

LANCASTER®
WATER TREATMENT



**INSTALLATION, OPERATING AND
SERVICE MANUAL**

**TWIN TANK WATER SOFTENER WITH
THE X-FACTOR CONTROL VALVE**

- 7-TTLX-150
- 7-TTLX-200
- 7-TTLX-300
- 7-TTLX-400
- 7-TTLX-600

- 7-TTFESLX-60
- 7-TTFESLX-90
- 7-TTFESLX-120
- 7-TTFESLX-180



Congratulations on purchasing your new **Lancaster Water Softener**. This unit is designed to give you many years of trouble free service. When installed in accordance with the following instructions and if given reasonable care, clear-soft water will be the result. For servicing and future inspection purposes, please file this booklet with your important documents.

In the event that you need assistance for servicing your water softener, please first contact the professional contractor who installed the system.

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JOB SPECIFICATIONS

MODEL NO. _____
INSTALLATION DATE _____
SERIAL NUMBER _____
INSTALLER NAME _____ PHONE _____
ADDRESS _____

WATER TEST AT TIME OF INSTALLATION

_____ Hardness CaCo₃ (gpg) Other: _____
_____ Iron (ppm) _____
_____ pH _____

SIZING INFORMATION

All Water is Softened Except:

_____ Rear Hose Bib _____ Front Hose Bib _____ Kitchen Cold _____ Toilets _____ All Cold
_____ Other _____

The average family uses 50 gallons per person daily for all water uses in the home.

_____ Daily Water Usage (Gallons/Person)

x _____ Family Size (Number of people in family)

= _____ Total Gallons Per Day

x _____ Grains Per Gallon of hardness

(Note: Add 4 grains per gallon of hardness for each ppm iron for total compensated hardness)

= _____ Total Grains per Day

PRE-INSTALLATION REVIEW

WATER QUALITY: If sand or sediment is present in the water supply, a sediment filter should be installed ahead of the water softener. Your water softener has been designed to adequately reduce hardness from levels up to 100 grains per gallon. Ferrous bicarbonate iron levels up to 0.5 ppm can also be reduced. This is iron that is dissolved in water and not visible to the eye in a freshly drawn sample. After standing in contact with air, the ferrous iron will become oxidized to the ferric state and start to precipitate as a reddish brown floc. It can be seen and may cause discolored water. Air must not come in contact with water until after it has passed through the water softener. In some cases, additional treatment equipment may be needed to treat water having special characteristics, such as: ferric hydroxide iron, iron bacteria, low pH, tastes and odors, etc. Consult your dealer if you have any questions. **This water softener is not to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after treatment.**

WATER PRESSURE: A minimum of 20 pounds of water pressure (psi) is required for regeneration. Maximum 100 psi. CAUTION: the softener cannot be subject to a vacuum due to loss of pressure (such as a water main break or submersible well pump check valve failure).

WATER TEMPERATURE: The range of water temperature is 35°F to 100°F. DO NOT install any water softener with less than 10 feet of piping between its outlet and the inlet of a water heater.

AMBIENT TEMPERATURE: DO NOT locate softener where it or its connections (including the drain and overflow lines) will ever be subject to room temperatures under 33°F.

ELECTRICITY: An uninterrupted 120 volt 60Hz source is required. *Make sure electrical source is not on a timer or switch.* All electrical connections must be connected according to local codes. The plug-in transformer is for dry locations only. Surge protection is recommended with all electrical connections.

DRAIN: All plumbing should be done in accordance with local plumbing codes. The distance between the drain and the water softener should be as short as possible. The pipe size for the drain line should be a minimum of 1/2" (inside diameter of pipe).

SOFTENING: It is recommended that the softener be installed to soften both the hot and cold water supply. A separate hard water faucet may be plumbed for drinking purposes if desired. Outside faucets should be left on hard water.

BYPASS: A bypass valve (optional accessory) should be installed so that water will be available if it should be necessary to shut off the pressure in order to service the softener.

GENERAL INSTALLATION AND SERVICE WARNINGS

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

HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC., MAY DAMAGE PRODUCTS THAT CONTAIN O-RINGS OR PLASTIC COMPONENTS. EXPOSURE TO SUCH HYDROCARBONS MAY CAUSE THE PRODUCTS TO LEAK. DO NOT USE THE PRODUCT(S) CONTAINED IN THIS DOCUMENT ON WATER SUPPLIES THAT CONTAIN HYDROCARBONS SUCH AS KEROSENE, BENZENE, GASOLINE, ETC.

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

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

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 unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons 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 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 1/2". Backwash flow rates in excess of 7 gpm (26.5 lpm) or length in excess of 20' (6.1m) require 3/4" 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 Noryl¹ (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 the replenishing of treated water into a regenerant tank, when applicable.

Control valve installation is made easy because the distributor tube can be cut 1/2" above to 1/2" below the top of tank thread. The distributor tube is held in place by an o-ring seal and the control valve also has a bayonet lock feature for upper distributor baskets.

The 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.

BYPASS VALVE

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

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

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

OPERATION:

1. Normal Operation Position: The inlet and outlet handles point in the direction of flow indicated by the engraved arrows on the control valve. Water flows through the control valve during normal operation and this position also allows the control valve to isolate the media bed during the regeneration cycle. (see figure 1)

2. Bypass Position: The inlet and outlet handles point to the center of the bypass, the control valve is isolated from the water pressure contained in the plumbing system. Untreated water is supplied to the plumbing system. (see figure 2)

3. Diagnostic Position: The inlet handle points in the direction of flow and the outlet handle points to the center of bypass valve, system water pressure is allowed to the control valve and the plumbing system while not allowing water to exit from the control valve to the plumbing. (see figure 3)

4. Shut Off Position: The inlet handle points to the center of the bypass valve and the outlet handle points in the direction of flow, the water is shut off to the plumbing system. If water is available on the outlet side of the softener it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system). (see figure 4)

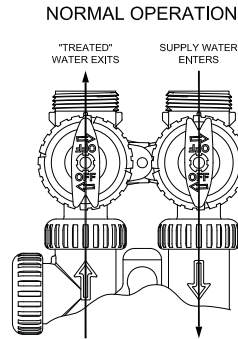


figure 1

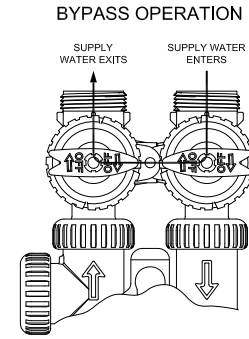


figure 2

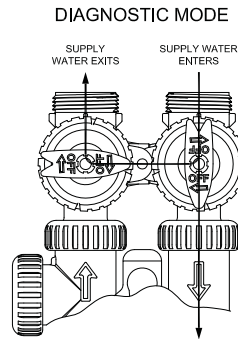


figure 3

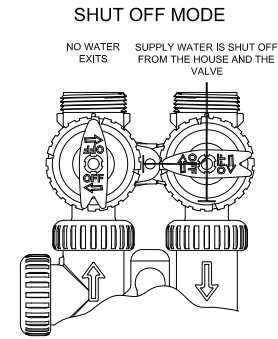


figure 4

The working parts of the bypass valve are the rotor assemblies that are contained under the bypass valve caps. Before working on the rotors, make sure the system is depressurized. Turn the red arrow shaped handles towards the center of the bypass valve and back several times to ensure rotor is turning freely.

The nuts and caps are designed to be unscrewed or tightened by hand. If necessary a pliers or the service spanner wrench 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 screwdriver in slots on caps and/or tap with a hammer.

Refer to page 19 for bypass valve parts diagram and service spanner wrench information.

To access the rotor, unscrew the cap and lift the cap, rotor and handle out as one unit. Twisting the unit as you pull it out will help to remove it more easily. There are three o-rings: one under the rotor cap, one on the rotor stem and the rotor seal. Replace worn o-rings. Clean rotor. Reinstall rotor.

When reinstalling the red arrow handles be sure that:

1. The handle pointers are lined up with the control valve body arrows, and the rotor seal o-ring and retainer on both rotors face to the right when being viewed from the front of the control valve; or
2. Arrows point toward each other in the bypass position.

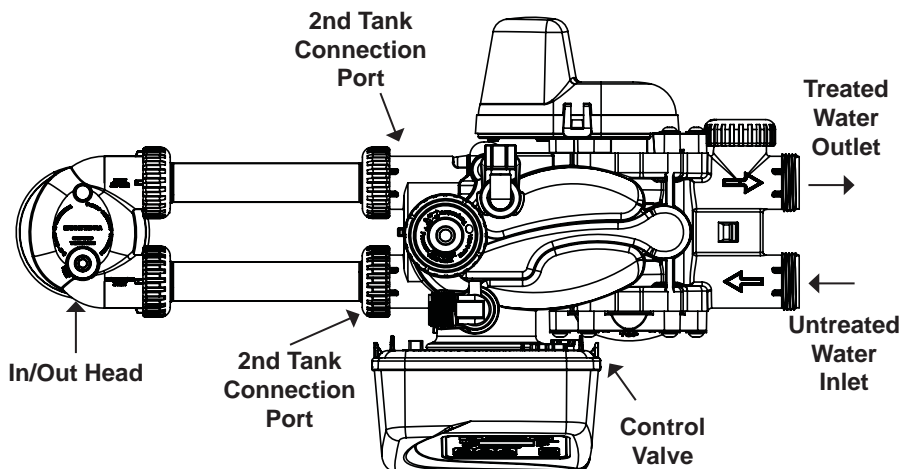
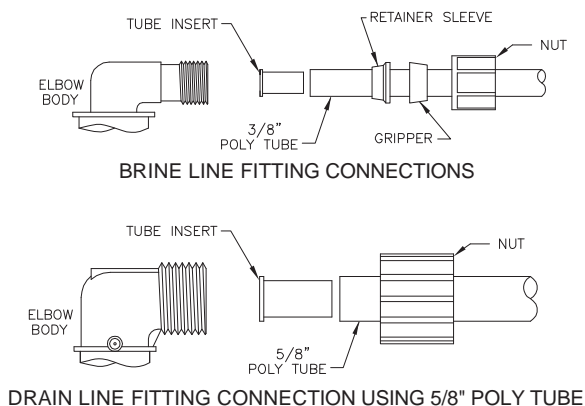
Since the handles can be pulled off, they could be accidentally reinstalled 180° from their correct orientation. To install the red arrow handles correctly, keep the handles pointed in the same direction as the arrows engraved on the control valve body while tightening the bypass valve caps.

INSTALLATION INSTRUCTIONS

(All electrical & plumbing should be done in accordance to all local codes)

1. Place the softener where you want to install it, making sure it is on a clean, level and firm base.
2. Do all necessary plumbing (inlet to inlet, outlet to outlet, and drain line to drain). The control valve, fittings and/or bypass are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.
3. 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 joint 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.
4. **A jumper ground wire should be installed between the inlet and outlet pipe whenever the metallic continuity of a water distribution piping system is interrupted. Install grounding strap on metal pipes.**
5. The drain connection may be made using either 5/8" polytube (see below) or a 3/4" female adapter. The polytube insert is shipped attached to the drain line elbow's locking clip. Press the insert into the drain line tubing (tubing not provided). Loosen the nut of the drain line elbow. Press the 5/8" polytube with insert into the drain line elbow until it seats on the back of the fitting. Tighten the nut. If soldering, 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. Never insert a drain line into a drain, sewer line, or trap. Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into the softener.

6. The brine refill flow control assembly is installed in an easy to access refill elbow located on top of the control valve. The refill flow control assembly is attached to the control valve with a locking clip. The locking clip allows the elbow to rotate 270 degrees so the outlet can be oriented towards the brine tank.
7. Connect the brine line polytubing found with the brine tank to the brine connection on the control valve. The control valve has a standard refill elbow to which a 3/8" flexible tube can be connected, see below. One polytube insert is shipped on the brine line elbow's locking clip. Remove this white polytube insert and replace the locking clip. The second polytube insert is taped to the top of the brine well cap in the brine tank. Press the polytube inserts into each end of the provided brine tubing, press the polytube with insert into the nut on the brine fitting. Tighten nut securely to create a pressure tight connection. The nut, gripper and retainer sleeve is a three-piece assembly that can come apart from the elbow body. Parts must be reassembled exactly as shown to function properly. If the nut is completely removed from the body, slip the nut, plastic gripper and retainer sleeve on to the tube then tighten on to the fitting. Make sure the floor is clean beneath the brine tank and that it is level and smooth. Install brine tubing to the brine tank using the above instructions.
8. A 1/2" (inside diameter, not provided) gravity drain line should be connected to the overflow fitting on the side of the brine tank. This overflow is in case of a malfunction in the brine shut off. If the unit is installed where water may flow in the event of an overflow and cause water damage, connect a length of flexible tubing and run to a drain below the level of the overflow. **(Do not connect the tubing to the drain line on the control valve. Do not run tubing above overflow height at any point.)**



PLACING SOFTENER INTO SERVICE

Do not add salt to the brine tank yet. Do not plug the transformer into the receptacle yet. Make sure inlet and outlet valves are to their closed positions. If using optional bypass, place in bypass position. Turn on main water supply. Open a cold water faucet. This will clear the line of any debris (solder, pipe dope, etc.) that may be in the line. Let water run at faucet for a couple minutes, or until clear. Turn off faucet. Manually add 1 ½ gallons of water to the brine tank. Now plug the transformer into a 120 volt receptacle (be certain the receptacle is uninterrupted). Within 5 seconds the control display and buttons will illuminate and the time of day screen will appear.

- Press and hold the **REGEN** button for approximately 5 seconds until the motor starts.
- Wait until display reads **BACKWASH** and numbers start counting down.
- Momentarily press **REGEN** again. Valve is now in the **REGENERANT DRAW** position.
- Momentarily press **REGEN** again. Valve is now in the **BACKWASH** position.

If using optional bypass **SLOWLY** turn bypass valve to **DIAGNOSTIC** position (See figure 3 on page 4) or slowly open inlet valve to allow water to slowly enter Softener.

When water is flowing steadily to drain without the presence of air, momentarily press **REGEN** again. Display will read **RINSE**. Open the outlet valve of the softener, or if using optional bypass place to **NORMAL OPERATION MODE** (see figure 1 on page 4). Allow control to finish the **RINSE** cycle. Allow the control to automatically advance to the **FILL** position. Close inlet valve then repeat above steps for the second softener tank. When the **FILL** cycle is reached, press **REGEN** to advance to the **SOFTENING** position. Now load the brine tank with salt. Solar Salt is recommended. The brine tank salt level should be checked every couple of weeks to determine salt usage. Keeping the brine tank salt level at least 1/2 full is recommended.

SANITIZING: Use 2 oz. of 5 ¼% unscented household chlorine bleach for each cubic foot of resin. Pour bleach directly into the 4" diameter white brine well located inside the brine tank. Press and hold the **REGEN** for 5 - 6 seconds until the motor starts running. Allow system to complete the regeneration automatically. Check for other local and state codes which may also specify sanitation methods.

Note: The first step of the regeneration process is to fill the brine tank with the proper amount of water. The brine tank will only have a very slight amount of water in it after the regeneration cycles are completed.


GENERAL OPERATION



Note: As an energy saving feature, the control will automatically turn off all SOLID BLUE or SOLID GREEN display illumination and keypad illumination after about 5 minutes of the last keypad button push. Any further keypad touch will cause the re-illumination of the display and keypad, and re-activate keypad control.

User Displays

When the system is in normal service mode, one of up to five available User Displays will be shown. Pressing **NEXT** will alternate between the following displays:

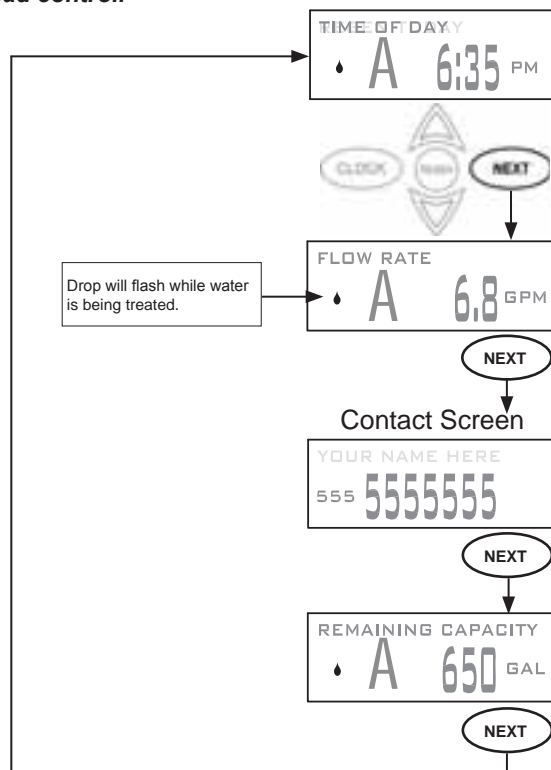
- Current time of day
- Treated water flow rate
- Service contact name and phone number (if entered)
- Remaining Capacity of treated water available

Pressing the  button while in the Capacity Remaining or Days Remaining displays will decrease the capacity remaining in ten gallon increments or the days remaining in one day increments.

To clear the Service Call reminder, press the  and  buttons simultaneously while the number and banner text screen is displayed.


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


Utilizing the control valve's built-in water meter, a water drop flashes on the display when water is being treated (i.e. water is flowing through the system).







SET TIME OF DAY




Current time of day needs to be entered during initial installation, and adjusted when daylight saving time begins or ends. If an extended power outage occurs and depletes the on-board non-rechargeable coin cell battery, when power resumes the time of day should be reset and battery replaced.


STEP 1 **STEP 1** – Press 




STEP 2 **STEP 2** - Current Time (hour): Set the hour of the day using  or  buttons. AM/PM toggles after 12. Press  to go to Step 3.





STEP 3 **STEP 3** - Current Time (minutes): Set the minutes of the day using  or  buttons. Press NEXT to exit Set Time of Day. Press  to return to previous step.

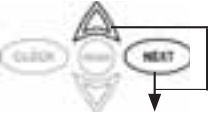






RETURN TO NORMAL MODE






ADJUST HARDNESS, DAYS BETWEEN REGENERATIONS, OR TIME OF REGENERATION

STEP 1 **STEP 1** - Press  and  simultaneously for 3 seconds to access Installer Display Settings.






STEP 2 **STEP 2** – Hardness: Set the amount of hardness in grains of hardness as calcium carbonate per gallon using the  or  buttons. The default is 20 with value ranges from 1 to 150 in 1 grain increments. Note: The grains per gallon can be increased if soluble iron needs to be reduced. Press  to go to step 3. Press  to exit Installer Display Settings.






STEP 3 **STEP 3** – Day Override: Set the maximum number of days between regenerations. If value set to “OFF”, regeneration initiation is based solely on volume used. If value is set as a number (allowable range from 1 to 28) a regeneration initiation will be called for on that day even if sufficient volume of water were not used to call for a regeneration. Set Day Override using  or  buttons:

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


Press  to go to step 4. Press  to return to previous step.



STEP 4 **STEP 4** – Press  to go to Step 5. Press  to return to previous step.



RETURN TO NORMAL MODE

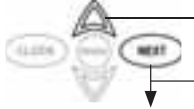



LOW BATTERY

A non-rechargeable coin cell battery is located on the circuit board, used only to maintain the time of day during power outages (all other information will be stored in memory no matter how long the power outage). The screen displays LOW BATTERY when the battery needs to be replaced. The screen will remain illuminated solid blue when LOW BATTERY is displayed. Initially LOW BATTERY display will alternate with the User display, finally displaying only LOW BATTERY. User displays are still accessible by pressing **NEXT**.

CONTACT SCREEN PROGRAMMING

STEP 1



STEP 1 - Press **NEXT** and  simultaneously for 3 seconds to access Installer Display Settings.

STEP 2



STEP 2 - Press **NEXT** to go to step 3.



STEP 3



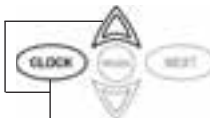
STEP 3 - Press **NEXT** to go to step 4.





STEP 4





From Step 4, Press and hold both the **CLOCK** and  button to change phone number and banner text.



Phone Number - Set phone number using the  or  arrow. Press **NEXT** to forward to the next digit. Press **REGEN** to return to previous digit.



Banner Text - Set the banner text up to a maximum of 44 characters. Use the  or  to select letters of the alphabet, numbers, ampersand (&), or a space in the banner text. Press **NEXT** to forward to the next character or to exit the Installer Display Settings.

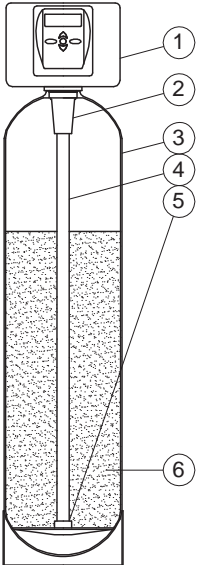
X FACTOR SERIES TTLX SPECIFICATIONS

MODEL NUMBER	7-TTLX-150	7-TTLX-200	7-TTLX-300	7-TTLX-400	7-TTLX-600
Service Flow (GPM) at 15 PSI Pressure Drop	13	17	16	18	19
Resin Tank Size; Diameter x Height (inches)	8 x 44	10 x 40	10 x 54	12 x 48	14 x 65
Resin; Cu. Ft. (each tank)	0.75	1	1.5	2	3
Brine Tank Size; (inches)	15 x 17 x 36	15 x 17 x 36	15 x 17 x 36	18 x 40	24 Dia x 50
Brine Tank Capacity; Lbs NaCl	275	275	275	450	900
Drain Line Flow Control; GPM	1.0	1.7	1.7	2.7	4.2
Brine Line (Re-Fill)Flow Control; GPM	0.5	0.5	0.5	0.5	0.5
Injector; color	1C - Violet	1E - White	1E - White	1F - Blue	1H - Green

X FACTOR SERIES TTLXC SPECIFICATIONS

MODEL NUMBER	7-TTLXC-150
Service Flow (GPM) at 15 PSI Pressure Drop	18
Resin Tank Size; Diameter x Height (inches)	10 x 35
Resin; Cu. Ft. (each tank)	0.75
Cabinet Size (including top cover); W" x L" x H"	13.5 x 22.5 x 44
Cabinet Capacity (with grid); Lbs NaCl	225
Drain Line Flow Control; GPM	1.7
Brine Line (Re-Fill) Flow Control; GPM	0.5
Injector; color	1E - White

SOFTENER ASSEMBLY

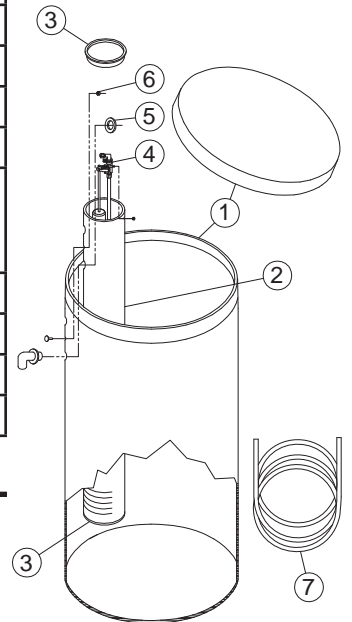


Dwg. No.	Order No.	Description	Qty
1	LXCV1TT (detailed components shown in this manual)	Metered Control Valve - Twin Tank	1
2	D1203	Top Distributor	2
3,4,5	FG844VT, D1130-12 Ft. (cut for 44 in.), R-DIP1050	Tank, Pipe, Connector, Assy for Model 7-TTLX-150	2
	FG1040VT, D1130-12 Ft. (cut for 40 in.), R-DIP1050	Tank, Pipe, Connector, Assy for Model 7-TTLX-200	2
	FG1054VT, D1130-12 Ft. (cut for 54 in.), R-DIP1050	Tank, Pipe, Connector, Assy for Model 7-TTLX-300	2
	FG1248VT, D1130-12 Ft. (cut for 48 in.), R-DIP1050	Tank, Pipe, Connector, Assy for Model 7-TTLX-400	2
	FG1465VT, D1130-12 Ft. (cut for 65 in.), R-DIP1050	Tank, Pipe, Connector, Assy for Model 7-TTLX-600	2
6	A4074 (3/4 Cu. Ft. = 39 LBS)	Ion Exchange Resin for Model 7-TTLX-150	2
	A4074 (1 Cu. Ft. = 52 LBS)	Ion Exchange Resin for Model 7-TTLX-200	2
	A4074 (1 1/2 Cu. Ft. = 78 LBS)	Ion Exchange Resin for Model 7-TTLX-300	2
	A4074 (2 Cu. Ft. = 104 LBS)	Ion Exchange Resin for Model 7-TTLX-400	2
	A4074 (3 Cu. Ft. = 156 LBS)	Ion Exchange Resin for Model 7-TTLX-600	2

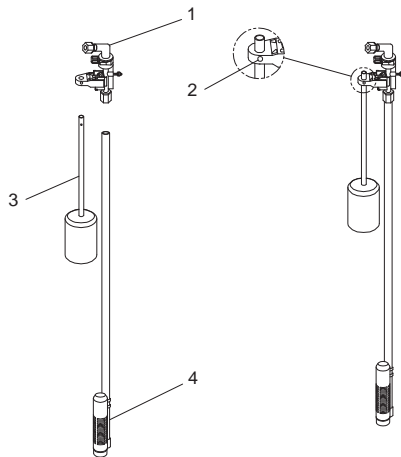
BRINE TANK ASSEMBLY

Dwg. No.	Order No.	Description	Qty
1	L56-40A	18x40 Brine Tank with Cover for Model 7-TTLX-400	1
	G2162	24x50 Brine Tank with Cover for Model 7-TTLX-600	1
2	H1031	4x28 Slotted Brine Well for Model 7-TTLX-150, -200, -300	1
	H1042	4x46 Slotted Brine Well for Model 7-TTLX-600	1
3	H7016	4 inch Brine Well Cap for Model 7-LX-150, -200, -300, -600	1
4	4740	3/8" Brine Valve Assembly (using 1/2"x24" long air check assy for Model 7-TTLX-150, -200, 300) (using 1/2"x43" long air check assy for Model 7-TTLX-600)	1
5	H1018	Two Piece Overflow Set	1
6	1640N	Nylon Screw (only for Model 7-TTLX-600)	1
	6785N	Nylon Nut (only for Model 7-TTLX-600)	1
7	H1023	3/8" O.D. x 6 Ft. Poly Tubing	1

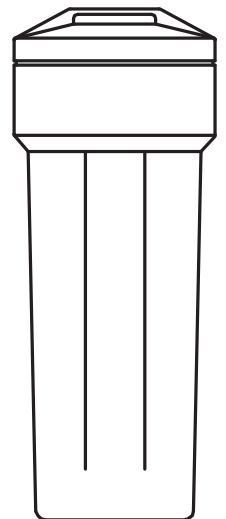
L56-50A 24 x 50
Brine Tank Assy.



4740 BRINE VALVE ASSEMBLY



J7952 15 x 17 x 36
Brine Tank Assy.

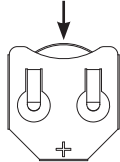


Dwg No.	Order No.	Description	Qty
1	H4600	3/8" Safety Brine Valve	1
2	10151	Pin	1
3	H4640-9.5	Float Assembly	1
4	H4500-48	Air Check Assembly (uncut length) see brine tank assy for cut length	1

X-FACTOR FRONT COVER AND DRIVE ASSEMBLY

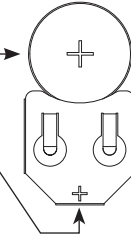
Drawing No.	Order No.	Description	Quantity
1	V3692-02LW	LP Front Cover Assembly	1
2	V3107-01	Motor	1
3	V3106-01	Drive Bracket & Spring Clip	1
4	V3757LP-BOARD	PC Board	1
5	V3110	Drive Gear 12x36	3
6	V3109	Drive Gear Cover	1

When replacing the battery, align positives and push down to fully seat.



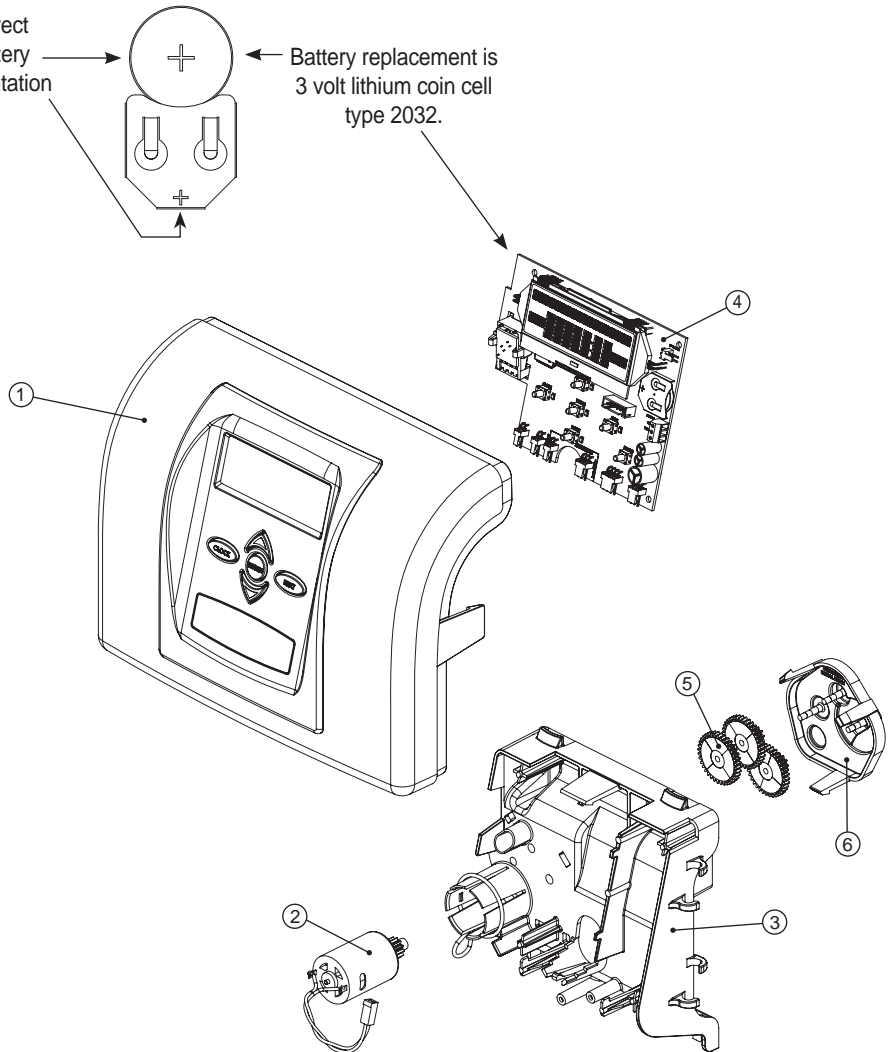
Battery Fully Seated

Correct Battery Orientation



Battery replacement is 3 volt lithium coin cell type 2032.

AC Adapter	(Not shown)
Order No.	V3186
Supply Voltage	120V AC
Supply Frequency	60 Hz
Output Voltage	12V AC
Output Current	500 mA



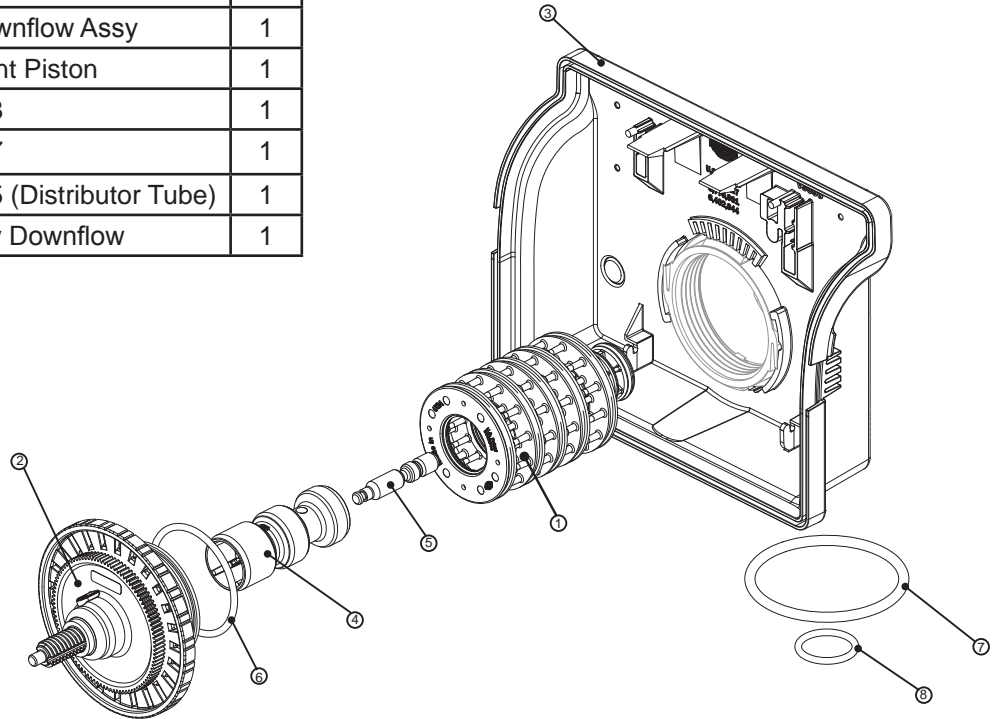
After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons, unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold **NEXT** and **REGEN** buttons for 3 seconds. This resets the electronics and establishes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

DRIVE CAP ASSEMBLY, DOWNFLOW PISTON, REGENERANT PISTON AND SPACER STACK ASSEMBLY

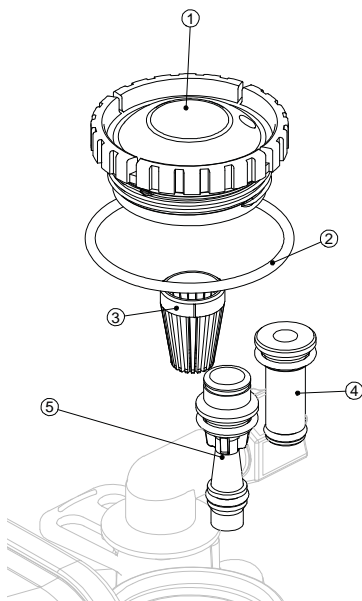
Drawing No.	Order No.	Description	Qty
1	V3005	Spacer Stack Assembly	1
2	V3004	Drive Cap Assy	1
3	V3178LP	Back Plate	1
4	V3011	Piston Downflow Assy	1
5	V3174	Regenerant Piston	1
6	V3135	O-ring 228	1
7	V3180	O-ring 337	1
8	V3105	O-ring 215 (Distributor Tube)	1
Not Shown	V3001	Body Assy Downflow	1

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary. **Avoid any type of lubricants, including silicone, on the clear lip seals.**

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



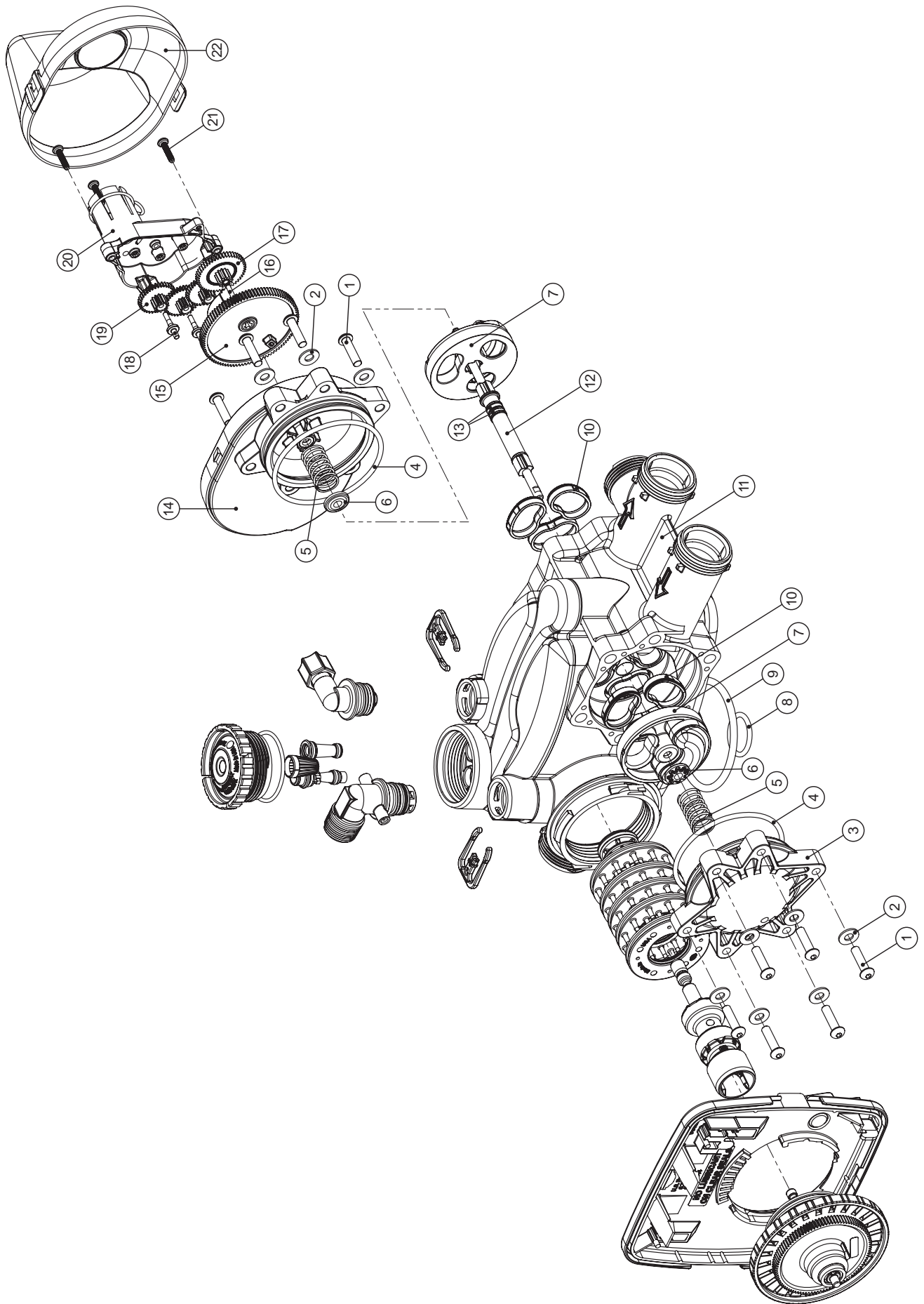
INJECTOR CAP, INJECTOR SCREEN, INJECTOR, PLUG AND O-RING



Drawing No.	Order No.	Description	Qty
1	V3176	INJECTOR CAP	1
2	V3152	O-RING 135	1
3	V3177-01	INJECTOR SCREEN CAGE	1
4	V3010-1Z	INJECTOR ASSY Z PLUG	1
5	V3010-1A	INJECTOR ASSY A BLACK	1
	V3010-1B	INJECTOR ASSY B BROWN	
	V3010-1C	INJECTOR ASSY C VIOLET	
	V3010-1D	INJECTOR ASSY D RED	
	V3010-1E	INJECTOR ASSY E WHITE	
	V3010-1F	INJECTOR ASSY F BLUE	
	V3010-1G	INJECTOR ASSY G YELLOW	
	V3010-1H	INJECTOR ASSY H GREEN	
	V3010-1I	INJECTOR ASSY I ORANGE	
	V3010-1J	INJECTOR ASSY J LIGHT BLUE	
	V3010-1K	INJECTOR ASSY K LIGHT GREEN	
Not Shown	V3170	O-RING 011	*
Not Shown	V3171	O-RING 013	*

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

The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench (see page 19). 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 slots on caps and/or tap with a hammer.



Twin Transfer

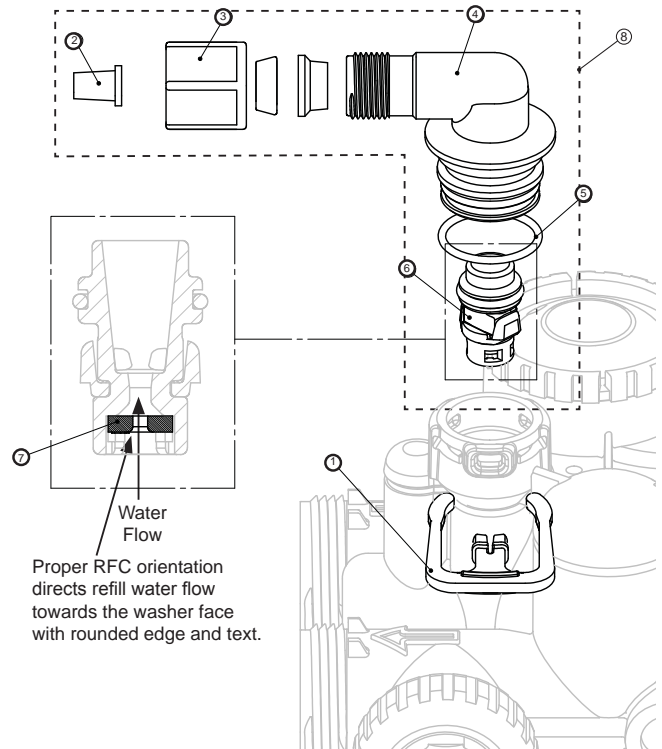
Drawing No.	Order No.	Description	Quantity
1	V3470	SCREW BHC 1/4-20 X 1 SS	12
2	V3724	WASHER FLAT SS 1/4	12
3	V4005-01	T1 TRANSFER CAP ASY	1
4	V4029	O-RING 236	2
5	V4015	T1 TRANSFER SPRING	2
6	V4014	T1 TRANSFER SPRING SUPPORT	2
7	V4036	T1 ROTOR DISK ASY	2
8	V3105	O-RING 215 (DISTRIBUTOR TUBE)	1
9	V3180	O-RING 337	1
10	V4016	T1 TRANSFER SEAL	6
11	V3031	T1 BODY SFT WTR REGEN	1
12	V4023	T1 TRANSFER DRIVE SHAFT ASY	1
13	V3287	O-RING 110	2
14	V4006-01	T1 TRANSFER DRIVE CAP ASY	1
15	V4011-01	T1 TRANSFER DRIVE GEAR ASY	1
16	V4012	T1 TRANSFER DRIVE GEAR AXLE	1
17	V4013	T1 TRANSFER REDUCTION GEAR	1
18	V3264	WS2H BYPASS REDUCTION GEARAXLE	3
19	V3110-01	WS1 DRIVE REDUCING GEAR PLAIN	3
20	V3262-01	WS1.5&2ALT/2BY REDUCGEARCVRASY	1
21	V3592	SCREW #8-1 PHPN T-25 SS	3
22	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	V4017-01	T1 INTERCONNECT FITTING ASY	1
NOT SHOWN	D1400	1191 IN/OUT HEAD	1

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

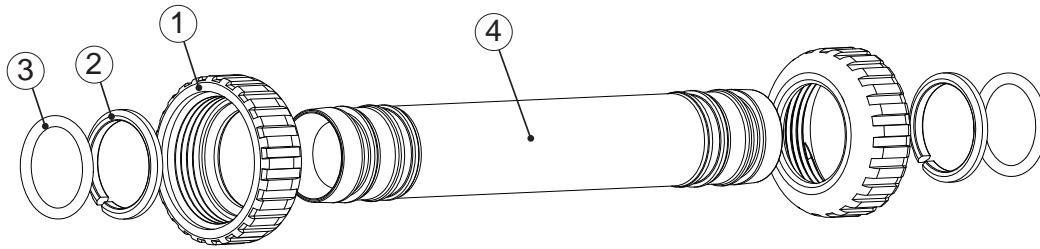
REFILL FLOW CONTROL ASSEMBLY

Drawing No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	H4614	Polytube insert 3/8"	1
3	H4612	Nut 3/8"	1
4	H4613	Elbow Cap 3/8"	1
5	V3163	O-ring 019	1
6	V3165-01*	RFC Retainer Assy	1
7	V3182	RFC	1
8	V3330	Brine Elbow Assy w/RFC 3/8"	1

*Assembly includes V3182 RFC.

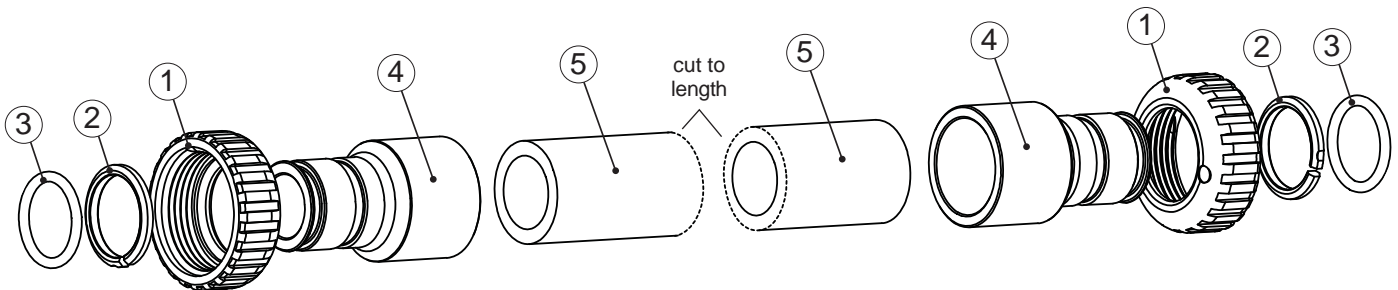


V4017-01 TT Interconnect Fitting Assembly up to 10" tanks



Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	4
2	V3150	WS1 SPLIT RING	4
3	V3105	O-RING 215	4
4	V4017	T1 INTERCONNECT FITTING	2

V4052-01 TT Interconnect Fitting Assembly for 12" to 21" Tanks



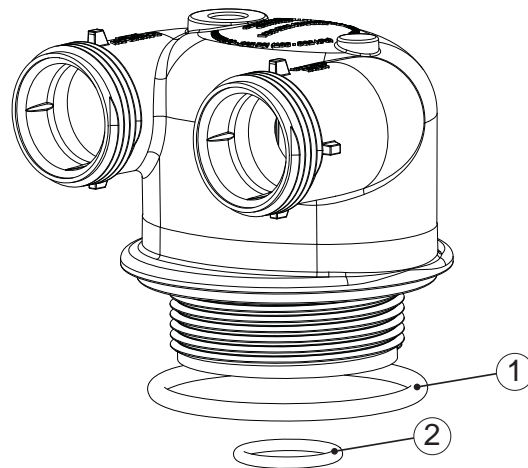
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 NUT 1" QUICK CONNECT	4
2	V3150	WS1 SPLIT RING	4
3	V3105	O-RING 215	4
4	V3352	WS1 FITTING 1¼" & 1½" PVC SOLVENT	4
5	V4052	PIPE PVC SCH 80 1¼" X 2"	2

D1400 1191 In/Out Head

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.
- Slide nut on first, then the split ring and o-ring.
- Hand tighten the nut only.

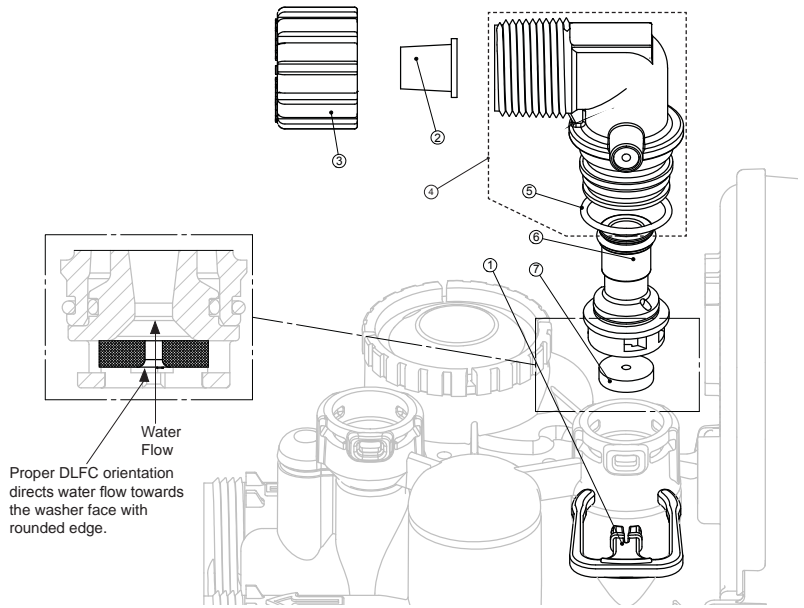
The V4017-01 twin tank control valve interconnect kit can be used on tanks up to 10" in diameter and is packed in with control valve. **If using 12" diameter tanks or larger order optional kit number V4052-01 twin tank control valve interconnect kit for 12" thru 21" diameter tanks.**



Drawing No.	Order No.	Description	Quantity
1	V3180	O-RING 337	1
2	V3105	O-RING 215 (DISTRIBUTOR TUBE)	1

DRAIN LINE - 3/4"

Dwg No.	Order No.	Description	Qty
1	H4615	Elbow Locking Clip	1
2	V3194	Polytube insert 5/8	Option
3	V3192	Nut 3/4 Drain Elbow	Option
4*	V3158	Drain Elbow 3/4 Male	1
5	V3163	O-ring 019	1
6*	V3159	DLFC Retainer Assy	1
7	V3162-007	DLFC 0.7 gpm for 3/4	One DLFC must be used if 3/4 fitting is used
	V3162-010	DLFC 1.0 gpm for 3/4	
	V3162-013	DLFC 1.3 gpm for 3/4	
	V3162-017	DLFC 1.7 gpm for 3/4	
	V3162-022	DLFC 2.2 gpm for 3/4	
	V3162-027	DLFC 2.7 gpm for 3/4	
	V3162-032	DLFC 3.2 gpm for 3/4	
	V3162-042	DLFC 4.2 gpm for 3/4	
	V3162-053	DLFC 5.3 gpm for 3/4	
	V3162-065	DLFC 6.5 gpm for 3/4	
V3162-075	DLFC 7.5 gpm for 3/4		
V3162-090	DLFC 9.0 gpm for 3/4		
V3162-100	DLFC 10.0 gpm for 3/4		



*4 and 6 can be ordered as a complete assembly - V3331 Drain Elbow and Retainer Assy

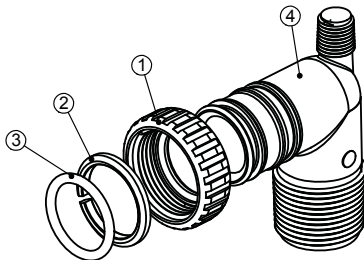
Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 3/4" NPT connection (unless using 5/8" polytubing).

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

INSTALLATION FITTING ASSEMBLIES

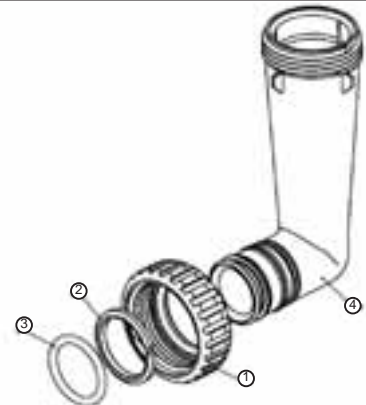
Order No: **V3007** (Standard)
Description: **Fitting 1" PVC Male NPT Elbow Assembly**

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



Order No. **V3191-01** (Optional)
Description: **Fitting Vertical Adapter Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3191	Vertical Adapter	2



Do not use pipe dope or other sealants on threads. Teflon tape must be used on threads of 1" NPT connection. Teflon tape is not necessary on the nut connection nor caps because of o-ring seals.

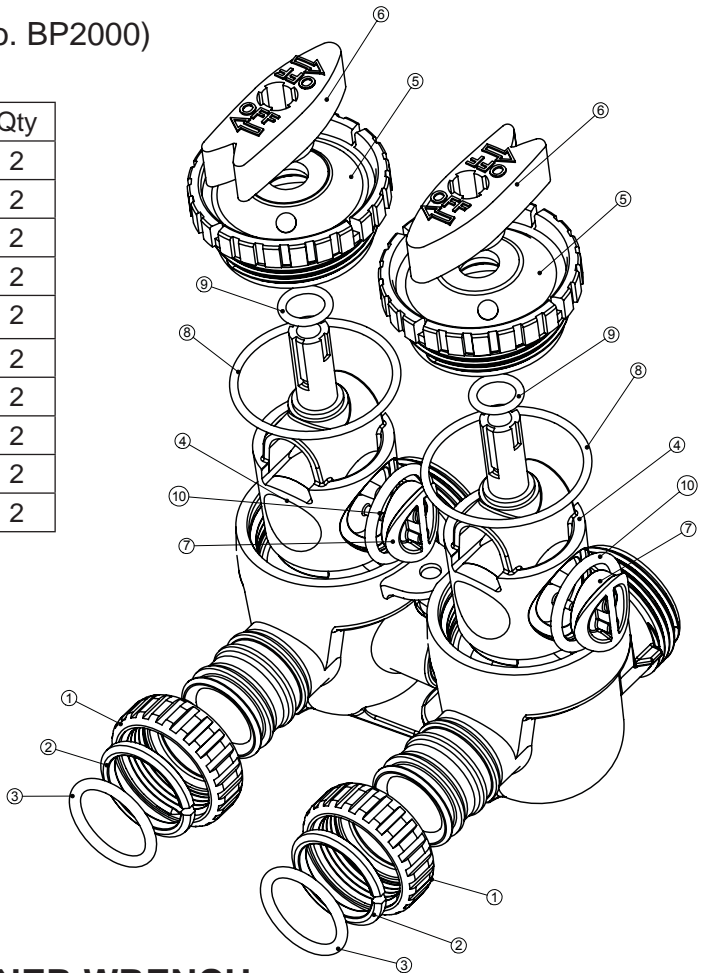
The nut and caps are designed to be unscrewed or tightened by hand or with the service spanner wrench (see page 17). If necessary a pliers can be used to unscrew the nut or cap. Do not use a pipe wrench to tighten or loosen nuts or caps. Do not place a screwdriver in slots on caps and/or tap with a hammer.

Do not use Vaseline, oils, other hydrocarbon lubricants or spray silicone anywhere. A silicone lubricant may be used on black o-rings but is not necessary.

BYPASS VALVE

(Order No. BP2000)

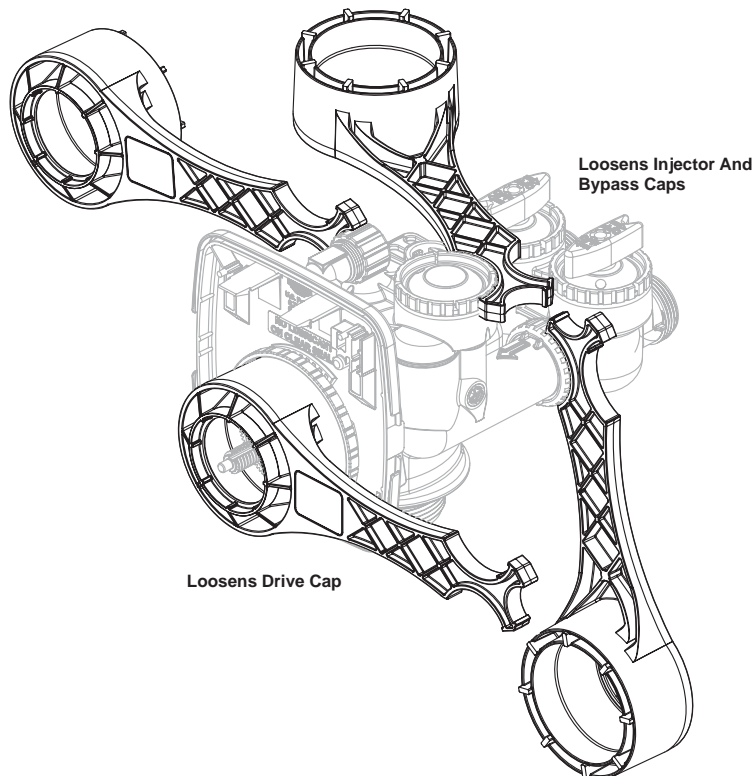
Drawing No.	Order No.	Description	Qty
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	Bypass 1" Rotor	2
5	V3146	Bypass Cap	2
6	V3147	Bypass Handle	2
7	V3148	Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2



SERVICE SPANNER WRENCH

(Order No. V3193)

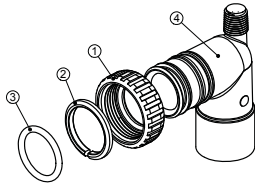
Although no tools are necessary to assemble or disassemble the valve, the wrench (shown in various positions on the valve) may be purchased to aid in assembly or disassembly.



OPTIONAL INSTALLATION FITTING ASSEMBLIES

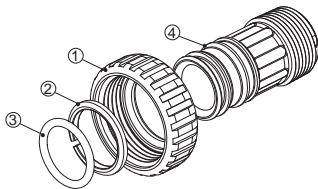
Order No: **V3007-01**
Description: **Fitting ¾" & 1" PVC Solvent 90° Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3189	Fitting ¾&1" PVC Solvent 90	2



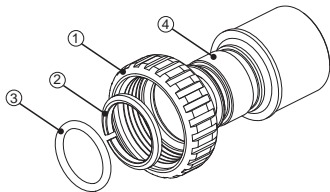
Order No: **V3007-04***
Description: **Fitting 1" Plastic Male NPT Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3164	Fitting 1" Plastic Male NPT	2



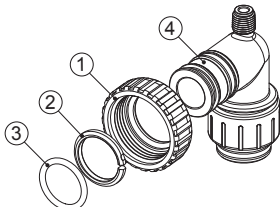
Order No: **V3007-09***
Description: **Fitting 1¼" & 1½" Brass Sweat Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3375	Fitting 1¼" & 1½" Brass Sweat	2



Order No: **V3007-15**
Description: **Fitting ¾" John Guest QC Elbow Assembly**

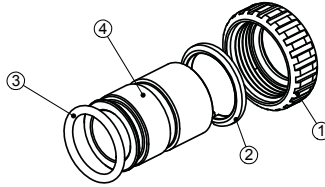
Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3790	Fitting Elbow ¾/4 Quick Connect w/Stem	2



Order No: **V3007-02**
Description: **Fitting 1" Brass Sweat Assembly**

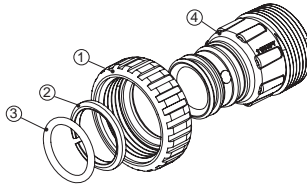
Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188	Fitting 1 Brass Sweat Assembly	2

Do not install in California.



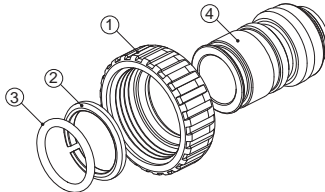
Order No: **V3007-05**
Description: **Fitting 1-¼" Plastic Male NPT Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3317	Fitting 1-¼" Plastic Male NPT	2



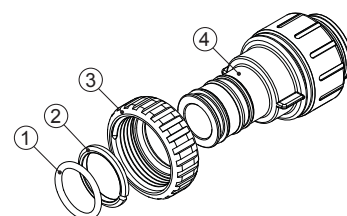
Order No: **V3007-12**
Description: **Fitting ¾" Brass SharkBite Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3628	Ftg ¾/4 Brass Shark-Bite	2



Order No: **V3007-17**
Description: **Fitting 1" John Guest QC Straight Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3105	O-Ring 215	2
2	V3150	Split Ring	2
3	V3151	Nut 1" Quick Connect	2
4	V3375	Fitting 1" Quick Connect	2



Order No: **V3007-03**
Description: **Fitting ¾" Brass Sweat Assembly**

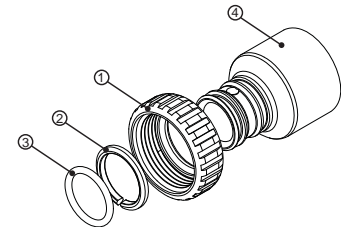
Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3188-01	Fitting ¾ Brass Sweat	2

Do not install in California.



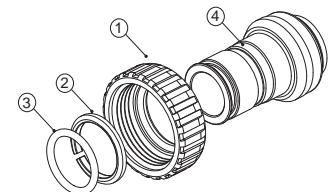
Order No: **V3007-07***
Description: **Fitting 1¼" & 1½" PVC Solvent Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3352	Fitting 1¼"&1½" PVC Solvent	2



Order No: **V3007-13***
Description: **Fitting 1" Brass SharkBite Assembly**

Drawing No.	Order No.	Description	Quantity
1	V3151	Nut 1" Quick Connect	2
2	V3150	Split Ring	2
3	V3105	O-Ring 215	2
4	V3629	Ftg 1" Brass Shark-Bite	2



*Must be special ordered. Minimum quantity of 24

The WS1TT 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 motor. The PC board's two-prong jack connects wires to the direct current (DC) motor. 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 backwashing, regeneration, rinsing, refill or service. The motor is fully reversible (turns both ways) and changes direction of rotation to change the direction of piston motion. The motor is easily replaced if necessary.

There are three drive gears held in place by the drive gear cover. All three 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 & 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 two main pistons is always used:

1. A 1.25" diameter downflow piston is used when the WS1TT control valve is used as a downflow softener, regenerating filter or non-regenerating filter.
2. A 1.25" diameter upflow piston is used when the WS1TT control valve is used as an upflow softener. Upflow option not applicable for EA, EE or EI control valves.

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.

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 & 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 four 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 two holes under the injector cap labeled "DN" and "UP". The holes will be filled with a plug or an injector.

The plug (Order # V3010-1Z) 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 WS1TT (for softeners or regenerating filters install injector in DN location, plug in UP location)
- regeneration upflow WS1TT (upflow option is for softeners only, which are not EA, EE or EI control valves. Install injector in UP location, plug in other hole location)
- no regenerant WS1TT (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 WS1TT valve as long as software supports upflow brine.

REFILL FLOW CONTROL ASSEMBLY OR REFILL PORT PLUG

The refill flow control assembly consists of a refill flow elbow, refill flow control retainer assembly, refill flow control, polytube insert and nut assembly. The refill flow control retainer fits in the refill elbow. The refill flow control retainer houses the refill flow control which controls the flow rate when the regenerant tank is being refilled. The refill 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 treated water.

The refill flow control assembly is installed in an easy to access refill elbow located on top of the control valve. The refill flow control assembly is attached to the control valve with a locking clip. The locking clip allows the elbow to rotate 270 degrees so the outlet can be orientated towards the regenerant tank.

The control valve has a standard refill elbow to which a 3/8" flexible tube can be connected. An optional elbow can be ordered which accommodates a 1/2" flexible tube for a high regenerant draw rate situation (G injectors and larger). Both elbows use the same refill flow control and retainer.

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 P/N V3195-01.

DRAIN LINE FLOW CONTROL AND FITTING ASSEMBLIES

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

DRAIN LINE FLOW CONTROL AND FITTING ASSEMBLY INFORMATION

Drain Line Fitting	Drain Line Flow Control Order No.	Number on Drain Line Flow Control	Backwash Flow Rate (gpm)	Backwash Flow Rate (lpm)
3/4"	V3162-007	007	0.7	2.6
3/4"	V3162-010	010	1.0	3.8
3/4"	V3162-013	013	1.3	4.9
3/4"	V3162-017	017	1.7	6.4
3/4"	V3162-022	022	2.2	8.3
3/4"	V3162-027	027	2.7	10.2
3/4"	V3162-032	032	3.2	12.1
3/4"	V3162-042	042	4.2	15.9
3/4"	V3162-053	053	5.3	20.1
3/4"	V3162-065	065	6.5	24.6
3/4"	V3162-075	075	7.5	28.4
3/4"	V3162-090	090	9.0	34.1
3/4"	V3162-100	100	10.0	37.9
1"	V3190-090	090	9.0	34.1
1"	V3190-100	100	10.0	37.9
1"	V3190-110	110	11	41.6
1"	V3190-130	130	13	49.2
1"	V3190-150	150	15	56.8
1"	V3190-170	170	17	64.3
1"	V3190-200	200	20	75.7
1"	V3190-250	250	25	94.6

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

The drain line flow control can be installed in the standard 3/4" drain line elbow, which accommodates 5/8" polytube or 3/4" NPT drain line connections. The optional nut and polytube insert for the 3/4" drain line elbow is designed for use with flexible polytube only. The 3/4" drain line elbow can be rotated 180 degrees so the outlet can be orientated to the nearest drain. The same retainer is used for all drain line flow controls for the 3/4" fitting. Drain line flow controls designed for the 3/4" fitting are available for flow rates ranging from 0.7 to 10 gpm (2.6 to 37.9 lpm).

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

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 plug (black wire) from the PC board prior to disconnecting the motor or water meter plugs from the PC board. The power source plug connects to the four-pin jack. The motor plug connects to the two-pin jack on the left-hand side of the PC board. The water meter plug (gray wire) connects to the three-pin jack on the far right-hand 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 plugs from the PC board. Lift the middle latch along the top of the drive bracket while pulling outward on the top of the PC board. The drive bracket has two plastic pins that fit into the holes on the lower edge of the PC board. Once the PC board is tilted about 45° from the drive bracket it can be lifted off of these pins. To reinstall the PC board, position the lower edge of the PC board so that the holes in the PC board line up with the plastic pins. Push the top of the PC board towards the valve until it snaps under the middle latch, weave the power and water meter wires into the holders and reconnect the motor, water meter and power plugs.

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 start by removing the plugs for the power source and the water meter. Unweave the wires from the side holders. Two tabs on the top of the drive back plate hold the drive bracket in place. Simultaneously lift the two tabs and gently ease the top of the drive bracket forward. The lower edge of the drive bracket has two notches that rest on the drive back plate. 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 back plate. Push the top of the drive bracket toward the two latches. The drive bracket may have to be lifted slightly to let the threaded piston rod pass through the hole in the drive bracket. Maintain a slight engaging force on top of the drive bracket while deflecting the bracket slightly to the left by pressing on the side of the upper right corner. This helps the drive gears mesh with the drive cap assembly. The drive bracket is properly seated when it snaps under the latches on the drive back plate. 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 back plate, 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 back plate. (Refer to the instructions above regarding removing the drive bracket from the drive back plate. 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 three clips. The largest of the three clips is always orientated to the bottom of the drive bracket. With the PC board facing up, push in and down on the large clip on the drive gear cover. Handle the cover and the gears carefully so that the gears do not fall off 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 on one way, with the large clip orientated towards the bottom. If all three clips are outside of the gear shroud on the drive bracket the drive gear cover slips easily into place.

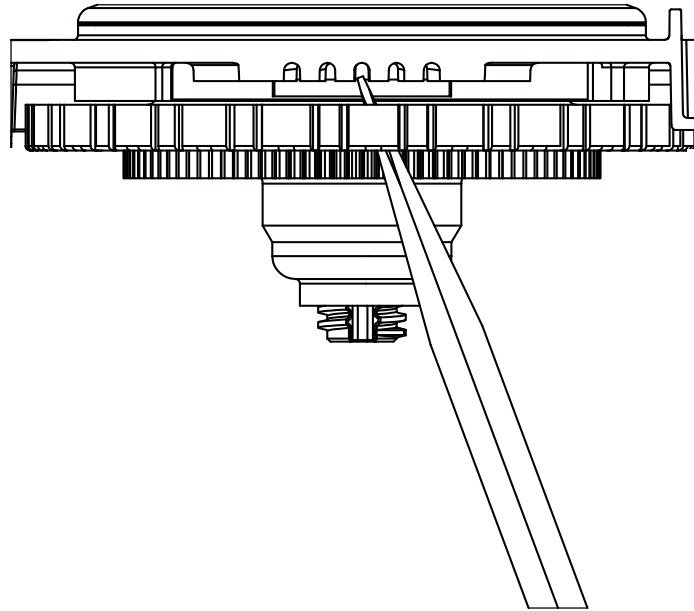
The drive bracket does not need to be removed from the drive plate if the motor needs to be removed. To remove the motor, disconnect the power and motor plugs from the jacks on the PC board. Move the spring clip loop to the right and hold. Rotate the motor at least a ¼ turn in either direction so the 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 two-pronged jack 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 plug.

Replace the valve cover. After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons 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 then reset the valve to the service position.

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 1/4" to 1/2" 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 back plate around the top 2" of the piston cavity. The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counter clockwise. Once loosened unscrew the drive cap assembly by hand and pull straight out.



The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. 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. Upflow is not applicable to EA, EE or EI control valves.

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 back plate. 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 jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons 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 then reset the valve to the service position.

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 in to the control valve body bore by hand. Since the spacer stack assembly can be compressed it is easier to use a blunt object (5/8" to 1-1/8" in diameter) to push the center of the assembly into the control valve body. The assembly is properly seated when at least four threads are exposed (approximately 5/8"). Do not force the spacer stack assembly in. The control valve body bore interior can be lubricated with silicone to allow for easy insertion of the entire stack.

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

After completing any valve maintenance involving the drive assembly or the drive cap assembly and pistons unplug power source jack from the printed circuit board (black wire) and plug back in or press and hold NEXT and REGEN buttons 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 then 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 pried out 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 insure that 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. Check for compliance. Refer to Valve Body Compliance Table at the beginning of this manual.

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.

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 back plate. To reinstall, rethread the water meter wire through the drive back plate and the side of the drive assembly. Reattach the drive assembly and the water meter and power plugs.

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.

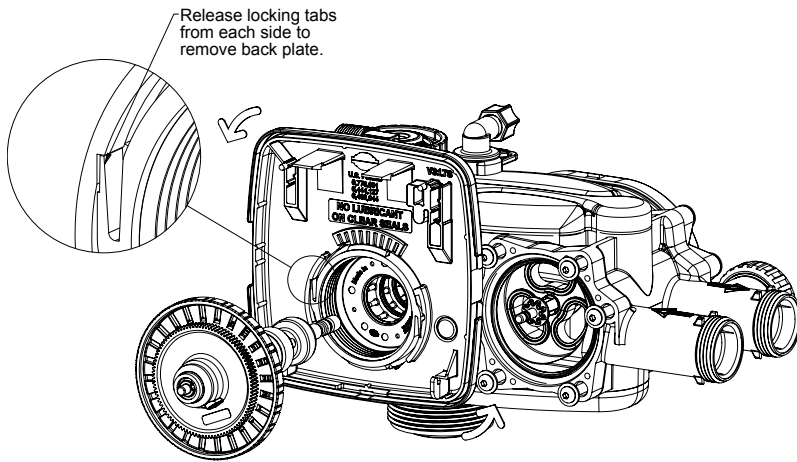
With the nut removed, a slot at the top of the water meter is visible. Twist a flat blade screwdriver in the slot between the control valve body and the meter. When the meter is part way out it is easy to remove the water meter from the housing. Once the water meter is removed from the control valve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

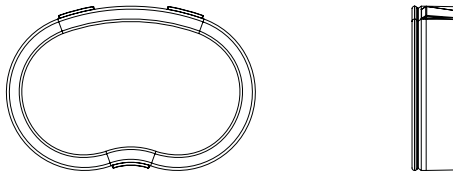
SERVICING TRANSFER CAP ASSEMBLIES



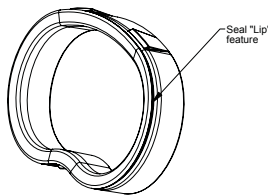
The control valves backplate must be removed first to allow access to removing the transfer cap assembly. NOTE: Hold slight downward pressure on the top left corner of the backplate while using a thin flat screwdriver or knife blade to push in on the locking tabs, this will release the backplate and 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 then rotate the motor a ¼ turn and pull outward to remove the motor from the reducing gear cover assembly. Remove the three 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 / check 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 4mm 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, vinegar or just wiped with a soft clean cloth.



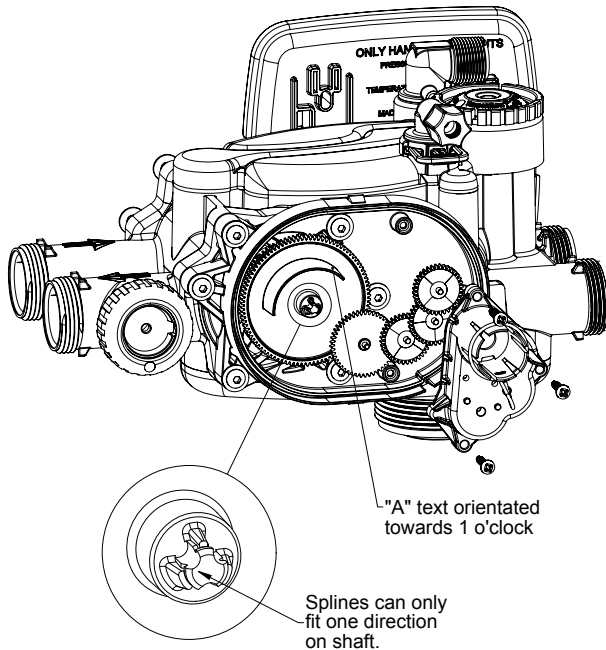
To remove seals gently pull out on the outer lip of the seal to lift the seal out from its cavity being careful not to damage the face surface of the seal. To reassemble re-seat seals into the seal cavity of the control valve body being sure that the lip of the seal is facing outward. With seals in place put a thin film of Dow #7 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: That 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 c 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.

BE SURE NOT TO USE ANYTHING HYDROCARBON BASED SUCH AS VASELINE OR PETROLEUM JELLY TO LUBRICATE PLASTIC COMPONENTS OR O-RINGS AS THEY WILL BE DAMAGED BY THE HYDROCARBONS AND POTENTIALLY CAUSE FAILURES THAT CAN RESULT WITH LEAKS.



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 opposing 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 4mm allen wrench, **DO NOT OVER TIGHTEN SCREWS.**

NOTE: be careful and 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. Re-install the grey reducing gear cover over the gears and affix with the 3 stainless steel screws. Now you can re-install the drive motor by pressing the spring clip loop to the right then rotate 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 and make sure that the top of the motor is flush with the top of the grey gear housing. Press the drive motor wires down into the strain relief of the drive cap, now you can re-install the cover assembly.

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

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 three 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 three pin connector	c. Verify meter cable wires are installed securely into three 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 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. 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 three 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 three pin connector	d. Verify meter cable wires are installed securely into three pin connector labeled METER
	e. Defective meter	e. Replace meter
	f. Defective PC Board	f. Replace PC Board

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 Trouble Shooting 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 mix matched	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. 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 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

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

Problem	Possible Cause	Solution
<p>17. Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position</p>	<p>a. Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface</p>	<p>a. Snap drive bracket in properly then Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
<p>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</p> <p>Motorized Alternating Valve = MAV</p> <p>Separate Source = SEPS</p> <p>No Hard Water Bypass = NHBP</p> <p>Auxiliary MAV = AUX MAV</p>	<p>a. Control valve programmed for ALT A or b, nHbP, SEPS, or AUX MAV with out having a MAV or NHBP valve attached to operate that function</p>	<p>a. Press NEXT and REGEN buttons 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</p>
	<p>b. MAV/ NHBP motor wire not connected to PC Board</p>	<p>b. Connect MAV/ NHBP motor to PC Board two pin connection labeled DRIVE. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>c. MAV/ NHBP motor not fully engaged with reduction gears</p>	<p>c. Properly insert motor into casing, do not force into casing Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>d. Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor</p>	<p>d. Replace piston and stack assemblies. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
<p>19. Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position</p> <p>Motorized Alternating Valve = MAV</p> <p>Separate Source = SEPS</p> <p>No Hard Water Bypass = NHBP</p> <p>Auxiliary MAV = AUX MAV</p>	<p>a. Foreign material is lodged in MAV/ NHBP valve</p>	<p>a. Open up MAV/ NHBP valve and check piston and seal/ stack assembly for foreign material. Press NEXT and REGEN buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>
	<p>b. Mechanical binding</p>	<p>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 buttons for 3 seconds to resynchronize software with piston position or disconnect power supply from PC Board for 5 seconds and then reconnect.</p>



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