

“C”-SERIES

AUTOMATIC WATER CONDITIONERS

*INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL*

("C" SERIES) SPECIFICATION TABLE

Model Number	Units	CMP-22-k C22-2-STD	CMP-30-k C30-2-STD	CMP-40-K C40-2-STD	C45-2-STD	C60-2-STD	CMP- Combo	CMP-22-KC C22-C-STD	CMP-30-KC C30-C-STD
Exchange Capacity-Kilograins	MAX	22.00	30.00	40.00	45.00	60.00	30.00	22.00	30.00
	MID	18.00	24.00	32.00	37.00	49.00		18.00	24.00
	MIN	15.00	19.00	25.00	29.00	39.00		15.00	19.00
Saltper Regeneration LBS./Regem	MAX	11.50	15.00	19.50	22.50	30.00	15.00	11.50	15.00
	MID	7.50	10.00	12.50	15.00	20.00		7.50	10.00
	MIN	3.00	5.00	6.50	7.50	10.00		3.00	5.00
Max Service Flow(1)	GPM	16.00	15.00	16.00	17.00	20.00	11.40	16.00	15.00
Pipe Size In-Out Drain	INS	1"	1"	1"	1"	1"	1"	1"	1"
	INS	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"
Maxium Operating Pressure	PSI	125	125	125	125	125	125	120	125
Operating Temperature Maxium	DEG F	110	110	110	110	110	110	110	110
Mineral Tank Size (DIA X HT) (2)	INS.	8 X 44	9 X 40	9 X 48	10 X 54	12 X 52	10 X 47	8 X 35	10 X 35
Brine Tank (DIA X HT) (3)	INS.	18 X 33	18 X 33	18 X 33	18 X 40	18 X 40	18 X 33		
Salt Storage	LBS.	375	375	375	375	450	450	250	250
Resin Volume	CU.FT	0.75	1.00	1.25	1.50	2.00	1.00	0.75	1.00
Electrical (Voltage Cycle)	120 Volts 60 HZ								
Shipping Weight	LBS	72	86	105	119	137	110	77	91
Floor Space	INS.	27 X 18	28 X 18	28 X 18	29 X 16	31 X 18	13 X 20	13.5 X 22.5	13.5 X 22.5
Overall HT	INS.	52	48	56	62	60	55	42	42
Max Flow To Drain During Regeneration	GPM	1.7	2.2	2.2	2.7	3.2	1.3	1.7	2.7

Note

- (1) Pressure Drops at 15 PSI.
- (2) Pressure Vessels are seamless and made of reinforced fiberglass, pressure tested at 300 PSI.
- (3) Brine tanks are fabricated of seamless, rigid,tough, high impact, non-toxic polyethylene.
- (4) Produce materials and workmanship are protected with a written warranty.
- (5) Bypass water during regeneration is perfunctory.

Table 1

Minimum/Maximum Operating Pressures	20 psi (138 kPa) -125 psi (862 kPa)
Minimum/Maximum Operating Temperatures	40°F (4°C) -110°F (38°C)
Current Draw & Voltage	0.5 Amperes 110 Volts Other options available

**Table 2
Valve Specifications**

Service flow rate (includes bypass)	27 gpm (102.2 lpm) @ 15 psig (103 kPa) drop
Backwash flow rate (includes bypass)	27 gpm (102.2 lpm) @ 25 psig (172 kPa) drop
Minimum/Maximum Operating Pressures	20 psi (138 kPa) -125 psi (862 kPa)
Minimum/Maximum Operating Temperatures	40°F (4°C) -110°F (38°C)
Current Draw & Voltage	0.5 Amperes 110 Volts Other options available
Regenerant Refill Rate	0.5 gpm (1.9 lpm)
Injectors	See Injector Graphs
Drain Line Flow Controls	See Table 11
Inlet / Outlet Fitting Options	(a) 1" NPT elbow which has a unique drill out feature to allow a 1/4" NPT connection to the inlet and/or outlet (b) 3/4" & 1" PVC solvent weld fitting (c) 1" straight brass sweat fitting (d) 3/4" straight brass sweat fitting
Distributor Tube Opening	1.05" Diameter (3/4" U.S. PVC Pipe Size)
Tank Thread	2-1/2" – 8 NPSM
Control Valve Weight	4.5 lbs 2.0 kg
PC Board Memory	Nonvolatile EEPROM (electrically erasable programmable read only memory)
Compatible with regenerants/chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, sodium hydroxide, hydrochloric acid, chlorine and chloramines

Installation Fitting Assemblies

The installation fittings connect to the control valve or the bypass valve using nuts that only require hand tightening. Hand tighten nut connections between control valve and installation fittings, control valve and bypass valve, and bypass valve and installation fittings allow for easy serviceability. Do not use a pipe wrench to tighten nuts on installation fittings. Hand tighten only.

Split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage. The split ring design, incorporated into the installation fittings allows approximately 2 degrees off axis alignment to the plumbing system. The installation fittings are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

When assembling the installation fitting package, connect the fitting to the plumbing system first and then attach the nut, split ring and o-ring. Heat from soldering or solvent cements may damage the nut, split ring or o-ring. Solder joints should be cool and solvent cements should be set before installing the nut, split ring and o-ring. Avoid getting primer and solvent cement on any part of the o-rings, split rings, bypass valve or control valve. Solvent cements and primers should be used in accordance with the manufacturer's instructions.

Slip the nut onto the fitting first, then the split ring second and the o-ring last. Hand tighten the nut. If the fitting is leaking tightening the nut will not stop the leak. Remove the nut, remove the fitting, and check for damage or misalignment of the o-ring.

Do not use pipe dope or other sealant on threads. Teflon tape must be used on the threads of the 1" NPT elbow and the 1/4" NPT connection and on the threads for the drain line connection. Teflon tape is not necessary on the nut connection or caps because of o-ring seals.

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicon lubricant may be used on black o-rings.

Bypass Valve

The bypass valve easily connects to the control valve body using nuts that only require hand tightening. Hand tighten nut connections between control valve and fittings, control valve and bypass valve, and bypass valve and installation fittings allow for easy serviceability. The split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage. The split ring design, incorporated into the bypass, allows approximately 2 degrees off axis alignment to the plumbing system. The bypass is designed to accommodate minor plumbing misalignments but is not designed to support the weight of a system or the plumbing.

Avoid getting primer and solvent cements on any part of the o-rings or split rings, bypass valve or control valve. Do not use pipe dope or other sealant on threads. Teflon tape is not necessary on the caps because of o-ring seals.

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicon lubricant may be used on black o-rings.

A. GENERAL

1. Shut off all water at main supply valve.
2. Shut off the fuel supply to water heater.
3. Open faucets (hot and cold) nearest pump or water meter to relieve pressure and drain system.
4. Move softener into the installation position. Loosely attach all fittings to measure for bypass valve assembly (if used), or manual bypass valve.
5. Level the unit. Place shims under cabinet or brine tank as needed. (Do Not use metal shims.)
6. Cut the cold water supply line as required.
7. Install the bypass valve assembly if used.

B. PLANNING INSTALLATION

1. All installation procedures must conform to local plumbing, electrical and sanitation codes and ordinances.
2. It is recommended that outside faucets for lawn service be on the hard water line, ahead of the softener, to conserve softened water, save salt and prevent lawn damage.
3. If this isn't practical, use the convenient integral bypass valve assembly. CAUTION: The inlet water temperature MUST NOT exceed 120 oF.
4. Do not locate softener where ambient temperature drops below 40o F.
5. Allow space around the softener for ease of servicing.
6. The softener drain lines must never be solidly connected to the sewer line. (Always provide an air gap at the END of the drain line). Valve drain line must not be elevated over 5' from the top of the softener on well systems, and not over 8" on municipal water systems.
7. The salt storage cabinet or brine tank is a gravity drain, and this drain line must be lower than the drain fitting on the side wall of the cabinet.
8. Move the softener into position and connect to bypass assembly (if used). The integral manual bypass option is a connection which eliminates the need for a 3-valve manifold. This makes installation easier and provides a more convenient method of bypassing.
9. IMPORTANT: Be sure that the water inlet line is connected to the ~inlet~ side of the bypass valve or to the inlet fitting. (Bypass valve or to the inlet fitting. (Bypass valve both inlet/outlet fittings are marked.) if water lines are reversed, (inlet/outlet) resin may be forced from the water softener into the household plumbing system. If this occurs, household plumbing system must be flushed clean.

C. CONNECT ALL FITTINGS (refer to previous page)

CAUTION: Care must be used when working with copper tubing. Do not allow the flame from torch to contact any portion of the Valve assembly.

1. Attach 1/2" drain line to drain elbow with insert and nut.
2. Do not elevate the drain line over 5' above the top of the valve (8' on municipal systems) or to exceed 25' in length at either height. CAUTION: An air gap must be provided upon sewer entry. (Conform to local plumbing and sanitation codes and ordinances).
3. The salt storage cabinet or brine tank provides an overflow. Attach 1/2" ID flexible plastic tubing to the overflow fitting and direct it to the drain. DO NOT connect to the main drain line-use a separate line.

D. PRESSURE TEST THE INSTALLATION

The plumbing system can now be checked for any possible leaks.

Control Valve Function and Cycles of Operation

This glass filled Noryl¹ fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a water softener or filter. When the control valve is set up as a softener, the control valve can be set to perform down flow or up flow regeneration. When the control valve is set up as a filter, the control valve can be set to perform down flow regeneration or simply backwash. The control valve can be set to regenerate on demand (consumption of a predetermined amount of water) and/or as a time clock (passage of a particular number of days). The control valve can be set so that a softener can meet the Water Quality Association (WQA) or NSF International efficiency rating.

The control valve is compatible with a variety of regenerants and resin cleaners. The control valve is capable of routing the flow of water in the necessary paths to regenerate or backwash water treatment systems. The injector regulates the flow of brine or other regenerants. The control valve regulates the flow rates for backwashing, rinsing, and the replenishing of treated water into a regenerant tank, when applicable.

The control valve is designed to deliver high service (27 gpm @ 15 psig) and backwash (27 gpm @ 25 psig) flow rates when the bypass has straight fittings. The control valve uses no traditional fasteners (e.g. screws), instead clips, threaded caps and nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screw driver, one large blade screw driver, pliers and a pair of hands. A plastic wrench is available which eliminates the need for screw-drivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market. Control valve installation is made easy because the distributor tube can be cut 1/2" above to 1/2" below the top of tank thread. The distributor tube is held in place by an o-ring seal and the control valve also has a bayonet lock feature for upper distributor baskets.

The transformer power pack comes with a 15 foot power cord and is designed for use with the control valve. The transformer power pack is for dry location use only. The control valve remembers all settings for two hours if the power goes out. After two hours, the only item that needs to be reset is the time of day, all other values are permanently stored in the nonvolatile memory. The control valve does not need batteries.

Table 3 shows the order of the cycles when the valve is set up as a softener. When the control valve is used as a down flow softener, two backwashes always occur. When the control valve is used as an up flow softener, only one backwash occurs after brining. The OEM has the option of having the regenerant refill after the rinse cycle or have the regenerant prefill before regeneration. If the OEM chooses to have the regenerant prefill before regeneration, the prefill starts two hours before the regeneration time set. During the 2-hour period in which the brine is being made, treated (softened) water is still available. For example: regeneration time = 2:00 am, prefill option selected, downflow softener. Fill occurs at 12:00 a.m., start of backwash cycle occurs at 2:00 a.m.

When set up as a softener the backwash and rinse cycles automatically increase with increasing salt dosage. Backwashes can be set to be NORMAL or LONGER. The option selected will apply to all backwashes. Tables 4 and 5 show the length of the cycles when the valve is set up as a softener.

Table 3
Regeneration Cycles Softening

Down flow Regenerant Refill After Rinse
1 st Cycle: Backwash
2 nd Cycle: Regenerate
3 rd Cycle: Backwash
4 th Cycle: Rinse
5 th Cycle: Fill/Dissolve
6 th Cycle: Service

¹ Noryl is a trademark of General Electric.

Table 4
Backwash Normal Length Softener
Cycle Times in Minutes

		Down Flow Softener		
Grains Capacity/lb NaCl		6000 to 3501	3500 to 2501	2500 to 1700
lbs NaCl/cu ft resin ²		Less than 7.5	7.5 to 12	More than 12
Cycle Time in minutes	Backwash Normal	6	8	8
	Regenerate	45	60	75
	Backwash Normal	3	8	10
	Rinse	3	4	6
	Total ³	57	80	99

Table 5
Backwash Longer Length Softener
Cycle Times in Minutes

		Down Flow Softener		
Grains Capacity/lb NaCl		6000 to 3501	3500 to 2501	2500 to 1700
lbs NaCl/cu ft resin ²		Less than 7.5	7.5 to 12	More than 12
Cycle Time in minutes	Backwash Longer	8	10	12
	Regenerate	45	60	75
	Backwash Longer	8	10	12
	Rinse	4	6	8
	Total ³	65	86	107

**Table 9
DIR/Time Clock Options**

DIR	Time Clock	Reserve Capacity	Softener	Filter		Settings ⁶	
				Regenerant	Backwash Only	Day Override	Gallon Capacity
Yes		Automatically calculated	Yes			Off	Auto
Yes		If desired enter a value less than estimated capacity	Yes	Yes	Yes	Off	Any Number
Yes	Yes	Automatically calculated	Yes			Any Number	Auto
Yes	Yes	If desired enter a value less than estimated capacity	Yes	Yes	Yes	Any Number	Any number
	Yes	None	Yes	Yes	Yes	Any Number	Off

For DIR Softeners, there are two options for setting the Gallons Capacity. The Gallons Capacity is automatically calculated if set to AUTO. Reserve Capacity is automatically estimated based on water usage if AUTO is used. The other option is to set the Gallons Capacity to a specific number. If a specific number is set, reserve capacity is zero, unless the value is manually set (i.e. the manufacturer intentionally sets the gallon capacity number below the calculated capacity of the system).

The control valve can also be set to regenerate immediately or at the next regeneration time by changing the Regeneration Time Option. There are three choices for settings:

1. "NORMAL" means regeneration will occur at the preset regeneration time.
2. "on 0" means regeneration will occur when the gallons capacity reaches zero.
3. "NORMAL" and "on 0" means the regeneration will occur at the preset regeneration time unless the gallons capacity reaches zero. If the gallons capacity reaches zero the regeneration will begin 10 minutes after no water usage.

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

1. Pressing and releasing the REGEN button. "Regen Today" will flash on the display and the regeneration will occur at the delayed regeneration time. The user can cancel the request by pressing and releasing the REGEN button. This method of manually initiating regeneration is not allowed when the system is set to immediately regenerate when the gallon capacity reaches zero.
2. Pressing and holding the REGEN button for approximately 3 seconds will immediately start the regeneration. The user cannot cancel this request, except by resetting the control by pressing NEXT and REGEN buttons simultaneously for 3 seconds.

Installer Displays/Settings

Step 11



STEP 11 - Press NEXT and Δ simultaneously for 3 seconds.

Step 21



STEP 21 – Hardness: Set the amount of hardness in grains of hardness as calcium carbonate per gallon using the ∇ or Δ buttons. The default is 20 with value ranges from 1 to 150 in 1 grain increments. Note the grains per gallon can be increased if soluble iron needs to be reduced. This display will show “-nA-” if “FILTER” is selected in Step 2F or if ‘AUTO’ is not selected in Step 6S. Press NEXT to go to step 31. Press REGEN to exit Installer Displays/Settings.

Step 31



STEP 31 – Day Override: When gallon capacity is set to off, sets the number of days between regenerations. When gallon capacity is set to AUTO or to a number, sets the maximum number of days between regenerations. If value set to “oFF” regeneration initiation is based solely on gallons used. If value is set as a number (allowable range from 1 to 28) a regeneration initiation will be called for on that day even if sufficient number of gallons were not used to call for a regeneration. Set Day Override using ∇ or Δ buttons:

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

Step 41



See Table 12 for more detail on softener setup and Table 13 for more detail on filter setup. Press NEXT to go to step 41. Press REGEN to return to previous step.

Step 51



STEP 41 – Next Regeneration Time (hour): Set the hour of day for regeneration using ∇ or Δ buttons. AM/PM toggles after 12. The default time is 2:00 a.m. This display will show “REGEN on 0 GAL” if “on 0” is selected in Step 9S or Step 7F. Press NEXT to go to step 51. Press REGEN to return to previous step.

STEP 51 – Next Regeneration Time (minutes): Set the minutes of day for regeneration using ∇ or Δ buttons. This display will not be shown if “on 0” is selected in Step 9S or Step 7F. Press NEXT to exit Installer Displays/Settings. Press REGEN to return to previous step.

RETURN TO
NORMAL
MODE

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

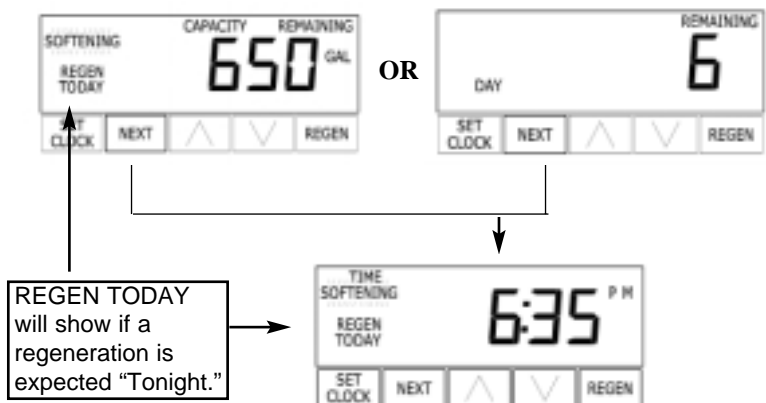
User Displays/Settings

General Operation

When the system is operating one of two displays will be shown. Pressing NEXT will alternate between the displays. One of the displays is always the current time of day. The second display is one of the following: days remaining or gallons remaining. Days remaining is the number of days left before the system goes through a regeneration cycle. Capacity remaining is the number of gallons that will be treated before the system goes through a regeneration cycle. The user can scroll between the displays as desired.

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

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



Regeneration Mode

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



When the system begins to regenerate, the display will change to include information about the step of the regeneration process and the time remaining for that step to be completed. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.

Manual Regeneration

Sometimes there is a need to regenerate the system, sooner than when the system calls for it, usually referred to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

REGEN TODAY will Flash if a regeneration is expected "Tonight."



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

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

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

STEP 1U



Set Time of Day

The user can also set the time of day. Time of day should only need to be set after extended power outages or when daylight saving time begins or ends. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset.

STEP 2U



STEP 1U – Press SET CLOCK.

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

STEP 3U



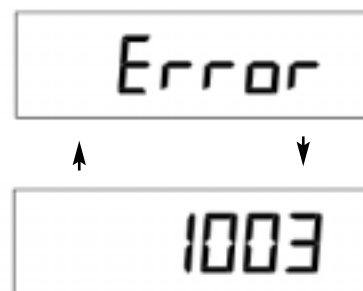
STEP 3U - Current Time (minutes): Set the minutes of the day using ∇ or Δ buttons. Press NEXT to exit Set Clock. Press REGEN to return to previous step.

Power Loss

If the power goes out for less than two hours, the system will automatically reset itself. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset. The system will remember the rest.

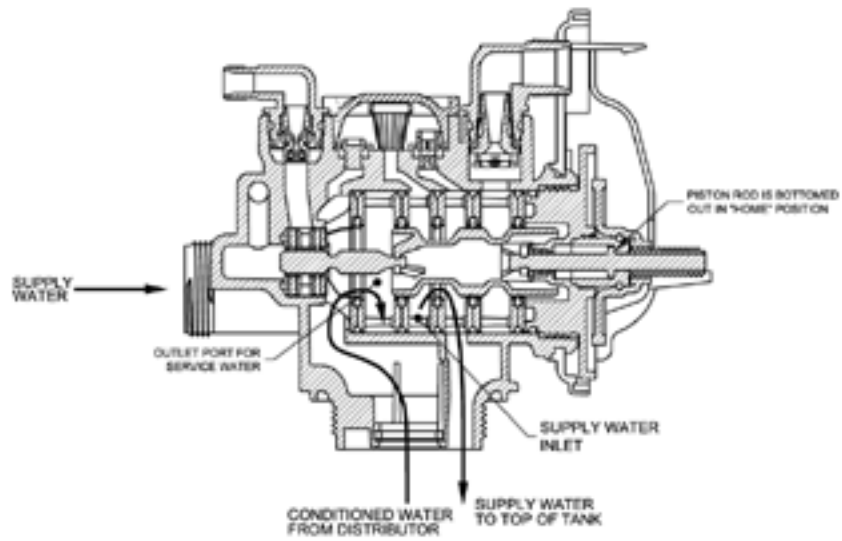
Error Message

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

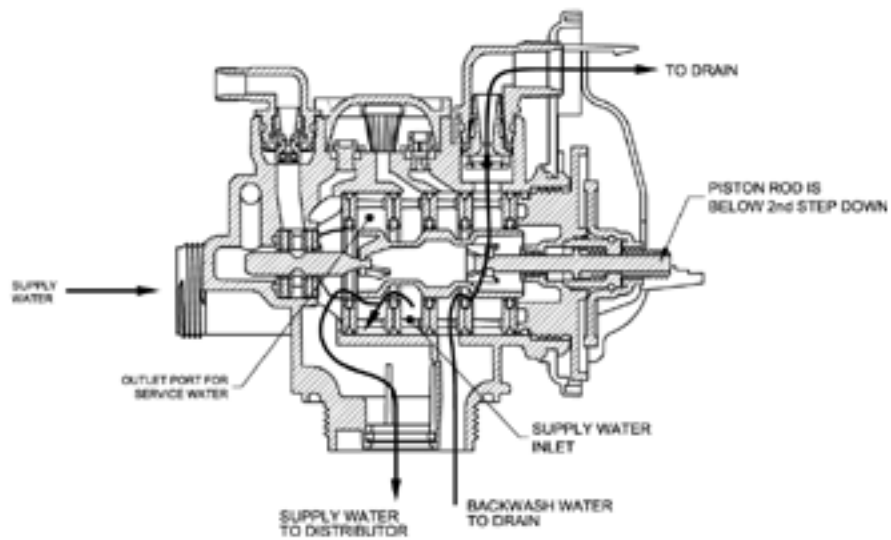


Flow Diagrams – Service and Backwash

flow diagram...service

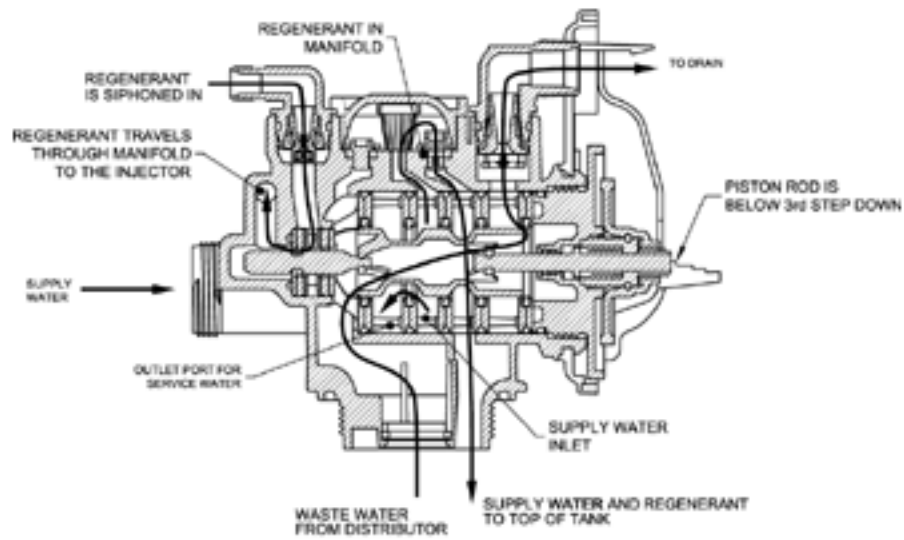


flow diagram...backwash



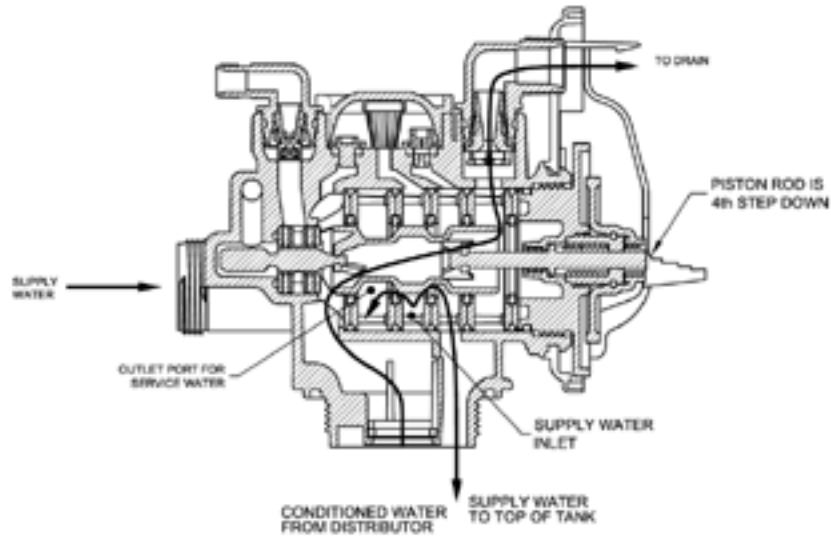
Flow Diagrams – Downflow

flow diagram...downflow brine

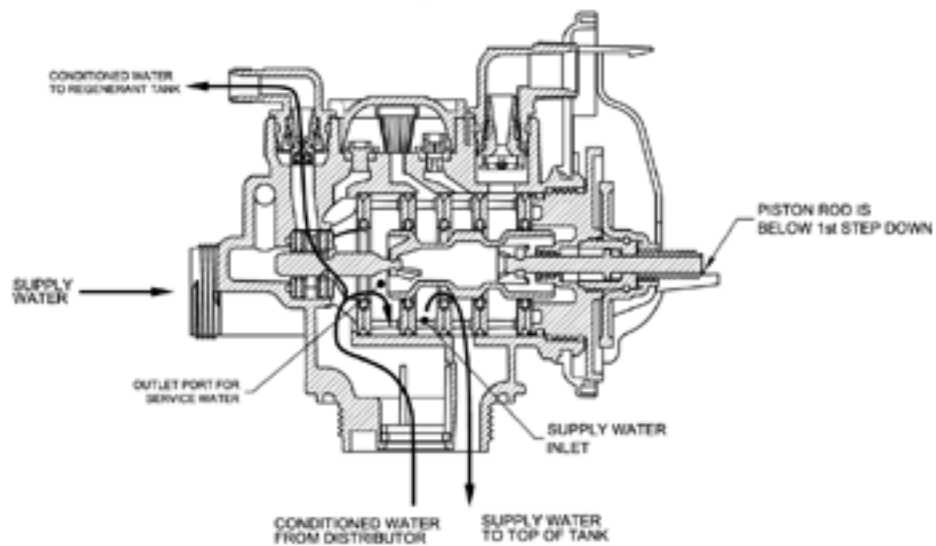


Flow Diagrams – Rinse and Fill

flow diagram...rinse



flow diagram...fill



BYPASS VALVE OPERATION

Figure 1

NORMAL OPERATION

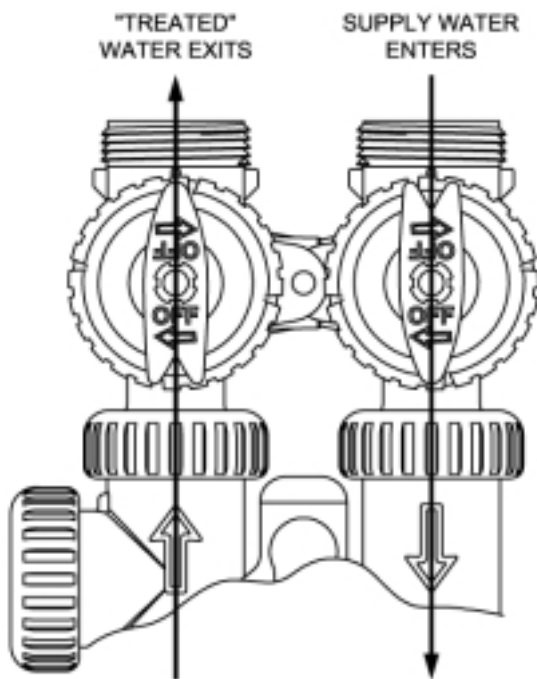


Figure 2

BYPASS OPERATION

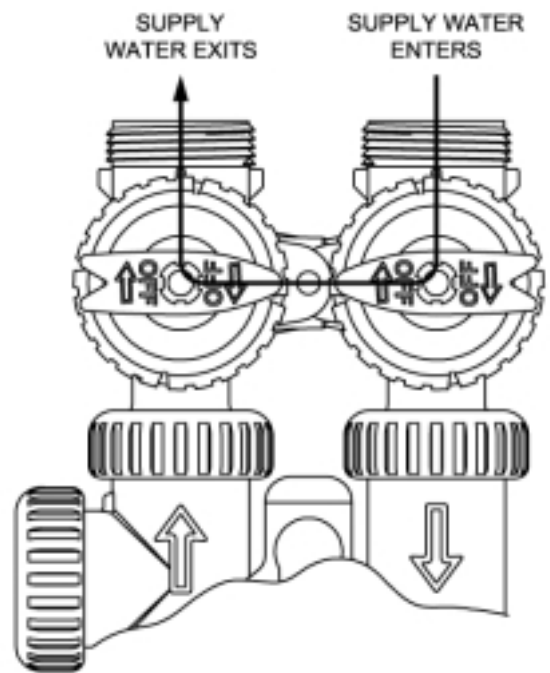


Figure 3

DIAGNOSTIC MODE

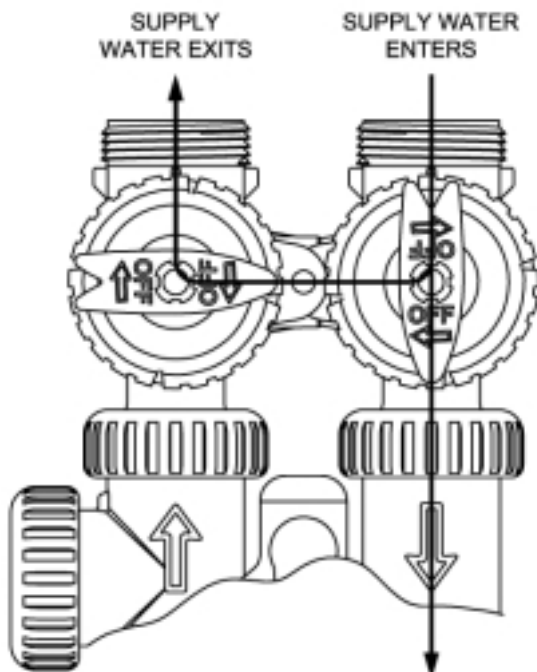
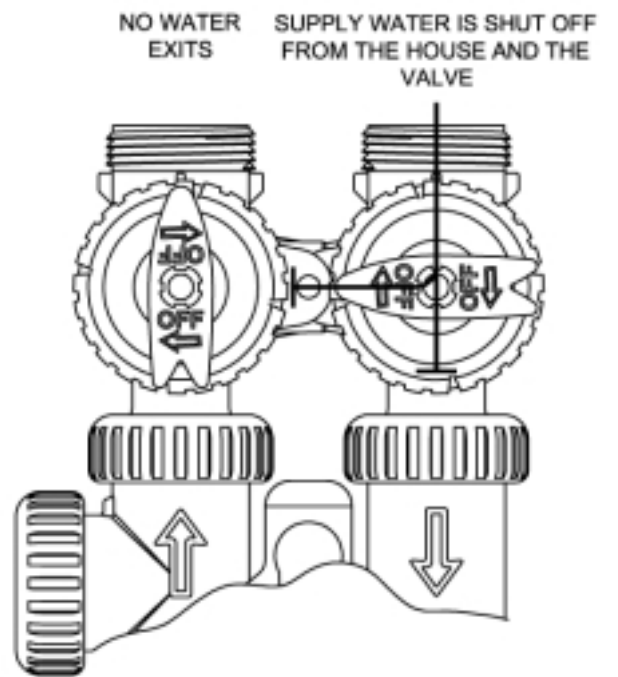


Figure 4

SHUT OFF MODE



Bypass Valve

The bypass valve is typically used to isolate the control valve from the plumbing system's water pressure in order to perform control valve repairs or maintenance. The WS1 bypass valve is particularly unique in the water treatment industry due to its versatility and state of the art design features. The 1" full flow bypass valve incorporates four positions including a diagnostic position that allows service personal to work on a pressurized system while still providing untreated bypass water to the facility or residence. Its completely non-metallic, all plastic design allows for easy access and serviceability without the need for tools.

The bypass body and rotors are glass filled Noryl and the nuts and caps are glass filled polypropylene. All seals are self-lubricating EPDM to help prevent valve seizing after long periods of non-use. Internal o-rings can easily be replaced if service is required.

The bypass consists of two interchangeable plug valves that are operated independently by red arrow shaped handles. The handles identify the flow direction of the water. The plug valves enable the bypass valve to operate in four positions.

- 1. Normal Operation Position:** The inlet and outlet handles point in the direction of flow indicated by the engraved arrows on the control valve. Water flows through the control valve during normal operation and this position also allows the control valve to isolate the media bed during the regeneration cycle. (See Figure 1)
- 2. Bypass Position:** The inlet and outlet handles point to the center of the bypass, the control valve is isolated from the water pressure contained in the plumbing system. Untreated water is supplied to the plumbing system. (See Figure 2)
- 3. Diagnostic Position:** The inlet handle points in the direction of flow and the outlet handle points to the center of bypass valve, system water pressure is allowed to the control valve and the plumbing system while not allowing water to exit from the control valve to the plumbing. (See Figure 3)
- 4. Shut Off Position:** The inlet handle points to the center of the bypass valve and the outlet handle points in the direction of flow, the water is shut off to the plumbing system. If water is available on the outlet side of the softener it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system). (See Figure 4)

Program Timer "Lockout" Feature

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

When in operation normal user displays such as time of day, gallons remaining or days remaining before regeneration are shown. When stepping through a procedure if no buttons are pressed within five minutes the display returns to a normal user display. Any changes made prior to the five minute time out are incorporated. The one exception is current flow rate display under the diagnostic procedure. The current flow rate display has a 30 minute time out feature.

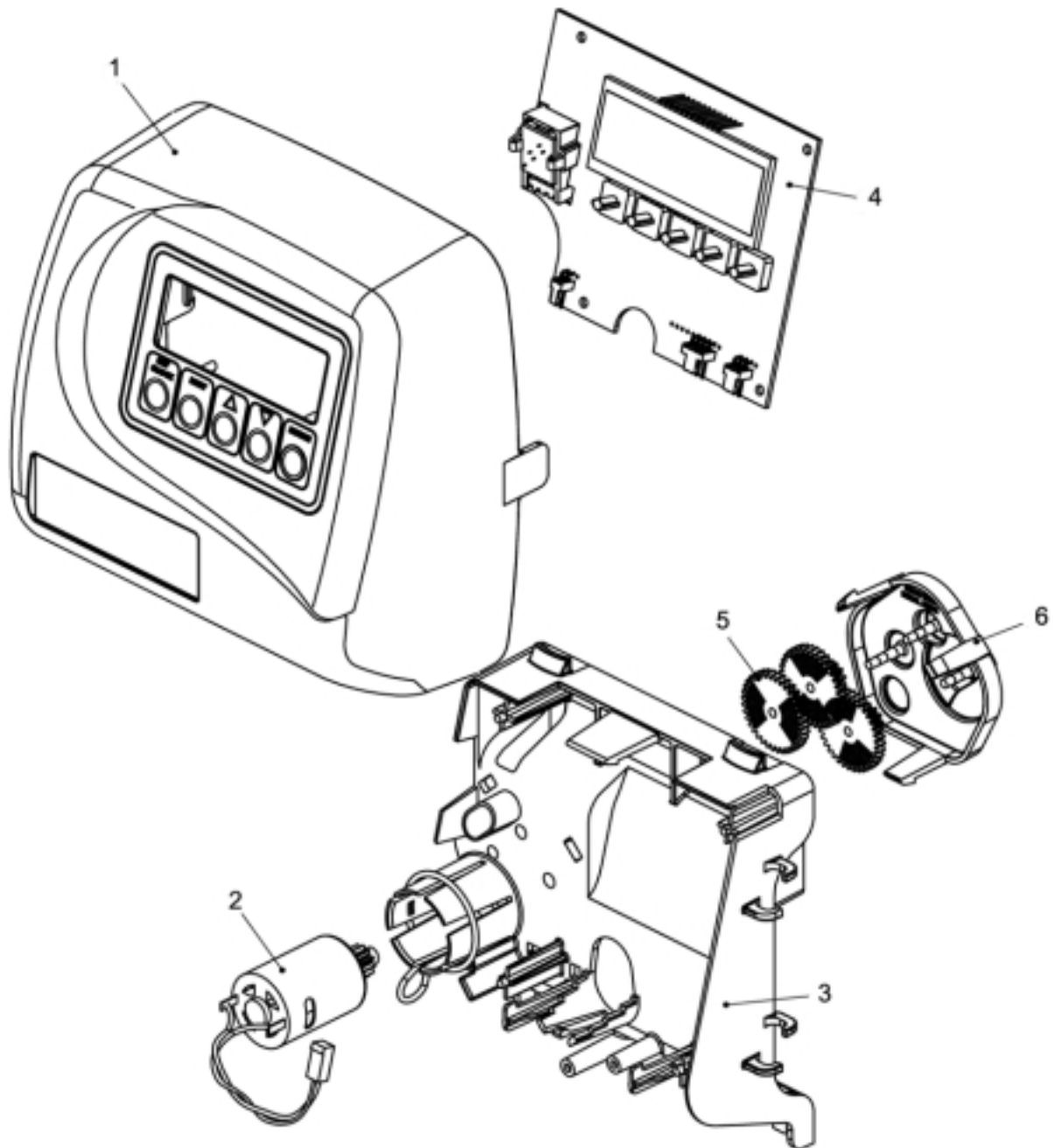
To quickly exit OEM Softener Setup, OEM Filter Setup, Installer Displays/Settings, Diagnostic or Valve History press SET CLOCK. Any changes made prior to the exit are incorporated.

When desired (e.g. when the valve is installed in a new location) certain information on the valve can be reset to zero. Table 14 identifies which information can be reset. To reset to zero, press NEXT and ∇ buttons simultaneously for 3 seconds and release. Press Δ and ∇ simultaneously for 3 seconds to reset diagnostic values to zero.

Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175-01	WS1 Front Cover ASY	1
2	V3107-01	WS1 Motor	1
3	V3106-01	WS1 Drive Bracket&Spring Clip	1
4	V3108	WS1 PC Board	1
5	V3110	WS1 Drive Gear 12x36	3
6	V3109	WS1 Drive Gear Cover	1
	V3002	WS1 Drive ASY	*
Not Shown	V3186	WS1 Transformer 110V-12V	1

* Drawing number parts 2 through 6 may be purchased as a complete assembly, part V3002.

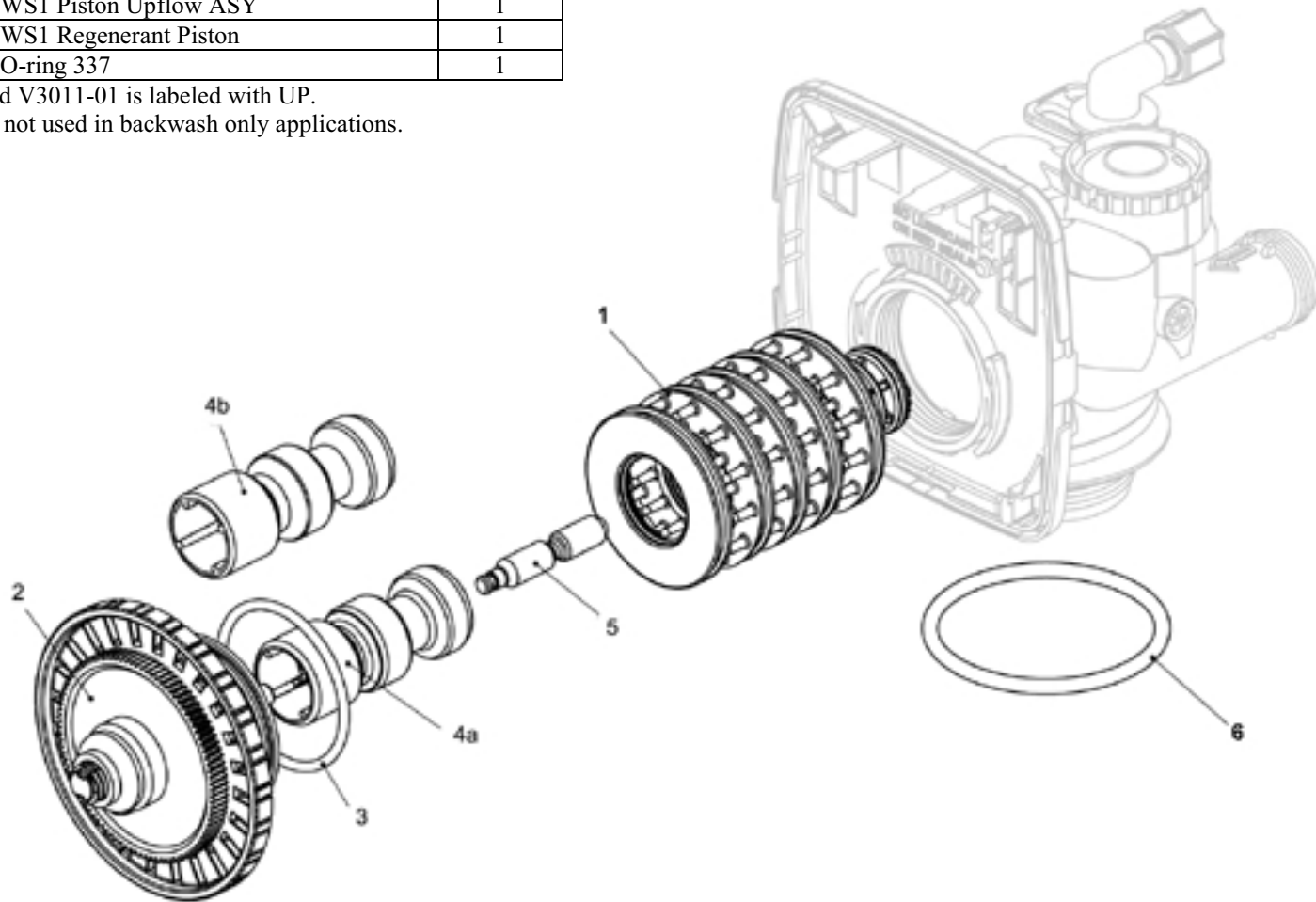


Drive Cap Assembly, Downflow Piston, Upflow Piston, Regenerant Piston and Spacer Stack Assembly

Drawing No.	Order No.	Description	Quantity
1	V3005	WS1 Spacer Stack Assembly	1
2	V3004	Drive Cap ASY	1
3	V3135	O-ring 228	1
4a	V3011*	WS1 Piston Downflow ASY	1
4b	V3011-01*	WS1 Piston Upflow ASY	1
5	V3174	WS1 Regenerant Piston	1
6	V3180	O-ring 337	1

*V3011 is labeled with DN and V3011-01 is labeled with UP.

Note: The regenerant piston is not used in backwash only applications.

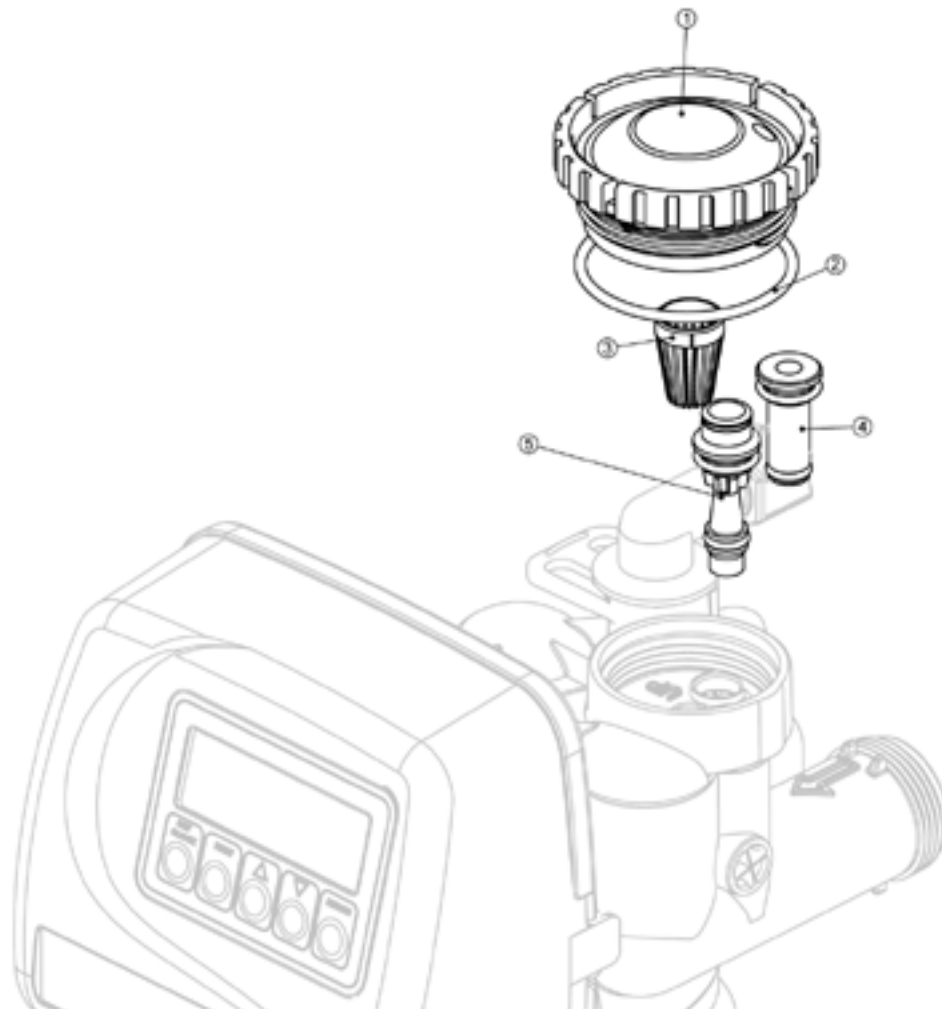


Injector Cap, Injector Screen, Injector, Plug and O-Ring

Drawing No.	Order No.	Description	Quantity
1	V3176	Injector Cap	1
2	V3152	O-ring 135	1
3	V3177	Injector Screen	1
4	V3010-1Z	WS1 Injector ASY Z Plug	1
5	V3010-1A	WS1 INJECTOR ASY A BLACK	1
	V3010-1B	WS1 INJECTOR ASY B BROWN	
	V3010-1C	WS1 INJECTOR ASY C VIOLET	
	V3010-1D	WS1 INJECTOR ASY D RED	
	V3010-1E	WS1 INJECTOR ASY E WHITE	
	V3010-1F	WS1 INJECTOR ASY F BLUE	
	V3010-1G	WS1 INJECTOR ASY G YELLOW	
	V3010-1H	WS1 INJECTOR ASY H GREEN	
	V3010-1I	WS1 INJECTOR ASY I ORANGE	
	V3010-1J	WS1 INJECTOR ASY J LIGHT BLUE	
	V3010-1K	WS1 INJECTOR ASY K LIGHT GREEN	
Not Shown	V3170	O-ring 011	*
Not Shown	V3171	O-ring 013	*

*The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring.

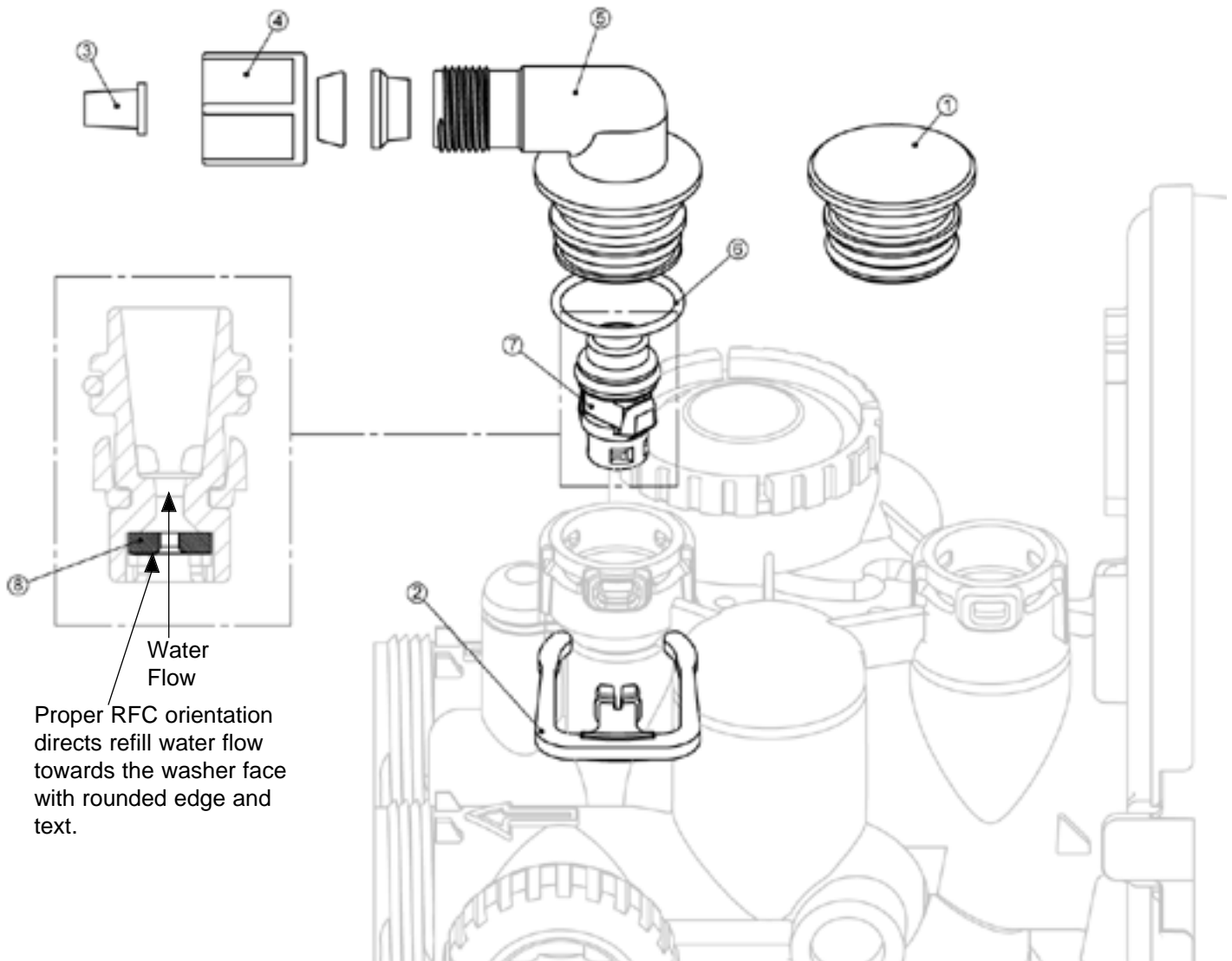
Note: For upflow position, injector is located in the up hole and injector plug in the down hole. For a filter that only backwashes injector plugs are located in both holes.



Refill and Refill Port Plug

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

*Assembly includes WS1 RFC.

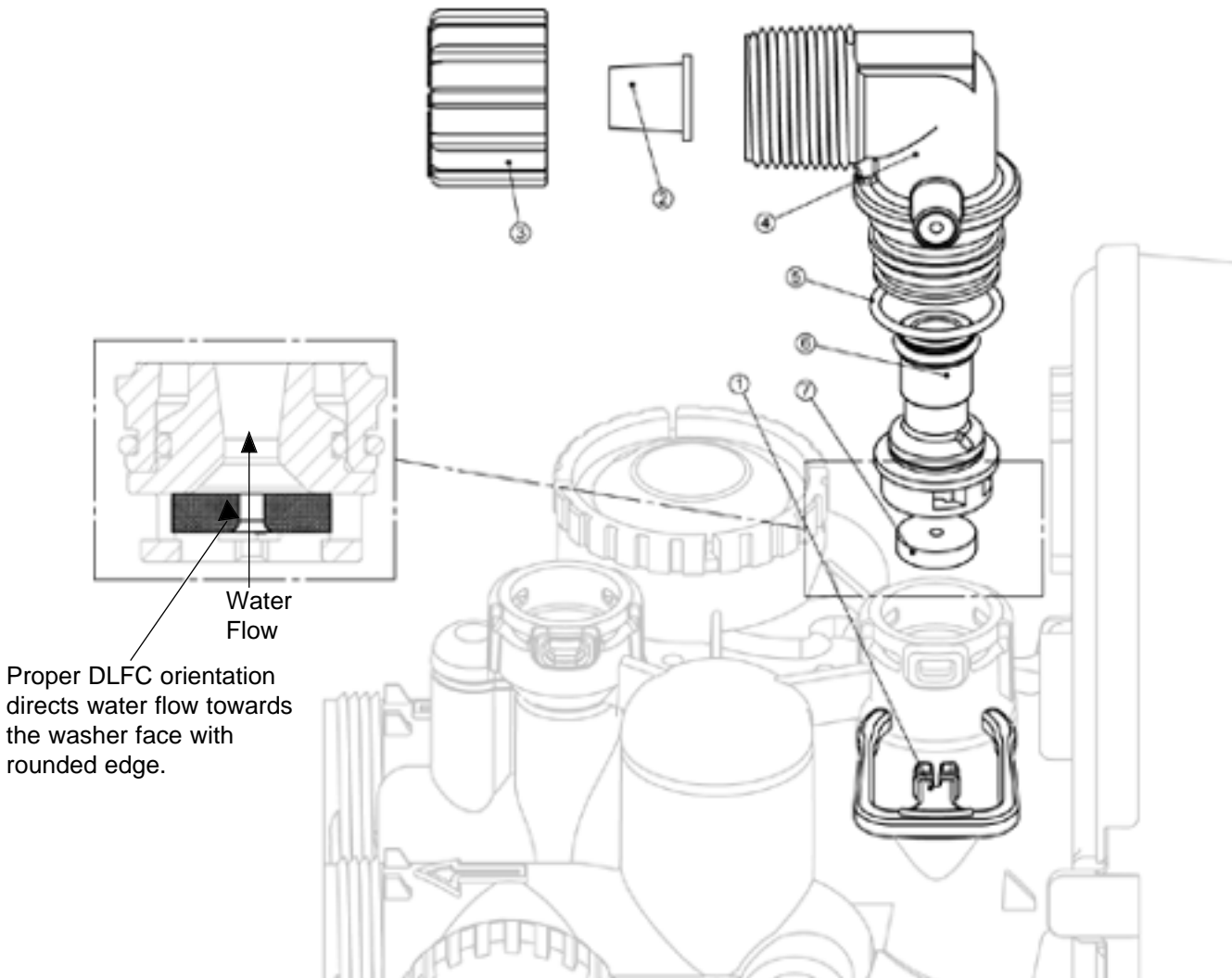


Proper RFC orientation directs refill water flow towards the washer face with rounded edge and text.

Drain Line – 3/4"

Drawing No.	Order No.	Description	
1	H4615	Elbow Locking Clip	
2	PKP10TS8-BULK	Polytube insert 5/8	
3	V3192	WS1 Nut 3/4 Drain Elbow	Opt
4	V3158-01	WS1 Drain Elbow 3/4 Male	ASY
5	V3163	O-ring 019	1
6	V3159-01	WS1 DLFC Retainer ASY	1
7	V3162-007	WS1 DLFC 0.7 gpm for 3/4	One DLFC must be used if 3/4 fitting is used
	V3162-010	WS1 DLFC 1.0 gpm for 3/4	
	V3162-013	WS1 DLFC 1.3 gpm for 3/4	
	V3162-017	WS1 DLFC 1.7 gpm for 3/4	
	V3162-022	WS1 DLFC 2.2 gpm for 3/4	
	V3162-027	WS1 DLFC 2.7 gpm for 3/4	
	V3162-032	WS1 DLFC 3.2 f gpm or 3/4	
	V3162-042	WS1 DLFC 4.2 gpm for 3/4	
	V3162-053	WS1 DLFC 5.3 gpm for 3/4	
	V3162-065	WS1 DLFC 6.5 gpm for 3/4	
	V3162-075	WS1 DLFC 7.5 gpm for 3/4	
	V3162-090	WS1 DLFC 9.0 gpm for 3/4	
	V3162-100	WS1 DLFC 10.0 gpm for 3/4	

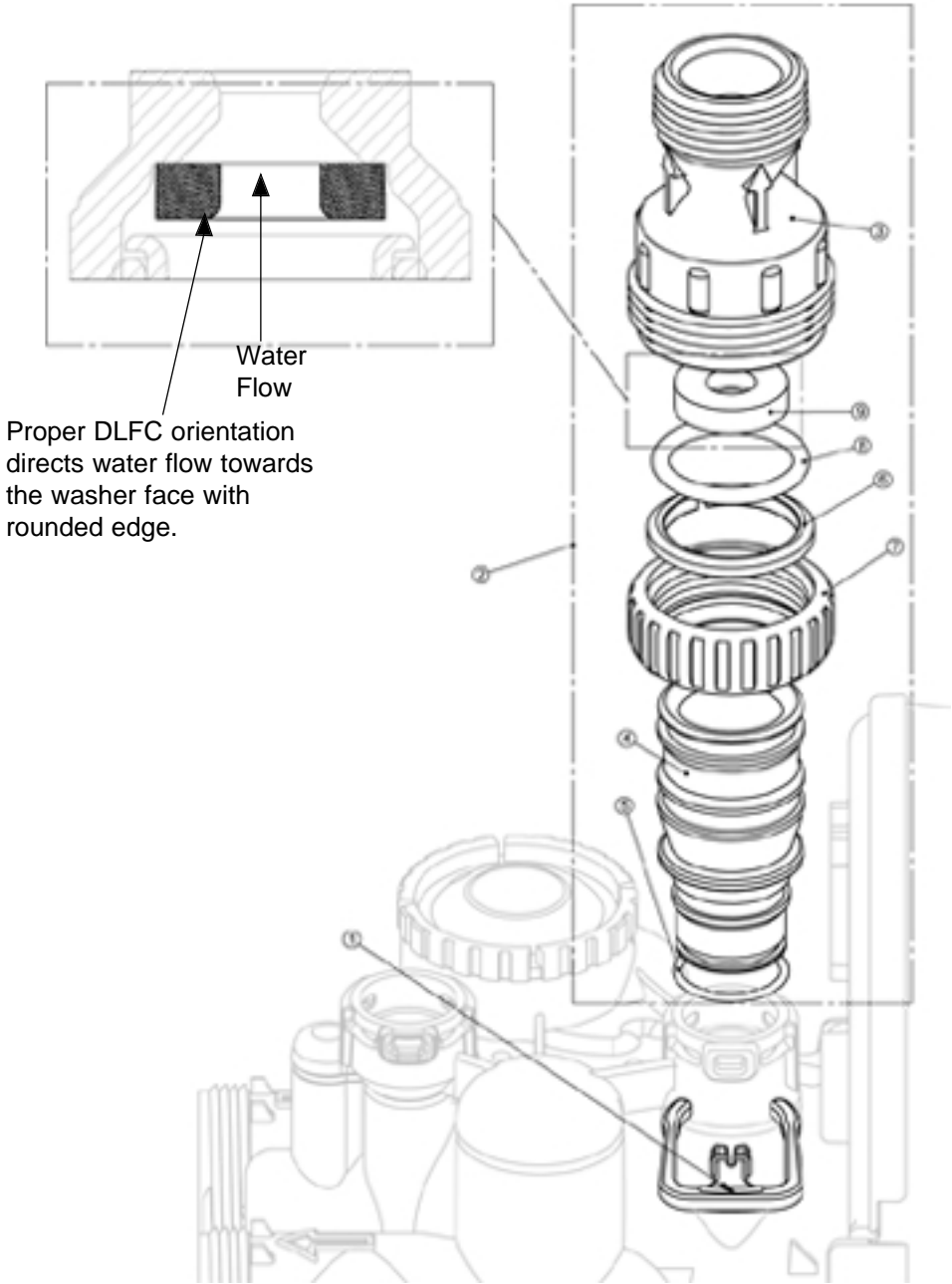
Valves are shipped without drain line flow control (DLFC) - if shipped without 3/4" nut for drain elbow (polytube installation installation only).



Drain Line – 1”

Drawing No.	Order No.	Description	Qu
1	H4615	Elbow Locking Clip	1
2	V3008-02	WS1 Drain FTG 1 Straight	1
3*	V3166	WS1 Drain FTG Body 1	1
4*	V3167	WS1 Drain FTG Adapter 1	1
5*	V3163	O-ring 019	1
6*	V3150	WS1 Split Ring	1
7*	V3151	WS1 Nut 1" QC	1
8*	V3105	O-ring 215	1
9	V3190-090	WS1 DLFC 9.0 gpm for 1	One DLFC must be used if 1" fitting is used
	V3190-100	WS1 DLFC 10.0 gpm for 1	
	V3190-110	WS1 DLFC 11.0 gpm for 1	
	V3190-130	WS1 DLFC 13.0 gpm for 1	
	V3190-150	WS1 DLFC 15.0 gpm for 1	
	V3190-170	WS1 DLFC 17.0 gpm for 1	
	V3190-200	WS1 DLFC 20.0 gpm for 1	
V3190-250	WS1 DLFC 25.0 gpm for 1		

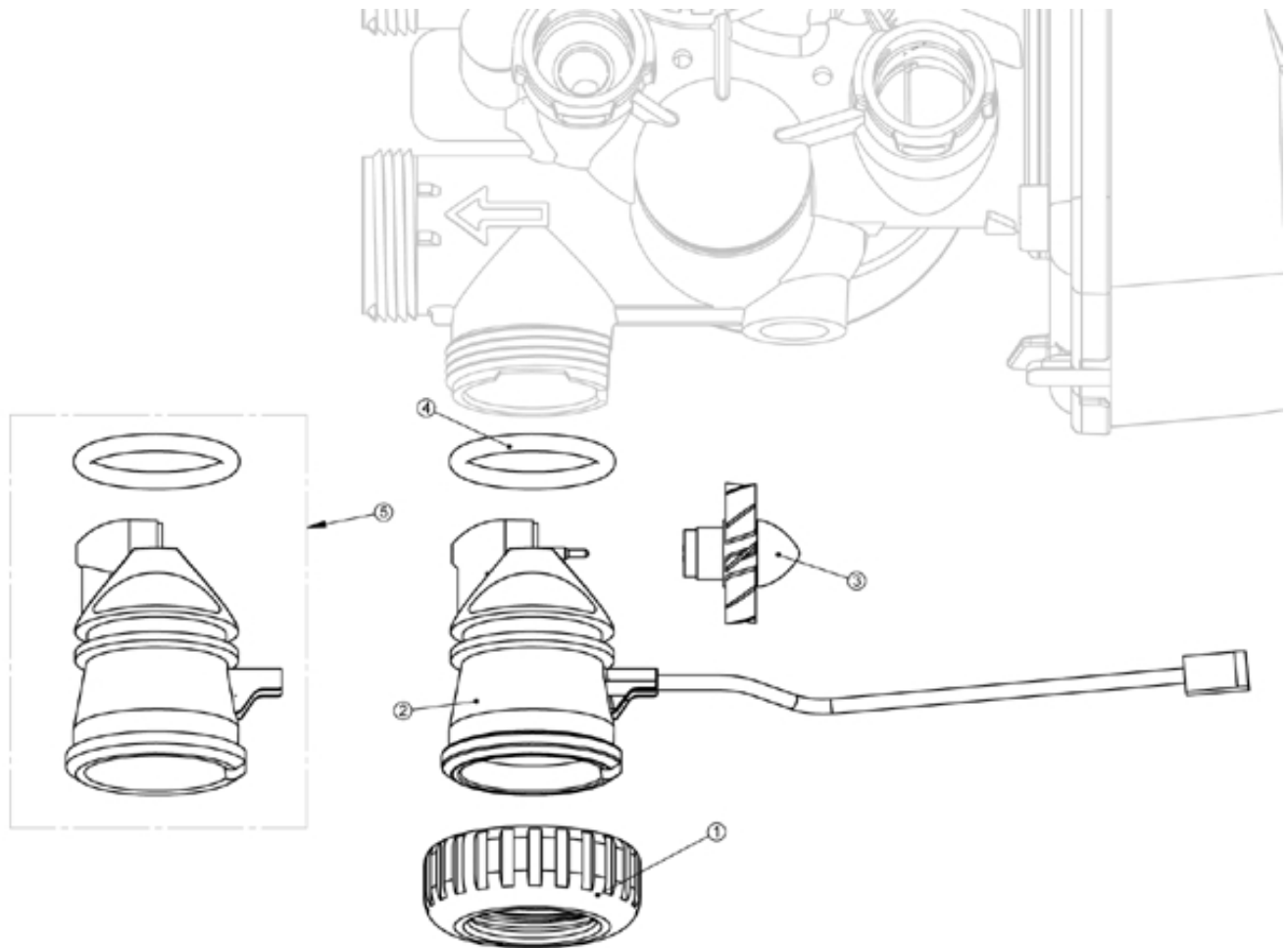
* Can be ordered as a set order number V3008-02, description:



Water Meter and Meter Plug

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" QC	1
2	V3003*	WS1 Meter ASY	1
3	V3118-01	WS1 Turbine ASY	1
4	V3105	O-ring 215	1
5	V3003-01	WS1 Meter Plug ASY	1

*Order number V3003 includes V3118-01 and V3105.

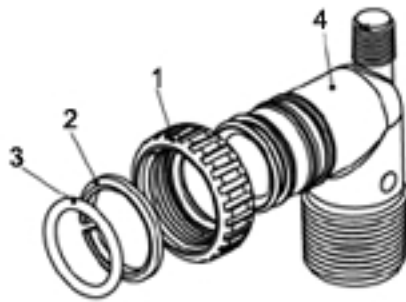


Installation Fitting Assemblies

Order No: **V3007**

Description: **WS1 Fitting 1" PVC Male NPT Elbow Assembly**

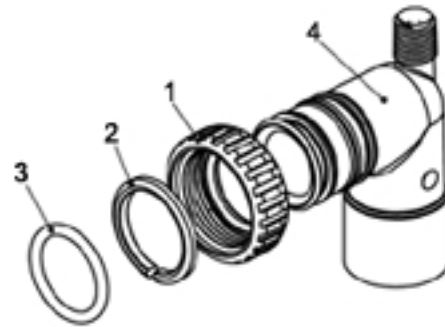
Drawing No	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3149	WS1 Fitting 1 PVC Male NPT Elbow	2



Order No: **V3007-01**

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

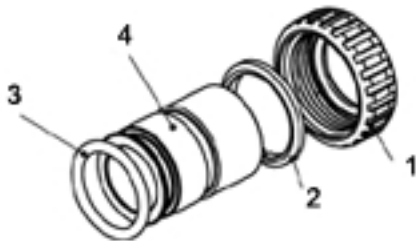
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3189	WS1 Fitting 3/4" & 1" PVC Solvent 90°	2



Order No: **V3007-02**

Description: **WS1 Fitting 1" Brass Sweat Assembly**

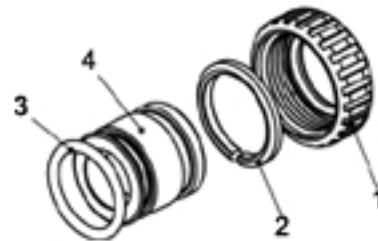
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3188	WS1 Fitting 1 Brass Sweat	2



Order No: **V3007-03**

Description: **WS1 Fitting 3/4" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3188-01	WS1 Fitting 3/4 Brass Sweat	2

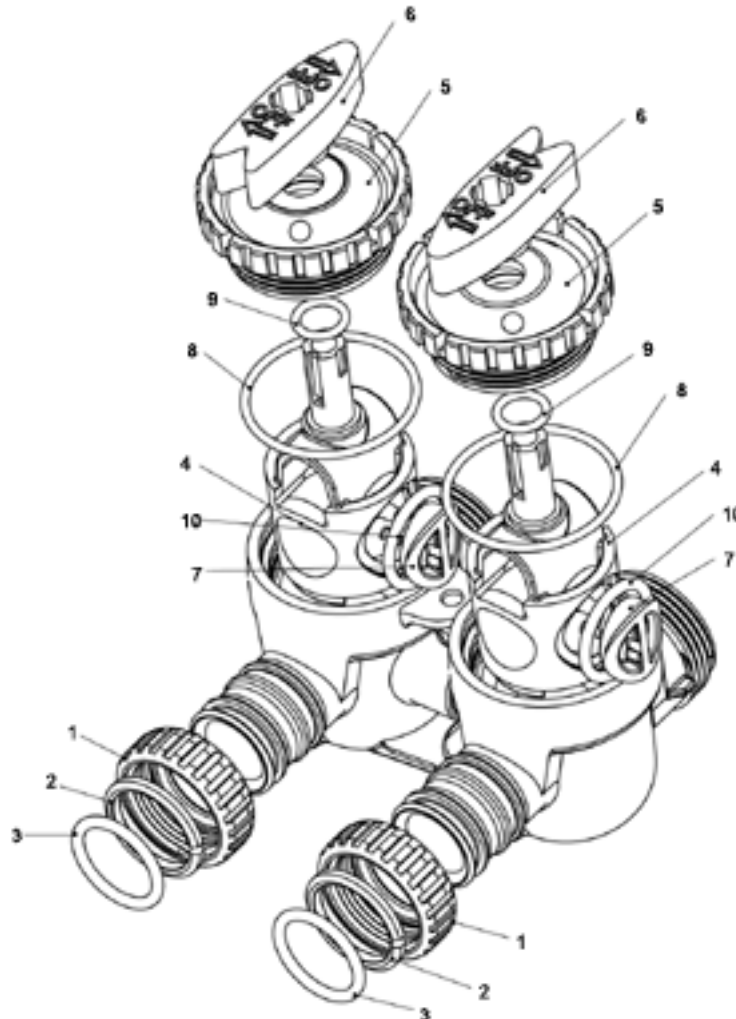


Bypass Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	WS1 Bypass 1" Rotor	2
5	V3146	WS1 Bypass Cap	2
6	V3147	WS1 Bypass Handle	2
7	V3148	WS1 Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

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

Order No.	Description	Quantity
V3151	WS1 Nut 1" Quick Connect	2
V3150	WS1 Split Ring	2
V3105	O-Ring 215	2
V3191-01	WS1 Bypass Vertical Adapter Assembly	2



**Table 15
Troubleshooting Procedures**

Problem	Possible Cause	Solution
1. Timer does not display time of day	a. Transformer unplugged	a. Connect power
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
2. Timer does not display correct time of day	a. Switched outlet	a. Use uninterrupted outlet
	b. Power outage	b. Reset time of day
	c. Defective PC board	c. Replace PC board
3. No softening/filtering display when water is flowing	a. Bypass valve in bypass position	a. Put bypass valve in service position
	b. Meter connection disconnected	b. Connect meter to PC board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
4. Control valve regenerates at wrong time of day	a. Power outages	a. Reset control valve to correct time of day
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration incorrect	c. Reset regeneration time
	d. Control valve set at "on 0" (immediate regeneration)	d. Check control valve set-up procedure regeneration time option
	e. Control valve set at NORMAL + on 0	e. Check control valve set-up procedure regeneration time option
5. ERROR followed by code number Error Code 1001 -Unable to recognize start of regeneration Error Code 1002 – Unexpected stall Error Code 1003 – Motor ran to long, timed out trying to reach next cycle position Error Code 1004 - Motor ran to long, timed out trying to reach home position If other Error Codes display contact the factory.	a. Control valve has just been serviced	a. Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
	b. Foreign matter is lodged in control valve	b. Check piston and spacer stack assembly for foreign matter
	c. High drive forces on piston	c. Replace piston(s) and spacer stack assembly
	d. Control valve piston not in home position	d. Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
	e. Motor not inserted fully to engage pinion, motor wires broken or disconnected, motor failure	e. Check motor and wiring. Replace motor if necessary
	f. Drive gear label dirty or damaged, missing or broken gear	f. Replace or clean drive gear
	g. Drive bracket incorrectly aligned to back plate	g. Reseat drive bracket properly
	h. PC board is damaged or defective	h. Replace PC board
	i. PC board incorrectly aligned to drive bracket	i. Ensure PC board is correctly snapped on to drive bracket

Problem	Possible Cause	Solution
6. Control valve stalled in regeneration	a. Motor not operating	a. Replace motor
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
	e. Broken drive gear or drive cap assembly	e. Replace drive gear or drive cap assembly
	f. Broken piston retainer	f. Replace drive cap assembly
	g. Broken main or regenerant piston	g. Replace main or regenerant piston
7. Control valve does not regenerate automatically when REGEN button is depressed and held	a. Transformer unplugged	a. Connect transformer
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Broken drive gear or drive cap assembly	c. Replace drive gear or drive cap assembly
	d. Defective PC board	d. Replace PC board
8. Control valve does not regenerate automatically but does when REGEN button is depressed	a. By-pass valve in bypass position	a. Put bypass valve in normal operation position
	b. Meter connection disconnected	b. Connect meter to PC board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign matter
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
	f. Set-up error	f. Check control valve set-up procedure
9. Time of day flashes on and off	a. Power has been out more than two hours, the transformer was unplugged and then plugged back into the wall outlet, the transformer plug was unplugged and then plugged back into the board or the NEXT and REGEN buttons were pressed to reset the valve.	a. Reset the time of day