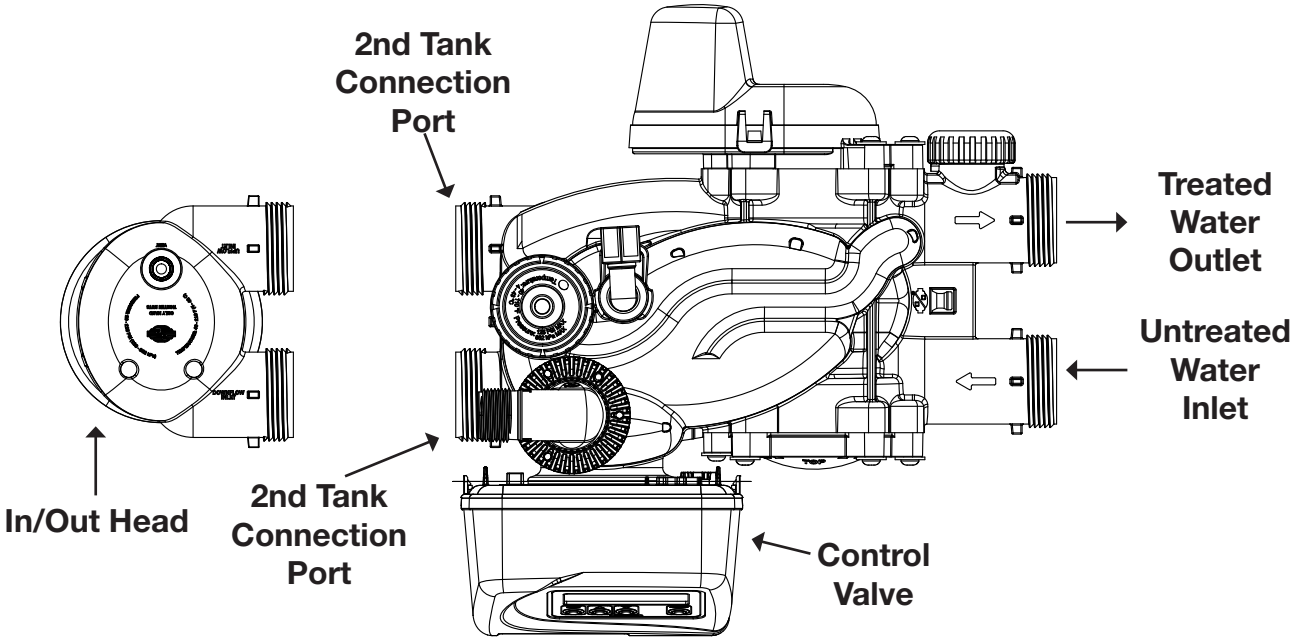
Water Specialist
WS1.5TT Drawings and Service Manual



Proper installation shown above.
See page 2 for issues that arise if the in/out head is incorrectly connected to the untreated water inlet/treated water outlet of the control valve, rather than to the 2nd tank connection ports.

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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Twin Valve Installation Tips:

We have had a number of instances where customers have incorrectly installed the in/out head to the untreated water inlet/treated water outlet of the control valve, rather than to the 2nd tank connection ports.

Below are a number of situations that will occur when the in/out head is incorrectly installed to the untreated water inlet/treated water outlet of the control valve.

1) When tank A is in the draw cycle, it will not draw brine and will put water into the salt tank. Tank B will draw properly.
2) When tank B is in the backwash cycle, tank A will have no flow to service.
3) The transfer disc seals may be forced out of their cavities on the back/motor side of the transfer discs, and it is possible that one of the seals could get pushed up into the valve and get stuck in the top of tank port of the spacer stack assembly.

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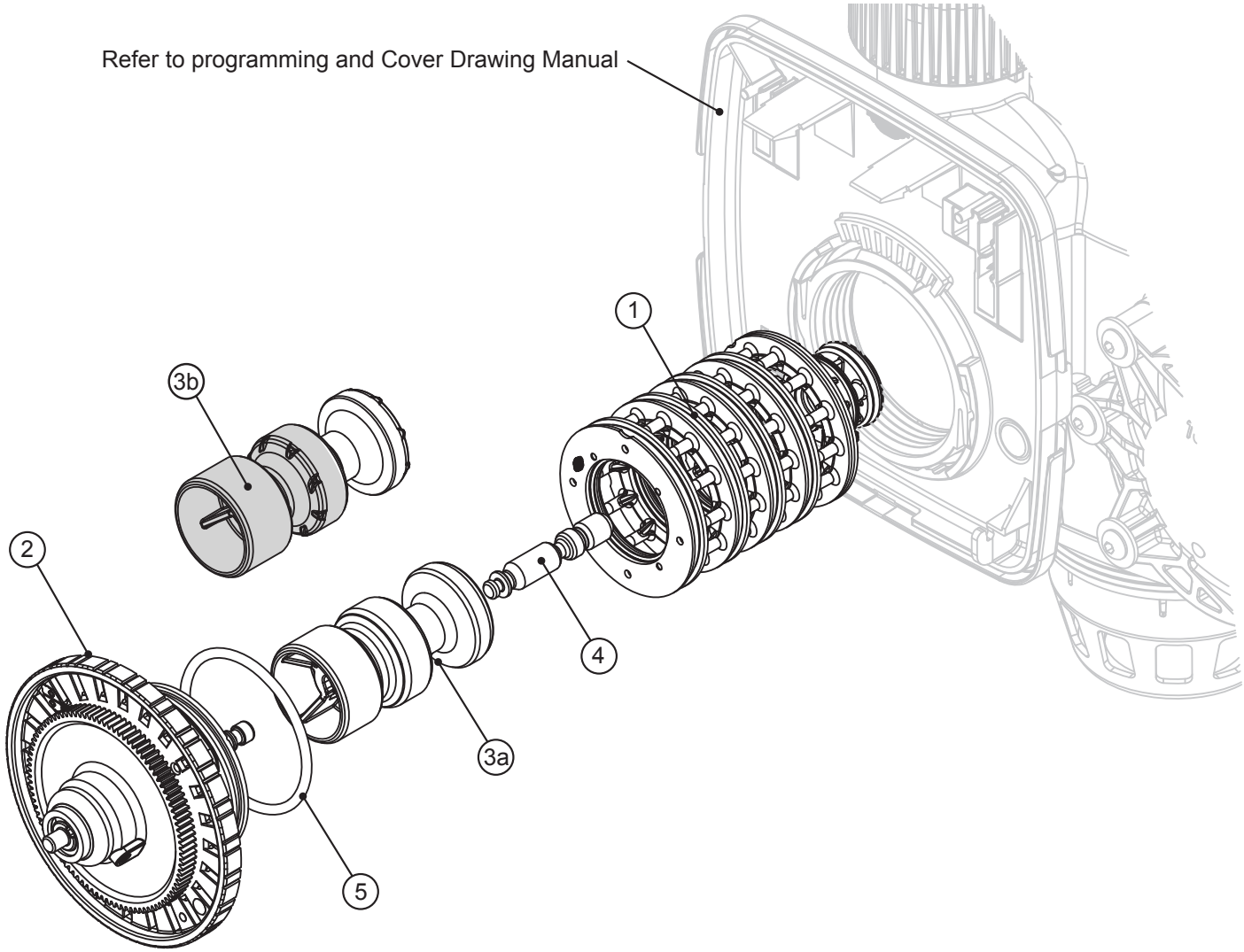
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Drive Cap Assembly, Downflow Piston, Upflow Piston, Regenerant Piston, and Spacer Stack Assembly

Drawing No.	Order No.	Description	Quantity
1	V3430-01	WS125/15 EDPM SPACER STACK ASY	1
2	V3004	DRIVE CAP ASY	1
3a	V3407	WS125/15 PISTON DOWNFLOW ASY (AMBER)	1
3b	V4042	WS125/15 PISTON UPFLOW ASY (BLACK)	
4	V3174	WS1 REGENERANT PISTON	1
5	V3135	O-RING 228	1

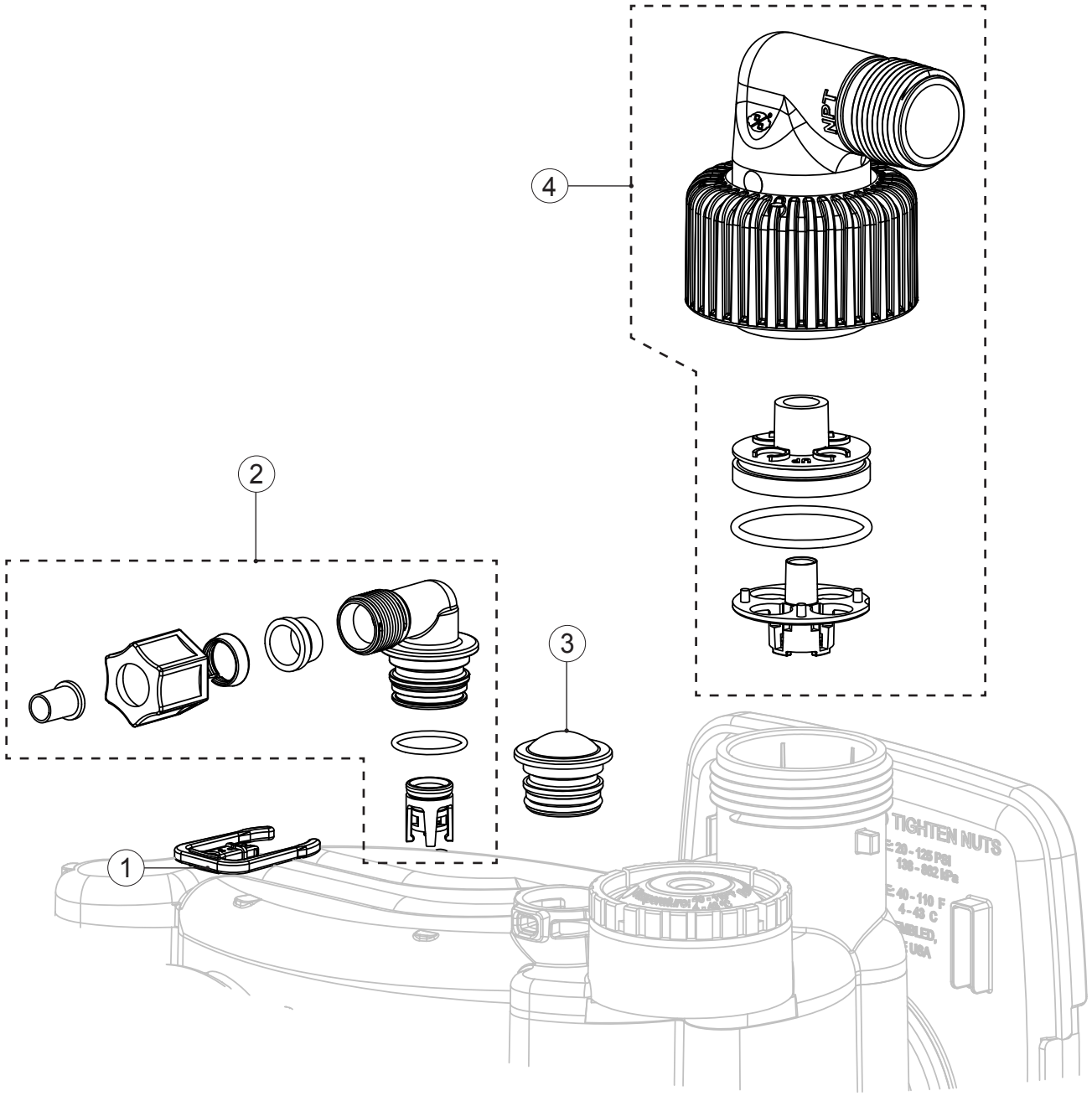
Note: The regenerant piston is not used in backwash only applications.



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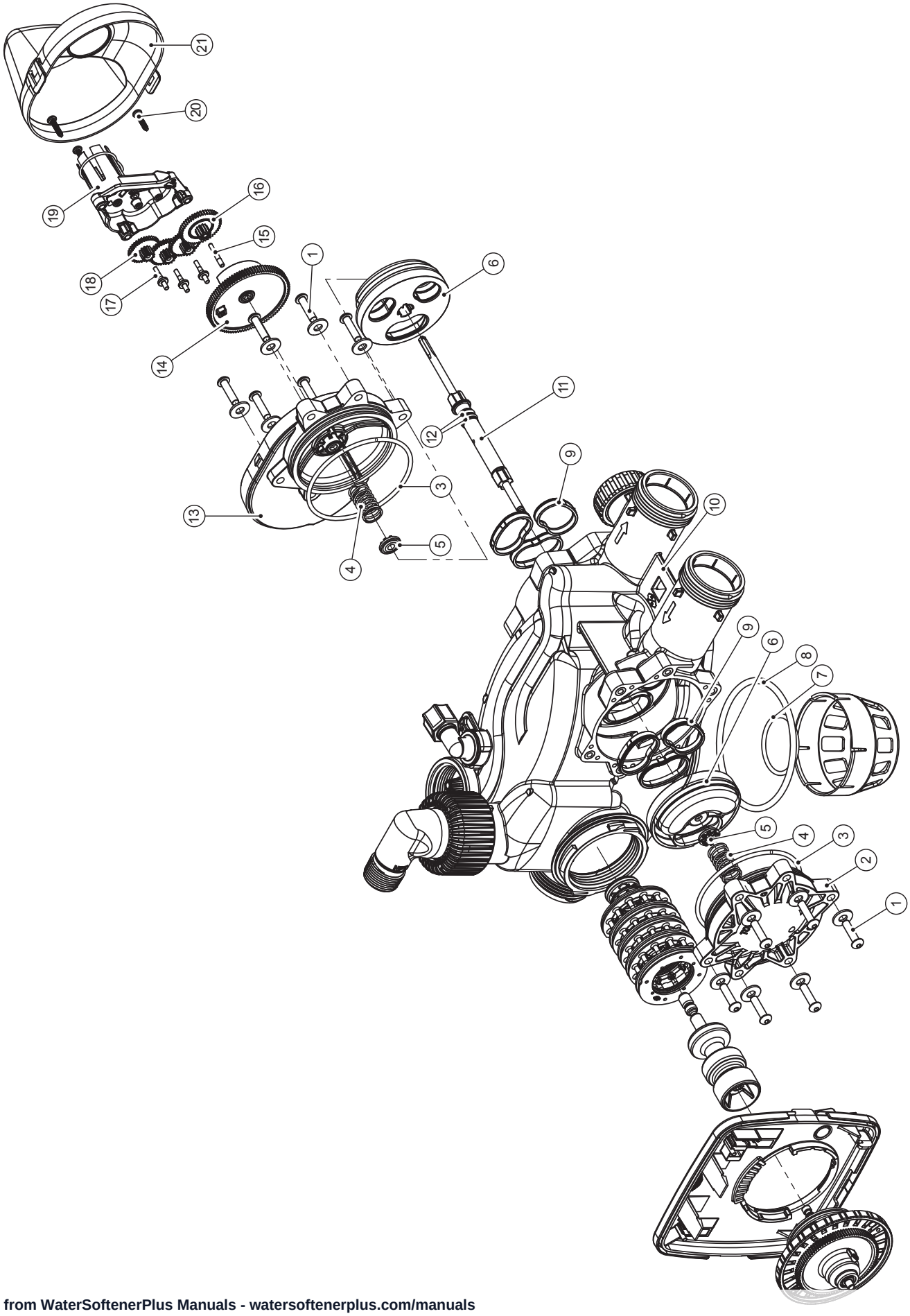
Regenerant Components

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	



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Twin Transfer



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Twin Transfer

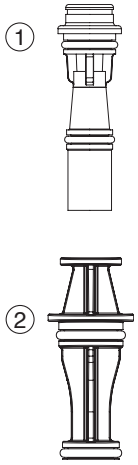
Drawing No.	Order No.	Description	Quantity
1	V3470	SCREW BHC 1/4-20 X 1 SS	12
	V3724	SS 1/4 WASHER	12
2	V4547	T15 TRANSFER CAP	1
3	V4536	O-RING 240	2
4	V4552	T15 TRANSFER SPRING	2
5	V4014	T1 TRANSFER SPRING SUPPORT	2
6	V4551	T15 ROTOR DISC ASY	2
7	V3641	O-RING 225 (NPT only)	1
	V3441	O-RING 226 (BSPT only)	
8	V3419	O-RING 347	1
9	V4543	T15 TRANSFER SEAL	6
10	V4700-NPT	T15 BODY NPT ASY	1
	V4700-BSPT	T15 BODY BSPT ASY	
11	V4545	T15 TRANSFER DRIVE SHAFT	1
12	D1245	O-RING 111	2
13	V4548-01	T15 TRANFER DRIVE CAP ASY	1
14	V4011-01	T1 TRANSFER DRIVE GEAR ASY	1
15	V4012	T1 TRANSFER DRIVE GEAR AXLE	1
16	V4013	T1 TRANSFER REDUCTION GEAR	1
17	V3264	WS2H BYPASS REDUCTION GEAR AXLE	3
18	V3110-01	WS1 DRIVE REDUCING GEAR PLAIN	3
19	V3262-01	WS1.5&2ALT/2BY REDUC GEAR CVR ASY	1
20	V3592	SCREW #8-1 PHPN T-25 SS	3
21	V4049	T1 COVER ASSEMBLY	1
NOT SHOWN	V4043	T1 TRANSFER MOTOR ASY	1
NOT SHOWN	V3151	WS1 NUT 1 QC	1
NOT SHOWN	V4055*	TWIN TANK METER ASY	1
NOT SHOWN	D1403	1192 1.5 IN/OUT HEAD	1
	D1403-01	1192 50MM IN/OUT HEAD	1

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

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

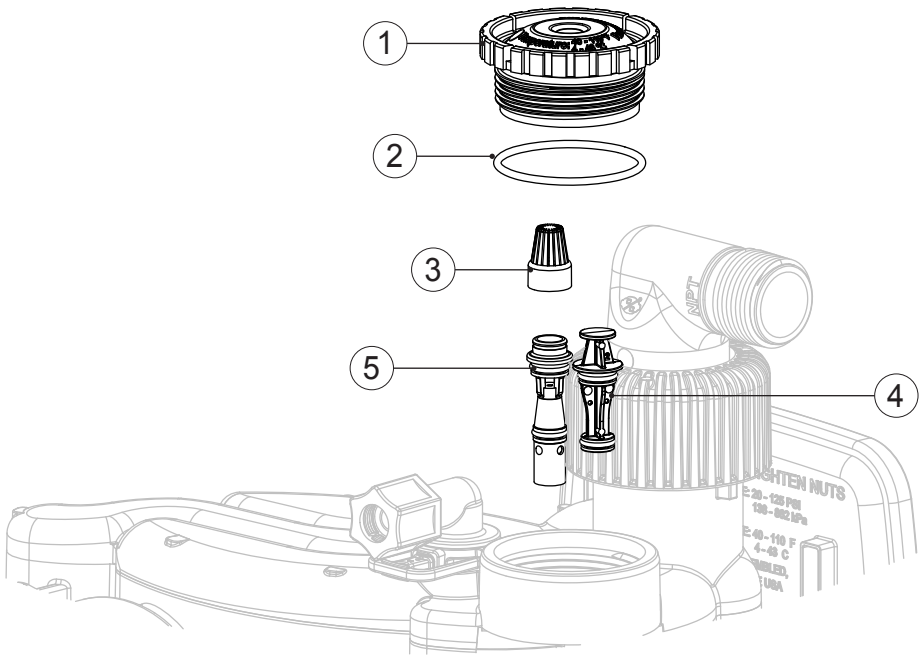
Drawing No.	Order No.	Description	Nozzle Color	Downflow Typical Tank Diameter	Quantity
1	V3010-15B	WS1.5 INJECTOR ASY B	Violet	12"	1
	V3010-15C	WS1.5 INJECTOR ASY C	Red	13"	
	V3010-15D	WS1.5 INJECTOR ASY D	White	14"	
	V3010-15E	WS1.5 INJECTOR ASY E	Blue	16"	
	V3010-15F	WS1.5 INJECTOR ASY F	Yellow	18"	
	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.

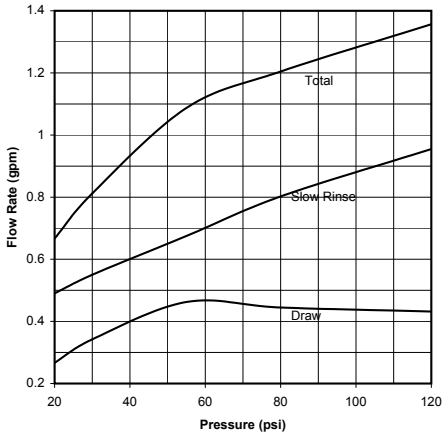
Drawing No.	Order No.	Description	Quantity
1	V4349	WS15P INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V4120	INJECTOR SCREEN	1
4	V3010-15Z	WS15 INJECTOR PLUG ASY	1 or 2
5	V3010-15X	WS15 INJECTOR ASY	1 or 0



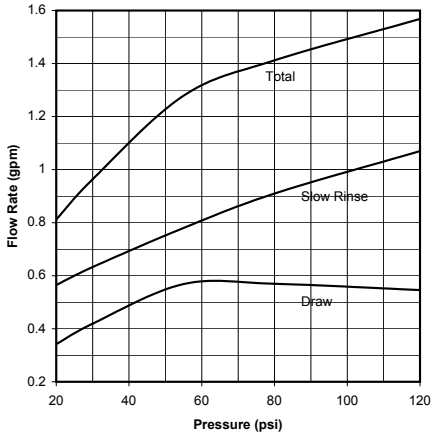
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Injector Flow Graphs—U.S. Units

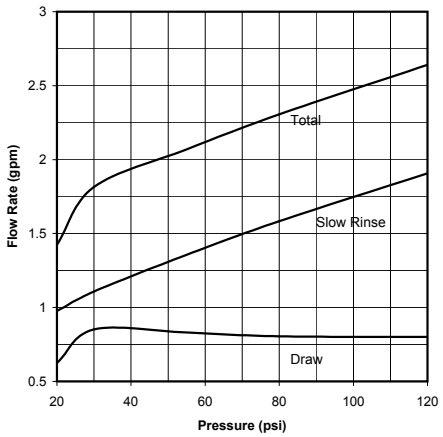
ORDER NO. V3010-15B
VIOLET



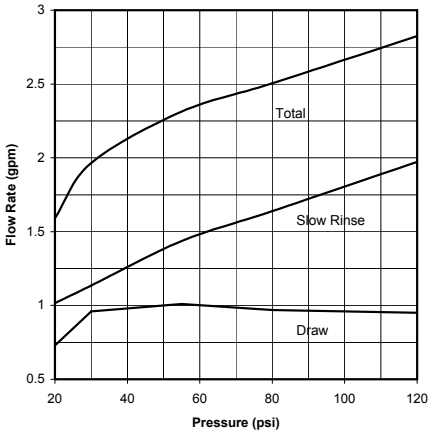
ORDER NO. V3010-15C
RED



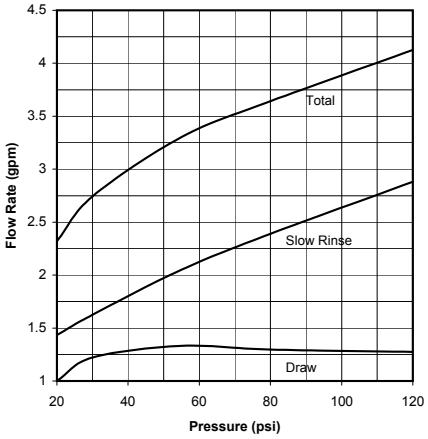
ORDER NO. V3010-15D
WHITE



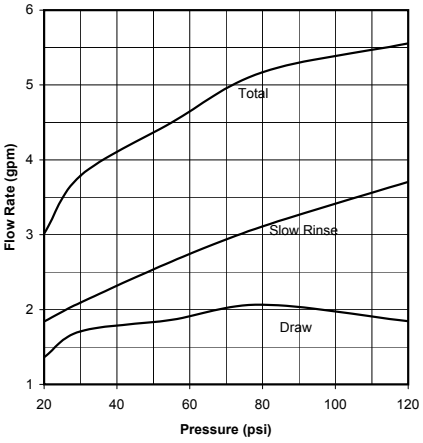
ORDER NO. V3010-15E
BLUE



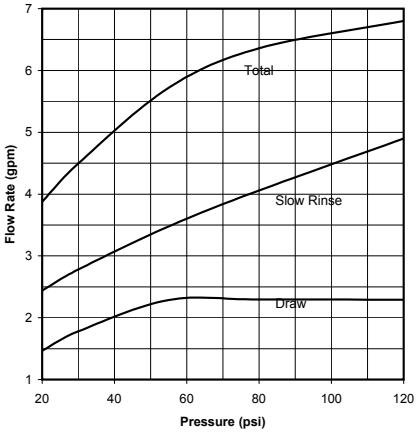
ORDER NO. V3010-15F
YELLOW



ORDER NO. V3010-15G
GREEN



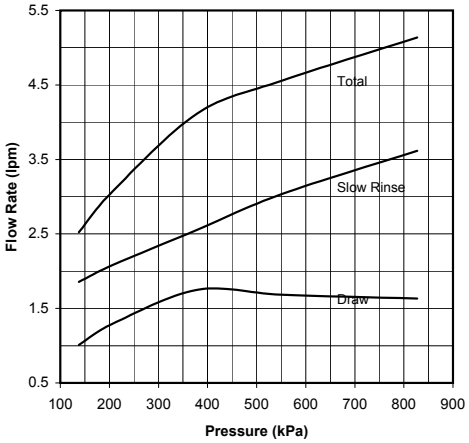
ORDER NO. V3010-15H
ORANGE



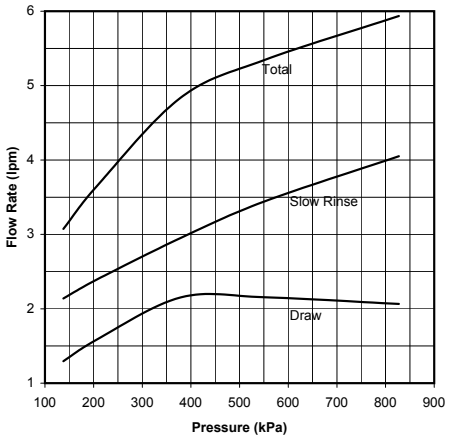
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Injector Flow Graphs—Metric Units

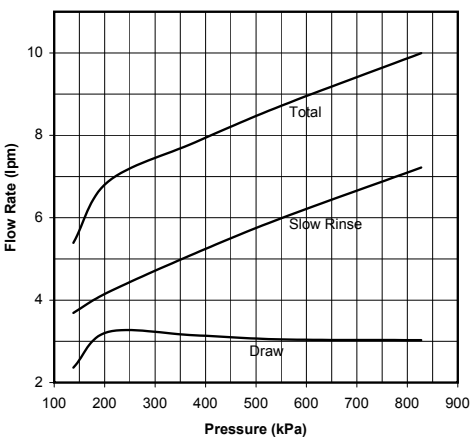
ORDER NO. V3010-15B
VIOLET



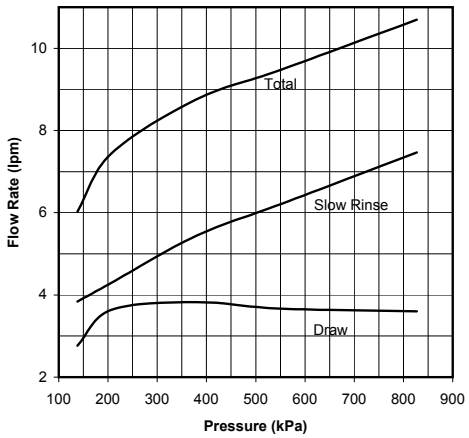
ORDER NO. V3010-15C
RED



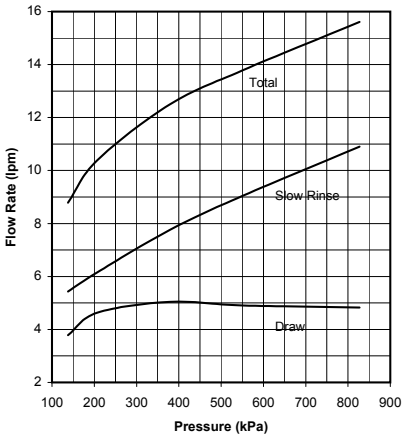
ORDER NO. V3010-15D
WHITE



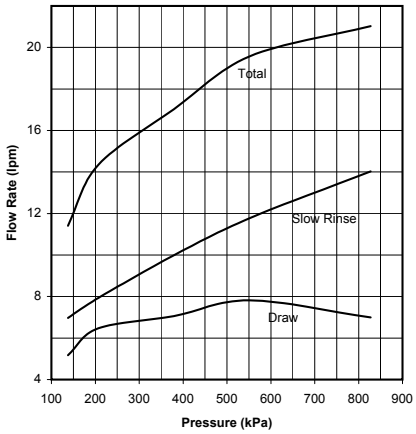
ORDER NO. V3010-15E
BLUE



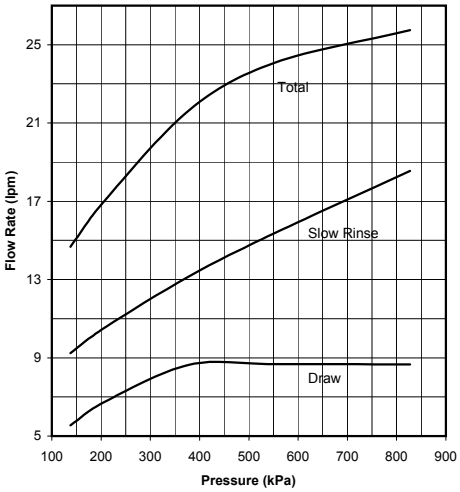
ORDER NO. V3010-15F
YELLOW



ORDER NO. V3010-15G
GREEN



ORDER NO. V3010-15H
ORANGE



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Fitting Kits

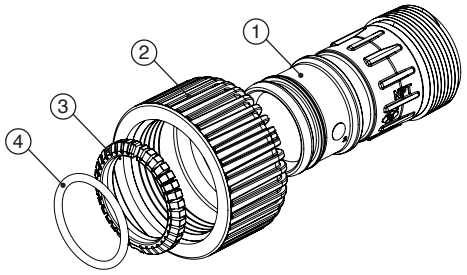
USE ONLY SILICONE BASED LUBRICANTS ON ALL CLACK COMPONENTS. HYDROCARBONS WILL DAMAGE COMPONENTS THAT CONTAIN O-RINGS AND/OR PLASTIC. THIS CAN CAUSE LEAKS OR BREAKAGE. DO NOT USE LUBRICANTS THAT CONTAIN HYDROCARBONS SUCH AS VASELINE®/PETROLEUM JELLY, WD-40®, ETC. DO NOT USE CLACK CONTROL VALVE PRODUCTS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

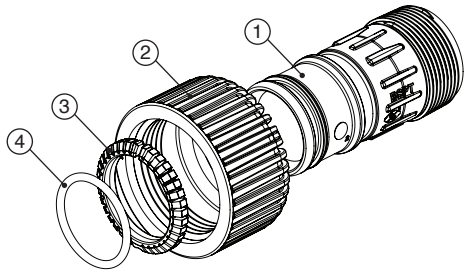
Clack Order No. V4430-01
Description: WS15P QC to NPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1	V4353	WS15P QC TO NPT FITTING	2
2	V4344	WS15P QC NUT	2
3	V4345	WS15P SPLIT RING	2
4	V4367	O-RING 222	2



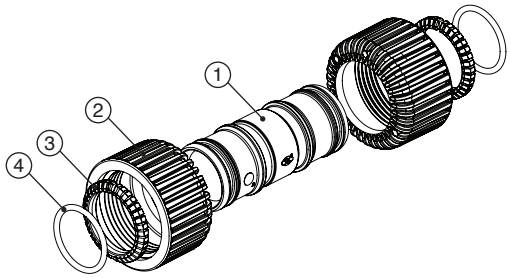
Clack Order No. V4430-02
Description: WS15P QC to BSPT Fitting Kit

Drawing No.	Order No.	Description	Quantity
1	V4355	WS15P QC TO BSPT FITTING	2
2	V4344	WS15P QC NUT	2
3	V4345	WS15P SPLIT RING	2
4	V4367	O-RING 222	2



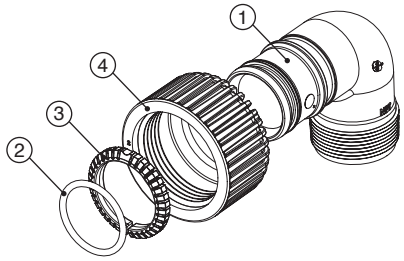
Clack Order No. V4430-03
Description: WS15P QC to QC Fitting Kit

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



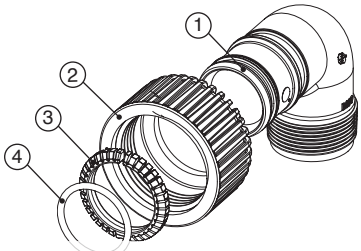
Clack Order No. V4430-07
Description: WS1.5 PLASTIC ELBOW QC TO NPT

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



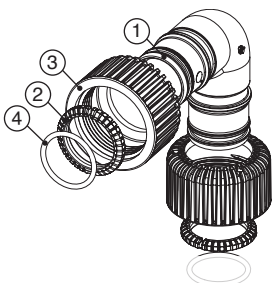
Clack Order No. V4430-08
Description: WS1.5 PLASTIC ELBOW QC TO BSPT

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

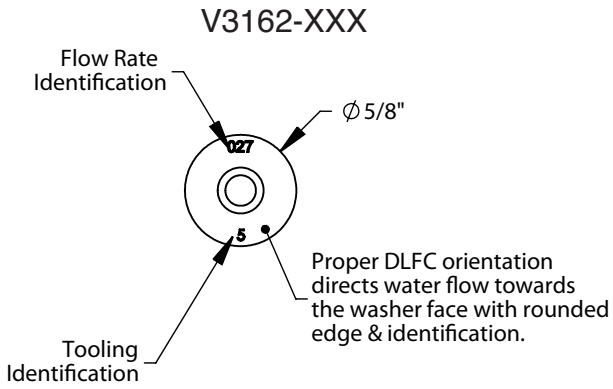
Drawing No.	Order No.	Description	Quantity
1	V4432QC	1.5 PLASTIC QC TO QC ELBOW	1
2	V4345	1.5 SPLIT RING	2
3	V4344	QC NUT 1.5 PLASTIC	2
4	V4367	O-RING 222	2



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Drain Line Flow Control Washers

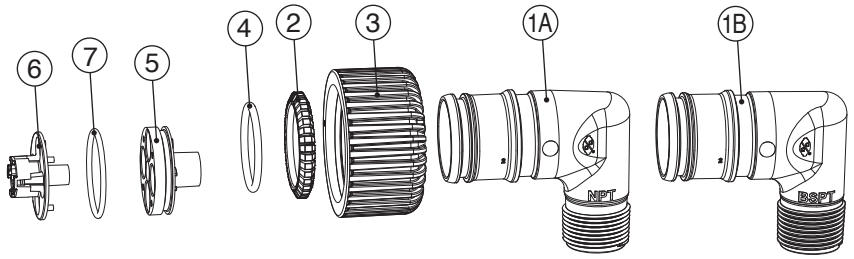
Order No.	Description
V3162-007	0.7 GPM DRAIN LINE FLOW CONTROL
V3162-010	1.0 GPM DRAIN LINE FLOW CONTROL
V3162-013	1.3 GPM DRAIN LINE FLOW CONTROL
V3162-017	1.7 GPM DRAIN LINE FLOW CONTROL
V3162-022	2.2 GPM DRAIN LINE FLOW CONTROL
V3162-027	2.7 GPM DRAIN LINE FLOW CONTROL
V3162-032	3.2 GPM DRAIN LINE 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



All DLFC housings ship without DLFC installed.
Up to 5 x 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.

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



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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

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.

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.

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 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.

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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.

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Quick Reference Specifications

Minimum/Maximum Operating Pressures	20 – 125 psi (138 kPa – 862 kPa)	
Minimum/Maximum Operating Temperatures	40° – 110°F (4° – 43°C)	
Power Adapter: Supply Voltage Supply Frequency Output Voltage Output Current	U.S. 100 VAC – 240 VAC 50/60 Hz 15 VDC 500 mA	International 200 VAC – 240 VAC 50/60 Hz 15 VDC 500 mA
Service Flow Rate	54 GPM @ 15 psi drop (204 Lpm, 12.3 m^3/h)	
Backwash Flow Rate	22 GPM @ 25 psi drop (83 Lpm, 4.9 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	11"	
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	

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Component Information

The WS1.5T control valves consist of the following components:

1. Drive Assembly
2. Drive Cap Assembly, Main Piston, and Regenerant Piston
3. Spacer Stack Assembly
4. Injector Cap, Screen, Injector Plug, and Injector
5. Refill Flow Control Assembly or Refill Port Plug
6. Drain Line Flow Control and Fitting Assembly
7. Water Meter
8. Twin Transfer Valve

Drive Assembly:

The drive assembly consists of the following parts:

- Drive Bracket
- Printed Circuit (PC) Board
- Motor
- Drive Gears
- Drive Gear Cover

The drive bracket holds the PC board, the motor, the drive gears and the drive gear cover in place.

The PC board receives and retains information, displays the information, determines when to regenerate and initiates regeneration. The display shows different types of information in the initial system set up (for softeners or filters), installer display settings, diagnostics, valve history or user display settings.

The PC board powers the direct current (DC) motor via the 2-pin connector. The motor is held in place on the drive bracket by a spring-loaded clip and a small bulge in the plastic, which fits in one of the slots on the motor housing. The motor turns drive gears that drive the piston to cycle positions for backwash, regeneration, rinse, refill, or service. The motor is fully reversible (turns both ways) and changes the direction of rotation to change the direction of piston motion. The motor is easily replaced if necessary.

There are 3 drive gears held in place by the drive gear cover. All 3 drive gears are the same size. A reflective coating is applied to the gears. As the center drive gear turns, a light shines on the coating and a light sensing diode determines if a light pulse was returned. The PC board counts the pulses and determines when to stop driving the motor.

Drive Cap Assembly, Main Piston, and Regenerant Piston:

The drive gears turn the main gear of the drive cap assembly, which moves the piston. The screw-driven, horizontally-moving piston stops at specific positions to direct the flow of water to backwash, regenerate, rinse, or refill. The PC board determines the position of the piston by counting pulses produced when the piston is moved. An optical sensor looking at one of the reduction drive gears generates these pulses. Each cycle position is defined by a number of pulses. The counter is zeroed each time the valve goes to the service position. The PC board finds the service position by noting the increase in current delivered to the motor when the mechanical stop at the service position is reached. This method of controlling piston position allows for greater flexibility and requires no switches or cams (U.S. Patent 6444127).

One of 2 main pistons is always used:

1. A 1.5" diameter downflow piston is used when the WS1.5T control valve is used as a downflow softener, regenerating filter, or non-regenerating filter.
2. A 1.5" diameter upflow piston is used when the WS1.5T control valve is used as an upflow softener.

If the control valve is used as a softener or a regenerating filter, a regenerant piston must be attached to the main piston. If the control valve is to be used on a system that does not require a regenerant to be added, the regenerant piston must be removed.

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Spacer Stack Assembly:

The spacer stack assembly provides the necessary flow passage for water during the different cycles. The all-plastic spacer stack assembly (U.S. Patent 6402944) is a one-piece design which allows the stack to be removed using your fingers.

The exterior of the stack is sealed against the body bore with self-lubricating EPDM O-rings, while the interior surface is sealed against the piston using slippery self-cleaning directional (one-way) silicone lip seals. The lip seals are clear in color and have a special slippery coating so that the piston does not need to be lubricated.

Injector Cap, Screen, Injector Plug, and Injector:

The screen, injector, and/or injector plug(s) are installed under the injector cap in an easy-to-access location on top of the valve. The injector cap contains 4 slots so no water accumulates in the cap. The injector cap is designed to be hand-tightened.

Under the injector cap, there is an easy-to-clean removable screen to prevent fouling of the injector. There are 2 holes under the injector cap labeled *DN* and *UP*. The holes will be filled with a plug or an injector.

The plug (Order # V3010-15Z) prevents water from traveling a certain pathway. The injector lets water pass through the pathway. The self-priming injector increases the velocity of the water, creating a zone of negative pressure that draws in the concentrated liquid regenerant, such as sodium chloride (brine), potassium permanganate, etc. The regenerant blends with the stream of water, which passes through the media to regenerate the bed.

The injector provides a consistent regenerant/water mixture ratio over the entire operating pressure range of the control valve. The injector provides good performance in a variety of applications, which may involve elevated drain lines and long regenerant draw lengths. Injectors are chosen by knowing the type, amount, and regenerant flow rate for a particular type of media. Guidelines can be found in the media manufacturer's literature. The color coded injectors give different regenerant draw, slow rinse, and total flow rates over the pressure range. See injector graphs (pages 10 – 13) for total, slow rinse, and draw flow rates.

The control valve has been manufactured to be one of the following:

- Regeneration downflow WS1.5T (for softeners or regenerating filters install injector in *DN* location, plug in *UP* location).
- Regeneration upflow WS1.5T (Upflow option is for softeners only. Install injector in *UP* location, plug in other hole location).
- No regenerant WS1.5T (both the *DN* and *UP* holes have injector plugs installed and plug installed for the refill elbow).

Note: It is okay to field convert valves from upflow to downflow and vice versa with the WS1.5T valve as long as software supports upflow brine.

Refill Flow Control Assembly or Refill Port Plug:

The refill flow control assembly consists of an elbow, flow control retainer, and flow control washer. The flow control retainer fits in the elbow. The flow control retainer houses the flow control washer which controls the flow rate when the regenerant tank is being refilled. The flow control is a flexible washer-like part with a small orifice and a precision molded contour that delivers a steady 0.5 GPM regenerant tank refill rate at varying inlet pressures.

Refill is accomplished with filtered water on filters and soft water on water softeners.

The refill flow control elbow assembly is attached to the control valve with a locking clip. The locking clip allows the elbow to rotate 270° so the outlet can be oriented towards the regenerant tank.

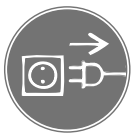
If the control valve is to be used as a non-regenerant filter control valve, the refill elbow is removed and replaced with a refill port plug (Order # V3195-01).

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Service Instructions



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.

Drive Assembly:

Remove the valve cover to access the drive assembly.

Disconnect the power source (black wire) from the PC board prior to disconnecting the motor or water meter. The power source connects to the 4-pin connector. The motor connects to the 2-pin connector on the left side of the PC board. The water meter (gray wire) connects to the 3-pin connector on the far right side of the PC board.

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 and 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 2 plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45° away 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 and push the top of the PC board towards the valve until it snaps under the middle latch. Then, weave the power and meter wires into the holders and reconnect the motor, water meter, and power plugs.

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. To remove the drive bracket, unplug the power source and meter and unweave the wires from the side holders. There are 2 tabs on the top of the drive backplate that hold the drive bracket in place. Simultaneously lift the 2 tabs and gently ease the top of the drive bracket forward. The lower edge of the drive bracket has 2 notches that rest on the drive backplate. Lift up and outward on the drive bracket to disengage the notches.

To reassemble, 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 toward the 2 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 notches are not fully engaged, the piston rod is not in hole, the wires are jammed between the drive bracket and drive backplate, or the gear is not engaging the drive cap assembly.

To inspect the drive gears, the drive gear cover needs to be removed. Before trying to remove the gear cover, the drive bracket must be removed from the drive backplate. (Refer to the instructions above regarding removing the drive bracket from the drive backplate.) The drive gear cover can be removed from the drive bracket without removing the motor or the PC board. The drive gear cover is held in place on the drive bracket by 3 clips. The largest of the 3 clips is always oriented 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 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 gear cover only fits one way, with the large clip oriented towards the bottom. If all 3 clips are outside the gear shroud on the drive bracket, the drive gear cover slips easily into place.

The drive bracket does not need to be removed from the drive backplate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the PC board. Move the spring clip loop to the right and hold. Rotate the motor at least a quarter turn in either direction so the wires are vertical (up & down) 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.

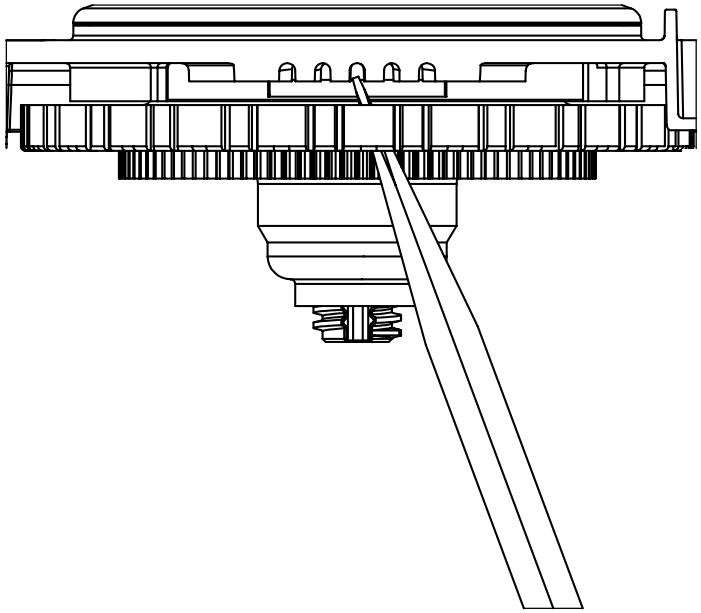
Replace the motor if necessary. Do not lubricate the motor or the gears. To reinstall the motor, move the spring clip loop to the right and hold. Gently turn the motor while inserting so that the gear on the motor meshes with the gears under the drive gear cover. Release the spring clip loop and continue to rotate the motor until the wires are horizontal and the motor housing engages the small plastic bulge inside the drive bracket motor retainer. Reconnect the motor plug to the 2-pin connector on the lower left side of the PC board. If the motor will not easily engage with the drive gears when reinstalling, lift and slightly rotate the motor before reinserting. Reconnect the power source.

Replace the valve cover. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source from the PC board (black wire) and plug back in or press and hold NEXT and REGEN for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software

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Drive Cap Assembly, Main Piston, and Regenerant Piston:

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 or insert a ¼" – ½" flat blade screwdriver into one of the slots around the top 2" of the drive cap assembly so it engages the notches molded into the drive backplate around the top 2" of the piston cavity. 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.



The drive cap assembly contains the drive cap, main drive gear, drive cap spline, piston rod, and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the O-ring. Attached to the drive cap assembly is the main piston (downflow or upflow) and, if a regenerant is used, a regenerant piston.

The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by pressing sideways and unsnapping it from its latch. Chemically clean in dilute sodium bisulfite or vinegar, or replace the regenerant piston if needed. To remove the main 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 in dilute sodium bisulfite or vinegar, or replace the main piston.

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 using a screwdriver as a ratchet until 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 involving the drive assembly or the drive cap assembly and pistons, unplug power source from the PC board (black wire) and plug back in or press and hold NEXT and REGEN for 3 seconds. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version and reset the valve to the service position.

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Spacer Stack Assembly:

To access the spacer stack assembly, remove the drive assembly, drive cap assembly, and piston. The spacer stack assembly can be removed easily without tools by using thumb and forefinger. Inspect the black O-rings and clear lip 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.

The spacer stack assembly can be pushed into the control valve body bore by hand. Since the spacer stack assembly can be compressed, it is easier to use a blunt object (⅝" – 1⅛" in diameter) to push the center of the assembly into the control valve body. The assembly is properly seated when at least 4 threads are exposed (approximately ⅝"). Do not force the spacer stack assembly into the body bore. The body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

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

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

Injector Cap, Screen, Injector Plug, and Injector:

Unscrew the injector cap and lift off. Loosen cap with special plastic wrench or pliers if necessary. Attached to the injector cap is a screen. Remove the screen and clean if fouled.
The plug and/or injector can be extracted with a small screwdriver. The plug can be wiped clean. If the plug leaks, replace the entire plug. The injector consists of a throat and a nozzle. Chemically clean the injector with vinegar or sodium bisulfite. The holes can be blown out with air. Both pieces have small diameter holes that control the flow rates of water to ensure the proper concentration of regenerant is used. Sharp objects, which can score the plastic, should not be used to clean the injector. Scoring the injector or increasing the diameter of the hole could change the operating parameters of the injector.

Two holes are labeled *DN* and *UP*. Refer to Valve Body Compliance Table for more information.

Push the plug(s) and/or injectors firmly in place, replace the screen, and hand-tighten the injector cap.

Refill Flow Control Assembly or Refill Port Plug:

To clean or replace the refill flow control, pull out the elbow-locking clip and then pull straight up on the elbow. Replace the elbow locking clip in the slot so that it is not misplaced. Twist to remove the white 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.

Chemically clean the flow control or the white flow control retainer using dilute sodium bisulfite or vinegar. Do not use a wire brush. If necessary, replace the flow control, O-ring on the flow control retainer, or the O-ring on the elbow.

Reseat the flow control so the rounded end is visible in the flow control. Reseat the white flow control retainer by pushing the retainer into the elbow until the O-ring seats. Remove locking clip, push down on elbow to reseat, and insert locking clip.

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 white retainer.

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Water Meter:

The water meter assembly is connected to the PC board by a wire. If the entire water meter assembly is to be replaced, remove the control valve cover and disconnect the power source and water meter plugs from the PC board. Unlatch the drive assembly and lean it forward. Unthread the water meter wire from the side of the drive assembly and through the drive backplate. To reinstall, rethread the water meter wire through the drive backplate and the side of the drive assembly. Reattach the drive assembly and connect water meter and power source.

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

OPERATING PRESSURES: 20 PSI MINIMUM / 125 PSI MAXIMUM • OPERATING TEMPERATURES: 40°F MINIMUM / 110°F MAXIMUM

If no water meter wire is visible, then a plug is installed, not a water meter.

The water meter wire does not need to be removed from the PC board if the water meter is only being inspected and cleaned. To remove the water meter assembly, unscrew the meter cap on the left side of the control valve. Pliers may be used to unscrew the nut if necessary.

With the nut removed, a slot at the top of the water meter is visible. Twist a flat blade screwdriver in the slot between the control valve body and the meter. When the meter is part way out, it is easy to remove the water meter from the housing. Once the water meter is removed from the control valve body, gently pull forward on the turbine to remove it from the shaft.

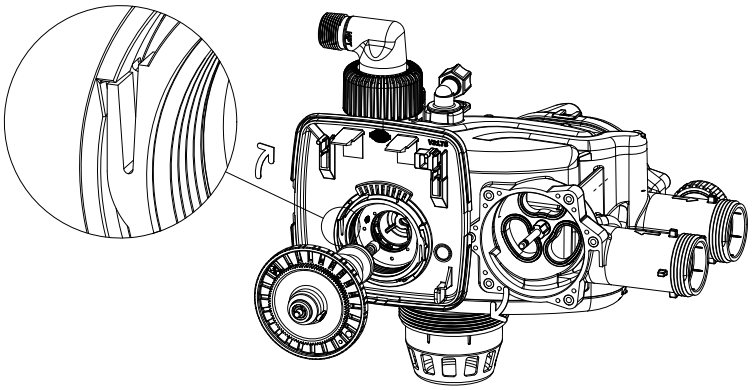
Do not use a wire brush to clean the turbine. Wipe with a clean cloth or chemically clean in dilute sodium bisulfite or vinegar. The turbine can be immersed in the chemical. Do not immerse electronics. If the turbine is scored or damaged or the bearings on the turbine are worn, replace the turbine.

Do not lubricate the turbine shaft. The turbine shaft bearings are pre-lubricated. Do not use Vaseline, oils, or other unacceptable lubricants on the O-ring. A silicone lubricant may be used on the black O-ring.

Reinsert the water meter into the side slot. Hand-tighten the nut. Do not use a pipe wrench to tighten nut.

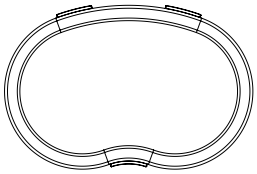
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Servicing Transfer Cap Assemblies

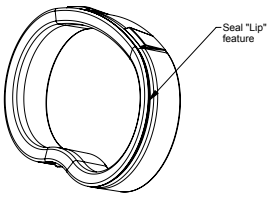


The control valve's backplate must be removed first to allow access to removing the transfer cap assembly. *Note:* Hold slight downward pressure on the top left corner of the backplate while using a thin flat screwdriver or knife blade to push in on the locking tabs, this will release the backplate and it will twist to the left off of the valve body. For removal of the drive motor side, you will need to remove the drive cover assembly to access the motorized drive. The drive motor can be removed by pressing the spring clip loop to the right, rotating the motor a quarter turn, and pulling outward to remove the motor from the reducing gear cover assembly. Remove the 3 Phillips head stainless steel screws that retain the reducing gear cover to the drive cap. Once the cover is removed, you have access to the reducing drive gears. Simply slide them off of the gear axles with your fingers to inspect them. There are 3 small, black gears with foil decals and 1 larger black reducing gear. Remove the large white drive gear from the stainless steel drive shaft. To remove the large white transfer drive gear, firmly grab the outside edge of the gear with your fingers and pull it outward away from the control valve assembly. Now you can use a 5/32" or 4 mm Allen wrench to remove the ¼-20 screws that retain the transfer drive cap assemblies on both sides of the valve.

Note: Once the screws are removed from retaining the inlet side transfer valve cap and the outlet drive motor transfer cap from the control valve, the cap will spring out away from the valve body. At this point, the transfer discs may be removed by pulling the discs outward off of the shaft away from the valve body with your hand. With the disc out, you can inspect the flat surface area to be sure it's clean and smooth free of any debris or scratches. Note that the disc is keyed to the drive shaft so that it will only assemble in one orientation. The transfer discs may be chemically cleaned with a dilute sodium bisulfate solution or vinegar, or wiped with a soft clean cloth.







To remove seals, gently pull on the outer lip of the seal to lift the seal out from its cavity, being careful not to damage the face surface of the seal. To reassemble, reseat seals into the seal cavity of the control valve body, being sure that the lip of the seal is facing outward. With seals in place, put a thin film of Dow #7 lubricant on the tops of the seals and the flat surface of the discs. Prior to reinstalling the discs, the drive shaft should be removed and the O-rings cleaned, inspected, and lubricated with Dow #7. The shaft can then be installed into the disc prior to installation. With the outlet disc assembled to the shaft, the orientation of the shaft to inlet disc can be assured by installing the set with the through hole on the outlet disc at the 6 o'clock position.

The easiest thing would be to remove both disc drives and assemble the outlet side first. Then each disc could be fitted on the shaft individually. At this point, the transfer valve cap assemblies can be reinstalled.

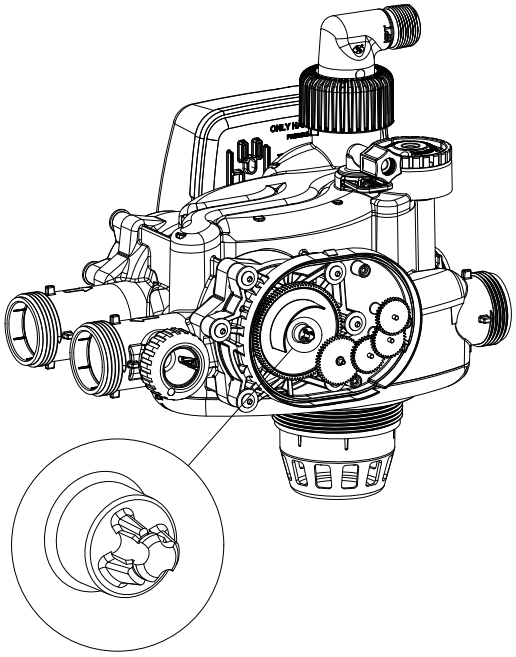
Note: Both transfer caps only mount in one orientation. Prior to installation of cap assembly, be sure to check that the stainless steel spring and the plastic spring support is in place attached to the inside of the assembly. Next, you can wipe the outside edge of the O-ring on the cap and the inside mating area of the valve with a clean cloth & re-apply a thin layer of silicone lubricant like Dow #7.

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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Noting the one possible orientation of the transfer drive cap, use one hand to press in and support the transfer drive cap while using the other hand to start two screws in, one on the top and one opposing it on the bottom. Tighten the screws in evenly so the cap seats the O-ring without getting pinched or damaged. Screws should only be hand tightened with a 5/32" or 4 mm Allen wrench. **DO NOT OVER-TIGHTEN SCREWS.**

Note: Be careful to make sure the meter cable doesn't get under the drive cap while tightening as it will result in damaging the cable.



Position the large white drive gear with the A pointing toward the 1 o'clock position and then press it onto the stainless-steel drive shaft, make sure it snaps & locks into position.
Note: The white drive gear is splined to the drive shaft and will only assemble in one orientation. Because of this, it is not necessary that the discs and gear be exactly positioned, the positioning needs to be approximate but they have to fit on the shaft.

Next, install the larger black reducing gear onto the stainless-steel shaft, then install the remaining smaller reducing gears from left to right. Reinstall the reducing gear cover over the gears and affix with the 3 stainless-steel screws. Now you can reinstall the drive motor by pressing the spring clip loop to the right and rotating the motor as you are inserting it so the gear of the motor meshes properly with the reducing gears. Release the spring clip loop and rotate the motor until the motor housing engages with the plastic nub inside the housing that holds the motor in place. Make sure that the top of the motor is flush with the top of the gear housing. Press the drive motor wires down into the strain relief of the drive cap. Then, reinstall the cover assembly.

After completing any valve maintenance involving the valve drive assembly or the transfer drive assembly, press and hold NEXT and REGEN simultaneously for 3 – 5 seconds to perform a soft reset which will synchronize the control valve's positions.

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Troubleshooting

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. Meter is not connected to meter connection on PC board	a. Connect meter to 3-pin connection labeled *METER* on PC board
	b. Restricted/stalled meter turbine	c. Remove meter and check for rotation or foreign material
	c. Meter wire not installed securely into 3-pin connector	c. Verify meter cable wires are installed securely into 3-pin connector labeled *METER*
	d. Defective meter	d. Replace meter
	e. Defective PC board	e. Replace PC board
4. Control valve regenerates at wrong time of day	a. Power 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 to *on 0* (immediate regeneration)	d. Check programming setting and reset to *NORMAL* (for a delayed regen time)
	e. Control valve set to *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. Defective PC board
7. Control valve does not regenerate automatically but **does** when the REGEN button is depressed and held.	a. Meter is not connected to meter connection on PC board	a. Connect meter to 3-pin connection labeled *METER* on PC board
	b. Restricted/stalled meter turbine	b. Remove meter and check for rotation or foreign material
	c. Incorrect programming	c. Check for programming error
	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

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Problem	Possible Cause	Solution
8. Hard or untreated water is being delivered	a. Media is exhausted due to high water usage	a. Check program settings or diagnostics for abnormal water usage
	b. Meter not registering	b. Remove meter and check for rotation or foreign material
	c. Water quality fluctuation	c. Test water and adjust program values accordingly
	d. No regenerant or low level of regenerant in regenerant tank	d. Add proper regenerant to tank
	e. Control fails to draw in regenerant	e. Refer to Troubleshooting Guide number 12
	f. Insufficient regenerant level in regenerant tank	f. Check refill setting in programming. Check refill flow control for restrictions or debris and clean or replace
	g. Damaged seal/stack assembly	g. Replace seal/stack assembly
	h. Control valve body type and piston type mismatched	h. Verify proper control valve body type and piston type match
	i. Fouled media bed	i. 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. Excess 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 straighten 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

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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*. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC board for 5 seconds then reconnect
	b. PC board not properly snapped into drive bracket	b. Properly snap PC board into drive bracket. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds 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. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC board for 5 seconds then reconnect.
	b. Mechanical binding	b. Check piston and seal/stack assembly, check reduction gears, check drive bracket and main drive gear interface. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC board for 5 seconds then reconnect.
	c. Main drive gear too tight	c. Loosen main drive gear. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC board for 5 seconds then reconnect.
	d. Improper voltage being delivered to PC Board	d. Verify that proper voltage is being supplied. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC board for 5 seconds 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. Then, press NEXT and REGEN for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds 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 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 then reconnect.

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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 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 connector 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 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 then reconnect
	d. Foreign matter built up on piston and stack assemblies creating enough friction and drag 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 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 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 then reconnect
	b. Mechanical binding	b. Check piston and seal/stack assembly, check reduction gears, drive gear interface, and 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 then reconnect

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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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