Water Specialist
WS1.5P, WS1.5PB, and WS2P
Control Valve
Parts and Service Manual

USE ONLY SILICONE BASED LUBRICANTS ON ALL CLACK 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.

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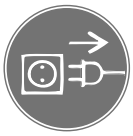
Introduction

This manual is for 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 service of a particular water treatment system. This manual is not intended to be used as a manual for a complete water softener or filter.

General Warnings

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



Disconnect from electrical power prior to servicing the valve.

- **INGESTION HAZARD:** This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if ingested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **KEEP** new and used batteries **OUT OF REACH of CHILDREN**.
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

Service and maintenance should be performed by qualified personnel only.

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

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The nuts and caps are designed to be unscrewed or 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 Teflon tape on the threaded inlet, outlet, and drain fittings. Teflon 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 the drive cap assembly and pistons, reset the PC board. This can be done by unplugging the power source from the printed circuit board (black wire) and plugging it back in or by pressing and holding NEXT and REGEN buttons for 3 seconds. The display should flash all wording, then flash the software version, and then 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 1". Backwash flow rates in excess of 25 GPM (94.6 Lpm) or length in excess of 20' (6.1 m) with no air-gap or vacuum breaker to protect the system will require 1½" 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.

Plug into an electrical outlet.

Note: All electrical connections must be connected according to local codes. Be certain the outlet is uninterrupted.

Install grounding strap on metal pipes.

This glass-filled Noryl[1] (or equivalent) fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a water softener or filter.

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

Control valve installation is made easy because the distributor tube can be cut ½" above to ½" below the top of tank thread. The distributor tube is held in place by an O-ring seal, and the control valve also has a bayonet lock feature for upper distributor baskets.

The power adapter comes with a 15-foot power cord and is designed for use with the control valve. The power adapter is for dry location use only. The control valve remembers all settings until the battery power is depleted if the power goes out.
After the battery power is depleted, the only item that needs to be reset is the time of day; other values are permanently stored in the nonvolatile memory. The control valve battery is not rechargeable but is replaceable.

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.

[1]Noryl is a trademark of SABIC.

WS1.5P/PB General Specifications

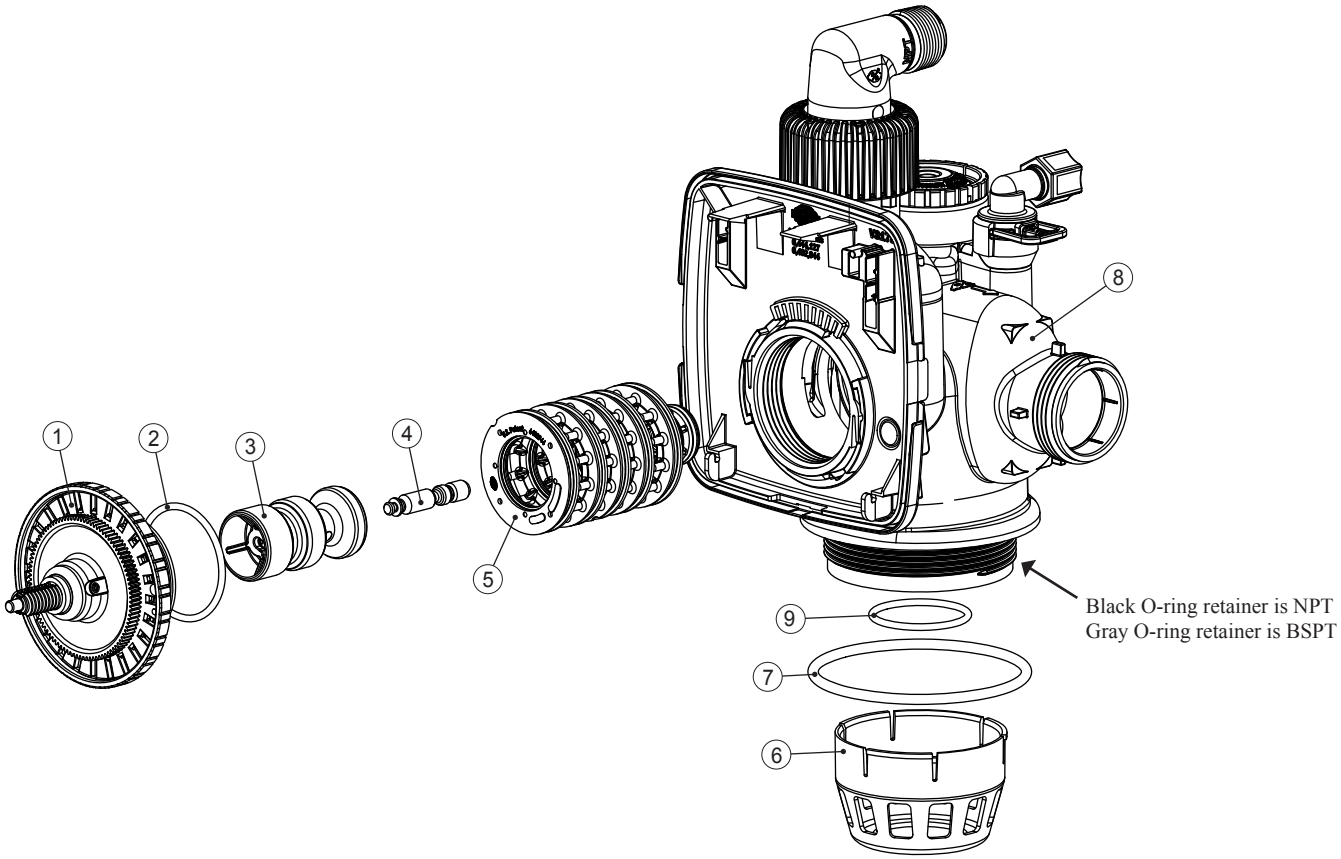
Minimum/Maximum Operating Pressures	20 – 125 psi (138 kPa – 862 kPa)	
Minimum/Maximum Operating Temperatures	40°F – 110°F (4°C – 43°C)	
Power Adapter: Supply Voltage Supply Frequency Output Voltage Output Current	U.S. 100 VAC – 120 VAC 50/60 Hz 15VDC 500 mA	International 200 VAC – 240 VAC 50/60 Hz 15VDC 500 mA
Service flow rate	WS1.5P Valve: 60 gpm @ 15 psi drop (227 lpm, 13.6 m^3/h) WS1.5PB Valve: 48 gpm @ 15 psi drop (181 lpm, 10.9 m^3/h)	
Backwash flow rate	WS1.5P Valve: 43 gpm @ 25 psi drop (163 lpm, 9.8 m^3/h) WS1.5PB Valve: 43 gpm @ 25 psi drop (163 lpm, 9.8 m^3/h)	
Meter: Accuracy Flow Range	 ±5% 0.75 – 75 gpm (2.8 – 284 lpm)	
Inlet/Outlet	1.5" Male NPT or BSPT	
Drain line	1" Male Elbow NPT or 1" BSPT	
Brine line	½" OD polytube compression	
Tank connection	4"-8 UN	
Height from top of tank	10.75"	
PC board memory	Nonvolatile EEPROM	
Valve material	Glass-filled composite	
Regenerant/chemical compatibility	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine, and chloramines	
Regeneration	Downflow or upflow	
Tank applications	12" – 24" diameter	

WS1.5P Drive Cap Assembly, Pistons, Stack Assembly, & Main Body

Drawing No.	Order No.	Description	Quantity
1	V3004	WS1 DRIVE CAP ASSEMBLY	1
2	V3135	O-RING 228	1
3	V3407	WS125/15 PISTON DOWNFLOW ASSEMBLY (AMBER)	1
	V4042	WS112/15 PISTON UPFLOW ASSEMBLY (BLACK)	
4	V3174*	WS1 REGENERANT PISTON	1
5	V3430-01	WS1.5 SPACER STACK ASSEMBLY	1
6	D1300	TOP BAFFLE DIFFUSER 1.5/55MM	1
7	V3419	O-RING 347	1
8	V4400-NPT	WS15P NPT BODY ASSEMBLY	1
	V4400-BSPT	WS15P BSPT BODY ASSEMBLY	
9	V3641	O-RING 225 FOR VALVE BODIES WITH NPT THREADS	1
	V3441	O-RING 226 FOR VALVE BODIES WITH BSPT THREADS	1

*V3174 Regenerant Piston not used for Backwash Only valves. Use V3010-15Z Injector Plug and V3195-01 Refill Port Plug Assembly.

** Inlet/Outlet fitting kits are sold separate, see page 10 for fitting selection.



WS1.5PB Drive Cap Assembly, Pistons, Stack Assembly, & Main Body

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2	V3135	O-RING 228	1
3	V3407	WS125/15 PISTON DOWNFLOW ASSEMBLY (AMBER)	1
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4	V3174*	WS1 REGENERANT PISTON	1
5	V3430-01	WS1.5 SPACER STACK ASSEMBLY	1
6	D1300	TOP BAFFLE DIFFUSER 1.5/55MM	1
7	V3419	O-RING 347	1
8	V4900-NPT	WS15P NPT BODY ASSEMBLY	1
	V4900-BSPT	WS15P BSPT BODY ASSEMBLY	
9	V3641	O-RING 225 FOR VALVE BODIES WITH NPT THREADS	1
	V3441	O-RING 226 FOR VALVE BODIES WITH BSPT THREADS	1

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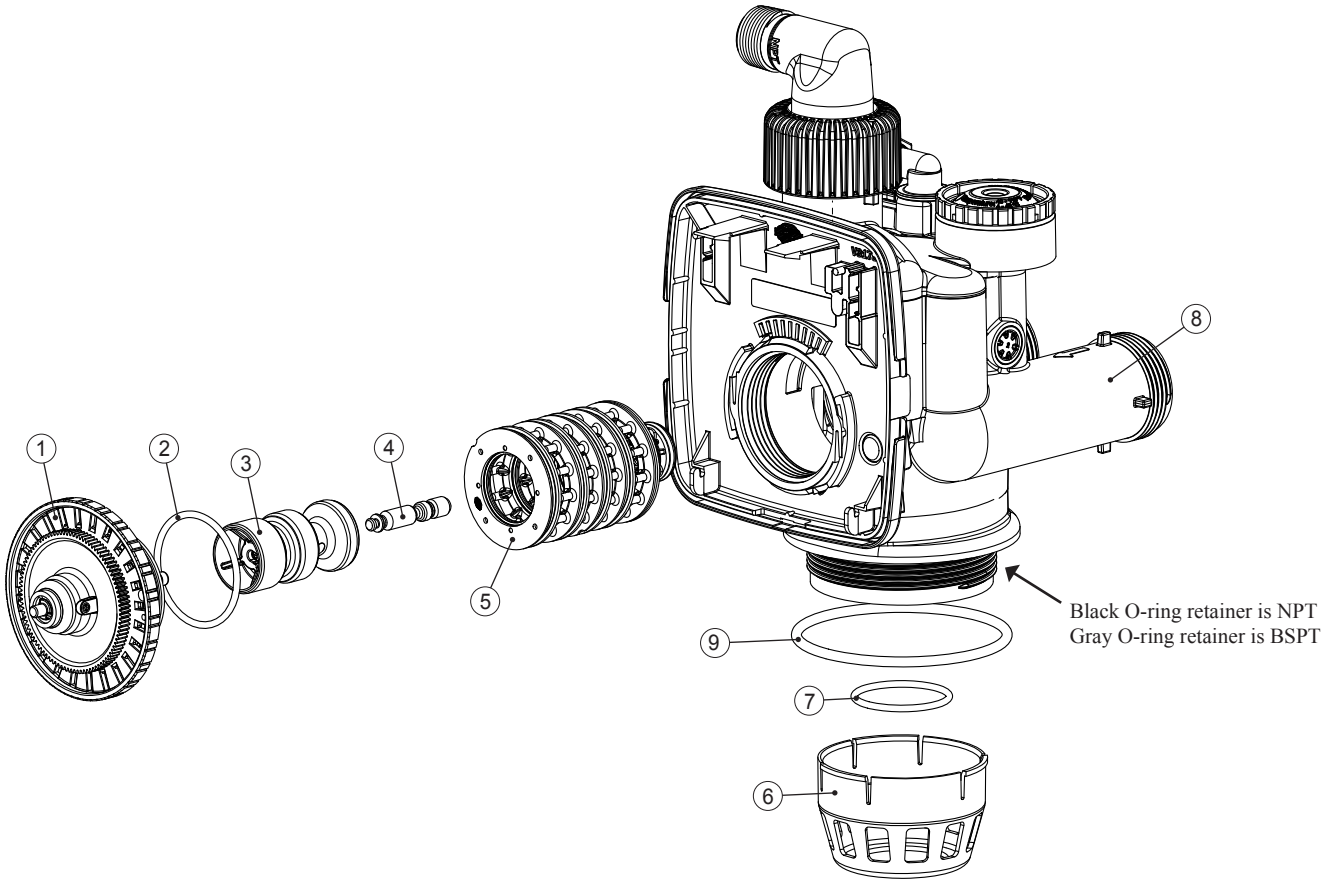
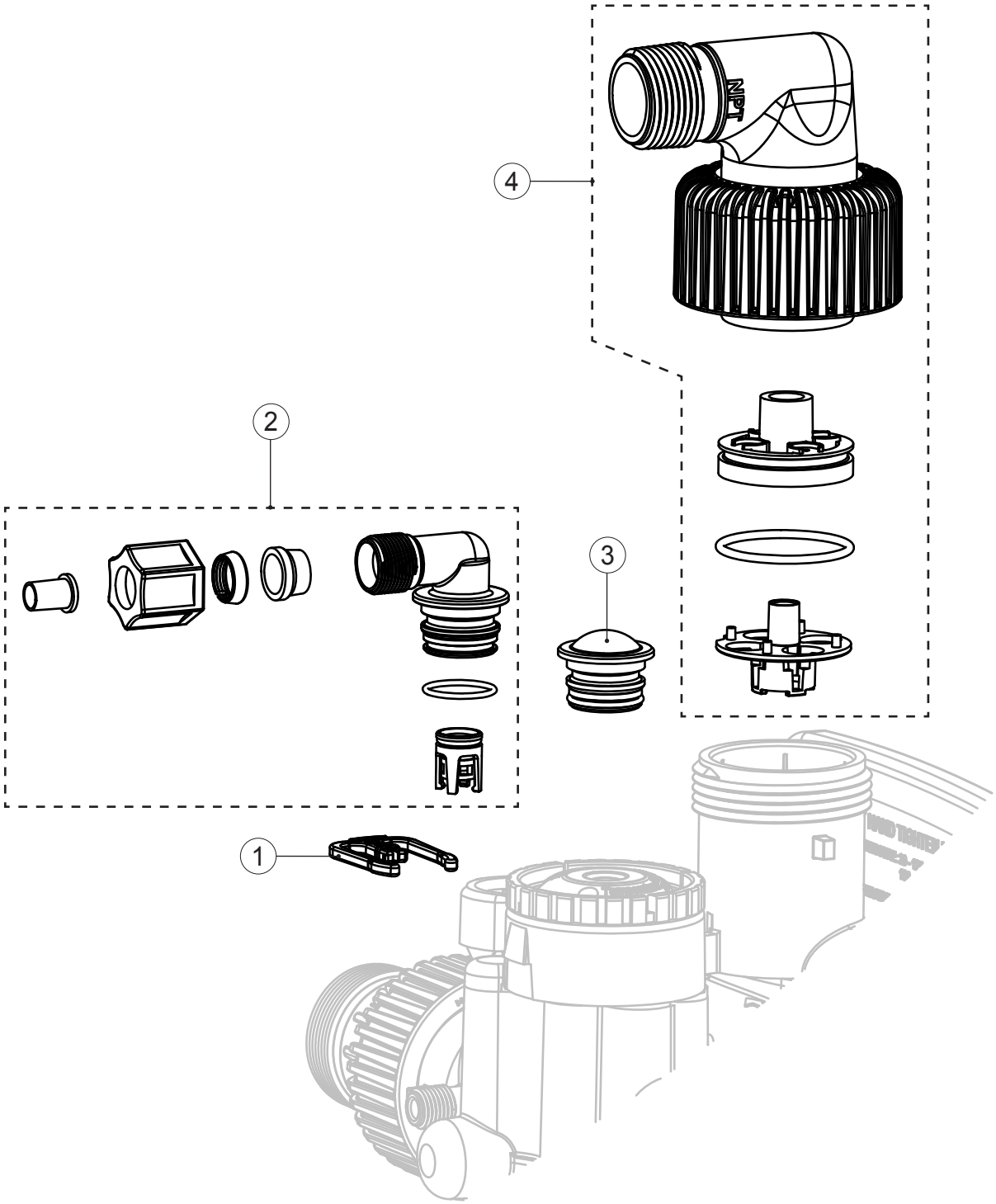


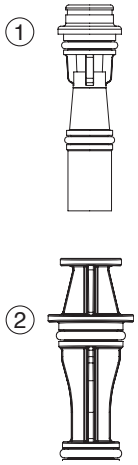
WS1.5P Regenerant Components

Drawing No.	Order No.	Description	Quantity
1	H4615	RETAINING CLIP	1
2	V3498	WS15 BRINE ELBOW ASY W/RFC ½	1
3	V3195-01	REFILL PORT PLUG ASY	1
4	V4430-04NPT	WS15P NPT DRAIN KIT	1
	V4430-04BSPT	WS15P BSPT DRAIN KIT	



WS1.5" Injectors

Drawing No.	Order No.	Description	Nozzle Color	Downflow Typical Tank Diameter[1]	Quantity
1	V3010-15B	WS1.5 Injector Asy B	Violet	12"	1
	V3010-15C	WS1.5 Injector Asy C	Red	13"	
	V3010-15D	WS1.5 Injector Asy D	White	14"	
	V3010-15E	WS1.5 Injector Asy E	Blue	16"	
	V3010-15F	WS1.5 Injector Asy F	Yellow	18"	
	V3010-15G	WS1.5 Injector Asy G	Green	21"	
	V3010-15H	WS1.5 Injector Asy H	Orange	24"	
2	V3010-15Z	WS1.5 Injector Plug		N/A	

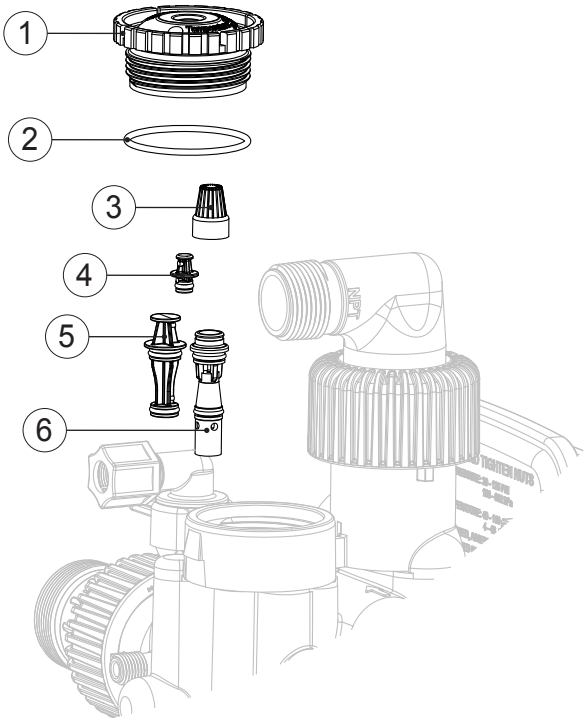


V3010-15B – V3010-15H injectors include one V3416 O-Ring 012 (lower) and one V3171 O-Ring 013 (upper).

For upflow brine applications, it is recommended that the injector be downsized 2 tank sizes minimum. Refer to the injector graphs for verifying proper selection.

WS1.5P Regenerant Components

Drawing No.	Order No.	Description	Quantity
1	V4349	WS15P INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V4120	INJECTOR SCREEN	1
4	V4350-15Z	WS15P INJECTOR FEED PLUG	1
5	V3010-15Z	WS15 INJECTOR PLUG ASY	1 or 2
6	V3010-15X	WS15 INJECTOR ASY	1 or 0



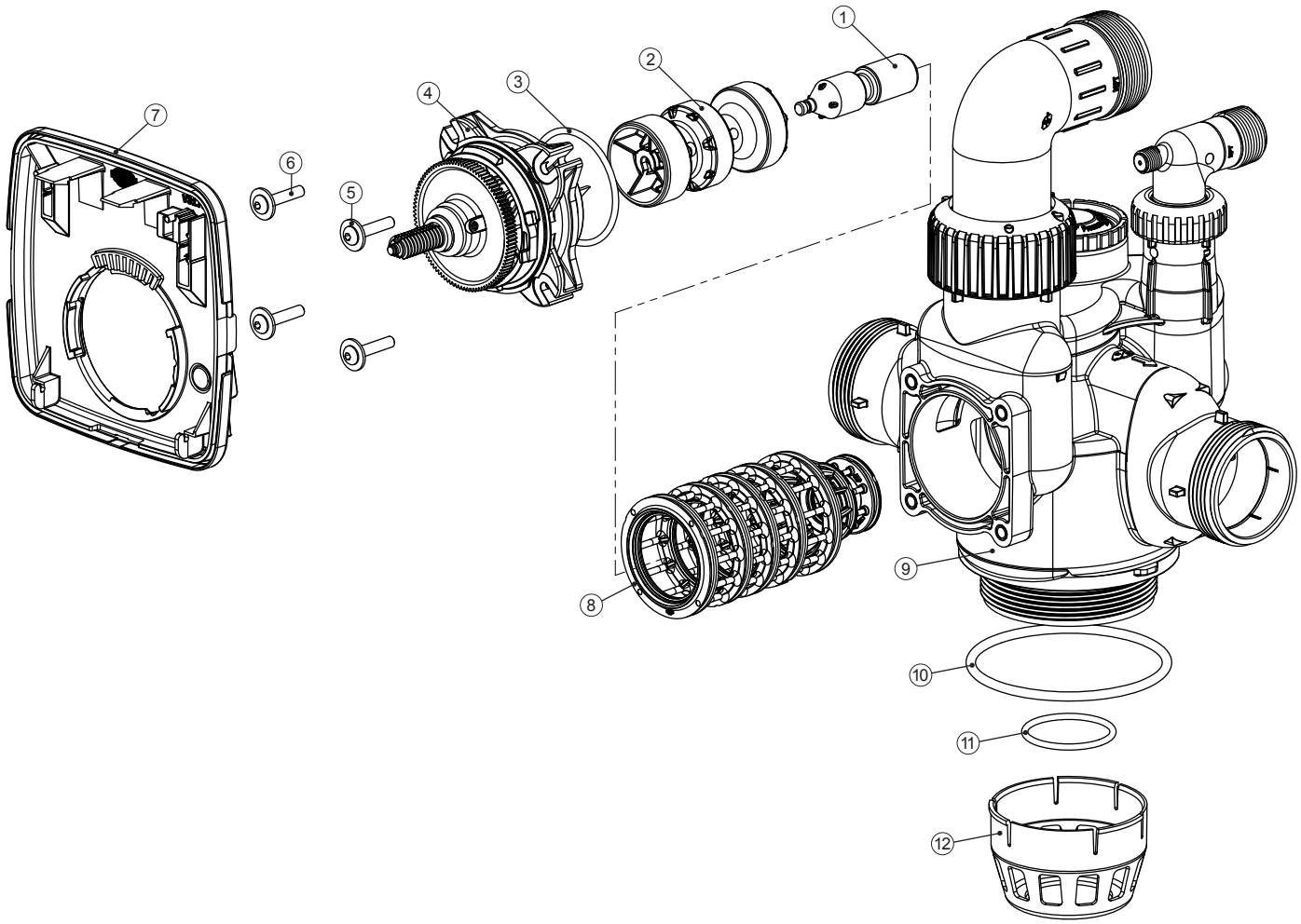
WS2P General Specifications

Minimum/Maximum Operating Pressures	20 – 125 psi (138 kPa – 862 kPa)	
Minimum/Maximum Operating Temperatures	40°F – 110°F (4°C – 43°C)	
Power Adapter: Supply Voltage Supply Frequency Output Voltage Output Current	U.S. 100 VAC – 120 VAC 50/60 Hz 15VDC 500 mA	International 100 VAC – 240 VAC 50/60 Hz 15VDC 500 mA
Service flow rate	95 gpm @ 15 psi drop (359 lpm, 21.6 m^3/h)	
Backwash flow rate	85 gpm @ 25 psi drop (322 lpm, 19.3 m^3/h)	
Meter: Accuracy Flow Range	 ±5% 1.5 – 150 gpm (2.8 – 284 lpm)	
Inlet/Outlet	2" QC fitting optional straight or 90°	
Drain line	2" Male BSPT 90° QC elbow	
Brine line	1" Male NPT elbow, ¾" x 1" w/ ½" OD polytube compression	
Tank connection	4"-8 UN	
Height from top of tank	12.5"	
PC board memory	Nonvolatile EEPROM	
Valve material	Glass-filled composite	
Regenerant/chemical compatibility	Sodium chloride, potassium chloride, potassium permanganate, sodium bisulfite, chlorine, and chloramines	
Regeneration	Downflow or upflow (must be ordered, cannot be converted)	
Tank applications	12" – 36" diameter	

WS2P Drive Cap Assembly, Pistons, Stack Assembly, & Main Body

Drawing No.	Order No.	Description	Quantity
1	V3726*	WS2/QC/P DN BRINE PISTON	1
	V3745	WS2/QC/P UP BRINE PISTON	
2	V3725	WS2 PISTON DOWNFLOW ASSEMBLY (AMBER IN COLOR)	1
	V4059	WS2 PISTON UPFLOW ASSEMBLY (BLACK IN COLOR)	
3	V3452	O-RING 230	1
4	V3728	WS2 DRIVE CAP ASSEMBLY	1
5	V3724	WASHER FLAT SS 1/4	4
6	V3642	BOLT BHCS S/S 1/4-20X1.25	4
7	BACKPLATE	REFER TO PROGRAMMING AND COVER DRAWING MANUAL	1
8	V3729	WS2 STACK DOWNFLOW ASSEMBLY (BLACK IN COLOR)	1
	V3729-01	WS2 STACK UPFLOW ASSEMBLY (BLACK AND GREY IN COLOR)	
9	V4800-NPT	WS2P NPT BODY ASSEMBLY (“D” NEAR INLET ARROW, BLACK DISTRIBUTOR RING)	1
	V4800-BSPT	WS2P BSPT BODY ASSEMBLY (“D” NEAR INLET ARROW, GREY DISTRIBUTOR RING)	
	V4800UP-NPT	WS2P NPT UPFLOW BODY ASSEMBLY (“U” NEAR INLET ARROW, BLACK DISTRIBUTOR RING)	
	V4800UP-BSPT	WS2P BSPT UPFLOW BODY ASSEMBLY (“U” NEAR INLET ARROW, GREY DISTRIBUTOR RING)	
10	V3419	O-RING 347	1
11	V3641	O-RING 225 FOR NPT VALVE BODIES WITH BLACK DISTRIBUTOR RING	1
	V3441	O-RING 226 FOR BSPT VALVE BODIES WITH GREY DISTRIBUTOR RING	1
12	D1300	TOP BAFFLE DFSR CLACK 1.5/50MM	1

* V3726 WS2 Brine Piston must also be used for Backwash Only valves.



WS2 Injector Valve Body, Refill Flow Control, and Injector

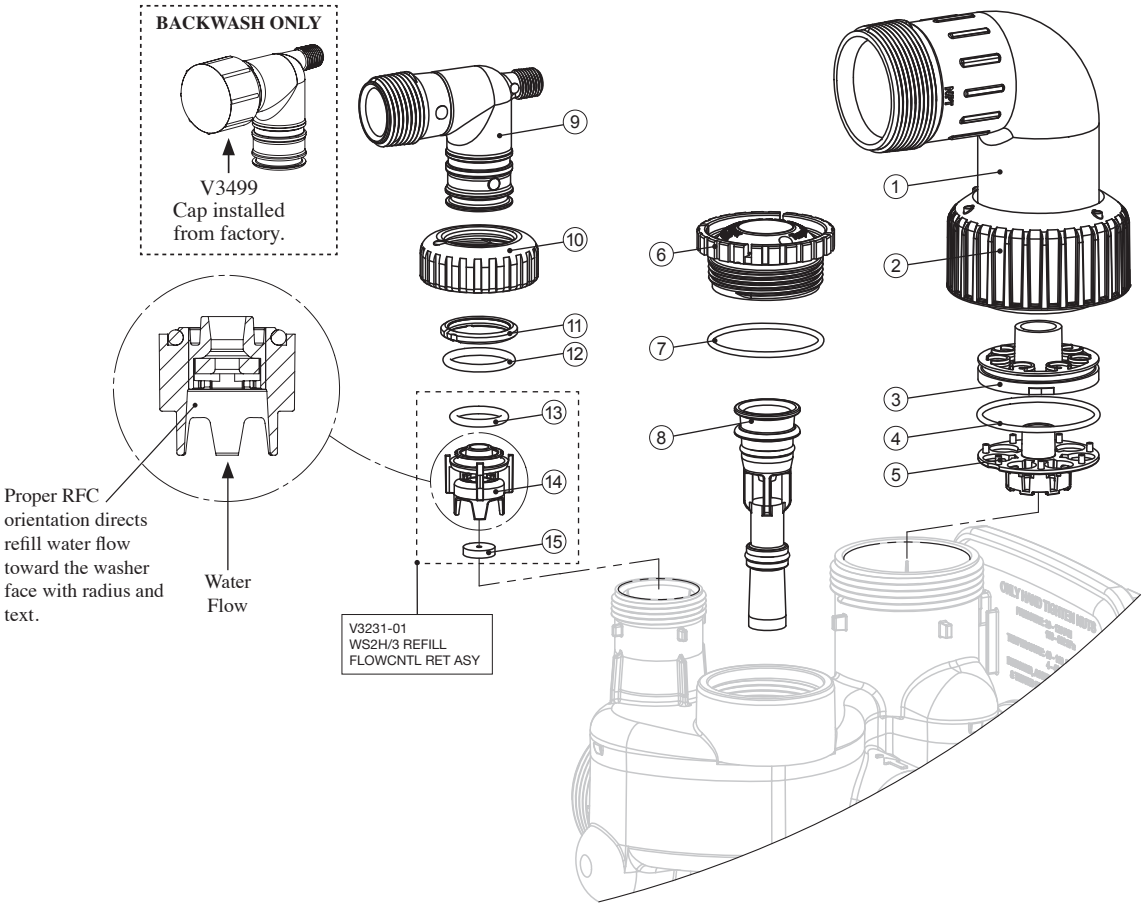
Drawing No.	Order No.	Description	Qty
1	V4460-07NPT	WS2P NPT DRAIN KIT	1
	V4460-07BSPT	WS2P BSPT DRAIN KIT	
6	V3477	WS2H INJECTOR CAP	1
7	V3152	O-RING 135	1
8	See Page 11	WS2/2H INJECTOR ASSY	1
9	V3149	WS1 FTG 1 MALE NPT ELBOW	1
10	V3151	WS1 NUT 1 QC	1
11	V3150	WSI SPLIT RING	1
12	V3105	O-RING 215	1
13	V3277	O-RING 211	1
14	V3231	WS2H REFILL FLOWCNTRL RETAINER	1
15	V3162-022*	WS1 DLFC 022 FOR 3/4	1
Not Shown	V3797**	WS1 FTG 1 MALE BSPT ELBOW	1 (BSPT only)
Not Shown	V3961***	FITTING KIT WS2 1/2 POLYTUBE	Optional

*Any V3162-XXX flow control may be used. WS2 valves are shipped with a 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, take minutes of fill times the flow rate of the flow control being used to arrive at the number of gallons of water be added to the brine tank. Each gallon of water will dissolve approximately 3 pounds of salt.

** BSPT Valves also include a V3797 WS1 FTG 1 MALE BSPT ELBOW

***Use of V3961 may severely reduce brine draw rates.

Backwash Only Valves include a V3499 but do not include the following parts: V3189, H4915, V3162-022, V3231, and V3277.



WS2" and 2" QC Injectors

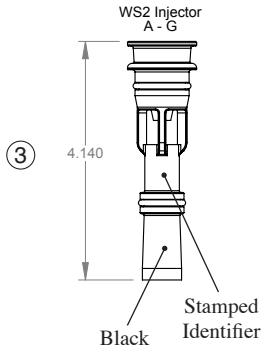
Drawing No.	Order No.	Description	Identifier	Downflow Typical Tank Diameter[1]	Quantity
Not Shown	V3010-2R-15B **	WS2 / 2H Injector Assembly R, W/V3010-15B	Violet	12"	1
	V3010-2S-15C **	WS2 / 2H Injector Assembly S, W/V3010-15C	Red	13"	
	V3010-2T-15D **	WS2 / 2H Injector Assembly T, W/V3010-15D	White	14"	
	V3010-2U-15E **	WS2 / 2H Injector Assembly U, W/V3010-15E	Blue	16"	
3	V3010-2A	WS2 / 2H Injector Assembly A	Stamped A	18"	
	V3010-2B	WS2 / 2H Injector Assembly B	Stamped B	21"	
	V3010-2C	WS2 / 2H Injector Assembly C	Stamped C	24"	
	V3010-2D	WS2 / 2H Injector Assembly D	Stamped D	30"	
	V3010-2E	WS2 / 2H Injector Assembly E	Stamped E	36"	
	V3010-2F	WS2 / 2H Injector Assembly F	Stamped F	42"	
	V3010-2G	WS2 / 2H Injector Assembly G	Stamped G	48"	

** V3010-2X-15X Injectors contain a V3010-2-15 WS2 injector adapter with a WS1.5 injector inside

V3010-2X injectors and the V3010-2-15 Adapter include a V3283 O-RING 117 and a V3284 O-RING 114. The V3010-2-15 Adapter allows the 2" valve to be used on smaller tank sizes. The V3010-2-15 adapter can be used with any V3010-15X injector. The V3010-15X injector includes one V3416 O-RING 012 (lower) and one V3171 O-RING 013 (upper).

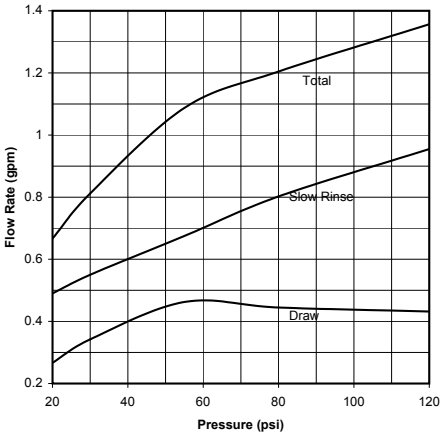
1. Actual injector size may vary depending on the design and application of the system. The injectors are sized for a typical downflow softener using standard mesh synthetic cation exchange media regenerating with sodium chloride. See the injector graphs on the following pages to meet specific applications.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

For upflow brine application, downsize your injector by 2 tank sizes minimum and refer to the injector graphs for verifying proper selection.

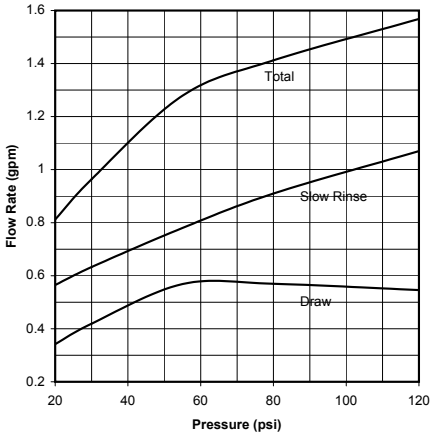


WS.5" Injector Flow Graphs: U.S. Units

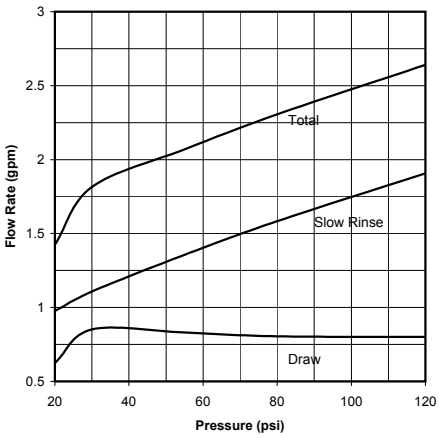
ORDER NO. V3010-15B
VIOLET



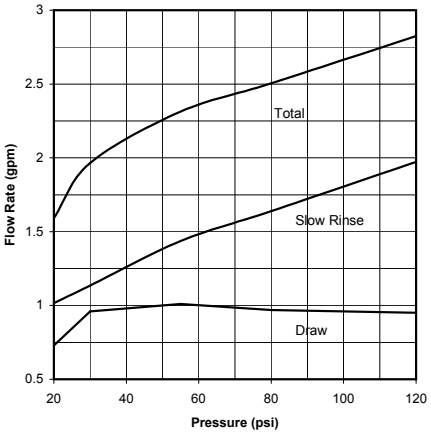
ORDER NO. V3010-15C
RED



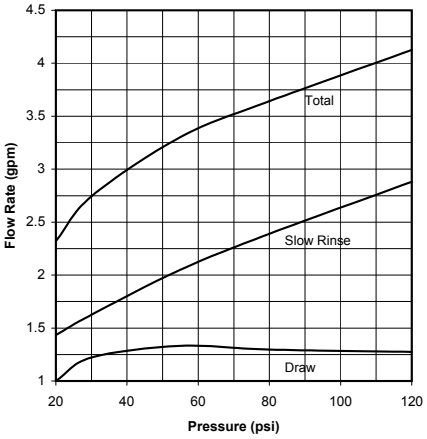
ORDER NO. V3010-15D
WHITE



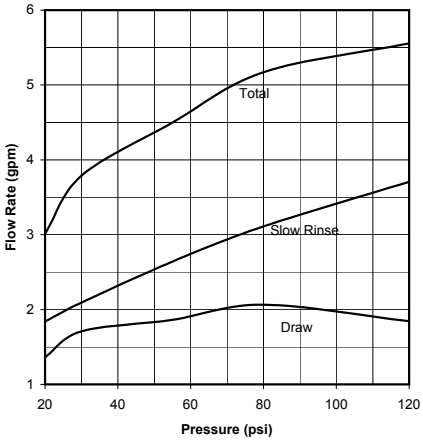
ORDER NO. V3010-15E
BLUE



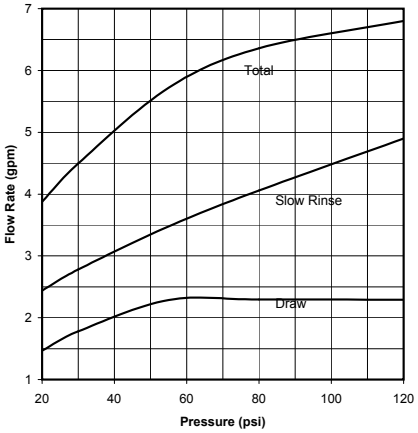
ORDER NO. V3010-15F
YELLOW



ORDER NO. V3010-15G
GREEN

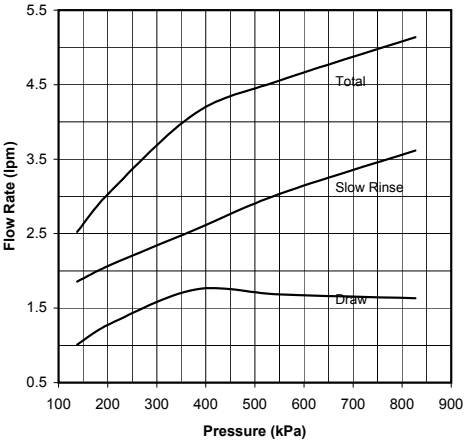


ORDER NO. V3010-15H
ORANGE

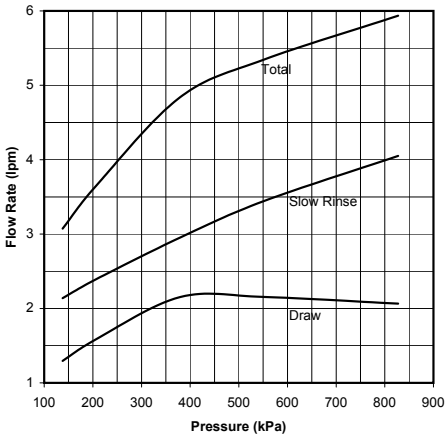


WS1.5" Injector Flow Graphs: Metric Units

ORDER NO. V3010-15B
VIOLET



ORDER NO. V3010-15C
RED



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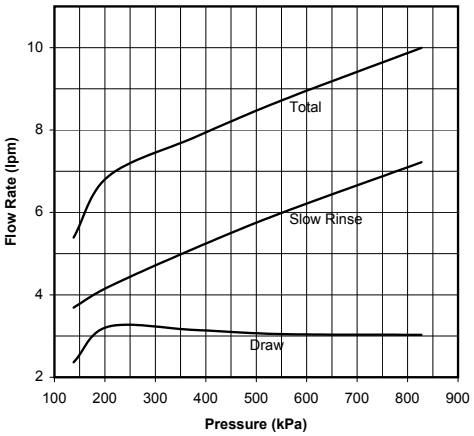
WHITE



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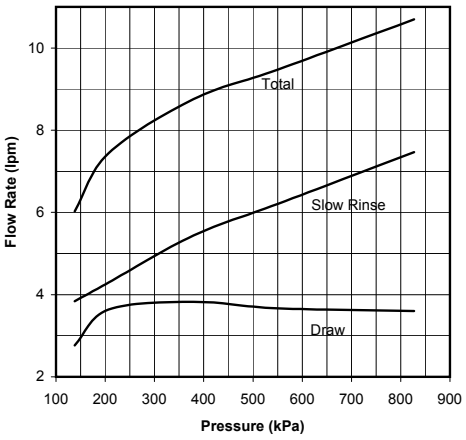

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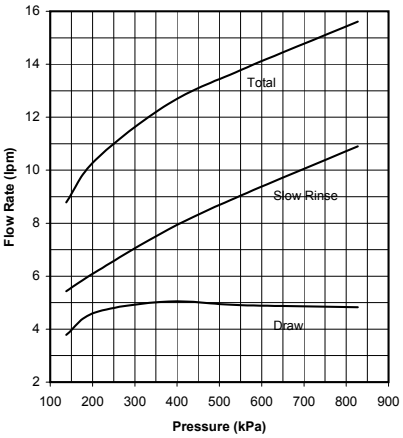
YELLOW



ORDER NO. V3010-15G
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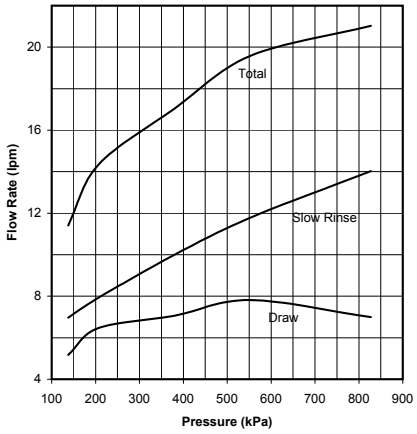
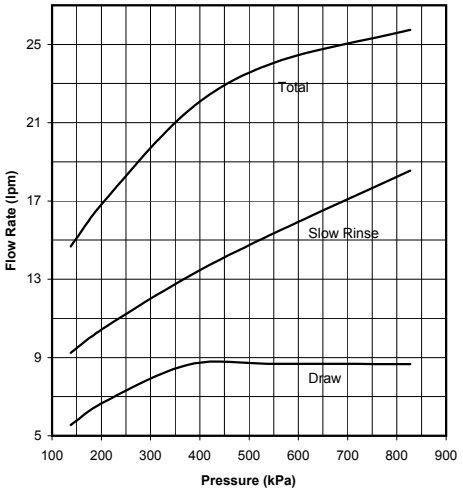
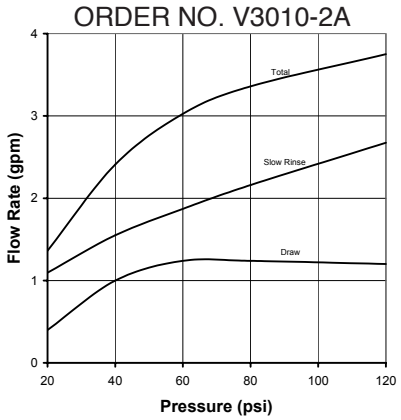
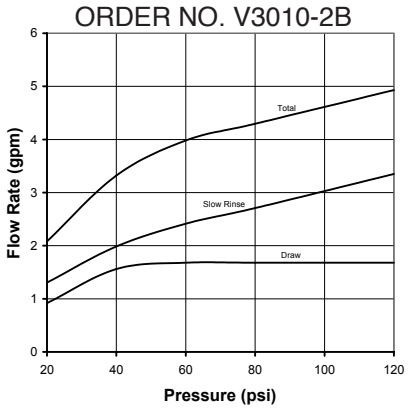


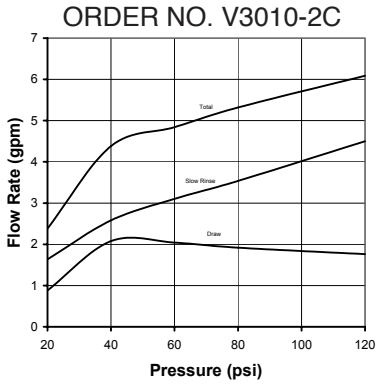
ORDER NO. V3010-15H
ORANGE

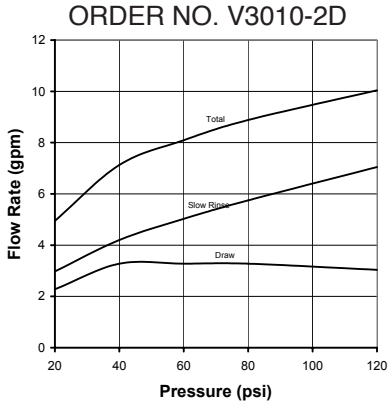


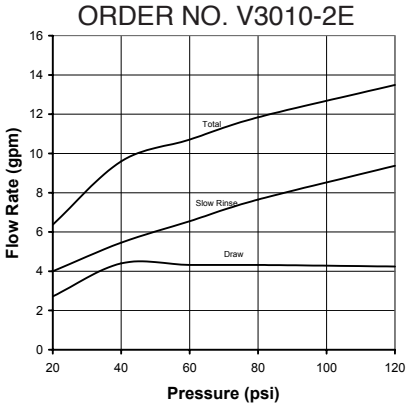
WS2" Injector Flow Graphs: U.S. Units

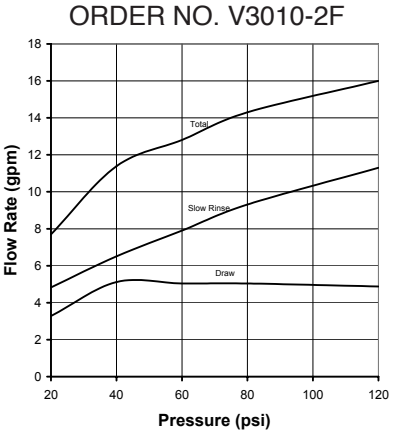


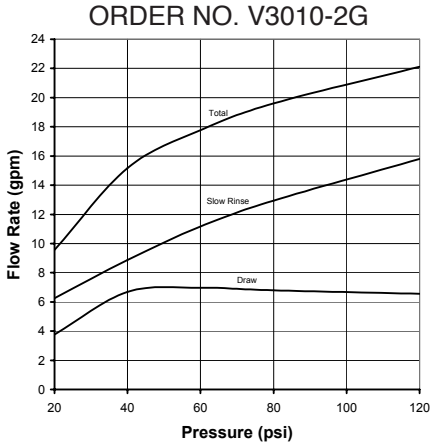






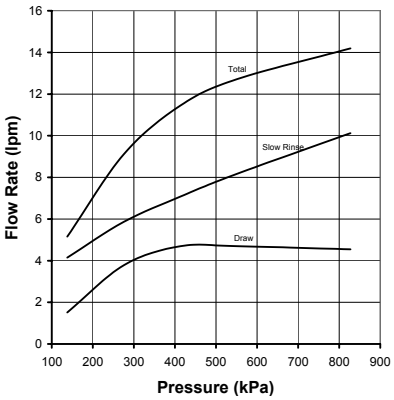






WS2" Injector Flow Graphs: Metric Units

ORDER NO. V3010-2A



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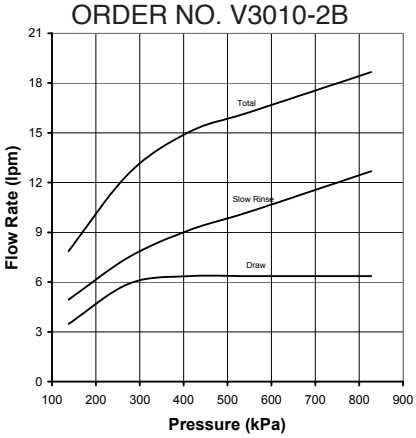

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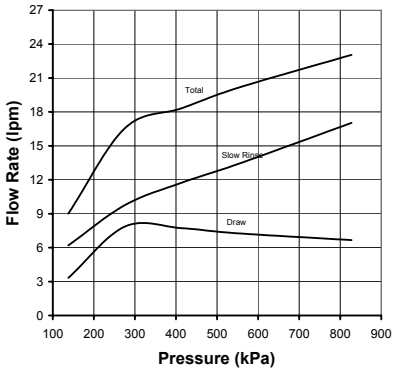
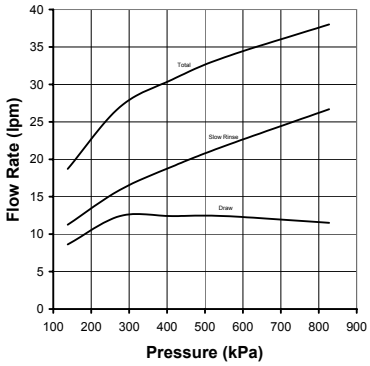
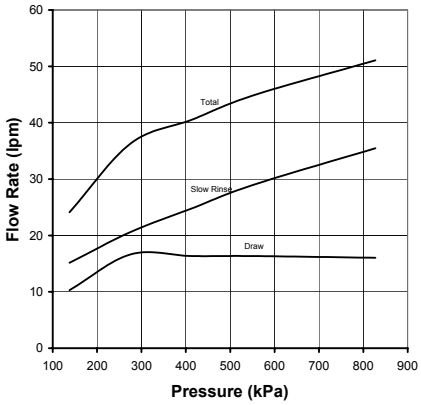


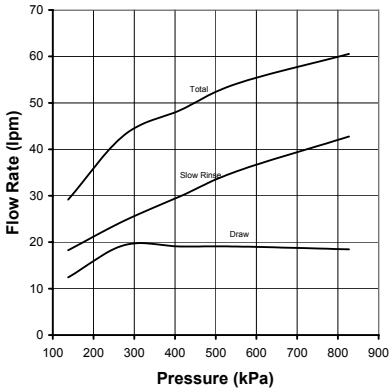
ORDER NO. V3010-2D



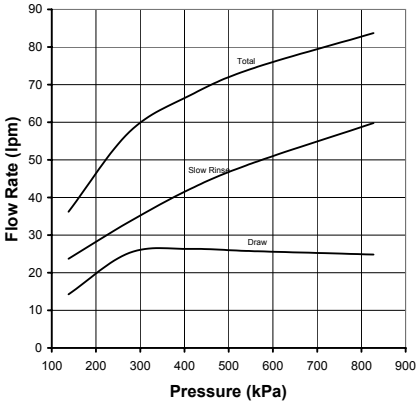
ORDER NO. V3010-2E



ORDER NO. V3010-2F



ORDER NO. V3010-2G



Fitting Kits

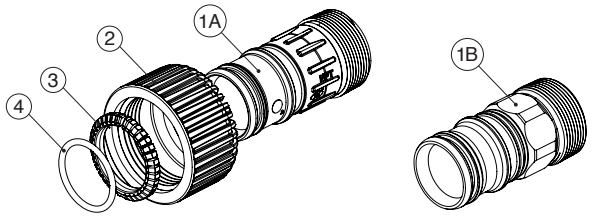
USE ONLY SILICONE BASED LUBRICANTS ON ALL CLACK COMPONENTS
HYDROCARBONS WILL DAMAGE COMPONENTS THAT CONTAIN O-RINGS AND OR PLASTIC. THIS CAN CAUSE LEAKS OR BREAKAGE. DO NOT USE LUBRICANTS THAT CONTAIN HYDROCARBONS SUCH AS VASELINE®/PETROLEUM JELLY, WD-40®, ETC. DO NOT USE CLACK CONTROL VALVE PRODUCTS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

Fitting Installation Instructions:

- Installation fittings are designed to accommodate minor plumbing misalignments, but are not designed to support the weight of a system or the plumbing.
- Teflon tape must be used on the fitting threads.
- Slide nut on first, then the split ring and O-ring.
- Hand tighten the nut only.

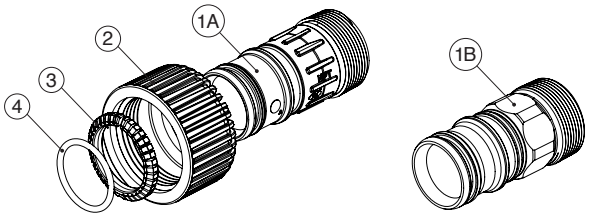
Clack Order No. V4430-01 (Plastic) / V4430-11 (Stainless)
Description: WS15P QC to NPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1A	V4353	WS15P QC TO NPT FITTING, PLASTIC	2
1B	V4610-01	WS15P QC TO NPT FITTING, STAINLESS STEEL	2
2	V4344	WS15P QC NUT	2
3	V4345	WS15P SPLIT RING	2
4	V4367	O-RING 222	2



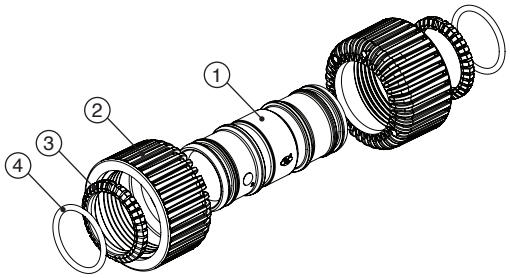
Clack Order No. V4430-02 (Plastic) / V4430-12 (Stainless)
Description: WS15P QC to BSPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1A	V4355	WS15P QC TO BSPT FITTING, PLASTIC	2
1B	V4611-01	WS15P QC TO BSPT FITTING, STAINLESS STEEL	2
2	V4344	WS15P QC NUT	2
3	V4345	WS15P SPLIT RING	2
4	V4367	O-RING 222	2



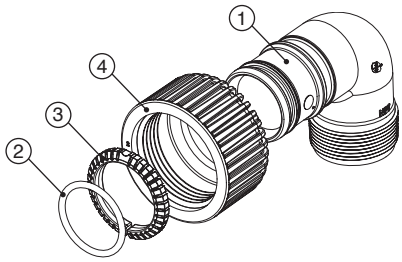
Clack Order No. V4430-03
Description: WS15P QC to QC Fitting Kit

Drawing No.	Order No.	Description	Quantity
1	V4354	WS15P QC TO QC FITTING	1
2	V4344	WS15P QC NUT	2
3	V4345	WS15P SPLIT RING	2
4	V4367	O-RING 222	2



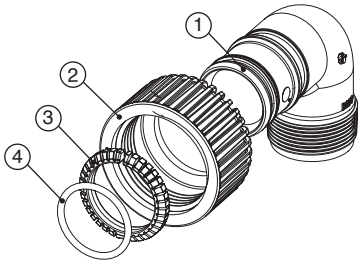
Clack Order No. V4430-07
Description: WS1.5 PLASTIC ELBOW QC TO NPT

Drawing No.	Order No.	Description	Quantity
1	V4432NPT	1.5 PLASTIC QC TO NPT ELBOW	2
2	V4367	O-RING -222	2
3	V4345	1.5 SPLIT RING	2
4	V4344	QC NUT 1.5 PLASTIC	2



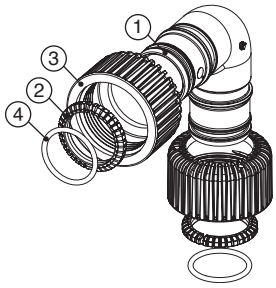
Clack Order No. V4430-08
Description: WS1.5 PLASTIC ELBOW QC TO BSPT

Drawing No.	Order No.	Description	Quantity
1	V4432BSPT	1.5 PLASTIC QC TO BSPT ELBOW	2
2	V4344	QC NUT 1.5 PLASTIC	2
3	V4345	1.5 SPLIT RING	2
4	V4367	O-RING -222	2



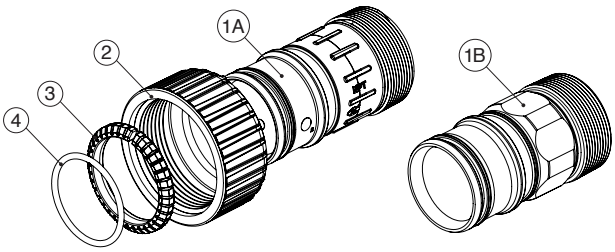
Clack Order No. V4430-09
Description: WS1.5 PLASTIC ELBOW QC TO QC

Drawing No.	Order No.	Description	Quantity
1	V4432QC	1.5 PLASTIC QC TO QC ELBOW	1
2	V4345	1.5 SPLIT RING	2
3	V4344	QC NUT 1.5 PLASTIC	2
4	V4367	O-RING -222	2



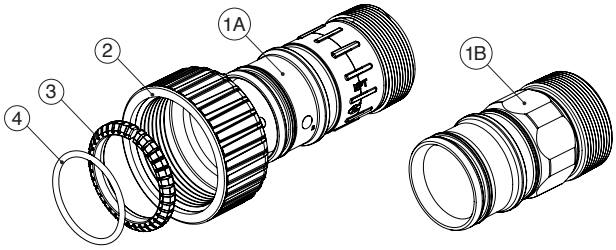
Clack Order No. V4460-01/V4460-11
Description: WS2PQC to NPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1A	V4415	WS2P QC TO NPT FITTING, PLASTIC	2
1B	V4620-01	WS2P QC TO NPT FITTING, STAINLESS STEEL	2
2	V4417	WS2P QC NUT	2
3	V4418	WS2P SPLIT RING	2
4	V3441	O-Ring 226	2



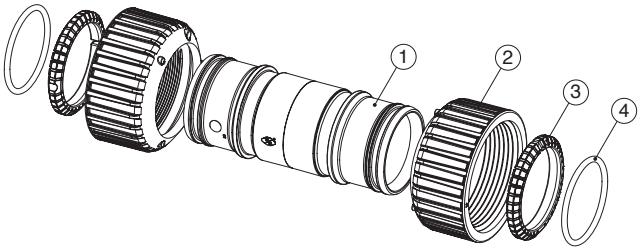
Clack Order No. V4460-02/V4460-12
Description: WS2PQC to BSPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1A	V4416	WS2P QC TO BSPT FITTING, PLASTIC	2
1B	V4621-01	WS2P QC TO BSPT FITTING, STAINLESS STEEL	2
2	V4417	WS2P QC NUT	2
3	V4418	WS2P SPLIT RING	2
4	V3441	O-Ring 226	2



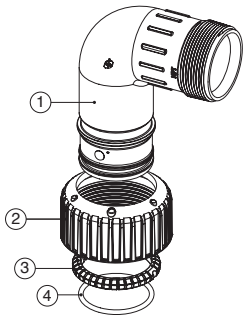
Clack Order No. V4460-03
Description: WS2 PLASTIC QC FITTING ASSY

Drawing No.	Order No.	Description	Quantity
1	V4439	WS2 PLASTIC QC TO QC	1
2	V4417	WS2 QC NUT	2
3	V4418	WS2 QC SPLIT RING	2
4	V3441	O-RING - 226	2



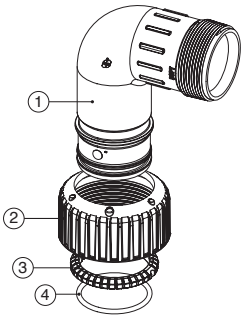
Clack Order No. V4460-04
Description: WS2P QC TO NPT ELBOW ASSY

Drawing No.	Order No.	Description	Qty.
1	V4462NPT	2 PLASTIC QC TO NPT ELBOW	2
2	V4417	WS2 QC NUT	2
3	V4418	WS2 QC SPLIT RING	2
4	V3441	O-RING - 226	2



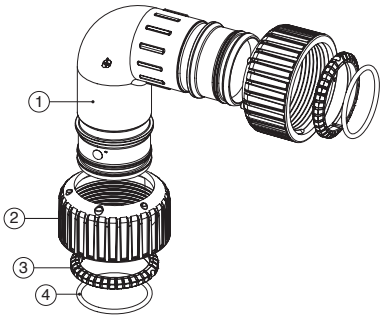
Clack Order No. V4460-05
Description: WS2P QC TO BSPT ELBOW ASSY

Drawing No.	Order No.	Description	Qty.
1	V4462BSPT	2 PLASTIC QC TO BSPT ELBOW	2
2	V4417	WS2 QC NUT	2
3	V4418	WS2 QC SPLIT RING	2
4	V3441	O-RING - 226	2



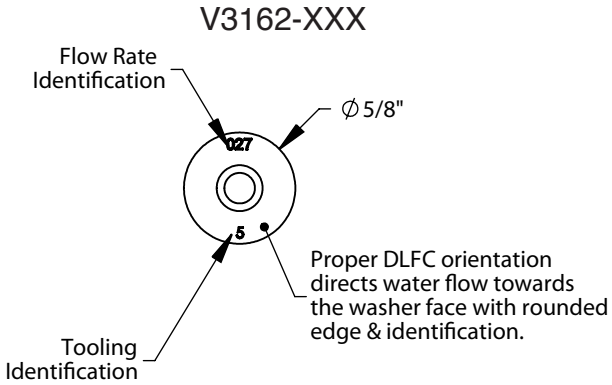
Clack Order No. V4460-06
Description: WS2P QC TO QC ELBOW ASSY

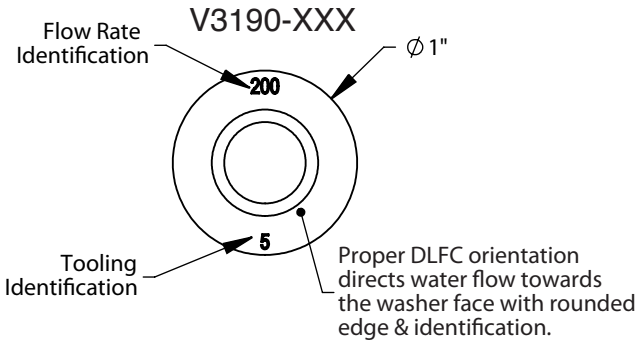
Drawing No.	Order No.	Description	Qty.
1	V4462QC	2 PLASTIC QC TO QC ELBOW	1
2	V4417	WS2 QC NUT	2
3	V4418	WS2 QC SPLIT RING	2
4	V3441	O-RING - 226	2



Drain Line Flow Control Washers

Order No.	Description
V3162-007	0.7 GPM Drain line flow control
V3162-010	1.0 GPM Drain line flow control
V3162-013	1.3 GPM Drain line flow control
V3162-017	1.7 GPM Drain line flow control
V3162-022	2.2 GPM Drain line flow control
V3162-027	2.7 GPM Drain line flow control
V3162-032	3.2 GPM Drain line flow control
V3162-042	4.2 GPM Drain line flow control
V3162-053	5.3 GPM Drain line flow control
V3162-065	6.5 GPM Drain line flow control
V3162-075	7.5 GPM Drain line flow control
V3162-090	9.0 GPM Drain line flow control
V3162-100	10.0 GPM Drain line flow control
V3190-090	9.0 GPM Drain line flow control
V3190-100	10.0 GPM Drain line flow control
V3190-110	11.0 GPM Drain line flow control
V3190-130	13.0 GPM Drain line flow control
V3190-150	15.0 GPM Drain line flow control
V3190-170	17.0 GPM Drain line flow control
V3190-200	20.0 GPM Drain line flow control
V3190-250	25.0 GPM Drain line flow control





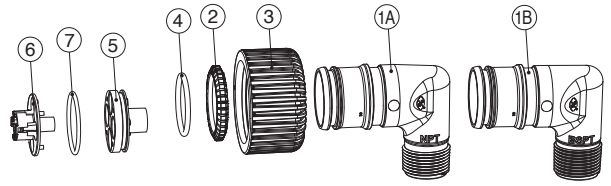
All DLFC housings ship without DLFC installed.

WS1.5P: Up to 5x V3162-XXX DLFC may be installed in V4430. Select 1 – 5 flow controls from table for proper backwash flow, based on media manufacturer's recommendations.

WS2P: At least 1x V3190-XXX and up to 7x V3162-XXX DLFC may be installed in the V4460. Select flow controls from table for proper backwash flow, based on media manufacturer's recommendations.

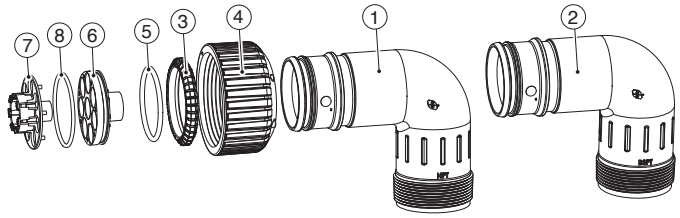
Clack Order No. V4430-04NPT OR V4430-04BSPT
Description: WS15P 1.5 Drain Elbow

Drawing No.	Order No.	Description	Quantity
1A	V4358	WS15P DRAIN ELBOW 1" NPT	1
1B	V4359	WS15P DRAIN ELBOW 1" BSPT	1
2	V4345	WS15P SPLIT RING	1
3	V4344	QC NUT 1.5 PLASTIC	1
4	V4367	O-RING 222	1
5	V4351	FLOW CONTROL HOUSING	1
6	V4352	FLOW CONTROL RETAINER	1
7	V4364	O-RING 129	1



Clack Order No. V4460-07NPT OR V4460-07BSPT
Description: WS2P 2 Drain Elbow

Drawing No.	Order No.	Description	Quantity
1	V4462NPT	2 PLASTIC QC TO NPT ELBOW	1
2	V4462BSPT	2 PLASTIC QC TO BSPT ELBOW	1
3	V4418	WS2 QC SPLIT RING	1
4	V4417	WS2 QC NUT	1
5	V3441	O-RING, -226	1
6	V4455	WS2 PLASTIC DLFC HOUSING	1
7	V4456	WS2 PLASTIC DLFC RETAINER	1
8	V3152	O-RING 137	1



Troubleshooting Procedures

Problem	Possible Cause	Solution
1. No Display on PC Board	a. No power at electric outlet	a. Repair outlet or use working outlet
	b. Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	b. Plug Power Adapter into outlet or connect power cord end to PC board connection
	c. Improper power supply	c. Verify proper voltage is being delivered to PC board
	d. Defective Power Adapter	d. Replace Power Adapter
	e. Defective PC board	e. Replace PC board
2. PC Board does not display correct time of day	a. Power Adapter plugged into electric outlet controlled by light switch	a. Use uninterrupted outlet
	b. Tripped breaker switch and/or tripped GFI	b. Reset breaker switch and/or GFI switch
	c. Power outage	c. Reset time of day. If PC Board has battery back up present, the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	d. Defective PC Board	d. Replace PC Board
3. Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to 3-pin connection labeled *METER* on PC Board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Meter wire not installed securely into 3-pin connector	d. Verify meter cable wires are installed securely into 3-pin connector labeled *METER*
	e. Defective meter	e. Replace meter
	f. Defective PC Board	f. Replace PC Board
4. Control valve regenerates at wrong time of day	a. Power outage	a. Reset time of day. If PC Board has battery back up present, the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration set incorrectly	c. Reset regeneration time
	d. Control valve set at ”on 0” (immediate regeneration)	d. Check programming setting and reset to NORMAL (for a delayed regen time)
	e. Control valve set at ”NORMAL + on 0” (delayed and/or immediate)	e. Check programming setting and reset to NORMAL (for a delayed regen time)
5. Time of day flashes on and off	a. Power outage	a. Reset time of day. If PC Board has battery back up present, the battery may be depleted. See Front Cover and Drive Assembly drawing for instructions.
6. Control valve does not regenerate automatically when the REGEN button is depressed and held.	a. Broken drive gear or drive cap assembly	a. Replace drive gear or drive cap assembly
	b. Broken Piston Rod	b. Replace piston rod
	c. Defective PC Board	c. Replace PC Board
7. Control valve does not regenerate automatically but **does** when the REGEN button is depressed and held.	a. Bypass valve in bypass position	a. Turn bypass handles to place bypass in service position
	b. Meter is not connected to meter connection on PC Board	b. Connect meter to 3-pin connection labeled *METER* on PC Board
	c. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
	d. Incorrect programming	d. Check for programming error
	e. Meter wire not installed securely into 3-pin connector	e. Verify meter cable wires are installed securely into 3-pin connector labeled *METER*
	f. Defective meter	f. Replace meter
	g. Defective PC Board	g. Replace PC Board

Problem	Possible Cause	Solution
8. Hard or untreated water is being delivered	a. Bypass valve is open or faulty	a. Fully close bypass valve or replace
	b. Media is exhausted due to high water usage	b. Check program settings or diagnostics for abnormal water usage
	c. Meter not registering	c. Remove meter and check for rotation or foreign material
	d. Water quality fluctuation	d. Test water and adjust program values accordingly
	e. No regenerant or low level of regenerant in regenerant tank	e. Add proper regenerant to tank
	f. Control fails to draw in regenerant	f. Refer to Troubleshooting Guide number 12
	g. Insufficient regenerant level in regenerant tank	g. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	h. Damaged seal/stack assembly	h. Replace seal/stack assembly
	i. Control valve body type and piston type mismatched	i. Verify proper control valve body type and piston type match
	j. Fouled media bed	j. Replace media bed
9. Control valve uses too much regenerant	a. Improper refill setting	a. Check refill setting
	b. Improper program settings	b. Check program setting to make sure they are specific to the water quality and application needs
	c. Control valve regenerates frequently	c. Check for leaking fixtures that may be exhausting capacity or system is undersized
10. Residual regenerant being delivered to service	a. Low water pressure	a. Check incoming water pressure – water pressure must remain at minimum of 25 psi
	b. Incorrect injector size	b. Replace injector with correct size for the application
	c. Restricted drain line	c. Check drain line for restrictions or debris and clean
11. Excessive water in regenerant tank	a. Improper program settings	a. Check refill setting
	b. Plugged injector	b. Remove injector and clean or replace
	c. Drive cap assembly not tightened in properly	c. Re-tighten the drive cap assembly
	d. Damaged seal/stack assembly	d. Replace seal/stack
	e. Restricted or kinked drain line	e. Check drain line for restrictions or debris and or un-kink drain line
	f. Plugged backwash flow controller	f. Remove backwash flow controller and clean or replace
	g. Missing refill flow controller	g. Replace refill flow controller
12. Control valve fails to draw in regenerant	a. Injector is plugged	a. Remove injector and clean or replace
	b. Faulty regenerant piston	b. Replace regenerant piston
	c. Regenerant line connection leak	c. Inspect regenerant line for air leak
	d. Drain line restriction or debris cause excess back pressure	d. Inspect drain line and clean to correct restriction
	e. Drain line too long or too high	e. Shorten length and/or height
	f. Low water pressure	f. Check incoming water pressure – water pressure must remain at minimum of 25 psi
13. Water running to drain	a. Power outage during regeneration	a. Upon power being restored, control will finish the remaining regeneration time. Reset time of day.
	b. Damaged seal/stack assembly	b. Replace seal/stack assembly
	c. Piston assembly failure	c. Replace piston assembly
	d. Drive cap assembly not tightened in properly	d. Re-tighten the drive cap assembly

Problem	Possible Cause	Solution
14. E1, Err – 1001, Err – 101 = Control unable to sense motor movement	a. Motor not inserted full to engage pinion, motor wires broken or disconnected	a. Disconnect power, make sure motor is fully engaged, check for broken wires, make sure 2-pin connector on motor is connected to the 2-pin connection on the PC Board labeled *MOTOR*. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. PC Board not properly snapped into drive bracket	b. Properly snap PC Board into drive bracket and then press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Missing reduction gears	c. Replace missing gears
15. E2, Err – 1002, Err – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled	a. Foreign material is lodged in control valve	a. Open up control valve and pull out piston assembly and seal stack assembly for inspection. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/stack assembly, check reduction gears, check drive bracket and main drive gear interface. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Main drive gear too tight	c. Loosen main drive gear. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Improper voltage being delivered to PC Board	d. Verify that proper voltage is being supplied. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
16. E3, Err – 1003, Err – 103 = Control valve motor ran too long and was unable to find the next cycle position	a. Motor failure during a regeneration	a. Check motor connections then press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	b. Replace piston and stack assemblies. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	c. Snap drive bracket in properly then press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
17. Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position	a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	a. Snap drive bracket in properly then press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.

Problem	Possible Cause	Solution
18. Err -1006, Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV without having a MAV or NHBP valve attached to operate that function	a. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect. Then re-program valve to proper setting.
	b. MAV/NHBP motor wire not connected to PC Board	b. Connect MAV/NHBP motor to PC Board 2-pin connection labeled *DRIVE*. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	c. MAV/ NHBP motor not fully engaged with reduction gears	c. Properly insert motor into casing, do not force into casing. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	d. Replace piston and stack assemblies. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
19. Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	a. Foreign material is lodged in MAV/NHBP valve	a. Open up MAV/NHBP valve and check piston and seal/stack assembly for foreign material. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.
	b. Mechanical binding	b. Check piston and seal/stack assembly, check reduction gears, drive gear interface, and check MAV/NHBP black drive pinion on motor for being jammed into motor body. Press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.

Revision History:

4/21/2022

PAGE 5:

9	V4430-01**	WS15P FTG ASY QC TO NPT	1 set of 2
	V4430-02**	WS15P FTG ASY QC TO BSPT	

** Inlet/Outlet fitting kits are sold separate, see page 10 for fitting selection.

PAGE 10:
Added V4430-07, V4430-08 and V4430-09 fittings.

6/28/2024

Various grammatical and formatting changes throughout.

Added pages 8-11, 14-15, and 17.

Updated V4430-01 and V4430-02 on page 16.

Updated page 18.

6/11/2025

Page 1 - add WS1.5PB
Page 3 - adjust page numbering - added battery warning
Page 4 - add WS1.5PB - service/backwash
Page 5 - removed fittings
Page 6 - new page

6/26/2025

Page 3 - adjust page numbering
Page 4 - add Introduction/General Warnings

9/4/2025

Page 12

1	V3726*	WS2/QC/P DN BRINE PISTON	1
	V3745	WS2/QC/P UP BRINE PISTON	

CLACK CORPORATION
SOFTENER AND FILTER CONTROLS
LIMITED WARRANTY

Clack Corporation (”Clack”) warrants to OEM that its Softener and Filter Control Valves will be free from defects in material and workmanship under normal use and service for a period of five years from the date of shipment of such Valves from Clack’s plant in Windsor, Wisconsin when installed and operated within recommended parameters. No warranty is made with respect to defects not reported to Clack within the warranty period and/or defects or damages due to neglect, misuse, alterations, accident, misapplication, physical damage, or damage caused by fire, acts of God, freezing or hot water or similar causes. For outdoor installations where the Softener and Filter Control Valves are not under cover, the weather cover must be utilized for the warranty to be valid.

Clack’s obligation to OEM under this Limited Warranty shall be limited, at its option, to replacement or repair of any Softener and Filter Control valve covered by this Limited Warranty. Prior to returning a Control Valve, OEM must obtain a return goods authorization number from Clack and return the Control Valve freight prepaid. If any Control Valve is covered under this Limited Warranty, Clack shall return the Control Valve repaired, or its replacement, prepaid to the original point of shipment.

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