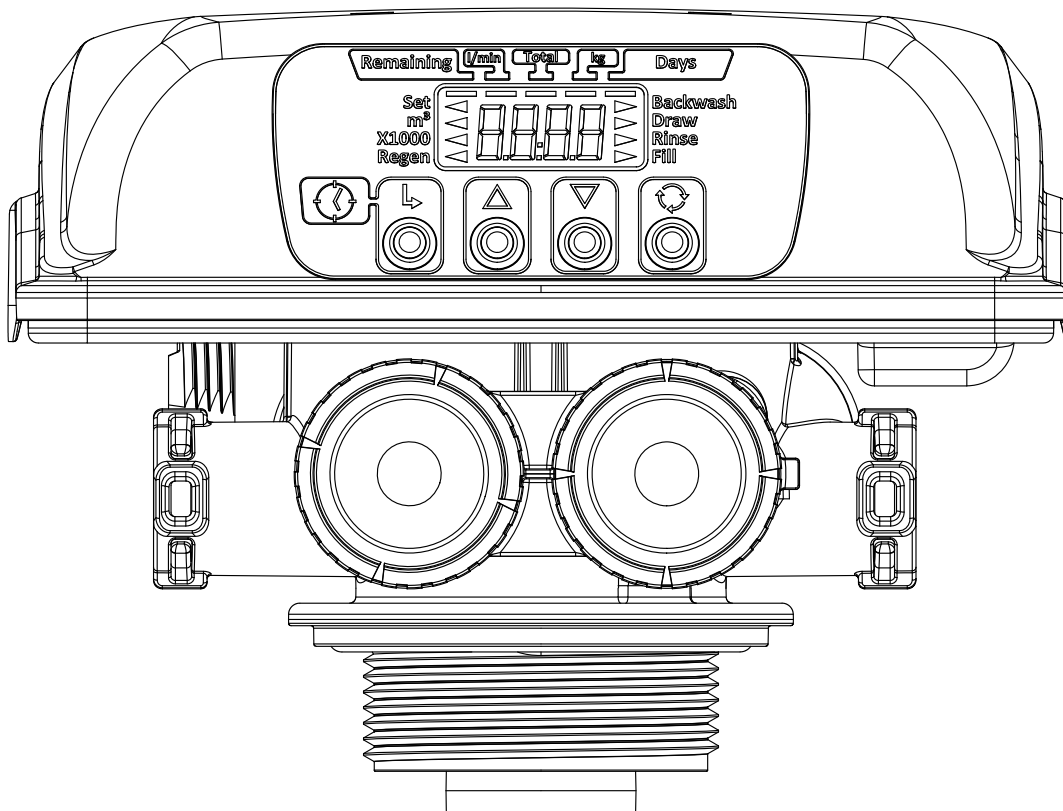


Water Specialist Disc Control Valve Drawings and Service Manual



Operation and Instruction Manual for OEM Only.

Please Note: This operation and instruction manual is for the training of the OEM and for the OEM to use to train their customers. This document is not to be used as the complete system manual.

WARNING: USE ONLY SILICONE-BASED LUBRICANTS ON ALL CLACK CORPORATION COMPONENTS HYDROCARBONS WILL DAMAGE COMPONENTS THAT CONTAIN O-RINGS AND/OR PLASTIC. THIS CAN CAUSE LEAKS OR BREAKAGE. DO NOT USE LUBRICANTS THAT CONTAIN HYDROCARBONS SUCH AS VASELINE®/PETROLEUM JELLY, WD-40®, ETC. DO NOT USE CLACK CONTROL VALVE PRODUCTS ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS BENZENE, GASOLINE, KEROSENE, ETC.

Table of Contents

Introduction.....	4
Specifications	5
DV Internal Components	6
Injector Cap, Injector Screen, Injector, Plug, and O-Ring	7
Injector Order Information.....	8
Refill Flow Control Assembly and Refill Port Plug.....	9
Drain Line – $\frac{3}{4}$ "	10
Drain Line Flow Control and Fitting Assembly	11
Water Meter, Meter Plug, and Mixing Valve	12
Installation Fitting Assemblies.....	13-14
Bypass Valve	15
Flow Diagrams.....	16
Service Spanner Wrenches.....	17

Introduction

This manual is about a control valve to be used on water softeners or water filters. The manual is designed to aid water treatment equipment manufacturers in the selection of the various control valve options. Information in this manual is different than what is needed for installation and servicing of a particular water treatment system. This manual is not intended to be used as a manual for a complete water softener or filter. Certain parts of the manual will serve as aids to manufacturers in the writing and layout of the manuals for installers and service personnel.

General Warnings (Must appear in OEM's manual):

The following general warnings and Specifications in the next section must appear in the OEM's System Manual.

The control valve, fittings, and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

A silicone-based lubricant may be used on black O-rings but is not necessary. Do not use hydrocarbon lubricants or spray silicone anywhere on the valve.

HYDROCARBONS WILL DAMAGE COMPONENTS THAT CONTAIN O-RINGS AND/OR PLASTIC. THIS CAN CAUSE LEAKS OR BREAKAGE. DO NOT USE LUBRICANTS THAT CONTAIN HYDROCARBONS SUCH AS VASELINE®/PETROLEUM JELLY, WD-40®, ETC. DO NOT USE CLACK CONTROL VALVE PRODUCTS ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS BENZENE, GASOLINE, KEROSENE, ETC.

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

The nuts and caps are designed to be unscrewed and tightened by hand or with the special plastic wrench. If necessary, a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in the slots on caps and/or tap with a hammer.

Do not use pipe dope or other sealants on threads. Use thread sealant tape on the threaded inlet, outlet, and drain fitting assemblies. Thread sealant tape is not necessary on the nut connection or caps because of O-ring seals.

After completing any valve maintenance involving the drive assembly or drive cap assembly, unplug the power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons for approximately 3 seconds. This resets the electronics and establishes the service position. The display should flash all wording then flash the software version and reset the valve to the service position.

All plumbing should be done in accordance with local plumbing codes. The pipe size for the drain line should be a minimum of ½". Backwash flow rates in excess of 7 gpm (26.5 lpm) or length in excess of 20' (6.1 m) require ¾" drain line.

Solder joints near the drain must be done prior to connecting the drain line flow control fitting. Leave at least 6" between the drain line control fitting and solder joints when soldering pipes that are connected on the drain line control fitting. Failure to do this could cause interior damage to the drain line flow control fitting.

When assembling the installation fitting package (inlet and outlet), 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.

Install grounding strap on metal pipes.

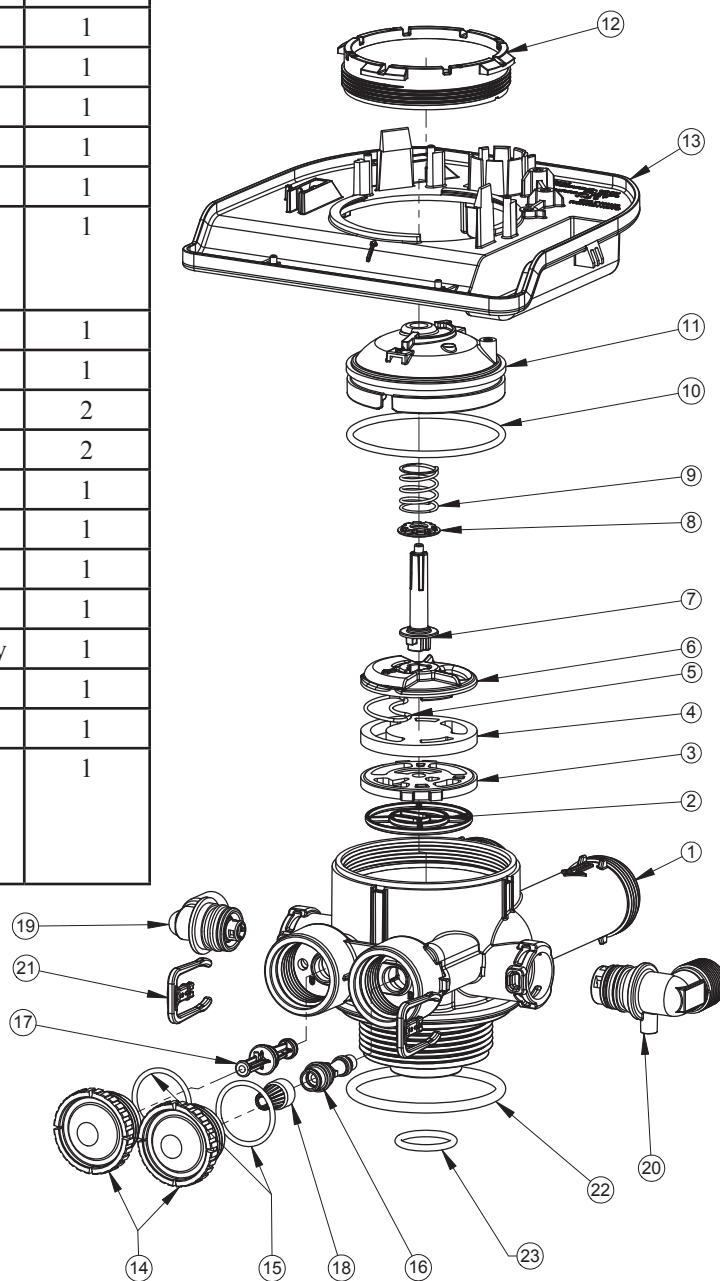
Specifications

Minimum/Maximum Operating Pressures	20 psi (138 kPa or 1.4 bar) – 125 psi (862 kPa or 8.6 bar)	
Minimum/Maximum Operating Temperatures	40°F (4°C) – 110°F (43°C)	
Power adapter: Supply Voltage Supply Frequency Output Voltage Output Current	International 200-240 VAC 50/60 Hz 15.0 VDC 500 mA	U.S 100-120 VAC 50/60Hz 15.0 VDC 500mA
Power Source (for PJ control only)	4 C Cell Alkaline Batteries	
No user serviceable parts are on the PC board or motor.		
Service Flow Rate 1” (includes bypass and meter)	11 gpm (41.6 lpm or 2.5 m³/h) @ 15 psig (103 kPa) drop	
Backwash Flow Rate 1” (includes bypass)	14 gpm (53.0 lpm or 3.2 m³/h) @ 25 psig (172 kPa) drop	
Regenerant Refill Rate	0.5 gpm (1.9 lpm)	
Injectors	See page 8	
Drain Line Flow Controls	See page 11	
Inlet/Outlet Fitting Options	See pages 13-14	
Distributor Tube Opening	1.05" outside diameter (¾" NPS)	
Distributor Height from Top of Tank	-¾" / +0	
Tank Thread	2½" - 8 NPSM	
Control Valve Weight	3.5 lb (1.59 kg)	
PC Board Memory	Nonvolatile EEPROM	
Compatible Regenerants/Chemicals	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine, and chloramines	

DV Internal Components

Drawing No.	Order No.	Description	Quantity
1	V4101	DV Body Assembly	1
2	V4103	DV Gasket	1
3	V4104	DV Ceramic Coated Base Disc	1
4	V4105	DV Ceramic Top Disc	1
5	V4222	DV Disc Seal	1
6	V4106	DV Disc Drive Cap	1
7	V4110	DV Drive Shaft	1
8	V4125	DV Spring Support	1
9	V4135	DV Compression Spring	1
10	V4108	O-Ring 235	1
11	V4107-01	DV Main Cap Assembly NOTE: Order number V4107-01 includes V4108 O-Ring 235	1
12	V4111	DV Lock Ring	1
13	V4114	DV Backplate	1
14	V4152	DV Injector Cap	2
15	V4196	O-Ring 124	2
16	V3010-XX	WS1 Injector Assembly	1
17	V4121-1Z	DV Injector Asy Z Plug	1
18	V4120	DV Injector Screen	1
19	V4144-01	Elbow $\frac{3}{8}$ Brine QC W/RFC	1
20	V3962	WS1 Drn Elb&Retain WO/Sil Asy	1
21	H4615	Clip Retaining 474/WS1	1
22	V3180	O-Ring 337	1
23	V3105	O-Ring 215 NOTE: V3105 O-Ring 215 is included with V4104 DV Body Assembly	1

No. 4, 5, and 6 can be ordered as V4105-01.

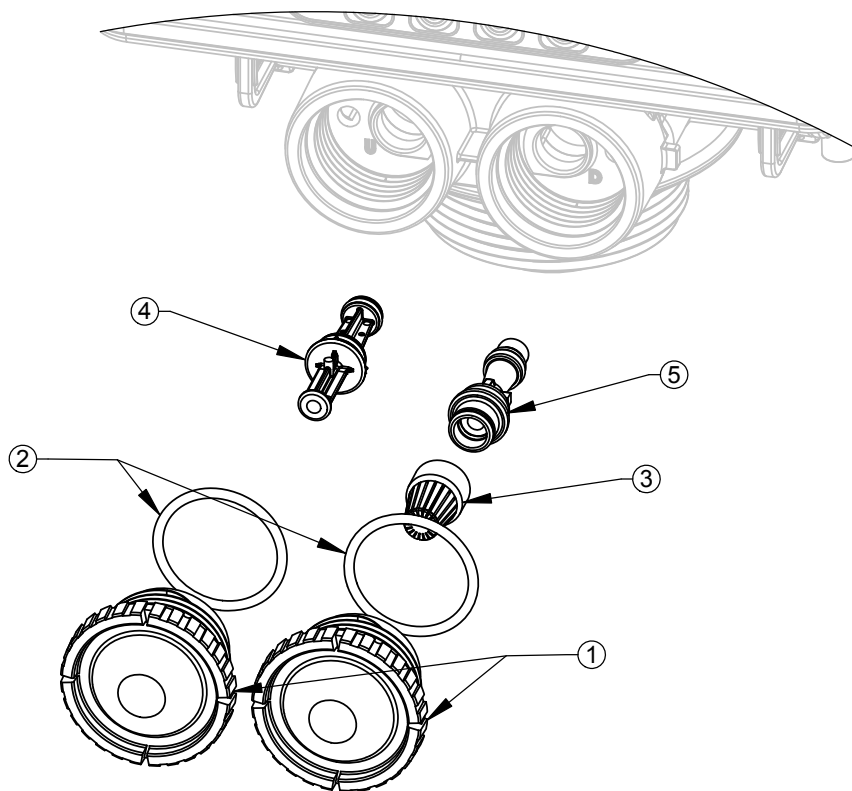


Injector Cap, Injector Screen, Injector, Plug, and O-Ring

Drawing No.	Order No.	Description	Quantity
1	V4152	INJECTOR CAP	2
2	V4196	O-RING 124	2
3	V4120	INJECTOR SCREEN CAGE	1
4	V4121-1Z	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 is in the other hole. For a filter that only backwashes, injector plugs are located in both holes.



Injector Order Information

Injector Order Number	Injector Color	Typical Tank Diameter	
		Down	Up
V3010-1A	Black	6"	8"
V3010-1B	Brown	7"	9"
V3010-1C	Violet	8"	10"
V3010-1D	Red	9"	12"
V3010-1E	White	10"	13"
V3010-1F	Blue	12"	14"
V3010-1G	Yellow	13"	16"
V3010-1H	Green	14"	18"
V3010-1I	Orange	16"	22"
V3010-1J	Light Blue	18"	
V3010-1K	Light Green	22"	

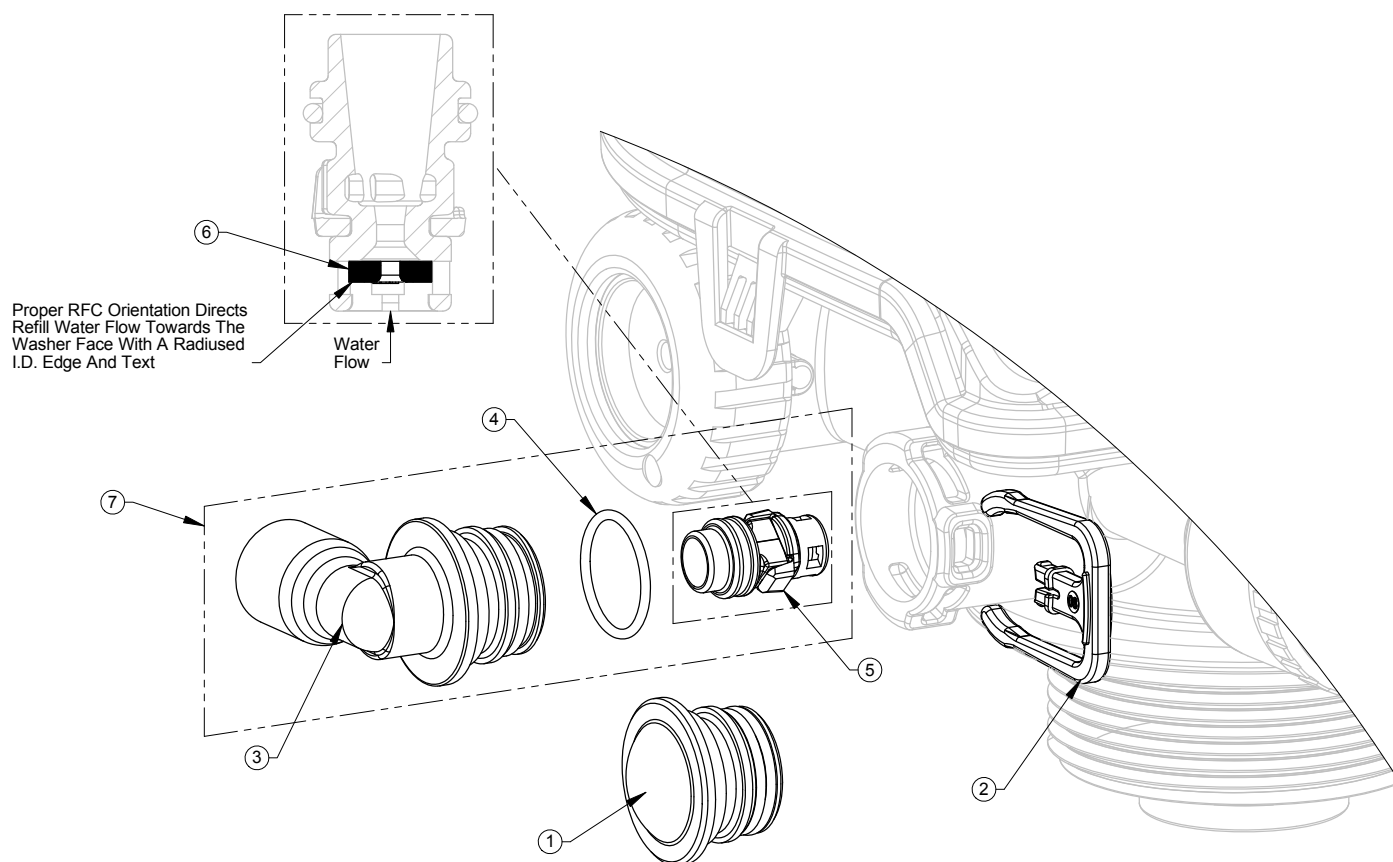
Actual tank size used may vary depending on the design and application of the system. Tank diameter is an approximation for the following:

1. Downflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride.
2. Upflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride, an inlet water pressure of 30 – 50 psi (2.1 – 3.4 bar), and water temperature of 60°F (15.6°C) or warmer. Higher pressures or lower temperatures would need smaller injectors to avoid lifting the bed.

Refill Flow Control Assembly 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	H4628	ELBOW $\frac{3}{8}$ BRINE QC	1
4	V3163	O-RING 019	1
5	V3165-01*	WS1 RFC RETAINER ASY (0.5 gpm)	1
6	V3182	WS1 RFC	1
7	V4144-01	ELBOW $\frac{3}{8}$ BRINE QC w/ RFC	1
Not Shown	V3552	WS1 BRINE ELBOW ASY w/ RFC	Option
Not Shown	H4650	ELBOW $\frac{1}{2}$ " w/ NUT AND INSERT	Option

*Assembly includes V3182 WS1 (0.5 gpm) RFC.

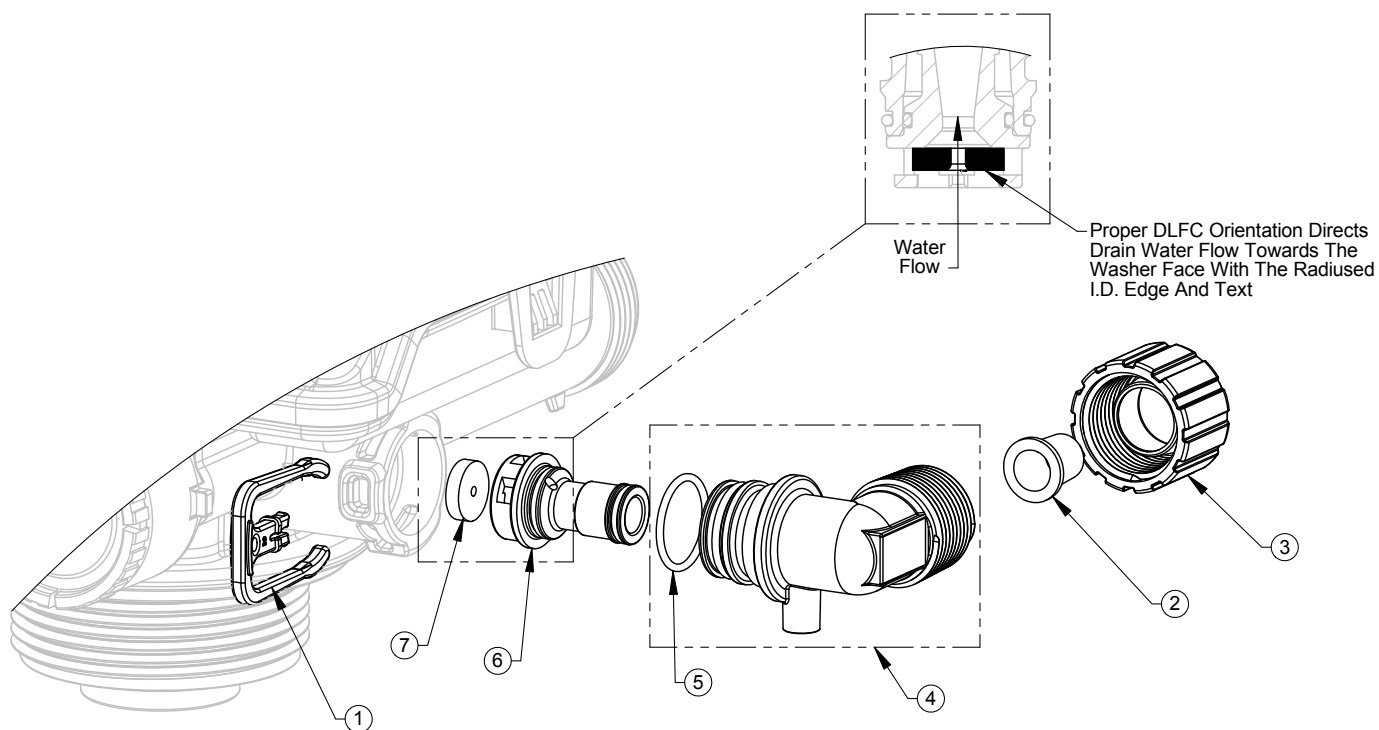


Drain Line – 3/4"

Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	PKP10TS8-BULK	Polytube Insert 5/8	Option
3	V3192	WS1 Nut 3/4 Drain Elbow	Option
4*	V3158-01	WS1 Drain Elbow 3/4 Male	1
	V3158-02	WS1 Drain Elbow 3/4 Male No Silencer	
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 gpm for 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	

*4 and 6 can be ordered as a complete assembly: V4057 WS1 Drain Elbow & Retainer Asy w/ Silencer or V3962 WS1 Drain Elbow & Retainer Asy w/o Silencer

Valves are shipped without drain line flow control (DLFC)—install DLFC before using. Valves are shipped without 3/4" nut for drain elbow (polytube installation only) and 5/8" polytube insert (polytube installation only).



Drain Line Flow Control and Fitting Assembly

The drain line flow control assembly includes a drain line flow control and a fitting. The drain line flow control allows proper media bed expansion by regulating the flow rate to the drain. The drain line flow control is a flexible washer-like part with an orifice and a precision molded contour. The flow rates are within $\pm 10\%$ over the pressure range of 20 – 125 psi (1.4 – 8.6 bar). See table below for flow rate information.

Drain Line Flow Control and Fitting Assembly Information

Drain Line Fitting	Drain Line Flow Control Order No.	Number on Drain Line Flow Control	Backwash Flow Rate (gpm)	Backwash Flow Rate (lpm)
¾"	V3162-007	007	0.7	2.6
¾"	V3162-010	010	1.0	3.8
¾"	V3162-013	013	1.3	4.9
¾"	V3162-017	017	1.7	6.4
¾"	V3162-022	022	2.2	8.3
¾"	V3162-027	027	2.7	10.2
¾"	V3162-032	032	3.2	12.1
¾"	V3162-042	042	4.2	15.9
¾"	V3162-053	053	5.3	20.1
¾"	V3162-065	065	6.5	24.6
¾"	V3162-075	075	7.5	28.4
¾"	V3162-090	090	9.0	34.1
¾"	V3162-100	100	10.0	37.9
1"	V3190-090	090	9.0	34.1
1"	V3190-100	100	10.0	37.9
1"	V3190-110	110	11	41.6
1"	V3190-130	130	13	49.2
1"	V3190-150	150	15	56.8
1"	V3190-170	170	17	64.3
1"	V3190-200	200	20	75.7
1"	V3190-250	250	25	94.6

The drain line flow control and fitting are located on the side of the control valve and are replaceable without the use of special tools.

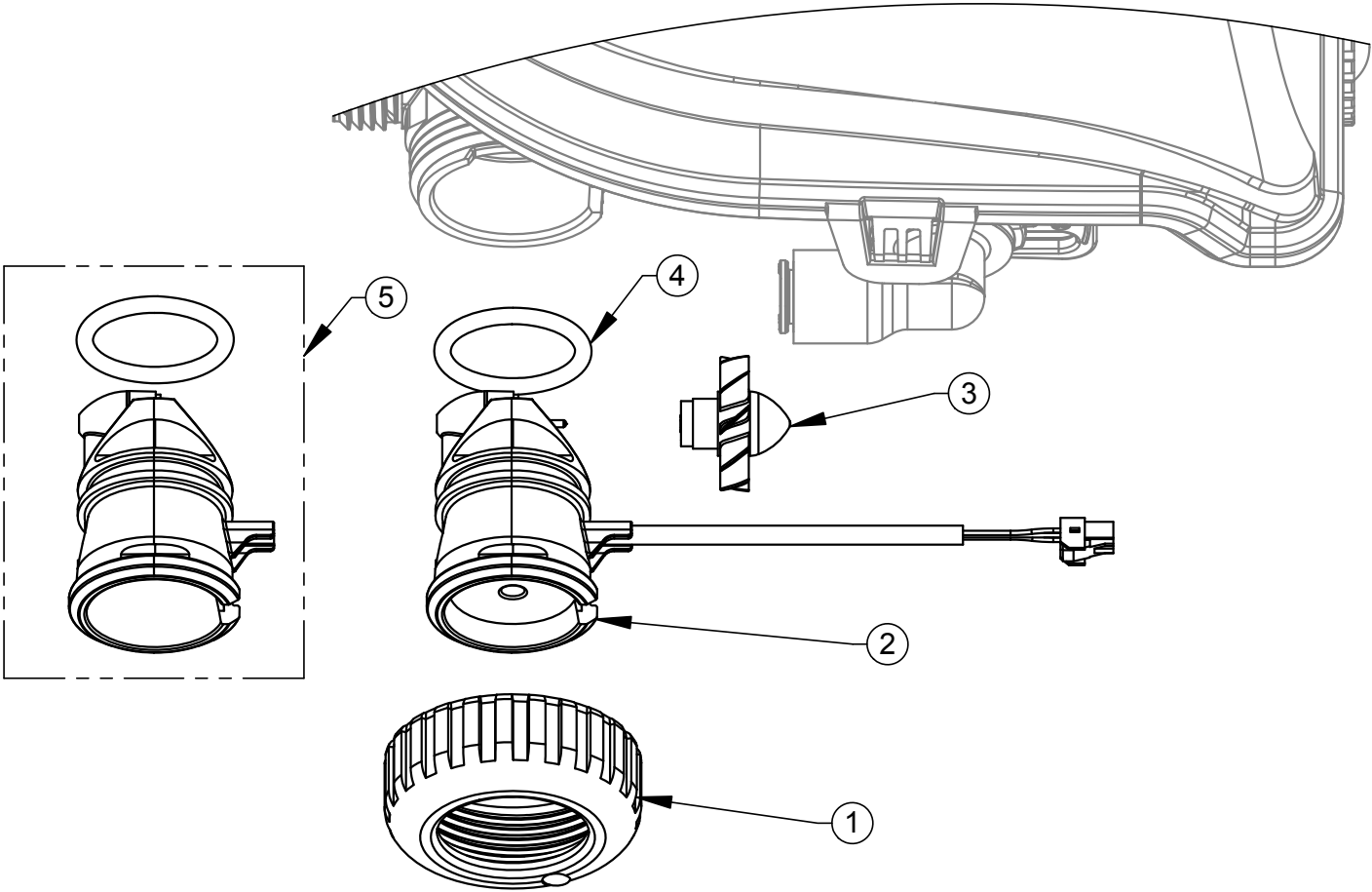
The drain line flow control can be installed in the standard ¾" drain line elbow, which accommodates ⅝" polytube or ¾" NPT drain line connections. The optional nut and polytube insert for the ¾" drain line elbow is designed for use with flexible polytube only. The ¾" drain line elbow can be rotated 180 degrees so the outlet can be oriented to the nearest drain. The same retainer is used for all drain line flow controls for the ¾" fitting. Drain line flow controls designed for the ¾" fitting are available for flow rates ranging from 0.7 – 10 gpm (2.6 – 37.9 lpm).

An optional 1" straight drain line fitting is available to accommodate drain line flow rates ranging from 9 – 25 gpm (34.1 – 94.6 lpm). This fitting is straight but still connects to the control valve using the same locking clip. The drain line flow control is located between 2 fitted parts (i.e. the fitting acts as the retainer). The nut is unscrewed to access the drain line flow control.

Water Meter, Meter Plug, and Mixing Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QC	1
2	V4173-01*	MOLEX DV1 L POWER METER ASY	1
3	V3118-01	WS1 TURBINE ASY	1
4	V3105	O-RING 215	1
5	V3003-01	WS1 METER PLUG ASY	1
6	V3013	MIXING VALVE	Optional

*Order number V4173-01 includes V3118-01 WS1 Turbine Asy and V3105 O-Ring 215.



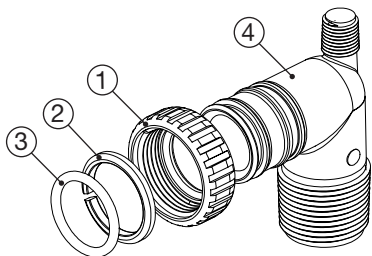
THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL OR HEALTH EFFECT APPLICATIONS.

Installation Fitting Assemblies

Order No: V3007

Description: WS1 Fitting 1" Male NPT Elbow Assembly

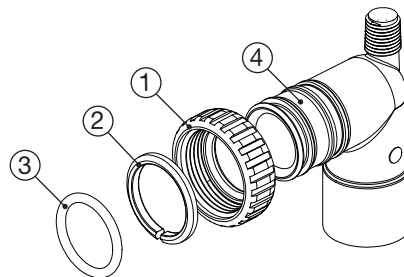
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3149	WS1 FITTING 1" MALE NPT ELBOW	2



Order No: V3007-01

Description: WS1 Fitting ¾" & 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 ¾" & 1" PVC SOLVENT 90	2

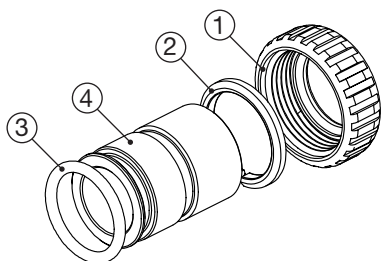


Order No: V3007-02LF

Description: WS1 Fitting 1" Brass Sweat Assembly LF

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-LF	WS1 FITTING 1" BRASS SWEAT ASSEMBLY LF	2

Do not install in California.

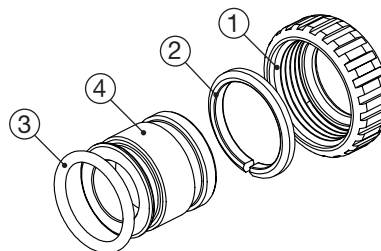


Order No: V3007-03LF

Description: WS1 Fitting ¾" Brass Sweat Assembly LF

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	V3188-01LF	WS1 FITTING ¾" BRASS SWEAT LF	2

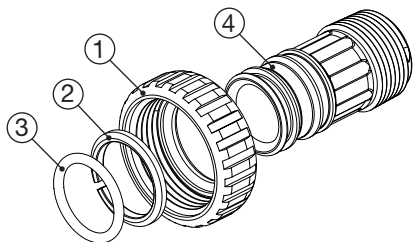
Do not install in California.



Order No: V3007-04

Description: WS1 Fitting 1" Plastic Male NPT Assembly

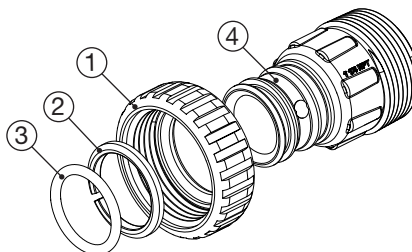
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3164	WS1 FITTING 1" PLASTIC MALE NPT	2



Order No: V3007-05

Description: WS1 Fitting 1¼" Plastic Male NPT Assembly

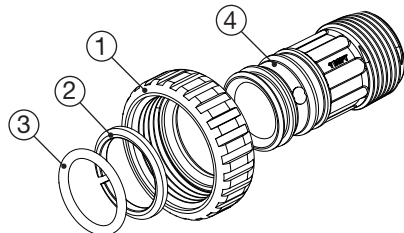
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3317	WS1 FITTING 1¼" PLASTIC MALE NPT	2



Order No: V3007-06

Description: WS1 Fitting 1" Plastic Male BSPT Assembly

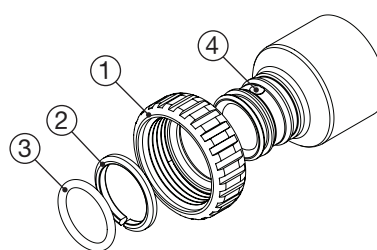
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3316	WS1 FITTING 1" PLASTIC MALE BSPT	2



Order No: V3007-07

Description: WS1 Fitting 1¼" & 1½" PVC Solvent 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	V3352	WS1 FITTING 1¼" & 1½" PVC SOLVENT	2

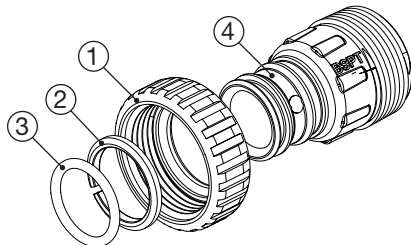


Installation Fitting Assemblies

Order No. V3007-08

Description: WS1 Fitting 1/4" Plastic Male BSPT Assembly

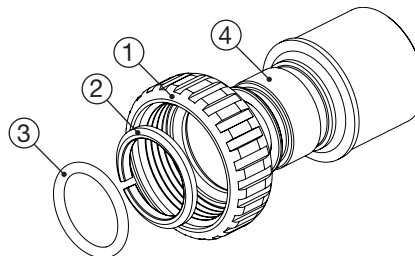
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3361	WS1 FITTING 1/4" PLASTIC MALE BSPT	2



Order No. V3007-09LF

Description: WS1 Fitting 1/4" & 1/2" Brass Sweat Assembly LF

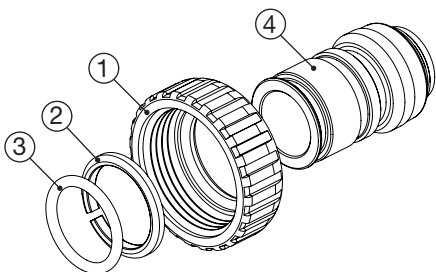
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3375-LF	WS1 FITTING 1/4" & 1/2" BRASS SWEAT LF	2



Order No. V3007-12LF

Description: WS1 Fitting 3/4" Brass SharkBite Assembly LF

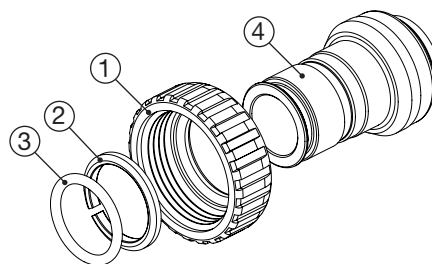
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3628-LF	WS1 FITTING 3/4" BRASS SHARKBITE LF	2



Order No. V3007-13LF

Description: WS1 Fitting 1" Brass SharkBite Assembly LF

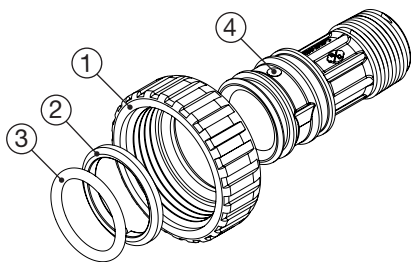
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3629-LF	WS1 FITTING 1" BRASS SHARKBITE LF	2



Order No. V3007-14

Description: WS1 Fitting 3/4" Plastic Male BSPT Assembly

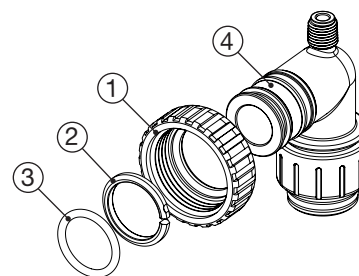
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3594	WS1 FITTING 3/4" PLASTIC MALE BSPT	2



Order No. V3007-15

Description: WS1 FTG 3/4" JG QC 90 ASY

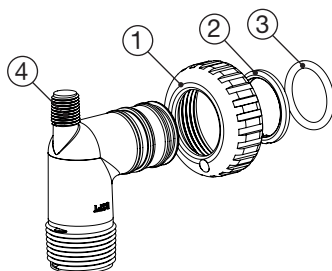
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3790	WS1 ELBOW 3/4" QC W/STEM	2



Order No. V3007-16

Description: WS1 Fitting 1" Male BSPT Elbow Assembly

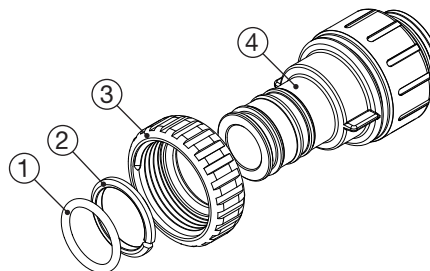
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3797	WS1 FITTING 1" MALE BSPT ELBOW	2



Order No. V3007-17

Description: WS1 FTG 1" JG QC ASY

Drawing No.	Order No.	Description	Quantity
1	V3105	O-RING 215	2
2	V3150	WS1 SPLIT RING	2
3	V3151	WS1 NUT 1" QUICK CONNECT	2
4	V4045	WS1 FITTING 1" QC	2

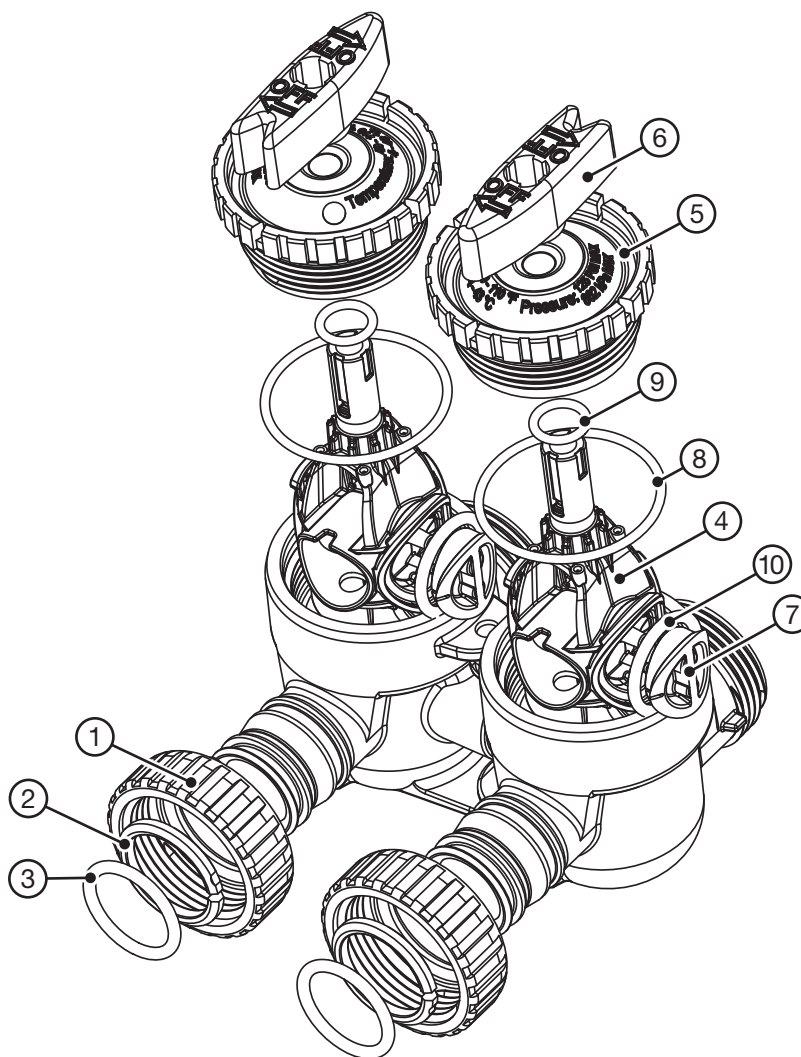


Bypass Valve

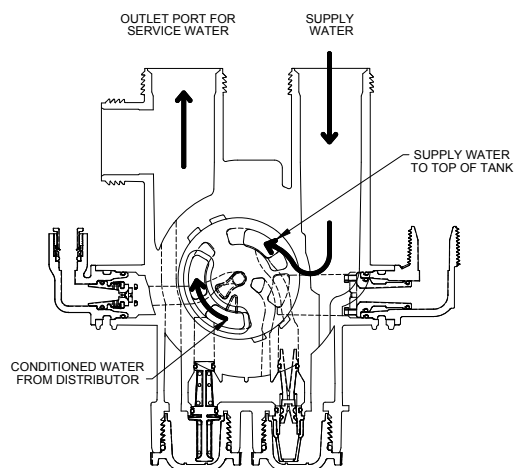
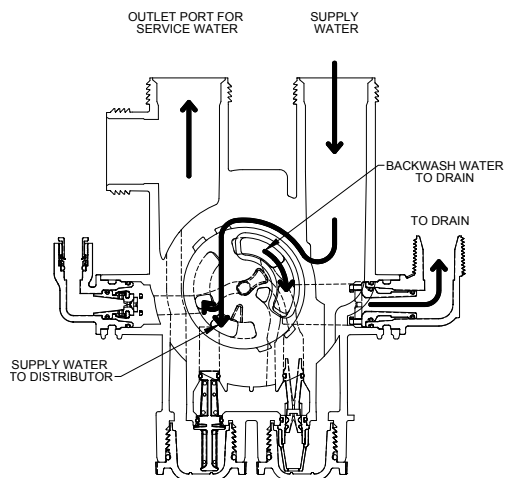
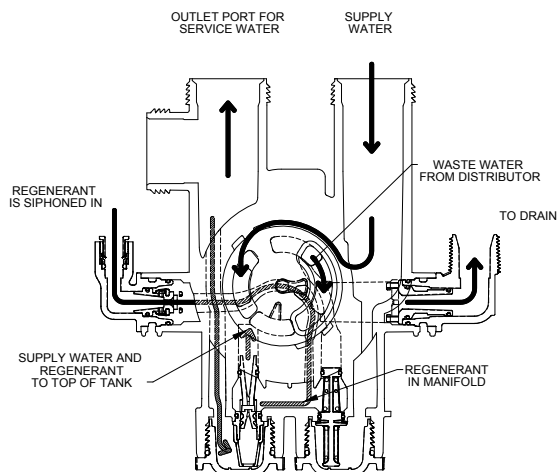
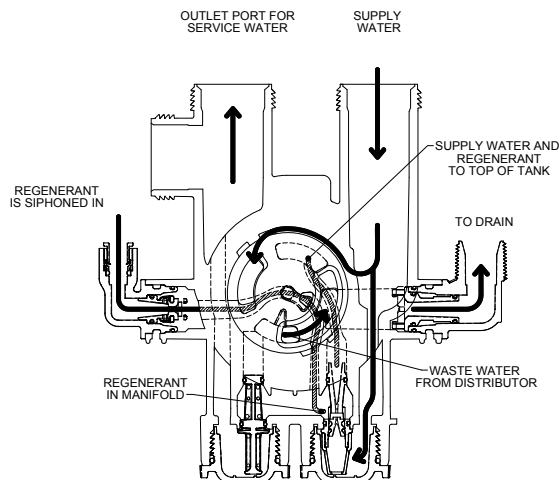
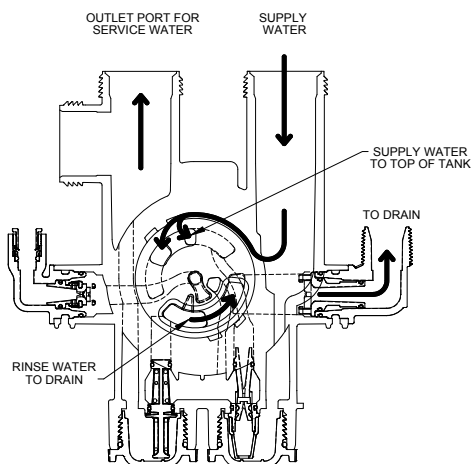
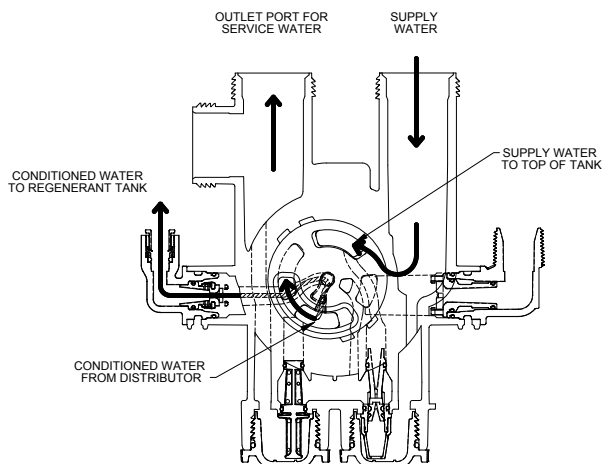
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	2
2	V3150	WS1 SPLIT RING	2
3	V3105	O-RING 215	2
4	V3145	WS1 BYPASS 1" ROTOR	2
5	V3146	WS1 BYPASS CAP	2
6	V3147	WS1 BYPASS HANDLE	2
7	V3148	WS1 BYPASS ROTOR SEAL RETAINER	2
8	V3152	O-RING 135	2
9	V3155	O-RING 112	2
10	V3156	O-RING 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	WS1 BYPASS VERTICAL ADAPTER	2



Flow Diagrams

SERVICE**BACKWASH****UPFLOW BRINE****DOWNFLOW BRINE****RINSE****FILL**

Service Spanner Wrenches

Order No. V3193-02—Service Spanner Wrench

Order No. V4261—DV Brine Cap Wrench

Although no tools are necessary to assemble or disassemble the valve, the wrenches (shown in various positions on the valve) may be purchased to aid in assembly or disassembly.

