SAFE WATER TECHNOLOGIES, INC.

SERVICE MANUAL

SERVICE INSTRUCTIONS & ASSEMBLY DRAWINGS

FOR

TECH CONTROL VALVES

(1.5 INCH, 2 INCH, and 2 INCH QC)

FILTERS, SOFTENERS, CONDITIONERS

1.5 INCH TECH-EE SERIES CONTROL VALVE MODEL: WS1.5EE

2 INCH TECH-EE SERIES CONTROL VALVE MODEL: WS2EE

2 INCH QC TECH-EE SERIES CONTROL VALVE MODEL: WS2QCEE

SEPTEMBER 2012

Installation Summary

Installation Date: _____

Installation Location: _____

Installer(s): _____

Phone Number: _____

Application Type: Softener: _____ Other: _____

Water Source: _____

Water Test Results

Hardness: _____ Iron: _____ pH: _____

Other: _____

_____

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

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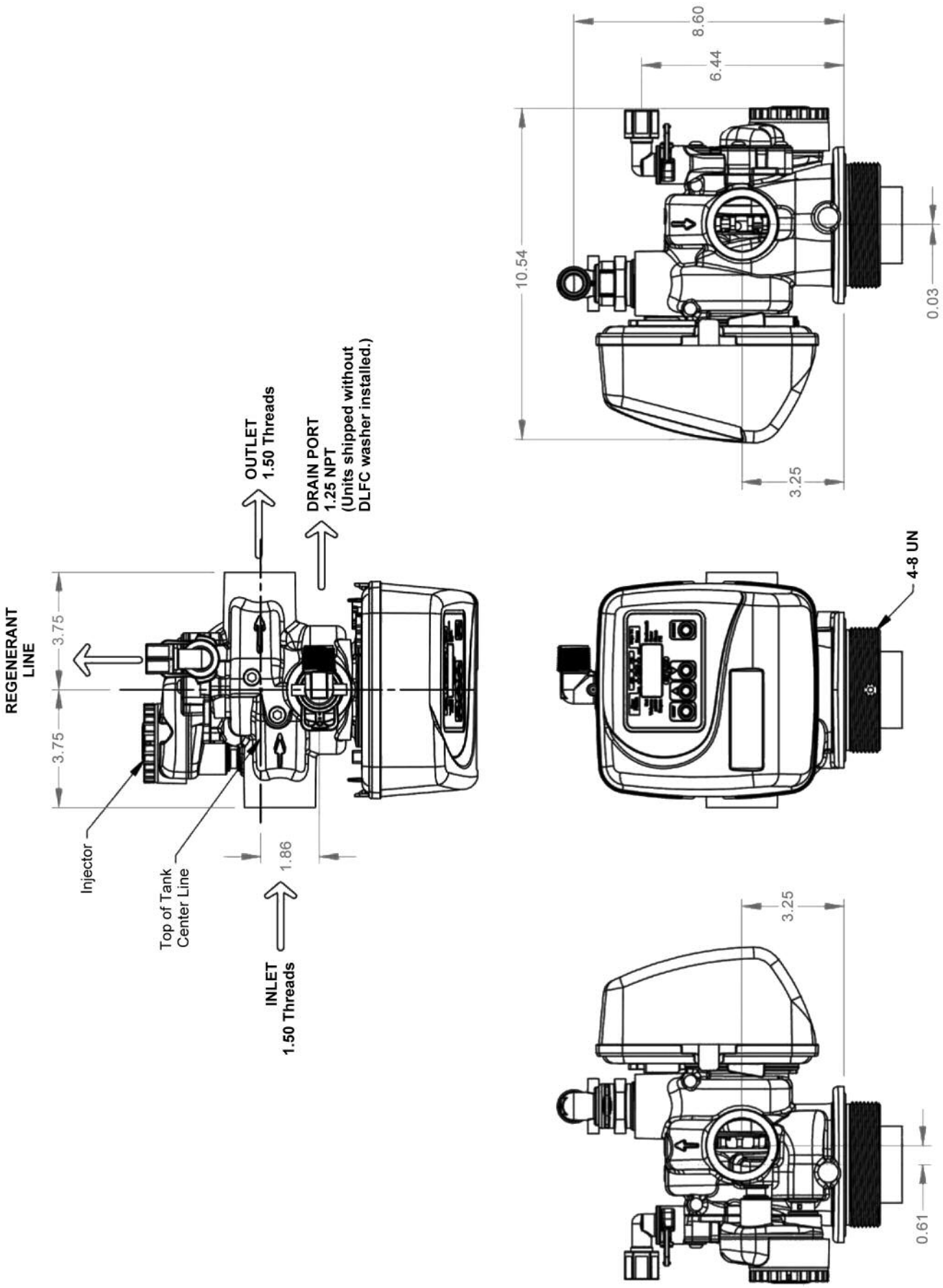
Specifications

Minimum to Maximum Operating Pressures	20 psi (138 kPa) to 125 psi (862 kPa)	
Minimum to Maximum Operating Temperatures	40°F (4°C) to 110°F (43°C)	
Service Flow Rate	*1.5 inch Valve:* 70 gpm (265 lpm, 15.9 m3/h) @ 15 psig (103 kPa) drop	
	2 inch Valve: 115 gpm (435 lpm, 26.1 m3/h) @ 15 psig (103 kPa) drop	
	2 inch QC Valve: 125 gpm (473 lpm, 28.4 m3/h) @ 15 psig (103 kPa) drop	
Backwash Flow Rate	*1.5 inch Valve:* 52 gpm (192 lpm, 11.8 m3/h) @ 25 psig (172 kPa) drop	
	2 inch Valve: 80 gpm (303 lpm, 18.2 m3/h) @ 25 psig (172 kPa) drop	
	2 inch QC Valve: 85 gpm (322 lpm, 19.3 m3/h) @ 25 psig (172 kPa) drop	
CV Service	*1.5 inch Valve:* 18.1	
	2 inch Valve: 29.7	
	2 inch QC Valve: 32.3	
CV Backwash	*1.5 inch Valve:* 10.4	
	2 inch Valve: 16.0	
	2 inch QC Valve: 17.0	
Meter	Accuracy	Flow Range
1.5 inch Valve	± 5%	0.5 to 75 gpm (1.9 to 283 lpm)
2 inch & 2 inch QC Valves	± 5%	1.5 to 150 gpm (5.7 to 568 lpm)
Regenerant Refill Rate	*1.5 inch Valve:* 0.5 gpm (1.9 lpm)	
	2 inch & 2 inch QC Valves: Variable – Shipped from Factory with 2.2 gpm (8.33 lpm)	
Injectors	*1.5 inch Valve:* See Injector Table (page 27)	
	2 inch & 2 inch QC Valves: See Injector Table (page 27)	
Inlet & Outlet	*1.5 inch Valves:* 1.5 inch Female NPT or BSPT	
	2 inch & 2 inch QC Valves: 2 inch Female NPT or BSPT	
Drain Line	*1.5 inch Valve:* 1.25 inch Female NPT	
	2 inch & 2 inch QC Valves: 1.5 inch Female NPT	
Distributor Tube Opening	For Valves with Female NPT Inlet & Outlet	For Valves with Female BSPT Inlet & Outlet
1.5 inch & 2 inch Valves	1.90 inch OD (1.5 inch NPS)	50 mm OD
2 inch QC Valve	2.375 inch OD (2.0 inch NPS)	63 mm OD
Distributor Tube Pipe Height * (for top mount control valves)	*1.5 inch & 2 inch Valves:* Plus or minus 0.5 inch	
	2 inch QC Valve: 2.25 to 2.5 inch	
Tank Connection	*1.5 inch & 2 inch Valves:* 4 inch #8 UN	
	2 inch QC Valves: 4 inch #8 UN, 6 inch Flange, Side Mount NPT or BSPT	
Shipping Weight	*1.5 inch Valve & Meter:* 23 lbs (11 kg)	
	2 inch & 2 inch QC Valve & Meter: 30 lbs (14 kg)	
PC Board Memory	Nonvolatile EEPROM (Electrically Erasable Programmable Read Only Memory)	
Compatible with Regenerants / Chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfi te, chlorine, chloramines	
Power Adapter	U.S.	International
Supply Voltage	120 VAC	230 VAC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 VAC	12 VAC
Output Current	500 mA	500 mA

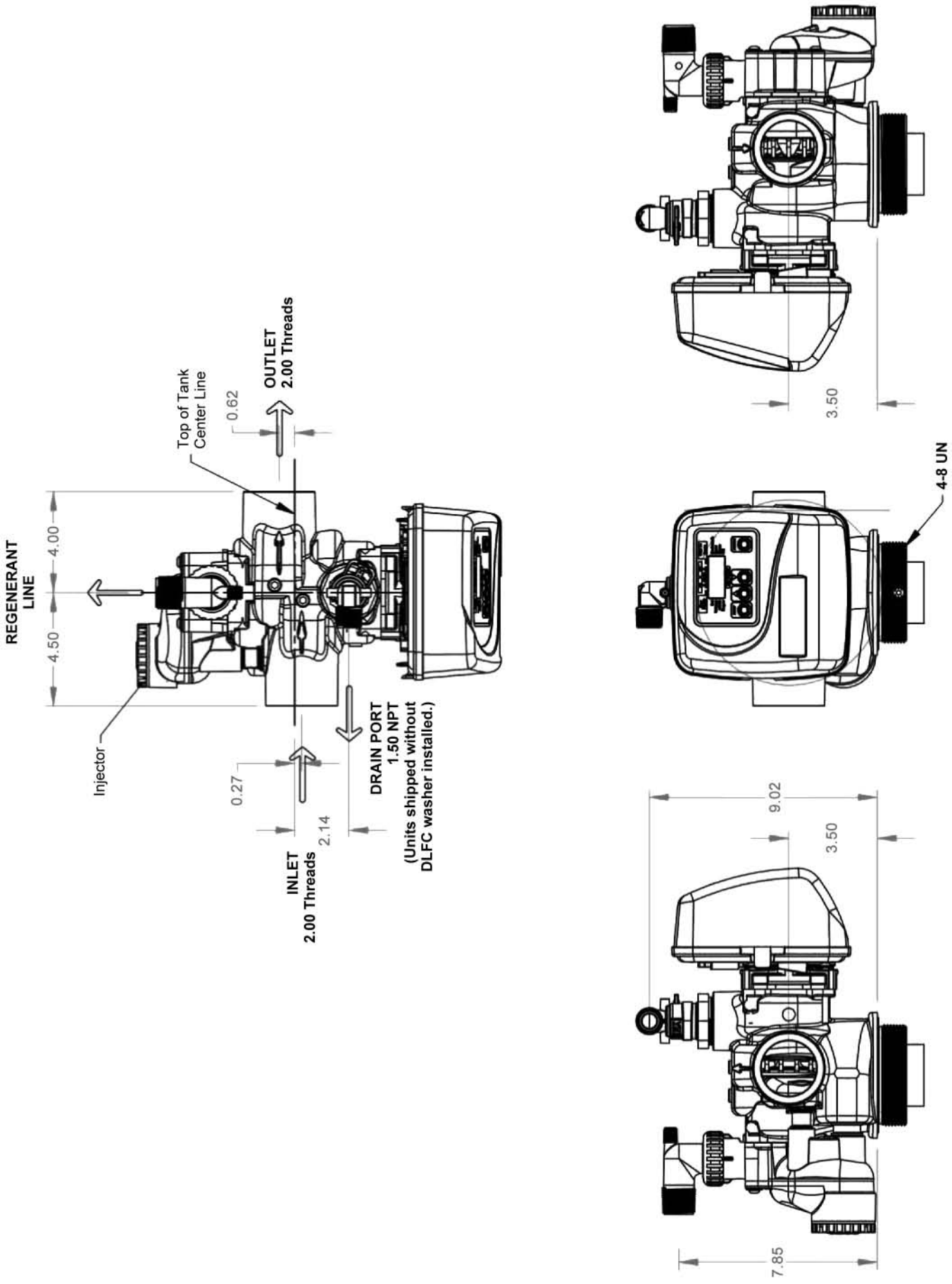
* Number of inches above the top of the tank for fiberglass tanks. Please verify distributor pipe and pilot o-ring engagement. Installer must determine engagement to be able to allow for tank expansion.

NOTE: 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.

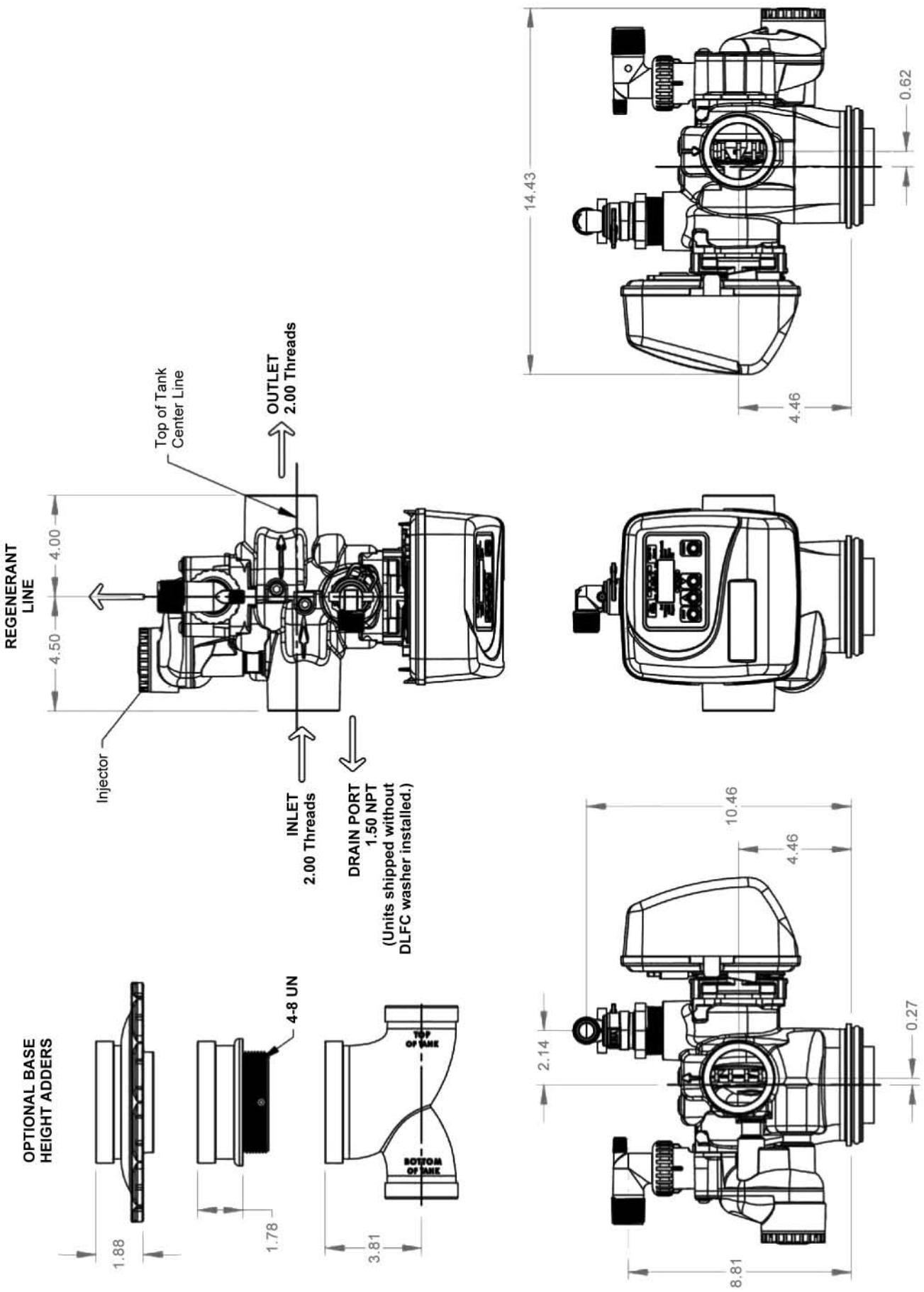
Tech 1.5 inch (WS1.5) Control Valve Dimensions



Tech 2 inch (WS2) Control Valve Dimensions



Tech 2 inch Quick Connect (WS2QC) Control Valve Dimensions



Introduction

This manual provides information about the service of the Safe Water Technologies 1.5 inch, 2 inch, and 2 inch QC (Quick Connect) Tech Series Control Valves for use in water softener or water filter applications.

General Warnings

- The control valve and fittings are not designed to support the weight of the system or the plumbing.
- **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.**
- **Tech Series water meters should not be used as the primary monitoring device for critical or health effect applications.**
- 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.
- Teflon tape is recommended for use on all threads. Do not use pipe dope, as it may break down the plastics in the control valve.

Site Requirements

1. The plug-in power adapter is for dry locations only, and should be connected to an uninterrupted outlet installed within 15 feet (4.57 meters) of the water conditioner. If the power adapter cord has not yet been connected to the control valve, remove the control valve cover and the drive bracket, then thread the power adapter cord through the hole in the backplate. Reinstall the drive bracket. Weave the cord through the hooks on the right hand side of the drive bracket and connect the end to the four-prong connector on the printed circuit board. Replace the cover and plug the power adapter into an uninterrupted outlet.
2. The tanks should be on a firm, level surface.
3. All plumbing should be done in accordance with local codes.
4. Do not locate unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures below 40°F (4°C).
5. INLET/OUTLET PLUMBING: Connect to a supply line downstream of outdoor spigots. Install an inlet shutoff valve and plumb to the unit's inlet. Installation of a bypass valve is recommended. If using plastic fittings, ground the water conditioner per local electrical codes. Do not install any water conditioner with less than 10 feet of piping between its outlet and the inlet of a water heater. If a water meter is used, install the water meter on the outlet side of the control valve. The turbine assembly may be oriented in any direction, but is usually oriented pointing up to reduce drainage out of the pipe during service.
6. Locate the water conditioner so the distance between the drain and the water conditioner is as short as possible. All units are shipped without a drain line flow control washer. Correctly size the drain line and install an appropriately sized drain line flow control. 1.5 inch valves are shipped with a 0.75 inch fitting that can be used with drain line flow controls up to 10 gpm, or an optional 1 inch fitting can be purchased to be used with drain line flow controls up to 25 gpm. For higher backwash rates, the adapter can be removed and the 1.25 inch NPT threaded drain outlet can be used. For 2 inch valves the drain outlet is 1.5 inch NPT thread. Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6 inches (152.4mm) between the drain line flow control fitting and the 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.

7. Regenerant tanks should be accessible for easy refilling. If the control valve is to be used to regenerate the water conditioner with brine (saturated salt solution) or other regenerants, use a polyethylene tube to connect the brine valve contained in the regenerant tank to the regenerant port on the control valve. It is recommended the brine valve contain a safety float. The 1.5 inch control valve's regenerant port has a 0.5 inch fitting. (Note: 0.5 inch tubing that runs longer than 6 feet may restrict draw rates with G and H injectors.) A 0.625 inch fitting is also available. The 2 inch control valve regenerant port has a 1 inch threaded connection. To ensure acceptable operation of the injectors, use 1 inch pipe to connect to the brine tank.

   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.

8. PROGRAM THE CONTROL VALVE: It is very important to program the control valve for the type of system (e.g. water softener or filter). Consult Control Valve Operation & Instruction Manual for proper program system settings.

9. The use of resin cleaners in an unvented enclosure is not recommended.

System Startup

1. After installation is completed, turn on the supply water to check for leaks.
2. Fully open a cold water faucet downstream of the system.
3. Allow water to run until clear.
4. Close the cold water faucet.
5. Turn off the supply water.
6. The system is now ready for startup.

Systems with a Regenerant Tank

1. Manually pour enough water into the regenerant tank to reach the top of the air check valve.
2. Press and hold the REGEN button for three seconds until the drive motor starts. Press the REGEN button to advance the unit to the backwash cycle. Wait until the motor stops and the backwash time begins to count down.
3. Open the inlet water supply valve very slowly allowing water to fill the tank in order to expel air. CAUTION: If water flows too rapidly, there will be a loss of media out of the drain.
4. When the water is flowing steadily to the drain without the presence of air, press the REGEN button to advance the control to the brine position. Wait until the motor stops and the brine time begins to count down.
5. Fully open the water supply inlet valve. Check that water is being drawn from the regenerant tank and there should be a slow flow to the drain. Allow three minutes for the media bed to settle.
6. Press the REGEN button to advance the unit to the rinse position. Allow water to run to drain for 2 to 3 minutes, or until the drain runs clear.
7. Press the REGEN button to advance to the fill position. Allow water to run into the regenerant tank and prepare it for the next regeneration. Allow the regenerant tank to fill automatically. Systems with a salt grid should see a water level 1.5 to 2 inches above the grid.
8. Add salt to the tank and allow ample time to dissolve the salt for the brine solution.
9. SANITIZE! Add a sanitizer to the regenerant tank brine well following the dosage recommendations specified by the media manufacturer. Press and hold the REGEN button for three seconds to begin regeneration. Allow the system to complete the regeneration automatically. The system will now be sanitized and producing treated water. Be sure to check for local codes which may also specify sanitization methods.

System without a Regenerant Tank

1. Press and hold the REGEN button for three seconds until the drive motor starts. Press the REGEN button to advance the unit to the backwash cycle. Wait until the motor stops and the backwash time begins to count down.
2. Open the inlet water supply valve very slowly allowing water to fill the tank in order to expel air. CAUTION: If the water flows too rapidly, there will be a loss of media out of the drain.
3. When the water is flowing steadily to the drain without the presence of air, fully open the water supply inlet valve.
4. Press the REGEN button again to advance to the rinse position and allow water to run to drain for 2 to 3 minutes or until the drain runs clear.
5. Press the REGEN button to advance to the service position.
6. SANITIZE! Add a sanitizer to the media following the dosage recommendations specified by the media manufacturer. Be sure to check for local codes which may also specify sanitization methods.

Service Instructions

Drive Assembly

Disassembly and Inspection:

Remove the valve cover to access the drive assembly.

The drive bracket must be removed to access the drive cap assembly and pistons or the drive gear cover. It is not necessary to remove the PC board from the drive bracket to remove the drive bracket. Disconnect the power source plug (4-pin, black cable) from the PC board prior to disconnecting any other plugs from the PC board. Disconnect and MAV/ AUX drive motors (2-pin, black cable) from the PC board. Disconnect the water meter plug (3-pin, gray cable), located on the far right side of the PC board. Unweave the wires from the side holders. Two tabs on the top of the drive backplate hold the drive bracket in place. Simultaneously lift the two tabs and gently ease the top of the drive bracket towards your body. The lower edge of the drive bracket has two notches that rest on the drive backplate. Lift up and outward on the drive bracket to disengage the notches.

To inspect the drive reduction gears, the drive gear cover needs to be removed. The drive gear cover is held in place on the drive bracket by three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off of the pegs in the cover. Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. Move the spring clip loop to the right and hold. Rotate the motor at least a 1/4 turn in either direction before gently pulling on the wire connectors to remove the motor. Pulling directly on the wires without rotating the motor may break the wires off the motor. Visually inspect the motor for free spinning and remaining brush life (visible through slots on the side of the motor). Check the pinion gear for endplay. If the pinion gear is pushed tight against the motor housing, eliminating endplay, slide it away from the housing so the end of the shaft is flush with the end of the gear.

The PC board can be removed separately from the drive bracket but it is not recommended. Do not attempt to remove the display panel from the PC board. Handle the board by the edges. To remove the PC board from the drive bracket, unplug the power, water meter, and motor plugs from the PC board. Lift the middle latch along the top of the drive bracket while pulling outward on the top of the PC board. The drive bracket has two plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45 degrees from the drive bracket it can be lifted off of these pins. To reinstall the PC board, position the lower edge of the PC board so that the holes in the PC board line up with the plastic pins. Push the top of the PC board towards the valve until it snaps under the middle latch. Weave the power and water meter wires into the holders and reconnect the motor, water meter, and power plugs.

Reassembly:

If the drive gear cover was removed, reinstall it with the large clip orientated towards the bottom. If all three clips are outside of the gear shroud on the drive bracket, the drive gear cover slips easily into place.

To reinstall the drive bracket, seat the bottom of the drive bracket so the notches are engaged at the bottom of the drive backplate. Push the top of the drive bracket towards the two latches. The drive bracket may have to be lifted slightly to let the threaded piston rod pass through the hole in the drive bracket. Maintain a slight engaging force on top of the drive bracket while deflecting the bracket slightly to the left by pressing on the side of the upper right corner. This helps the drive gears mesh with the drive cap assembly. The drive bracket is properly seated when it snaps under the latches on the drive backplate. If resistance is felt before latching, then either the notches are not fully engaged, the piston rod is not in the hole, the wires are jammed between the drive bracket and drive backplate, or the gear is not engaging the drive cap assembly.

Replace the motor if necessary. Do not lubricate the motor or the gears. To reinstall the motor, move the spring clip loop to the right and hold. Gently turn the motor while inserting so that the gear on the motor meshes with the gears

under the drive gear cover. Release the spring clip loop and continue to rotate the motor until the motor housing engages the small plastic bulge inside the drive bracket motor retainer. Reconnect the motor plug to the two-pronged jack on the lower left-hand side of the PC board. If the motor will not easily engage with the drive gear when reinstalling, lift and slightly rotate the motor before reinserting. Reconnect the power plug.

Replace the valve cover. After completing any valve maintenance, press and hold the NEXT and REGEN buttons for three seconds or unplug the power source jack (black wire) and plug it back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version, and then reset the valve to the service position.

Drive Cap Assembly

Disassembly of 1.5 inch Valves

Turn off the supply water and relieve the system pressure. The drive assembly must be removed to access the drive cap assembly. The drive cap assembly must be removed to access the piston(s). The drive cap assembly is threaded into the control valve body and seals with an o-ring. To remove the drive cap assembly, use the special plastic wrench (LC-V3193-02 Figure 1) or insert a 0.25 to 0.5 inch flat-blade screwdriver into one of the slots around the top two inches of the drive cap assembly so it engages the notches molded into the drive backplate around the top two inches of the piston cavity (see Figure 2). The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counterclockwise. Once loosened, unscrew the drive cap assembly by hand and pull straight out.

Figure 1

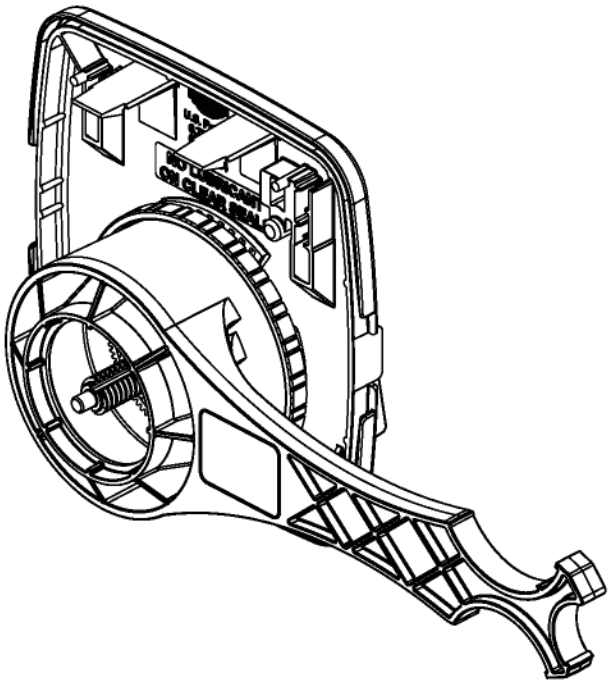
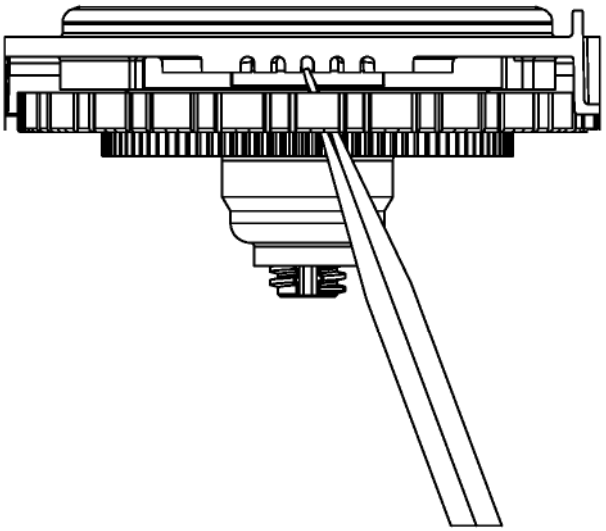


Figure 2



Disassembly of 2 inch Valves

After removing the bracket assembly, the drive backplate can be removed by squeezing the two locking tabs (located at 3 and 9 o-clock around the white gear) and rotating the backplate counterclockwise. The (4) 1/4-20 screws can then be removed and the drive cap pulled straight back out of the valve. Turning the main gear counterclockwise drives the piston in and may aid in pushing out the cap.

Inspection

The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod, and various other parts that should not be disassembled in the field. Visually inspect the drive cap for damage and free operation of the gear and threaded rod. The only replaceable part on the drive cap assembly is the o-ring.

Main Piston and Regenerant Piston

Disassembly and Inspection

Attached to the drive cap assembly is the main piston and depending on the configuration, a regenerant piston. The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by unsnapping it from its disassembly latch. To remove the main downflow piston, fully extend the piston rod and then unsnap the main piston from its latch by pressing on the side with the number. Chemically clean the piston in dilute sodium bisulfite or vinegar, or replace them. The main piston is teflon coated. If the teflon coating is abraded, replace the main piston.

Reassembly

Reattach the main piston to the drive cap assembly. Reattach the regenerant piston (if needed) to the main piston. Reinsert the drive cap assembly and piston into the spacer stack assembly and hand tighten the drive cap assembly. Continue to tighten the drive cap assembly until the backside of the drive cap bottoms out flush with the casting or the black o-ring on the spacer stack assembly is no longer visible through the drain port. Excessive force can break the notches molded into the drive backplate. Make certain that the main drive gear still turns freely. The exact position of the piston is not important as long as the main drive gear turns freely.

Reattach the drive assembly to the control valve and connect all plugs. After completing any valve maintenance, press and hold the NEXT and REGEN buttons for three seconds or unplug the power source jack (4-pin, black cable) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version, and then reset the valve to the service position.

Spacer Stack Assembly

Disassembly and Inspection

To access the spacer stack assembly, remove the drive assembly, drive cap assembly, and piston. The spacer stack assembly can then be pulled straight out. Inspect the black o-rings and inner seals for wear or damage. Replace the entire stack if necessary. Do not disassemble the stack.

The spacer stack assembly may be chemically cleaned (dilute sodium bisulfite or vinegar) or wiped with a soft cloth.

Reassembly

The spacer stack assembly can be pushed into the control valve body bore by hand. The assembly is properly seated when at least four threads are exposed (approximately 5/8 inch). Do not force the spacer stack assembly into position. The control valve body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

Reattach the drive cap assembly, piston(s), and the drive assembly.

After completing any valve maintenance, press and hold the NEXT and REGEN buttons for three seconds or unplug the power source jack (4-pin, black cable) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version, and then reset the valve to the service position.

Injector Cap, Screen, Injector Plug, and Injector

Disassembly and Inspection

The injector can be accessed at the back of the valve by removing the threaded injector cap. The cap is removed by using the LC-V3193-02 service wrench (Figure 1).

Once the cap is removed:

- 1.5 inch valves can use the bottom threaded edge of the injector cap at an angle to pry out the injector.
- 2 inch valves can use the open end of the LC-V3193-02 service wrench (Figure 1) at an angle to pry out the injector.

An injector consists of a throat and nozzle. It can be chemically cleaned with vinegar or dilute sodium bisulfate. The holes can be blown out by air. Sharp objects, which can score the plastic, should not be used to clean the injector. Scoring the the injector or increasing the diameter of the injector hole could change the operating parameters of the injector.

If the 1.5 inch valve does not use a regenerant, the injector plug should not need to be cleaned. Just verify that it has both o-rings on the plug and that it is fully seated.

Reassembly

Press the injector into its bore hole and press until it is seated all the way down. Replace the injector cap.

Refill Flow Control Assembly or Refill Port Plug

Disassembly and Inspection

To clean or replace the refill flow control, pull out the locking clip (1.5 inch valves) or remove the nut (2 inch valves) and then pull the fitting straight out. Remove the flow control retainer. The flow control can be removed by prying upward through the side slots of the retainer with a small flat-blade screwdriver, being careful not to mar the plastic seat.

Chemically clean the flow control or the flow control retainer using dilute sodium bisulfite or vinegar. Do not clean with abrasive methods. If necessary, replace the flow control, o-ring on the flow control retainer, or the o-ring on the fitting.

Reassembly

Insert the flow control into its seat, confirming correct flow control orientation. Reseat the flow control retainer and reassemble the fitting (see diagrams on pages 25 and 26).

Do not use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicone lubricant may be used on the o-ring on the elbow or the retainer, but not on the flow control or its seat.

Refill port plugs should not need to be serviced. O-rings may be replaced if necessary.

Regenerant Body

Disassembly and Inspection

Turn off the supply water and relieve system pressure.

Typically, the regenerant body would only be removed for servicing of the injector screen (not applicable to 2 inch valves). Removing the injector cap can allow much of the contained water to be drained before removing the body. Remove the (4) 1/4-20 screws. The regenerant body can then be pulled straight back off the main body taking care to not lose the o-ring between the regenerant and main body. The injector screen is installed inside the plastic body behind the injector feed tube. The injector screen can be pushed out from the half round hole feature behind the injector cap.

Reassembly

Insert the injector feed and draw tubes into the main body, bottoming them out in their bores. Install the injector screen in the 1.5 inch regenerant body, the small hole in the end of the screen will nest around a feature in the plastic body allowing the large end to be flush with a step in the tube bore. Confirm the placement of the o-ring on the flange of the plastic body then press the regenerant body straight onto the main body, assuring the o-rings

engages the bore in the main body. Install and tighten the (4) 1/4-20 screws. The lower injector o-ring engages the ID of the injector tube which may push the injector out of position when reinstalling the regenerant body. Verify the injector is seated all the way down into its bore, then reinstall the injector cap.

Drain Line Flow Control (DLFC)

Disassembly and Inspection

Depending on the flow control installed on the unit, remove either the red plastic retaining clip (plastic flow control) or the four screws (stainless steel flow control) to expose the flow control and retainer. The flow controls can be removed by flexing the washer with a small flat-blade screwdriver being careful not to mar the plastic seat. The flow control and retainer may be chemically cleaned using dilute sodium bisulfite or vinegar, do not clean with abrasive methods.

Reassembly

Insert the flow washers back into their respective bores, confirming correct flow control orientation (see diagram on page 29). Place back into the housing and reassemble the housing. Do not use Vasoline, oils, or other unacceptable lubricants on the o-rings. A silicone lubricant may be used on the o-ring of the elbow or the retainer, but not on the flow control or its seat.

Water Meter

This water meter should NOT be used as the primary monitoring device for critical or health effect applications.

Operating Pressure: 20 psi minimum / 125 psi maximum
Operating Temperature: 40°F minimum / 110°F maximum

Be sure the proper meter size is programmed in the software.

Disassembly and Inspection

Turn the bypass for the system on and relieve the pressure on the system before removing the meter. Press downward on the remote meter assembly to relieve tension on the meter retaining clip. Remove the meter retaining clip and take the meter assembly out of the meter housing. Remove the bend from the two exposed tips of the turbine clip and remove the turbine clip. Service or replace the turbine assembly.

Reassembly

Place the turbine assembly back on the turbine shaft. Insert the turbine clip and re-bend the exposed ends of the clip. The turbine assembly has a groove to line up with the turbine clip. Insert the meter assembly back into the meter housing. Re-install the meter retaining clip as shown on page 30 (or the U-shaped WS2 meter clip LC-V3223). Open the bypass for the system slowly to bring it back into service and check to be sure there are no water leaks.

Piston Style Motorized Alternating Valve (MAV)

For 1.5 inch Valve: LC-V3071, LC-V3071BSPT
For 2 inch Valve: LC-V3076, LC-V3076BSPT

Operating Pressure: 20 psi minimum / 125 psi maximum
Operating Temperature: 40°F minimum / 110°F maximum

Service or Installation of Motor

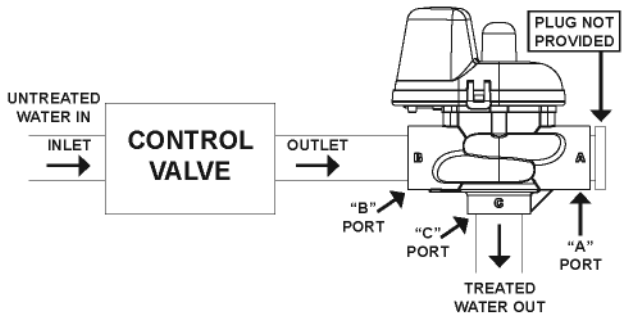
Do not lubricate the motor or the gears. To install the motor, move the spring clip loop to the right and hold. Gently turn the motor while inserting so that the gear on the motor meshes with the gears under the drive gear cover. If the motor will not easily engage with the drive gears when installing, lift and slightly rotate the motor before inserting. Release the spring clip loop and continue to rotate the motor until the wires are horizontal and the motor housing engages the small plastic bulge inside the drive bracket motor retainer. Reconnect the motor plug to the two-pronged jack on the PC board labeled DRIVE.

Up to two additional cables can be brought through the backplate. Locate the round strain relief knock-out on the inside of the backplate. Use a punch and hammer to remove the knock-out. One or both tabs at the bottom of the strain relief feature may be broken out with a needle-nose pliers. The additional cables may be brought through the knock-out hole, and connected to the PC board. After the cables are connected to the PC board, weave the cables through the strain relief feature, and then use Strain Relief Cover Kit (LC-V3805) to cover the cables in the strain relief. To help prevent damage to the cables, allow nearby solder joints to cool, or solvent cement joints to cure.

- For twin tank operation, the 8 foot interconnect cable must be threaded through the backplates and connected to the three-pin connector labeled INTERCONNECT CABLE on both the ALTA and ALTb control valves. The 8 foot interconnect cable is not used for No Hard Water Bypass (NHBP) or Separate Source (SEPS) operation. NOTE: It is possible to use the Motorized Alternating Valve on controls with individual meters with some international or custom PC boards. When using the Motorized Alternating Valve with two meters, it is necessary to disconnect or cut the left wire on the interconnect cable. This is the wire closest to the center cut-out on the PC board.
- The 8 foot alternator valve motor cable must be threaded through the backplate and connected to the two-pin connector labeled DRIVE on the control valve PC board. (For twin tank operation connect to the unit set as ALTA.)
- The 15 foot water meter cable must be threaded through the backplate and connected to the three-pin connection labeled METER on the control valve PC board. NOTE: A meter must be used for twin tank operation. Meters are recommended but not required for NHBP or SEPS operation. If using the Motorized Alternating Valve with a meter on each control, it is necessary to connect each meter to the PC board.
- The 15 foot AC adapter or power cable must be threaded through the backplate of all control valves. The AC adapter should be installed to a properly grounded (not switched) outlet.

No Hard Water Bypass (NHBP)

The MAV will be driven closed before the first regeneration cycle that is not FILL or SOFTENING or FILTERING, and be driven open after the last regeneration cycle that is not FILL. If the control valve enters into an error state during regeneration mode, the MAV will remain in its current state until the error is corrected and reset.

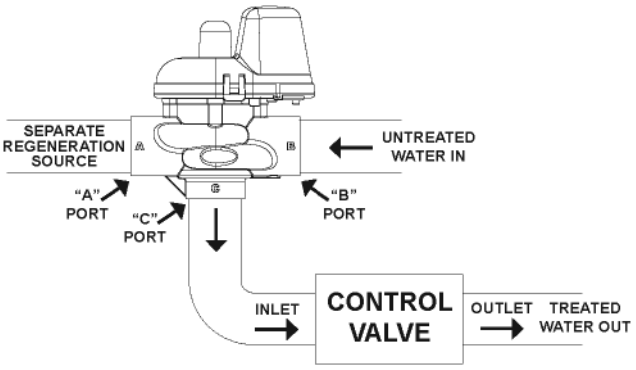


CAUTION: No Hard Water Bypass installation prevents water from entering the downstream plumbing. If a downstream plumbing device or local code requires an uninterrupted water supply, design the installation to accommodate.

Separate Source Regeneration (SEPS)

The MAV will be driven closed (i.e. let water flow from “A” port to “C” port) before the first regeneration cycle, and be driven open (i.e. let water flow from “B” port to “C” port) after the last regeneration cycle. If the control valve enters into an error during regeneration mode, the MAV will remain in its current state until the error is corrected and reset.

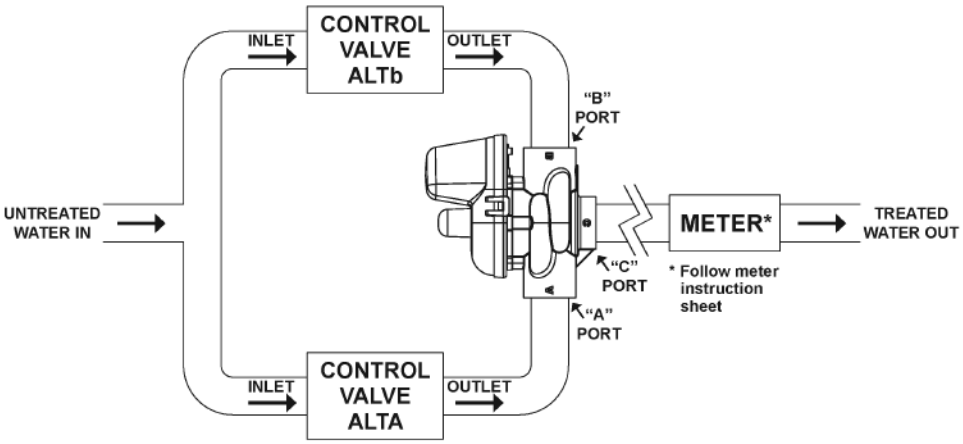
Note: If there is a treated water demand during regeneration, separate source water will be used.



Twin Tank Alternator (ALTA, ALTb)

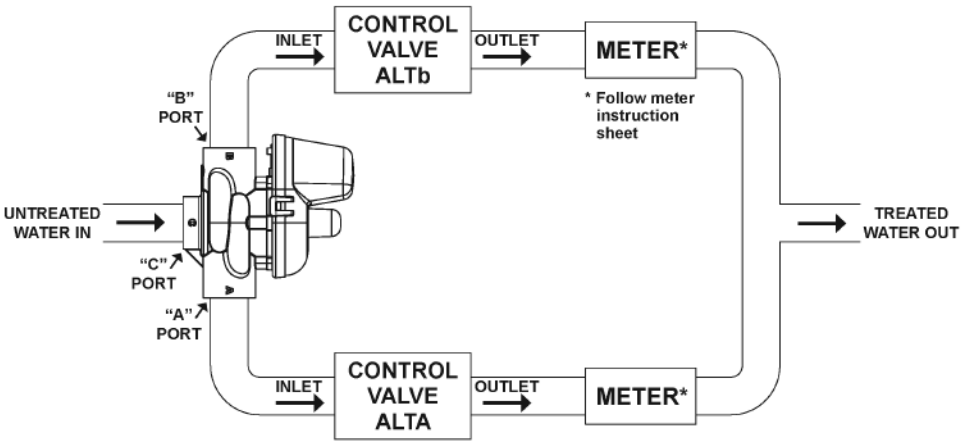
If the control valve is in an error state during regeneration mode, the MAV will close the “B” port and keep open the “A” port until the error is corrected and reset.

REGENERATION WITH UNTREATED (HARD) WATER

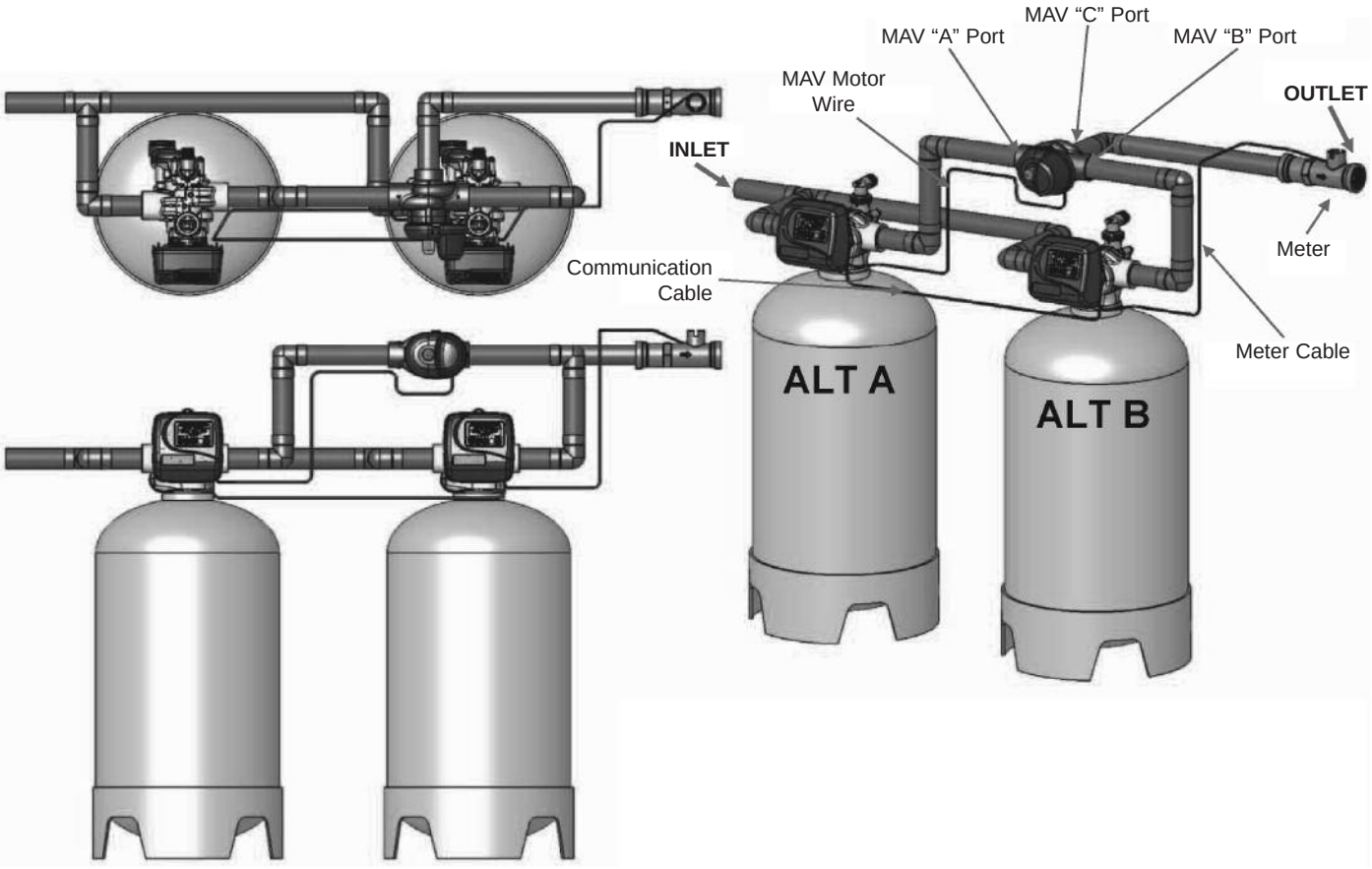


REGENERATION WITH TREATED (SOFT) WATER

NOTE: WS2 valve can NOT be used in this type of installation.



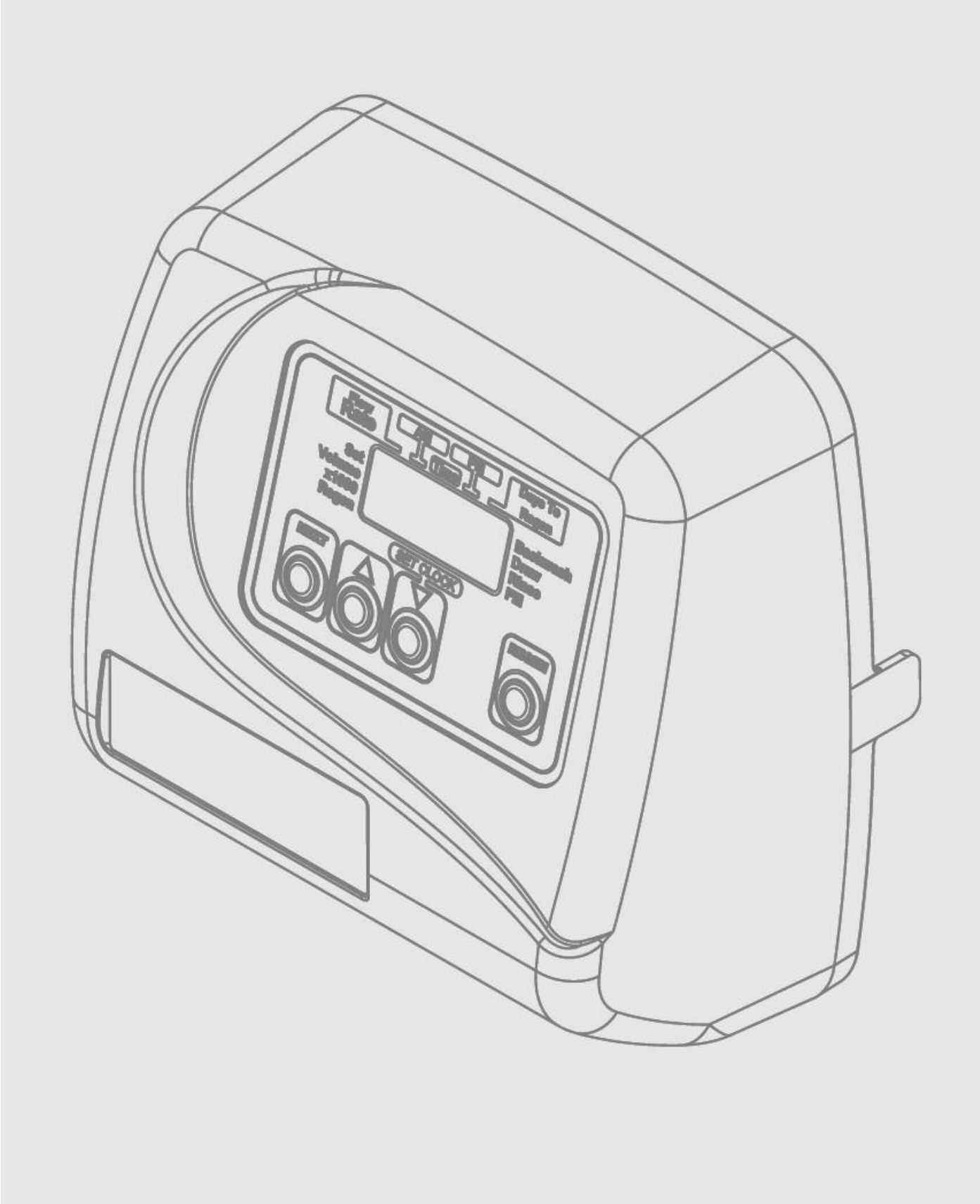
Typical Twin Tank Alternating System Configuration



LC-V3076 MAV and WS2 valves shown. Diagram is typical for WS1.5, WS2, or WS2QC valves using LC-V3071 or LC-V3076 piston style MAVs and regenerating with untreated (hard) water.

NOTE: These drawings are for reference only. Installer needs to install inlet and outlet isolation ball valves for each control valve and a three valve bypass for the system. It is recommended to have some unions in the plumbing. Meter should be mounted horizontally or in a downflow vertical position to reduce bearing wear.

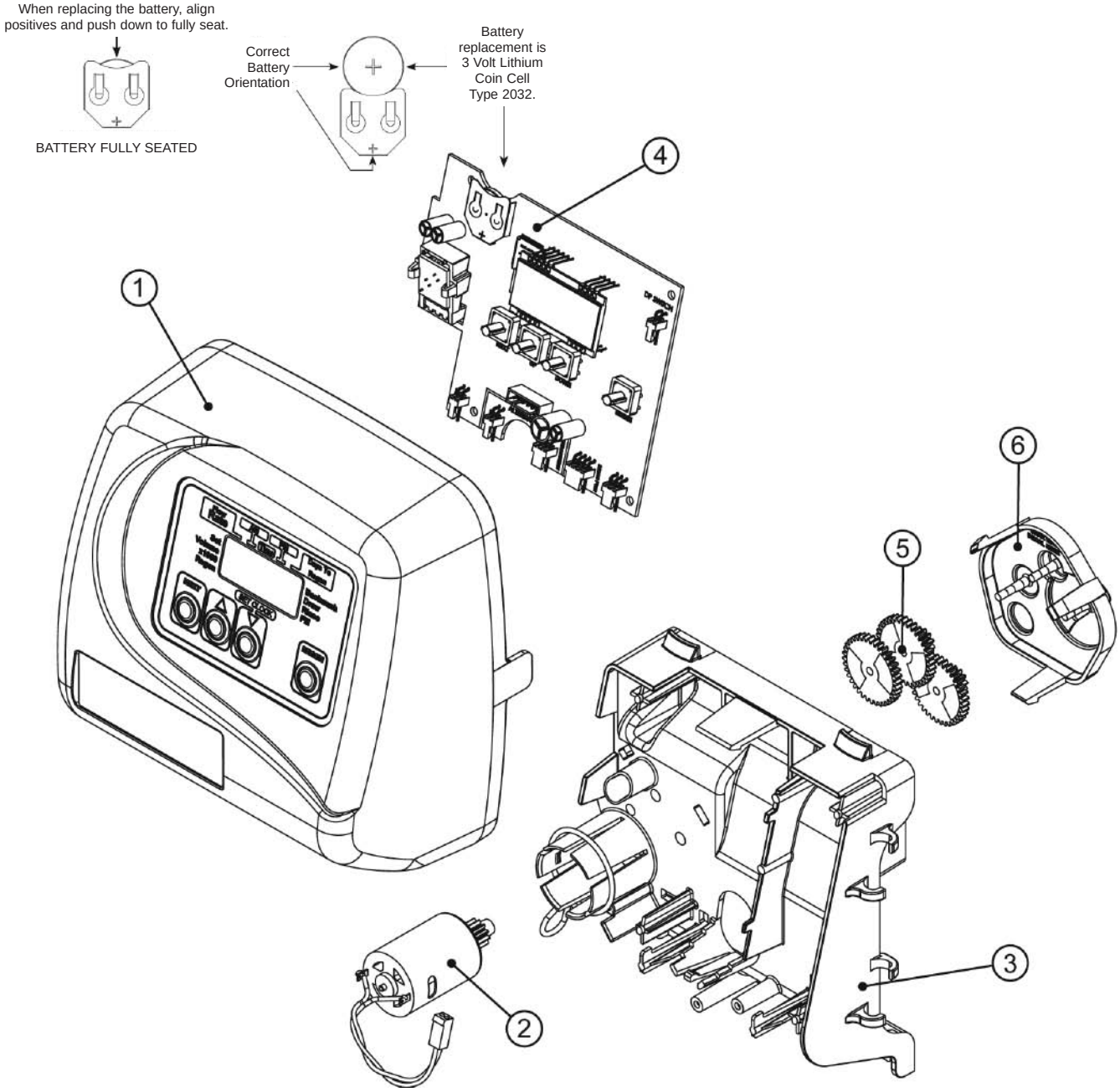
Drawings and Part Numbers



Tech-EE Front Cover and Drive Assembly

Drawing No.	Part No.	Description	Quantity
1	LC-V3175EE-01	WS1EE Front Cover Assembly	1
2	LC-V3107-01	WS1 Motor	1
3	LC-V3106-01	WS1 Drive Bracket and Spring Clip	1
4	LC-V3408EE-03BOARD	WS1EE thru 2L/2EE PC Board with Battery	1
5	LC-V3110	WS1 Drive Reducing Gear 12 x 36	3
6	LC-V3109	WS1 Drive Gear Cover	1
Not Shown	LC-V3186	WS1 AC Adapter 120V-12V	1
	LC-V3186-01	WS1 AC Adapter Cord Only 15 Feet	1
	LC-V3178	WS1 Drive Back Plate	1

AC Adapter	**US**	**International**
Supply Voltage	120 VAC	230 VAC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 VAC	12 VAC
Output Current	500 mA	500 mA

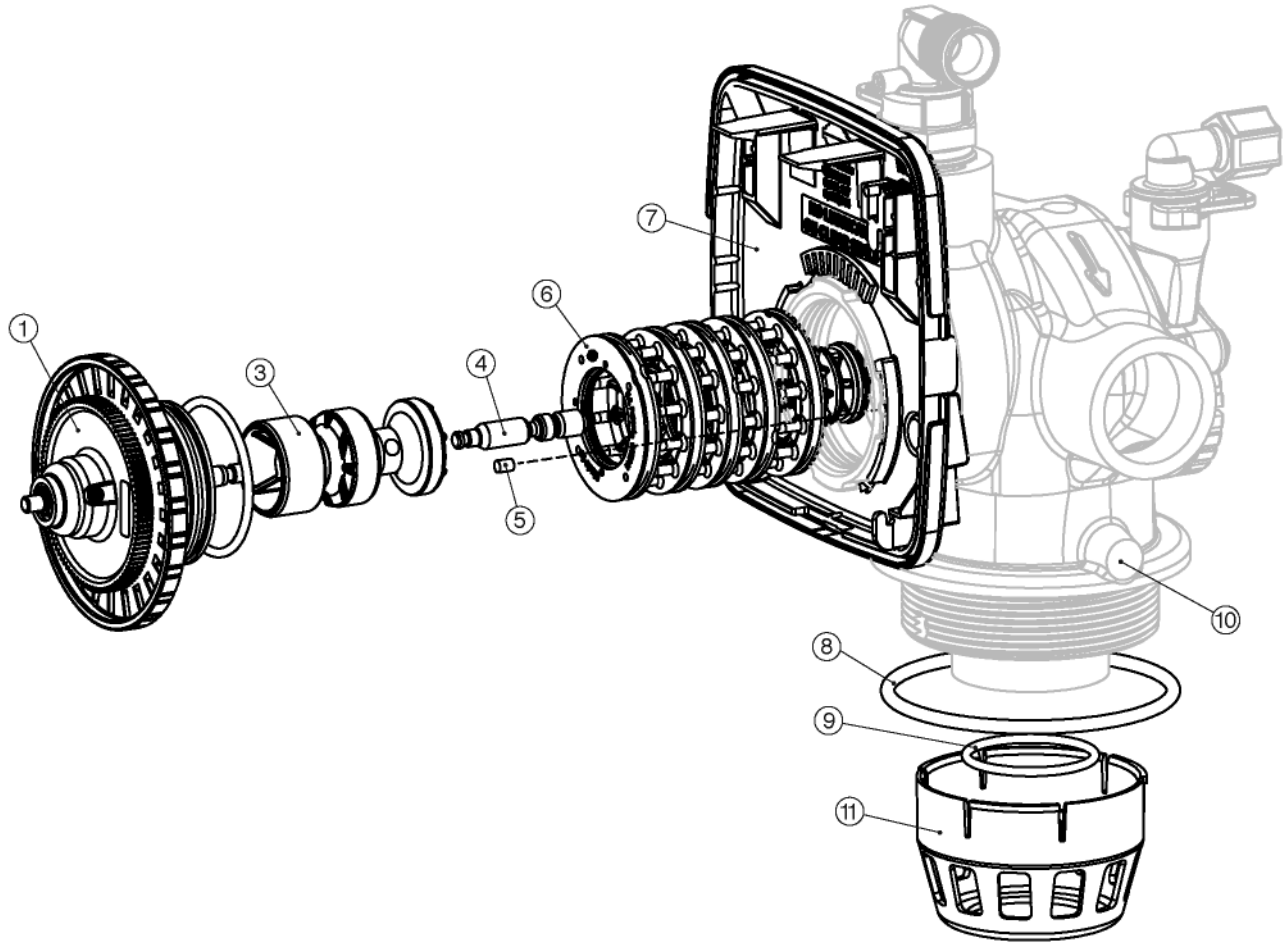


WS1.5 Drive Cap Assembly, Downflow Piston, Regenerant Piston, Spacer Stack Assembly, and Main Body

Drawing No.	Part No.	Description	Quantity
1	LC-V3004	WS1 Drive Cap Assembly	1
2	LC-V3135	O-ring 228	1
3	LC-V3407	WS1.25/1.5 Piston Downflow Assembly	1
4	LC-V3174 *	WS1 Regenerant Piston	1
5	LC-V3423	WS1.5 Backplate Dowel	1
6	LC-V3430	WS1.5 Spacer Stack Assembly	1
7	LC-V3178	WS1 Drive Backplate	1
8	LC-V3419	O-ring 347	1
9	LC-V3641	O-ring 225 for Valve Bodies with NPT Threads	1
	LC-V3441	O-ring 226 for Valve Bodies with BSPT Threads	1
10	LC-V3950-01	WS1.5 NPT Valve Body with 0.25 inch NPT Test Port Plug	1
	LC-V3950BSPT-01 **	WS1.5 BSPT Valve Body with 0.25 inch BSPT Test Port Plug	1
11	LC-D1300	Top Baffle Diffuser 1.5in/50mm	1
Not Shown	LC-V3468	Test Port Plug 1/4 NPT	2
	LC-V3465	Test Port Plug 1/4 BSPT	2

* LC-V3174 regenerant piston not used for backwash only valves. LC-V3010-15Z injector plug and LC-V3195-01 refill port plug assembly must be used for backwash only valves.

** LC-V3950BSPT-01 has BSPT threads on the inlet and outlet ports, and NPT threads on the drain port.

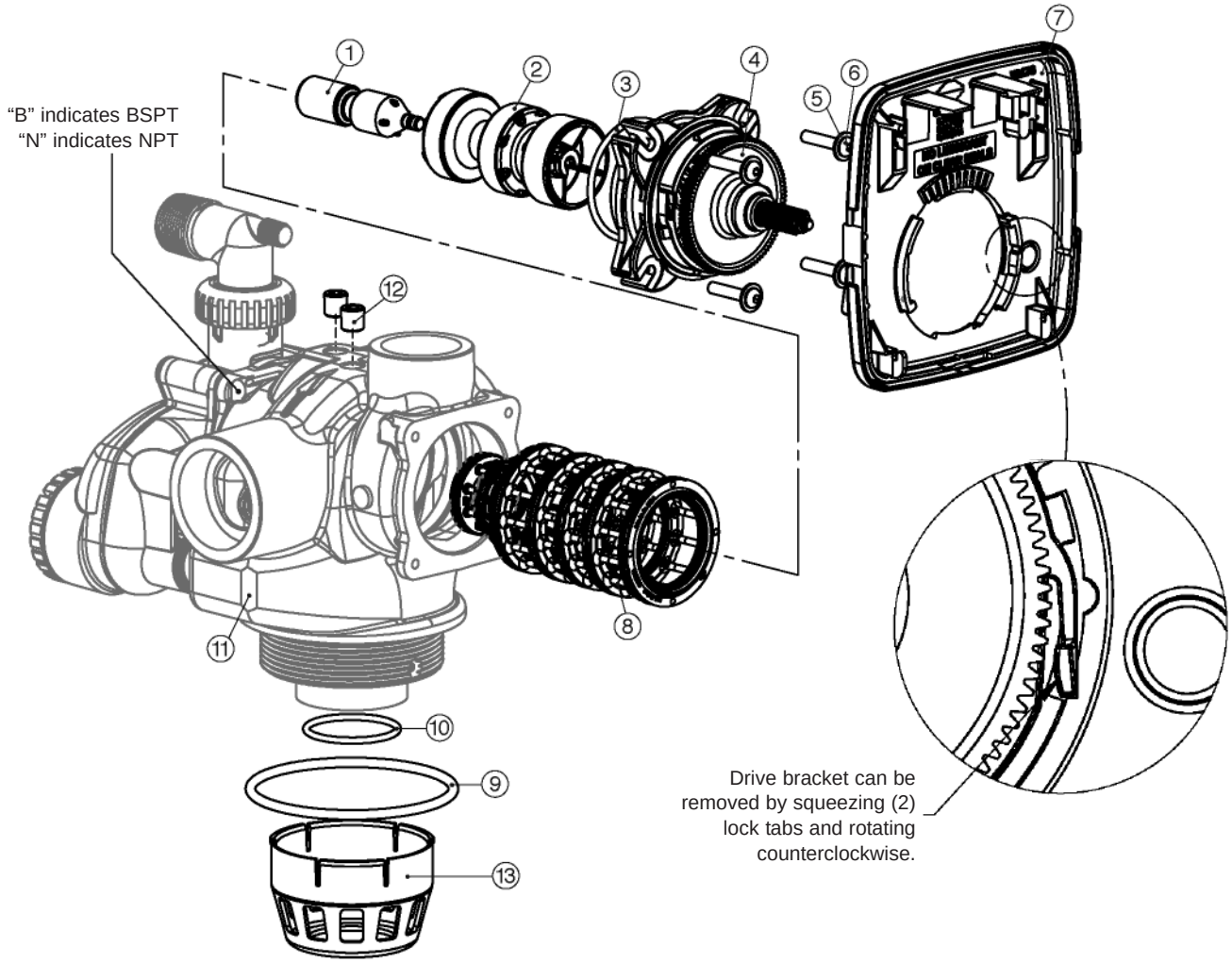


WS2 Drive Cap Assembly, Downflow Piston, Regenerant Piston, Spacer Stack Assembly, and Main Body

Drawing No.	Part No.	Description	Quantity
1	LC-V3726 *	WS2 Brine Piston Assembly	1
2	LC-V3725	WS2 Piston Downflow Assembly	1
3	LC-V3452	O-ring 230	1
4	LC-V3728	WS2 Drive Cap Assembly	1
5	LC-V3724	Washer Flat SS 1/4	4
6	LC-V3642	Bolt BHCS SS 1/4-20 x 1.25	4
7	LC-V3178	WS1 Drive Backplate	1
8	LC-V3729	WS2 Stack Assembly	1
9	LC-V3419	O-ring 347	
10	LC-V3641	O-ring 225 for Valve Bodies with NPT Threads	1
	LC-V3441	O-ring 226 for Valve Bodies with BSPT Threads	1
11	LC-V3700-01	WS2 NPT Valve Body	1
	LC-V3700BSPT-01 **	WS2 BSPT Valve Body	1
12	LC-V3468	WS2H Plug 1/4 Hex NPT	2
	LC-V3465	WS2H Plug 1/4 Hex BSPT	2
13	LC-D1300	Top Baffle Diffuser 1.5in/50mm	1

* LC-V3726 brine piston is used for backwash only valves.

** LC-V3700BSPT-01 valve body has BSPT threads on the inlet and outlet ports, and NPT threads on the drain port.



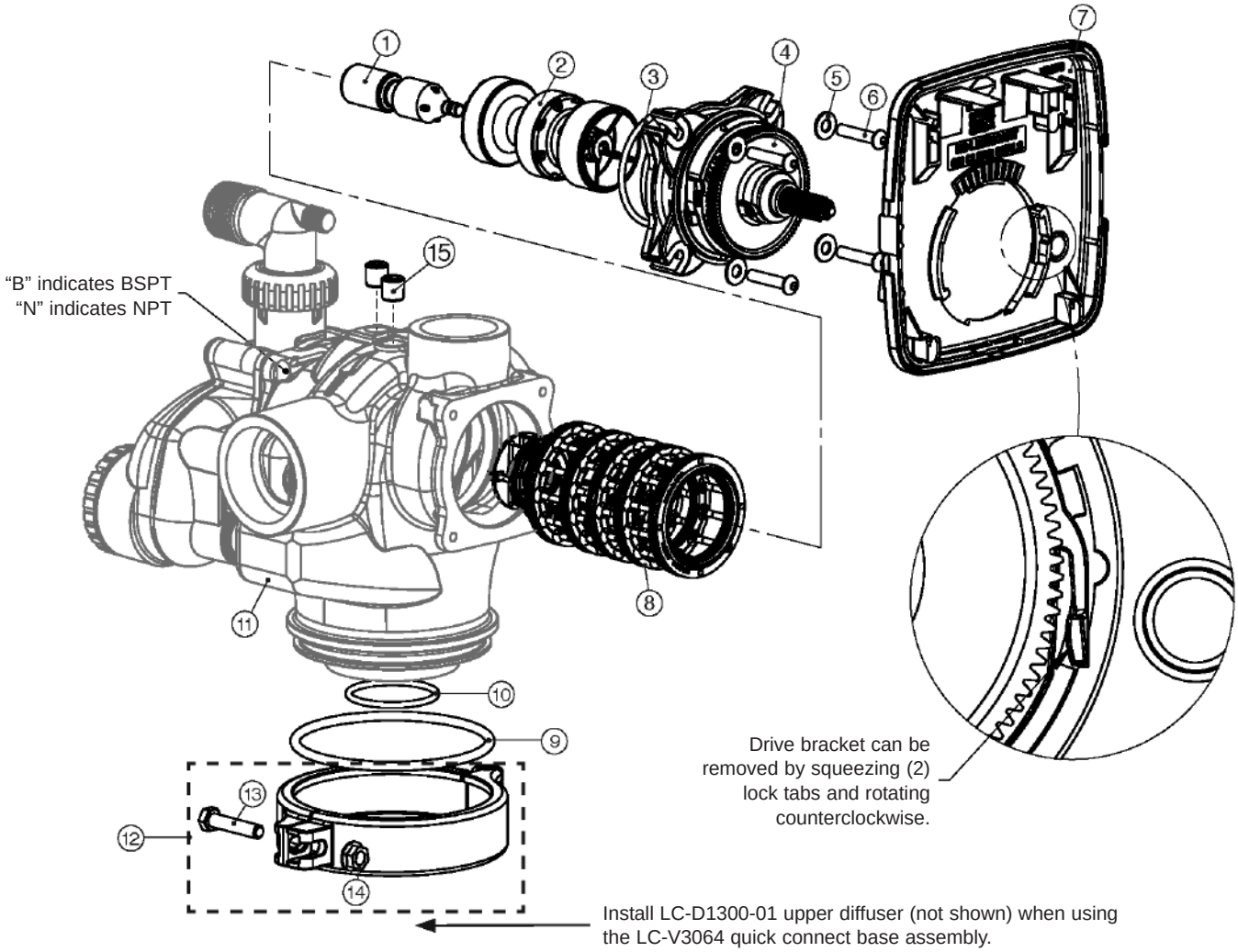
WS2QC Drive Cap Assembly, Downflow Piston, Regenerant Piston, Spacer Stack Assembly, and Main Body

Drawing No.	Part No.	Description	Quantity
1	LC-V3726 *	WS2 Brine Piston Assembly	1
2	LC-V3725	WS2 Piston Downflow Assembly	1
3	LC-V3452	O-ring 230	1
4	LC-V3728	WS2 Drive Cap Assembly	1
5	LC-V3724	Washer Flat SS 1/4	4
6	LC-V3642	Bolt BHCS SS 1/4-20 x 1.25	4
7	LC-V3178	WS1 Drive Backplate	1
8	LC-V3729	WS2 Stack Assembly	1
9	LC-V3279	O-ring 346	1
10	LC-V3280	O-ring 332 for Valve Bodies with NPT Threads	1
	LC-V3452	O-ring 230 for Valve Bodies with BSPT Threads	1
11	LC-V3737-01	WS2QC NPT Valve Body	1
	LC-V3737BSPT-01 **	WS2QC BSPT Valve Body	1
12	LC-V3054 ***	WS2H 4 inch Base Clamp Assembly	1
13	LC-V3276	WS2H Bolt Hex 5/16-18 x 1.75	1
14	LC-V3269	WS2H Nut 5/16-18 SS Hex	1
15	LC-V3468	WS2H Plug 1/4 Hex NPT	2
	LC-V3465	WS2H Plug 1/4 Hex BSPT	2
Not Shown	LC-D1300-01	Top Baffle Diffuser 2in/63mm	1

* LC-V3726 brine piston is used for backwash only valves.

** LC-V3737BSPT-01 valve body has BSPT threads on the inlet and outlet ports, and NPT threads on the drain port.

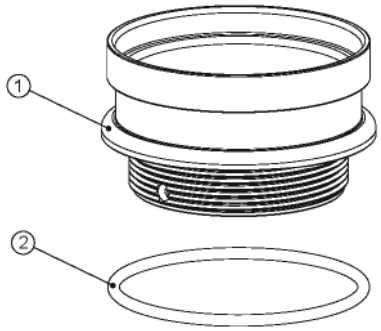
*** LC-V3054 assembly includes (1) LC-V3276 bolt and (1) LC-V3269 nut.



2 inch QC Base Assemblies

Part No: LC-V3064
Description: 4 inch Base Assembly for 2 inch QC Valve

Drawing No.	Part No.	Description	Qty.
1	LC-V3202-01	4 inch Base	1
2	LC-V3419	O-ring 347	1

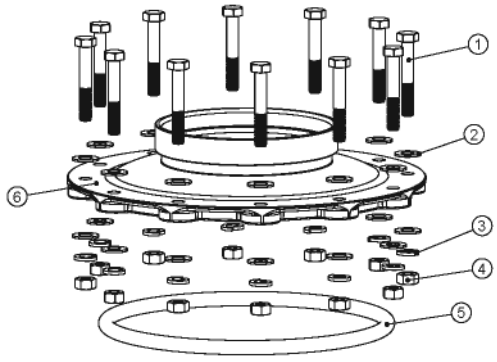


Part No: LC-V3260-02
Description: 2 inch Side Mount Base NPT Assembly for 2 inch QC Valve

Drawing No.	Part No.	Description	Qty.
--	LC-V3260-02	Side Mount Base NPT	1

Part No: LC-V3055
Description: 6 inch Flange Base Assembly for 2 inch QC Valve

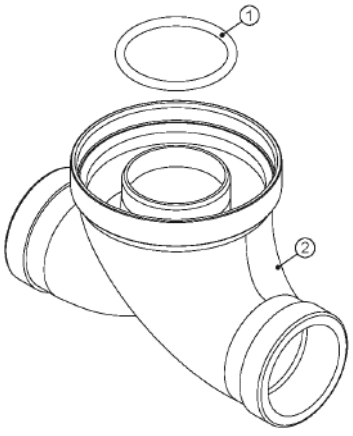
Drawing No.	Part No.	Description	Qty.
1	LC-V3444	Screw SS Hex 5/16-18 x 2	12
2	LC-V3293	Washer SS Flat 5/16	24
3	LC-V3445	Washer SS Split Lock 5/16	12
4	LC-V3447	Nut SS Hex 5/16-8	12
5	LC-COR60FL	O-ring 6 Flange Adapter	1
6	LC-V3261-01	Flange Base	1



Part No. LC-V3260BSPT-02
Description: 2 inch Side Mount Base BSPT Assembly for 2 inch QC Valve

Drawing No.	Part No.	Description	Qty.
1	LC-V3280 *	O-ring 332	1
2	LC-V3260 BSPT-01	Side Mount Base BSPT	1

* When using side mount base with WS2QC BSPT valve, LC-V3280 o-ring 332 is used to replace LC-V3452 o-ring 230. See exploded view of WS2QC valve (page 23, drawing 10) for specific location of distributor pilot o-ring.



WS1.5 Injector Valve Body, Refill Flow Control, and Injector

Drawing No.	Part No.	Description	Quantity
1	LC-V3967	WS1.5 Injector Body Assembly	1
2	LC-V3441	O-ring 226	1
3	LC-V3968 *	WS1.5 Injector Feed Tube Assembly	1
4	LC-V3177-01	WS1 Injector Screen	1
5	LC-V3969 **	WS1.5 Injector Draw Tube Assembly	1
6	LC-V3176	WS1 Injector Cap	1
7	LC-V3152	O-ring 135	1
8	See Page 27	WS1.5 Injector	1
9	LC-V3498 ***	WS1.5 Brine Elbow Assembly with Refill Flow Control 0.5 inch	1
10	LC-V3428 ***	WS1.5 Refill Retainer Assembly (0.5 gpm)	1
11	LC-V3163	O-ring 019	1
12	LC-H4612	Regenerant Elbow with Flow Control	1
13	LC-VJCPG-8PBLK	Compression Nut 0.5 inch Black	1
14	LC-JCP-P-8	Polytube Insert 0.5 inch	1
15	LC-V3182	Refill Flow Control (0.5 gpm)	1
16	LC-H4615	Retaining Clip	1
17	LC-V3724	Washer Flat Stainless Steel 1/4	4
18	LC-V3642	Bolt BHCS Stainless Steel 1/4-20 x 1.25	4
19	LC-V3195-01	Refill Port Plug Assembly	1
20	LC-V3163	O-ring 019	1
21	LC-V3415	WS1.5 BLFC Adapter	1

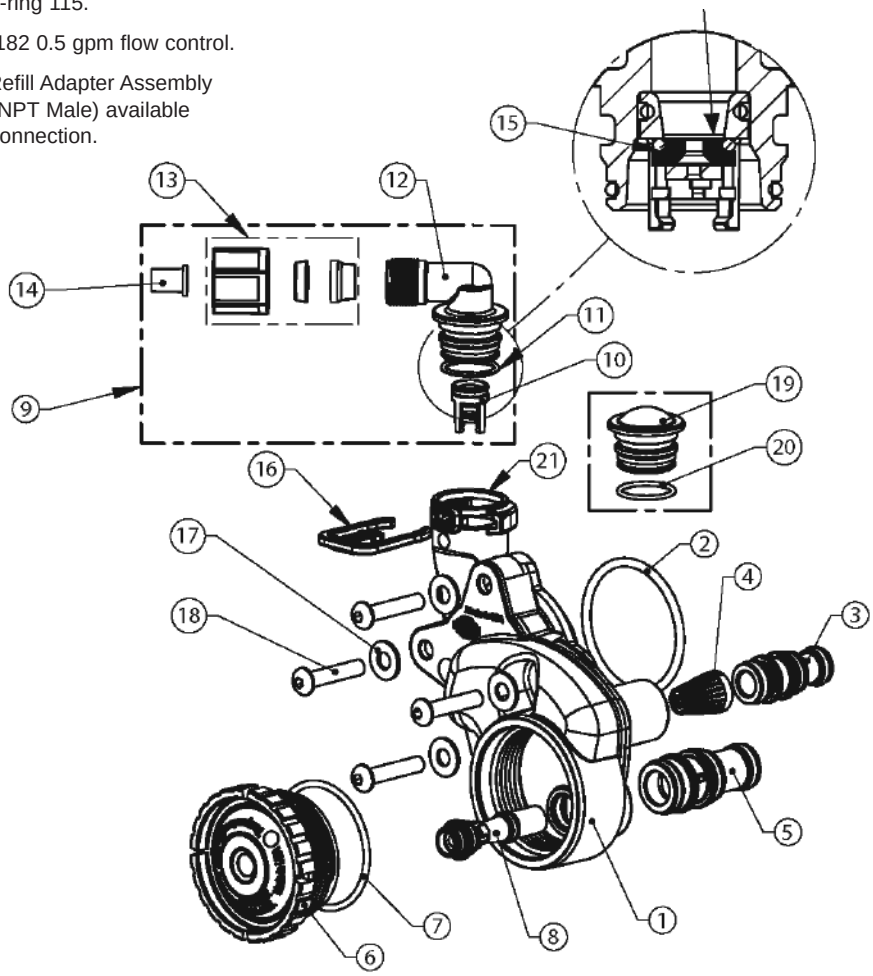
* LC-V3968 injector feed tube contains (1) LC-D1240 o-ring 111 and (2) LC-V3155 o-ring 112.

** LC-V3969 injector draw tube contains (1) LC-V3638 o-ring 113 and (2) LC-V3157 o-ring 115.

*** Contains (1) LC-V3182 0.5 gpm flow control.

NOTE: LC-V3434-01 Refill Adapter Assembly (5/8" O.D. Tube x 3/4" NPT Male) available for 5/8 inch brine line connection.

Proper RFC orientation directs refill water flow toward the washer face with radius and text.



WS2 Injector Valve Body, Refill Flow Control, and Injector

Drawing No.	Part No.	Description	Quantity
1	LC-V3477	WS2H Injector Cap	1
2	LC-V3152	O-ring 135	1
3	LC-V3727	WS2 Injector Body Assembly	1
4	See Page 27	WS2/2QC Injector Assembly	1
5	LC-V3731	WS2 Injector Draw Tube Down Assembly	1
6	LC-V3730	WS2 Injector Feed Tube Down Assembly	1
7	LC-V3315	O-ring 231	1
8	LC-V3724	Washer Flat Stainless Steel 1/4	4
9	LC-V3643	Bolt BHCS Stainless Steel 1/4-20 x 2.25	4
10	LC-V3162-022 *	WS1 DLFC 022 for 3/4 inch Fitting	1
11	LC-V3231	WS2 Refill Flow Control Retainer	1
12	LC-V3277	O-ring 211	1
13	LC-V3105	O-ring 215	1
14	LC-V3150	WS1 Split Ring	1
15	LC-V3151	WS1 Nut 1 QC	1
16	LC-V3149	WS1 Elbow Fitting 1 PVC Male NPT	1
Not Shown	LC-V3189	WS1 Solvent Elbow Fitting 3/4 & 1 PVC	Optional
	LC-H4915 **	Polytube Fitting Kit 494 BV 1/2	Optional
	LC-V3499	WS2 Fitting Cap 1 Threaded	Optional
	LC-V3797 ***	WS1 Elbow Fitting 1 PVC Male BSPT	BSPT Only

* Any LC-V3162-XXX flow control may be used (see page 29). WS2 valves are shipped with a LC-V3162-022 (2.2 gpm) flow control. Flow control sizes range from 0.7 up to 10 gpm. WS2 valves can only be set for minutes of fill because various sizes of flow controls can be used. To calculate for pounds or kilograms of salt, multiply the minutes of fill by the flow rate of the flow control being used to arrive at the number of gallons of water to be added to the brine tank. Each gallon of water will dissolve approximately three pounds of salt.

** Use of LC-H4915 fitting kit may severely reduce brine draw rates.

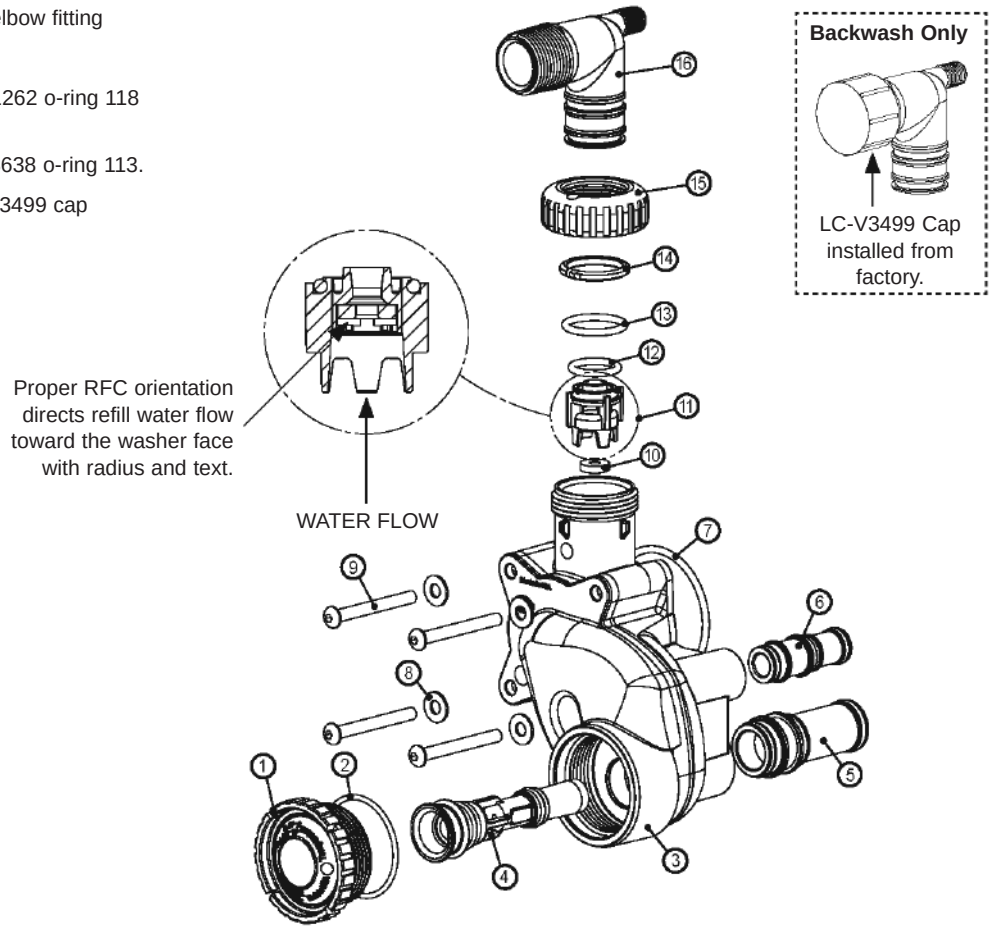
*** BSPT valves include (1) LC-V3797 elbow fitting

NOTES:

LC-V3731 assembly contains (1) LC-D1262 o-ring 118 and (2) LC-V3639 o-ring 119.

LC-V3730 assembly contains (3) LC-V3638 o-ring 113.

Backwash Only valves include (1) LC-V3499 cap but do not include the following parts: LC-V3189, LC-H4915, LC-V3162-022, LC-V3231, LC-V3277.



WS1.5 Injectors

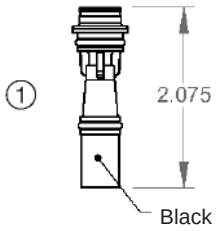
Drawing No.	Part No.	Description	Nozzle Color	Typical Tank Dia.	Quantity
1	LC-V3010-15B	WS1.5 Injector Assembly B	Violet	12 inch	1
1	LC-V3010-15C	WS1.5 Injector Assembly C	Red	13 inch	1
1	LC-V3010-15D	WS1.5 Injector Assembly D	White	14 inch	1
1	LC-V3010-15E	WS1.5 Injector Assembly E	Blue	16 inch	1
1	LC-V3010-15F	WS1.5 Injector Assembly F	Yellow	18 inch	1
1	LC-V3010-15G	WS1.5 Injector Assembly G	Green	21 inch	1
1	LC-V3010-15H	WS1.5 Injector Assembly H	Orange	24 inch	1
1	LC-V3010-15I *	WS1.5 Injector Assembly I	Machined PVC	30 inch	1
2	LC-V3010-15Z	WS1.5 Injector Plug	--	NA	1

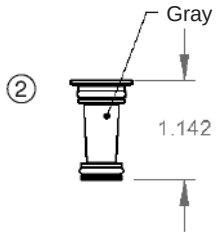
* Injector assembly I requires a LC-V3158-02 drain elbow assembly be installed. Also requires a LC-H7070-36CF-5 or LC-H7070-54CF-5 brine valve, with 5 gpm brine line flow control, 1 inch air check, or 494 brine valve assembly, with a minimum 0.75 inch hard pipe PVC brine line.

LC-V3010-15B through LC-V3010-15H injectors include (1) LC-V3416 o-ring 012 (lower) and (1) LC-V3171 o-ring 013 (upper).

LC-V3010-15I injector includes (2) LC-V3171 o-ring 013 and is for use on WS1.5 valves only..

NOTE: Actual injector size may vary depending on the design and application of the system. The injectors are sized for a typical downflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride. See the WS1.5 injector graphs (page 40) to meet specific applications. Variances in drain and draw line restrictions will effect injector performance.





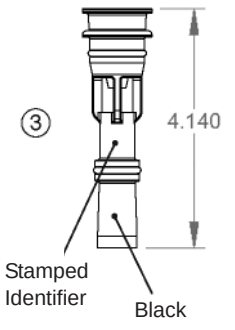
WS2/2QC Injectors

Drawing No.	Part No.	Description	Identifier	Typical Tank Dia.	Quantity
Not Shown	LC-V3010-2R-15B **	WS2 Injector Assembly R with LC-V3010-15B	Violet	12 inch	1
Not Shown	LC-V3010-2S-15C **	WS2 Injector Assembly R with LC-V3010-15B	Red	13 inch	1
Not Shown	LC-V3010-2T-15D **	WS2 Injector Assembly R with LC-V3010-15B	White	14 inch	1
Not Shown	LC-V3010-2U-15E **	WS2 Injector Assembly R with LC-V3010-15B	Blue	16 inch	1
3	LC-V3010-2A	WS2 Injector Assembly A	Stamped A	18 inch	1
3	LC-V3010-2B	WS2 Injector Assembly B	Stamped B	21 inch	1
3	LC-V3010-2C	WS2 Injector Assembly C	Stamped C	24 inch	1
3	LC-V3010-2D	WS2 Injector Assembly D	Stamped D	30 inch	1
3	LC-V3010-2E	WS2 Injector Assembly E	Stamped E	36 inch	1
3	LC-V3010-2F	WS2 Injector Assembly F	Stamped F	42 inch	1
3	LC-V3010-2G	WS2 Injector Assembly G	Stamped G	48 inch	1

** LC-V3010-2X-15X injectors contain a LC-V3010-2-15 WS2 injector adapter with a WS1.5 injector inside. This allows the 2 inch valve to be used on smaller tank sizes. The LC-V3010-2-15 adapter can be used with any LC-V3010-15X injector.

LC-V3010-2X injectors and the LC-V3010-2-15 adapter include (1) V3283 o-ring 117 and (1) LC-V3284 o-ring 114.

NOTE: Actual injector size may vary depending on the design and application of the system. The injectors are sized for a typical downflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride. See the WS2 injector graphs (page 43) to meet specific applications. Variances in drain and draw line restrictions will effect injector performance.

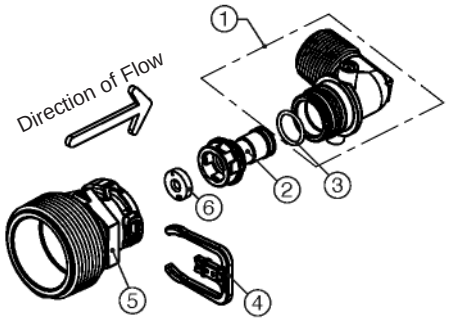


Drain Line Flow Controls (DLFC)

NOTE: All drain line flow control housings are shipped WITHOUT flow control washers.
See drain line flow control washer section (next page) for available flow selections.

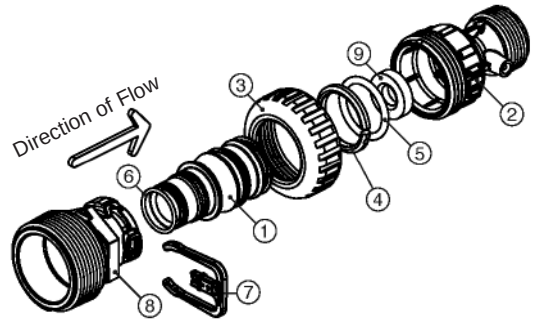
Part No: LC-V3158-04
Description: Elbow PVC (0.7 to 10 gpm)

Drawing No.	Part No.	Description	Qty.
1	LC-V3158-03	Drain Elbow 3/4 NPT	1
2	LC-V3159-01	DLFC Retainer Assembly	1
3	LC-V3163	O-ring 019	1
4	LC-H4615	Locking Clip	1
5	LC-V3983	WS2 DLFC Adapter	1
6	LC-V3162-XXX	DLFC Washer 0.7 to 10 gpm	1



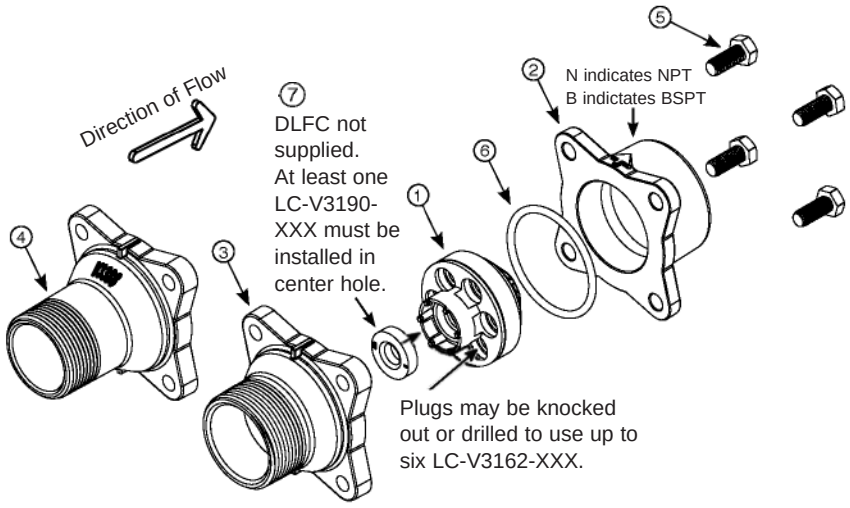
Part No: LC-V3008-05
Description: Inline Plastic (9 to 25 gpm)

Drawing No.	Part No.	Description	Qty.
1	LC-V3167	Drain Fitting Adapter 1 NPT	1
2	LC-V3166-01	Drain Fitting Body	1
3	LC-V3151	WS1 Nut QC	1
4	LC-V3150	WS1 Split Ring	1
5	LC-V3105	O-ring 215	1
6	LC-V3163	O-ring 019	1
7	LC-H4615	Locking Clip	1
8	LC-V3983	WS2 DLFC Adapter	1
9	LC-V3190-XXX	DLFC Washer 9 to 25 gpm	1



Part No: LC-V3079, LC-V3079BSPT, LC-V3080, LC-V3080BSPT
Description: 1.25 MNPT x 1.5 FNPT Stainless Steel (9 to 85 gpm)

Drawing No.	Part No.	Description	Quantity			
			LC-V3079	LC-V3079BSPT	LC-V3080	LC-V3080BSPT
1	LC-V3081	WS15 Retainer DLFC Assembly	1	1	1	1
2	LC-V3645	WS15 DLFC Flange Outlet FNPT	1		1	
	LC-V3645BSPT	WS15 DLFC Flange Outlet FBSPT		1		1
3	LC-V3646	WS15 DLFC Flange Inlet MNPT			1	1
4	LC-V3388	WS125 DLFC Flange Inlet MNPT	1	1		
5	LC-V3652	Bolt Hex SS HCS 5/16-18 x 0.75	4	4	4	4
6	LC-V3441	O-ring 226	1	1	1	1
7	LC-V3162-XXX	DLFC Washer 0.7 to 10 gpm	0 to 6	0 to 6	0 to 6	0 to 6
8	LC-V3190-XXX	DLFC Washer 9 to 25 gpm	1	1	1	1

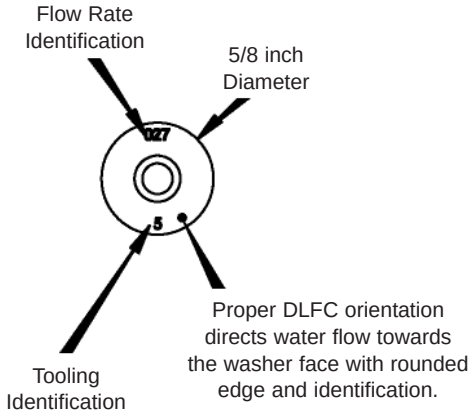


Drain Line Flow Control Washers

NOTE: All drain line flow control housings are shipped WITHOUT flow control washers.
Select control(s) from tables below for proper backwash, based on media manufacturer's recommendations.

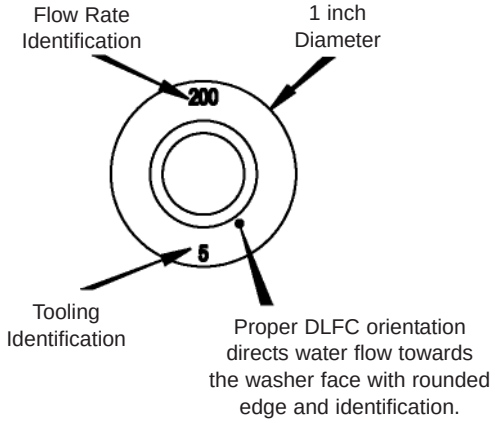
Part No: LC-V3162-XXX
Description: DLFC Washers for 3/4 inch Fittings
(0.7 to 10 gpm)

Part No.	Description
LC-V3162-007	0.7 gpm Drain Line Flow Control
LC-V3162-010	1.0 gpm Drain Line Flow Control
LC-V3162-013	1.3 gpm Drain Line Flow Control
LC-V3162-017	1.7 gpm Drain Line Flow Control
LC-V3162-022	2.2 gpm Drain Line Flow Control
LC-V3162-027	2.7 gpm Drain Line Flow Control
LC-V3162-032	3.2 gpm Drain Line Flow Control
LC-V3162-042	4.2 gpm Drain Line Flow Control
LC-V3162-053	5.3 gpm Drain Line Flow Control
LC-V3162-065	6.5 gpm Drain Line Flow Control
LC-V3162-075	7.5 gpm Drain Line Flow Control
LC-V3162-090	9.0 gpm Drain Line Flow Control
LC-V3162-100	10.0 gpm Drain Line Flow Control



Part No: LC-V3190-XXX
Description: DLFC Washers for 1 inch Fittings
(9 to 25 gpm)

Part No.	Description
LC-V3190-090	9.0 gpm Drain Line Flow Control
LC-V3190-100	10.0 gpm Drain Line Flow Control
LC-V3190-110	11.0 gpm Drain Line Flow Control
LC-V3190-130	13.0 gpm Drain Line Flow Control
LC-V3190-150	15.0 gpm Drain Line Flow Control
LC-V3190-170	17.0 gpm Drain Line Flow Control
LC-V3190-200	20.0 gpm Drain Line Flow Control
LC-V3190-250	25.0 gpm Drain Line Flow Control



WS1.5 & WS2 Meter Assembly

Drawing No.	Part No.	Description	Quantity
1	LC-V3003-02	Commercial Meter Assembly with 28 inch Cable	1
	LC-V3221	Commercial Meter Assembly with 15 foot Cable	1
2	LC-V3118-03	Commercial Meter Turbine Assembly	1
3	LC-V3105	O-ring 215	1
4	LC-V3501	Turbine Clip	1
5	LC-V3632	Meter Retaining Clip	1
6	LC-V3754-01	WS2 Meter Housing NPT	1
	LC-V3754BSPT-01	WS2 Meter Housing BSPT	1
7	LC-V3401-04	WS1.5 Meter Housing NPT	1
	LC-V3401BSPT-01	WS1.5 Meter Housing BSPT	1
Not Shown	LC-V3437	WS1.5 Flow Straightener	1
	LC-V3488	WS2 Flow Straightener	1

Part No.	Description
LC-V3040	28 inch Cable for WS1.5 NPT Meter
LC-V3040BSPT	28 inch Cable for WS1.5 BSPT Meter
LC-V3040-15	15 foot Cable for WS1.5 NPT Meter
LC-V3040BSPT-15	15 foot Cable for WS1.5 BSPT Meter
LC-V3094	28 inch Cable for WS2 NPT Meter
LC-V3094BSPT	28 inch Cable for WS2 BSPT Meter
LC-V3094-15	15 foot Cable for WS2 NPT Meter
LC-V3094BSPT-15	15 foot Cable for WS2 BSPT Meter

Minimum Operating Pressure: 20 psi minimum

Maximum Operating Pressure: 125 psi maximum

Minimum Operating Temperature: 40°F minimum

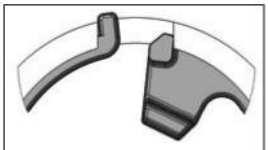
Maximum Operating Temperature: 110°F maximum

For WS2 Meter NPT Assembly use 2 inch NPT pipe. For WS2 Meter BSPT Assembly use 63mm pipe.

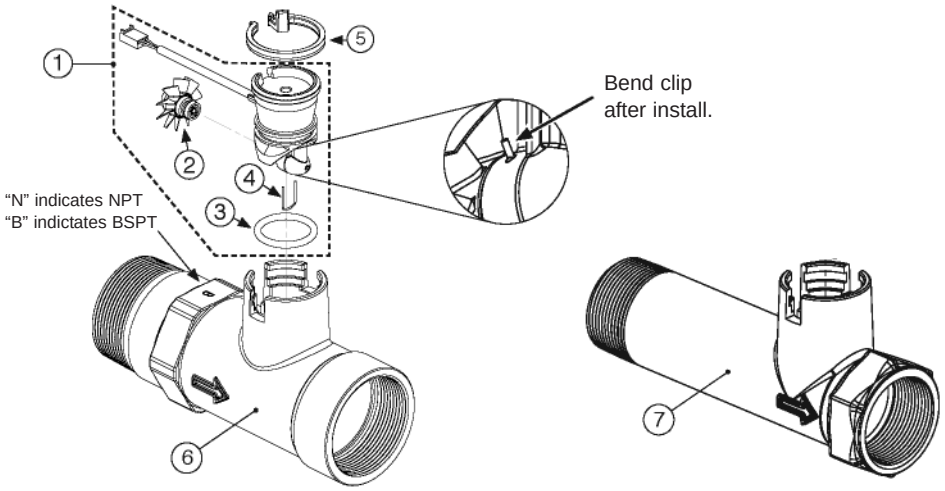
When installing the meter, make sure the arrow on the meter body is going the same direction as the water flow.

This water meter should NOT be used as the primary monitoring device for critical or health effect applications.

The meter can be installed in either horizontal or vertical applications.



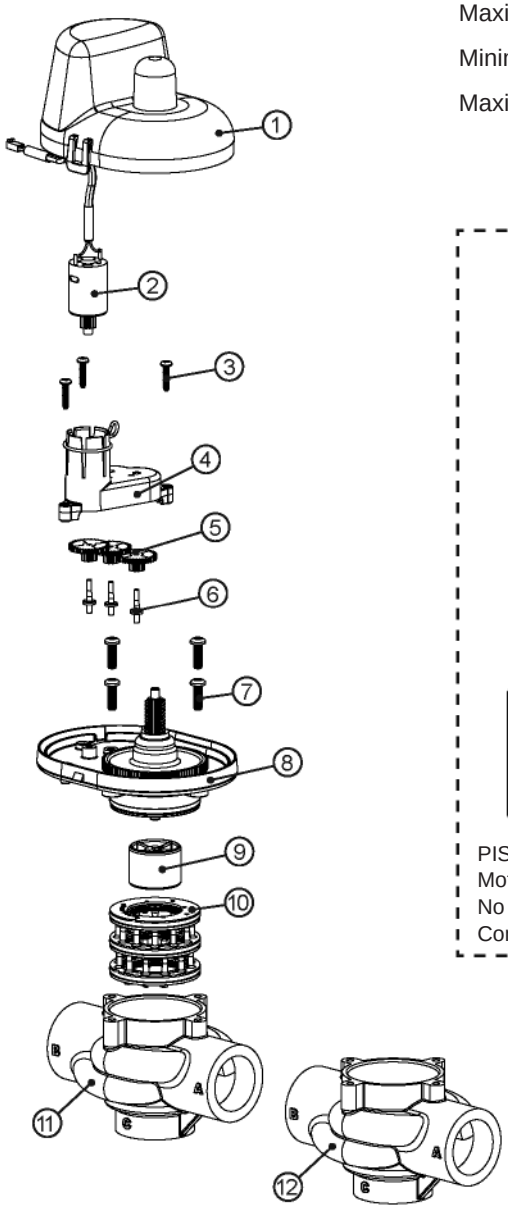
Typical meter retaining clip installation. Ensure clip is fully engaged in groove with tabs positioned in slot as shown.



1.5 inch Piston Style Motorized Alternating Valve (MAV) – LC-V3071, LC-V3071BSPT

Drawing No.	Part No.	Description	Quantity	
			LC-V3071	LC-V3071BSPT
1	LC-V3073	MAV/NHWB Cover Assembly	1	1
2	LC-V3476	Motor Assembly with 8 ft. Cord	1	1
3	LC-V3592	Screw #8-3/4 PHPN T-25 SS	3	3
4	LC-V3262-01	Reduction Gear Cover Assembly	1	1
5	LC-V3110	Drive Reduction Gear 12 x 36	3	3
6	LC-V3264	Bypass Reduction Gear Axle	3	3
7	LC-V3527	Screw 1/4-20 x 0.75 BHSCS SS (5/32 Hex Allen Wrench Reqd)	4	4
8	LC-V3072	MAV/NHWB Drive Assembly	1	1
9	LC-V3506-01	MAV/NHWB Piston	1	1
10	LC-V3074	MAV/NHWB Stack Assembly	1	1
11	LC-V3525-01	WS1.5 MAV Body NPT	1	N/A
12	LC-V3525BSPT-01	WS1.5 MAV Body BSPT	N/A	1
Not Shown	LC-V3474	Alt Connection Cord 8 ft. Black	1	1

.

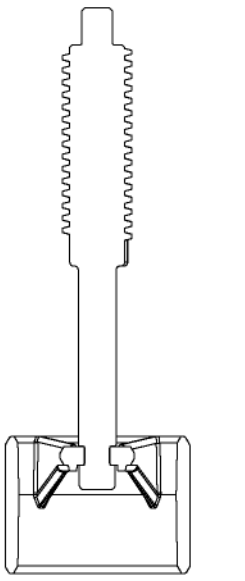


Minimum Operating Pressure: 20 psi minimum

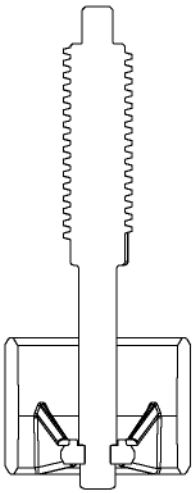
Maximum Operating Pressure: 125 psi maximum

Minimum Operating Temperature: 40°F minimum

Maximum Operating Temperature: 110°F maximum



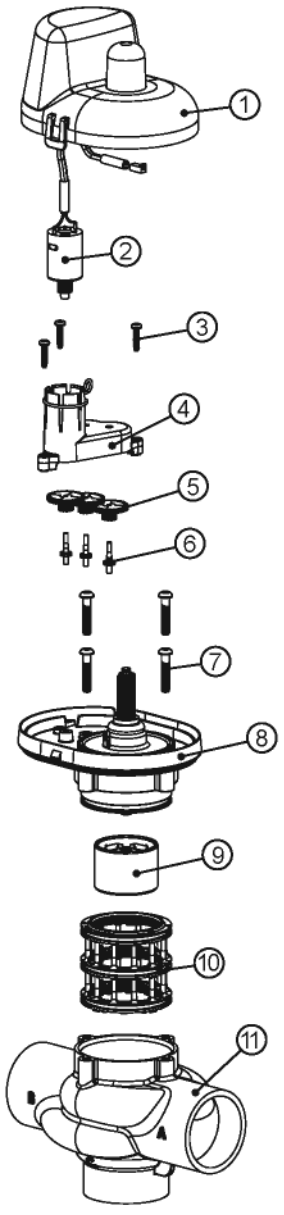
PISTON ORIENTATION 1
Motorized Alternating Valve &
No Hard Water Bypass Valve
Configurations.



PISTON ORIENTATION 2
No Hard Water Bypass
Valve Configuration.

2 inch Piston Style Motorized Alternating Valve (MAV) – LC-V3076, LC-V3076BSPT

Drawing No.	Part No.	Description	Quantity	
			LC-V3076	LC-V3076BSPT
1	LC-V3073	MAV/NHWB Cover Assembly	1	1
2	LC-V3476	Motor Assembly with 8 ft. Cord	1	1
3	LC-V3592	Screw #8-3/4 PHPN T-25 SS	3	3
4	LC-V3262-01	Reduction Gear Cover Assembly	1	1
5	LC-V3110	Drive Reduction Gear 12 x 36	3	3
6	LC-V3264	Bypass Reduction Gear Axle	3	3
7	LC-V3642	Screw 1/4-20 x 1.25 BHSCS SS (5/32 Hex Allen Wrench Reqd)	4	4
8	LC-V3078	MAV/NHWB Drive Assembly	1	1
9	LC-V3634-01	MAV/NHBP Piston	1	1
10	LC-V3077	MAV/NHWB Stack Assembly	1	1
11	LC-V3633-01	WS2 MAV Body NPT	1	N/A
	LC-V3633BSPT-01	WS2 MAV Body BSPT	N/A	1
Not Shown	LC-V3474	Alt Connection Cord 8 ft. Black	1	1

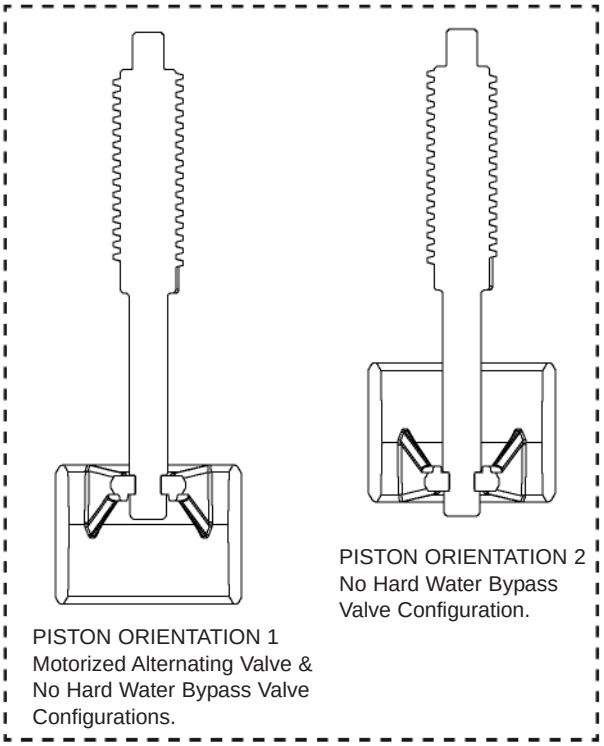


Minimum Operating Pressure: 20 psi minimum

Maximum Operating Pressure: 125 psi maximum

Minimum Operating Temperature: 40°F minimum

Maximum Operating Temperature: 110°F maximum



PISTON ORIENTATION 1
Motorized Alternating Valve &
No Hard Water Bypass Valve
Configurations.

PISTON ORIENTATION 2
No Hard Water Bypass
Valve Configuration.

1.5 inch No Hard Water Bypass (NHBP) – LC-V3097, LC-V3097BSPT

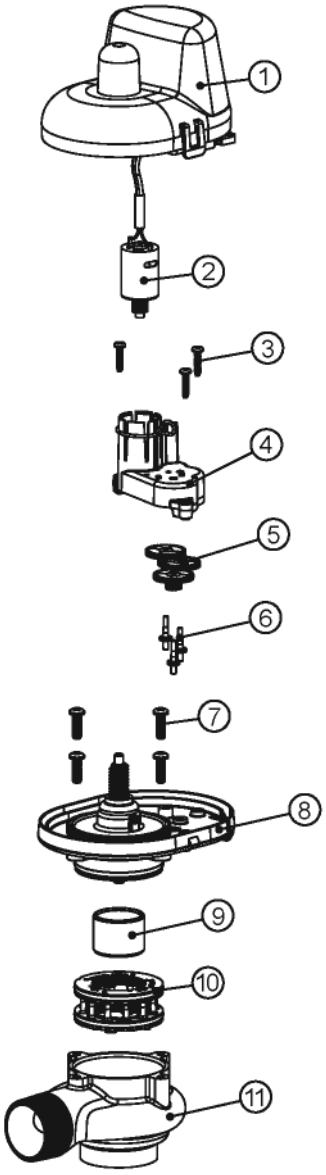
Drawing No.	Part No.	Description	Quantity	
			LC-V3097	LC-V3097BSPT
1	LC-V3073	MAV/NHBP Cover Assembly	1	1
2	LC-V3476	Motor Assembly with 8 ft. Cord	1	1
3	LC-V3592	Screw #8-3/4 PHPN T-25 SS	3	3
4	LC-V3262-01	Reduction Gear Cover Assembly	1	1
5	LC-V3110	Drive Reduction Gear 12 x 36	3	3
6	LC-V3264	Bypass Reduction Gear Axle	3	3
7	LC-V3527	Screw 1/4-20 x 0.75 BHSCS SS (5/32 Hex Allen Wrench Reqd)	4	4
8	LC-V3072	MAV/NHBP Drive Assembly	1	1
9	LC-V3506-01	MAV/NHBP Piston	1	1
10	LC-V3886	WS1.5 NHBP Stack Assembly	1	1
11	LC-V3832-01	WS1.5 NHBP Body Male x Female NPT	1	N/A
	LC-V3832BSPT-01	WS1.5 NHBP Body Male x Female BSPT	N/A	1
Not Shown	LC-V3805	Strain Relief Cover Kit	1	1

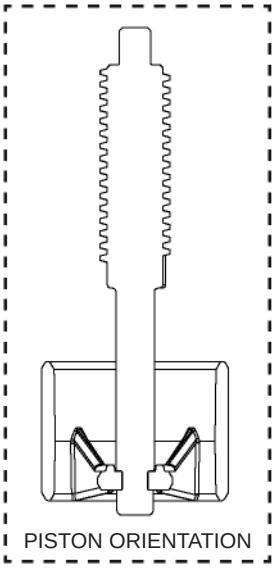
Minimum Operating Pressure: 20 psi minimum

Maximum Operating Pressure: 125 psi maximum

Minimum Operating Temperature: 40°F minimum

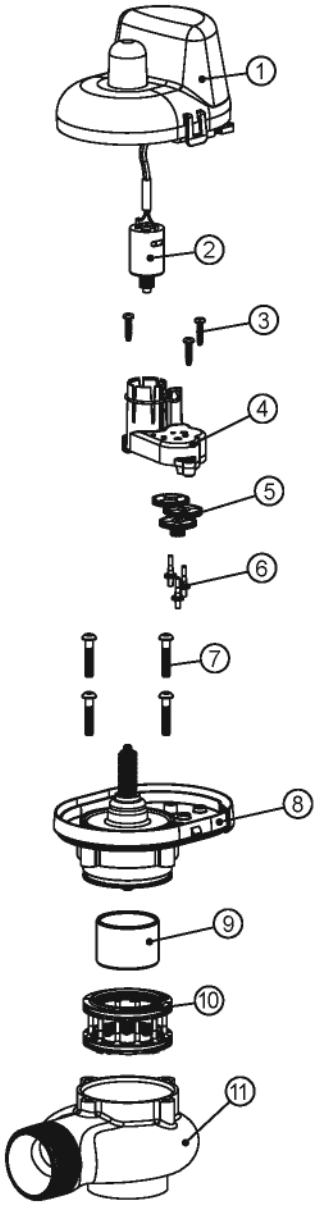
Maximum Operating Temperature: 110°F maximum




PISTON ORIENTATION

2 inch No Hard Water Bypass (NHBP) – LC-V3098, LC-V3098BSPT

Drawing No.	Part No.	Description	Quantity	
			LC-V3098	LC-V3098BSPT
1	LC-V3073	MAV/NHBP Cover Assembly	1	1
2	LC-V3476	Motor Assembly with 8 ft. Cord	1	1
3	LC-V3592	Screw #8-3/4 PHPN T-25 SS	3	3
4	LC-V3262-01	Reduction Gear Cover Assembly	1	1
5	LC-V3110	Drive Reduction Gear 12 x 36	3	3
6	LC-V3264	Bypass Reduction Gear Axle	3	3
7	LC-V3642	Screw 1/4-20 x 1.25 BHSCS SS (5/32 Hex Allen Wrench Reqd)	4	4
8	LC-V3078	MAV/NHBP Drive Assembly	1	1
9	LC-V3634-01	MAV/NHBP Piston	1	1
10	LC-V3887	WS2 NHBP Stack Assembly	1	1
11	LC-V3828-01	WS2 NHBP Body Male x Female NPT	1	N/A
	LC-V3828BSPT-01	WS2 NHBP Body Male x Female BSPT	N/A	1
Not Shown	LC-V3805	Strain Relief Cover Kit	1	1

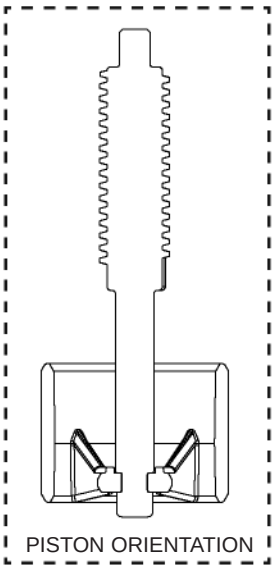


Minimum Operating Pressure: 20 psi minimum

Maximum Operating Pressure: 125 psi maximum

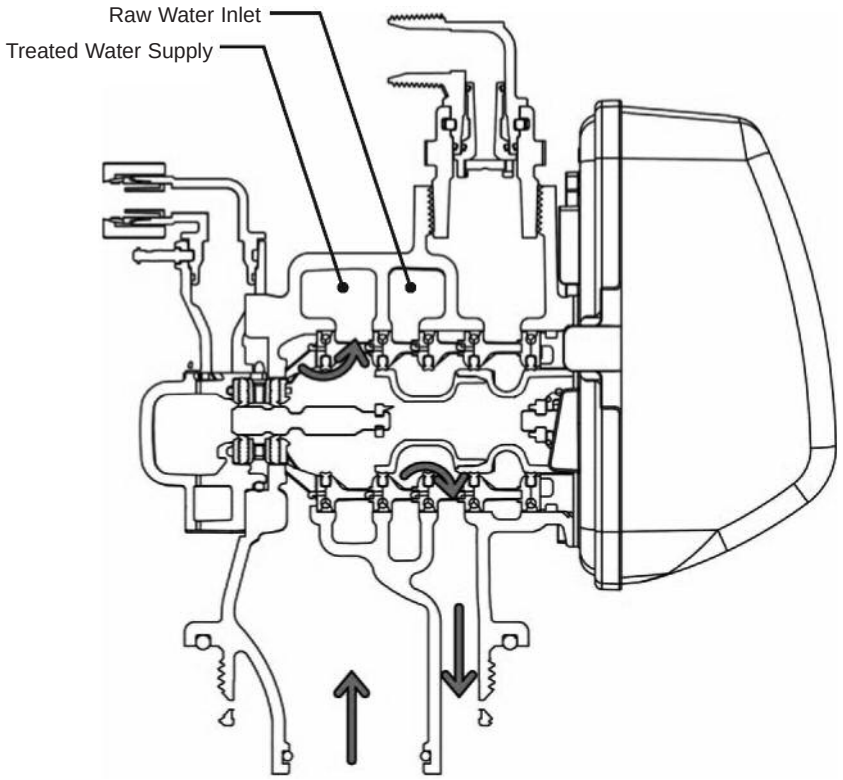
Minimum Operating Temperature: 40°F minimum

Maximum Operating Temperature: 110°F maximum

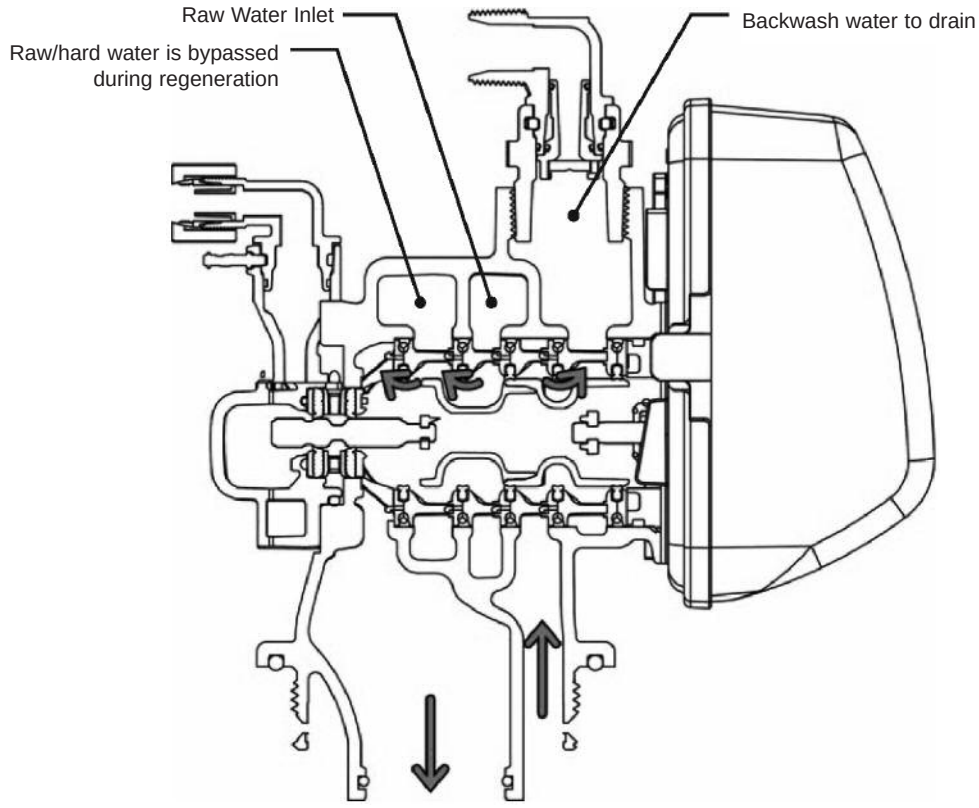


Control Valve Cycle Positions

WS1.5 Cycle Position – SERVICE

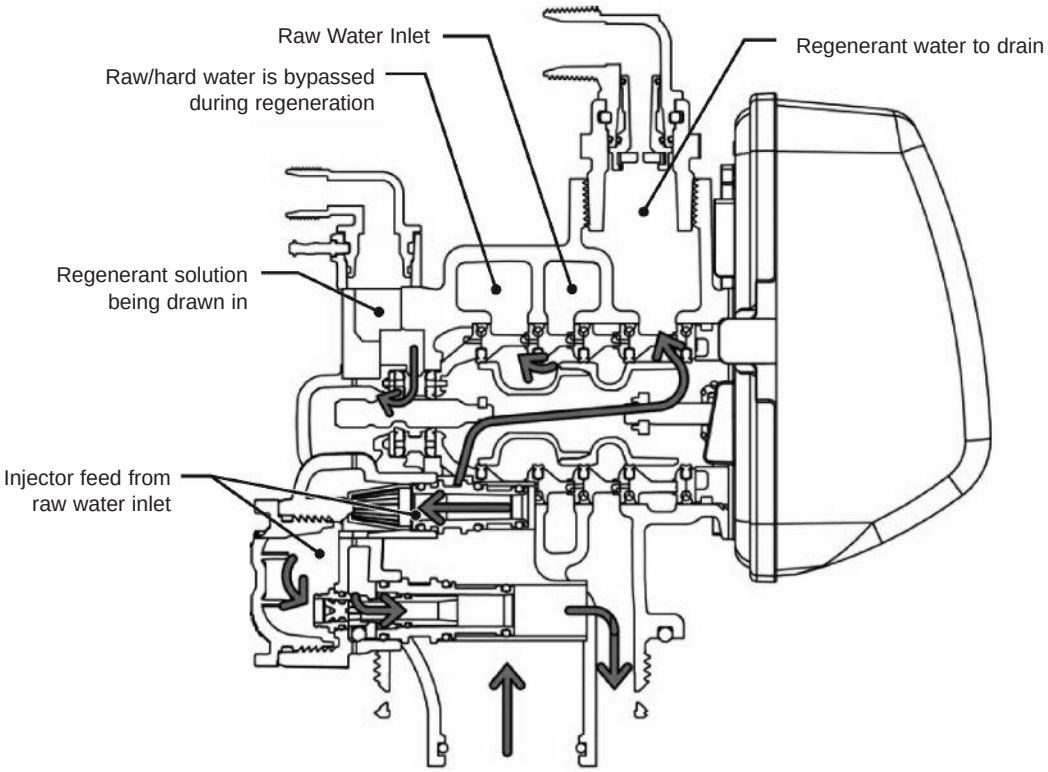


WS1.5 Cycle Position – BACKWASH

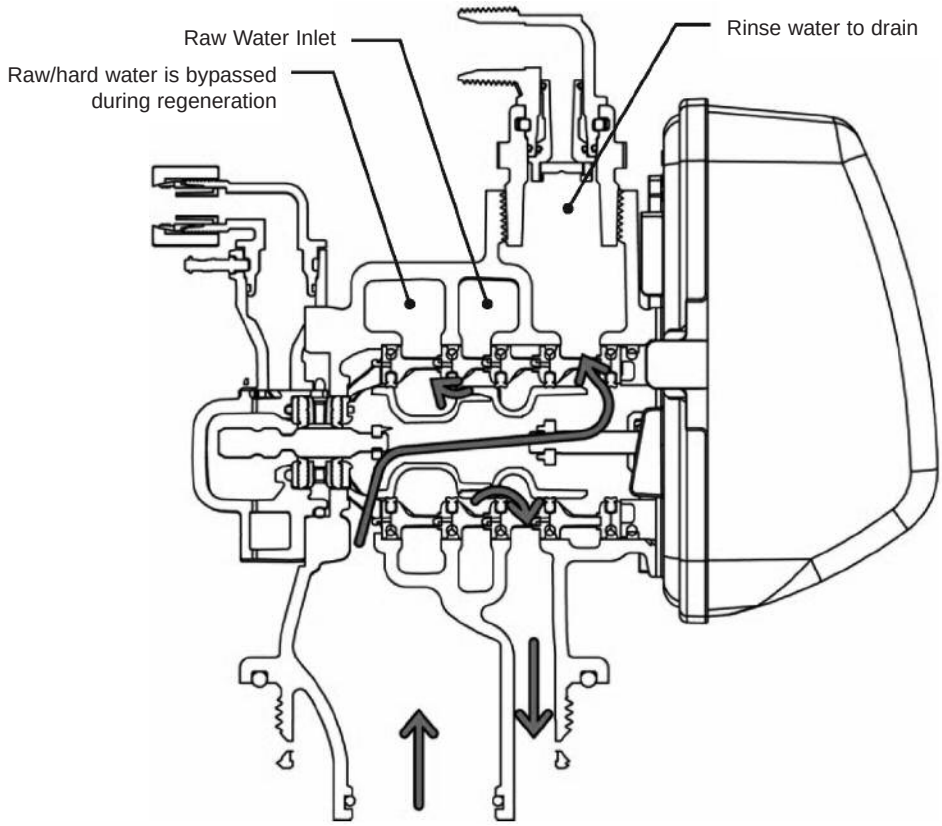


Control Valve Cycle Positions

WS1.5 Cycle Position – DRAW

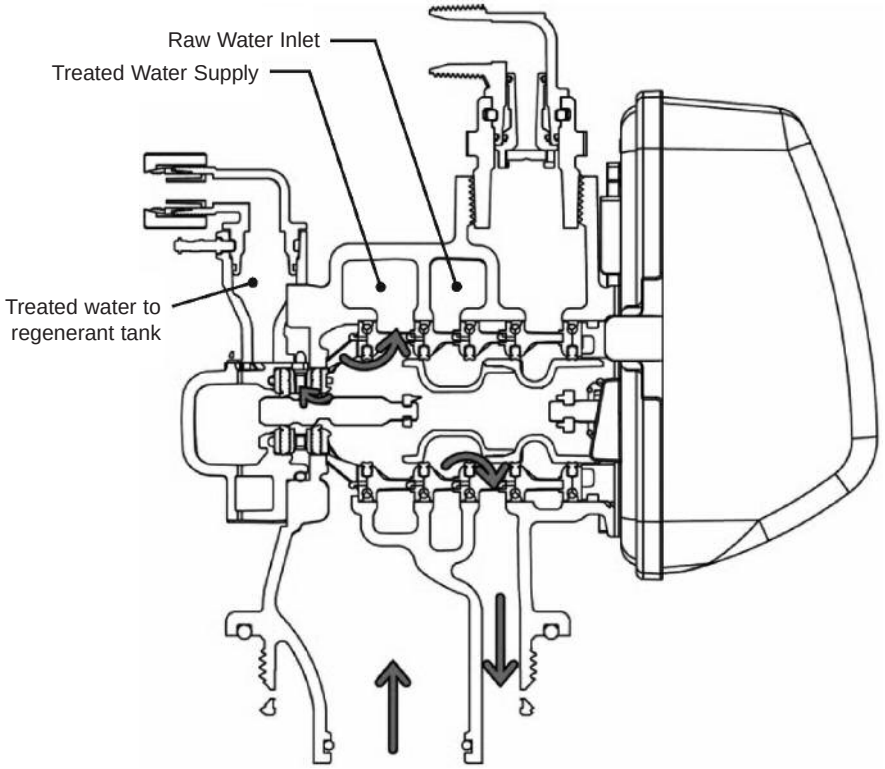


WS1.5 Cycle Position – RINSE

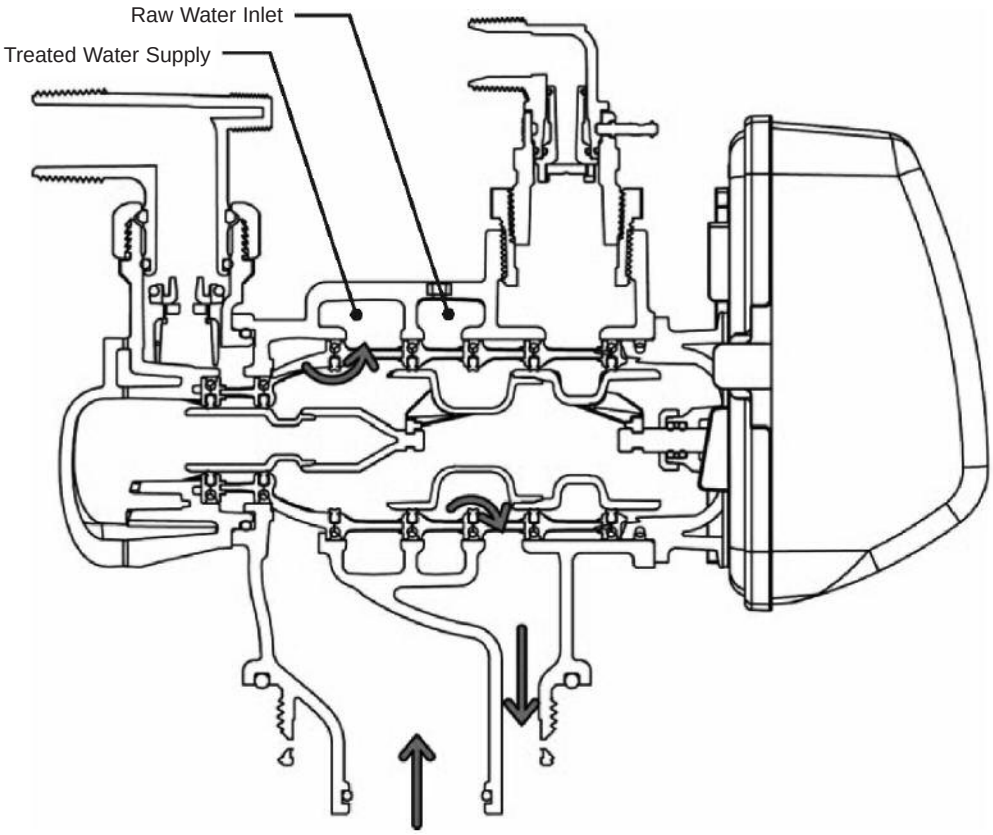


Control Valve Cycle Positions

WS1.5 Cycle Position – TREATED WATER REFILL

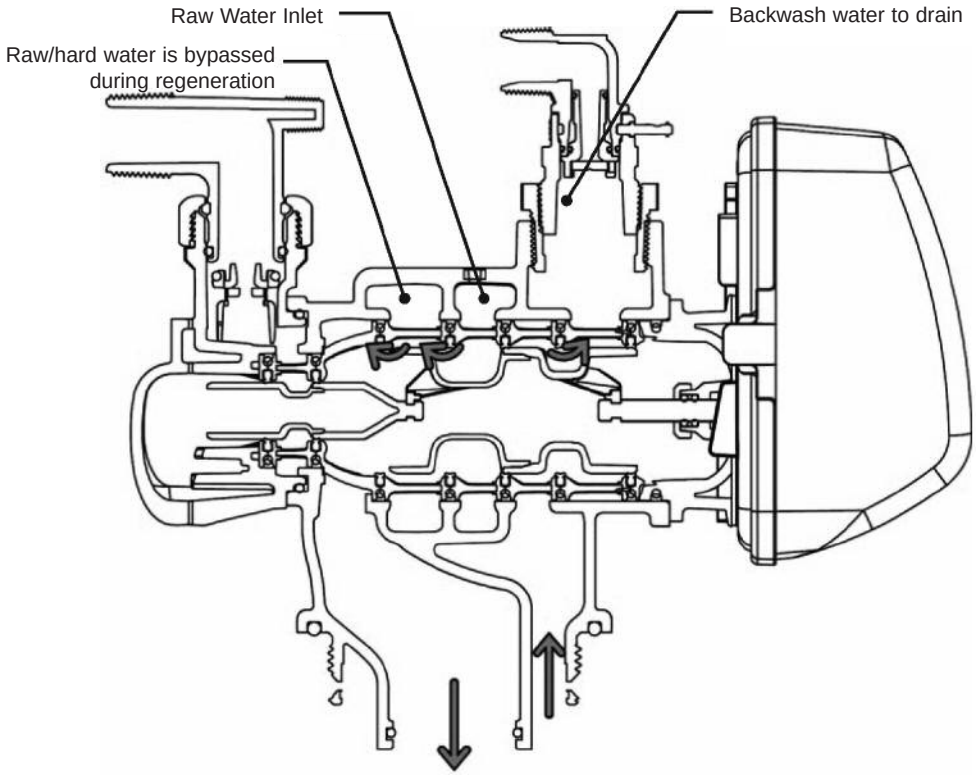


WS2 Cycle Position – SERVICE

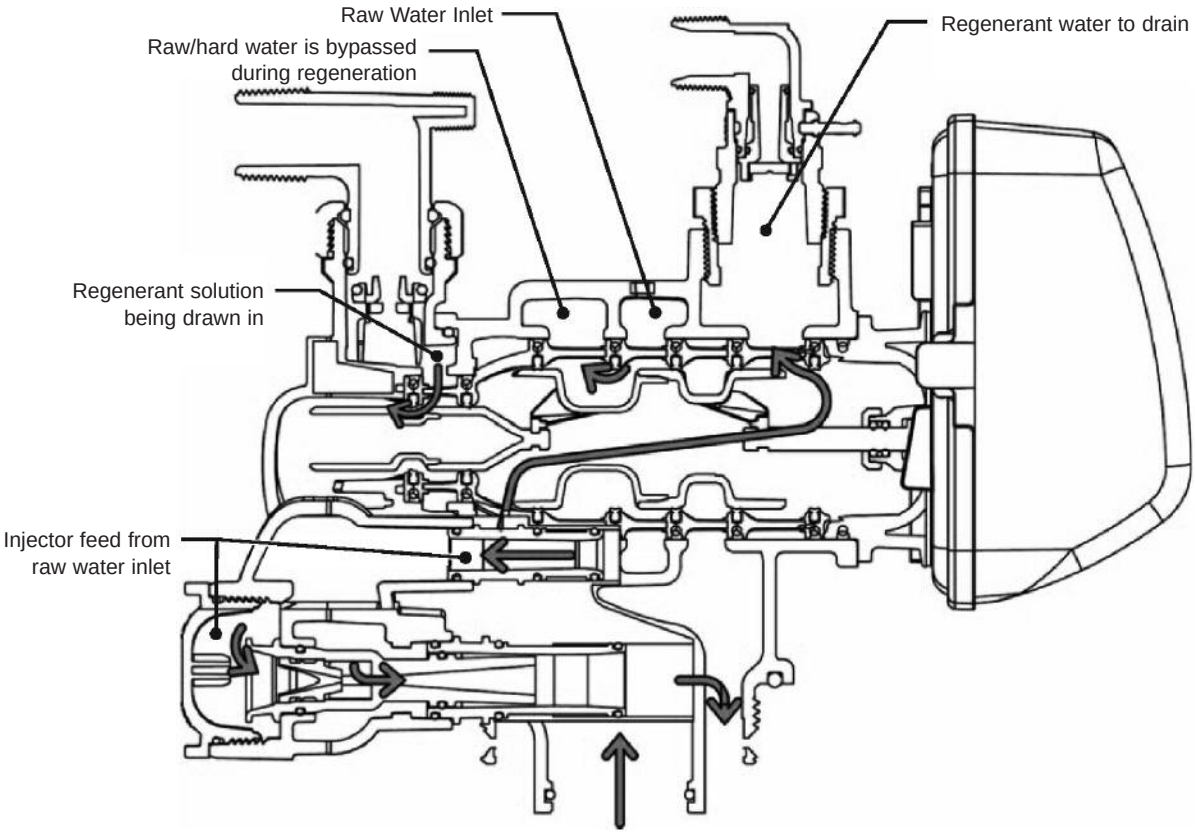


Control Valve Cycle Positions

WS2 Cycle Position – BACKWASH

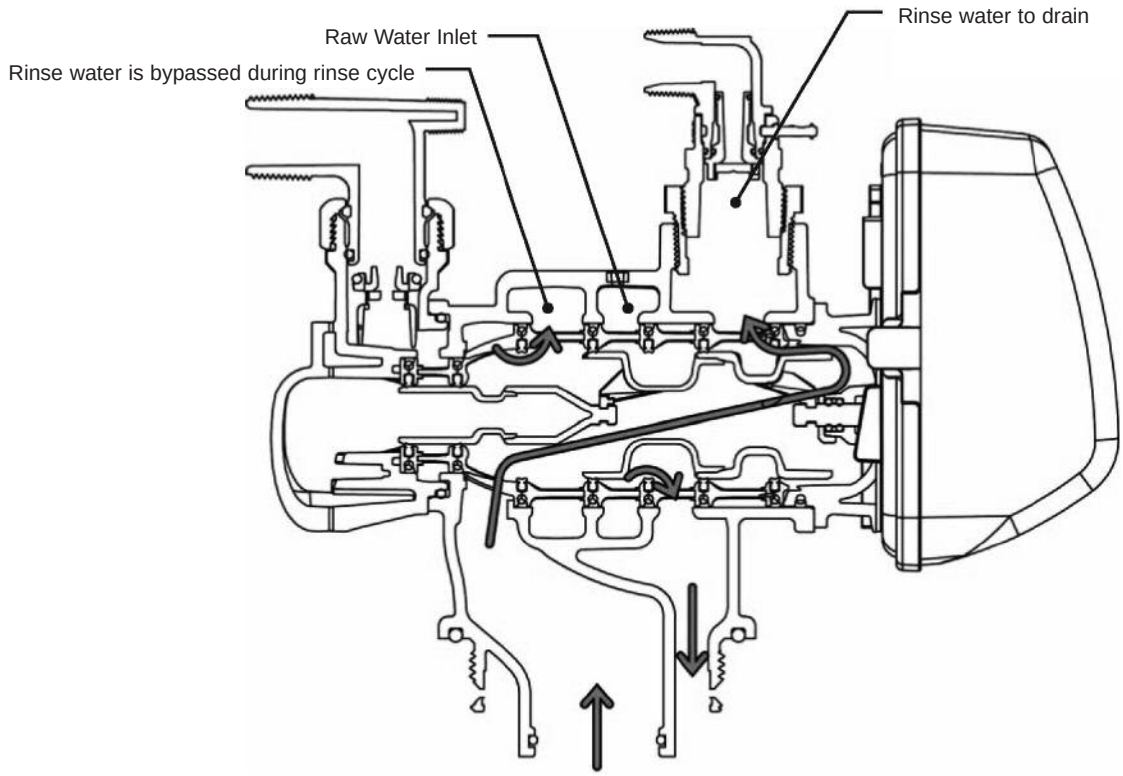


WS2 Cycle Position – DRAW

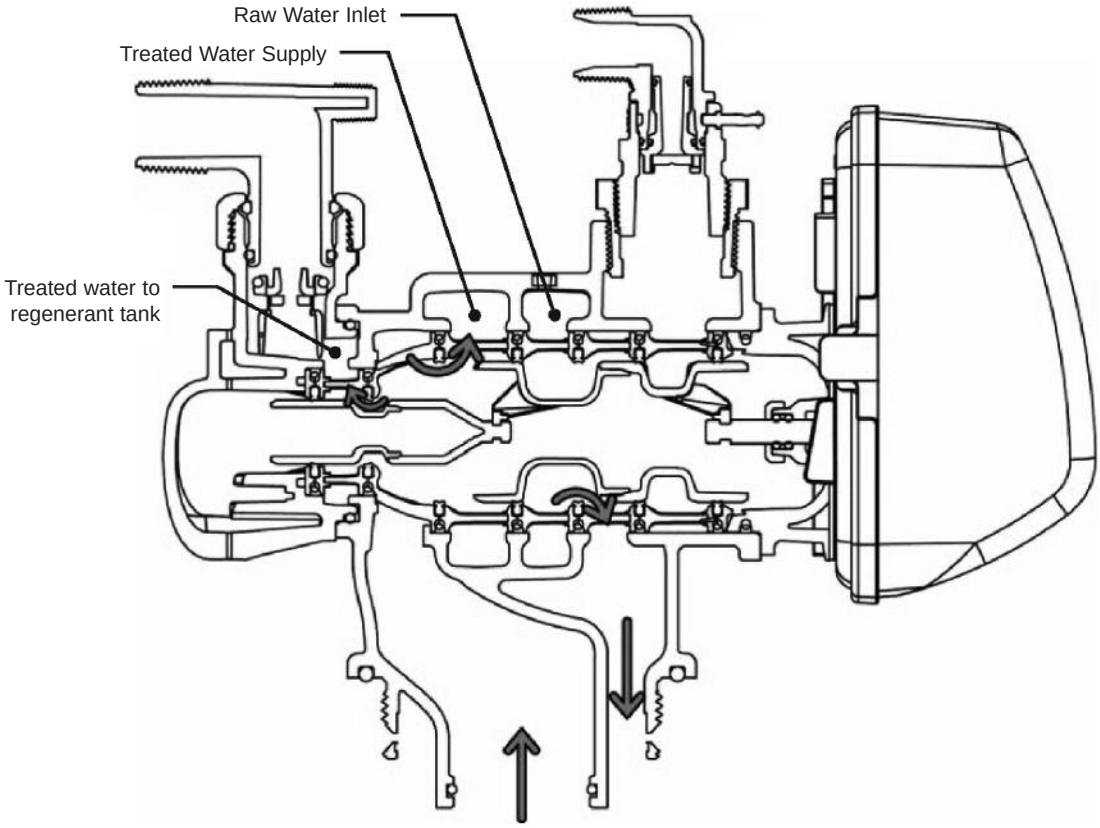


Control Valve Cycle Positions

WS2 Cycle Position – RINSE



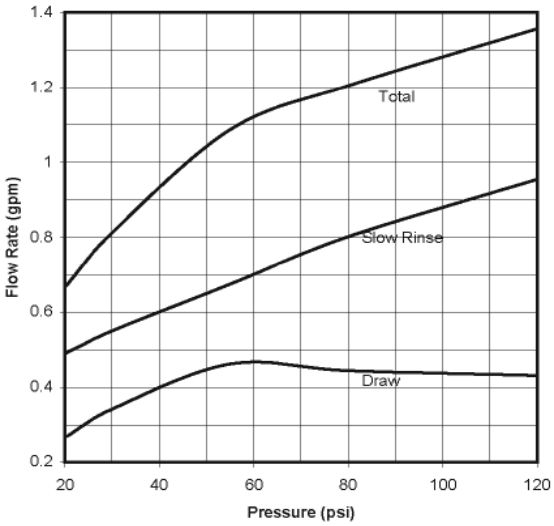
WS2 Cycle Position – TREATED WATER REFILL



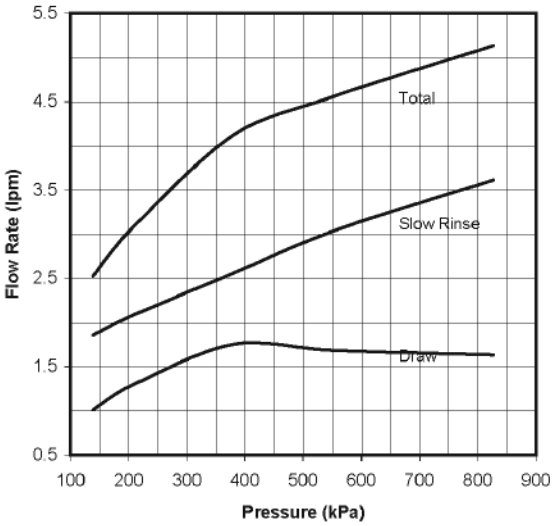
WS1.5 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

Violet, Part No. LC-V3010-15B or LC-V3010-2R-15B

US Units

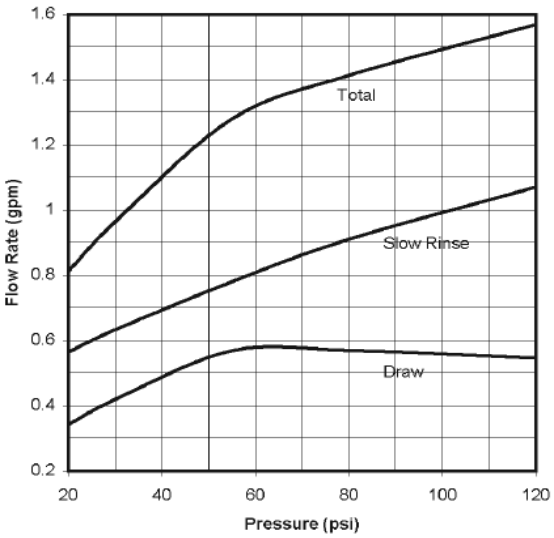


Metric Units

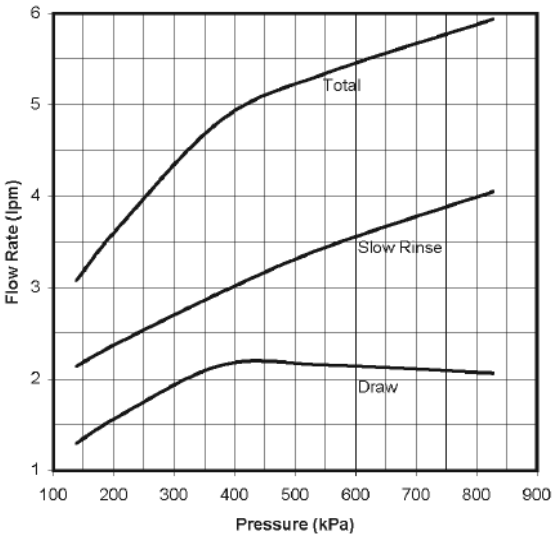


Red, Part No. LC-V3010-15C or LC-V3010-2S-15C

US Units

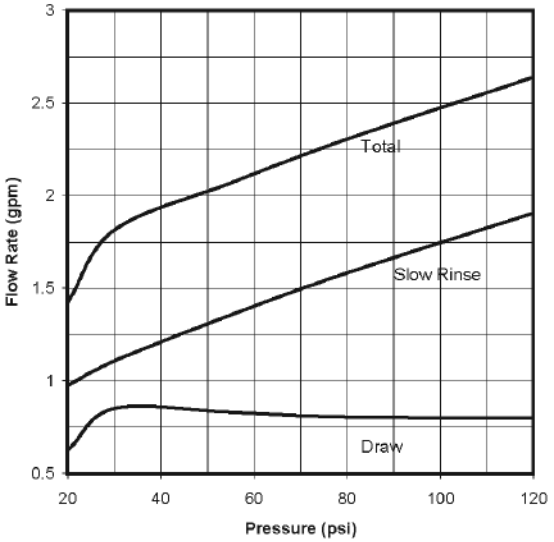


Metric Units

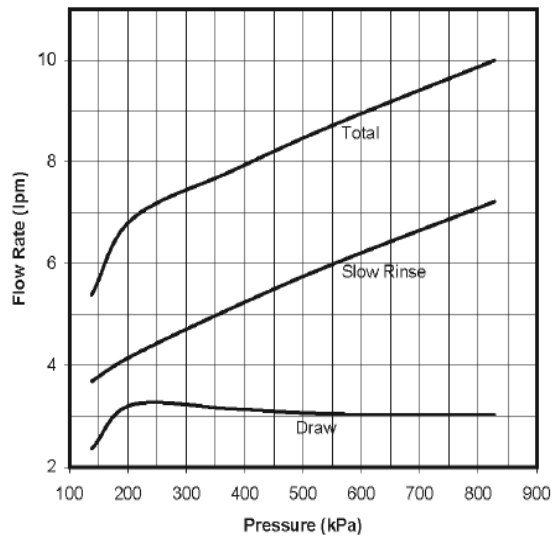


White, Part No. LC-V3010-15D or LC-V3010-2T-15D

US Units



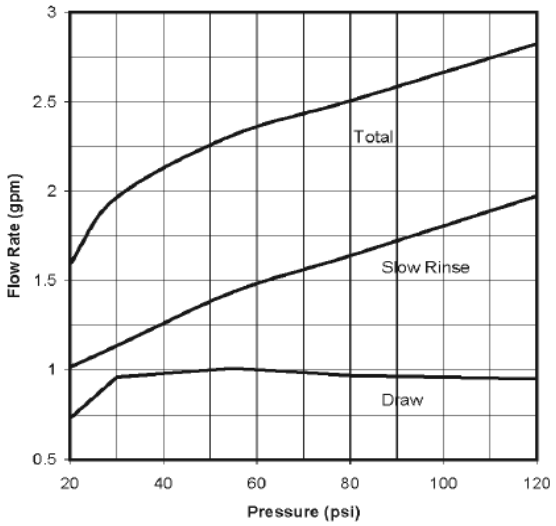
Metric Units



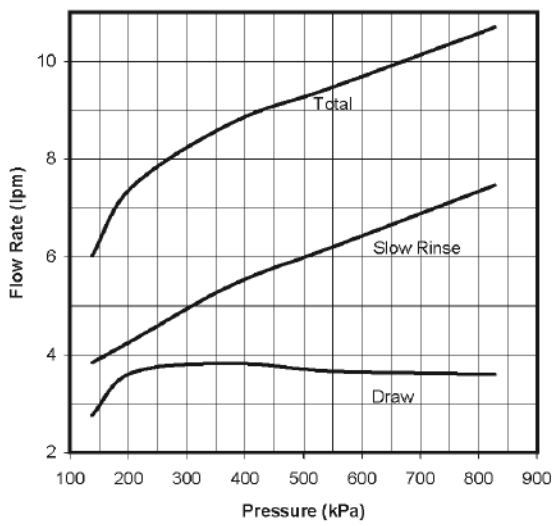
WS1.5 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

Blue, Part No. LC-V3010-15E or LC-V3010-2U-15E

US Units

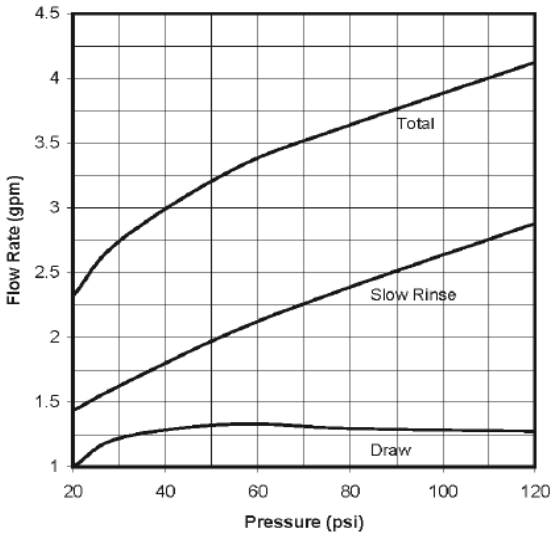


Metric Units

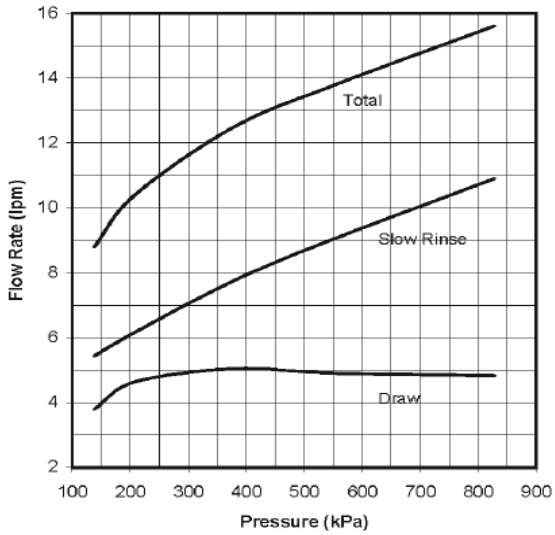


Yellow, Part No. LC-V3010-15F

US Units

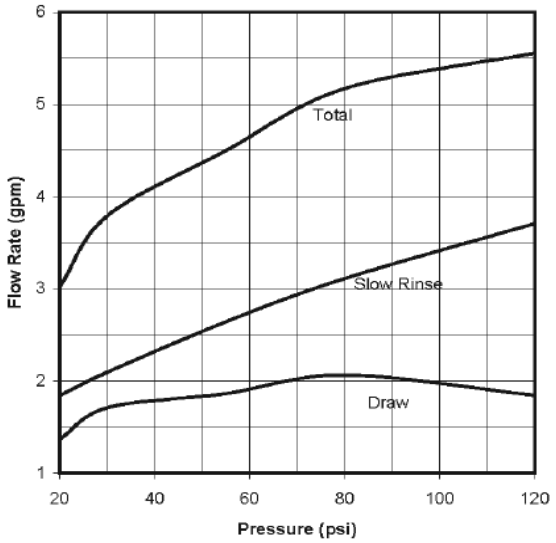


Metric Units

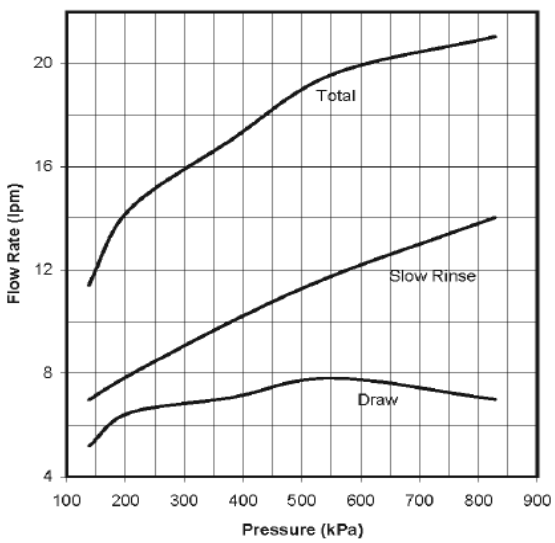


Green, Part No. LC-V3010-15G

US Units



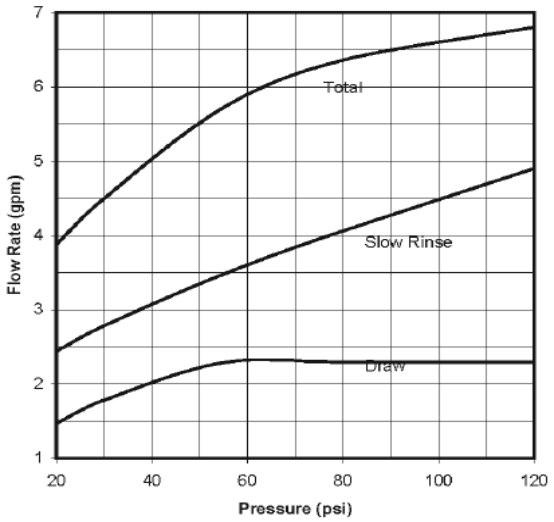
Metric Units



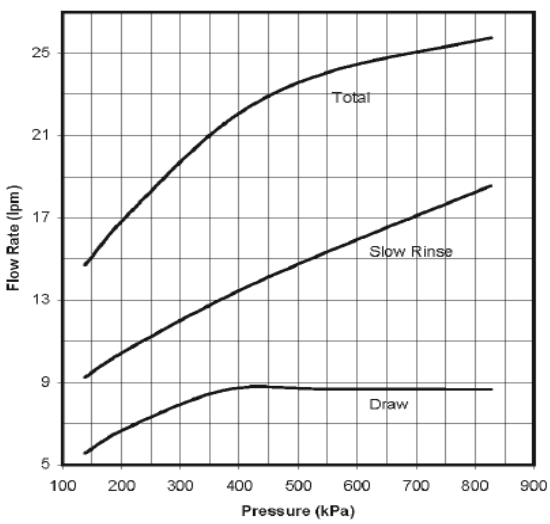
WS1.5 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

Orange, Part No. LC-V3010-15H

US Units

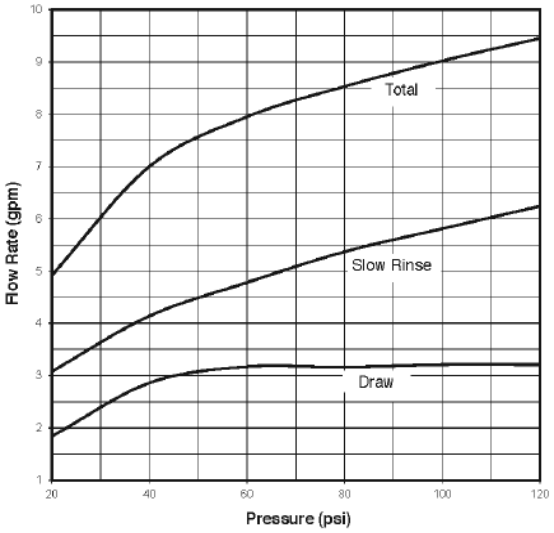


Metric Units

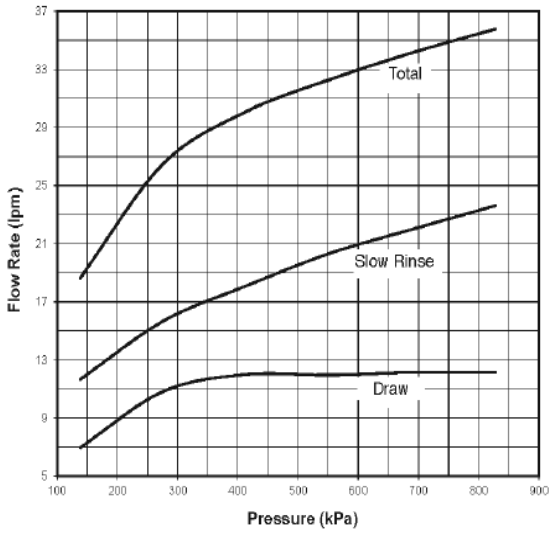


Part No. LC-V3010-15I

US Units



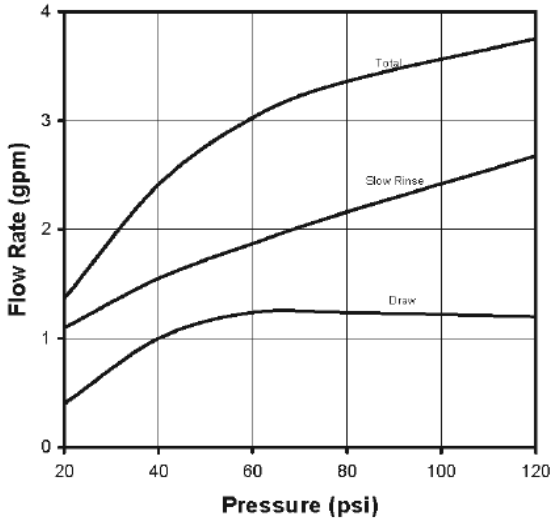
Metric Units



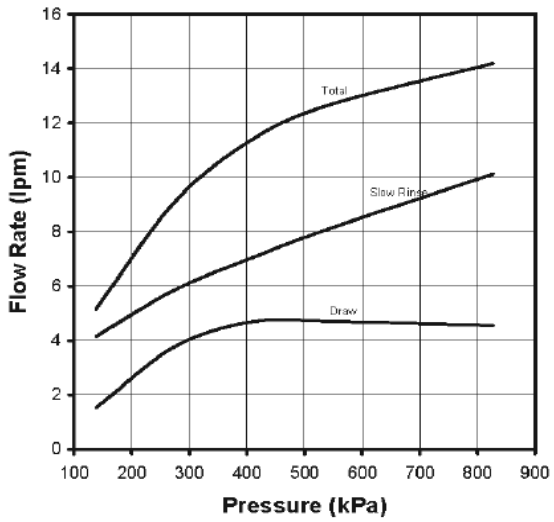
WS2 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

"A", Part No. LC-V3010-2A

US Units

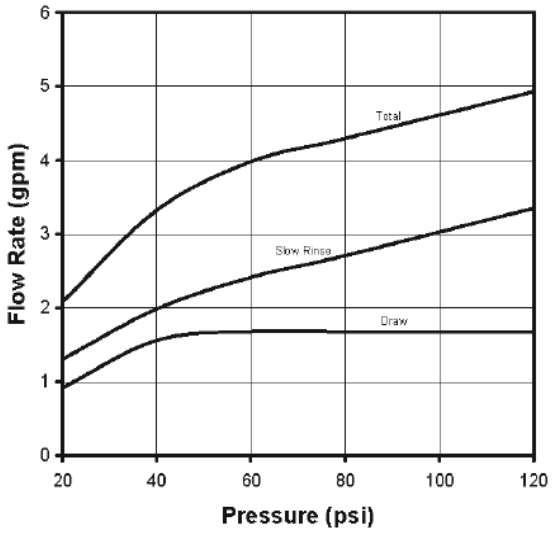


Metric Units

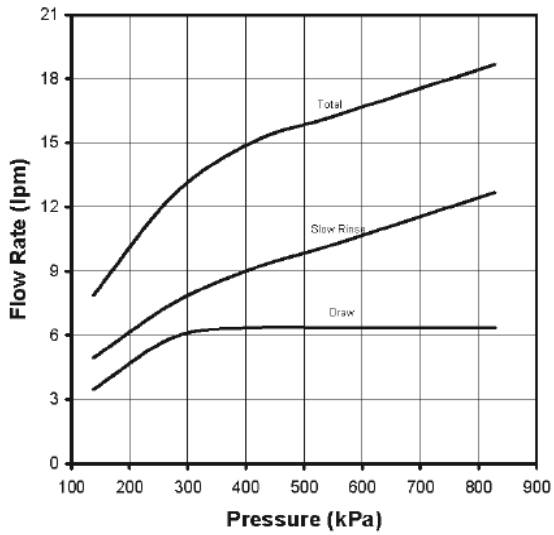


"B", Part No. LC-V3010-2B

US Units

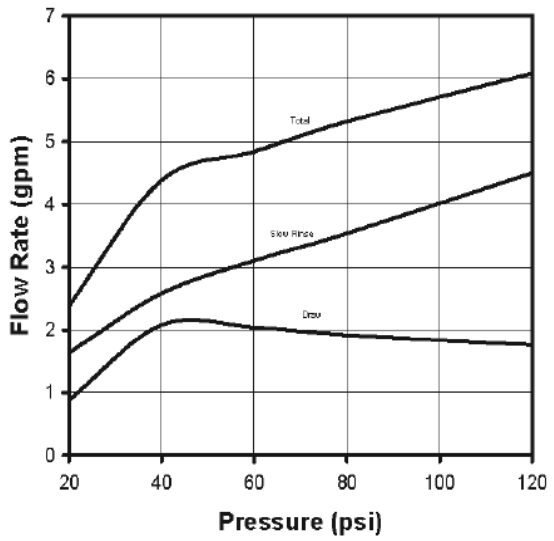


Metric Units

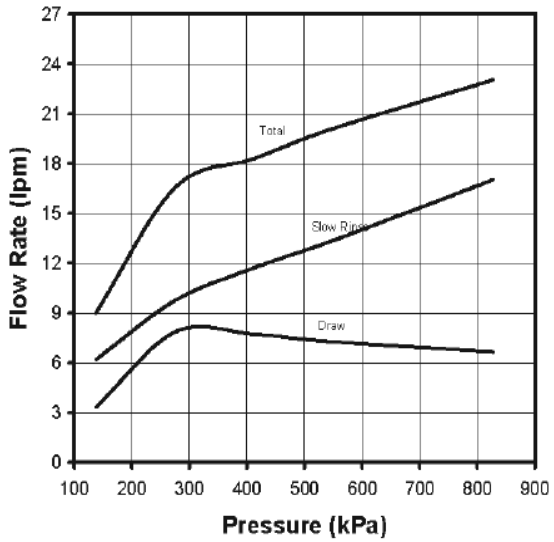


"C", Part No. LC-V3010-2C

US Units



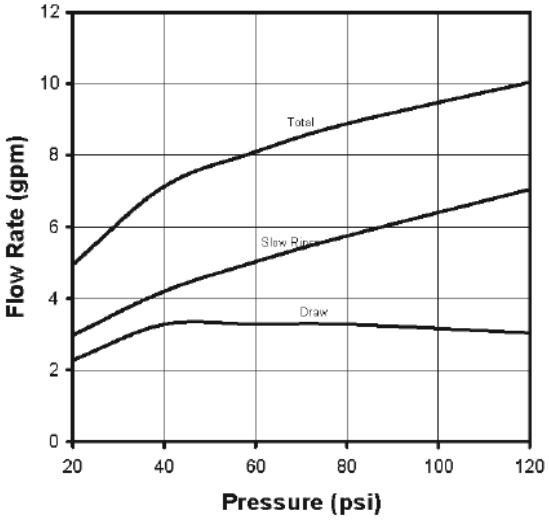
Metric Units



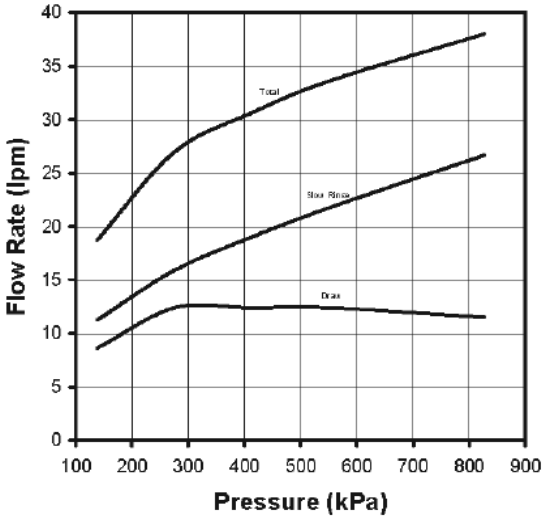
WS2 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

“D”, Part No. LC-V3010-2D

US Units

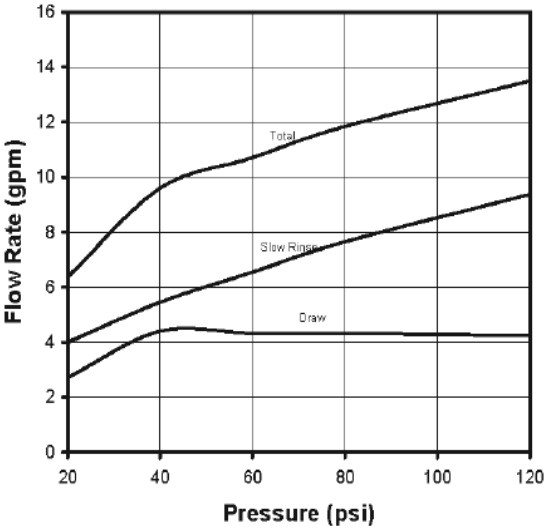


Metric Units

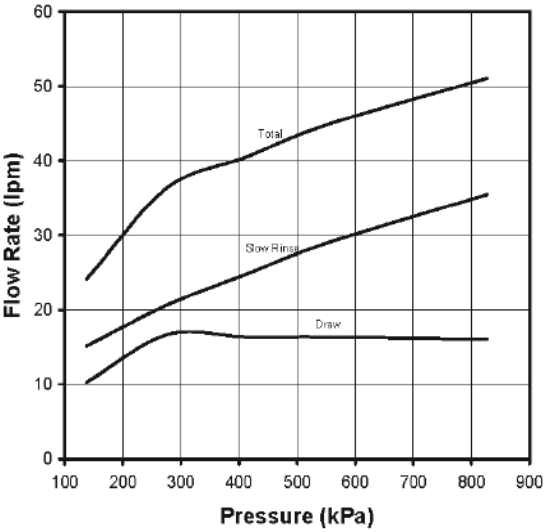


“E”, Part No. LC-V3010-2E

US Units

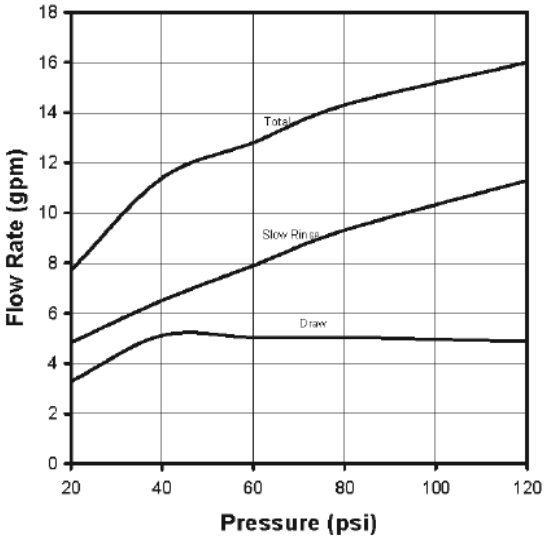


Metric Units

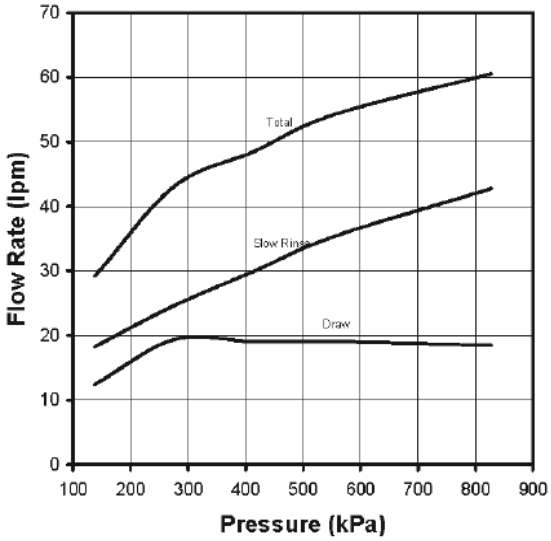


“F”, Part No. LC-V3010-2F

US Units



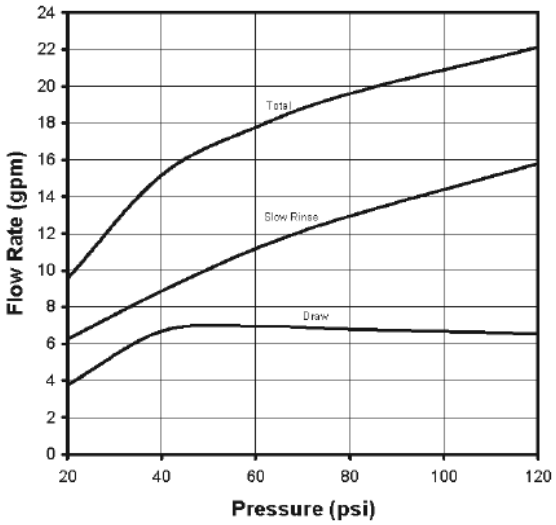
Metric Units



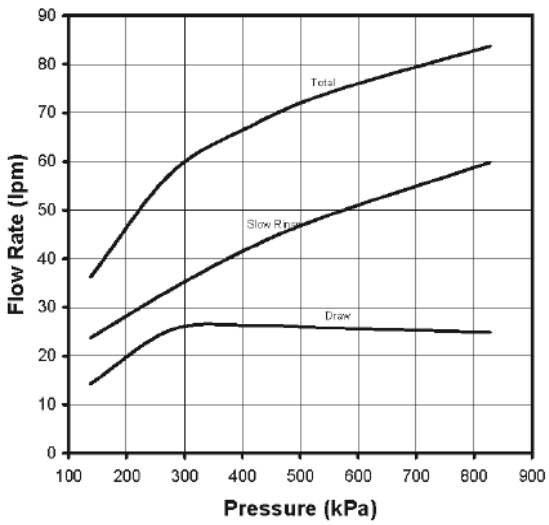
WS2 Injector Graphs: Injector Draw, Slow Rinse, and Total Flow Rates

“G”, Part No. LC-V3010-2G

US Units



Metric Units



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