigger capacity (less any fixed reserve) and enter it in this display;
- "OFF" = Time clock regeneration (w/o flow meter);
- "1000" is the Default.

Press **NEXT** to go to Step 6F.

Press **REGEN** to return to previous step.



Step 6F

Set Relay 1 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 7F.

Press **REGEN** to return to previous step.

Step 7F

Set Relay 2 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "ERROR" = Relay closes whenver the control enters the Error Mode and immediately reactivating once power is restored;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 8F.

Press **REGEN** to return to previous step.

Step 8F

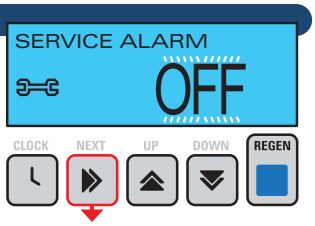
Set Service Alarm 1 Trigger using ▲ or ▼. Select between TIME, GALLONS or BOTH.

- "OFF" is the Default.

See Page 17 for Alarm Settings.

Press **NEXT** to **EXIT** Softener Pre Fill Settings.

Press **REGEN** to return to previous step.



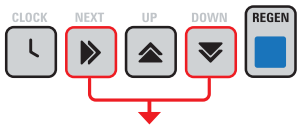
Filter System Setup - Continued

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

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

AIO System Settings

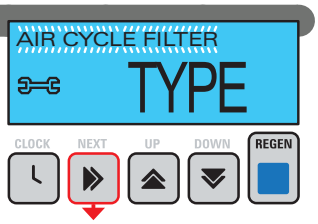
Step 1AIO



Press any button to activate display. Press **NEXT** and ▼ simultaneously for 3 seconds and release. If the screen in **Step 2F** does not appear, the lock on the valve is activated.

To unlock see **Step 1IL, Page 4**.

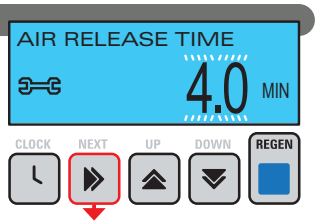
Step 2AIO



Use ▲ or ▼ to select AIR CYCLE FILTERING.

Press **NEXT** to go to Step 3AIO.

Step 3AIO



Use ▲ or ▼ to adjust first cycle air release time.

While in Regen, during Air Release, time counts down only during periods of non-flow up to a maximum of 20 minutes. If after 20 minutes the air release countdown has not yet reached zero, the control will skip the remaining air release time and continue on to the next Regen cycle step in the sequence. With Step 8AIO set to OFF (Time Clock Mode), this flow delay feature is inactive. During Regen, when Air Release occurs, Regen Screen 3 will be active.

Press **NEXT** to go to Step 4AIO.

Press **REGEN** to return to previous step.

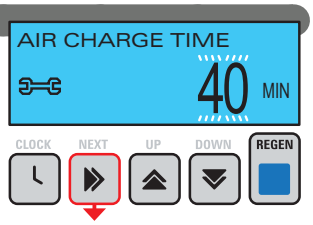
Step 4AIO

Use ▲ or ▼ to adjust second cycle backwash time.

Press **NEXT** to go to Step 5AIO.

Press **REGEN** to return to previous step.

Step 5AIO



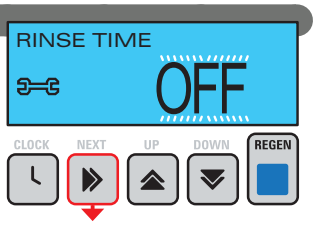
Use ▲ or ▼ to set third cycle air charge duration.

The direction of brining "DN" will NOT alternate with the current duration setting.

Press **NEXT** to go to Step 6AIO.

Press **REGEN** to return to previous step.

Step 6AIO

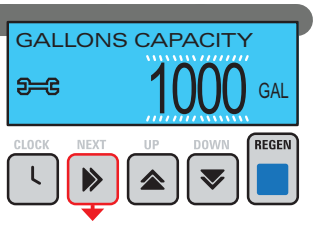


Use ▲ or ▼ to set fourth cycle to OFF.

Press **NEXT** to go to Step 7AIO.

Press **REGEN** to return to previous step.

Step 7AIO

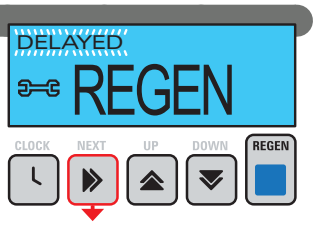


Use ▲ or ▼ to set regen trigger capacity (less any fixed reserve).

Press **NEXT** to go to Step 8AIO.

Press **REGEN** to return to previous step.

Step 8AIO



Use ▲ or ▼ to set Regeneration type.

"Immediate" = Immediate Regeneration @ 0 capacity without service flow delay.

However, w/Day Override initiated regenerations, Regen will not initiate until there is no service flow for at least 10 minutes.

"NORMAL" = Delayed regeneration @ specified time with service flow delay.

While in Air Cycle Mode and set to Delayed, Regen will not initiate until there is no service flow for at least 10 minutes. With Step 8AIO set to Off (Time Clock Mode), this flow delay feature is inactive.

Press **NEXT** to go to Step 9AIO.

Press **REGEN** to return to previous step.

Step 9AIO

Set Relay 1 Options using ▲ or ▼. If value is set to:

- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 10AIO.

Press **REGEN** to return to previous step.

AIO System Settings - Continued

Step 10AIO

Set Relay 2 Options using ▲ or ▼. If value is set to:

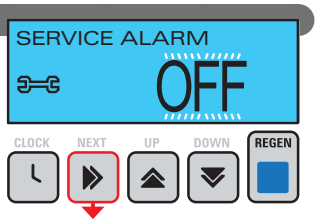
- "TIME" = This relay closes a set time after the start of regeneration, activation time referenced to start of the backwash or up-flow/down-flow brine whichever comes first;
- "GALLONS" = Relay closes every set number of gallons while in service;
- "REGEN GALLONS" = Relay closes every set number of gallons while in service or regeneration;
- "ERROR" = Relay closes whenver the control enters the Error Mode and immediately reactivating once power is restored;
- "OFF" is the Default.

See Page 16 for Relay Settings.

Press **NEXT** to go to Step 11AIO.

Press **REGEN** to return to previous step.

Step 11AIO



Set Service Alarm 1 Trigger using ▲ or ▼. Select between TIME, GALLONS or BOTH.

OFF is the Default

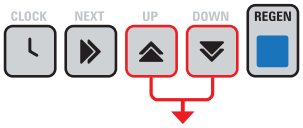
See Page 17 for Alarm Settings.

Press **NEXT** to **EXIT** Filter AIO Settings.

Press **REGEN** to return to previous step.

Diagnostics

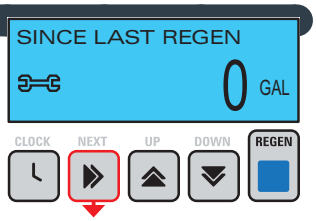
Step 1D



Press any button to activate display. Press ▲ and ▼ simultaneously for 3 seconds and release. If the screen in **Step 2D** does not appear, the lock on the valve is activated.

To unlock see **Step 1IL, Page 4**.

Step 2D

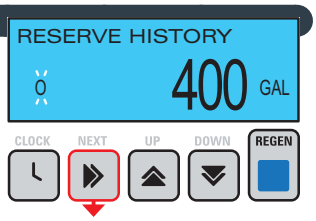


Displays the days since the last regeneration cycle.

Press **NEXT** to go to Step 3D.

Press **REGEN** to exit history.

Step 3D

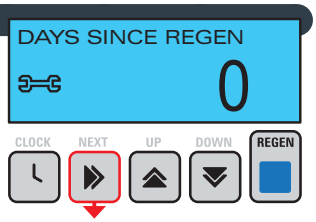


Displays the gallons since the last regeneration cycle.

Press **NEXT** to go to Step 4D.

Press **REGEN** to exit history.

Step 4D



Displays the Reserve History. Use the ▲ or ▼ buttons to review past reserve capacities.

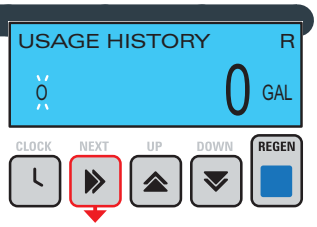
- "0" = Basic Reserve for the current day based on that days usage for the previous 4-6 weeks;
- "1" = Reserve for yesterday;
- "6" = Reserve for 6 days ago;

Display viewed only when the reserve capacity is determined by the control.

Press the **NEXT** button to go to Step 5D.

Press **REGEN** to return to previous step.

Step 5D



Displays the Usage History. Use the ▲ or ▼ buttons to review past usage.

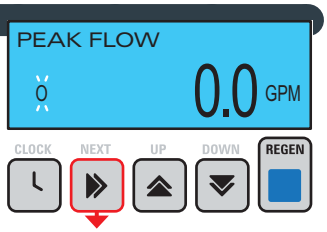
- "0" = Today;
- "1" = Yesterday;
- "63" = 63 days ago (max);
- "R" = Is shown for the 24 hour time period in which regeneration occured;

T1 and T2 usage for this day is combined in this display (1.0T Mode Only).

Press the **NEXT** button to go to Step 6D.

Press **REGEN** to return to previous step.

Step 6D



Displays the Max Flow Rate History for the past 7 days. Use the ▲ or ▼ buttons to select the day.

Reset by pushing both the ▲ and ▼ buttons simultaneously for 3 seconds. If configuration 3 is set to ALT A or B and the valve is currently in Standby, this display will be viewed but will not update.

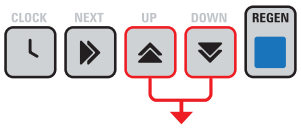
Press **NEXT** to Exit Diagnostic Level.

Press **REGEN** to return to previous step.

Controller History

Step 1H

Press any button to activate display. Press ▲ and ▼ simultaneously for 3 seconds and release. Press ▲ and ▼ simultaneously for 3 seconds again and release. If the screen in **Step 2H** does not appear, the lock on the valve is activated.



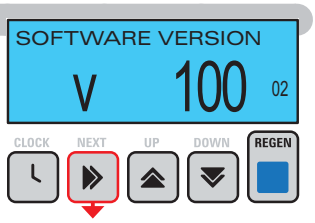
To unlock see **Step 1IL, Page 4**.

Step 2H

Displays the current software version programmed.

Press **NEXT** to go to Step 3H.

Press **REGEN** to exit history.

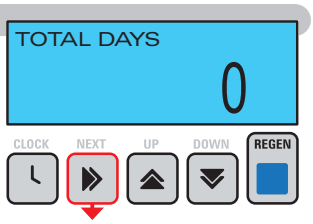


Step 3H

Displays the total days since valve startup. Time accumulates only when unit is plugged in.

Press **NEXT** to go to Step 4H.

Press **REGEN** to return to previous step.

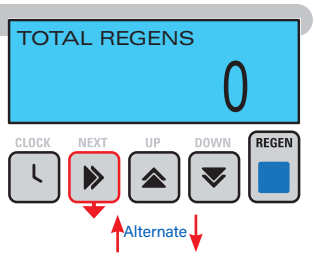


Step 4H

Displays the total number of regenerations since valve startup.

Press **NEXT** to go to Step 4H.

Press **REGEN** to return to previous step.

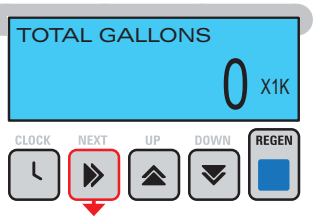


Step 5H

Displays the total gallons used since valve startup.

Press **NEXT** to go to Step 4H.

Press **REGEN** to return to previous step.

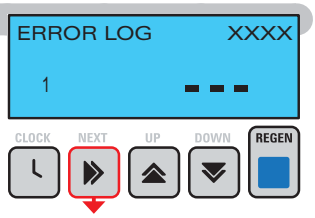


Step 6H

Displays the Error Log. Use the ▲ or ▼ buttons to review the last 10 loged error codes. With logged drive errors, motor position at the time of error detection is recorded in the top line of this display.

Press **NEXT** to Exit History Level.

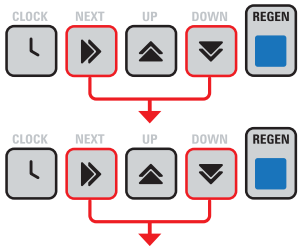
Press **REGEN** to return to previous step.



Configuration Settings

Step 1CS

Press any button to activate display. Press **NEXT** and ▼ simultaneously for 3 seconds and release. Press **NEXT** and ▼ simultaneously for 3 seconds again and release. If the screen in **Step 2CS** does not appear, the lock on the valve is activated.



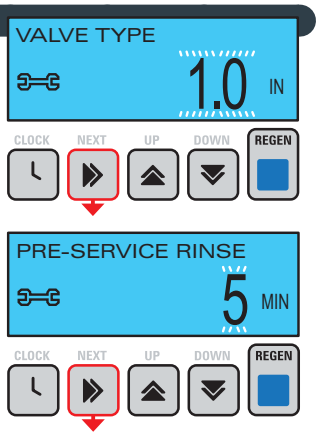
To unlock see **Step 1IL, Page 4**.

Step 2CS

Displays Valve Type. Use ▲ or ▼ to select 1.0 for 1" valve, 1.25 for 1.25" valve, 1.5 for 1.5" valve, 2.0 for 2" valve or 1.0T for twin valve. With 1.0T set, meter calibration will be fixed, with a differnet value for each tank. With 1.0T set, the Pre-Service Rinse setting will be viewed instead of Configuration 3CS. Default is 1.0.

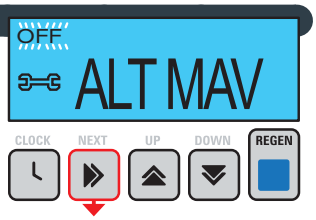
Press **NEXT** to go to Step 3CS.

Press **REGEN** to **EXIT** Configuration Settings.



Step 3CS

Use ▲ or ▼ to select the ALT MAV Output Operation.



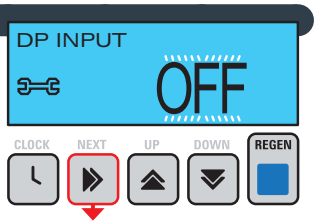
- "VALVE A or VALVE B" = Configures a 2-unit alternator system. With delayed alternator systems at 0 capacity, a unit transfers offline immediately, then waits for regeneration until Regen Time. Time Since Regen only reactivates on return to Service;
- "NO HARD BYPASS" = NHBP system with Bypass for part of regeneration cycle;
- "SEPARATE SOURCE" = NHBP system with Bypass for the full regeneration cycle;
- "SYSTEM CONTROLLER" = Configures board to operate as part of a non-alternator system;
- "PROGRESSIVE FLOW" = Configures board to operate multiple valves for progressive flow system;
- "OFF" is the Default.

Press **NEXT** to go to Step 4CS.

Press **REGEN** to return to previous step.

Configuration Settings - Continued

Step 4CS



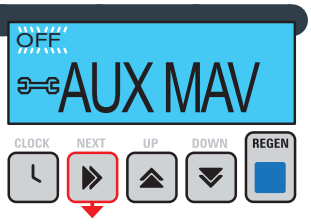
Use ▲ or ▼ to select the AUX MAV Output Operation.

- "TIME" = Output changes state at a set tiem referenced to the start of regenertion, for a preset duration of time independent of actual regeneration status;
- "SEPARATE SOURCE" = Configures a separate source NHBP system, with Bypass for the full regeneration cycle;
- "OFF" is the Default.

Press **NEXT** to go to Step 5CS.

Press **REGEN** to return to previous step.

Step 5CS



Use ▲ or ▼ to select the Auxillary (DP) Input Operation.

- "IMMED reg" = Input signal triggers an immediate regeneration after 2 minutes;
- "DELAY reg" = Input signal triggers a delayed regeneration after 2 minutes;
- "HOLD reg" = Input signal delays the start of regeneration until the signal is removed. Removing this signal for 15 sec minimum/non-cumulative, allows immediate regeneration, but skips delayed regeneration until Regeneration Time;
- "OFF" is the Default.

Press **NEXT** to go to Step 6CS.

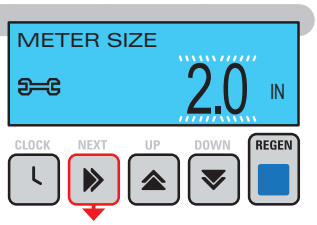
Press **REGEN** to return to previous step.

Twin Softener Valve Programming Steps

Configuration Settings	Step 5CS	Set to ALT A Connect the outlet plumbing of ALT A valve to the MAV's A port and connect the MAV's two pin wire connector to the two pin connector labeled "DRIVE" on the ALT A valve	Set to ALT b Connect the outlet plumbing of ALT B valve to the MAV's B port. No electrical connections are required between the ALT b valve and the MAV.
Softener System Setup	Step 10S	Set System Capacity	Set System Capacity
Softener System Setup	Step 11S	Set to 'AUTO'	Set to 'AUTO'
Softener System Setup	Step 12S	Set regeneration time option to 'on 0.'	Set regeneration time option to 'on 0.'
Installer Display Settings	Step 3i	Set Day Override to "oFF"	Set Day Override to "oFF"

Conditional Configuration Screens

Step 1CCS



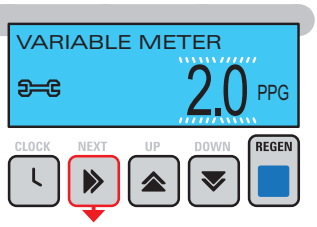
Using the ▲ or ▼ buttons, select the meter size, 1.5, 2.0, 3.0, 1.0r or VARIABLE METER.

Setting viewed when 2.0 or 1.5 are set in 2CS. When set to VARIABLE METER enter pulses per gallon.

Press **NEXT** to go to Step 2CCS.

Press **REGEN** to **EXIT** Configuration Settings.

Step 2CCS



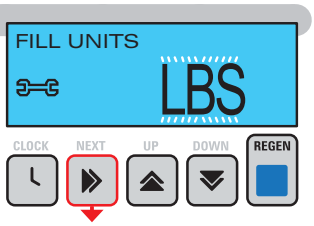
Setting viewed with VARIABLE METER option set. Set meter calibration in pulses per gallon.

- "DEFAULT" = 2.0 PPG

Press **NEXT** to go to Step 3CCS.

Press **REGEN** to return to previous step.

Step 3CCS



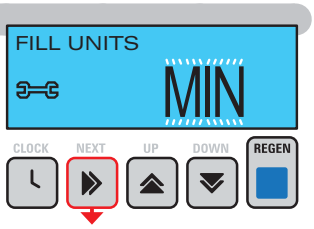
Display viewed when set to pounds of NaCL. Display only viewed in softener systems with Configuration 1 set to 1.5 IN and Fill is currently part of the regeneration cycle sequence.

- "DEFAULT" = LBS.

Press **NEXT** to go to Step 4CCS.

Press **REGEN** to return to previous step.

Step 4CCS



Display viewed when set to minutes of Fill. Display only viewed in softener systems with Configuration 1 set to 1.5 IN and Fill is currently part of the regeneration cycle sequence.

- "DEFAULT" = LBS.

Press **NEXT** to **EXIT** Configuration Settings.

Press **REGEN** to return to previous step.

Conditional User Screens

Conditional User 1

DP Regeneration Signal Status. Present only when DP switch contacts are closed with IMMEDreg or DELAYreg set in Configuration 5.

Conditional User 2

DP Hold Signal Status. Present only when DP switch controls are closed with HOLD reg set in Configurtion 5. This display takes precedence over USER 3 or 4

Service Alert 1

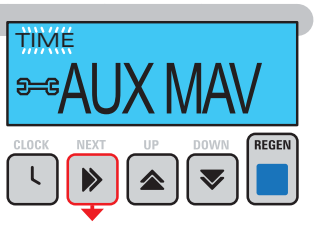
Scheduled Service Alert 1. Service Alarm 1 and 2 Screen WITHOUT a Contact Shown in User 5. Reset this display by pushing and holding both the ▲ and ▼ buttons for 3 seconds.

Service Alert 2

Service Alarm 1 and 2 Screen WITH a Contact Shown in User 5. While in Service Alarm Mode, these two screens will alternate being viewed. The top screen indicates that a service alarm has been triggered. The top line of the lower screen contains the set contact phone number, the large bottom line contains the set contact name. (NNNNNNN) scrolls. While either screen is viewed, push and hold both the ▲ and ▼ buttons for 3 seconds will reset the screen and its associated trigger.

Conditional Aux MAV Screens

Step 1AUX MAV Screens



Auxillary MAV Drive set to operate in Time Mode. Aux MAV transitions to Bypass at a set time referenced to the start of regeneration, AFTER Valve Motor deactivation. Aux MAV transitions back to Service at the completion of the preset duration time. The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening or Filtering. Aux MAV will automatically return to Service with power loss or when the REGEN Button is pushed DURING Bypass.

Press **NEXT** to go to Step 2AUX.

Press **REGEN** to **EXIT** Configuration Settings.

Step 2AUX MAV Screens

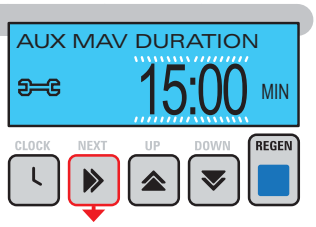
Set the start time for the Aux MAV transitioin to Bypasss. Setpoit referenced to start of the first backwash or up-flow/down-flow brine cycle, whichever comes first.

- "DEFAULT" = 10:00 MIN.

Press **NEXT** to go to Step 3AUX.

Press **REGEN** to return to previous step.

Step 3AUX MAV Screens



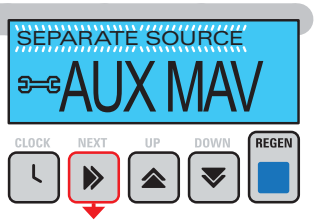
Set duration of Aux MAV transition to Bypass.

- "DEFAULT" = 15:00 MIN.

Press **NEXT** to go to Step 4AUX.

Press **REGEN** to return to previous step.

Step 4AUX MAV Screens



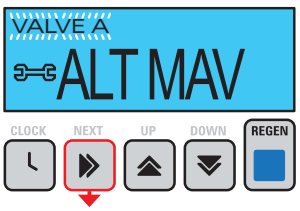
Auxillary MAV Drive set to operate in Separate Source Mode. Aux MAV transitions to Bypass before the start of Regen Cycle #1, AFTER Alt MAV Motor transition. Aux MAV transitions back to Service at the completion of the last programmed regen cycle, once the Valve Motor deactivates and BEFORE Alt MAV transition (if scheduled). Aux MAV will NOT automatically return to Service while manually stepping valve throught regeneration, or after power loss. MAV will instead remain in Byupass until regeneration cycle end.

Press **NEXT** to **EXIT** Configuration Settings.

Press **REGEN** to return to previous step.

Conditional Alternator MAV Screens

Step 1ALT MAV Screen



Alternator MAV set to operate as part of an alternator system.

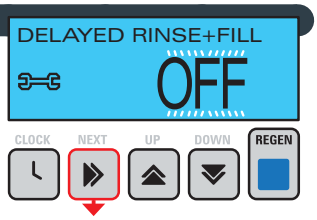
MAV gear retracted IN for Valve A in Service, Valve B in Standby.

MAV gear extended OUT for Valve A in Standby, Valve B in Service.

Press **NEXT** to go to Step 2ALT MAV.

Press **REGEN** to **EXIT** Configuration Settings.

Step 2ALT MAV Screen



Displays Alternator System Type.

- "ON" = Valve wil proceed with last 2 steps of regeneration (Rinse + Fill) just prior to a retrun to Service. Priot to that time, upon completion of the initial regeneration cycle steps, the valve will enter Standby;
- "OFF" = Standard alternator system operation, without delays between any cycle steps;
- "OFF" is the Default.

Press **NEXT** to go to Step 3ALT MAV.

Press **REGEN** to return to previous step.

Conditional Alternator MAV Screens - Continued

Step 3ALT MAV Screen

Alternator MAV set to operate as part of an alternator system.

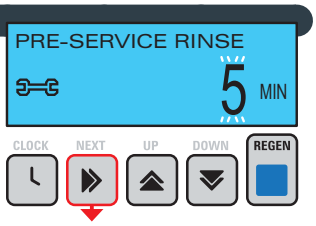
MAV gear retracted IN for Valve A in Service, Valve B in Standby.

MAV gear extended OUT for Valve A in Standby, Valve B in Service.

Press **NEXT** to go to Step 4ALT MAV.

Press **REGEN** to **EXIT** Configuration Settings.

Step 4ALT MAV Screen



Displays Alternator System Type.

Valve Motor Drive set to operate in Pre-Service Rinse Mode.

- "w/DURATION SET" = Valve in Standby drives to the Rinse Position for a set duration just prior to Service return. This duration is selectable from 1-20 minutes in 1 minute increments, including OFF;
- "OFF" = Standard alternator system operation, without any rinse prior to Service return;
- "DEFAULT" = OFF (1.0T Valve Type);
- "DEFAULT" = 5 minutes (2.0 Valve Type).

Press **NEXT** to go to Step 5ALT MAV.

Press **REGEN** to return to previous step.

Step 5ALT MAV Screen

Alternator MAV set to operate in No Hard Water Bypass Mode.

Bypass begins at the start of the first cycle step encountered that is NOT Fill, or at the end of SOFTENING or FILTERING in Pre-Fill systems. Bypass ends at the beginning of Fill in Post-Fill systems, or after the last cycle step has ended in Pre-Fill systems.

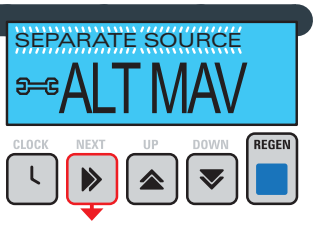
MAV gear extended OUT for service.

MAV gear retracted IN for bypass.

Press **NEXT** to go to Step 6ALT MAV.

Press **REGEN** to **EXIT** Configuration Settings.

Step 6ALT MAV Screen



Alternator MAV set to operate in Separate Source Mode.

Bypass begins in Post-Fill and Pre-Fill systems before the initial drive to the first cycle step. Bypass then continues until after the last cycle step has ended.

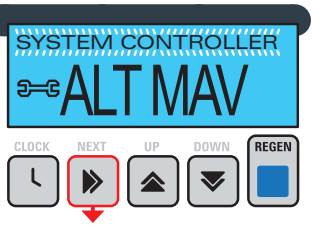
MAV gear extended OUT for service.

MAV gear retracted IN for bypass.

Press **NEXT** to go to Step 7ALT MAV.

Press **REGEN** to return to previous step.

Step 7ALT MAV Screen



Alternator MAV set to operate in System Controller Mode as part of a non-alternator system.

MAV gear extended OUT for service.

MAV gear retracted IN for bypass.

Press **NEXT** to **EXIT** Configuration Settings.

Press **REGEN** to return to previous step.

Step 8ALT MAV Screen

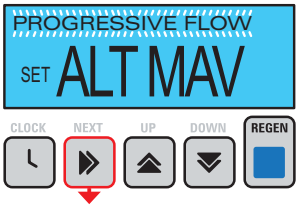
PROGRESSIVE FLOW SETUP

For proper progressive flow operation, three-wire communication cables are required to connected to each valve in the system via the 3-pin Comm Cable connector.

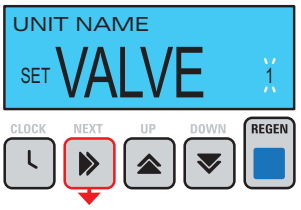
The available communication cables are:

1. **CL-COM-12** WS Alt Connect Cord 12 ft (For 2-Valve Progressive Flow Systems)
2. **CL-PROG-3** Cable Prog Flow Triple 8 ft (For 3-Valve Progressive Flow Systems)
3. **CL-PROG-4** Cable Prog Flow Quad 8 ft (For 4-Valve Progressive Flow Systems)

NOTE: All cabling must be connected before starting initial valve programming.



Select Progressive Flow from the Alt MAV Output Operation display. Operation in Progressive Flow Mode requires 2 to 4 valves plumbed in parallel, each with a separate flow meter and No Hard Water Bypass unit.



Press **NEXT** to go to the UNIT NAME display. Set the UNIT NAME as required by the position of the control valve in the system. Each Valve needs to be set to Progressive Flow and have different addresses, 1, 2, 3, and 4. Valve 1 will be the controlling valve of the system.

If setting Valve 1, press **NEXT** to go to the ADD ANOTHER UNIT display and set the required flow rate adder value. The ADD ANOTHER UNIT setting will add or subtract the number of units currently in service, based on the overall flow rate through the system. The ADD ANOTHER UNIT screen will only appear on Valve 1.

Complete valve setup by pressing **NEXT** to advance through the remaining displays and make any other required changes prior to exiting programming.

Conditional Relay Screens

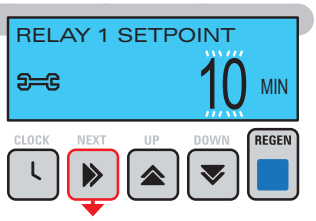
Step 1RS

Relay 1 set to operate in a Time Mode. Relay activates at a set time referenced to the start of regeneration. Relay deactivation is at the completion of the preset duration time. The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening, or Filtering. Relay operation during regen is immediately concluded when the REGEN button is pushed, or after power loss DURING Relay 1 activation. If OFF is selected, the next two screeens do not appear.

Press **NEXT** to go to Step 2RS.

Press **REGEN** to **EXIT** Configuration Settings.

Step 2RS



Set relay activation time from the start of regen.

Press **NEXT** to go to Step 3RS.

Press **REGEN** to return to previous step.

Step 3RS

Set duration of relay activation.

Press **NEXT** to go to Step 12S.

Press **REGEN** to return to previous step.

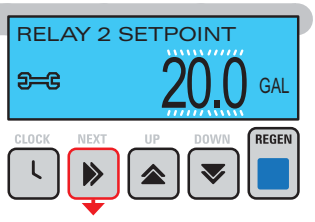
Step 4RS

Relay 2 set to operate in a Volume Mode during Normal Operation only. Relay activation is after the preset amount of service flow has been registered. Relay deactivation is at the completion of the preset duration time, or after the meter stops registering flow, whichever comes first. Setting not available with 1.0T set in 2CS.

Press **NEXT** to go to Step 5RS.

Press **REGEN** to **EXIT** Configuration Settings.

Step 5RS



Set relay activation volume.

Press **NEXT** to go to Step 6RS.

Press **REGEN** to return to previous step.

Step 6RS

Set duration of relay activation.

Press **NEXT** to go to Step 13S.

Press **REGEN** to return to previous step.

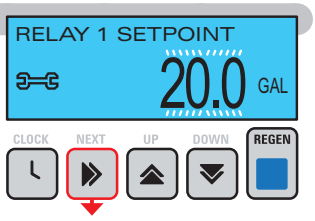
Step 7RS

Relay 1 set to operate in a Volume Mode during Normal Operation as well as Regeneration. Relay activation is after the preset amount of flow has been registered. Relay deactivation is at the completion of the set duration time, or after the meter stops registering flow, whichever comes first. Setting not available with Valve A or B set in Configuration 2.

Press **NEXT** to go to Step 5RS.

Press **REGEN** to **EXIT** Configuration Settings.

Step 8RS



Set relay activation volume.

Press **NEXT** to go to Step 6RS.

Press **REGEN** to return to previous step.

Step 9RS

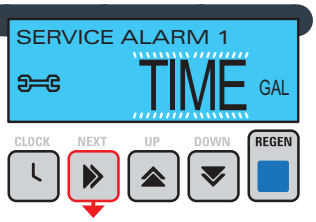
Set duration of relay activation.

Press **NEXT** to go to Step 12S.

Press **REGEN** to return to previous step.

Conditional Service Alarm

Step 1SA

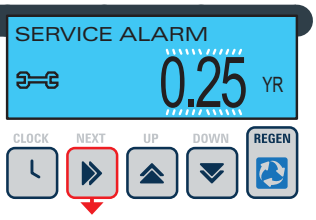


A Service Alarm is triggered by the passing of the amount of time as set in the next display.

Press **NEXT** to go to Step 6SA.

Press **REGEN** to **EXIT** Configuration Settings.

Step 2SA

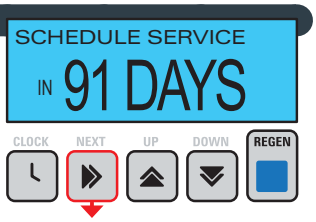


Set the duration between scheduled service calls based on the previously chosen format..

Press **NEXT** to go to Step 3SA.

Press **REGEN** to return to previous step.

Step 3SA

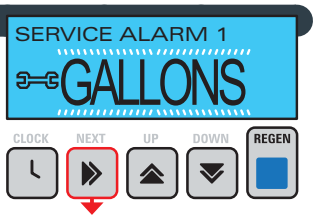


Time remaining to service alarm. To reset this value back to the initial value press ▲ and ▼ simultaneously for 3 seconds.

Press **NEXT** to go to Step 14S.

Press **REGEN** to return to previous step.

Step 4SA

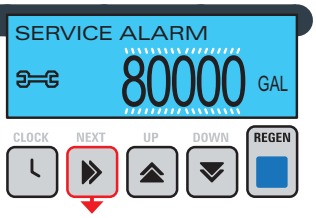


A Service Alarm is trigered by the amount of treated water usage as set in the next display.

Press **NEXT** to go to Step 5SA.

Press **REGEN** to return to previous step.

Step 5SA

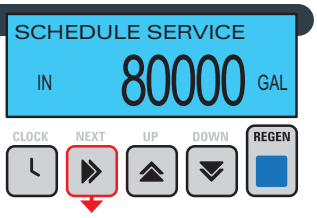


Set the duration between scheduled service calls based on the previously chosen format.

Press **NEXT** to go to Step 6SA.

Press **REGEN** to return to previous step.

Step 6SA

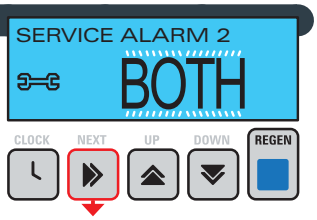


Time remaining to service alarm. To reset this value back to the initial value press ▲ and ▼ simultaneously for 3 seconds.

Press **NEXT** to go to Step 14S.

Press **REGEN** to return to previous step.

Step 7SA

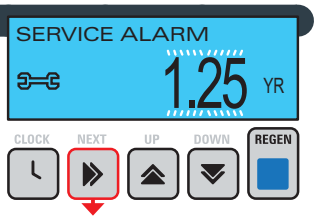


Service Alarm set to Both Mode. A Service Alarm is triggered by the passing of the amount of time as set in 8SA or by the settings in 9SA.

Press **NEXT** to go to Step 8SA.

Press **REGEN** to return to previous step.

Step 8SA

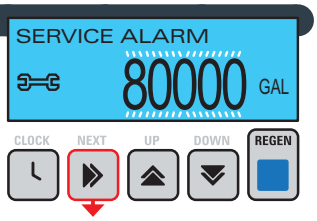


Set the duration between scheduled service calls based on the previously chosen format.

Press **NEXT** to go to Step 9SA.

Press **REGEN** to return to previous step.

Step 9SA

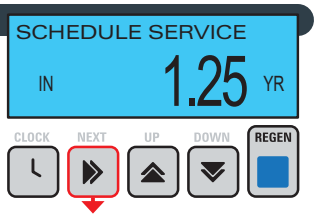


Set the duration between scheduled service calls based on the previously chosen format.

Press **NEXT** to go to Step 10SA.

Press **REGEN** to return to previous step.

Step 10SA

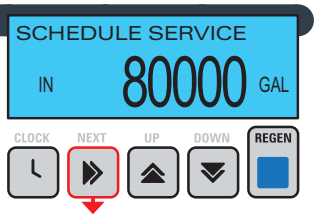


Time remaining to service alarm. To reset this value back to the initial value press ▲ and ▼ simultaneously for 3 seconds.

Press **NEXT** to go to Step 11SA.

Press **REGEN** to return to previous step.

Step 11SA



Time remaining to service alarm. To reset this value back to the initial value press ▲ and ▼ simultaneously for 3 seconds.

Press **NEXT** to go to Step 14S.

Press **REGEN** to return to previous step.

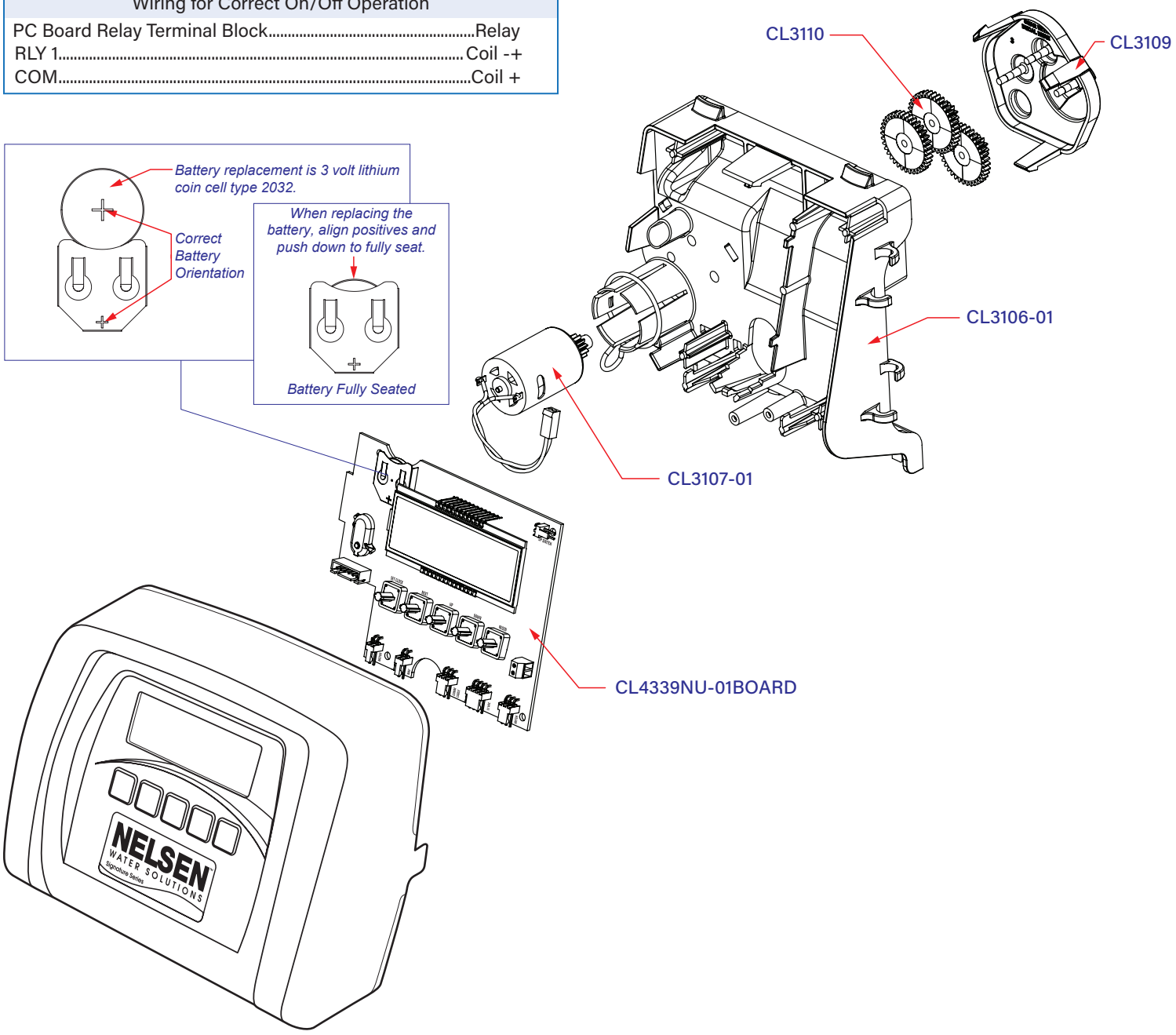
Front Cover and Drive Assembly

Part No.	Description	Qty
NWS4174-01G	NWS Front Cover	1
CL3107-01	Motor Assembly	1
CL3106-01	Drive Bracket & Spring Clip	1
CL4339NU-01BOARD	1" thru 2" NWS PCB 5 Digit Rpl Board	1
CL3110	Drive Reducing Gear 12 x 36	3
CL3109	Drive Gear Cover	1
CL3002TC	TC Drive Assembly	*
	Not Shown	
CL3186	AC Adapter 120V-12V	1
CL3186-01	AC Adapter Cord Only	1

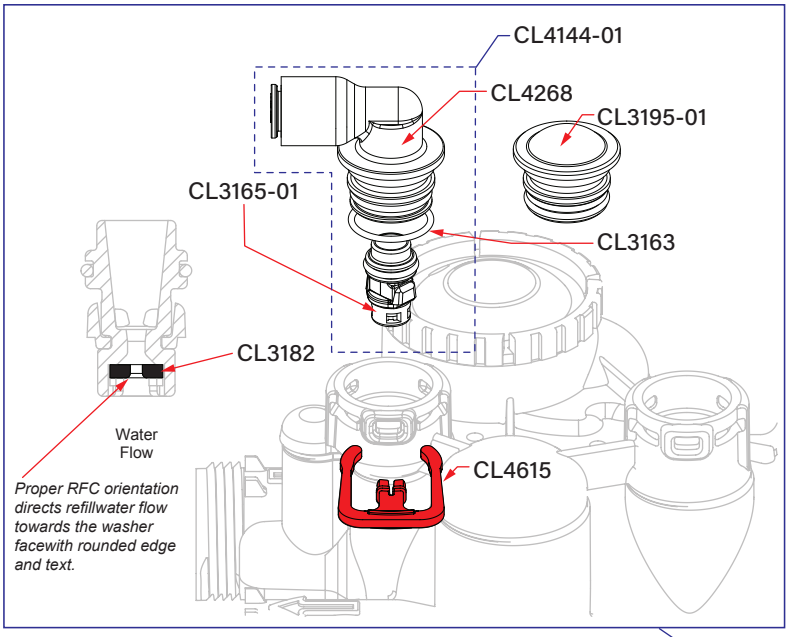
Relay Specifications: 12V DC Relay with a coil resistance not less than 80 ohms. If mounting relay under the cover, check for proper mounting dimensions on the backplate.

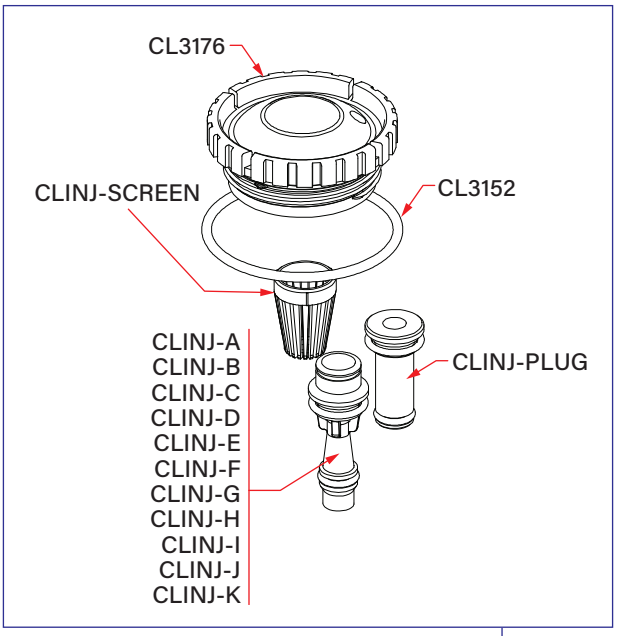
Wiring for Correct On/Off Operation

PC Board Relay Terminal Block.....Relay
RLY 1.....Coil -+
COM.....Coil +

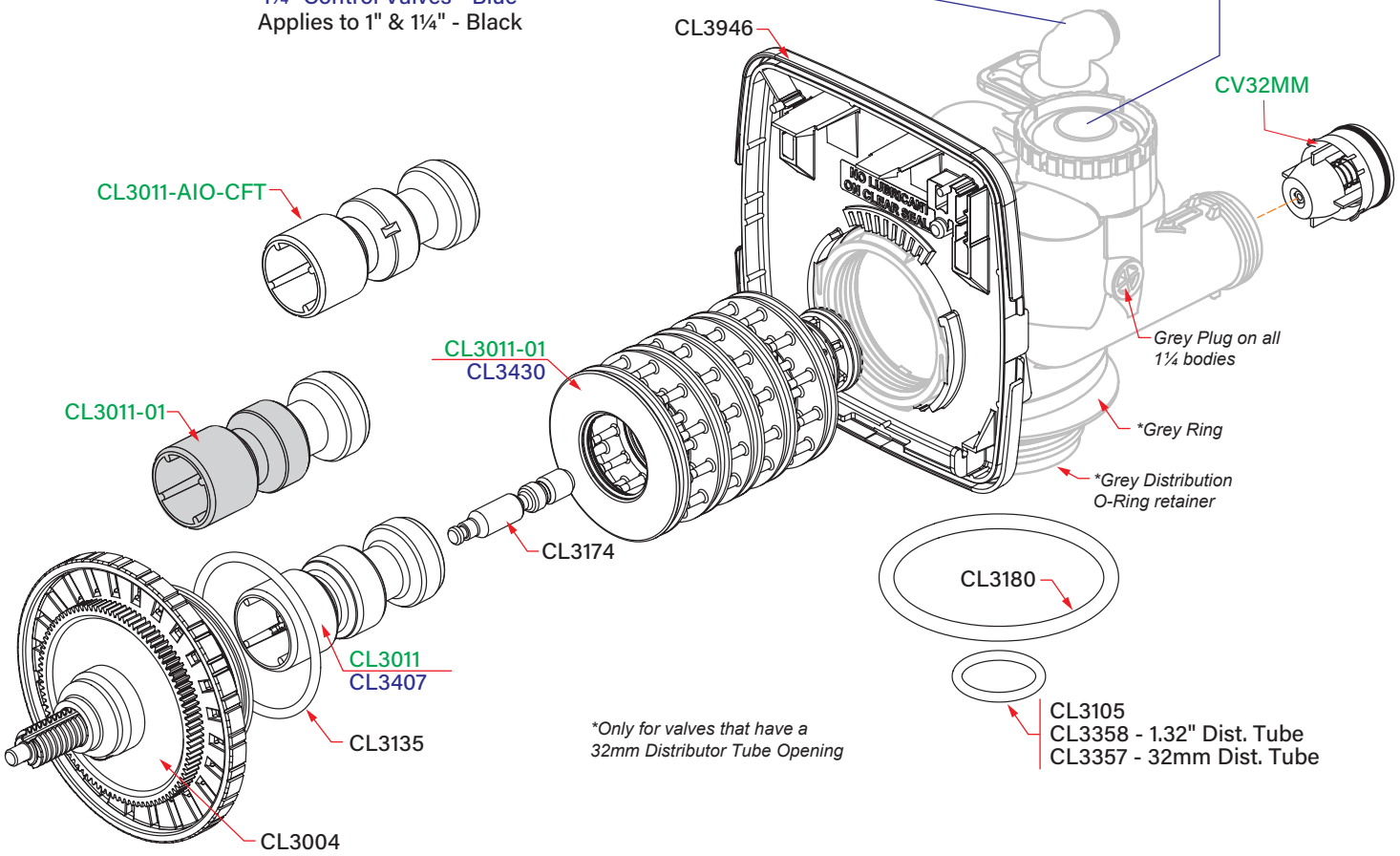


Drive Cap - Spacer Assembly

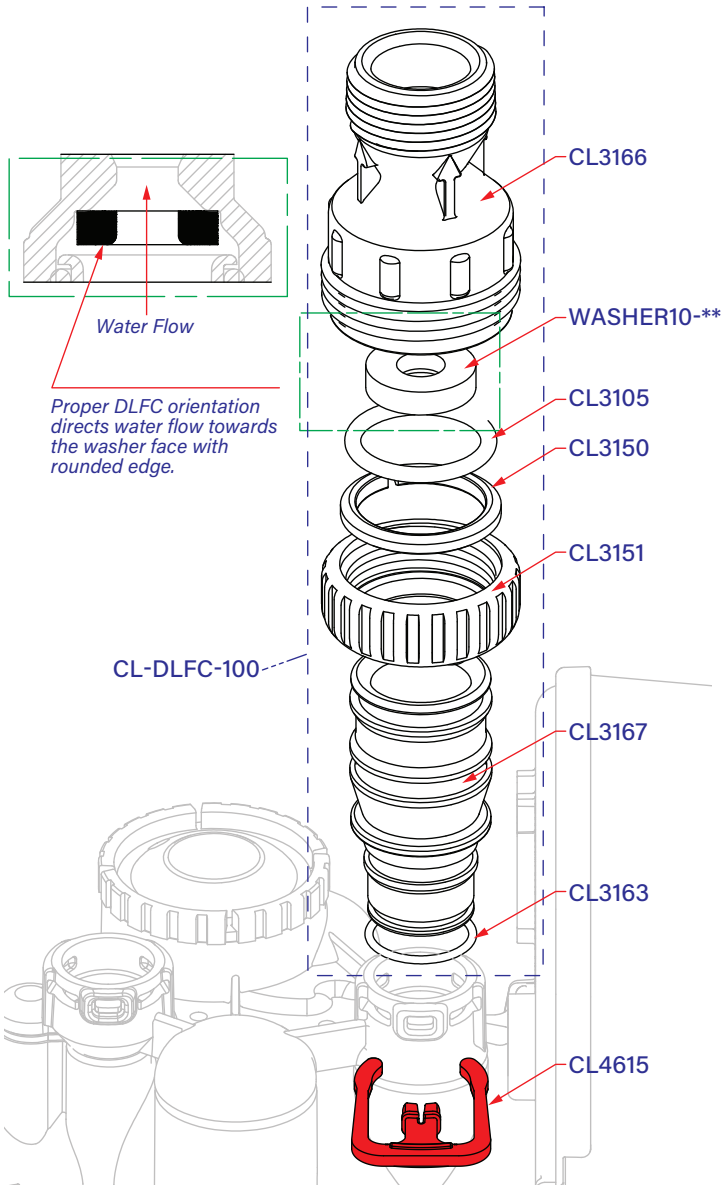




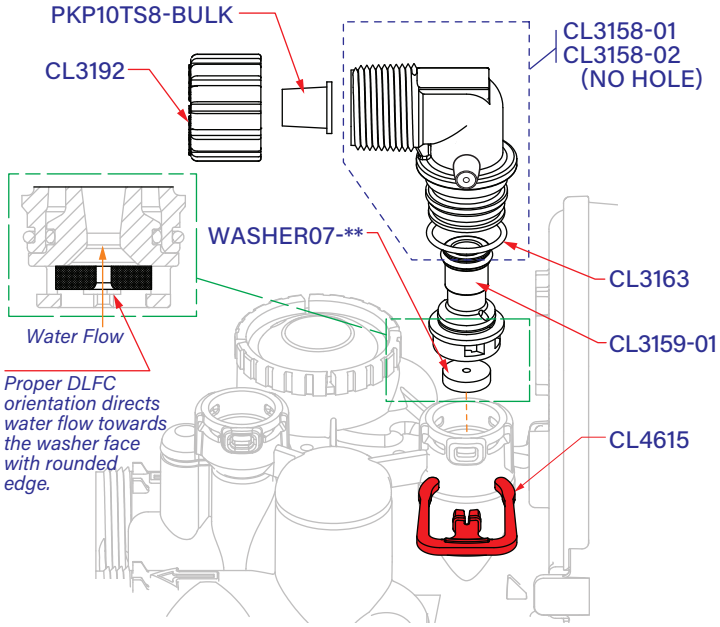
1" Control Valves - Green
1¼" Control Valves - Blue
Applies to 1" & 1¼" - Black



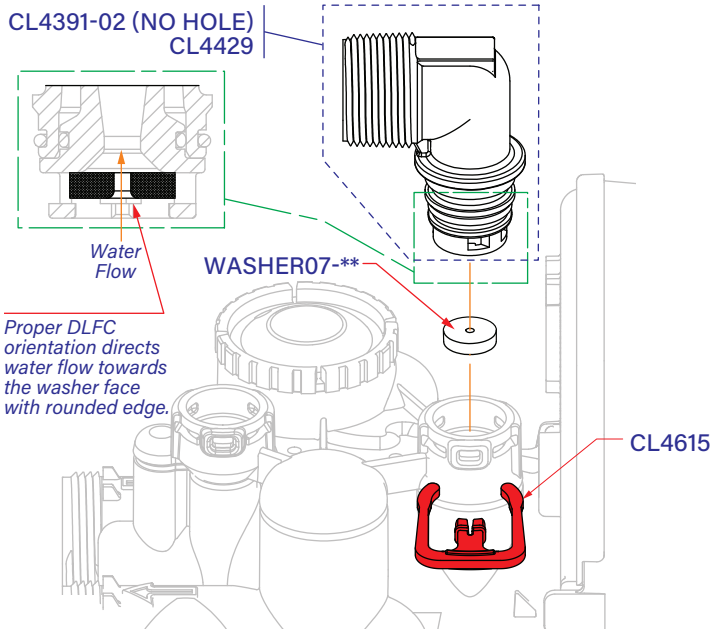
1" Drain Line Assembly



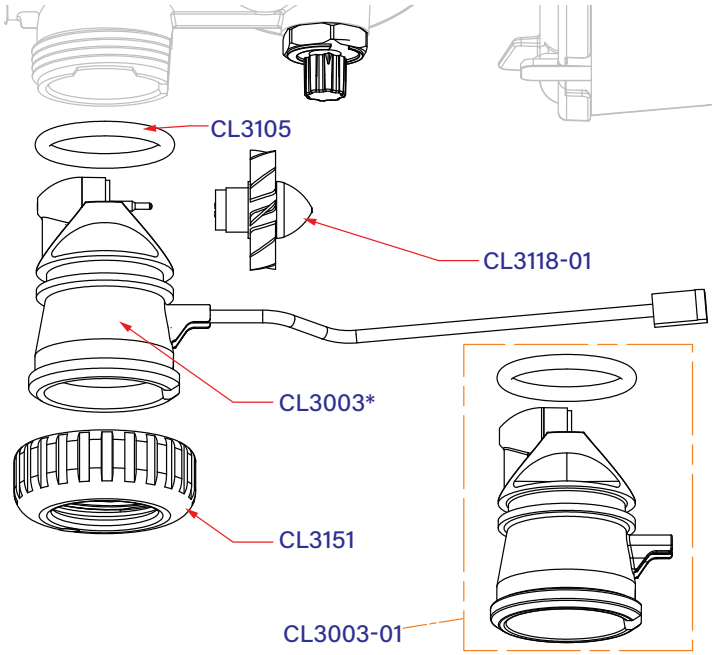
¾" Drain Line Elbow Assembly



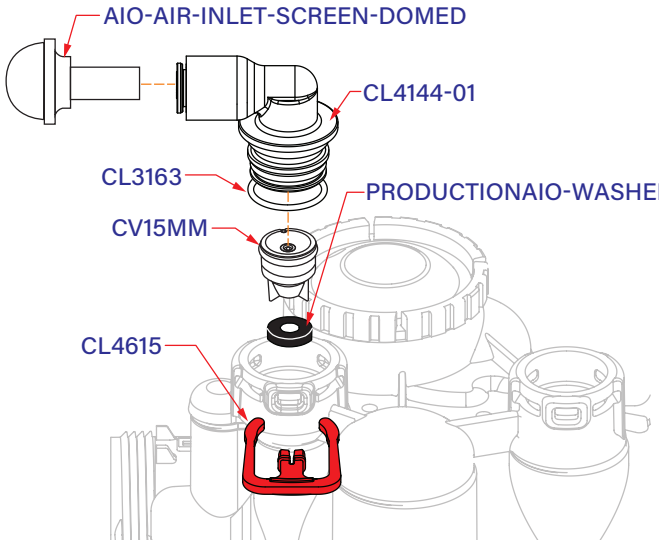
1" Drain Line Elbow Assembly



Water Meter Assembly

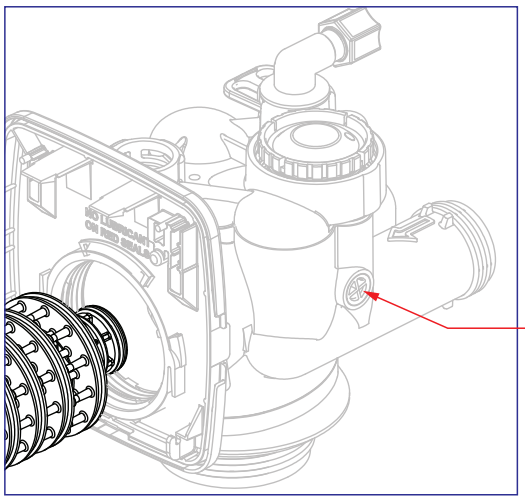


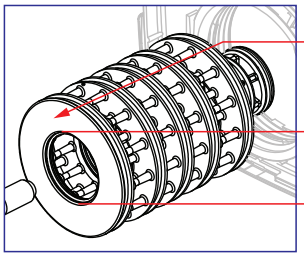
Air Check Valve Assembly

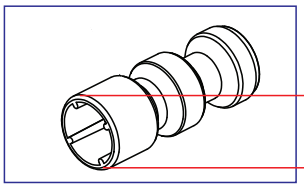


Distributor Identification

WS1 with 1.050" Distributor Tube Opening Identification

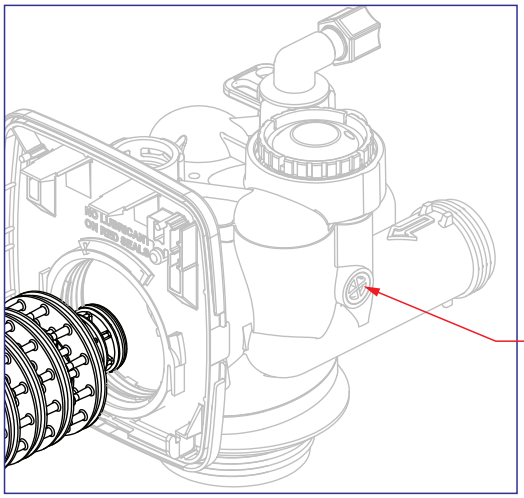


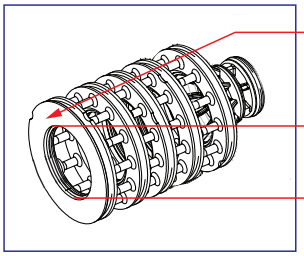


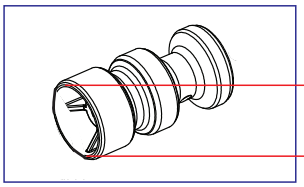


Note: The WS1 down

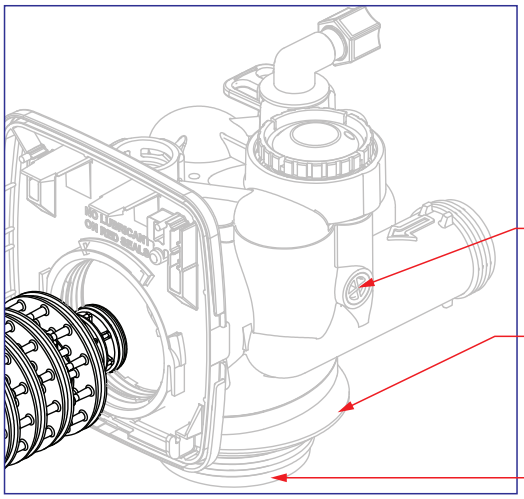
WS1.25 with 1.32" Distributor Tube Opening Identification

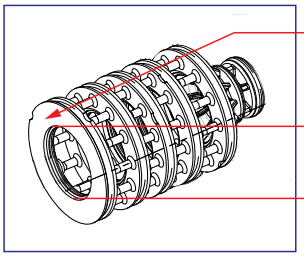


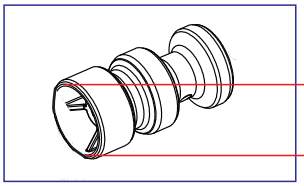




WS1.25 with 32mm Distributor Tube Opening Identification







Troubleshooting

1.	No Display on PC Board	a.	No power at electric outlet	a. Repair outlet or use working outlet
		b.	Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	b. Plug Power Adapter into outlet or connect power cord end to PC Board connection
		c.	Improper power supply	c. Verify proper voltage is being delivered to PC Board
		d.	Defective Power Adapter	d. Replace Power Adapter
		e.	Defective PC Board	e. Replace PC Board
2.	PC Board does not display correct time of day	a.	Power Adapter plugged into electric outlet controlled by light switch	a. Use uninterrupted outlet
		b.	Tripped breaker switch and/or tripped GFI	b. Reset breaker switch and/or GFI
		c.	Power outage	c. Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
		d.	Defective PC Board	d. Replace PC Board
3.	Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing	a.	Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
		b.	Meter is not connected to meter connection on PC Board	b. Connect meter to three pin connection labeled METER on PC Board
		c.	Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
		d.	Meter wire not installed securely into three pin connector	d. Verify meter cable wires are installed securely into three pin connector labeled METER
		e.	Defective meter	e. Replace meter
		f.	Defective PC Board	f. Replace PC Board
4.	Control valve regenerates at wrong time of day	a.	Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
		b.	Time of day not set correctly	b. Reset to correct time of day
		c.	Time of regeneration set incorrectly	c. Reset regeneration time
		d.	Control valve set at "on 0" (immediate regeneration)	d. Check programming setting and reset to NORMAL (for a delayed regen time)
		e.	Control valve set at "NORMAL + on 0" (delayed and/or immediate)	e. Check programming setting and reset to NORMAL (for a delayed regen time)
5.	Time of day flashes on and off	a.	Power outage	a. Reset time of day. If PC Board has battery back up present the battery may be depleted. See front cover and drive assembly drawing for instructions
6.	Control valve does not regenerate automatically when the REGEN button is depressed and held	a.	Broken drive gear or drive cap assembly	a. Replace drive gear or drive cap assembly
		b.	Broken Piston Rod	b. Replace piston rod
		c.	Defective PC Board	c. Defective PC Board
7.	Control valve does not regenerate automatically but does when the REGEN button is depressed and held	a.	Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
		b.	Meter is not connected to meter connection on PC Board	b. Connected meter to three pin connection labeled METER on PC Board
		c.	Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
		d.	Incorrect programming	d. Check for programming error
		e.	Meter wire not installed securely into three pin connector	e. Verify meter cable wires are installed securely into three pin connector labeled METER
		f.	Defective meter	f. Replace meter
		g.	Defective PC Board	g. Replace PC Board
8.	Hard or untreated water is being delivered	a.	Bypass valve is open or faulty	a. Fully close bypass valve or replace
		b.	Media is exhausted due to high water usage	b. Check program settings or disgnostics for abnormal water usage
		c.	Meter not registering	c. Remove meter and check for rotation or foreign material
		d.	Water quality fluctuation	d. Test water and adjust program values accordingly
		e.	No brine or low level of brine in brine tank	e. Add proper salt to tank
		f.	Control fails to draw in brine	f. Refer to Trouble Shooting Guide number 12
		g.	Insufficient brine level in brine tank	g. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
		h.	Damaged seal/stack assembly	h. Replace seal/stack assembly
		i.	Control valve body type and piston type mix matched	i. Verify proper control valve body type and piston type match
		j.	Fouled media bed	j. Replace media bed

Troubleshooting

9. Control valve uses too much brine	a.	Improper refill setting	a. Check refill setting
	b.	Improper program settings	b. Check program setting to make sure they are specific to the water quality and application needs
	c.	Control valve regenerates frequently	c. Check for leaking fixtures that may be exhausting capacity or system is undersized
10. Residual brine being delivered to service	a.	Low water pressure	a. Check incoming water pressure - water pressure must remain at minimum of 25 psi
	b.	Incorrect injector size	b. Replace injector with correct size for the application
	c.	Restricted drain line	c. Check drain line for restrictions or debris and clean
11. Excessive water in brine tank	a.	Improper program settings	a. Check refill setting
	b.	Plugged injector	b. Remove injector and clean or replace
	c.	Drive cap assembly not tightened in properly	c. Re-tighten the drive cap assembly
	d.	Damaged seal/stack assembly	d. Replace seal/stack
	e.	Restricted or kinked drain line	e. Check drain line for restrictions or debris and or un-kink drain line
	f.	Plugged backwash flow controller	f. Remove backwash flow controller and clean or replace
	g.	Missing refill flow controller	g. Replace refill flow controller
12. Control valve fails to draw in brine	a.	Injector is plugged	a. Remove injector and clean or replace
	b.	Faulty brine piston	b. Replace brine piston
	c.	Brine line connection leak	c. Inspect brine line for air leak
	d.	Drain line restriction or debris cause excess back pressure	d. Inspect drain line and clean to correct restriction
	e.	Drain line too long or too high	e. Shorten length and or height
	f.	Low water pressure	f. Check incoming water pressure - water pressure must remain at minimum of 25 psi
13. Water running to drain	a.	Power outage during regeneration	a. Upon power being restored control will finish the remaining regeneration time. Reset time of day
	b.	Damaged seal/stack assembly	b. Replace seal/stack assembly
	c.	Piston assembly failure	c. Replace piston assembly
	d.	Drive cap assembly not tightened in properly	d. Re-tighten the drive cap assembly
14. E1, Err - 1001, Err - 101 = Control unable to sense motor movement	a.	Motor not inserted full to engage pinion, motor wires broken or disconnected	a. Disconnect power, make sure motor is fully engaged, check for broken wires, make sure two pin connector on motor is connected to the two pin connection on the PC Board labeled MOTOR. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect
	b.	PC Board not properly snapped into drive bracket	b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect
	c.	Missing reduction gears	c. Replace missing gears
15. E2, Err - 1002, Err - 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled	a.	Foreign material is lodged in control valve	a. Open up control valve and pull out piston assembly and seal/stack assembly for inspection. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect
	b.	Mechanical binding	b. Check piston and seal/stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect
	c.	Main drive gear too tight	c. Loosen main drive gear. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect
	d.	Improper voltage being delivered to PC Board	d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect

Troubleshooting

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

Error Codes

Error	Description of Error	
101	UNABLE TO START	Valve not sensing valve movement with motor output energized
102	MOTOR STALLED	Valve unable to find next cycle position (stalled)
103	MOTOR RAN TOO LONG	Valve unable to find next cycle position
104	VALVE HOMING	Valve unable to find Home position
106	ALT MAV RAN TOO LONG	Alt MAV motor RAN TO LONG - unable to find proper park position
107	ALT MAV STALLED	Alt MAV motor RAN TO SHORT, STALLED - unable to find proper park position
109	INVALID MOTOR STATE	Control can no longer operate properly due to the detection of an invalid motor state
116	AUX MAV RAN TOO LONG	Aux MAV motor RAN TOO LONG - unable to find proper park position
117	AUX MAV STALLED	Aux MAV motor RAN TOO SHORT, STALLED - unable to find proper park position
201	INVALID REGEN STEP	Control can no longer operate properly due to the detection of an invalid regeneration cycle step - Internal Software Error
202	UNEXPECTED STALL	Motor encountered a unexpected stall which it was able to recover from and proceed normally
402	POWER DOWN MEMORY	Control can no longer operate properly due to a check sum error for the Operational Data and Status Section of E^2PROM memory
403	PROGRAM MEMORY	Control can no longer operate properly due to a check sum error for the Programming Section of E^2PROM memory
404	DIAGNOSTIC MEMORY	Control can no longer operate properly due to a check sum error for the Diagnostic Section of E^2PROM memory
405	HISTORY MEMORY	Control continues to operate normally w/check sum error for the History Section of E^2PROM memory, however error is recorded in Error Log
406	CONTACT MEMORY	Control can no longer operate properly due to a check sum error for the Contact Screen Section of E^2PROM memory
407	STATUS RAM	STATUS RAM MEMORY FAILURE - Error generated when the microcontroller can't operate properly due to corrupted data contained in the Operational Data/Status Section of RAM memory. When this error is generated, like a "405" or "408" Error, a "407" is recorded in the Error Log, but the control does not enter Error Mode and continues to operate normally using previously stored Status RAM data (that can be up to 6 hrs. old). This portion of memory includes the state of motors, relays, flow, regen, and more. Most things that are tracked on a moment-by-moment basis that need to be able to recover in the event of a power loss or reset is saved here.
408	DIAGNOSTIC RAM	DIAGNOSTIC RAM MEMORY FAILURE - Error generated when the microcontroller can't operate properly due to corrupted data contained in the Diagnostic Section of RAM memory. When this error is generated, like a "405" or "407" Error, a "408" is recorded in the Error Log, but the control does not enter Error Mode and continues to operate normally using previously stored Diagnostic RAM data (that can be up to 6 hrs. old). This portion of memory includes parameters normally displayed in the diagnostic branch of the menu map.
410	CONFIG DOWNLOAD	Configurator file downloaded to the control was not originally uploaded from another control with the identical software revision

Part No: NWS DEALER MANUAL