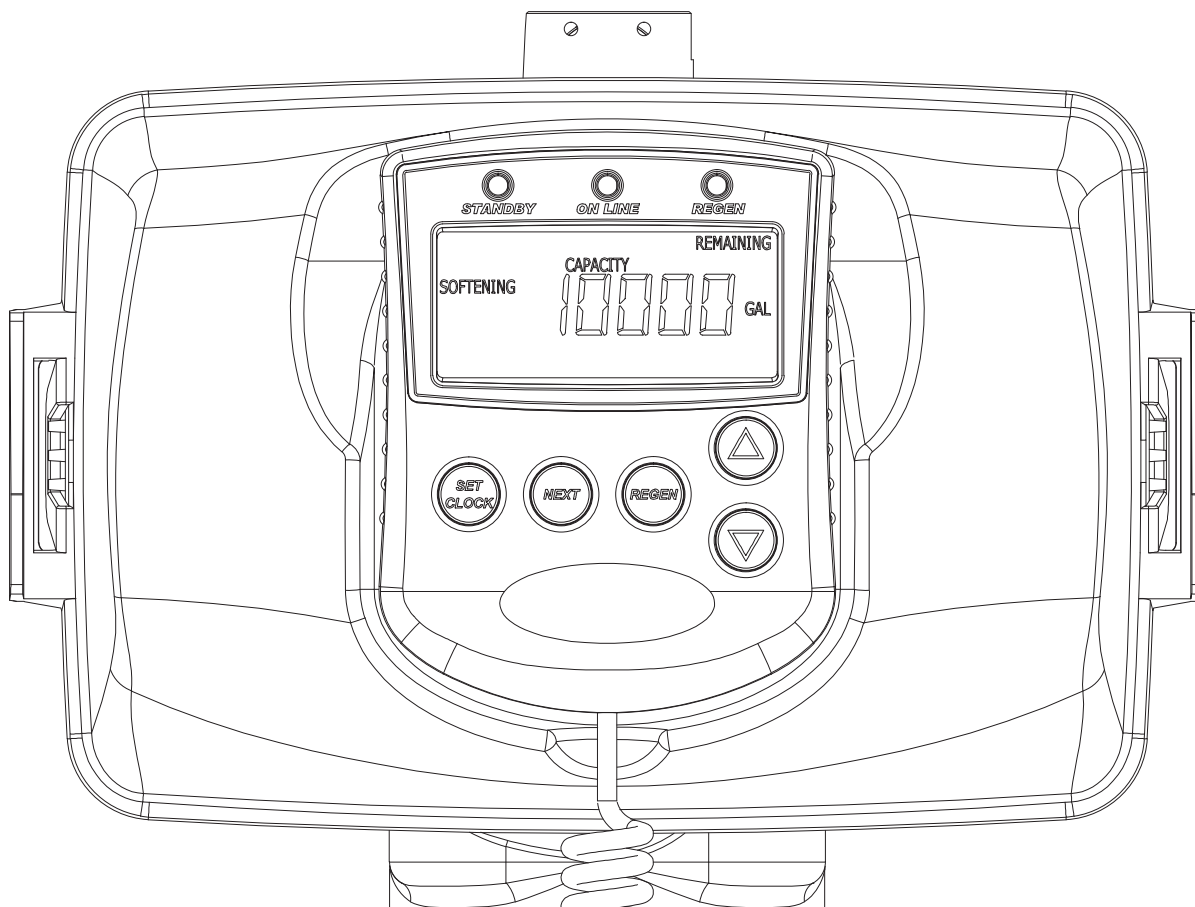


Water Specialist WS2H and WS3 Control Valve Manual



HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC., MAY DAMAGE PRODUCTS THAT CONTAIN O-RINGS OR PLASTIC COMPONENTS. EXPOSURE TO SUCH HYDROCARBONS MAY CAUSE THE PRODUCTS TO LEAK. DO NOT USE THE PRODUCT(S) CONTAINED IN THIS DOCUMENT ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC.

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GENERAL SPECIFICATIONS AND PRE-INSTALLATION CHECKLIST

TABLE 1

Minimum/Maximum Operating Pressures	20 psi (138 kPa) -125 psi (862 kPa)			
Minimum/Maximum Operating Temperatures	40°F (4°C) – 110°F (43°C)			
Power Adapter: Supply Voltage Supply Frequency Output Voltage Output Current	U.S. 120V AC 60 Hz 20V or 24V AC (see Table 2) 800 mA		International 230V AC 50 Hz 20V or 24V AC 800 mA	
No user serviceable parts are on the PC board, the motor, or the Power adapter. The means of disconnection from the main power supply is by unplugging the Power adapter from the wall.				
Service flow rate	WS2H Valve: 125 gpm (473 lpm, 28.4 m³/h) @ 15 psig (103 kPa) drop WS3 Valve: 250 gpm (946 lpm, 56.8 m³/h) @ 15 psig (103 kPa) drop			
Backwash flow rate	WS2H Valve: 125 gpm (473 lpm, 28.4 m³/h) @ 25 psig (172 kPa) drop WS3 Valve: 220 gpm (833 lpm, 50.0 m³/h) @ 25 psig (172 kPa) drop			
CV Service	WS2H Valve: 32.3 WS3 Valve: 64.6			
CV Backwash	WS2H Valve: 25.0 WS3 Valve: 44.0			
Meter: Accuracy Flow Range	WS2H Valve: Internal Meter + 5 % 1.5 – 125 gpm (5.7 – 473 lpm)	WS3 Valve: Optional External Meter + 5 % 3.5 – 350 gpm (13.3 – 1325 lpm)		
Regenerant Refill Rate	WS2H and WS3 Valves: Variable - Shipped from Factory with 2.2 gpm (8.33 lpm)			
Injectors	WS2H & WS3 Valves: See Injector Graphs V3010-2A through 2H			
Brine Line Adapters Included	1" Male NPT Elbow & ¾" x 1" Solvent Weld Elbow			
Inlet, Outlet and Drain Line Openings	WS2H Valve: 2" Female NPT or BSPT or 2.5" Groove Lock WS3 Valve: 3" Female NPT or BSPT, No Groove Lock			
*Distributor Tube Sizing: WS2H Valve WS3 Valve	Female NPT Inlet & Outlet		Female BSPT Inlet & Outlet	
	2.375" OD (2.0" NPS) 3.5" OD (3" NPS)	+2.25" - +2.5" +2.5" – 2.75"	63 mm OD 90 mm OD	+57 mm - +64 mm +64 mm - + 70 mm
Tank Connection: WS2H Valve WS3 Valve	4"-8UN, 6" Flange, Side Mount (2" Female NPT or BSPT or 2.5" Groove Lock) 6" Flange or Side Mount (3" Female NPT or BSPT)			
Shipping Weight	WS2H Valve with Meter: 50 lbs. (22.7 kg) WS3 Valve: 57 lbs. (25.9 kg) Meter Sold Separately			
PC Board Memory	Nonvolatile EEPROM (electrically erasable programmable read only memory)			
Compatible with the following typical concentrations of regenerants/chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine and chloramines			

*Height is based off the top of tank. Installer to verify proper engagement and allowance for tank expansion

**SOFTWARE AND POWER SUPPLY COMPATIBILITY
TABLE 2**

Software Version		Power Supply	
V3242-01BOARD Main Board ¹	V3243-01BOARD System Board	Output Voltage	Part # and Description
114.10	1.03	24 VAC	V3461 ² WS2H/3 AC ADAPTER V3461EU WS2H/3 AC ADAPTER EU V3461UK WS2H/3 AC ADAPTER UK
114.11			
115.17	1.07 or 1.08		
115.25			
200.01			
215.02	1.11 or 1.13		
215.03			
215.04			
215.10	1.11 or 1.13	20 VAC ³	V3461-01 WS2H/3 AC ADAPTER 20V V3461EU-01 WS2H/3 AC ADAPTER EU 20V V3461UK-01 WS2H/3 AC ADAPTER UK 20V
216.04 or greater	1.13 or greater	20 VAC	V3461-01 WS2H/3 AC ADAPTER 20V V3461EU-01 WS2H/3 AC ADAPTER EU 20V V3461UK-01 WS2H/3 AC ADAPTER UK 20V

¹It is recommended to maintain one version throughout a system.

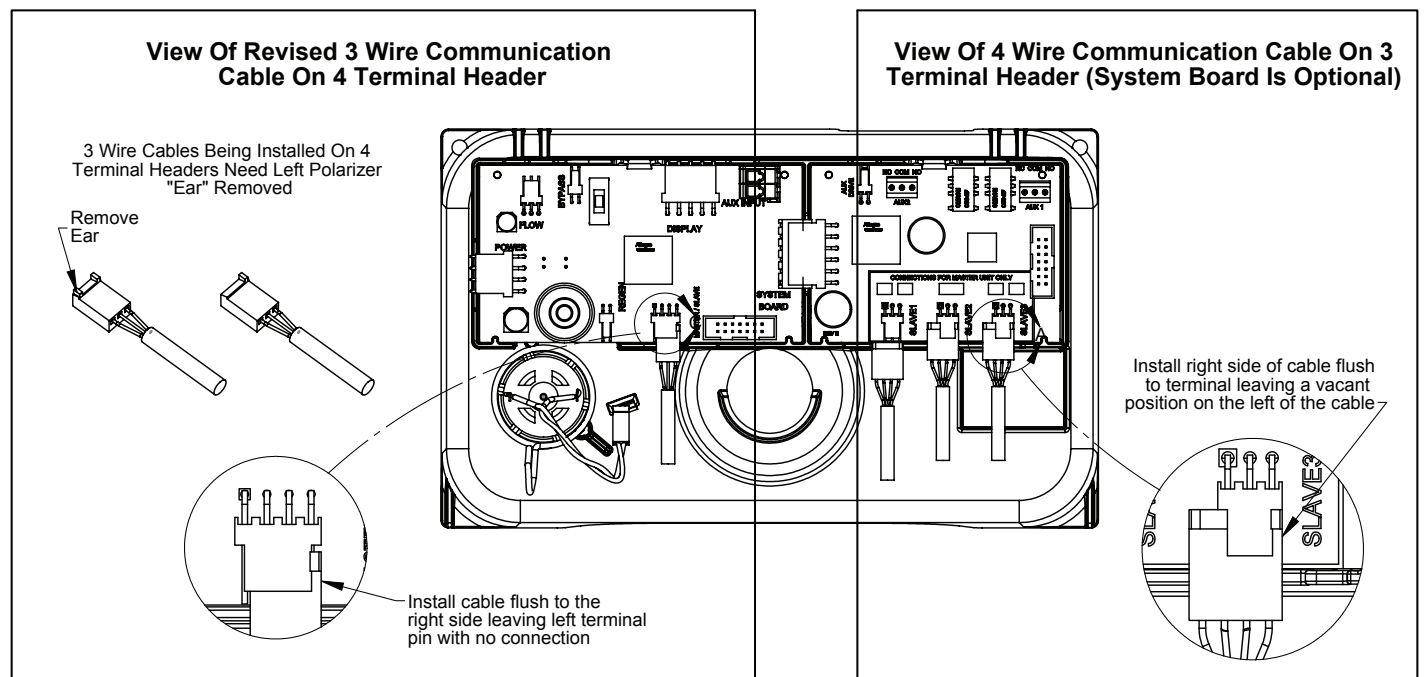
²Replacement V3461 power supplies have screw terminals and are shipped less a cord. Use cord from existing power supply to connect to the screw terminals.

³V3461EU-01 and V3461UK-01 will not be available for sale until August 2010.

COMMUNICATION CABLE CONNECTION TO PC BOARD LAYOUT

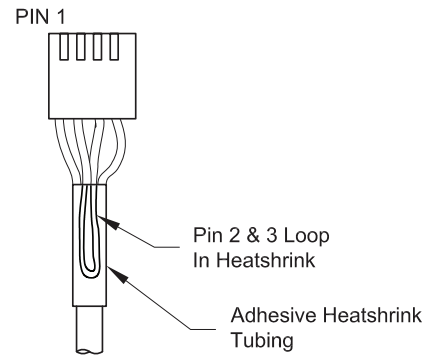
Revised communication cable connectivity.

Refer to diagram (below) when combining 3- and 4-wire communication hardware.



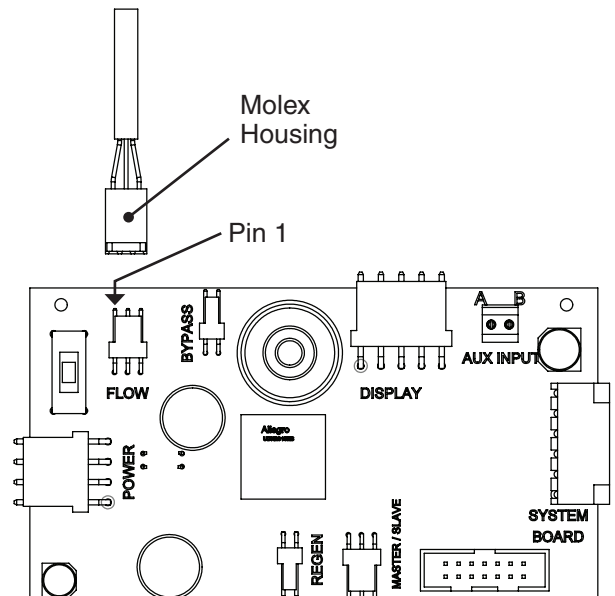
WIRING FOR CUSTOM AC ADAPTER

1. See Table 2 Software and Power Supply Compatibility.
2. Cable should be one unshielded pair of 22AWG, UV resistant UL2464 compliant wire.
3. Connector details:
 - a. Terminate end with one Molex white housing, P/N 09-50-8043 and four Molex pins, P/N 08-50-0108.
 - b. Pin 1 = AC from power supply (White)
Pin 2 = Jumper to Pin 3
Pin 3 = Jumper to Pin 2
Pin 4 = AV from power supply (Black)

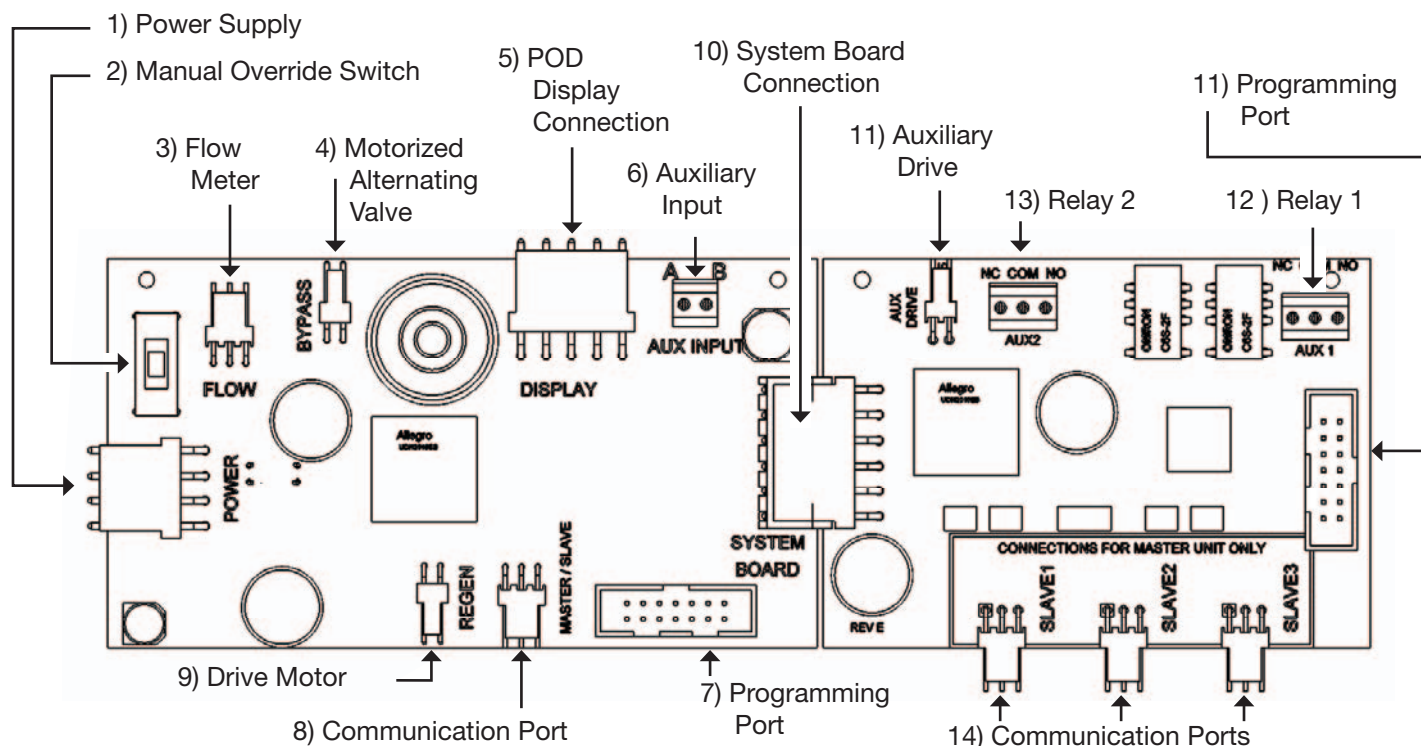


CUSTOM METER WIRING

- 1) Terminate end with a Molex series 2695 housing, part number 22-01-3037 and (3) Molex series 41572 (or 40445) pins, part number 08-65-0805 (or 97-00-44).
- 2) Auxilliary meter must be able to operate on 5VDC
Pin 1 = +5VDC,
Pin 2 (Center) = Signal
Pin 3 = Ground
- 3) Acceptable pulse input is .1 – 999 pulses/gallon, or .4 – 519 pulses / liter.



MAIN PC BOARD WITH SYSTEM BOARD



Item	Board label	Description
1	POWER	Connect to proper power supply
2	SW1	Manual override switch used to force isolation (On Line or Standby status) The units corresponding LED will flash twice / second to alert its override condition
3	FLOW	Input for the units flow meter
4	BYPASS	Drive circuit for factory motorized isolating valve (MAV or NoHBP)
5	DISPLAY	Connection for POD display or data extraction with the proper software and cabling
6	AUX INPUT	Connect to external dry contacts to control functionality based on the unit's settings **Wiring units inputs in parallel requires matching each units polarity**
7	PROGRAM	Factory use only
8	MASTER/SLAVE	Communication port on the main board can be used on the master of a 2 unit system & is the communication port for any slave unit **Greater than 2 unit systems require the optional system board on the master for additional ports**
9	REGENERATION	Motor circuit used to power the main drive of the unit during regeneration
The following connections are for an optional expansion board		
10	SYSTEM BOARD	Connection for the optional V3243 system board to expand communication ports, add a second motor circuit or relay output functionality
11	AUX DRIVE	2nd Drive circuit for factory motorized isolating valve (MAV or NoHBP)
12	AUX 1	Dry contact outputs to operate external devices based on the program settings of Relay 1
13	AUX 2	Dry contact outputs to operate external devices based on the program settings of Relay 2
		Maximum power through either relay to be: A) 1A, 30 VDC B) 1A, 30 VAC
14	SLAVE 1, 2 or 3	Expanded communication ports for connecting up to 3 additional units to the master unit in a system

TYPICAL SYSTEM EXAMPLES

Twin Tank System, Simple Alternator (Sharing a MAV) System consists of 2 power heads, 1 communication cable and 1 MAV

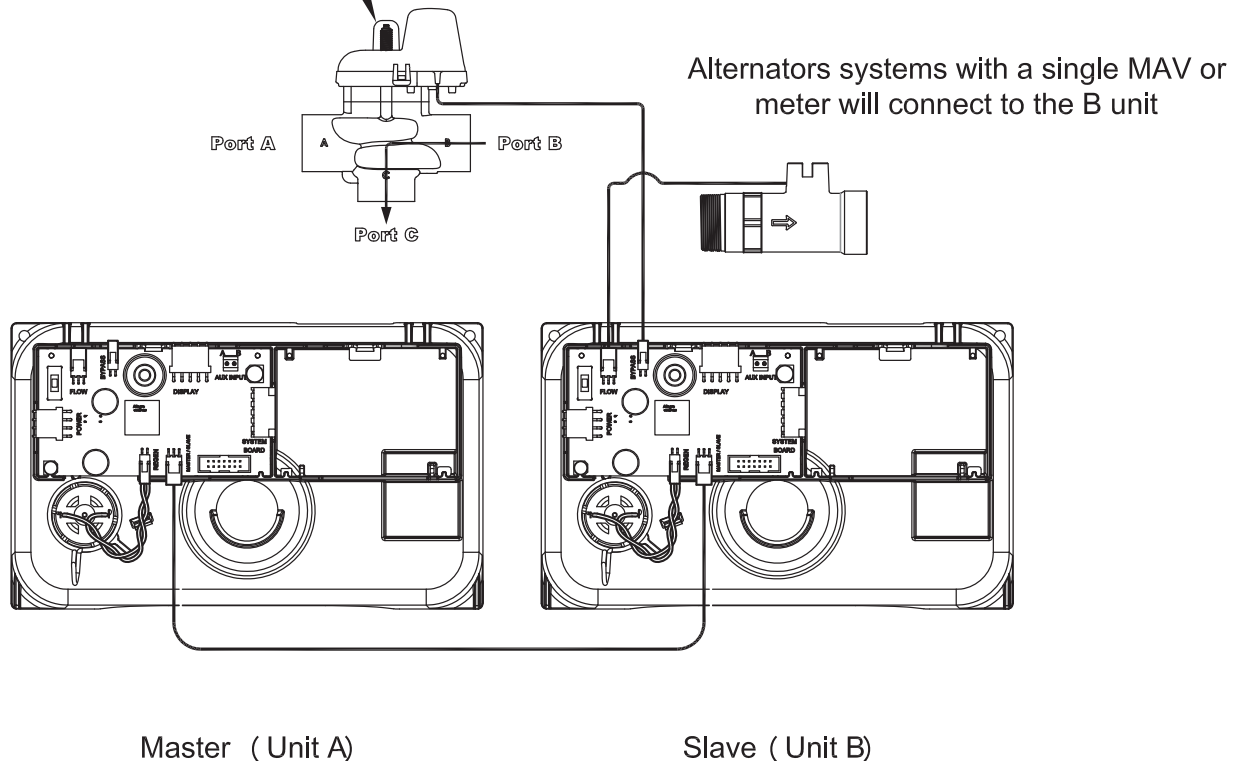
Electrical Connections:

- The MAV's motor wire is connected to the 2-pin connector labeled BYPASS on Unit 2 (Unit B) PC board
 - The communication cable is connected to each unit's 3-pin connector labeled MASTER/SLAVE
 - If a single external meter is used, it should be connected to the 3-pin connector on Unit 2 (Unit B) labeled FLOW.
- NOTE: When using a single external meter, "SYSTEM PULSES" and the proper pulse rate must be selected in the programming section.

Plumbing Connections:

- To regenerate with raw/untreated water, the outlet of each unit is piped to the MAV. Port A will be piped to the Master (Unit A), Port B to the slave (Unit B), and Port C to the common supply outlet.
- To regenerate with soft/treated water, the inlet of each unit is piped to the MAV. Port A will be piped to the Master (Unit A), Port B to the slave (Unit B) and Port C to the common supply outlet.

The piston rod being visible indicates the current flow path is between the "B" port to the common "C" port



TYPICAL SYSTEM EXAMPLES (CONTINUED)

Multi-tank System, 3 Unit shown

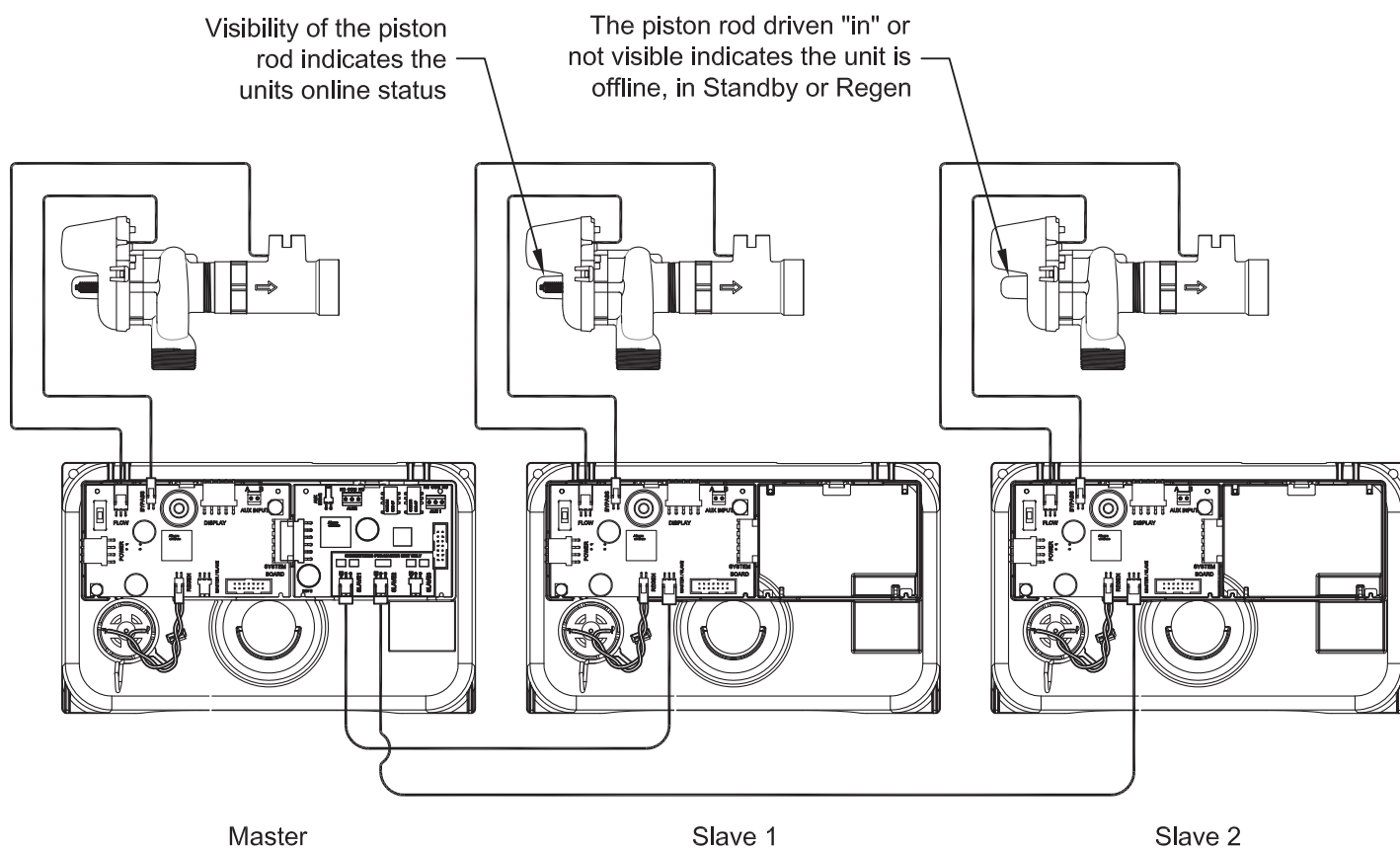
System consists of 3 power heads, 2 communication cables and 3 No Hard Water Bypass (Isolation) valves

Electrical Connections:

- Each unit's isolation valve motor wire is connected to the 2-pin connector labeled BYPASS on each unit's PC board.
- The communication cable is connected to each unit's 3-pin connector labeled MASTER/SLAVE
- Communication cables are connected to each unit's 3-pin connector labeled MASTER/SLAVE. NOTE: Systems with more than 2 units require the Master Unit to have the optional System Board for communication port expansion, routing communications from the expansion ports (Slave 1, 2 or 3) to each unit's MASTER/SLAVE connector.

Plumbing Connections:

- To regenerate with raw/treated water, the isolation valve is piped into the outlet of each unit.
- To regenerate with soft/treated water, the isolation valve is piped into the inlet of each unit.



BUTTON FUNCTION AND PROGRAMING KEY SEQUENCE



Standby LED

- Signals that a unit is not in service, or regen
- Flashes to alert status conditions
 - 1 per second indicates flow had been detected while the unit was offline
 - 2 per second indicates the bypass override switch is being used to force the unit offline.



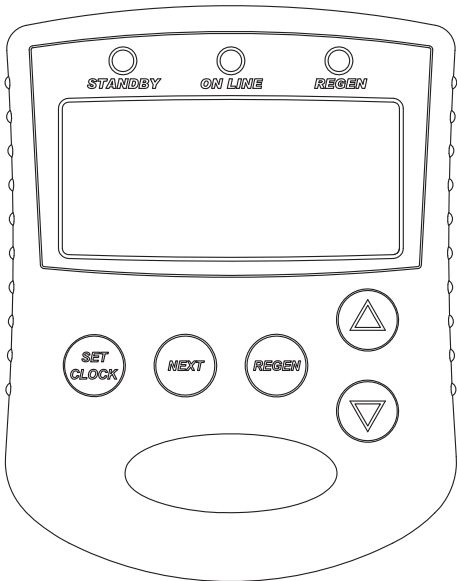
Online LED

- Signals that a unit is currently in service
- Flashes to alert status conditions
 - 2 per second indicates the bypass override switch is being used to force the unit online.



Regen LED

- Signals that a unit is currently in regen



Set clock from Usert Screens
Exit & save from setup or program screens.



Move to the next display



Change variable being displayed



Toggles scheduled regen time on/off.
Holding for >3 sec. starts Immediate regen (immediate regen is the only option if set to immediately regenerate upon 0 gallons).
Moves back one display while in program mode.



Reset
Holding for >3 seconds Initiates a reset. The software version Is shown and the piston returns to the "home" position, re-synchronizing the valve.



History Reset
Holding the Set Clock & Regen buttons for >3 seconds initiates a totalizer or history reset.

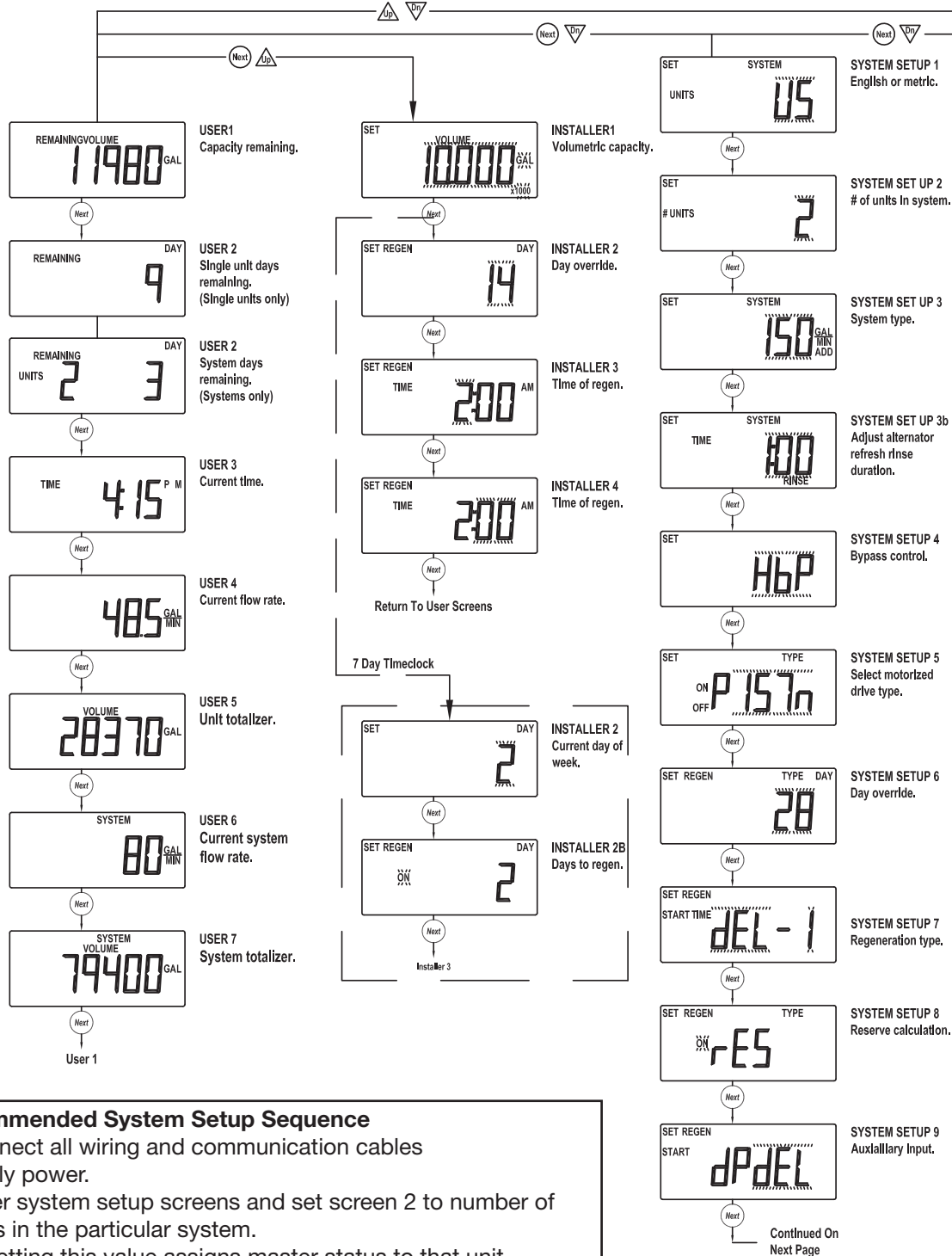


Key sequence to lock and unlock programming screens

Programming Key Sequence	
Programming Level	Buttons
Installer	Next Up
System Setup	Next Dn
Timers	Next Dn
Cycle Setup	Next Dn
Diagnostic History	Up Dn

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PROGRAMING QUICK REFERENCE

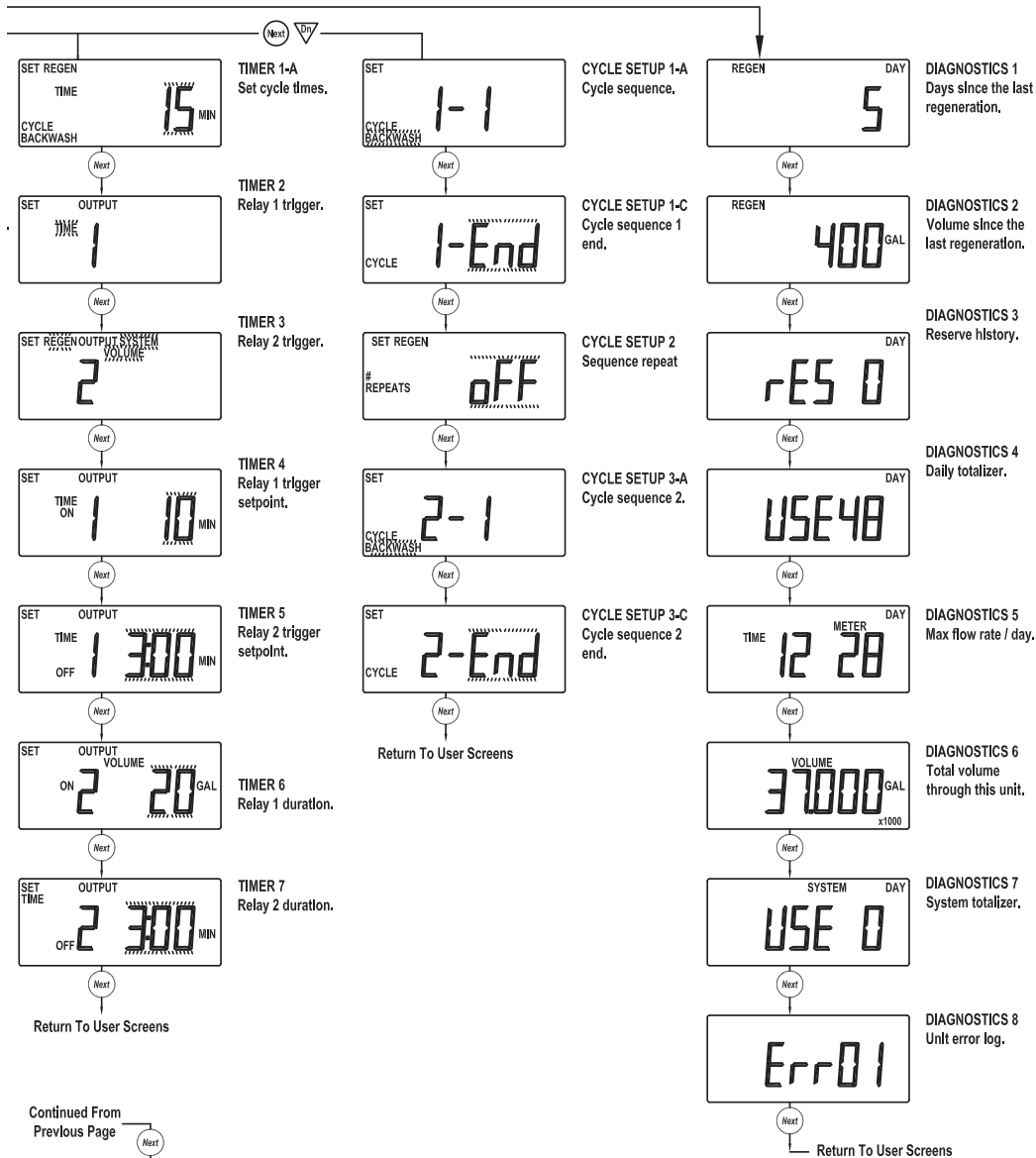
**Recommended System Setup Sequence**

1. Connect all wiring and communication cables
2. Apply power.
3. Enter system setup screens and set screen 2 to number of units in the particular system.
 - a. Setting this value assigns master status to that unit
 - b. The master unit will establish communication with the remaining units and transfer the remaining settings to them.
4. Set cycle sequence
5. Set cycle times
6. Set installer data

WS2 Programming Screen Quick Reference

1. Individual screen descriptions and settings are detailed on the following pages.
2. Some screens have been omitted for clarity.

PROGRAMING QUICK REFERENCE



SET TYPE METER 20

SYSTEM SETUP 10
Meter type.

SET METER PULSES 80

SYSTEM SETUP 10B
Custom meter pulses.

SET AUdr

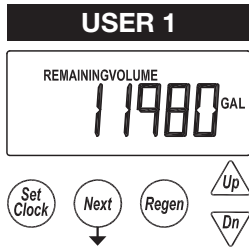
SYSTEM SETUP 11
Separate source Inlet.

Return To User Screens

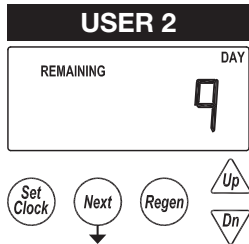
List Of Error Codes

Code	Description
1001	No Encoder Pulses
1002	Unexpected Stall, Main Drive
1003	Run Time Too Long, Main Drive
14001	Message Queue Full
15003	Run Time Too Long, Bypass Drive
15010	Run Time Too Short, Bypass Drive Could Not Drive Offline
15011	Run Time Too Short, Bypass Drive Could Not Drive Online
16001	Communication Lost With Unit 2
16002	Communication Lost With Unit 3
16003	Communication Lost With Unit 4
17000	Run Time Too Long, Auxiliary Drive Of Option Board
17002	Run Time Too Short, Auxiliary Drive Of Option Board
18000	Reset Performed
18001	Power Loss
18002	Power Restored

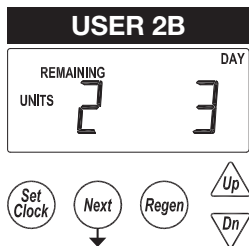
TYPICAL USER SCREENS

**USER 1 - Capacity Remaining**

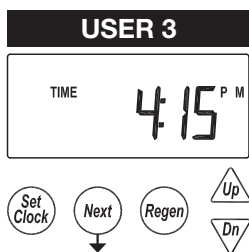
- Displays the units current capacity remaining
- This screen does not display on units with volumetric capacity turned off
- Can be manually decremented by holding the down arrow

**USER 2 - Days Remaining, Single Unit**

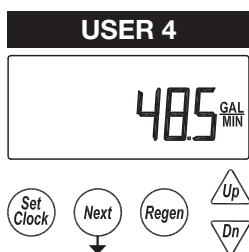
- Displays a single units days until a regeneration, based on the day override setting
- This screen does not display on units with day override turned off
- On systems the master unit displays the days remaining on the lead unit
- Days can be manually reduced by holding the down arrow

**USER 2B - Days Remaining, System**

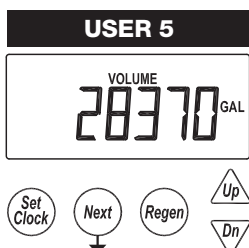
- The master in a system displays the days until a regeneration, based on the day override settings.
- The displays also indicates which unit the day over ride is currently pertaining to
 - Series regen systems do not display a unit as they will regenerate all units sequentially

**USER 3 - Time**

- Displays the current time of day

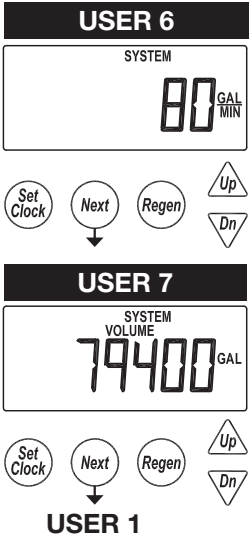
**USER 4 - Flow Rate, Unit**

- Displays that units current flow rate

**USER 5 - Volume Totalizer, Unit**

- Displays the total volume since install / reset
- Re-settable to zero, while in this screen, by holding the “Set Clock” & “Regen” buttons

TYPICAL USER SCREENS (CONTINUED)



USER 6 – Flow Rate, System

- Displays the current combined flow rate of all the units in the system
- This screen does not display on single tank units, or systems with volumetric capacity turned off

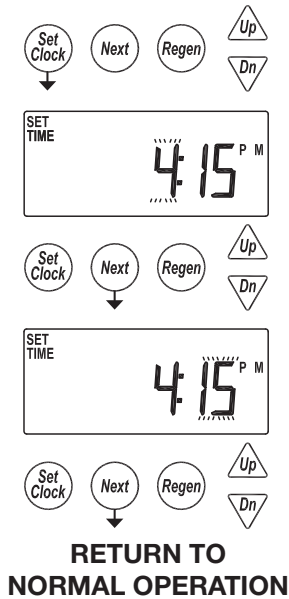
USER 7 – Volume Totalizer, System

- Displays the total volume of the system since install / reset
- Re-settable to zero, while in this screen, by holding the “Set Clock” & “Regen” buttons
- This screen does not display on single tank units

SETTING TIME OF DAY

SET TIME

Accessed by pressing Set Clock while in the User Screens. Use UP and DOWN arrows to scroll hours. AM/PM alternates at midnight.

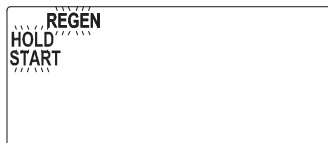


NOTIFICATIONS



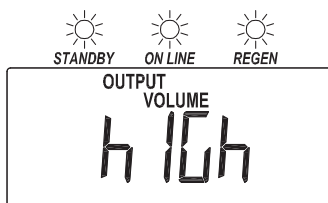
• REGEN TODAY

- Flashing indicates a regeneration has been manually set and can be turned off by pressing and releasing the REGEN button
- A solid display indicates the regeneration has been scheduled by input requirements and can't be manually turned off



• REGEN START / REGEN HOLD

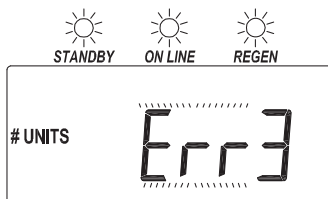
- The display will flash "REGEN" or "REGEN HOLD", depending on settings, to indicate an external switch closure to the Aux. Input



• HIGH USAGE

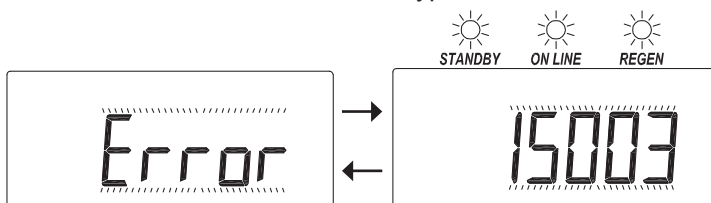
- Screen flashes indicating setpoint was reached when using relay outputs to signal high water usage. All LED lights flash and the relay with that setpoint closes.
 - Screen and the relay are re-set by pressing any button
 - System operates as normal behind the indicator screen.
- Only active if Timer 2 or Timer 3 is set to "Day & Gal" or "Day & Gal & System"

ERRORS



• NUMBER OF UNITS ERROR

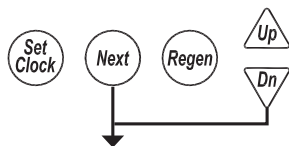
- The master unit of a system would flash an error screen alerting of a loss of communication with a unit
- Check for proper operation and connectivity of the unit specified as lost communications
- Pressing any button will return the user to the # units set up screen to correct / verify the value of units in the system. Exiting will re-establish communications
- Each unit of the system will regenerate, based on its settings, with hard water bypass



• FUNCTIONAL ERROR

- "Error" and its code alternate on the display
- The unit attempts to return to service but will not regenerate until the error is cleared
- See troubleshooting section for a description of possible error codes.

SYSTEM SETUP SCREENS



Accessed by pressing NEXT and DOWN simultaneously for >3 seconds.

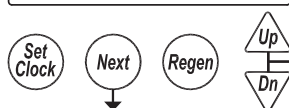
- System setup screens will be hidden on units determined to be a slaves of a system
 - Slave units need to be reset, “Next” & “Regen”, from the Timer 1 screen to have their slave status tuned off.

SYSTEM SETUP 1

SYSTEM SETUP 1 – Select units of operation

US: Volume measurements are in gallons, time is displayed in 12 hour format, meter selections are in inches.

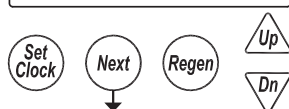
SI: Volume measurements are in liters or cubic meters, time is displayed in 24 hour format, meter selections are in mm.



SYSTEM SETUP 2A

SYSTEM SETUP 2A - Set number of units

- 1 – 2 Up to 2 units can be connected off the communicate port of the main board
- 3 – 4 Requires an optional system board to expand communication ports



SYSTEM SETUP 2B

SYSTEM SETUP 2B – Select System Type / Operation

- Setting a flow rate adder point determines the system operation

0: Parallel Flow; All units are always online unless they are regenerating.

- Units in a parallel flow system will determine the need to regenerate based on:
 - Any one unit reaching 0 capacity
 - Day over ride
- Any one units need to regenerate will initiate sequential regenerations of all units (series regeneration)
- On0 systems will regenerate all units in series at the first available time slot
- Delayed units will regenerate at each available time slot, one unit per time slot

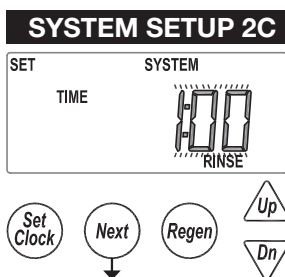
ALT: Operates the system as an alternator, having one unit off line at all times either regenerating or fully regenerated.

- A unit in an alternator system will determine the need to regenerate based on:
 - The current “lead” unit reaching 0 capacity
 - On0 systems immediately regenerate and alternate the exhausted unit with a fully regenerated standby unit.
 - Delayed systems will immediately alternate the exhausted unit with a fully regenerated standby unit, and regenerate at the next available time slot.
- “Lead” unit regenerates based on “Lag” units
 - The first “lag” unit depleting down to 15% less than its ratio of system capacity
 - 1/3 for a 4 unit; 1/2 for a 3 unit
 - The second “lag” unit depleting down to 15% less than its ratio of system capacity
 - 2/3 for a 4 unit
 - Delayed systems will flag “lead” units based on “lag” capacity, but will not alternate with remaining capacity until the next available delayed time.
- Day over ride
 - 1 day; 1 unit will regen
 - Day triggered regens will run at the time set in DEL-1

CONTINUED...

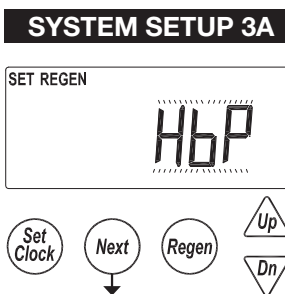
SYSTEM SETUP SCREENS (CONTINUED)

- 1 – 499: Demand Recall;** one unit is always online & additional units are added as the online units exceed this flow rate / unit set point.
- Additional units are brought online when:
 - The adder point is exceeded for 30 seconds
 - All required units required to cover the flow conditions will be brought into service immediately if the flow exceeds 120% of the adder point.
 - Units will go offline when
 - System flow reduces to 95% of the set adder point / unit for 1 minute.
 - Any unit in a demand recall system will determine the need to regenerate based on:
 - Each unit individually reaching 0 capacity
 - On 0 systems will regenerate depleted units immediately after current flow conditions allow depleted units offline.
 - Delayed units will alternate lead units immediately upon exhaustion & regenerate them at the next available time slot.
 - Day Override
 - One unit will be regenerated per delayed time slot (i.e. a 4 unit system will need 4 delayed times to regenerate all units / set number of days).
 - Day triggered regens will run at the time set in DEL-1
 - Units cannot regenerate if flow demands them to remain online
 - On 0 units regen immediately after flow allows them offline
 - Del units regen at the next available time slot
 - Day units regen at the next time slot



SYSTEM SETUP 2C – Set Pre-Service Rinse

- Only available on Alternator systems
- Standby units will run through a rinse cycle before coming into service



SYSTEM SETUP 3A - Select isolation timing

- Selections allow enabling and timing control of motorized drive
- Selection availability can vary by the type of system
- Custom timing sequences can be configured under “Custom Motorized Drive Timing” at the end of the programming section

HbP: Hardwater Bypass

- Only available on single units
- Unit will internally bypass hard water to the service lines while in regeneration

no.HbP: No Hardwater Bypass

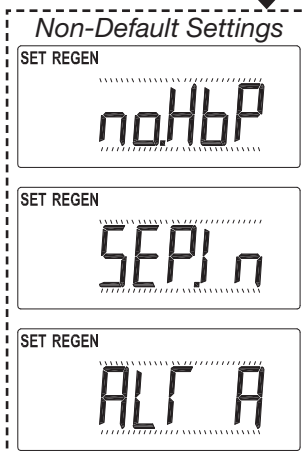
- Each unit has isolation to control system operation and will not supply service water during regeneration
- Drive timing will bring the unit into service during fill

SEP.In: Separate Source

- Each unit has isolation to control system operation and will not supply service water during regeneration
- Drive timing will keep units isolated through the entire regeneration sequence

ALT-A: Simple Alternator Sharing 1 MAV

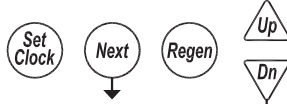
- Only available when set to a 2 unit alternator
- A “Simple 2 Unit” shares one MAV to be electrically connected to the bypass connection of the “B” (slave) unit



SYSTEM SETUP SCREENS (CONTINUED)

SYSTEM SETUP 3B

SET	TYPE
ON	PISTON
OFF	



Non-Default Settings

SET	TYPE
ON	POPPET
OFF	

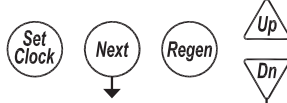
SET	TYPE
ON	RELAY
OFF	

SYSTEM SETUP 3B - Select isolation type

- Piston: Factory motorized isolation drive has an internal piston & seals similar to the main piston
- Poppet: Factory motorized isolation drive uses a flat disc “face” seal
- Relay: Isolation will be done through the optional board relays & does not initialize the BYPASS motorized drive circuit

SYSTEM SETUP 4

SET REGEN	TYPE	DAY
		28



Non-Default Settings

SET REGEN	TYPE	DAY
		7

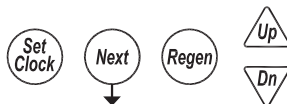
SET REGEN	TYPE	DAY
		OFF

SYSTEM SETUP 4 - Day override control

- 28 day time clock: Used to regenerate units based on a set number of days between regenerations
- 7 Day Time Clock: Used to control regeneration based on specific days
- OFF: Days have no control on regenerations, and will not be a selection if volumetric capacity is set to OFF

SYSTEM SETUP 5

SET REGEN	START TIME
	DEL-1



Non-Default Settings

SET REGEN	START TIME
	on 0

SYSTEM SETUP 5 - Regeneration control

Delayed 1 – 4

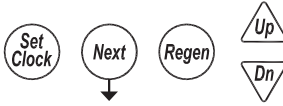
- Delays regeneration of units upon reaching 0 gallons capacity
- Allows setting of up to 4 regeneration times per day
- Systems with delayed regen will remove a unit from service based upon 0 capacity and regenerate at the scheduled regen time.
 - Only one unit will regen / scheduled time
 - Day driven regens will regen at the DEL-1 time slot
 - Depleted units will regen at the next available delayed time slot

On 0

- Immediate regeneration of units upon reaching 0 capacity
- Series regeneration systems set to On0 will sequentially regenerate all units at the delayed time based on day override

SYSTEM SETUP SCREENS (CONTINUED)

SYSTEM SETUP 6

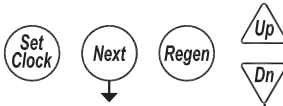


SYSTEM SETUP 6 – Automatic reserve calculation

This screen will not display on units set to On 0, capacity set to Off, or any systems On: Unit will regenerate before reaching 0 capacity, based on previous usage trends
Requires delayed regeneration

OFF: Regeneration is scheduled after reaching 0 capacity

SYSTEM SETUP 7A



SYSTEM SETUP 7A - Auxiliary Input

START REGEN

- Control will start an immediate regeneration upon switch closure
- Systems follow “on0 logic” regenerating all flagged units sequentially

START TIME REGEN dEL

- Control will immediately schedule a regeneration upon accumulating 2 minutes of intermittent switch closures
- Systems follow “Delayed Logic” regenerating flagged units in available time slots

START REGEN dEL

- Control will immediately schedule a regen upon switch closure
- Systems follow “Delayed Logic” regenerating flagged units in available time slots

LEVEL

- Only available on single units
- External switching can be used to control the On Line / Standby status
 - Switch closure will trigger the unit to go to a standby condition

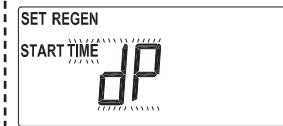
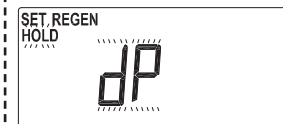
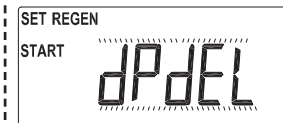
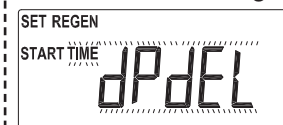
HOLD

- Regeneration will not be allowed as long as there is switch closure
 - On0 units will regenerate immediately after the hold switch opens
 - Delayed regenerations will be delayed until the next scheduled time if the hold is active when the scheduled time passes

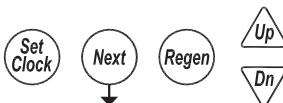
START TIME REGEN

- Control will immediately regenerate upon accumulating 2 minutes of intermittent switch closures
- Systems follow “on0 logic” regenerating all flagged units sequentially

Non-Default Settings



SYSTEM SETUP 7B

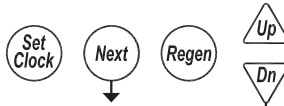


SYSTEM SETUP 7B - Level option selected

Set a time duration of switch closure when Level option is selected



SYSTEM SETUP SCREENS (CONTINUED)

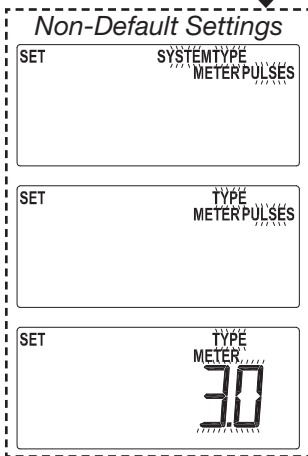
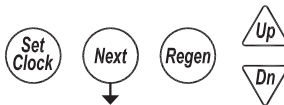
SYSTEM SETUP 8A**SYSTEM SETUP 8A - Meter Calibration**

2.0: Setting for using a factory 2" meter

3.0: Setting for using a factory 3" meter

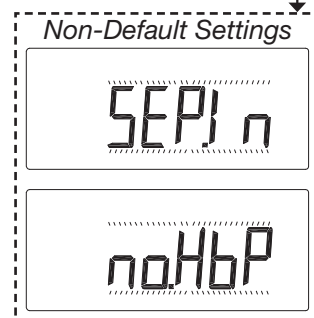
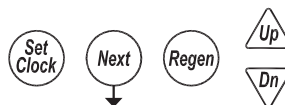
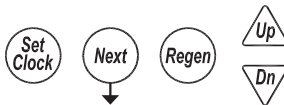
Pulses: Used to set meter input off custom pulse rate, typically for non-factory meters

System Pulses: Only available on 2 unit alternators. The system shares 1 external meter which is connected to the slave unit's meter connection.

**SYSTEM SETUP 8B****SYSTEM SETUP 8B - Set Meter Pulses / Gallon**

-Only displays if "Pulses" or "System Pulses" is selected in the previous screen

-Set to the desired pulse rate of the installed metering device

SYSTEM SETUP 9**SYSTEM SETUP 9 - Auxiliary Drive**

- Selections allow enabling and timing control of the Auxilliary motorized drive circuit
 - This screen does not display if the unit does not have a system board
- Requires a factory motorized drive to be connected to the drive circuit of the system board
- Custom timing sequences can be configured under "Custom Motorized Drive Timing" at the end of the programming section

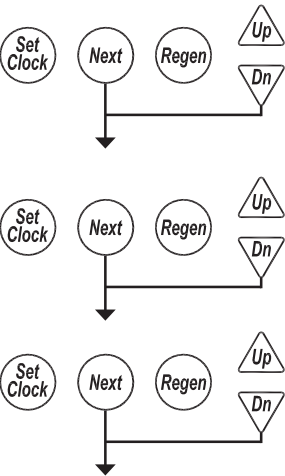
no.HbP: No Hard Water Bypass

- Each unit has isolation to control system operation and will not supply service water during regeneration
- Drive timing will bring the unit into service during fill

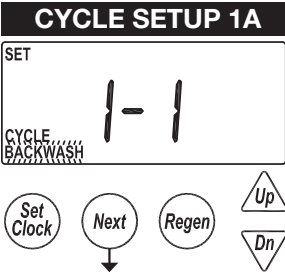
SEP.In: Separate Source

- Each unit has isolation to control system operation and will not supply service water during regeneration
- Drive timing will keep units isolated through the entire regeneration sequence

CYCLE SETUP SCREENS

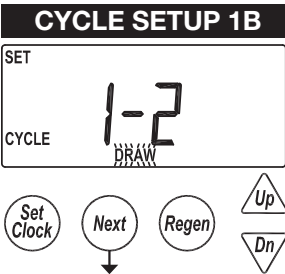


Accessed by pressing NEXT and DOWN simultaneously for >3 seconds, then by pressing NEXT and DOWN simultaneously again for >3 seconds, then by pressing NEXT and DOWN simultaneously again for >3 seconds



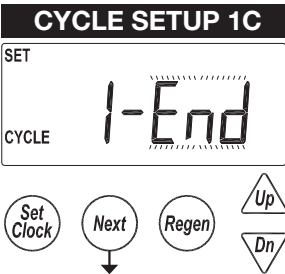
CYCLE SETUP 1A

Select first regeneration cycle.



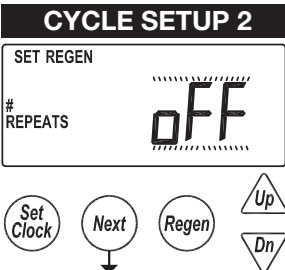
CYCLE SETUP 1B

Select second cycle.



CYCLE SETUP 1C

After cycles are configured, an END is added. (9 cycles maximum.)



CYCLE SETUP 2

Select regeneration repeats, 1-9 or OFF. Repeats regeneration cycle Sequence 1 a selected number of times before regenerating a single time with Sequence 2.

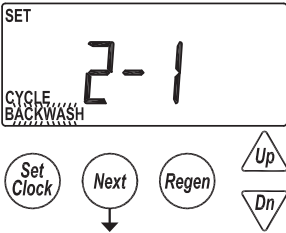
The following screens will not appear if Cycle Setup 2 is set to OFF.

Available Cycles	
Backwash	
Draw	
Slow Rinse	Separate cycle from Draw
2nd Backwash	
Rinse (fast)	
Fill	
End	
Hold	Piston in Service position

Cycle Number	Cycle Default
1	Backwash
2	Draw
3	2nd Backwash
4	Rinse
5	Fill
6	End

CYCLE SETUP SCREENS (CONTINUED)

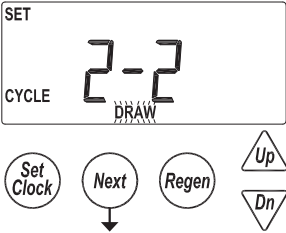
CYCLE SETUP 3A



CYCLE SETUP 3A

Select first cycle of “alternate” regeneration sequence (Sequence 2).

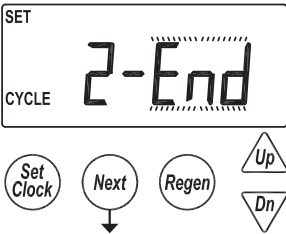
CYCLE SETUP 3B



CYCLE SETUP 3B

Select second cycle of ‘alternate’ regeneration sequence.

CYCLE SETUP 3C



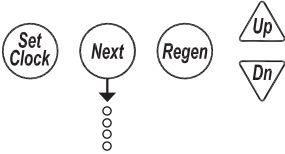
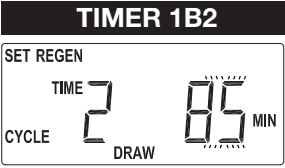
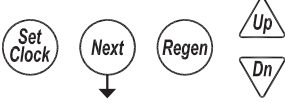
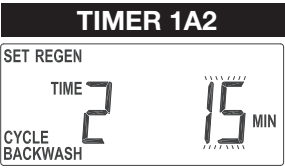
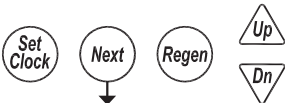
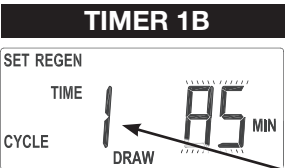
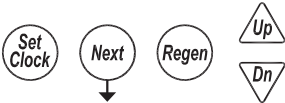
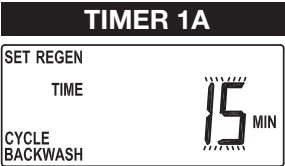
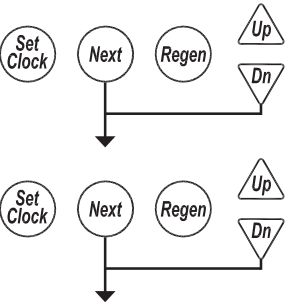
CYCLE SETUP 3C

After cycles are configured, an END is added. (9 cycles maximum.)

RETURN TO NORMAL
OPERATION

TIMER SCREENS

Accessed by pressing NEXT and DOWN simultaneously for >3 seconds, then by pressing NEXT and DOWN simultaneously again for >3 seconds.



TIMER 1A
Select runtime of cycle 1.

TIMER 1B
Select runtime of cycle 2.

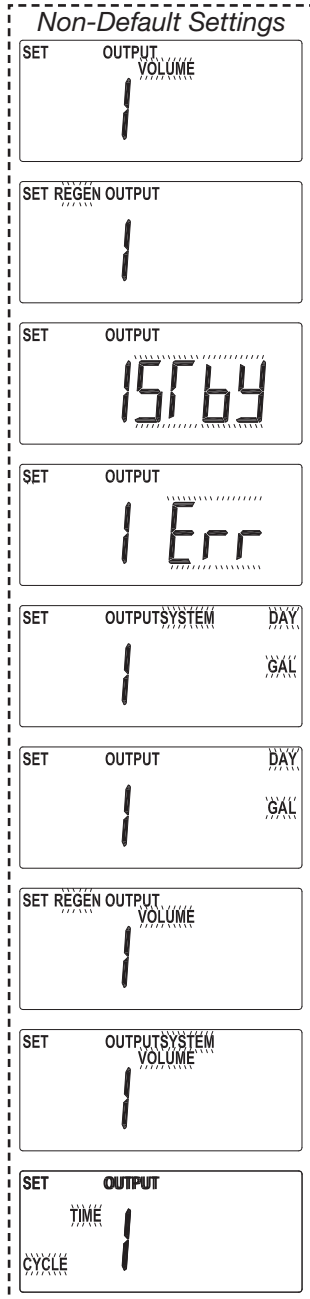
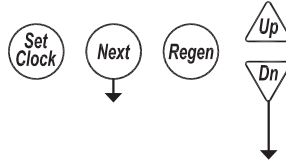
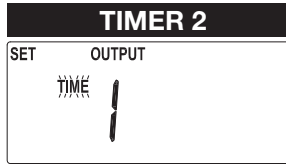
1 or 2 will be displayed if set for Alternate Regenerations in Cycle Setup 2.

Cycle	Units	Range	Increments
Backwash	Minutes	1-30 30-95	1 5
Draw	Minutes	1-30 30-100 100-180	1 5 10
Slow Rinse	Minutes	1-30 30-95	1 5
Rinse	Minutes	1-30 30-95	1 5
Fill	Minutes	0.1-10.0 10.0-30.0 30.0-99.0	0.1 0.2 1.0
Hold	Minutes	1-30 30-100 100-480	0.1 2.0 10.0

TIMER 1A2
If Alternate Regenerations has been selected in Cycle Setup 2, select runtime of Alternate Regeneration Cycle 1.

TIMER 1B2
Select runtime of Alternate Regeneration, cycle 2.

TIMER SCREENS (CONTINUED)



TIMER 2 – Set Trigger for Output 1

- Timer screens are only available with a system board installed

Time

- The relay is actuated based on a set amount of time after the start of regeneration

Volume

- The relay is actuated, during service only, every specified amount of volume usage

Regen

- Relay actuation is based on regen status

Standby

- Relay actuation is based on the units Standby status
- Relays would be used to control external valving or signaling a units Online status.

Error

- Relay actuates to signal an error condition

Day & Gal & System

- Relay actuates, based on system usage, at a specified daily volume to signal a usage alarm.
- “Usage High” flashes on the screen with unit continues to operate as normal. Pressing any button resets the relay and returns the unit to the user screens.
- Only available on the master unit of a system

Day & Gal

- Relay actuates, based on a units usage, at a specified daily volume to signal a usage alarm
- “Usage High” flashes on the screen with unit continues to operate as normal. Pressing any button resets the relay and returns the unit to the user screens.

Volume & Regen

- Relay is actuates, during service & while in regen, every specified amount of service flow

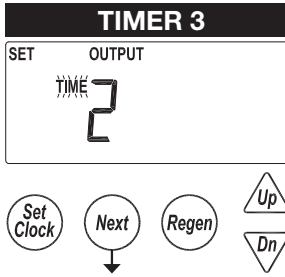
Volume & System

- Relay actuates, at a specified amount, based on combined volume usage of all units in the system
- Only available on the master unit of a system

Cycle

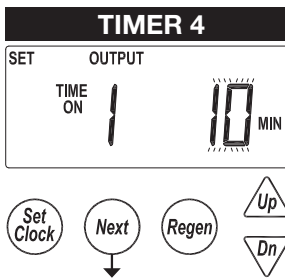
- Relay actuation is based on the start of a specified cycle

TIMER SCREENS (CONTINUED)



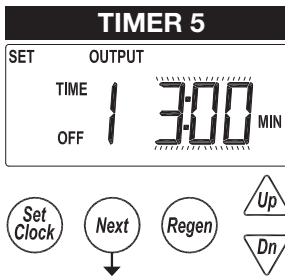
TIMER 3 – Set Trigger for Output 2

- Trigger options are the same as for output 1



TIMER 4 – Set Output 1 Trigger

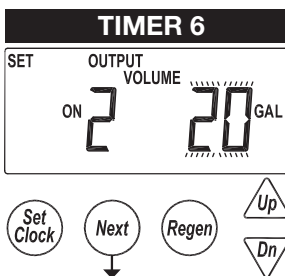
- Set the trigger point in these screens are based on the selection in the previous screens



TIMER 5 – Set the relays ON time duration

- A unit's ON time does not accumulate; ie a unit set to trigger the relay every 10 gallons and stay on for 5 minutes is flowing 10 gpm. The unit would not add 5 minutes every 10 gallons, it would reset the 5 minute countdown every 10 gallons
- A unit which is manually stepped through regeneration will reset the relay.

Relay Trigger Settings				
Trigger	Units	Range	Increment	Default
Time	Min-utes	0-240	1	10
Cycle				Slow Rinse
Volume	Gal-lons	1-200 200-1000 1000-10000	1 5 10	20
Volume	Liters	5-750 750-4000 4000-38000	5 20 40	75
Relay Duration Settings				
Trigger	Units	Range	Increment	Default
Time	Min-utes	:01-2:00 2:00-20:00 20-240	:01 :05 1	3:00



TIMER 6

Select Relay 2 output "ON", per units previously selected.

Time

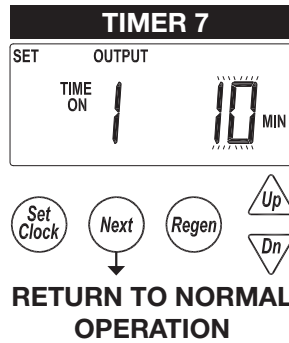
Time after the start of a regen before relay is actuated.

Cycle

Select a cycle which will actuate output 1.

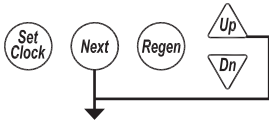
Volume

Volume of water interval during service between relay actuations.

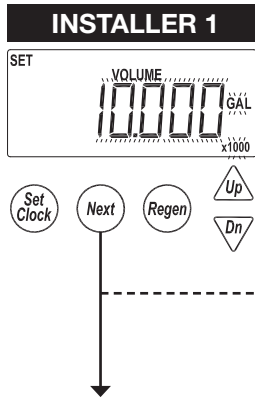
TIMER SCREENS (CONTINUED)**TIMER 7 – Set the relays ON time duration**

- A unit's ON time does not accumulate; ie a unit set to trigger the relay every 10 gallons and stay on for 5 minutes is flowing 10 gpm. The unit would not add 5 minutes every 10 gallons, it would reset the 5 minute countdown every 10 gallons
- A unit which is manually stepped through regeneration will reset the relay.

INSTALLER SETUP SCREENS



Accessed by pressing NEXT and UP simultaneously for >3 seconds.



INSTALLER 1 – Set Volumetric Capacity

Capacity: Set the units Volumetric Capacity in gallons or cubic meters

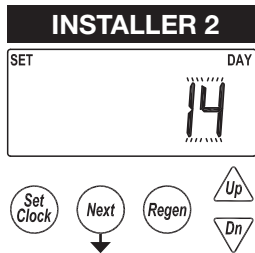
OFF

- Units will not regenerate based on volume but will track usage history
- Will not be an option on units with no day override set

Set current day and regen days when set as a 7 day time clock in System Setup 1. See next page.

X1000 Indicator Illuminates At 10,000 Gallons

Units	Range	Increments
US (GAL)	10-10,000	10
	10,000-100.00 x 1000	100
	100.00-999.00 x 1000	1000
SI (L)	50-50,000	50
	50,000-50.00 x 1000	50
	500.00-5000.0 x 1000	5000



INSTALLER 2 – Set Days Between Regenerations (Day override)

Set day override. 1-28 days between regenerations, or if set to 7 day time clock, see 7 day setup on next page. OFF will only be displayed if “OFF” is selected in System Setup 4.

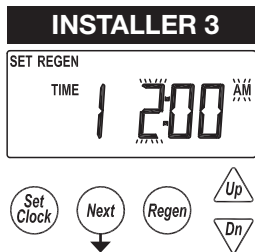
- Settings will be based on the type of day override control set in system setup.
- Off will be displayed for units with day override turned off

1 – 28: When set as a 28 day override

- Set the days between regens

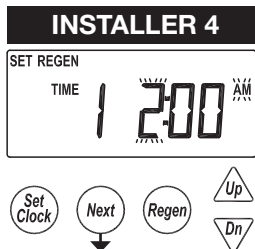
1 – 7: When set as a 7 day timeclock

- First, set 1 – 7 to signify the current day (1 = Sunday – 7 = Saturday)
- Next turn regen on or off for each specific day of the week, 1 - 7



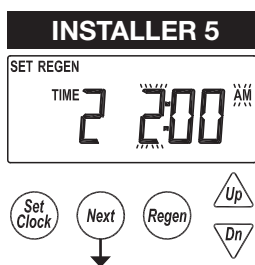
INSTALLER 3 – Set Delayed Regeneration Time

- Set the delayed time of regeneration, hour (AM / PM toggles at midnight)
- Units with no time dependent control (Aux Input settings or Day Override) will display on0



INSTALLER 4 – Set Delayed Regeneration Time

- Set delayed time of regeneration, minutes



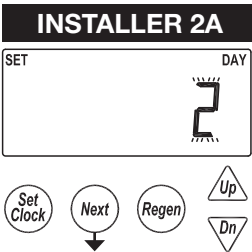
INSTALLER 5 – Set Multiple Delayed Regeneration Times

- When configured for multiple delayed regeneration times, repeat steps 3 & 4 for each additional time slot

**RETURN TO NORMAL
OPERATION**

INSTALLER SETUP SCREENS (CONTINUED)

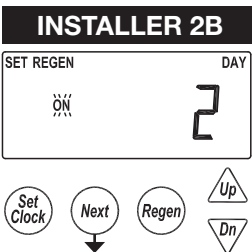
7 DAY OPTION



INSTALLER 2A

7 day time clock option. Set current day of the week:

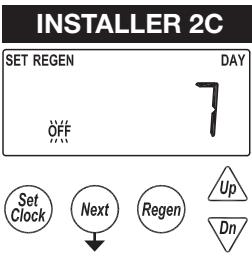
- 1 = Sunday
- 2 = Monday
- 3 = Tuesday
- 4 = Wednesday
- 5 = Thursday
- 6 = Friday
- 7 = Saturday



INSTALLER 2B

1 – 7: Signifies each day of the week, Sunday thru Saturday

- Scroll through each day using the up & down arrow
- Use Set Clock to toggle between ON or OFF to control regeneration for each day
 - i.e., regen on Monday, no regen on Sunday

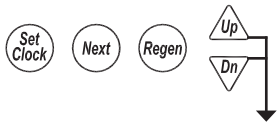


INSTALLER 2C

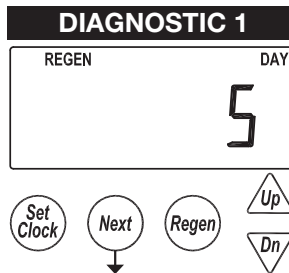
(i.e., no regeneration on Saturday.)

INSTALLER 3
(see previous page)

DIAGNOSTIC SCREENS



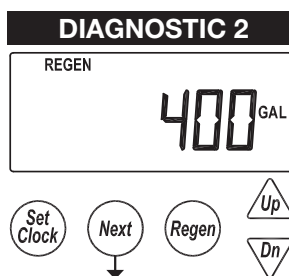
Accessed by pressing UP and DOWN simultaneously for >3 seconds.



DIAGNOSTIC 1

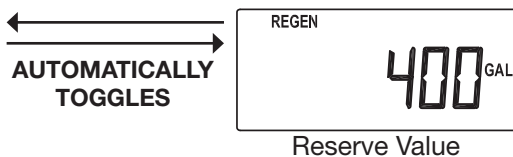
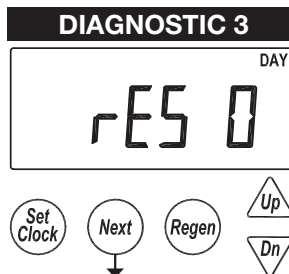
Days since the last regeneration.

All Diagnostic History screens are resettable with the History Reset sequence while in the Diagnostics 1 screen. Holding the Set Clock and Regen buttons for > 3 seconds initiates a totalizer or history reset.



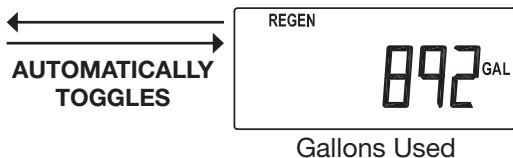
DIAGNOSTIC 2

Volume since the last regeneration.



DIAGNOSTIC 3

- Displays the reserve history
- Does not display on systems, or units with reserve set to OFF
- Use the UP & DN arrows to scroll through each days history
 - Day 0 is today's reserve (tomorrow's anticipated usage)
 - 1 was yesterday's reserve (today's anticipated usage)



DIAGNOSTIC 4A

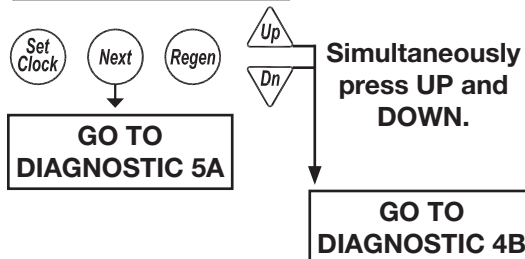
History of volume used.

Use UP and DOWN arrows to select a day.

0 = Today

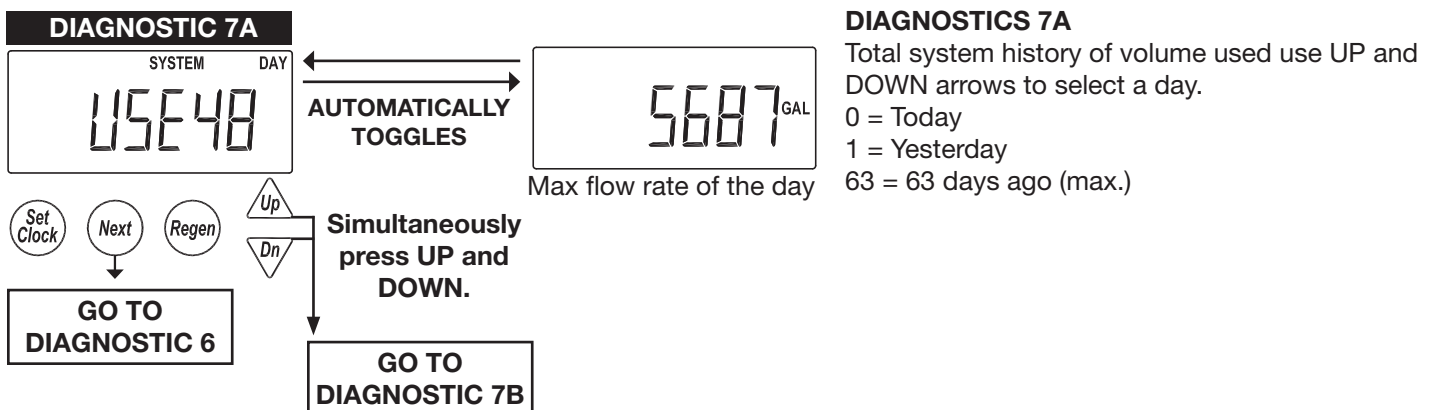
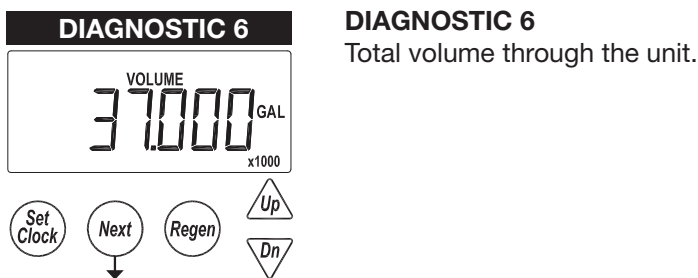
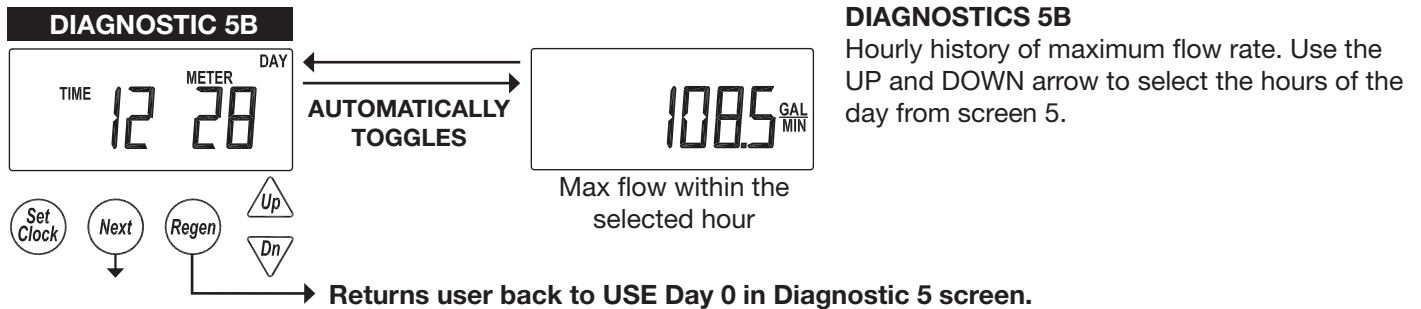
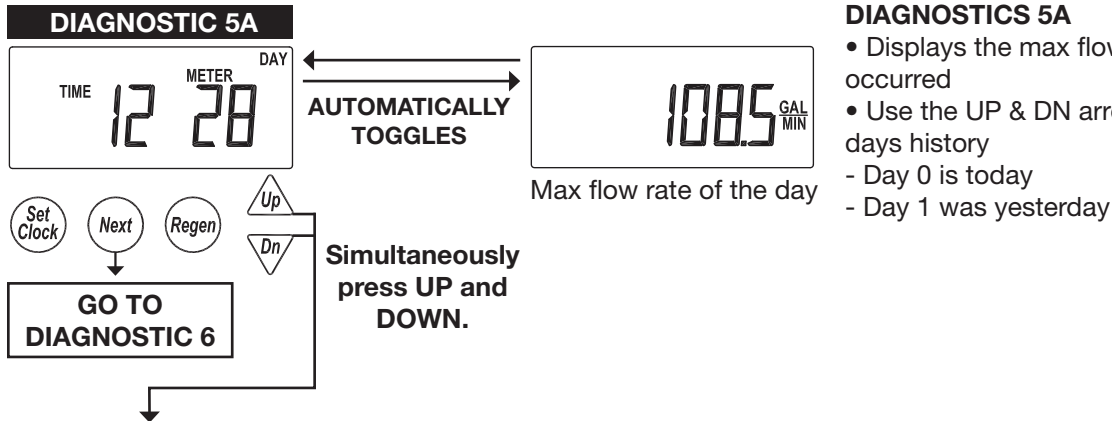
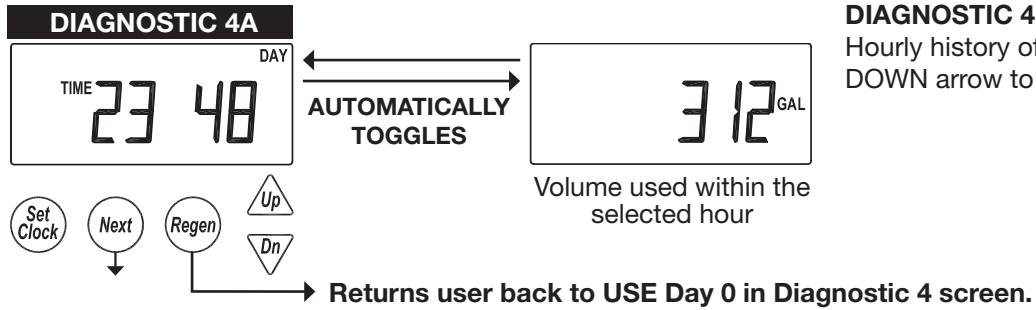
1 = Yesterday

63 = 63 days ago (max.)

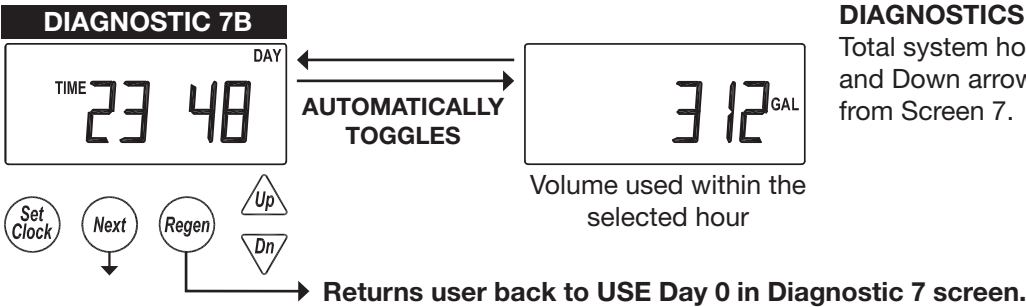


REGEN will display if a regeneration occurred that day.

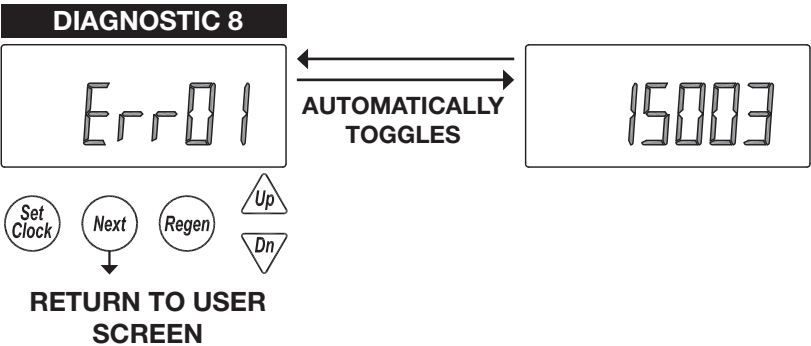
DIAGNOSTIC SCREENS (CONTINUED)



DIAGNOSTIC SCREENS (CONTINUED)

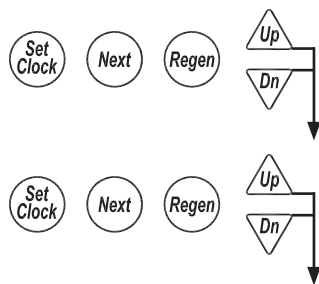


DIAGNOSTICS 7B
Total system hourly history of volume use Up and Down arrow to select the hours of the day from Screen 7.



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VALVE HISTORY

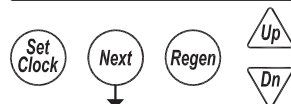


Accessed by pressing UP and DOWN simultaneously for >3 seconds, then by pressing UP and DOWN simultaneously again for >3 seconds.
Non-Resettable



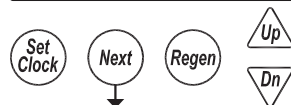
HISTORY 1

Total days since startup.
Time only accumulates while the unit is plugged in.



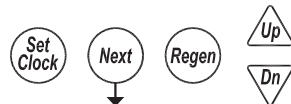
HISTORY 2

Total regenerations since startup.



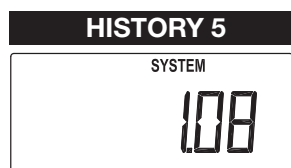
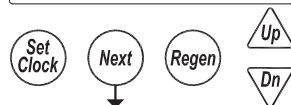
HISTORY 3

Total volume treated since startup.



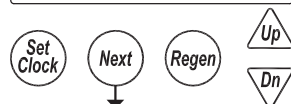
HISTORY 4

Main board software



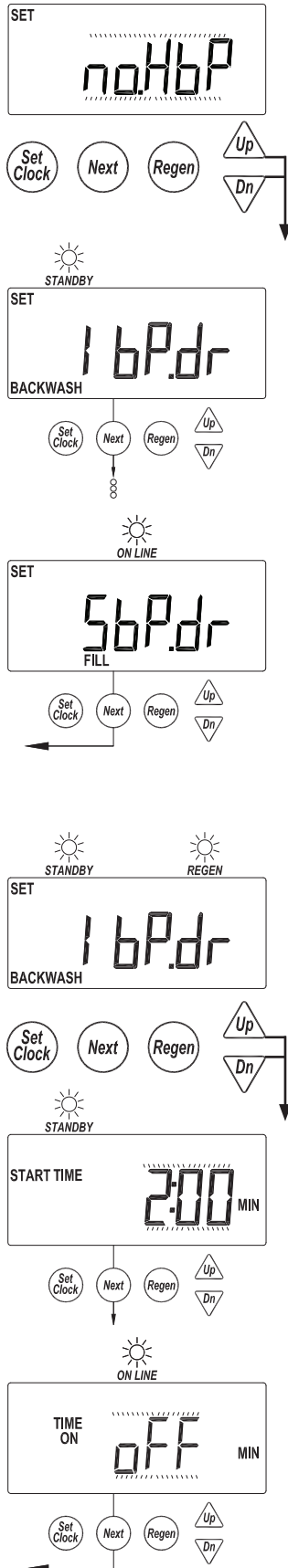
HISTORY 5

System board software revision. Will display -nA- if no system board is detected.



**RETURN TO NORMAL
OPERATION**

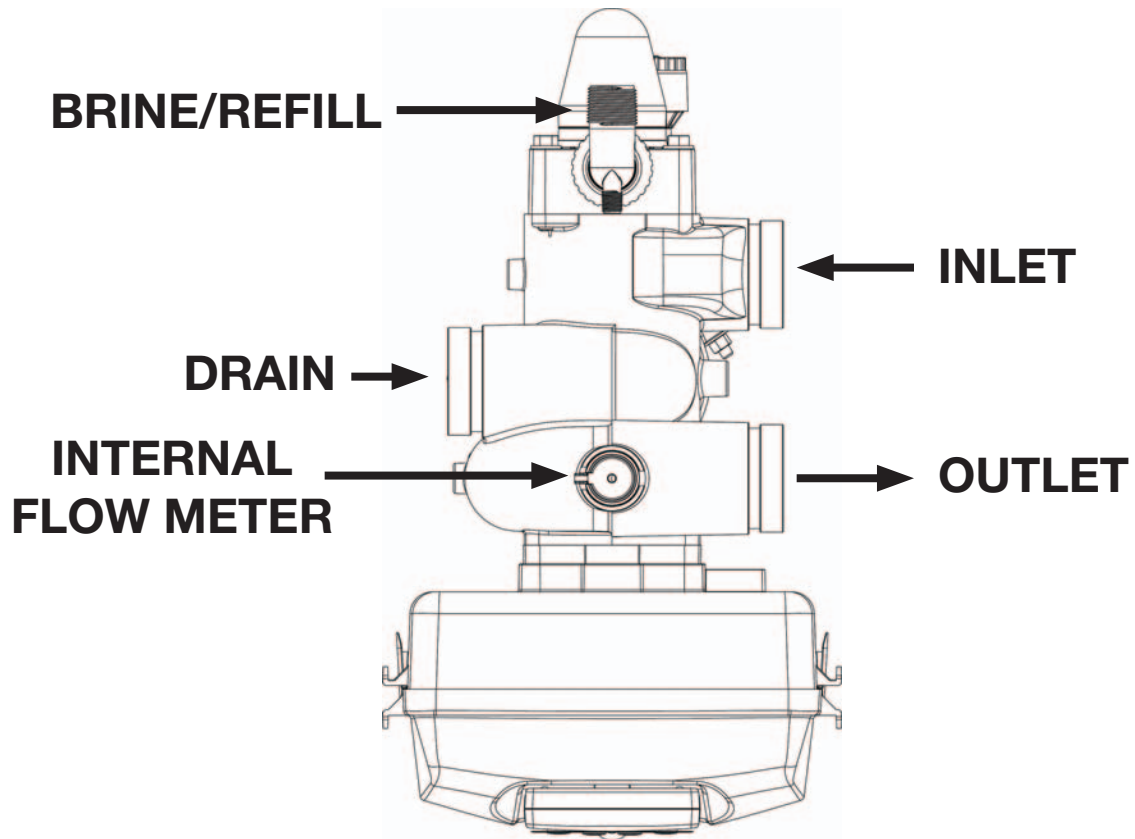
CUSTOM MOTORIZED DRIVE TIMING



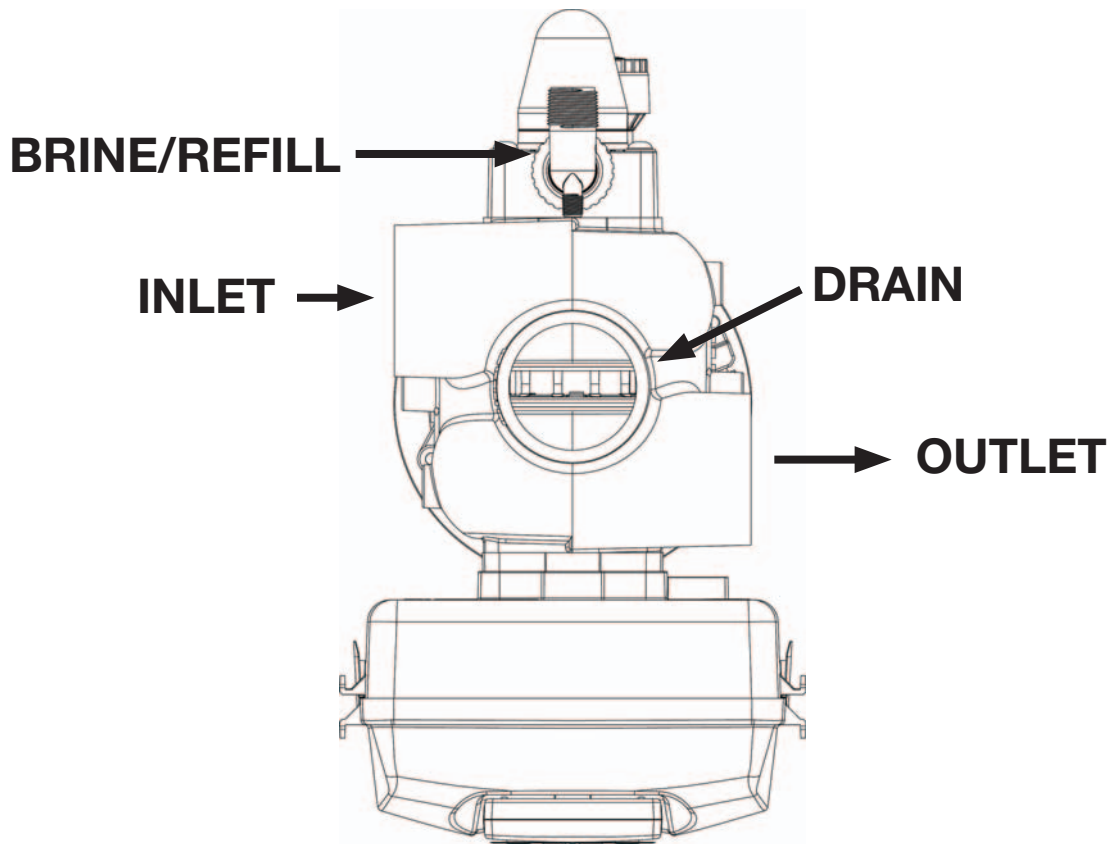
- Used to alter the standard timing sequence of the motorized isolation valve for complete custom timing of the drive circuits
 - Setup procedure applies to both the “Bypass” drive of the main board and “Aux Drive” of the optional expansion board
- Customization needs to be done after defining the regeneration cycle sequence
- Accessed by pressing the Up & Dn arrows simultaneously while in the No Hard Water Bypass selection
 - Next will scroll through each cycle of the regeneration program
 - Arrow buttons toggle Standby and Online indicating the desired position the drive during that cycle of the regeneration.
 - In the example screens the “Bypass” drive will be transitioning offline for Backwash (Cycle 1) and coming online for Fill (Cycle 5).
- Timing can be further customized per cycle by adding a time delay to the sequence
 - Accessed by pressing the Up & Dn arrows simultaneously while in the drive sequence screens
 - Setting a “Start Time” delays the start of that transition after reaching set cycle
 - A second time screen then sets the time the drive maintains that set position before transition back to its previous position.
 - “Regen” will be illuminated to identify that a sequence has a time modifier associated with it
 - In the example screens the “Bypass” drive will delay its transition to offline until 2 minutes into Backwash (Cycle 1) and coming online for Fill (Cycle 5).

INSTALLATION

WS2H CONTROL VALVE TOP VIEW



WS3 CONTROL VALVE TOP VIEW



INSTALLATION (CONTINUED)

GENERAL INSTALLATION & SERVICE WARNINGS

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

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC., MAY DAMAGE PRODUCTS THAT CONTAIN O-RINGS OR PLASTIC COMPONENTS. EXPOSURE TO SUCH HYDROCARBONS MAY CAUSE THE PRODUCTS TO LEAK. DO NOT USE THE PRODUCT(S) CONTAINED IN THIS DOCUMENT ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC.

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

Do not use pipe dope or other sealants on threads. Teflon tape is recommended to be used on all threads.

Use of pipe dope may break down the plastics in the control valve.



When servicing the valve, water may leak from the valve. Water from the valve may create a slip hazard. Clean up water spills.



Disconnect from electrical power prior to servicing the valve.

Allow two feet of clearance to service WS2H and WS3 valves.

The valve will withstand transportation and storage temperatures of -13 °F (-25 °C) to 131 °F (55 °C) and for short periods up to 158 °F (70 °C). If valve has been exposed to freezing conditions let valve warm up to room temperature before running water through it. The valve has been packaged to prevent damage from the effects of normal humidity, vibration and shock.

SITE REQUIREMENTS:

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

All plumbing should be done in accordance with local codes.

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

INSTALLATION (CONTINUED)

6. INLET/OUTLET PLUMBING: Connect to a supply line downstream of outdoor spigots. Install inlet and outlet shutoff valves for the control valve; see top view drawings for control valve inlet and outlet locations. Installation of a three valve bypass is recommended. If using plastic fittings ground the water conditioner per local electric codes. If an external water meter is used, install the water meter on the outlet side of the control valve. It is recommended that the meter assembly be installed horizontally or in a downflow vertical position to reduce turbine bearing wear. The turbine assembly may be orientated in any direction. Remove the cover and drive bracket and thread the water meter cord through the hole in the back plate. Reinstall the drive bracket. Weave the cord through the strain relief on the backplate and connect the end to the three prong connector labeled FLOW on the printed circuit board. Re-install the cover.

7. Drain: Verify that the drain can handle the backwash rate of the water conditioner. Correctly size the drain line and install an appropriately sized drain line flow control. For WS2H and WS3 valves a drain line flow control are NOT supplied with a valve. For WS2H valves the drain outlet is 2" Female NPT or BSPT threads or 2.5" groove lock connection. For WS3 valves the drain port is 3" Female NPT or BSPT, no groove lock connection. If using copper, solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" (152.4 mm) between the drain line flow control fitting and solder joints to prevent heat from damaging the flow control. Avoid elevating the drain line above the control valve where possible. Discharge the drain line through an air gap to a receptacle in accordance with local plumbing codes.

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

8. Regeneration: If the control valve is to be used to regenerate the water conditioner with brine (saturated salt solution) or other regenerants. The WS2H and WS3 control valves regenerant port has a 1" 90° Male NPT threaded outlet connection that swivels 360°. To ensure acceptable operation of the injectors use 1" pipe to connect to the brine tank. Smaller drain line flow controls may result in the injector performance not matching the injector graphs. Use an adequately size drain line flow control to ensure proper brine draw. See Table 3 for injector order number and size for tank diameter. An overflow drain line from the regenerant tank that discharges into an acceptable drain is recommended, as a regenerant overflow could damage furnishings or the building structure. Connect a line to the overflow fitting on the regenerant tank. If an overflow fitting is not already installed on the regenerant tank, install one. Do not elevate the overflow drain line. Discharge the overflow drain line through an air gap to a receptacle in accordance with local plumbing codes.

9. Power Adapter: If a Power Adapter is already connected to the control valve, plug the Power Adapter into an uninterrupted outlet. If the Power Adapter cord has not yet been connected to the control valve, remove the control valve cover and the drive bracket and thread Power Adapter cord through the hole in the back plate. Reinstall the drive bracket. Weave the cord through the strain relief on the backplate and connect the end to the four pin connector on the printed circuit board labeled POWER. Reinstall the cover. Plug the Power Adapter into an uninterrupted outlet.

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

INSTALLATION SUMMARY

Installation Date: _____

Installation Location: _____

Installer(s): _____

Phone Number: _____

Application Type: (Softener) _____ Other: _____

Water Source: _____**Water Test Results:**

Hardness: _____ Iron: _____ pH: _____

Other: _____

Misc:

Service Flow Rates: min. _____ max. _____

Tank Size: Diameter _____ Height: _____

Resin or Media Volume: _____

Resin or Media Type: _____

Capacity: _____

Salt or Fill Setting per Regeneration: _____

Brine Tank Size: _____

Control Valve Configuration:

Valve Type: _____

Valve Part Number: _____

Valve Serial Number: _____

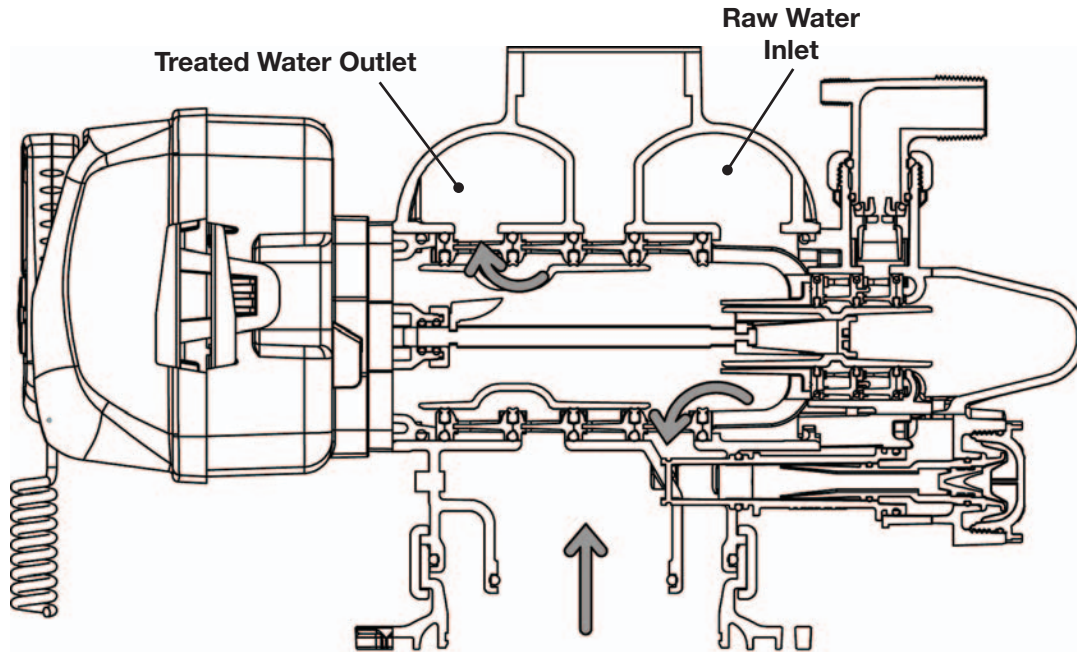
Regenerant Refill Control: _____ gpm/lpm

Injector Size: _____

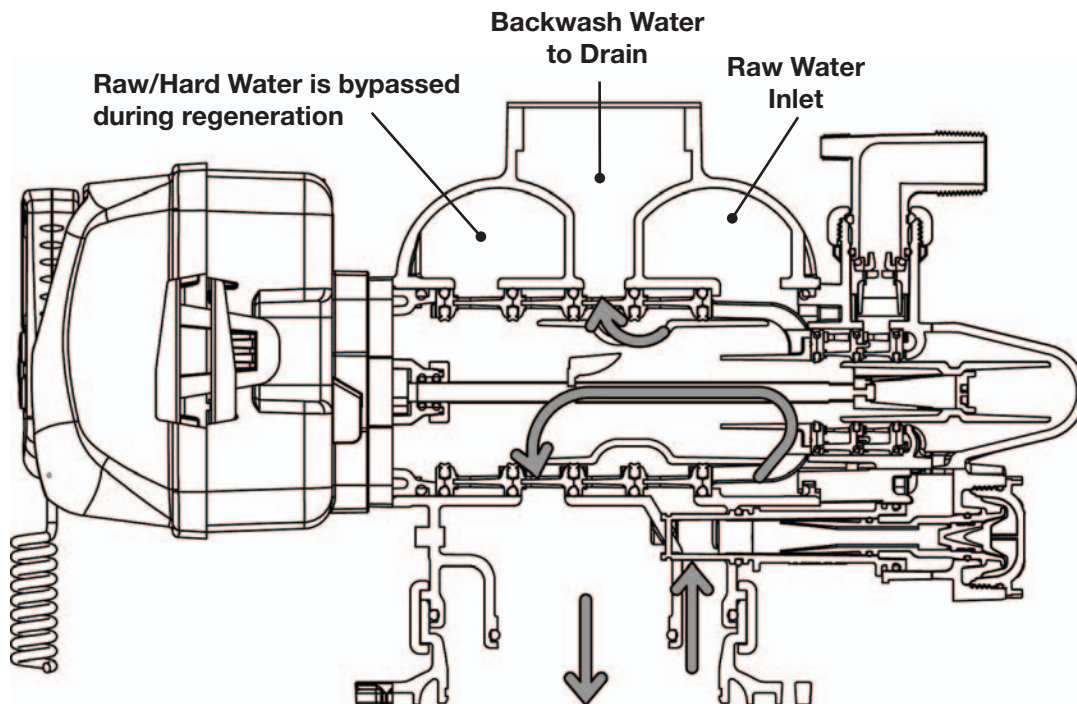
Drain Line Flow Control: _____ gpm/lpm

CYCLE POSITIONS / FLOW DIAGRAMS

SERVICE

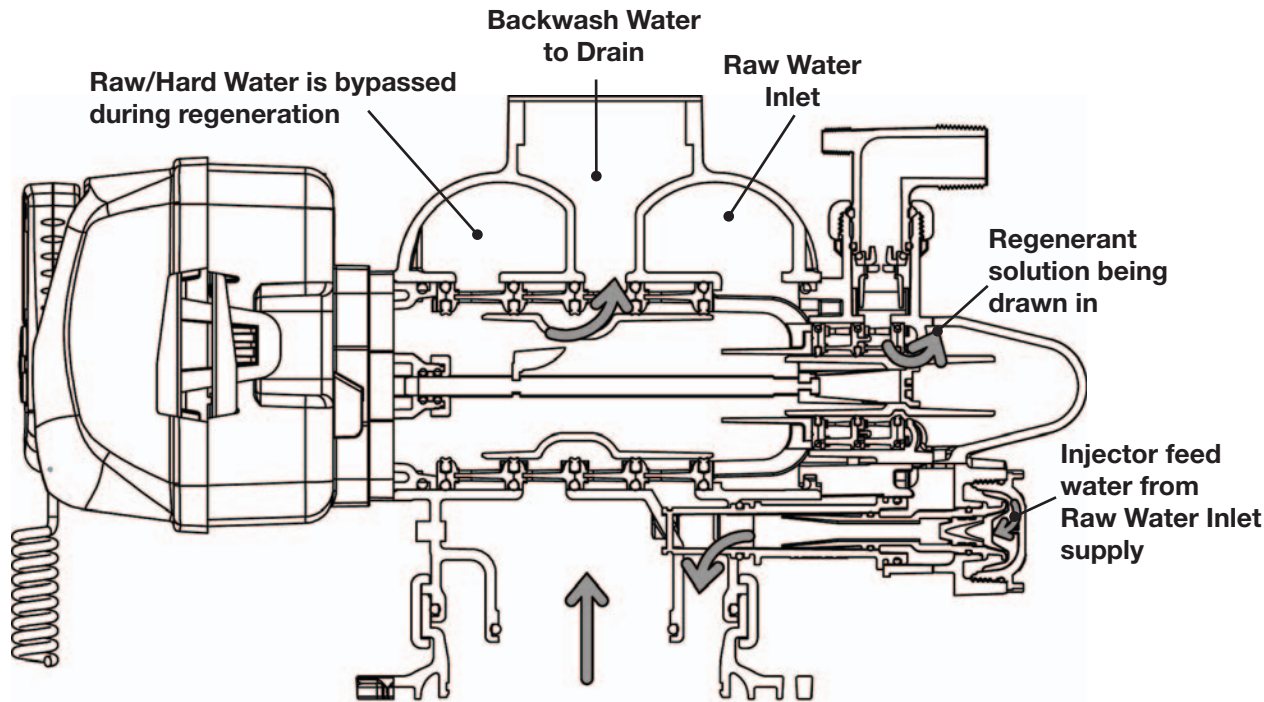


BACKWASH

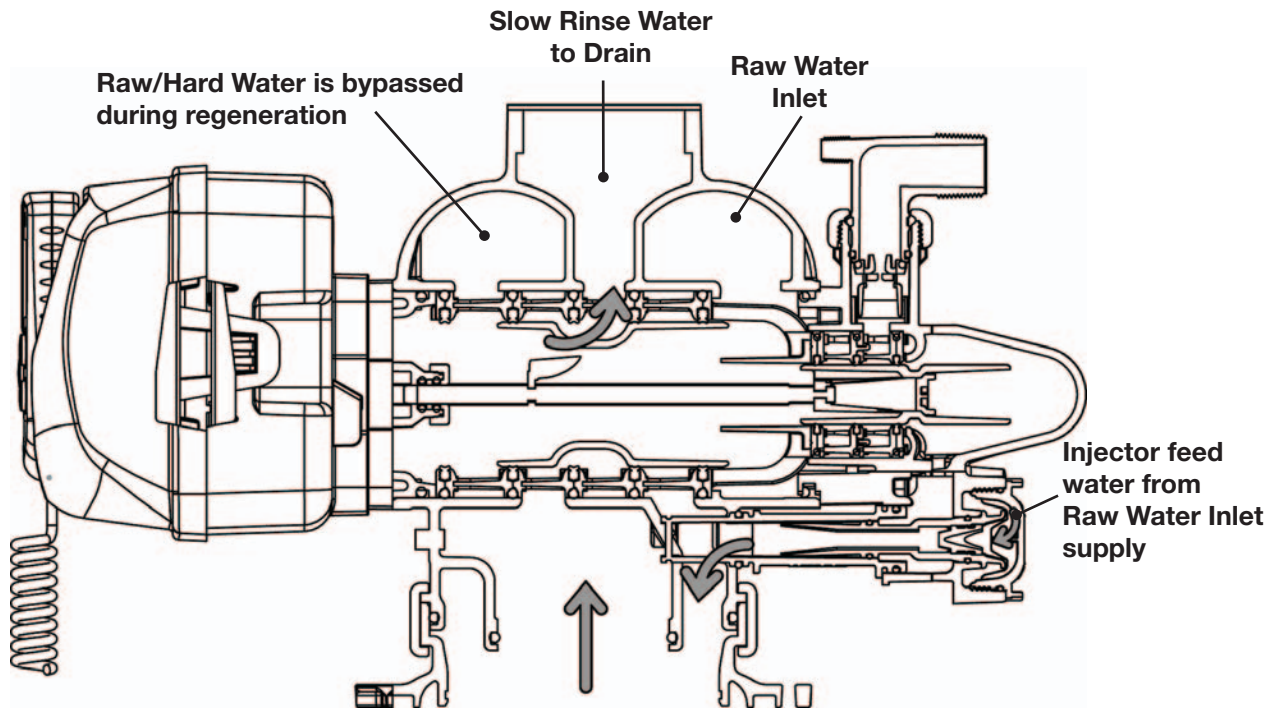


CYCLE POSITIONS / FLOW DIAGRAMS (CONTINUED)

DRAW

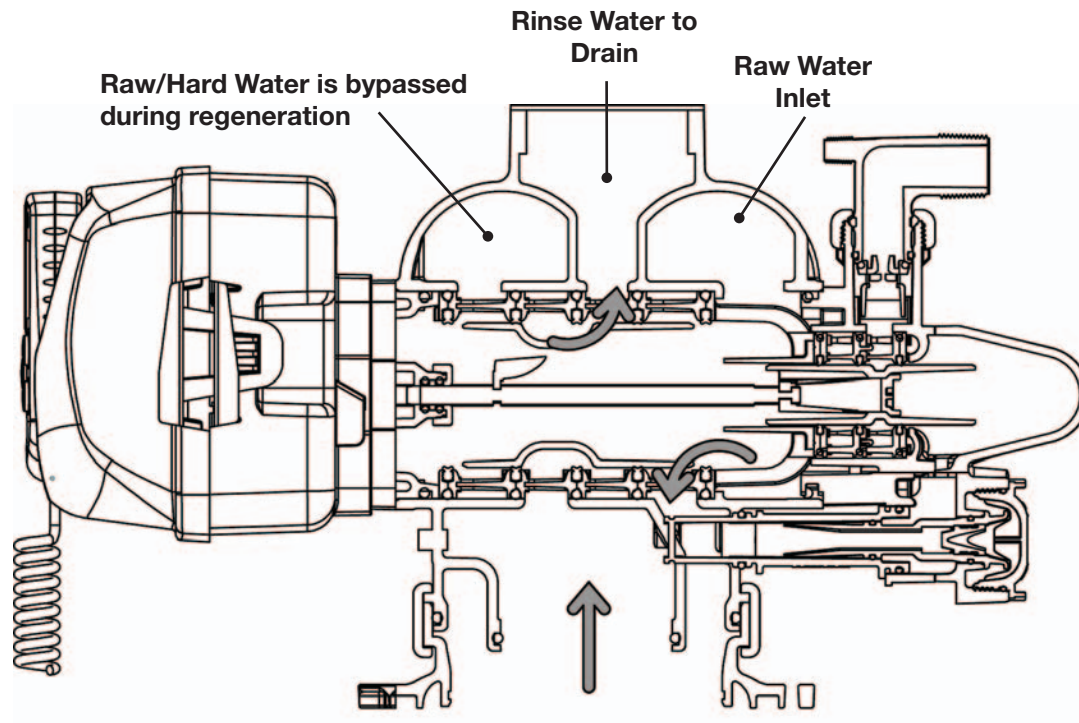


SLOW RINSE

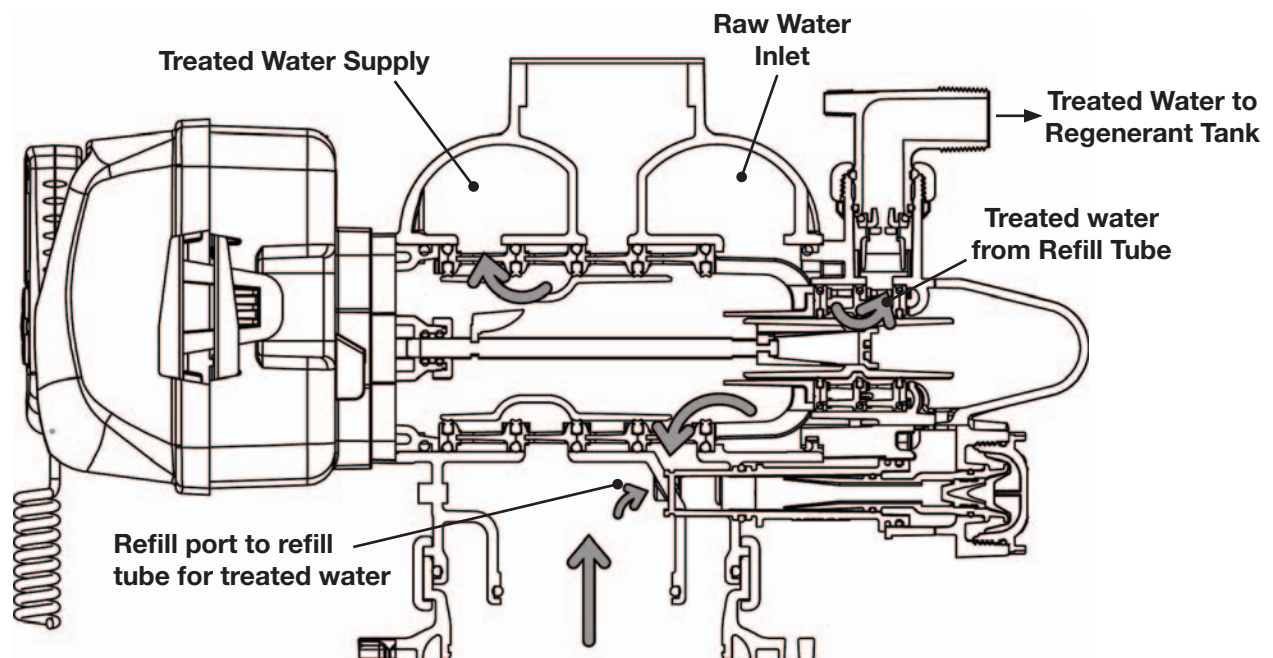


CYCLE POSITIONS / FLOW DIAGRAMS (CONTINUED)

RINSE



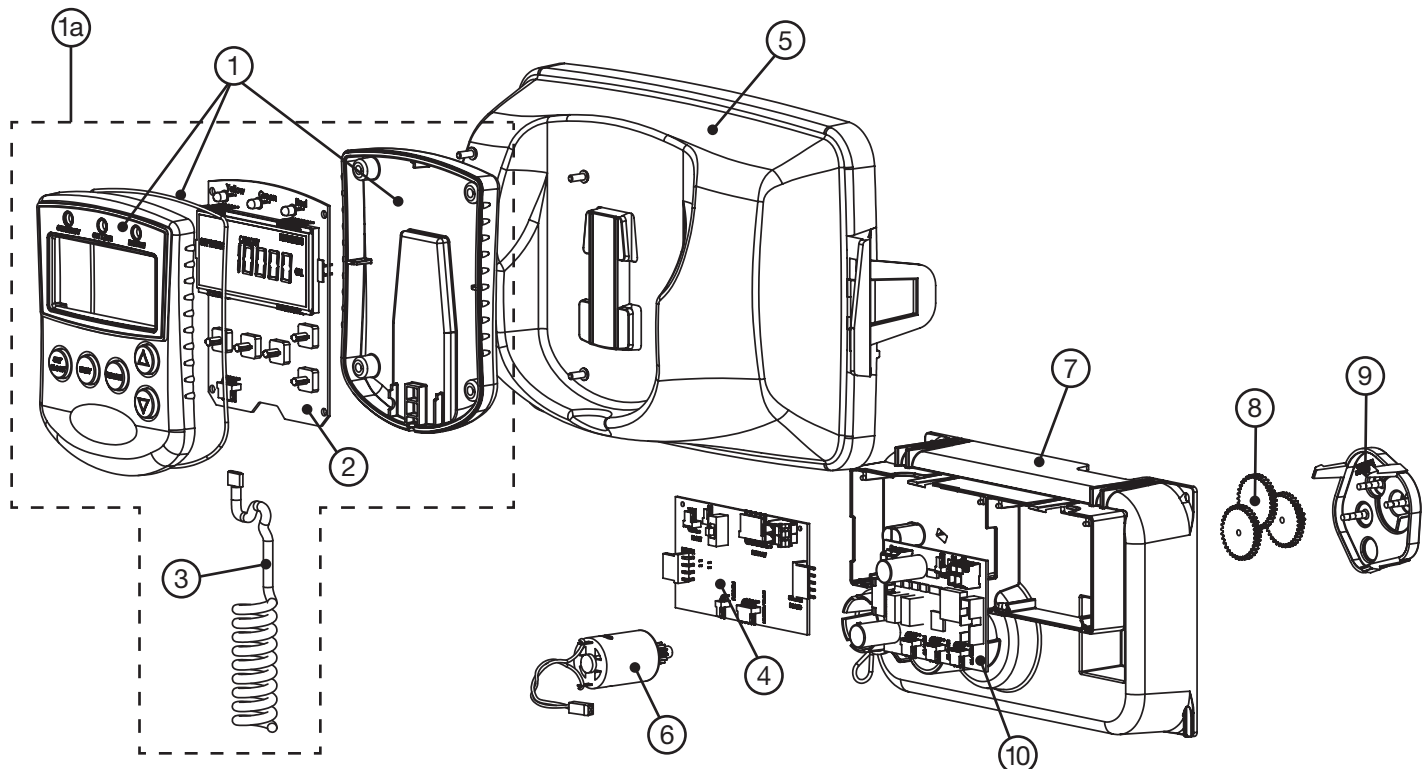
SOFT WATER REFILL



FRONT COVER AND DRIVE ASSEMBLY

Drawing No.	Order No.	Description	Quantity
1	V3068	WS2H/3 POD FRNT-BK COVERS	1
1a	V3082	WS2H/3 POD ASY COMPLETE W/BOARD*	Optional
2	V3241-01 BOARD	WS2H/3 PC BOARD DISPLAY	1
3	V3248	WS2H/3 CABLE DISPLAY POD	1
4	V3242-01BOARD	WS2H/3 PC BOARD VALVE	1 See Table 2 Software and Power Supply Compatibility for option Selection
5	V3224-01R	WS2H/3 COVER ASY PLATINUM	1
6	V3107-01	WS1 MOTOR ASY	1
7	V3226-01	WS2H/3 DRIVE BRACKET ASY	1
8	V3110	WS1 DRIVE GEAR 12X36	3
9	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3461-01	WS2H/3 AC ADAPTER 20VAC	1 See Table 2 Software and Power Supply Compatibility for option selection
	V3461EU-01	WS2H/3 AC ADAPTER EU 20VAC	
	V3461UK-01	WS2H/3 AC ADAPTER UK 20VAC	
10	V3243-01BOARD	WS2H/3 PC BOARD SYSTEM	1 See Table 2 Software and Power Supply Compatibility for option Selection
Not Shown	V3475-12	WS2H/3 SYS CONNECT CORD 12 FT RED	Optional
Not Shown	V3475-24	WS2H/3 SYS CONNECT CORD 24 FT BL	Optional
Not Shown	V3475-36	WS2H/3 SYS CONNECT CORD 36 FT YEL	Optional

*Contains items 1,2 & 3 Pod Assembly, PC Board and Cable



WS2H DRIVE CAP ASSEMBLY, DOWNFLOW PISTON, REGENERANT PISTON, SPACER STACK ASSEMBLY, DRIVE BACK PLATE, MAIN BODY AND METER

Drawing No.	Order No.	Description	Quantity
1	V3275	WS2H/3 SCREW BTNSKT HD SS3/8-16X2-1/4 (7/32" hex allen wrench required)	4
2	V3291	WS2H/3 WASHER SS 3/8	4
3	V3225	WS2H/3 BACK PLATE	1
4	V3066	WS2H DRIVE ASY	1
5	V3289	O-RING 344	1
6	V3204-01	WS2H PISTON	1
7	V3238-01***	WS2H/3 BRINE PISTON	1
8	V3065	WS2H STACK ASY	1
Not Shown	V3468-04	WS15/2/3 PLUG 1/4NPT PLST TAPE	2
	V3465-04	WS15/2/3 PLG 1/4BSPT PLST TAPE	
9	V3201-03	WS15/2/3 PLG 1/4BSPT PLST TAPE	1
	V3201BSPT-03	WS2H BSPT BODY W/V3465 PLUG	
10	V3632*	WS1.5/2/3 METER RETAINING CLIP	1
11	V3003-02	WS1.5/2H METER COMMERCIAL ASY	1
12	V3118-03	WS1.5/2 TURBINE ASY	1
13	V3105	O-RING 215	1
14	V3501	WS1.5/2 TURBINE CLIP	1
15	V3279	O-RING 346	1
16	V3280	O-RING 332 FOR VALVE BODIES WITH NPT THREADS	1
	V3452	O-RING 230 FOR VALVE BODIES WITH BSPT THREADS	
17	V3054**	WS2H 4 IN BASE CLAMP ASY	1
18	V3276	WS2H/3 BOLT HEX SS 5/16-18X1-3/4	1
19	V3269	WS2H/3 NUT 5/16-18 SS HEX	1
Not Shown	D1300-01	TOP BAFFLE DFSR CLACK 2/63MM	1

* In 2008 a modification was made to Meter Housings to use V3632 WS1.5/2/3 Meter Retaining Clip. Do not use V3632 on old style housings which have holes through the castings to accept the U-shaped V3223 WS2 Meter Clip.

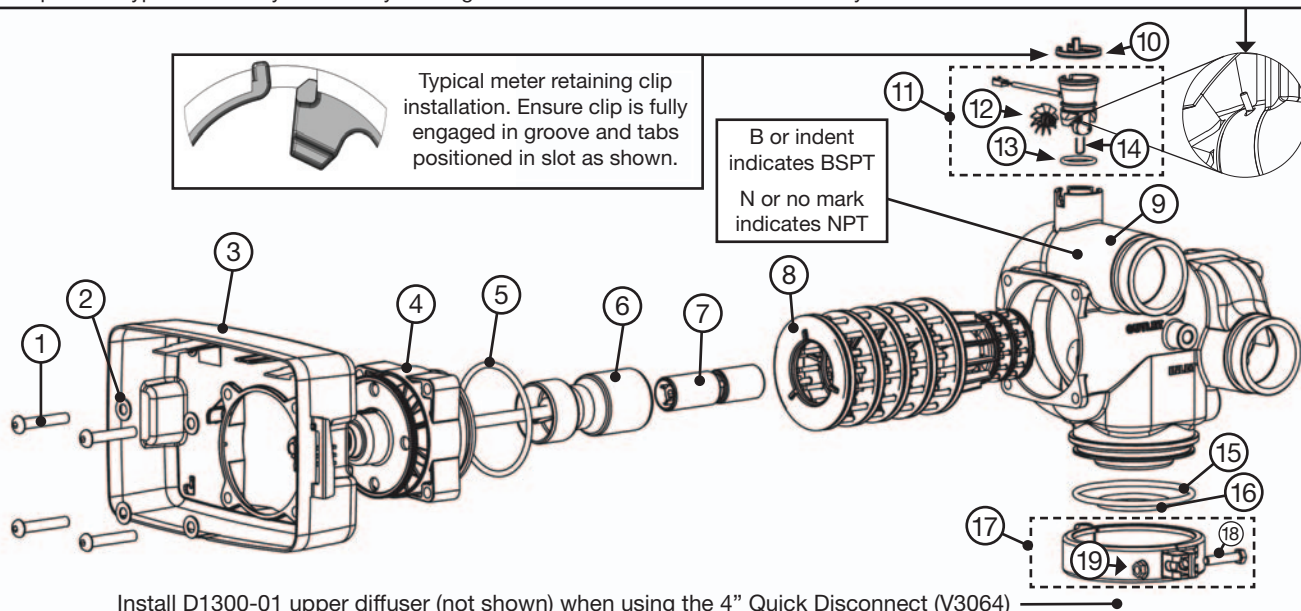
**V3054 WS2 4 IN BASE CLAMP ASY includes a V3276 WS2 BOLT HEX SS 5/16-18X1-3/4 and V3269 WS2 NUT 5/16-18 SS HEX.

***V3238-01 Brine Piston is used for Backwash Only valves.

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

Service or replace the turbine by:

1. Turn the bypass for the system off and relieve the pressure on the system.
2. Press downward on the remote meter assembly to relieve tension on the retaining clip V3632 (or the U-shaped V3223 WS2 Meter Clip). Remove the clip and take the meter assembly out of the housing.
3. Remove the bend from the two exposed tips of the retaining clip V3501 and remove clip.
4. Service or replace the V3118-03 WS15/2 Turbine Assembly and place it back in the turbine shaft.
5. Insert the V3501 WS15/2 Turbine Clip and re-bend the exposed ends of the clip. The V3118-03 turbine has a groove to line up with the V3501 WS15/2 Turbine Clip.
6. Insert meter assembly back into the meter housing.
7. Re-install the meter retaining clip V3632 as shown below (or the U-shaped V3223 WS2 Meter Clip).
8. Open the bypass for the system slowly to bring back into service and check to be sure you have no water leaks.

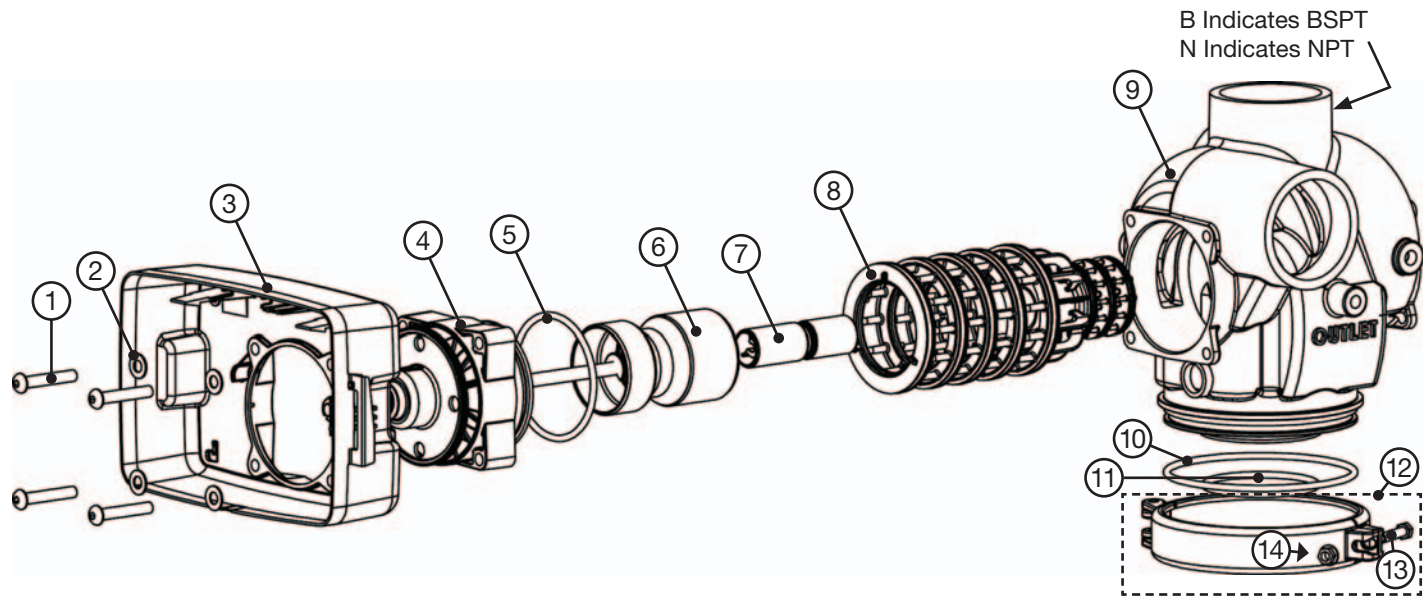


WS3 DRIVE CAP ASSEMBLY, DOWNFLOW PISTON, REGENERANT PISTON, SPACER STACK ASSEMBLY, DRIVE BACK PLATE AND MAIN BODY

Drawing No.	Order No.	Description	Quantity
1	V3274	WS2H/3 SCREW BTNSKT HD SS3/8-16X2 (7/32" hex allen wrench required)	4
2	V3291	WS2H/3 WASHER SS 3/8	4
3	V3225	WS2H/3 BACK PLATE	1
4	V3093	WS3 DRIVE ASY	1
5	V3289	O-RING 344	1
6	V3666-01	WS3 PISTON	1
7	V3238-01**	WS2H/3 BRINE PISTON	1
8	V3092	WS3 STACK ASY	1
Not Shown	V3468-04	WS15/2/3 PLUG 1/4NPT PLST TAPE	2
	V3465-04	WS15/2/3 PLG 1/4BSPT PLST TAPE	
9	V3667-03	WS3 BODY W/V3468 PLUG	1
	V3667BSPT-03	WS3 BSPT BODY W/V3465 PLUG	
10	V3763	O-RING 361	1
11	V3762	O-RING 341 FOR VALVE BODIES WITH NPT OR BSPT THREADS	1
12	V3091*	WS3 BASE CLAMP ASY	1
13	V3276	WS2H/3 BOLT HEX SS 5/16-18X1-3/4	1
14	V3269	WS2H/3 NUT 5/16-18 SS HEX	1
Not Shown	V3672	TOP BAFFLE DFR CLACK 3/90MM	1

*V3091 WS3 BASE CLAMP ASY includes a V3276 WS2H/3 BOLT HEX SS 5/16-18X1-3/4 and V3269 WS2H/3 NUT 5/16-18 SS HEX.

**V3238-01 Brine Piston is used for Backwash Only valves.



Install V3672 upper diffuser (not shown) when using the 6" Flange Base (V3090) →

WS2H AND WS3 BRINE VALVE BODY AND INJECTOR COMPONENTS

Drawing No.	Order No.	Description	Quantity	
			WS2H	WS3
1	V3237-01	WS2H/3 SOFTFILL TUBE ASY	1	1
2a	V3236-04*	WS2H INJECTOR TUBE ASY FOR A THRU H	1	
2b	V3670-01**	WS3 INJECTOR TUBE DOWNFLOW ASY		1
3	V3289	O-RING 344	1	1
4	V3067	WS2H/3 BRINE BODY ASY	1	1
5	V3477	WS2H/3 INJECTOR CAP	1	1
6	V3152	O-RING 135	1	1
7	V3275	WS2H/3 SCREW BSHD SS 3/8-16X2-1/4 (7/32" hex allen wrench required)	4	4
8	V3291	WS2H/3 WASHER SS 3/8	4	4
9	V3162-022***	WS1 DLFC 022 FOR 3/4	1	1
10	V3231	WS2H/3 REFILL FLOW CNTRL RETAINER	1	1
11	V3277	O-RING 211	1	1
12	V3105	O-RING 215	1	1
13	V3150	WS1 SPLIT RING	1	1
14	V3151	WS1 NUT 1 QC	1	1
15	V3149	WS1 FTG 1 PVC MALE NPT ELBOW	1	1
Not Shown	V3189	WS1 FTG 3/4&1 PVC SLVNT 90	Optional	Optional
Not Shown	V3499****	WS2H/3 FITTING CAP 1 IN THREADED	1	1
Not Shown	V3797*****	WS1 FTG 1 PVC MALE BSPT ELBOW	BSPT Only	BSPT Only

*V3236-04 WS2H INJECTOR TUBE ASY A thru H contains a V3285 O-RING 213 and a V3286 O-RING 216.

**V3670-01 WS3 INJECTOR TUBE DOWNFLOW ASY contains a V3285 O-RING 213, V3286 O-RING 216 and a V3163 O-RING 019.

***Any V3162-XXX flow control may be used. V3237-01 WS2H SOFTFILL TUBE ASY contains a V3155 O-RING 112, V3287 O-RING 110 and a V3288 O-RING 206.

****V3010-2A through V3010-2G injectors contain a V3283 O-RING 117 and a V3284 O-RING 114. V3010-2H injectors use a V3283 O-RING 117 and D1263 O-RING 116.

Backwash Only Valves include a V3499 but do not include the following parts: V3189, V3162-022, V3231 and V3277.

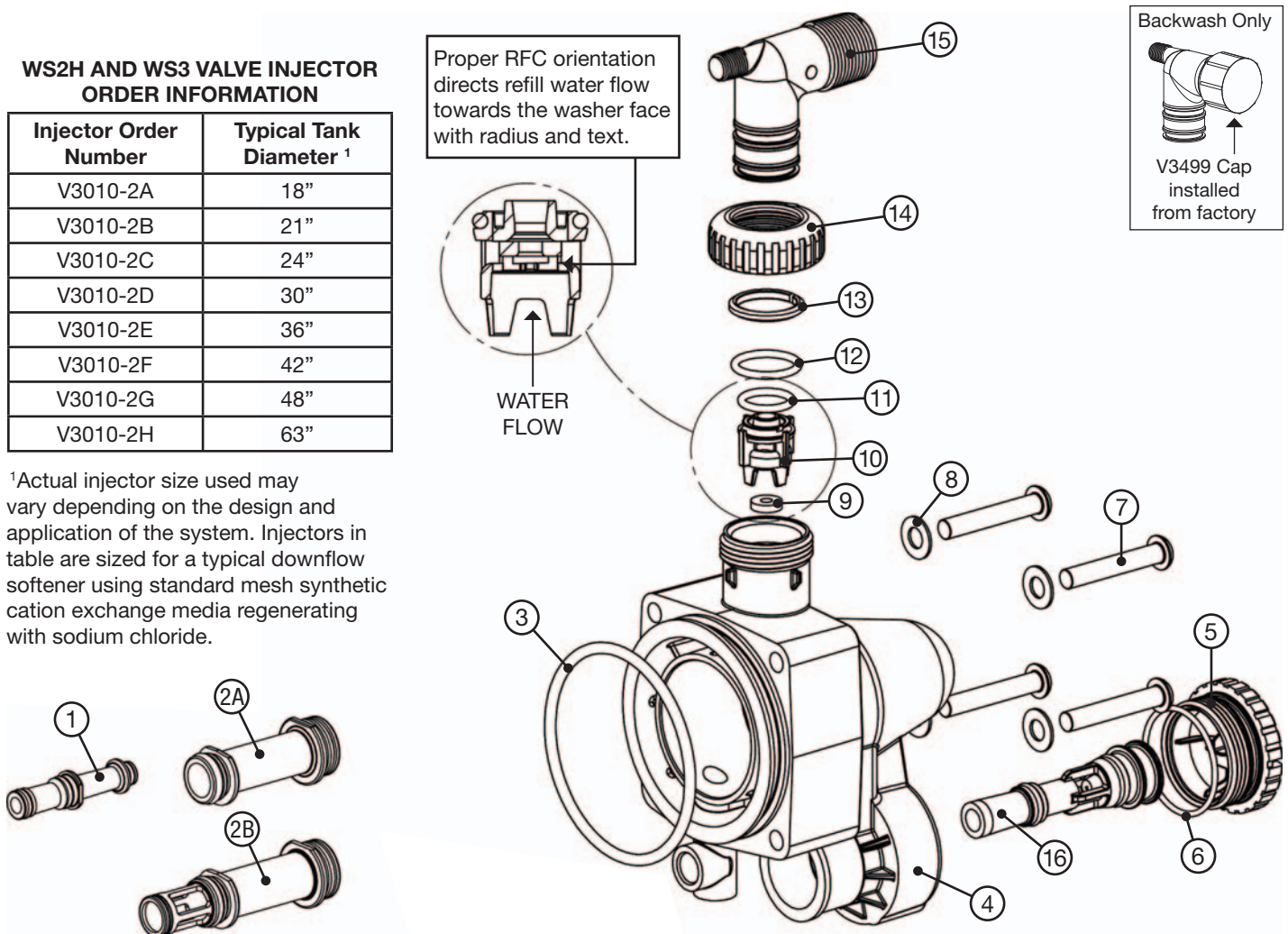
***** Install V3499 on V3149 if valve is to be set up as a backwash only valve.

***** BSPT valves also include a V3797 WS1 FTG 1 PVC MALE BSPT ELBOW

WS2H AND WS3 VALVE INJECTOR ORDER INFORMATION

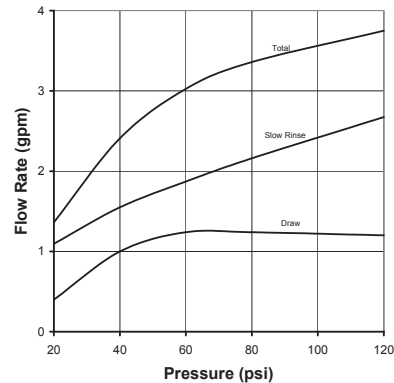
Injector Order Number	Typical Tank Diameter ¹
V3010-2A	18"
V3010-2B	21"
V3010-2C	24"
V3010-2D	30"
V3010-2E	36"
V3010-2F	42"
V3010-2G	48"
V3010-2H	63"

¹Actual injector size used may vary depending on the design and application of the system. Injectors in table are sized for a typical downflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride.

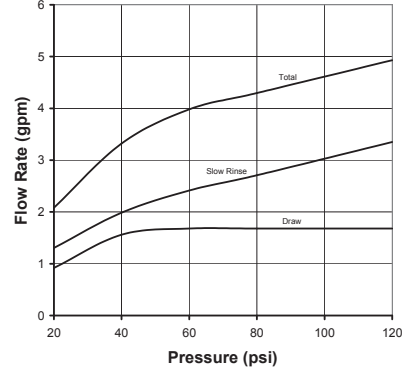


STANDARD INJECTOR GRAPHS

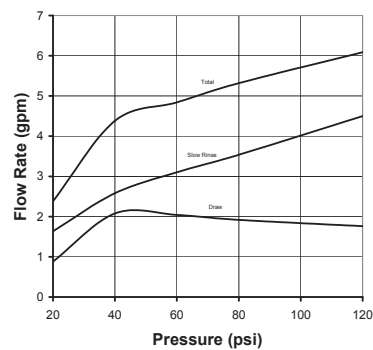
Order No. V3010-2A
US Units



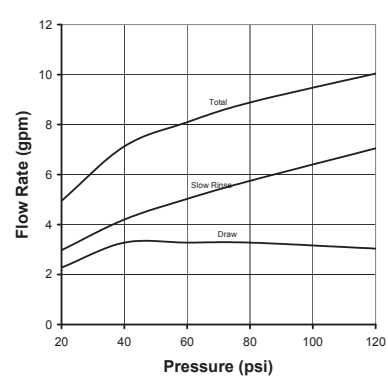
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US Units



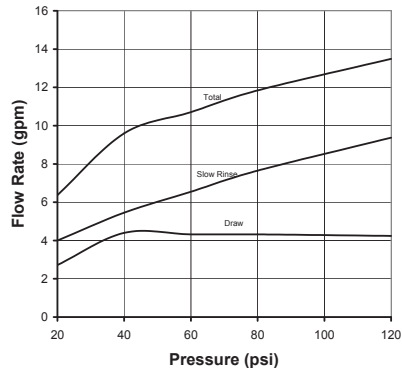
Order No. V3010-2C
US Units



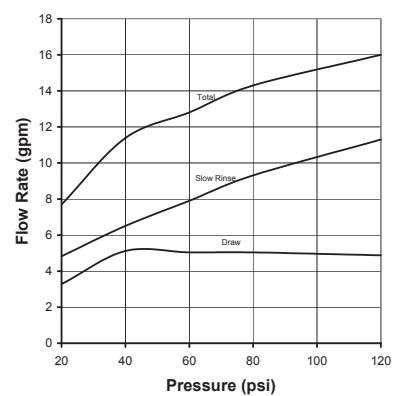
Order No. V3010-2D
US Units



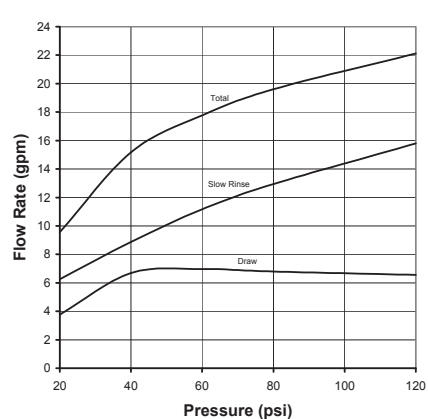
Order No. V3010-2E
US Units



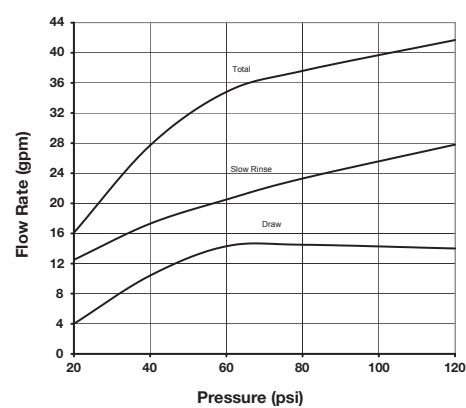
Order No. V3010-2F
US Units



Order No. V3010-2G
US Units

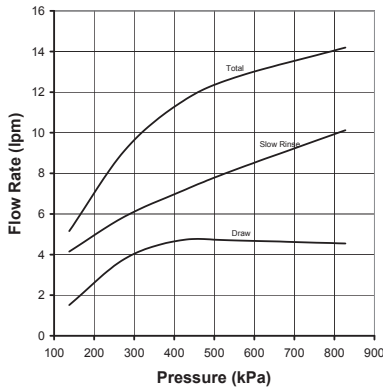


Order No. V3010-2H
US Units

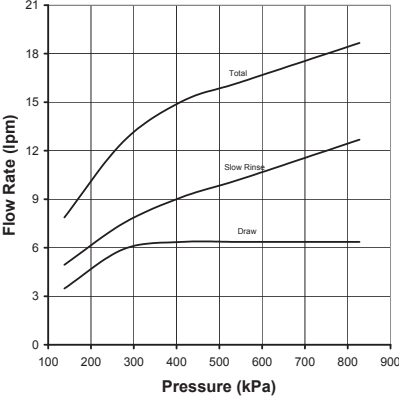


STANDARD INJECTOR GRAPHS (CONTINUED)

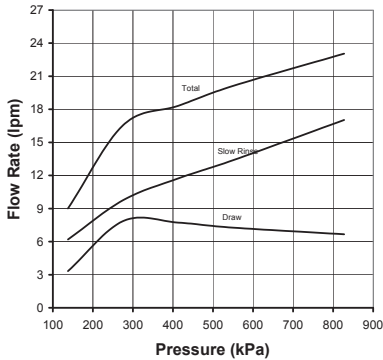
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Metric Units



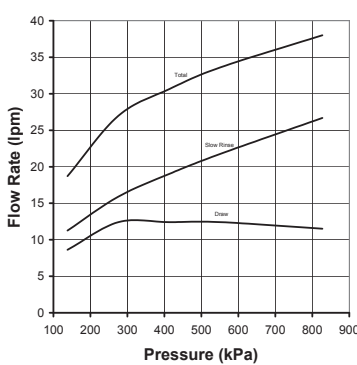
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Metric Units



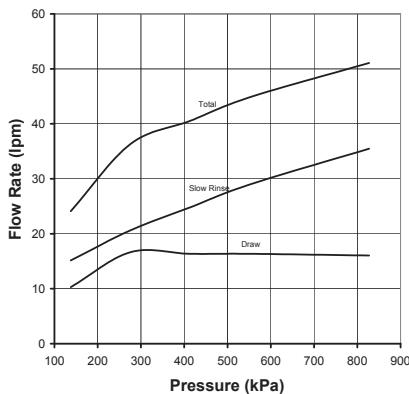
Order No. V3010-2C
Metric Units



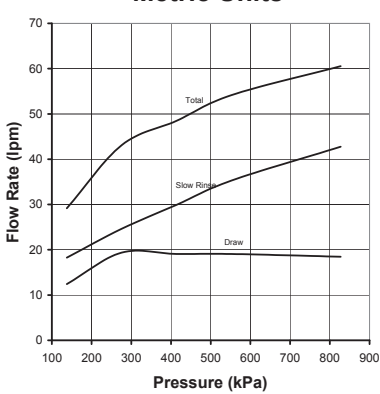
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Metric Units



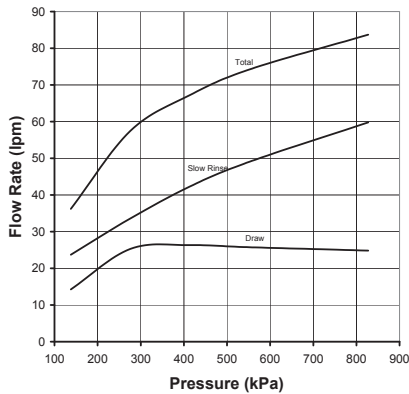
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Metric Units



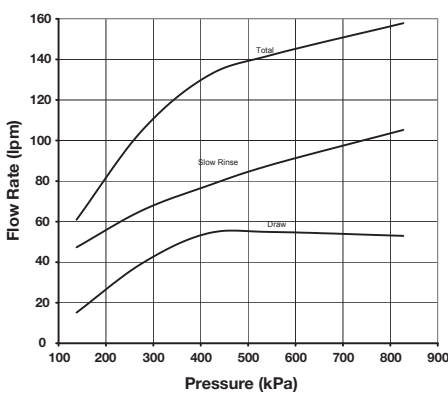
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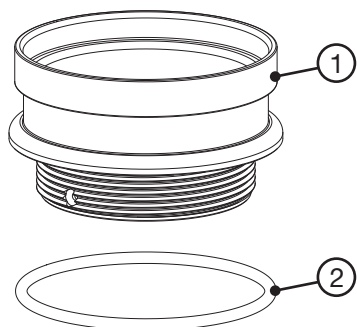


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Metric Units

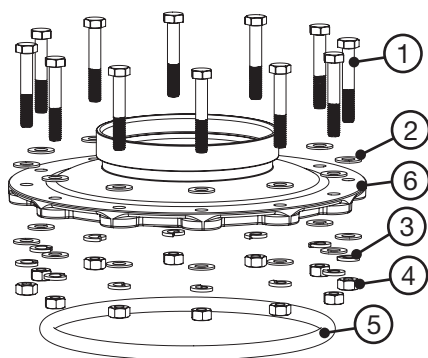


Order No. V3010-2H
Metric Units

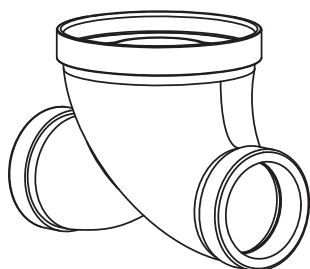


V3064 WS2H/2QC 4 INCH BASE ASY (FOR USE ON WS2H OR WS2QC ONLY)

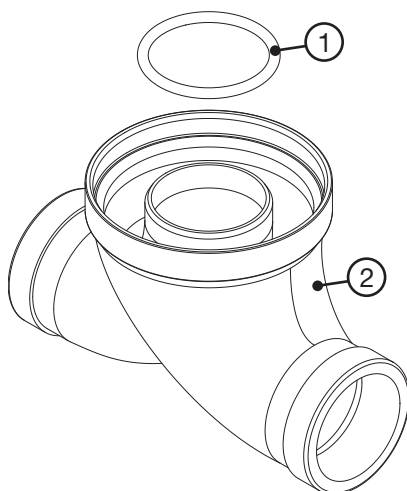
Drawing No.	Order No.	Description	Quantity
1	V3202-01	WS2H BASE	1
2	V3419	O-RING 347	1

V3055 WS2H/2QC 6 INCH FLANGE BASE ASY or V3090 WS3 6 INCH FLANGE BASE ASY

Drawing No.	Order No.	Description	Quantity	
			V3055	V3090
1	V3444	WS2H SCREW HEXCAP 5/16-18X2 SS	12	12
2	V3293	WS2H WASHER SS 5/16 FLAT	24	24
3	V3445	WS2H WASHER SPLIT LOCK 5/16 SS	12	12
4	V3447	NUT HEX 5/16-18 SILICON BRASS	12	12
5	COR60FL	O RING 6 FLANGE ADAPTER	1	1
6	V3261-01	WS2H FLANGE BASE	1	
	V3671-01	WS3 FLANGE BASE		1

WS2H/2QC SIDE MOUNT BASE ASSEMBLY

Order No.	Description	Inlet/Outlet	For Valve
V3260-02	WS2H/2QC SIDE MOUNT NPT ASY	2" Female NPT or 2.5" Groove Lock	WS2H NPT
V3674-02	WS3 SIDE MOUNT NPT ASY	3" Female NPT	WS3 NPT
V3674BSPT-02	WS3 SIDE MOUNT BSPT ASY	3" Female BSPT	WS3 BSPT

V3260BSPT-02 WS2H/2QC SIDE MOUNT BASE BSPT ASSEMBLY

Drawing No.	Order No.	Description	Quantity
1	V3280	O-RING 332	1
2	V3260BSPT-01	WS2H SIDE MOUNT BASE BSPT	1

When using a side mount base with 2H or 2QC BSPT valves replace distributor pilot o-ring V3452 O-RING 230 with V3280 O-RING 332. See exploded view of 2H or 2QC valve for specific location of distributor pilot o-ring.

DRAIN LINE FLOW CONTROLS

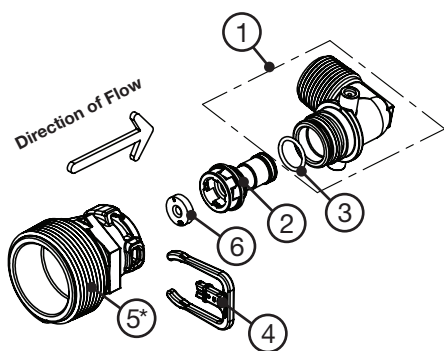
All drain line flow control housings are shipped without flow control washers.

See drain line flow control washer section for available flow selections.

PVC Elbow, 0.7 - 10 GPM

Item	Part#	Description	Qty.
	V3158-04	WS Drain Fitting, 3/4" Elbow	
1	V3158-03	Drain Elbow, 3/4 NPT	1
2	V3159-01	DLFC Retainer Assembly	1
3	V3163	O-ring, -019	1
4	H4615	Locking Clip	1
5*	V3983	WS2 DLFC Adapter	1
6	V3162-xx	See DLFC Section	1

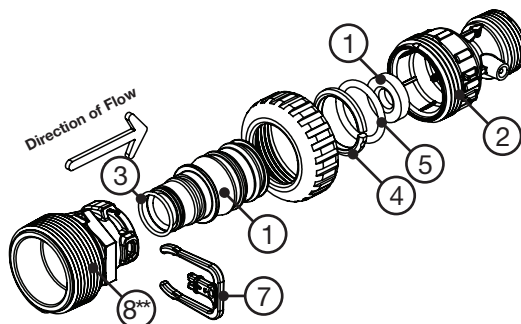
*Also available: V3414 WS1.5 DLFC Adapter



Inline Plastic, 9 - 25 GPM

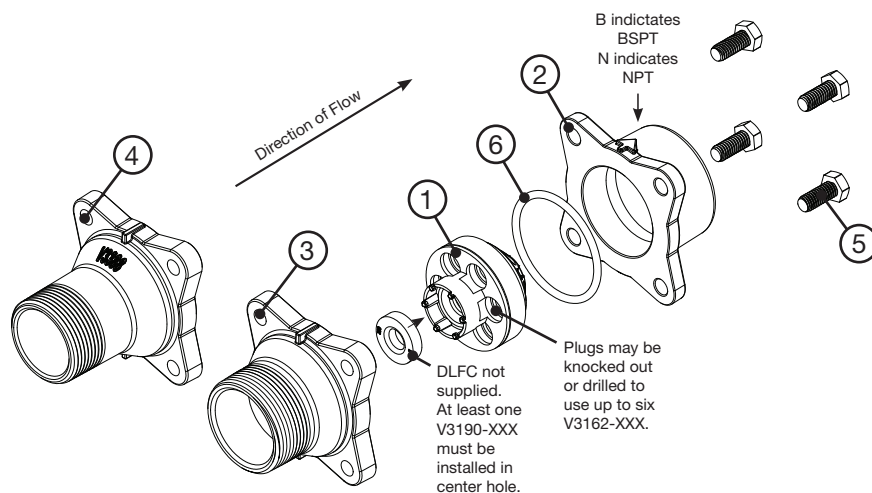
Item	Part#	Description	Qty.
	V3008-05	WS Drain Fitting, 1" Straight	
1	V3167	WS Drain Fitting Adapter, 1" NPT	1
2	V3166-01	Drain Fitting Body	1
3	V3151	WS1 Nut, QC	1
4	V3150	WS1 Split Ring	1
5	V3105	O-ring -215	1
6	V3163	O-ring -019	1
7	H4615	Locking Clip	1
8**	V3983	WS2 DLFC Adapter	1
9	V3190-xx	See DLFC Section	1

**Also available: V3414 WS1.5 DLFC Adapter



Stainless Steel, 9 - 85 GPM

Drawing No.	Order No.	Description	Quantity			
			V3079	V3079BSPT	V3080	V3080BSPT
1	V3081	WS15 RETAINER DLFC ASY	1	1	1	1
2	V3645	WS15 DLFC FLANGE OUTLET FNPT	1		1	
	V3645BSPT	WS15 DLFC FLANGE OUTLET FBSPT		1		1
3	V3646	WS15 DLFC FLANGE INLET MNPT			1	1
4	V3388	WS125 DLFC FLANGE INLET MNPT	1	1		
5	V3652	B S 5/16-18x3/4	4	4	4	4
6	V3441	O-RING 226	1	1	1	1
7	V3162-xx	See DLFC Table	0-6	0-6	0-6	0-6
8	V3190-xx	See DLFC Table	1	1	1	1

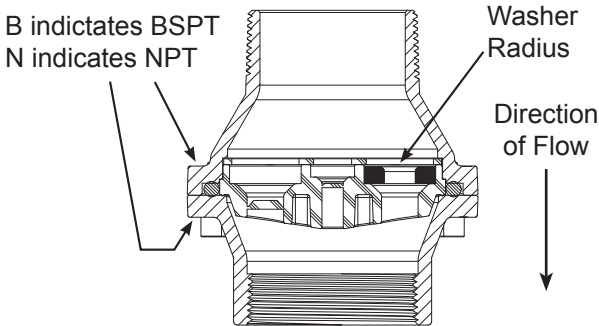
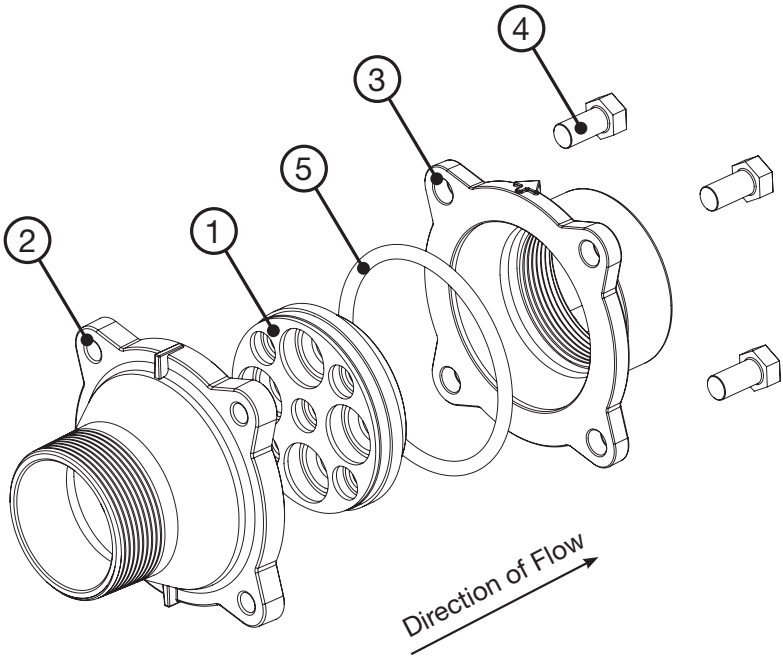


M X F STAINLESS STEEL, 0.7 – 150 GPM

Drawing No.	Order No.	Description	Quantity	
			V3051	V3051BSPT
1	V3052	WS2 DLFC Retainer Asy	1	1
2	V3245	WS2 DLFC Flange Inlet NPT	1	
	V3245BSPT	WS2 DLFC Flange Inlet BSPT		1
3	V3246	WS2 DLFC Flange Outlet NPT	1	
	V3246BSPT	WS2 DLFC Flange Outlet BSPT		1
4	V3273	Bolt Hex Hd S/S HCS 3/8-16x3/4	4	4
5	V3278	O-ring 338	1	1
6	V3162-XX	See DLFC table	0-5	0-5
7	V3190-XX	See DLFC table	0-4	0-4

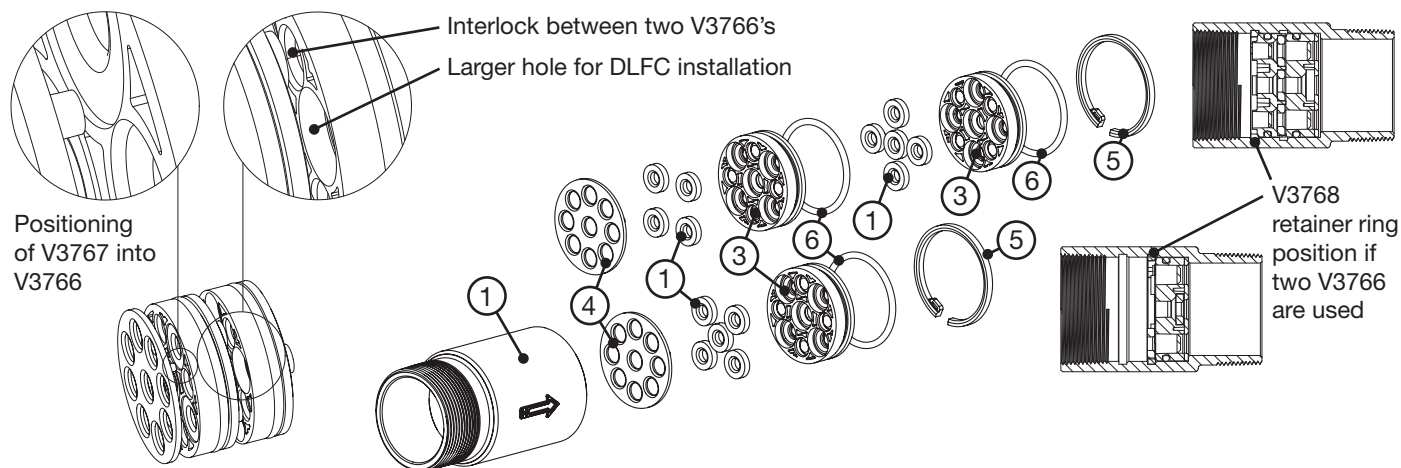
Assemblies are shipped without drain line flow control (DLFC). Assembly instructions:

1. Determine the desired flowrate. Select a combination of V3162-XXX's and V3190-XXX's to arrive at the desired flow rate. Up to five of the smaller V3162-XXX's may be used. Up to four of the larger V3190-XXX's may be used.
2. Using a drill or punch remove the desired knockout(s) in V3052.
3. Smooth hole(s).
4. Install appropriate size(s) of drain line flow control washers. Pay close attention to proper DLFC orientation.
5. Assemble. Properly orientate the V3052 in the direction of flow.
6. Inlet and outlet threads are 2". Couplings for iron pipe may also be used.



MXF STAINLESS STEEL, 9-225 GPM

Drawing No.	Order No.	Description	Quantity	
			V3764	V3764BSPT
1	V3765-01	WS3 DLFC HOUSING NPT	1	
	V3765BSPT-01	WS3 DLFC HOUSING BSPT		1
2	V3766	WS3 DLFC RETAINER	1	1
3	V3767	WS3 DLFC RETAINER COVER	1	1
4	V3768	WS3 DLFC RETAINER RING	1	1
5	V3769	O-RING 336	1-2	1-2
6	V3190-XX	See DLFC table	1-9	1-9



Assemblies are shipped without drain line flow control (DLFC) washers.

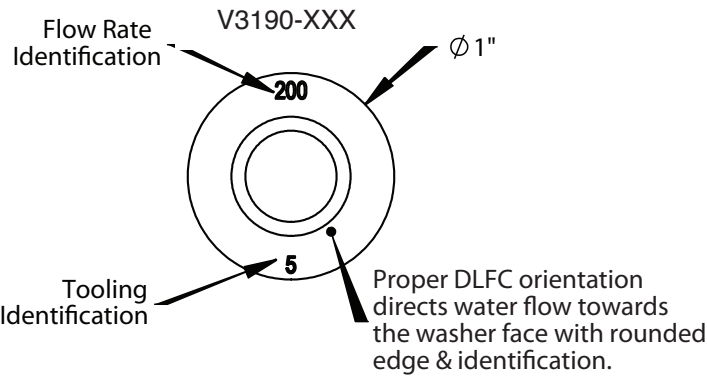
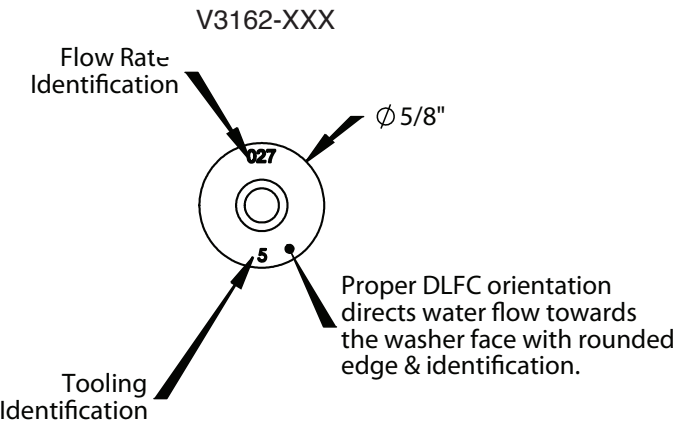
Assembly instructions:

1. Determine the desired flow rate. Select a combination of V3190-XXX's to arrive at the desired flow rate.
2. Using a drill or punch remove the desired knockout(s) in V3766. Each V3766 retainer contains two types of knockouts. The larger knockouts are removed to install a DLFC. If two V3766 retainers are needed remove the smaller diameter knockout that lines up with the DLFC installed in the other retainer. One or two V3766 retainers may be used. When using one V3766 retainer V3190-XXX must be installed in the center hole. When using two V3766 retainers a V3190-XXX must be installed in the center hole of one of the retainers and the center hole on the other retainer must remain open.
3. Smooth hole(s).
4. Install appropriate size(s) of drain line flow control washers. Pay close attention to proper DLFC orientation.
5. Assemble. Each V3766 retainer must have a V3769 o-ring installed. One each of the V3767 retainer cover and V3768 retainer ring must be used whether one or two V3766 retainers are used. The positioning of the V3768 retainer ring varies depending on the number of V3766 retainer(s) used. Properly orientate the V3766(s) in the direction of flow.
6. Properly orientate the complete assembly in the direction of flow. Inlet and outlet threads are 3".

DRAIN LINE FLOW CONTROL WASHERS

Order No.	Description
V3162-007	.7 GPM Drain line flow control
V3162-010	1.0 GPM Drain line flow control
V3162-013	1.3 GPM Drain line flow control
V3162-017	1.7 GPM Drain line flow control
V3162-022	2.2 GPM Drain line flow control
V3162-027	2.7 GPM Drain line flow control
V3162-032	3.2 GPM Drain line flow control
V3162-042	4.2 GPM Drain line flow control
V3162-053	5.3 GPM Drain line flow control
V3162-065	6.5 GPM Drain line flow control
V3162-075	7.5 GPM Drain line flow control
V3162-090	9.0 GPM Drain line flow control
V3162-100	10.0 GPM Drain line flow control
V3190-090	9.0 GPM Drain line flow control
V3190-100	10.0 GPM Drain line flow control
V3190-110	11.0 GPM Drain line flow control
V3190-130	13.0 GPM Drain line flow control
V3190-150	15.0 GPM Drain line flow control
V3190-170	17.0 GPM Drain line flow control
V3190-200	20.0 GPM Drain line flow control
V3190-250	25.0 GPM Drain line flow control

All DLFC housings ship without DLFC installed.
Select control from table for proper
backwash, based on media manufacturer's
recommendations.



WS2H/ WS3 TROUBLE SHOOTING GUIDE

Problem	Possible Cause	Solution
1. No Display on POD	a. No power at electric outlet b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection c. Improper power supply d. Poor connection between POD connector and PC Board. e. Defective Power Adapter f. Defective PC Board	a. Repair outlet or use working outlet b. Plug Power Adapter into outlet or connect power cord end to PC Board connection c. Verify proper voltage is being delivered to PC Board d. Check connector on POD, possible broken wire or terminal pin not inserted properly in connector. Clean pins on PC Board by plugging & unplugging the POD connector a few times to remove excess protective coating. e. Replace Power Adapter f. Replace PC Board
2. POD does not display correct time of day	a. Power Adapter plugged into electric outlet controlled by light switch b. Tripped breaker switch and/or tripped GFI c. Power outage d. Defective PC Board	a. Use uninterrupted outlet b. Reset breaker switch and/ or GFI switch c. Reset time of day 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/ isolation valve in bypass position b. Meter is not connected to meter connection on PC Board c. Restricted/ stalled meter turbine d. Meter wire not installed securely into three pin connector e. Defective meter f. Defective PC Board	a. Turn bypass/ isolation handles to place in service position b. Connect meter to three pin connection labeled FLOW on PC Board c. Remove meter and check for rotation or foreign material d. Verify meter cable wires are installed securely into three pin connector labeled FLOW e. Replace meter f. Replace PC Board
4. Control valve regenerates at wrong time of day	a. Power outage b. Time of day not set correctly c. Time of regeneration set incorrectly d. Control valve set at "on 0" (immediate regeneration)	a. Reset time of day. b. Reset to correct time of day c. Reset regeneration time d. Check programming setting and reset to dEL (for a delayed regen time)
5. Time of day flashes on and off	a. Power outage	a. Reset time of day.
6. Control valve does not regenerate automatically when the REGEN button is depressed and held.	a. Defective PC Board b. For the case of systems, another unit in regen would not allow another unit to go into regeneration.	a. Replace PC Board b. Wait for unit in regeneration to finish

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
7. Control valve does not regenerate automatically but does when the REGEN button is depressed and held.	<ul style="list-style-type: none"> a. Bypass/ isolation valves in bypass position b. Meter is not connected to meter connection on PC Board c. Restricted/ stalled meter turbine d. Incorrect programming e. Meter wire not installed securely into three pin connector f. Defective meter g. Defective PC Board 	<ul style="list-style-type: none"> a. Turn bypass/ isolation valves handles to place in service position b. Connect meter to three pin connection labeled FLOW on PC Board c. Remove meter and check for rotation or foreign material d. Check for programming error e. Verify meter cable wires are installed securely into three pin connector labeled FLOW f. Replace meter g. Replace PC Board
8. Hard or untreated water is being delivered	<p>Check water quality directly at unit outlet</p> <ul style="list-style-type: none"> 1. Water quality is good <ul style="list-style-type: none"> a) Bypass/ isolation valves are open or faulty 2. Water quality is poor <ul style="list-style-type: none"> a) Damaged seal/stack assembly b) Faulty riser tube or seal c) Control valve body type and piston type mix matched 3. Media is exhausted, water quality is poor <ul style="list-style-type: none"> a) Higher than anticipated water usage b) Meter not registering c) No regenerant or low level of regenerant in regenerant tank d) Control fails to draw in regenerant e) Water quality fluctuation f) Fouled media bed 	<ul style="list-style-type: none"> 1. External Bypass Leak <ul style="list-style-type: none"> a) Fully close bypass/ isolation valves or replace 2. Internal Bypass Leak <ul style="list-style-type: none"> a) Replace seal/stack assembly b) Verify seal placement & engagement with riser c) Verify proper control valve body type and piston type match 3. No internal leaks <ul style="list-style-type: none"> a) Check program settings or diagnostics for abnormal water usage b) See Troubleshooting Guide #3 c) Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace, check refill flow control rate for proper fill time. d) Refer to Troubleshooting Guide # 12 e) Test water and adjust program values accordingly f) Replace media bed
9. Control valve uses too much regenerant	<ul style="list-style-type: none"> a. Improper refill setting or refill fill flow control is not sized properly b. Improper program settings c. Control valve regenerates frequently 	<ul style="list-style-type: none"> a. Check refill setting and check refill flow control for proper refill rate. b. Check program setting to make sure they are specific to the water quality and application needs c. Check for leaking fixtures that may be exhausting capacity or system is undersized

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
10. Residual regenerant being delivered to service	a. Low water pressure b. Plugged, fouled, or incorrect injector size c. Restricted drain line d. Damaged seal/ stack assembly or piston allowing leakage during draw e. Draw time too short f. Excessive refill g. Vacuum leak in draw line / elbow	a. Check incoming water pressure – water pressure must remain at minimum of 25 psi b. Inspect and clean or replace injector, or replace injector with correct size for the application c. Check drain line for restrictions or debris and clean d. Check seal/ stack assembly and piston for damage and replace e. Program proper draw time needed f. Program proper refill time needed g. Locate vacuum leak and fix
11. Excessive water in regenerant tank	1. Tank is being overfilled a) Improper program settings b) Missing refill flow controller 2. Previous regenerant is not being drawn out	1. Excess from fill cycle a) Verify program settings b) Visual inspection / measure volume output into container 2. See Troubleshooting Guide #12
12. Control valve fails to draw in regenerant	a. Injector is plugged b. Faulty regenerant piston c. Regenerant line connection leak d. Drain line restriction or debris cause excess back pressure e. Drain line too long or too high f. Low water pressure g. Damaged seal/ stack assembly	a. Remove injector and clean or replace b. Replace regenerant piston c. Inspect regenerant line for air leak d. Inspect drain line and clean to correct restriction e. Shorten length and/or height f. Check incoming water pressure – water pressure must remain at minimum of 25 psi g. Inspect seal stack assembly for damage and replace
13. Water running to drain	a. Power outage during regeneration or unit is currently in regeneration b. Damaged seal/ stack assembly c. Piston assembly failure d. Drive cap assembly not tightened properly	a. Upon power being restored control will finish the remaining regeneration time. Reset time of day. b. Replace seal/ stack assembly c. Replace piston assembly d. Re-tighten the drive cap assembly
14. Motor drives intermittently during regeneration.	a. Low power	a. See Table 2 Software and Power Supply Compatibility

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
15. Err – 1001 = Control unable to sense motor movement	<ul style="list-style-type: none"> a. Motor not inserted fully to engage pinion, motor wires broken or disconnected b. PC Board not properly snapped into drive bracket c. Missing reduction gears d. Damaged or dirty reduction gear reflectors e. Faulty or dirty optics on back of PC board 	<ul style="list-style-type: none"> 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 REGEN. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. b. Properly snap PC Board into drive bracket and then Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. c. Replace missing gears d. Clean or replace reduction gear e. Clean or replace PC Board
16. Err – 1002 = Control valve motor ran too short and was unable to find the next cycle position and stalled	<ul style="list-style-type: none"> a. Foreign material is lodged in control valve b. Mechanical binding c. Main drive gear too tight d. Improper voltage being delivered to PC Board 	<ul style="list-style-type: none"> a. Open up control valve and pull out piston assembly and seal/ stack assembly for inspection. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. b. Check piston and seal/ stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Check that pinion is not pressed up tight against motor c. Loosen main drive gear. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Verify free motion by rotating main drive gear by hand, driving piston in and out d. Verify that proper voltage is being supplied. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
17. Err – 1003 = Control valve motor ran too long and was unable to find the next cycle position	<ul style="list-style-type: none"> a. Motor failure during a regeneration b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor c. Drive bracket not snapped in properly and out of position enough that reduction gears and drive gear do not interface d. Low voltage slowing drive 	<ul style="list-style-type: none"> a. Check motor connections then Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. b. Replace piston and stack assemblies. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. c. Snap drive bracket in properly then press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. d. See Table 2 Software and Power Supply Compatibility
18. Err - 14001 = Message queue full	<ul style="list-style-type: none"> a. Master PC Board did not receive a response from slave units. 	<ul style="list-style-type: none"> a. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
<p>19. Err -15003 = Motorized Bypass or MAV for NHBP valve motor ran too long and unable to find the proper park position</p> <p>Motorized Alternating Valve = MAV</p> <p>No Hard Water Bypass = NHBP</p>	<ul style="list-style-type: none"> a. Control valve programmed for ALT A or noHbP without having a motorized drive securely connected to the 2 pin terminal labeled “BYPASS” on the main PC Board b. Poor wire connection c. Excess drag causing timeout before stall d. Motorized Bypass or MAV for NHBP motor not fully engaged with reduction gears 	<ul style="list-style-type: none"> a. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Then re-program valve to proper setting b. Remove power and check connection for Motorized Bypass or MAV for NHBP motor to PC Board two pin connection labeled BYPASS. Make sure wires in connector are inserted securely and no wires are broken. Clean pins on PC Board by plugging and unplugging the connector a few times to remove excess protective coating. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. c. Open up Motorized Bypass or MAV for NHBP to check for obstructions d. Properly insert motor into casing, do not force into casing. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
<p>20. Err – 15010 = Motorized Bypass or MAV for NHBP valve motor ran too short (stalled) while trying to drive off-line</p> <p>Motorized Alternating Valve = MAV</p> <p>No Hard Water Bypass = NHBP</p>	<p>a. Foreign material is lodged in Motorized Bypass or MAV for NHBP valve</p> <p>b. Mechanical binding</p>	<p>a. Open up Motorized Bypass or MAV for NHBP and check for foreign material. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p> <p>b. Check poppet drive assembly or piston and seal/ stack assembly, check reduction gears, drive gear interface, and check Motorized Bypass or MAV for NHBP black drive pinion on motor. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p>
<p>21. Err – 15011 = Motorized Bypass or MAV for NHBP valve motor ran too short (stalled) while trying to drive on-line</p> <p>Motorized Alternating Valve = MAV</p> <p>No Hard Water Bypass = NHBP</p>	<p>a. Foreign material is lodged in Motorized Bypass or MAV for NHBP valve</p> <p>b. Mechanical binding</p>	<p>a. Open up Motorized Bypass or MAV for NHBP and check for foreign material. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p> <p>b. Check poppet drive assembly or piston and seal/ stack assembly, check reduction gears, drive gear interface, and check Motorized Bypass or MAV for NHBP black drive pinion on motor. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p>

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
<p>22. # of units error: Communications has been broken with the unit specified in the error message. These errors are logged as 16K series errors as follows: 16001: error with unit 2 16002: error with unit 3 16003: error with unit 4</p>	<p>a. System is programmed for the wrong number of units or a Slave unit is in “error # of units” mode due to loss of power.</p> <p>b. Poor connection on PC Boards</p> <p>c. More than one unit has determined that it is the master control</p>	<p>Correct all errors on satellite units before attempting to reset error on master</p> <p>a. Pressing any button while in the # of units error will enter the user into the setting screen. Adjust to the correct units for the system and press NEXT to exit the set up screen. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Re-program valve to proper setting.</p> <p>b. Make sure wires in connector are inserted securely and no wires are broken. Clean pins on PC Board by plugging and unplugging the connector a few times to remove excess protective coating. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p> <p>c. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Then re-program each valve to operate as single individual unit. Re-program the control that is to be the master control and it will filter down the programming to the slave controls automatically.</p>
<p>23. Err – 17000 = MAV for Separate Source valve motor ran too long while trying to find proper park position</p>	<p>a. Control valve programmed for “ON SEP In” with out having a MAV for separate source attached</p> <p>b. MAV for separate source motor wire not connected to System Board or poor connection</p> <p>c. MAV for separate source motor not fully engaged with reduction gears</p>	<p>a. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. Re-program valve to proper setting</p> <p>b. Remove power and check connection on MAV for separate source motor wire to System Board two pin connection labeled AUX DRIVE. Make sure wires in connector are inserted securely and no wires are broken. Clean pins on System Board by plugging and unplugging the connector a few times to remove excess protective coating. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p> <p>c. Properly insert motor into casing, do not force into casing. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.</p>

WS2H/ WS3 TROUBLE SHOOTING GUIDE (CONTINUED)

Problem	Possible Cause	Solution
24. Err – 17002 = MAV for Separate Source valve motor ran too short while trying to find proper park position	a. Foreign material is lodged in MAV for separate source valve b. Mechanical binding	a. Open up MAV for separate source and check for foreign material. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position. b. Check poppet drive assembly or piston and seal/ stack assembly, check reduction gears, drive gear interface, and check MAV for separate source black drive pinion on motor. Press NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.
25. Err – 18000 = Reset was performed, this error code will display in the diagnostics under the error log	a. Press the NEXT and REGEN buttons for about 3 seconds to resynchronize software with piston position.	
26. Err – 18001 = Power loss, this error code will display in the diagnostics under error log	a. When power is lost a signal is sent to log the power loss	
27. Err – 18002 = Power restored, this error code will display in the diagnostics under error log	a. When power is restored a signal is sent to log the power being restored	

Revision History:

6/27/2016

Updated manual – combined parts manual and programming manuals; refined and revised many sections.

1/6/2017

PAGE 5:

216.04 ⁴	1.13 or greater	20 VAC	V3461-01 WS2H/3 AC ADAPTER 20V V3461EU-01 WS2H/3 AC ADAPTER EU 20V V3461UK-01 WS2H/3 AC ADAPTER UK 20V
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⁴If using old and new version in a system, the master must be an older version.

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Description in table -

Maximum power through either relay to be:

- A) 1A, 30 VDC
- B) 1A, 30 VAC

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PAGE 4:

New table

PAGE 8:

New drawing

PAGE 9:

New drawing

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Removed Distributer Pipe Height

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PAGE 5:

216.04 or greater	1.13 or greater	20 VAC	V3461-01 WS2H/3 AC ADAPTER 20V V3461EU-01 WS2H/3 AC ADAPTER EU 20V V3461UK-01 WS2H/3 AC ADAPTER UK 20V
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