LANCASTER
WATER TREATMENT

X FACTOR SERIES™
FILTER

INSTALLATION, OPERATING AND SERVICE MANUAL

BRONZE LINE LET
ELECTRONIC WATER FILTER
TIME CLOCK MODEL
FEATURING THE LETCV1F VALVE

COLOR, TASTE, ODOR

- ☐ 7-LETCT-1B
- ☐ 7-LETCT-2B
- ☐ 7-LETCT-3B

IRON FILTER

- ☐ 7-LETIM-1B
- ☐ 7-LETIM-2B
- ☐ 7-LETIM-3B

SEDIMENT/TURBIDITY

- ☐ 7-LETST-1B
- ☐ 7-LETST-2B
- ☐ 7-LETST-3B

ACID NEUTRALIZERS

- ☐ 7-LETDAN-1B
- ☐ 7-LETDAN-1.5B
- ☐ 7-LETDAN-2B
- ☐ 7-LETDAN-3B

Congratulations on purchasing your new **Lancaster Water Filter**. This unit is designed to give you many years of trouble free service. 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 filter, please first contact the professional contractor who installed the system.

OPERATING PARAMETERS

Minimum / Maximum Operating Pressures	20 psi (138 kPa) - 125 psi (862 kPa)
Minimum / Maximum Operating Temperatures	40°F (4°C) - 110°F (38°C)
Current Draw & Voltage	0.5 Amperes - 110 Volts Other Options Available

GENERAL 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.

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), wait 5 seconds and plug back in or simultaneously press and hold SET HOUR and ▼ buttons for 5 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 ¾".

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.

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.

The control valve uses no traditional fasteners (e.g. screws); instead clips, threaded caps and nuts and snap type latches are used. Caps and nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screw driver, one large blade screw driver, pliers and a pair of hands. A plastic wrench is available which eliminates the need for screwdrivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market. 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 AC adapter comes with a 15 foot power cord and is designed for use with the control valve. The AC 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.

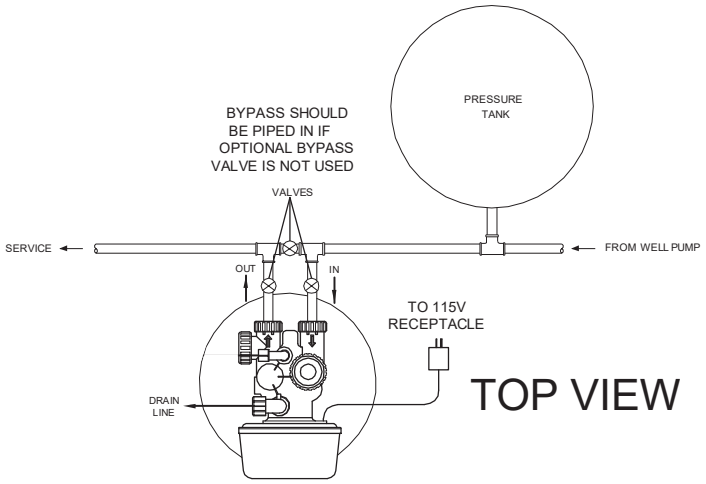
COMPONENTS:

MODEL	MINERAL TANK (dia. & ht.)	MINERAL- (QUANTITY OF BAGS)
7-LETDAN-1B	FG1047D, 10 X 47 (with dome plug)	A8021 CALCITE - (2)
7-LETDAN-1.5B	FG1054D, 10 X 54 (with dome plug)	A8021 CALCITE - (3)
7-LETDAN-2B	FG1354D, 13 X 54 (with dome plug)	A8021 CALCITE - (4)
7-LETDAN-3B	FG1365D, 13 X 65 (with dome plug)	A8021 CALCITE - (6)
7-LETIM-1B	FG1044,10 X 44	A8007 BIRM - (1)
7-LETIM-2B	FG1354, 13 X 54	A8007 BIRM - (2)
7-LETIM-3B	FG1465, 14 X 65	A8007 BIRM - (3)
7-LETCT-1B	FG1044,10 X 44	A8009 CARBON - (1)
7-LETCT-2B	FG1354, 13 X 54	A8009 CARBON - (2)
7-LETCT-3B	FG1465, 14 X 65	A8009 CARBON - (3)
7-LETST-1B	FG1044,10 X 44	A8014 FILTER AG - (1)
7-LETST-2B	FG1354, 13 X 54	A8014 FILTER AG - (2)
7-LETST-3B	FG1465, 14 X 65	A8014 FILTER AG - (3)

INSTALLATION

Allow one foot of clearance to service the valve. Place filter in desired location close to water supply inlet, after pressure tank, and near a source for waste water, (utility sink, floor drain or sewer line). A 115/120V, 60Hz uninterrupted outlet is required. Keep filter far enough away from walls and other obstructions to allow enough room for servicing the unit. If a water softener is also to be installed, generally it will be placed in line after the neutralizer or filter.

From water supply→ neutralizer → filter → softener → to service



New Installations: Gravel Support Bed must be added to the filter <u>BEFORE</u> adding mineral (See Figure A and B, next page).

Minerals must be added to the filter. Add the mineral by following these steps:

- Mineral can be loaded via the 1-1/4” dome hole using a funnel if the system purchased has this feature or through the 2-1/2” opening on the top of the mineral tank.
- If loading from the top of the mineral tank, remove the control valve by turning counter-clockwise.
- Plug or tape the distributor tube. (Figure A)
- Add the mineral. Do not overfill. Tank should be approx. 2/3 full.
- Remove the plug or tape.
- Water can be manually added at this time to begin the soaking process.
- Replace the control valve making sure that the distributor tube is inserted into the center hole of the bottom of the control valve.
- Complete plumbing.
- Place the bypass valve in “BYPASS OPERATION”. (Figure 1)
- Plug the transformer into a 120V uninterrupted receptacle.
- **Minerals such as Filter Ag and Carbon should be soaked in water for at least a 24-hour period before backwashing at full-flow. The mineral is dry and filling too quickly will result in the mineral plugging the drain line and valve assembly.**

INSTALLATION CONT.

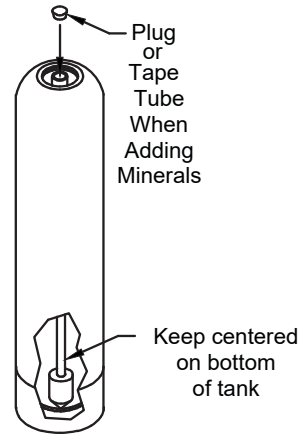


FIG. A

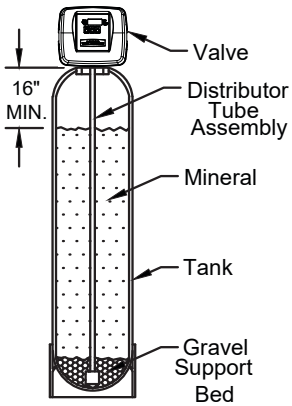


FIG. B

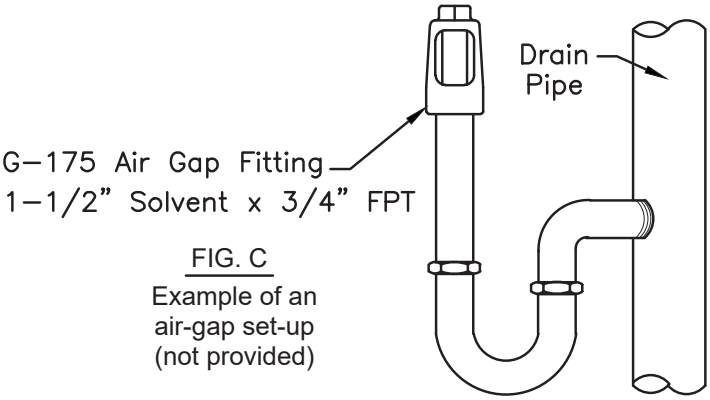


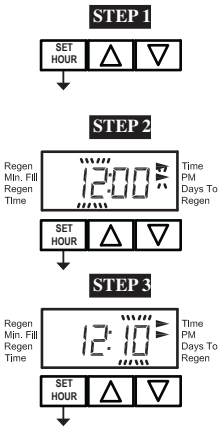
FIG. C

Example of an air-gap set-up (not provided)

DRAIN LINE: The 3/4" drain line elbow accommodates 3/4" NPT drain line connections. The drain line elbow can be rotated so the outlet can be oriented toward the nearest drain.

The drain line must be piped to an open drain with air gap between the drain and the sewer lines (Fig. C). Under no circumstances should there be a direct connection with sanitary sewage facilities. If it is necessary to run the drain pipe overhead (not to exceed 5' above valve) or longer than 20', be sure to increase the pipe size and follow all plumbing procedures to hold friction and restrictions to a minimum.

SET TIME OF DAY



STEP 1: Press and Hold **SET HOUR** for 3 seconds.

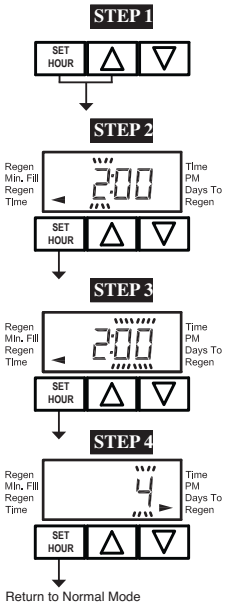
STEP 2: Current Time (hour): Set the hour of the day using ▲ or ▼buttons. AM/ PM toggles after 12. Pres **SET HOUR** to go to step 3.

STEP 3: Adjust minutes with ▲ or ▼. Press **SET HOUR** to exit Set Time of Day.

POWER LOSS: Only the current time of day will need to be reset if power is lost for greater than 8 hours. If power is lost while the system is regenerating, the control will complete regeneration at the point of interruption once power is restored.

ERROR MESSAGE: if "E1", "E2", "E3" or "E4" appears on the display contact the OEM for help. This indicates that the valve did not function properly.

SET REGENERATION TIME AND DAYS BETWEEN BACKWASHES



STEP 1: From normal mode, press **SET HOUR** + ▲ buttons simultaneously for 3 seconds and release.

STEP 2: Backwash Time Hour: Set the time for backwash to start using ▲ or ▼. Press **SET HOUR** to go to the next step.

STEP 3:Backwash Time Minutes: Set the time for backwash start using ▲ or ▼. Press **SET HOUR** to go to the next step.

STEP 4: Days to Backwash: Set the number of days between backwash. The allowable range is 1 to 99. Press **SET HOUR** to exit.

PLACING UNIT INTO SERVICE: Make sure the Bypass inlet and outlet valves connected to the control valve are to their closed positions (BYPASS OPERATION Figure 1). Turn on main water supply. Open a cold water faucet. This will clear the lines of any debris (solder, pipe dope, etc.) that may be in the line. Let water run at tap for a couple of minutes, or until clear. Turn off faucet.

- Simultaneously press and hold the ▲ and ▼ buttons for approx. 5 seconds or until the motor starts. Wait until the display reads C1. This is the BACKWASH position.
- Unplug the control valve from the electrical outlet to keep the valve in the backwash position.
- Slowly turn the bypass valve to the DIAGNOSTIC MODE (Figure 2) to allow water to **slowly** enter the system. The mineral is dry and filling too quickly will result in the mineral plugging the drain line and valve assembly.
- **CAUTION - Minerals such as Carbon and Filter Ag should be soaked in water for 24 hours before backwashing at full-flow. The mineral is dry and filling too quickly will result in the mineral plugging the drain line and valve assembly.**
- Flow water to drain very slowly, gradually increasing the flow until water runs clear. This may take up to 30 minutes.
- Plug in the control valve.
- Advance the control to the RINSE position by pressing and releasing the ▲ button. The display will read C4.
- Place the bypass valve in the NORMAL OPERATION position. (Figure 3)
- Allow the filter to complete the final rinse and automatically advance to the filter position.
- It is common to have some very fine particles visible in the service line immediately after loading new mineral even after initial backwash. This is temporary and will clear up after a few gallons of water have passed through the filter. A sediment cartridge filter can be installed after a backwashing filter to capture these particles if their presence is objectionable.

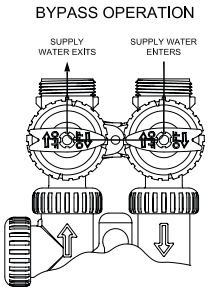


FIGURE 1

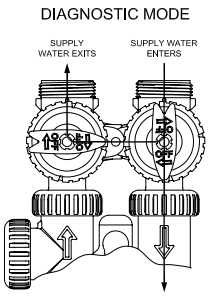


FIGURE 2

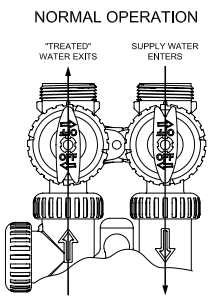


FIGURE 3

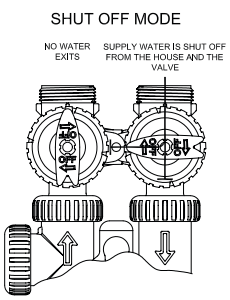


FIGURE 4

ADDITIONAL PROGRAMMING INFORMATION AVAILABLE FROM LANCASTER WATER TREATMENT UPON REQUEST. INCLUDES: 7-DAY OPTION, REGENERATION CYCLES, TIMES AND 50 Hz.

SERVICE INSTRUCTIONS

ACID NEUTRALIZERS, (7-LETDAN-): Mineral used: Calcite. Calcite will dissolve in proportion to the amount of acid in the raw water. The amount of calcite in the tank should be monitored and replaced periodically. A tank with a dome plug is provided so that calcite may be added without removing the control valve. To check level of calcite in the mineral tank **shut off water supply to the filter**. Press and hold the ▲ and▼ buttons until the filter goes into backwash. Unplug valve from power supply. This will relieve the pressure in the tank. Remove hexagonal dome plug. A small amount of water will be lost from the tank. Insert a dipstick into the dome hole until the stick reaches mineral level. Mark and remove the stick. Measure the marked distance on the stick. This number should never be less than 16". Replace calcite before the mineral level is 24" from the dome hole. Adding calcite will displace the water in the tank. This water may be siphoned out to reduce spillage. As each installation will use a different amount of calcite, monitoring the mineral level once a month for the first few months of operation should give a fairly good indication as to how frequently the calcite will need to be replenished. Replace the dome plug. Turn on the water supply to the neutralizer. Plug valve into power supply. Allow water to run to drain for a couple of minutes to allow "Fines" to backwash to drain. Press and release the ▲ button. Display will read **C4**. Press and release the ▲ button again. Time of day will need to be reset.

A pH test kit may also be used to monitor the pH level to help determine when mineral needs to be replenished. Calcite will add approximately four (4) or more grains per gallon to the original hardness of the raw water. This should be kept in mind when figuring regeneration cycle for a water softener. If a Corosex/Calcite mixture is recommended to be used (for high flow rates or very low pH level), mix one part Corosex with four parts Calcite **BEFORE** adding to the tank. **NOTE: 1 cu ft. of calcite = 85 lbs.**

IRON FILTERS, (7-LETIM-): Mineral used: Birm. No chemical regenerant is required, backwash periodically. No hardness is added to the water. For clear water iron, when the pH is less than seven (7) in the raw water, a water softener should be used in place of the iron filter. **Note: When using Birm for iron removal, it is necessary that the water: contain no oil or hydrogen sulfide, organic matter not to exceed 4-5 ppm, the D.O. content equal at least 15% of iron content with a pH of 6.8 or more. If the influent water has a pH of less that 6.8, neutralizing additives such as Calcite, Corosex or soda ash may be used prior to the Birm filter to raise the pH. A water having a low D.O. level may be pretreated by aeration. Chlorination greatly reduces Birm's activity. High concentrations of chlorine compounds may deplete the catalytic coating.**

COLOR, TASTE AND ODOR FILTERS, (7-LETCT-): Mineral used: Carbon. Used for removal of chlorine, color, taste, odor and low levels of sulfur, etc. The mineral bed should be backwashed periodically, but will in time reach the maximum absorbency. When this occurs the carbon should be completely replaced.

SEDIMENT AND TURBIDITY, (7-LETST-): Mineral used: Filter AG. This filter will filter out dirt, silica, etc. down to the 20-40 micron range. In most cases it has a lifetime fill and should be backwashed periodically depending on local conditions. Pressure drop is very low.

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.

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.

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.

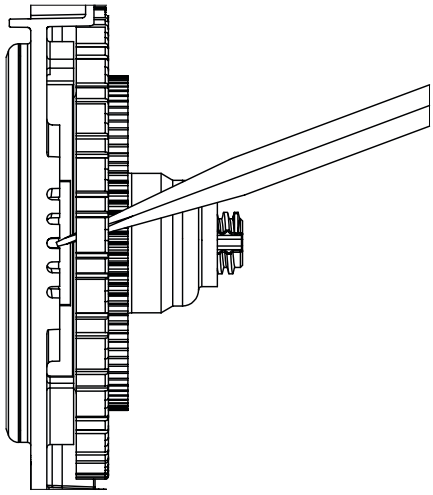
Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt or oils may interfere with pulse counting.

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.

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).

A regenerant piston must be attached to the main piston.



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 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.

NOTE: It is not recommended to field convert valves from upflow to downflow and vice versa. Separate areas in the valve supply water to the injector for upflow and downflow valves.

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.

METER PLUG:
This control valve does not come equipped with a meter, instead a plug is installed. The plug should not need to be serviced.

To remove the meter plug 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 meter plug is visible. Twist a flat blade screwdriver in the slot between the control valve body and the meter plug. When the meter plug is part way out it is easy to remove the meter plug from the housing.

DO NOT use a wire brush to clean. Wipe with a clean cloth or chemically clean in dilute sodium bisulfite or vinegar.

DO NOT use Vaseline, oils, or other unacceptable lubricants on o-rings. A silicone lubricant may be used on the black o-ring.

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

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

The nuts and caps are designed to be unscrewed or tighten by hand. 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 screwdriver in slots on caps and/or tap with a hammer. 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: under the bypass cap, on the rotor stem and on the rotor seal. Replace worn o-rings. Clean rotor. Reinstall rotor.

When reinstalling the red arrow handles be sure that:

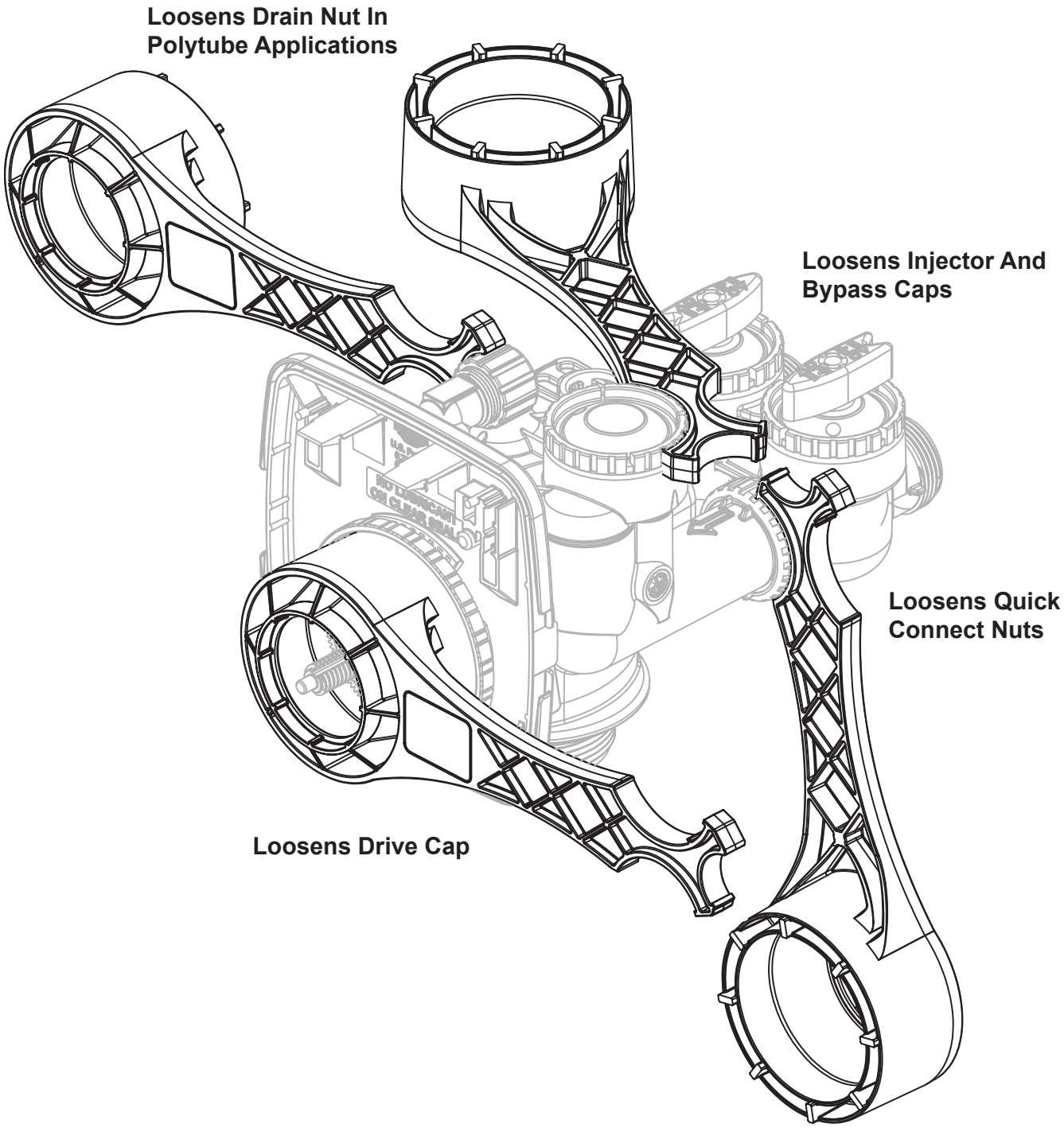
1. O-rings on both rotors face to the right when being viewed from the front of the control valve when the handle pointers are lined up with the control valve body arrows; or
2. Arrows point toward each other in the bypass position.

Since the handles can be pulled off, they could be accidentally reinstalled 180° from their correct orientation. To install the red 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.

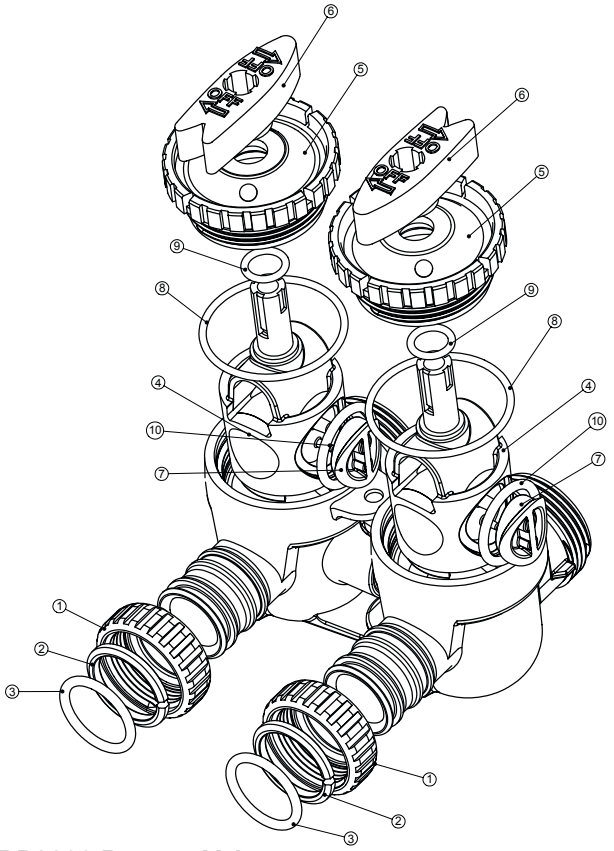
After completing any valve maintenance, press and hold **SET HOUR** and ▼ buttons for 5 seconds or unplug power source jack (black wire) from the circuit board and plug back in. This resets the electronics and establishes the filtering position. Reset the time of day.

OPTIONAL MAINTENANCE WRENCH V3193

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



PARTS

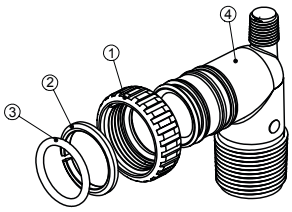


BP2000 Bypass Valve

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

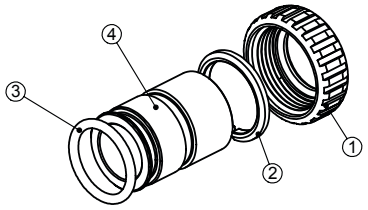
ADDITIONAL OPTIONAL FITTINGS	
Part Number	Description
V3007-01	3/4” X 1” PVC Solvent Elbow Assembly
V3007-02	1” Brass Sweat Assembly
V3007-03	3/4” Brass Sweat Assembly
V3007-04	1” Plastic Male NPT Assembly
V3007-05	1-1/4” Plastic Male NPT Assembly
V3007-07	1-1/4” & 1-1/2” PVC Solvent Elbow Assy
V3007-09	1-1/4” & 1-1/2” Brass Sweat Assembly
V3007-12	3/4” Shark Bite Assembly
V3007-13	1” Shark Bite Assembly
V3007-15	3/4” John Guest QC Elbow Assembly
V3007-17	1” John Guest Straight QC

V3007 1” PVC Male NPT Elbow Assembly Standard



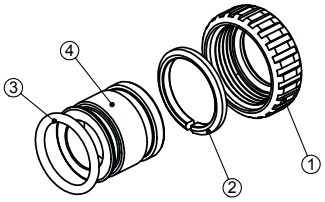
Item No.	Quantity	Part No.	Description
1	2	V3151	Nut 1” Quick Connect
2	2	V3150	Split Ring
3	2	V3105	O-Ring 215
4	2	V3149	1” PVC Male NPT Elbow

V3007-02 1” Brass Sweat Assembly Optional



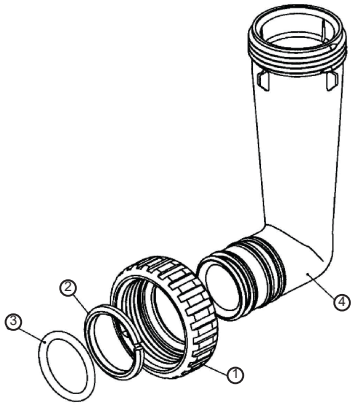
Item No.	Quantity	Part No.	Description
1	2	V3151	Nut 1” Quick Connect
2	2	V3150	Split Ring
3	2	V3105	O-Ring 215
4	2	V3188	Fitting - 1” Brass Sweat

V3007-03 3/4” Brass Sweat Assembly Optional

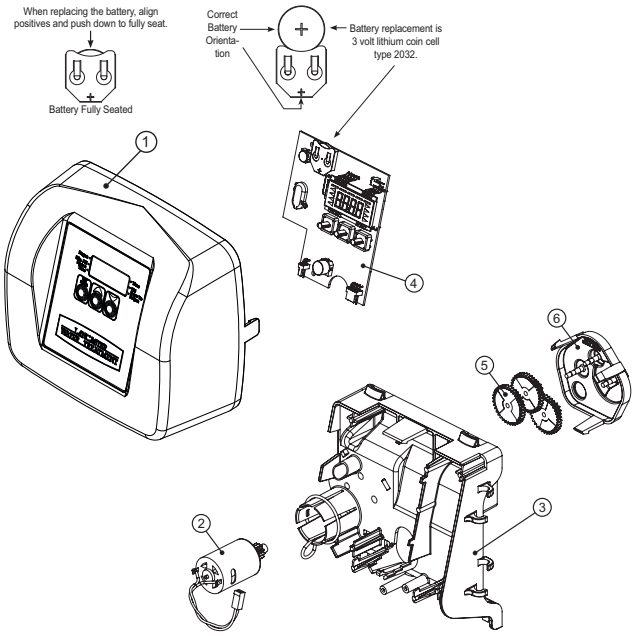


Item No.	Quantity	Part No.	Description
1	2	V3151	Nut 1” Quick Connect
2	2	V3150	Split Ring
3	2	V3105	O-Ring 215
4	2	V3188	Fitting - 3/4” Brass Sweat

V3191-01 Vertical Adapter Assembly Optional



Item No.	Quantity	Part No.	Description
1	2	V3151	Nut 1” Quick Connect
2	2	V3150	Split Ring
3	2	V3105	O-Ring 215
4	2	V3191	Vertical Adapter

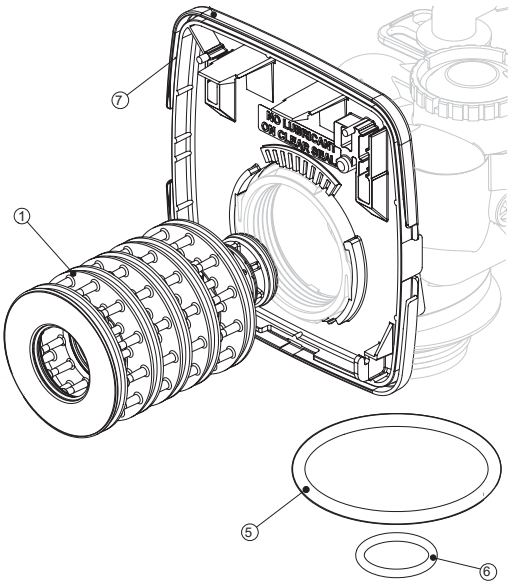


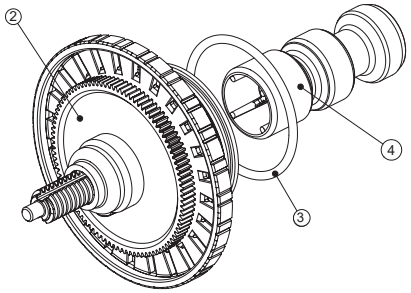
FRONT COVER AND DRIVE ASSEMBLY

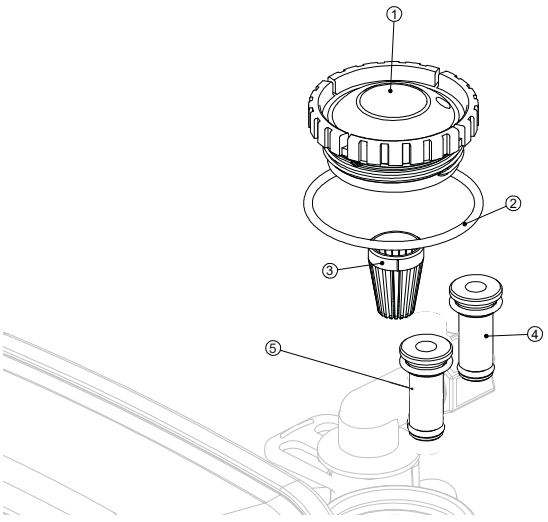
Item No.	Quantity	Part No.	Description
1	1	V4180	Front Cover Assembly
2	1	V3107	Motor
3	1	V3106	Drive Bracket/Spring Clip
4	1	V3818TC	PC Board
5	3	V3110	Drive Gear Cover
6	1	V32109	Drive Assembly
2-6	*	V3002TC	Drive Assembly (parts 2-6)
NOT SHOWN	1	V3186	Transformer 110V-12V

DRIVE CAP ASSEMBLY, DOWN FLOW PISTON, REGENERANT PISTON AND SPACER STACK ASSEMBLY

Item No.	Quantity	Part No.	Description
1	1	V3005	Spacer Stack Assembly
2	1	V3004	Drive Cap Assembly
3	1	V3135	O-Ring 228
4	1	V3011	Piston Assembly
5	1	V3180	O-Ring 337
6	1	V3105	O-Ring 215
7	1	V3946	Backplate



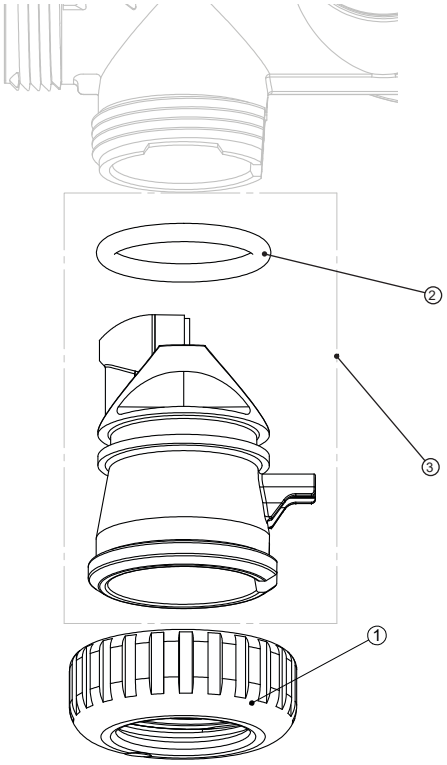




INJECTOR, INJECTOR CAP, SCREEN AND O-RING

Item No.	Quantity	Part No.	Description
1	1	V3176	Injector Cap
2	1	V3152	O-Ring 135
3	1	V3177	Injector Screen
4	1	V3010-1Z	Injector Assy. Z Plug
NOT SHOWN	*	V3170	O-Ring 011
NOT SHOWN	*	V3171	O-Ring 013

*** Injector plug and injector contains one 011 and one 013 O-ring**

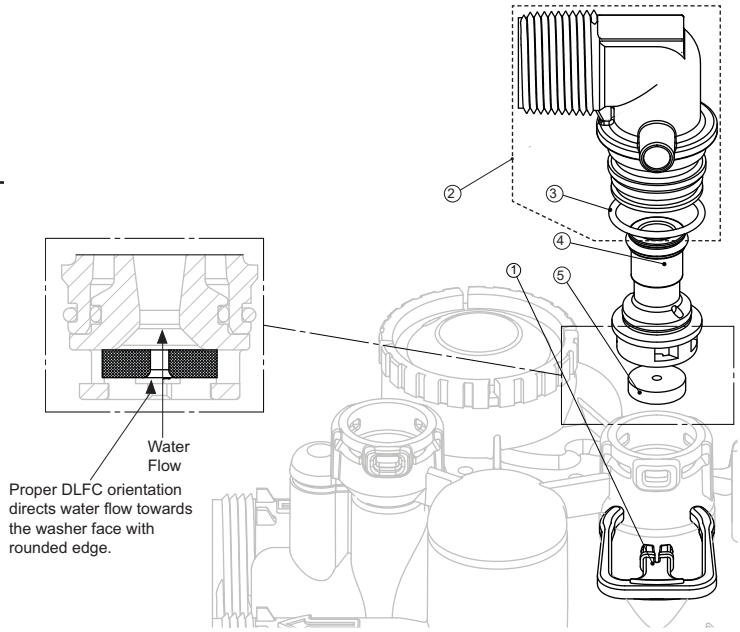


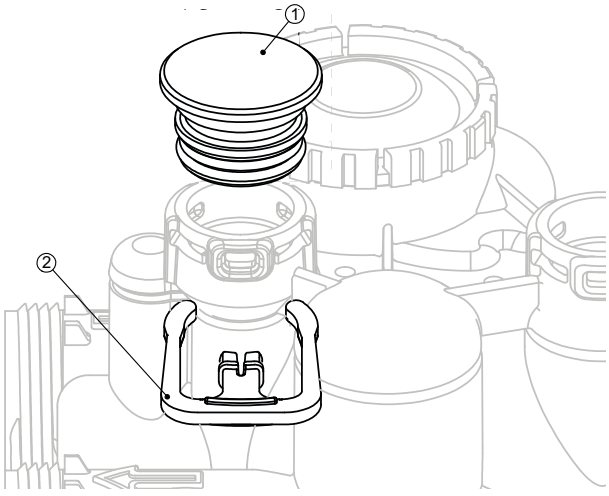
METER PLUG

Item No.	Quantity	Part No.	Description
1	1	V3151	Nut 1” QC
2	1	V3105	O-Ring 215
3	1	V3003	Meter Plug Assembly

DRAIN LINE - 3/4”

Item no.	Quantity	Part No.	Description
1	1	H4615	Elbow Locking Clip
2	1	V3158	3/4 Drain Elbow
3	1	V3163	O-Ring 019
4	1	V3159	DLFC Retainer
5	1	V3162-056	DLFC 5.3
5	1	V3162-065	DLFC 6.5
5	1	V3162-090	DLFC 9.0
5	1	V3162-100	DLFC 10.0





BRINE REFILL

Item No.	Quantity	Part No.	Description
1	1	V3195	Refill Port Plug Assyt
2	1	H4615	Elbow Locking Clip

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
1. Timer does not display time of day.	a. Transformer unplugged	a. Connect power
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
2. Timer does not display correct time of day.	a. Switched outlet	a. Use uninterrupted outlet
	b. Power outage	b. Reset time of day
	c. Defective PC board	c. Replace PC board
3. Control valve regenerates at wrong time of day.	a. Power outages	a. Reset control valve to correct time of day
	b. Time of day not set correctly	b. Reset to correct time of day
	c. Time of regeneration incorrect	c. Reset regeneration time
4. E1, E2 OR E3: Unable to recognize start of regeneration. Unexpected stall. Motor ran to long, timed out trying to reach next cycle position, or trying to reach home	a. Control valve has just been serviced	a. Press SET HOUR and ▼ for 5 seconds or unplug power source jack (black wire) and plug back in to reset control valve. Reset time of day.
	b. Foreign matter is lodged in control valve	b. Check piston and spacer stack assembly for foreign matter.
	c. High drive forces on piston	c. Replace piston (s) and spacer stack assembly.
	d. Control valve piston not in home position	d. Press SET HOUR and ▼ for 5 seconds or unplug power source jack (black wire) and plug back in to reset control valve. Reset time of day.
	e. Motor not inserted fully to engage pinion, motor wires broken or disconnected, motor failure	e. Check motor and wiring. Replace motor if necessary.
	f. Drive gear label dirty or damaged, missing or broken gear	f. Replace or clean drive gear.
	g. Drive bracket incorrectly aligned to back plate	g. Reset drive bracket properly.
	h. PC board is damaged or defective	h. Replace PC board.
	i. PC board incorrectly aligned to drive bracket	i. Ensure PC board is correctly snapped onto drive bracket.
5. Control valve stalled in regeneration.	a. Motor not operating	a. Replace motor
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
	e. Broken drive gear or drive cap assembly	e. Replace drive gear or drive cap assembly
	f. Broken piston retainer	f. Replace drive cap assembly
	g. Broken main or regenerant piston	g. Replace main or regenerant piston
6. Control valve does not regenerate automatically when ▲ and ▼ buttons are depressed and held.	a. Transformer unplugged	a. Connect transformer
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Broken drive gear or drive cap assembly	c. Replace drive gear or drive cap assembly
	d. Defective PC board	d. Replace PC board
7. Control valve does not regenerate automatically but does when ▲ and ▼ buttons are depressed.	a. Defective PC board	a. Replace PC board
	b. Set-up error	b. Check control valve set-up procedure

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