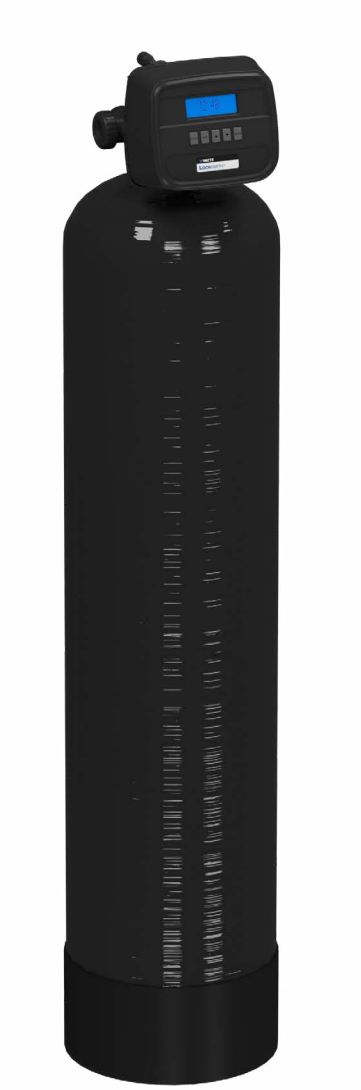
Installation, Operation and Maintenance

LOCKSMITH®

1¼" Residential Filox® Iron, Hydrogen Sulfide, and Manganese Reduction Systems

Model: PWFLAIO-IRON

WATTS® pure water



Model: PWFLAIO-IRON Series Backwash Filtration System

WATTS®

Congratulations on your purchase of this Watts® Pure Water Locksmith® residential backwash water filtration solution.

You have made an excellent choice to enhance your water quality and protect your plumbing system. These systems are designed for reliable, trouble-free operation and are built with high quality components. Its straightforward programming, corrosion-resistant mineral tank, and service-friendly design ensure long-term durability and ease of maintenance.

The Watts Pure Water Locksmith Series PWFLAIO Filox® AIO residential filtration system is a proven backwashing media solution for reducing iron, hydrogen sulfide and manganese in your water. Designed for reliability and performance, it combines air injection oxidation (AIO) with advanced media filtration to deliver consistent water quality improvement.

By improving water quality, these systems enhance drinking water safety and reduce exposure to harmful contaminants. Cleaner water supports overall wellness, lowers maintenance needs, and extends the lifespan of water heaters, fixtures, and other equipment, ensuring more reliable operation with minimal downtime.

Thank You,

The Watts Team

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⚠ WARNING



Read this Manual BEFORE using this equipment.

Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference.

⚠ WARNING

Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

⚠ WARNING

You are required to consult the local building and plumbing codes prior to installation. If the information in this manual is not consistent with local building or plumbing codes, the local codes should be followed. Inquire with governing authorities for additional local requirements.

How To Use This Manual

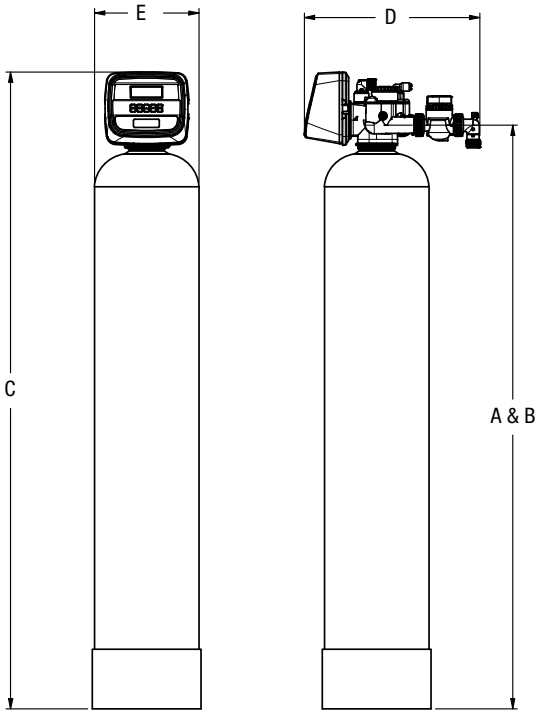
This installation manual is designed to guide the installer through the process of installing and starting up this residential water conditioning systems.

This manual is a reference and will not include every system installation situation. The person installing this equipment should have:

- Training on the control valve.
- Knowledge of water conditioning and how to determine proper control settings.
- Adequate plumbing skills.

System Specifications

Series PWFLAIO-IRON



Dimensions - Weights

Series PWFLAIO-IRON

Call customer service (800-659-8400) if you need assistance with technical details.

MODEL NO.	DIMENSIONS										WEIGHT	
	A		B		C		D		E			
	in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lb*	*kg*
PWFLAIO125IRON1	50 1/2	1283	50 1/2	1283	55 1/2	1410	11 3/4	298	9 1/2	241	167	76
PWFLAIO125IRON15	56 1/2	1435	56 1/2	1435	61 3/4	1568	12 1/4	311	10 1/2	267	235	107
PWFLAIO125IRON2	55	1397	55	1397	60	1524	13 1/4	337	12 1/2	318	318	144

Specification and Ordering Information

MODEL NO.	ORDERING CODE	TANK SIZE	PIPE SIZE	MEDIA (CU FT)	PEAK SERVICE FLOW (GPM)*	BACKWASH (GPM)	FLOOR SPACE (DXWXH)	SHIP WT. (LBS.)
PWFLAIO125IRON1	7101345	9x48	1 1/4	1	6	7.5	12" x 10" x 56"	167
PWFLAIO125IRON15	7101346	10x54	1 1/4	1.5	9	10	12" x 11" x 62"	235
PWFLAIO125IRON2	7101347	12x52	1 1/4	2	12	15	13" x 13" x 60"	318

NOTICE

Flow rates, dimensions, and capacities are per tank. Pipe size, tank size, and space requirements are in inches. Backwash flow rate may vary depending on temperature changes or specific bed expansion requirements.

NOTICE

*Peak service flow rate is for intermittent use only and not be interpreted as continuous flow rate capacity. These systems are designed to treat the domestic water used in a single family dwelling. For irrigation water treatment or higher volume applications, please contact your Watts representative.

Operating Parameters

Water Pressure	30 psi to 80 psi (205 kPa to 5.5 bar)
Temperature	34° to 110°F (1° to 43°C)
Operating Ambient Temperature	34° to 120°F (1° to 52°C)
Power Supply Input Voltage	100-120 VAC
Power Supply Input Frequency	50/60 Hz
Power Supply Output Voltage	15 VDC
Power Supply Output Current	500 mA (per control valve)
pH	6.56 to 9
H2S	Up to 3 ppm
Iron	Up to 10 ppm
Manganese	Up to 5 ppm

Water known to have heavy loads of dirt and debris may require pre-filtration prior to the water filtration system.

*Due to the presence of air in the media tank the maximum operating pressure of the system is 80 psi. To prevent exceeding the maximum of 80 psi, a pressure regulator is required on this system or warranty is voided.

For all other guideline information please contact your Watts representative.

Project Data Sheet

Installation Summary

Installation Date: _____

Installation Location: _____

Installer(s): _____

Phone Number: _____

Application Type: Filter System _____

Water Source: _____

Water Test Results: _____

Hardness: _____ Iron: _____ pH: _____

Other: _____

_____

Misc:

Service Flow Rates: min. _____ max. _____

Tank Size: Diameter _____ Height: _____

Media Volume: _____

Media Type: _____

Capacity: _____

Control Valve Configuration:

Valve Type: _____

Valve Part Number: _____

Valve Serial Number: _____

Injector Size: _____

Drain Line Flow Control: _____ gpm/lpm

Introduction

Water filtration is the reduction of contaminants or particles from water through a filtering medium. This process, in which water passes through a filter media (such as activated carbon, or other media types), then traps and reduces particles, debris, and/or other contaminants. Over time, the filter media will become clogged with these trapped particles, reducing filtration efficiency.

Locksmith PWFLAIO-IRON systems are selected for use when the concentration of iron, manganese, and hydrogen sulfide in water need to be reduced. They use the Locksmith PWFLAIO-IRON Control Valve to reduce the contaminants in the water without the use of chemicals. This valve is specially designed to capture a volume of air inside the system's mineral tank. Water passes through the control valve then passes through the air head in the top of the mineral tank. Oxygen from the captured air transfers into the water. The oxygen oxidizes the contaminants in the water to oxides or solid precipitants. Then they are mechanically filtered out of the water by the Filox media filter bed. The Filox media removes any residual iron, manganese, and hydrogen sulfide that has not formed into a solid by catalyzing it quickly into an oxide. The system will perform a regeneration cycle to clean the Filox media of the solids it has accumulated, draw in more air, rinse and then return to service daily.

Backwashing is a cleaning method used to restore the filter media by reversing the flow of water through the filter media. This reverse of flow forces the trapped particles to loosen and move out of the filter media, allowing the filtration system to function properly again. During this backwashing process, water is sent in the opposite direction of normal filtration flow. In filters that use granular media, the backwash causes the media to expand. With the increased velocity of the backwash and expansion of the filter bed, the accumulated dirt and debris is released and carried away through a drainage system. This process creates space for new contaminants to be captured during the next filtration cycle.

Backwashing is typically performed at regular intervals, depending on factors such as the volume of water processed, type of contaminants, and the type of filter. The backwash cycle duration is automated, ensuring effective cleaning without wasting too much water or time. The backwash process is highly effective in maintaining filtration efficiency, especially in systems dealing with large amounts of particulates. It extends the life of the filter media and ensures the continued quality of the filtered water. It is a critical maintenance process that helps restore filter media, ensuring that filtration systems continue to operate efficiently by removing the particles that accumulate during normal filtration.

Regeneration occurs automatically and consists of these steps:

Step 1- Backwash

Approximate Duration 14 Minutes- Fresh water flow is directed reversed through the media bed to remove solid particles the media bed has captured, sending them to drain.

Step 2- Draw Time

Approximate Duration 40 Minutes - Air Draw empties water from the tank and replenishes the oxygen within the mineral tank.

Step 3- Second Backwash (Optional)

Approximate Duration 8 Minutes- Fresh water flow is directed upward through the media bed to mix the media directly after slowrinse.

Step 4- Rapid Rinse

Approximate Duration 4 Minutes- After conclusion of the Air Draw cycle, fresh water will rinse over the filter media to ensure any residual particulates have been cleaned from the media and repacks the media bed before it returns to service.

Control Valve Functions

Control Valve Function and Cycles of Operation

This glass filled thermoplastic fully automatic control valve is designed as the primary control center to direct and regulate all cycles of a backwashing filter system.

The time clock control valve has two calendar options for backwashing frequency: 1. an option where the user can choose the number of days (1-99) between each backwash; and 2. a seven day option where the user can choose which day(s) of the week a backwash should occur.

The control valve uses no traditional fasteners (e.g. screws), instead clips, threaded nuts, split rings and O-rings are used. Do not use pliers to tighten the nuts. Nuts only need to be firmly hand tightened because radial seals are used. Tools required to service the valve include one small blade screwdriver, one large blade screwdriver, pliers and a pair of hands. A plastic wrench is available to be ordered which eliminates the need for screw-drivers and pliers. Disassembly for servicing takes much less time than comparable products currently on the market.

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.

The nuts and caps are designed to be unscrewed or tightened by hand or with the special plastic wrench. If necessary 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.

NOTICE

The control valve remembers all settings for two hours if the power goes out. After two hours the only item that needs to be reset is the time of day, all other values are permanently stored in the nonvolatile memory.

General Installation Guidelines

Installation Preview

Conduct a visual check of all equipment for any damage that may have occurred during shipment.

NOTICE

If there is obvious damage to any equipment, it should be noted on the carrier's Bill Of Lading. Open and inspect the contents of all closed crates, cartons, etc. and inspect for concealed damage. The manufacturer is not liable for any damage during transit.

Position the equipment in its proper location, setting on a flat surface. Level equipment as required. Equipment out of plumb can exhibit poor flow characteristics, which will affect the performance of the system.

NOTICE

Units are shipped with media (resin & gravel), distributions tube, and control valve installed. Double-check the valve installation on the tank. Tighten if necessary.

Unit should be positioned with the valve control facing forward.

Check the main line water pressure. The filter system is designed for a minimum of 30 psi and a maximum of 80 psi working pressure. If the line pressure exceeds this limit, a pressure-reducing valve should be installed.

Water temperature operating range is 34°F (1°C) to 120°F (52°C). A 120vac 60 cycle electrical source must be available for operation of the controller.

Connect raw water supply line to the inlet valve connection. Connect treated water outlet to service line. It is suggested that the pipe size be equal or one size larger than the valve connection.

NOTICE

Filter System to be located at least 10 feet away from hot water heater to protect against hot water back-up.

⚠ WARNING

When piping with copper, solder all piping as sub-assemblies before installing. Internal damage can result from the high heat of the torch.

It is recommended that manual isolating valves be installed on the inlet and outlet piping along with a system bypass valve. This will isolate the unit when service is required. Run drain line to a sump, drain trench, or other open drain. Open drains are required for taking samples and allowing a visual check. Avoid overhead pipe runs to drain facility, as undue backpressure will affect the operation of injectors.

NOTICE

All piping is to meet your local and state code. **AVOID CROSS CONNECTIONS!**

Be sure inlet/outlet isolating valves are closed and bypass valve is open.

⚠ WARNING

Do not exceed water pressure of 80 psi (5.5 bar). Do not exceed 110°F (43.3°C). Do not subject unit to freezing conditions.

All plumbing should be done in accordance with local plumbing codes.

NOTICE

If risk of vacuum exists, install Watts # 0556031 vacuum relief valve in the inlet supply line to protect the system against vacuum damage in well applications. If the system is installed on a public water supply above the ground floor of a building install the vacuum relief valve on the outlet line to protect the system against vacuum in the event the plumbing system is drained.

- Do not use pipe dope or other sealants on threads. Use polytetrafluoroethylene (PTFE) tape on the threaded inlet, outlet and drain fittings. PTFE tape is not necessary on the nut connection because of O-ring seals.
- All plastic connections should be hand tightened. PTFE tape may be used on connections that do not use an O-ring seal. Do not use pipe dope type sealants on the valve body. **Do not use pliers or pipe wrenches to tighten plastic connections, damage will occur.**
- Observe drain line requirements.
- Keep the media tank in the upright position. Do not turn upside down or drop. Turning the tank upside down or laying the tank on its side can cause media to enter the valve.
- 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.
- Do not support the weight of the system on the control valve fittings, plumbing, or the bypass.

Environmental:

- Use only regenerants designed for water conditioning. Do not use ice melting salt, block salt or rock salt.
- During cold weather it is recommended that the installer warm the valve to room temperature before operating.
- Do not use petroleum-based lubricants such as Vaseline® petroleum jelly, oils, or hydrocarbon based lubricants. Use only 100% silicone lubricants.
- Do not allow this water conditioning system to freeze. Damage from freezing will void this water conditioning system's warranty.

NOTICE

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.

Vaseline® is a trademark of Unilever PLC.

Pre-Installation Considerations

A. Water Pressure

A minimum of 30 pounds of water pressure is required for regeneration valve to operate effectively. Do not exceed maximum water pressure of 85 pounds of water pressure.

B. Electrical

⚠ WARNING

As with any electrical product, care should be taken to guard against the potential risk of fire, electric shock, and injury to persons.

- A continuous 120 volt, 60 Hertz current supply is required. Make certain the current supply is always hot and cannot be turned off with another switch.
- Use only the power transformer supplied with this water conditioning system.
- The power outlet must be grounded.
- All electrical connections must be connected according to local codes. (Be certain the outlet power is uninterrupted.)
- 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.
- Install an appropriate electrical bonding strap conductor across the metallic inlet and outlet piping of the water conditioning system to ensure that a proper ground is maintained.
- To disconnect power, unplug the AC adapter from its power source.

C. Soldering

Use only lead-free solder and flux, as required by federal and state codes, when installing soldered copper plumbing.

⚠ WARNING

Use caution when installing soldered metal piping near the water conditioning system. Heat can adversely affect the plastic control valve and bypass valve.

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 inlet and outlet plumbing adaptors, 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.

D. Existing Plumbing

Condition of existing plumbing should be free from lime and iron buildup. Piping that is built up heavily with lime and/or iron should be replaced.

E. Where to Install the Filter System

Consider the following points when determining where to install the filter system:

- Place the system as close as possible to a sewer drain.
- Do not install the filter system where it would block access to the water heater, or access to the main water shutoff, water meter, or electrical panels.
- Install the filter system in a place where water damage is least likely to occur in the event of a leak. Caution should be used in determining the placement of the system in a home to reduce water damages in the event should a leak occur.
- Always connect the system to the main water supply pipe before the water heater.
- Install the system where it will not be subject to temperatures outside of the limits stated in the Specification section or to direct sunlight.

F. Bypass Valves

Always provide for the installation of a bypass valve.

G. Valve to Tank Installation Instructions

1. Control Valve is installed at factory but may loosen during shipping. Confirm Control Valve is tightened to the mineral tank.

NOTICE

The control valve has right-hand threads, or clockwise, to install.

2. Rotate the valve freely without using force until it comes to a stop (this position is considered zero).
3. Rotate the valve clockwise from zero, between ¼ turn and ½ turn to fully tighten. No tools are needed. Hand tight is enough. Overtightening may cause valve or tank damage.

NOTICE

If lubricant is required, a silicone compound is strongly recommended. Silicone compound available from Watts (Ordering code 68102757), is recommended for best possible results. Dow Corning® 7 Release Compound Molykote® dimethyl silicon grease is used in the manufacture ofthis control valve.

The use of other types of lubricants may attack the control's plastic or rubber components. Petroleum-based lubricants can cause swelling in rubber parts, including O-rings and seals and may compromise product performance.

Molykote® is a trademark of DDP Specialty Electronic Materials US 9, LLC.

Pre-Installation Considerations (Continued)

H. Pre-Installation and Loading of Media

NOTICE

Systems that are 13" in diameter and larger are not loaded with media. These systems must be loaded with media before placing into service. To load a system follow the below steps.

1. Cap the top open end of the distributor tube with tape and plastic sheeting to keep foreign debris from entering the distributor tube. This cap must be secure and not come off during media loading.
2. Place the distributor tube, screen end down, into the mineral tank and center it in the bottom. The top of the distributor tube should be flush with the top of the tank.
3. Make sure the plastic and tape cap is secure to the top of the distributor tube, place a funnel on the top of the tank and load first the gravel (if different sizes of gravel are used load the largest gravel first, then the smaller gravel) then the media into the tank. The cap must not come off of the distributor tube during the loading of the media.
4. Remove the plastic cap from the distributor tube. **DO NOT PULL UP ON THE DISTRIBUTOR TUBE** when removing the cap. The distributor tube top must remain flush with the top of the tank.
5. Clean any media from the threads and top of the mineral tank.
6. Lubricate the O-rings on the bottom of the control valve (distributor pilot O-ring and top of tank O-ring). Use non-petroleum based silicone lubricant only.

NOTICE

The control valve has right-hand threads, or clockwise, to install.

7. Place the control valve on top of the tank. When doing this step, seat the top of the distributor tube inside the centered O-ring sealed port on the bottom of the valve first then press the valve down until the tank threads come in contact with the valve threads. This ensures that the distributor tube is properly seated into the bottom of the control valve. Rotate the valve freely without using force until it comes to a stop (this position is considered zero). Rotate the valve clockwise from zero, between 1/4 turn and 1/2 turn to fully tighten. No tools are needed. Hand tight is enough. Overtightening may cause valve or tank damage. Do not use thread sealant or PTFE tape on the valve base threads.
8. The system is now ready for installation. Follow the Installation Section in the Installation, Operation and Maintenance Manual.

NOTICE

If lubricant is required, a silicone compound is strongly recommended. Silicone compound available from Watts (Ordering code 68102757), is recommended for best possible results. Dow Corning 7 Release Compound Molykote dimethyl silicon grease is used in the manufacture of this control valve.

The use of other types of lubricants may attack the control's plastic or rubber components. Petroleum-based lubricants can cause swelling in rubber parts, including O-rings and seals and may compromise product performance.

Installation Instructions

1. Turn off water heater(s).
2. Turn off the main water supply to the home and open an inside faucet (cold and hot) to relieve any pressure within the plumbing system.

Select Location

3. Place the system in the desired installation location. Make sure that the location is level and sturdy enough to support the weight of the system once it is in operation.
4. You will need to locate the water filter system at least 10 feet away from the hot water heater so that hot water does not backup and damage the filter system.
5. You will need a drain close by for disposal of regenerated wastewater.
6. If installing the filter system in an outside location, make sure to protect filter system from the elements, such as freezing temperatures, rain, sunlight and contamination

Install a Bypass

NOTICE

Always install the included bypass, or a 3 valve bypass. This will allow you to shut off the water supply to the filter system but still have water in the house if the filter system is in need of repair.

After a location has been determined install the included bypass onto the control valve. (On page 10, Figures 1 and 3 show standard bypass on valve.) (Figures 2 and 4 show 3 valve bypass plumbing.)

NOTICE

If installing a 3 valve bypass valve, do so now.

Close main water supply valve, at the well or at the water meter.

Shut off electrical or fuel supply to the water heater before beginning the installation of this product.

Open all faucets to drain pipes.

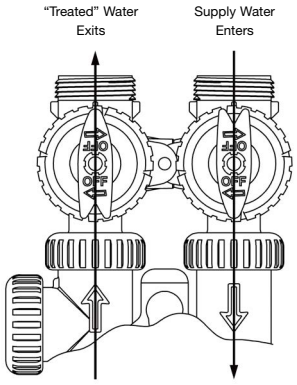
NOTICE

The bypass (provided) easily connects to the valve body using nuts that only require hand tightening. The split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage.

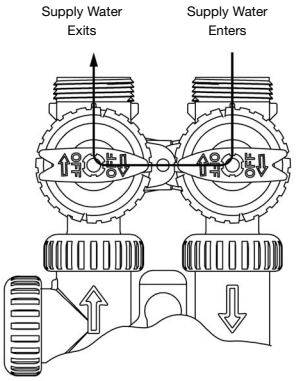
Make certain the nut is placed on first, then the split retainer ring, followed by the O-ring to make the seal. A silicon lubricant may be used on the black O-ring seals. **This should never handle the weight of the plumbing system.**

System Components Described

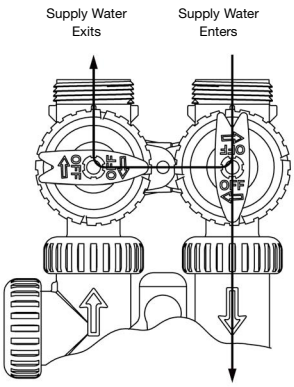
Normal Operation



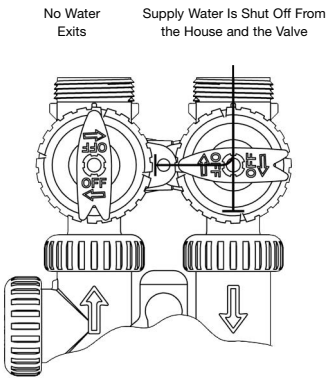
Bypass Operation



Diagnostic Mode



Shut Off Mode



Installation Instructions (Continued)

Bypass Valve Installation

NOTICE

Backwashing Filtration system connections follow the same method as shown in the images below, with the exception of the brine tank and brine connections.

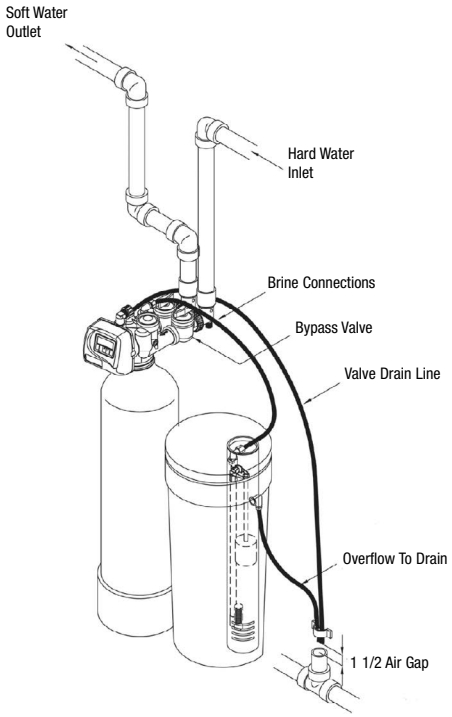


Figure 1: Plumbing with bypass (Standard).

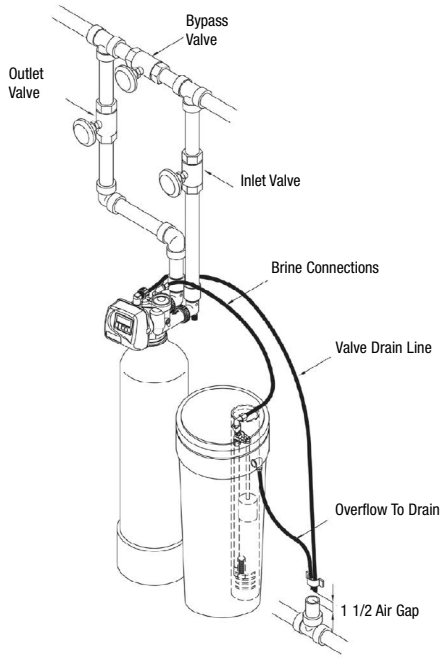


Figure 2: Plumbing with 3 valve bypass.

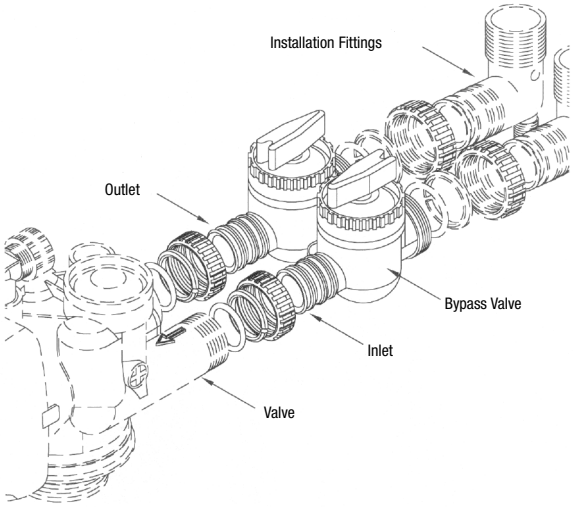


Figure 3: Bypass (standard).

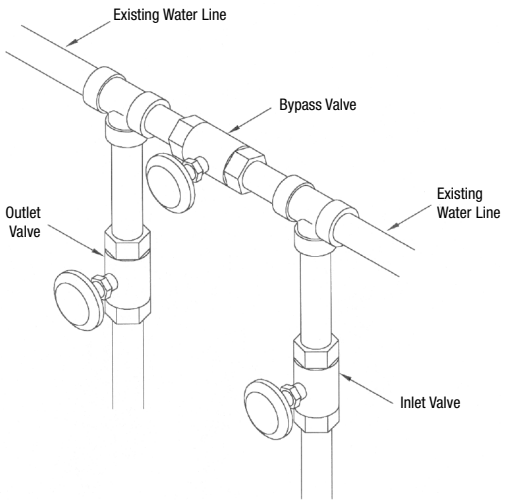


Figure 4: 3 valve bypass plumbing.

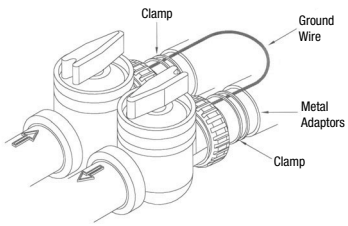


Figure 5:

When installing sweat copper follow state and federal codes by using a lead free solder and flux. Use a joint compound to seal threaded pipe. Some homes use the cold water pipes for an electrical ground (metal only). When finished with plumbing, a ground/bonding wire should be connected to the copper pipes to complete the ground circuit. Use two clamps and #4 copper for this.

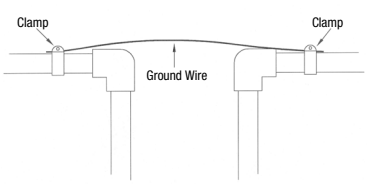


Figure 6:

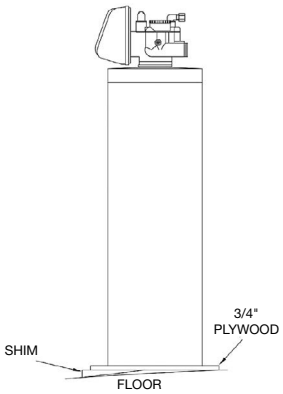
Installation Instructions (Continued)

Move Filter System Into Place

1. Make sure floor is level.
2. Connect the cold water supply to the inlet of the water conditioning system. While constructing the supply line, install a master supply valve (user supplied) in the supply line and close it.
3. Connect the feed water line to the home to the outlet of the system.

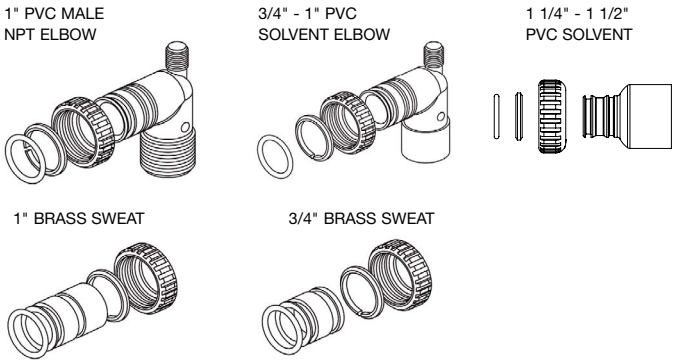
Measure, cut, and install pipe and fittings to the bypass valve (dry fit only to make sure you have a proper fit) inlet and outlet side. Be sure hard water is supplied to the inlet side.

The plumbing adapters connect to the control valve or the bypass valve using nuts that only require hand tightening. Hand tighten nut connections between control valve and plumbing adapters, control valve and bypass valve, and bypass valve and plumbing adapters allow for easy serviceability.



⚠ WARNING

Do not use a pipe wrench to tighten nuts on plumbing adapters. Hand tighten only.



Five types of Inlet/Outlet Plumbing Adapters.

NOTICE

When assembling the plumbing adapter fittings, 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, and 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, and bypass valve or control valve. Solvent cements and primers should be used in accordance with the manufacturer's instructions.

Split ring retainer design holds the nut on and allows load to be spread over the entire nut surface area reducing the chance for leakage. The split ring design, incorporated into the plumbing adapters allows approximately 2 degrees off axis alignment to the plumbing system. The plumbing adapters are designed to accommodate minor plumbing misalignments but are not designed to support the weight of a system or the plumbing.

Assembling the Inlet/Outlet Plumbing Adapters

Slip the nut onto the fitting first, then the split ring second and the O-ring last. Hand tighten the nut. If the fitting is leaking tightening the nut will not stop the leak. Remove the nut, remove the fitting, and check for damage or misalignment of the O-ring.

Do not use pipe dope or other sealant on threads of the bypass to plumbing adapters connection or the bypass to control valve connection. PTFE tape must be used on the threads of the 1" NPT elbow and the 1/4" NPT connection of the plumbing adapters and on the threads for the drain line connection. PTFE tape is not necessary on the nut connection because of O-ring seals.

Connect the Drain Line

1. Plumb the drain line to an appropriate drain abiding by all local, city, and state codes. Use a 3/4" drain line for backwash flow rates of 7 gpm or for drain lines of 7 gpm and less that exceed 20' in length. Use a 1" drain line for backwash flow rates of 10 gpm and 12 gpm.
2. If the drain line is a 5/8" outside diameter X 1/2" inside diameter flexible poly tube, slide the nut onto the poly tube, then place the poly tube insert into the end of the poly tube and tighten the nut on to the 3/4" drain line fitting. The nut is only designed for use with flexible poly tube. Use other nuts if attaching different materials. Run line to a drain. Making sure you have a 1 1/2" airgap. You may use a floor drain, standpipe or any open type drain (see Fig. 7 on page 12).

NOTICE

Do not use petroleum-based, oils, or other unacceptable lubricants on O-rings. A silicon lubricant may be used on the black O-ring.

Use pliers to tighten or unscrew the nut. Do not use a pipe wrench to tighten or loosen nut. Do not use pipe dope or other sealant on threads. Use PTFE tape on the threads of the drain line control fitting when installing 3/4" NPT onto the 3/4" male threads of the drain fitting. When connecting to the drain fitting using the compression nut and insert, do not use PTFE tape on the threads of the drain elbow.

A 3/4" Female NPT X 1/2" Male hose barb fitting is also provided to connect 1/2" inside diameter hose to the drain fitting. Be sure to secure the hose to the hose barb with a clamp.

Be certain to anchor the discharge end of the drain line so it can not move. Water damage may result if the drain hose is not properly secured and anchored.

Installation Instructions (Continued)

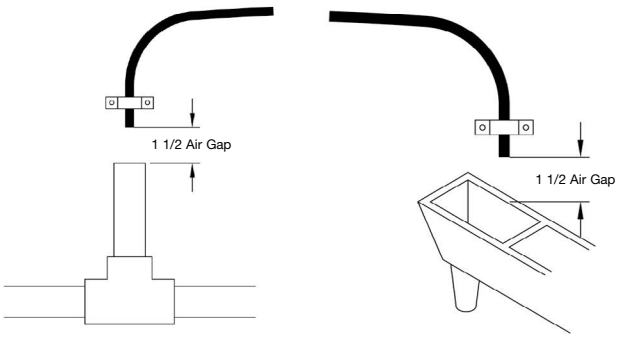


Figure 7: Also be sure drain line has an air gap.

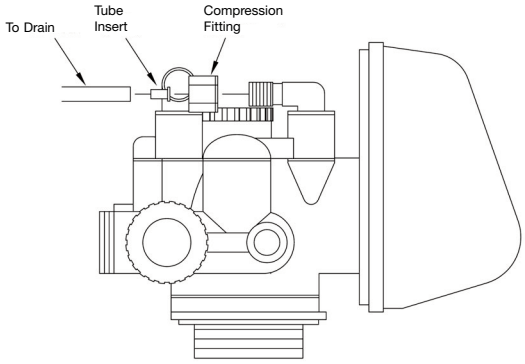


Figure 8: Drain Line Connection using Compressions Nut

Start Up

1. Plug the system into the electrical outlet.
2. Confirm that the bypass valve is in the bypass position (see figures 10 and 11 below).
3. Slowly open the master water supply to the home. Check for leaks and repair as needed.
4. Slowly open inlet valve of the bypass.
5. Allow system to fill with water and initiate an Immediate Manual Regeneration by pressing and holding the “REGEN” button for 3 seconds. This will place the system into “Backwash” mode, unplug the system from its electrical outlet once it has cycled into the backwash position. This will stall the unit in the “Backwash” mode.
6. Air will come out of the drain line until the backwashing tank is completely purged of air. Then the water will flow to drain. Allow water to flow to drain for 15 minutes or until the discharge water to drain is clear of media fines and color throw.
7. Plug the system back into the electrical outlet and manually cycle the control valve through the remaining regeneration steps by pressing the “REGEN” button until it arrives in the Service position.
8. Open a couple inside hot and cold faucets until all air has been purged from the plumbing system. Then close the faucets.
9. Slowly ope the outlet valve of the bypass.
10. Check system for leaks and repair as needed.
11. Then restore power/gas to water heaters and turn water heaters on.
12. Start Up is now complete and the system is ready for programming.

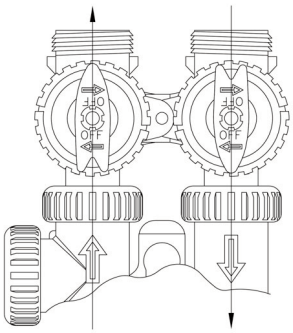


Figure 9: Operating Mode

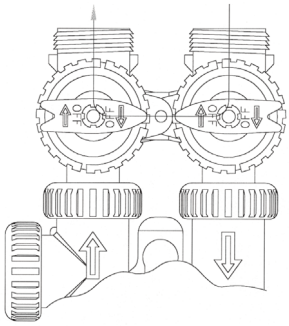


Figure 10: Bypass Mode

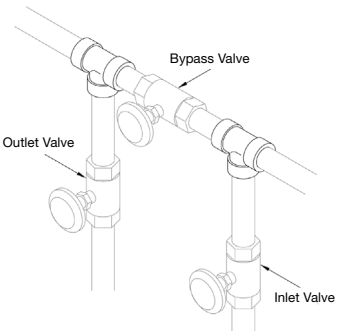


Figure 11: Bypass Mode

Control Programming

Quick Programming Overview

OEM Setup: Press NEXT & ▼

1. Configuration — Filtering DN Post
2. Cycle Durations*
3. Gallon Capacity — OFF
4. Relays #1 & 2
5. Service Alarm

Installer Setup: Press NEXT & ▲

1. Day Override — 5 Days
2. Time of Regeneration — 2:00AM
3. Energy Saver
4. Installer Contact Info

Diagnostics: Press ▼ & ▲

1. Number of days since last regeneration
2. Number of gallons since last regeneration
3. Daily gallon usage for last 63 days
4. Maximum flow rate in the last seven days

NOTICE

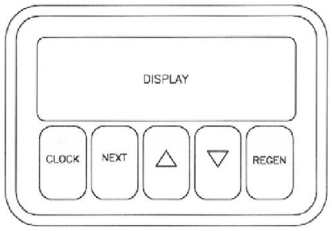
While in Diagnostics press the ▼ and ▲ arrows to enter Valve History.

Valve History: ▼ ▲ ▼ ▲

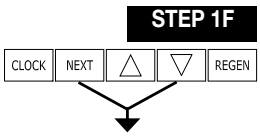
1. Software version
2. Total number of days since start-up
3. Total Number of regeneration since start-up
4. Total number of gallons since start-up
5. Last 10 error occurrences

* Refer to Table 1 Filtering Cycles Sequences & Default Lengths on page 14

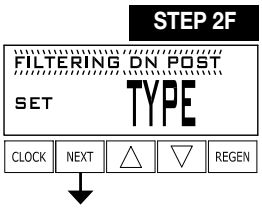
Figure 12: Key Pad



OEM Filter Setup

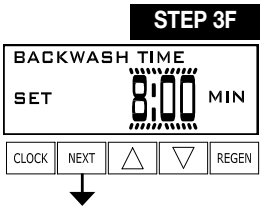


Step 1F – Press NEXT and ▼ simultaneously for 3 seconds and release. If screen in Step 2F does not appear in 5 seconds, the lock on the valve is activated. To unlock, press ▼, NEXT, ▲, and CLOCK in sequence, and try again.



Step 2F – Treatment Type Use ▼ or ▲ to select *FILTERING DN POST* **Factory Setting:** .

Press NEXT to go to Step 3F. Press REGEN to exit OEM Filter System Setup.



Step 3F – Use ▼ or ▲ to select the time for the first cycle. Value ranges and units will vary depending on the cycle, see Table below for more detail. Press NEXT to set the value for the next cycle. Repeat for all cycles.

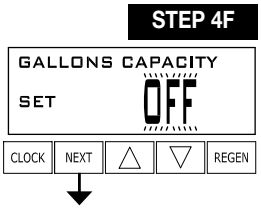
Once a value is set for all cycles, press NEXT to go to Step 4F. Press REGEN to return to previous step.

Table 1: Filtering Cycles Sequences & Default Lengths (Minutes)

CYCLE	UNITS	RANGE	FACTORY DEFAULT
Backwash	Minutes	1 – 120 or OFF	8:00
Draw Time	Minutes	1 – 120 or OFF	:40
*Second Backwash	Minutes	1 – 120 or OFF	OFF
Rinse Time	Minutes	1 – 120 or OFF	4:00
Fill	Minutes	1 – 120 or OFF	Off

NOTICE

*Optional second backwash if required should be set to 8:00 minutes



Step 4F – Gallons Capacity: Use ▼ or ▲ to select one of the following options:

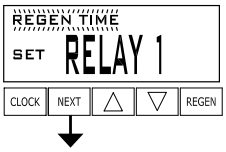
- **OFF (Factory Setting)***:* Regeneration will be based solely on the Day Override set in Step 3I.
- A number: Regeneration initiation will be based off the value specified.

See Setting Options Table for more detail.

Press NEXT to go to Step 5F. Press REGEN to return to previous step.

OEM Filter Setup (Continued)

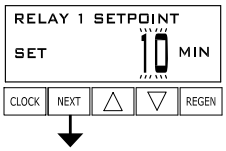
STEP 5F



Step 5F – Relay 1 Output: Use ▼ or ▲ to select one of the following options:

- **OFF (Factory Setting):** Feature not used. Step 5F(A) and Step 5F(B) will not appear if this option is selected. Press NEXT to go to Step 5F(A) or Step 6F. Press REGEN to return to previous step.
- *OREGEN TIME*: Relay activates a set time after the start of regeneration and deactivates after a set period of time. The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening, or Filtering.
- *VOLUME*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.
- *REGEN VOLUME*: Relay activates after a set volume of water has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.

STEP 5F(A)

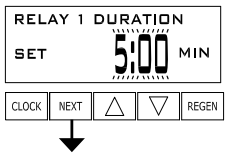


Step 5F(A) – Relay 1 Actuation: Use ▼ or ▲ to set the actuation value. The unit and range will vary depending on the selection in Step 5F.

- Regen Time: Set the length of time after the start of regeneration prior to relay activation (Range: 0 – 500 minutes). The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening, or Filtering.
- Volume or Regen Volume: Set the volume of water that will be treated prior to relay activation (Range: 0.1 – 20,000 gallons).

Press NEXT to go to Step 6F(B). Press REGEN to return to previous step.

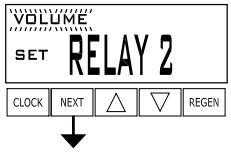
STEP 5F(B)



Step 5F(B) – Relay 1 Duration Time: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation (Range: 1 second – 500 minutes). If Step 5F is set to *VOLUME* or *REGEN VOLUME*, the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first.

Press NEXT to go to Step 6F. Press REGEN to return to previous step.

STEP 6F

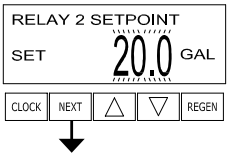


Step 6F – Relay 2 Output: Use ▼ or ▲ to select one of the following options:

- **OFF (Factory Setting):** Feature not used. Step 7F(A) and Step 7F(B) will not appear if this option is selected.
  Press NEXT to go to Step 6F(A) or Step 7F. Press REGEN to return to previous step
- *REGEN TIME*: Relay activates a set time after the start of regeneration and deactivates after a set period of time. The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening, or Filtering.
- *VOLUME*: Relay activates after a set volume has been used while in service and deactivates after the meter stops registering flow and the set time period has expired.
- *REGEN VOLUME*: Relay activates after a set volume of water has been used while in service or during regeneration and deactivates after the meter stops registering flow and the set time period has expired.
- *ERROR MONITOR*: Relay activates when the control enters an error state and immediately deactivates when the control exits the error state. Step 6F(A) and Step 6F(B) will not appear if this option is selected.

OEM Filter Setup (Continued)

STEP 6F(A)

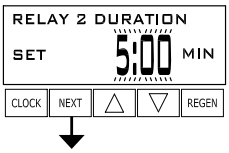


Step 6F(A) – Relay 2 Actuation: Use ▼ or ▲ to set the actuation value. The unit and range will vary depending on the selection in Step 6F.

- Regen Time: Set the length of time after the start of regeneration prior to relay activation (Range: 0 – 500 minutes). The start of regeneration is defined as the first regeneration cycle that is NOT Fill, Softening, or Filtering.
- Volume or Regen Volume: Set the volume of water that will be treated prior to relay activation (Range: 0.1 – 20,000 gallons).

Press NEXT to go to Step 6F(B). Press REGEN to return to previous step.

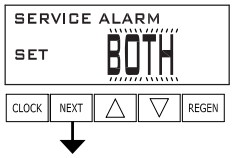
STEP 6F(B)



Step 6F(B) – Relay 2 Duration Time: Use ▼ or ▲ to set the length of time the relay will stay active prior to deactivation (Range: 1 second – 500 minutes). If Step 6F is set to *VOLUME* or *REGEN VOLUME*, the relay will deactivate after the time set has expired or after the meter stops registering flow, whichever comes first.

Press NEXT to go to Step 7F. Press REGEN to return to previous step.

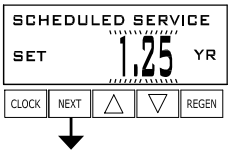
STEP 7F



Step 7F – Scheduled Service Alarm (Factory Setting): Use ▼ or ▲ to select one of the following options:

- *OFF*: Disables this feature. Step 7F(A) – Step 7F(D) will not appear if this option is selected. Press NEXT to go to Step 7F(A) or to exit OEM Filter System Setup. Press REGEN to return to previous step.
- *TIME*: Activates the service alarm after a set duration of time.
- *GALLONS*: Activates the service alarm after a set volume of water is treated.
- *BOTH*: Activates the service alarm after a set duration of time and after a set volume of water is treated, whichever comes first.

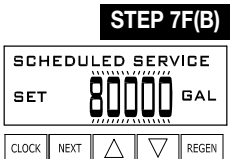
STEP 7F(A)



Step 7F(A) – Service Alarm Time: Use ▼ or ▲ to set the length of time between service alarms (Range: 0.25 – 9.75 years). This display will only appear if Step 7F is set to *TIME* or *BOTH*.

Press NEXT to go to Step 7F(A) or Step 7F(B). Press REGEN to return to the previous step.

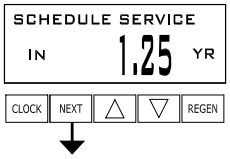
STEP 7F(B)



Step 7F(B) – Service Alarm Volume: Use ▼ or ▲ to set the volume of water treated between service alarms. This display will only appear if Step 7F is set to *GALLONS* or *BOTH*.

Press NEXT to go to Step 7F(C) or Step 7F(D). Press REGEN to return to the previous step.

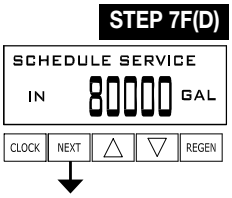
STEP 7F(C)



Step 7F(C) – Status Display (Time): Time remaining until service alarm generation. This display will only appear if Step 7F is set to *TIME* or *BOTH*. To reset this value to the value set in Step 7F(A), press ▼ and ▲ simultaneously for 3 seconds.

Press NEXT to go to Step 7F(D) or to exit OEM Filter System Setup. Press REGEN to return to previous step.

STEP 7F(D)

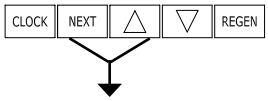


Step 7F(D) – Status Display Volume: Capacity remaining until service alarm generation. This display will only appear if Step 7F is set to *GALLONS* or *BOTH*. To reset this value to the value set in Step 7F(B), press ▼ and ▲ simultaneously for 3 seconds.

Press NEXT to exit OEM Filter System Setup. Press REGEN to return to previous step.

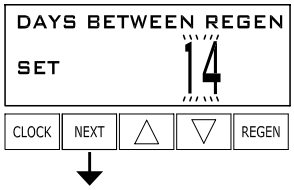
Installer Display Settings

STEP 1I



Step 1I – Press NEXT and ▲ simultaneously for 3 seconds.

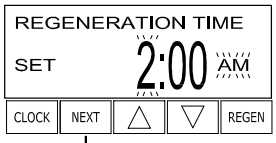
STEP 2I



Step 2I – Day Override: When Volume Capacity is set to OFF, sets the number of days between regenerations. When Volume Capacity is set to AUTO or to a number, sets the maximum number of days between regenerations. Use ▼ or ▲ to select one of the following options:

- A number (1 – 28): Regeneration initiation will be called for every set number of days even if sufficient volume of water was not used to call for a regeneration. BOTH: Activates the service alarm after a set duration of time and after a set volume of water is treated, whichever comes first. (Factory recommendation is 1 Day)
- OFF: Regeneration initiation is based solely on volume used. Press NEXT to go to Step 3I. Press REGEN to return to previous step.

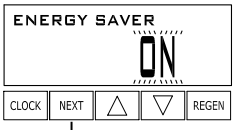
STEP 3I



Step 3I – Next Regeneration Time: Use ▼ or ▲ to set the hour of day for regeneration. a.m./p.m. toggles after 12. The default time is 2:00 a.m. Press NEXT to set the minutes.

Once the minutes are set, press NEXT to go to Step 4I. Press REGEN to return to previous step.

STEP 4I



RETURN TO NORMAL MODE

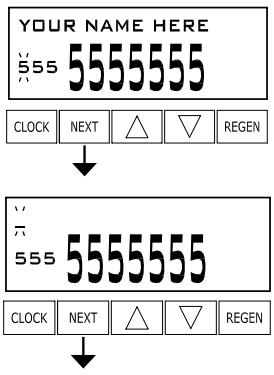
Step 4I – Energy Saver: Use ▼ or ▲ to select one of the following options:

- ON: Display backlight will turn off after 5 minutes of inactivity and turn on when a button is pushed **(Factory Recommendation).**
- OFF: Display backlight is always on.

Press and hold CLOCK and ▲ to go to Step 7I - Contact Screens or press NEXT to exit installer Display Settings.

NOTICE

You can HOLD DOWN the Arrows to scroll faster and to change from Upper Case to Lower Case to Numbers.



CONTACT SCREENS

Step 5I – Service Alarm Phone Number: Use ▼ or ▲ to set first digit of phone number. Press NEXT to advance to the next digit. Press REGEN to return to the previous digit. Once all digits are set, press NEXT to go to Step 6I.

Step 6I – Service Alarm Banner Text: Cursor will appear above the first number in upper left corner on the display. Use ▼ or ▲ to set the first character of the banner text. Press NEXT to advance to the next character. Press REGEN to return to the previous character. There is a maximum of 55 characters in the banner text.

Once all characters are set, press NEXT until system exits the Installer Display Settings.

NOTICE

Once Time set has been completed, the valve will automatically return to Service position and your Filtration System is now in Service. Set Time of Day instructions on page 20.

Installer Display Settings (Continued)

Set Time of Day

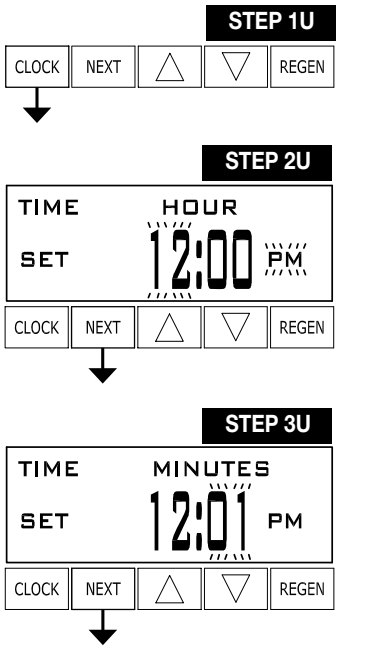
The user can also set the time of day. Time of day should only need to be set if the battery has been depleted because of extended power outages or when daylight saving time begins or ends. If an extended power outage occurs, the time of day will flash, which indicates the time of day should be reset and the non-rechargeable battery replaced.

Step 1U – Press CLOCK.

Step 2U – Current Time (hour): Use ▼ or ▲ to set the hour of the day. a.m./p.m. toggles after 12. Press NEXT to go to Step 3U.

Step 3U – Current Time (minutes): Use ▼ or ▲ to set the minutes of the day.

Press NEXT to exit Set Time of Day. Press REGEN to return to previous step.



RETURN TO NORMAL MODE

Power Loss:

If the power goes out the system will keep time until the battery is depleted. If an extended power outage occurs, the time of day will flash on and off which indicates the time of day should be reset and the non rechargeable battery replaced. The system will remember the rest.

Error Message:

If the word ERROR and a number are displayed, contact Watts at 800-659-8400 for help. This indicates that the valve was not able to function properly. If the number and banner text in the Contact Screens has been edited, the 2 displays below will alternate.

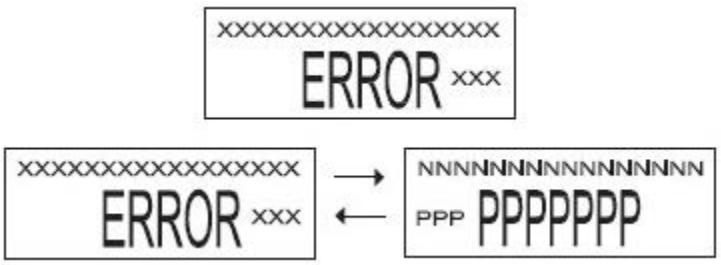
Manual Regeneration

Sometimes, there is a need to regenerate the system sooner than when the system calls for it, usually referred to as manual regeneration. There may be a period of heavy water usage because of guests or a heavy laundry day.

To initiate a manual regeneration immediately, press and hold the REGEN button for 3 seconds. The system will begin to regenerate immediately.

NOTICE

An immediate manual regeneration cannot be canceled.



User Display Settings

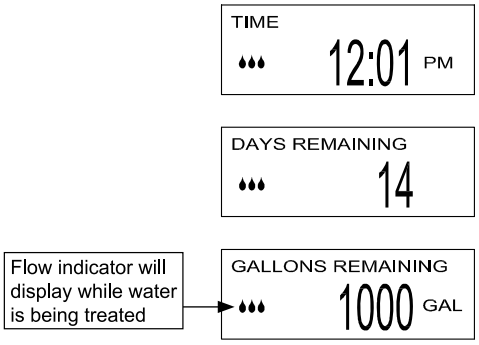
General Operation

When the system is operating, one of several displays may be shown. The displays normally rotate; however, pressing NEXT will pause on the selected display for 5 minutes. Press NEXT to alternate between the displays. One of the displays is always the current time of day. Days Remaining is the number of days left before the system goes through a regeneration cycle. Contact Screen (when programmed with Service Contact Phone Number and Name - see Steps 5I, 6I and 7I) will appear to alert customer who to call for service.

Flow Rate shows the current rate treated water is flowing through the system. If the dP switch is closed, the display will show REGENERATION DP or REGENERATION HOLD.

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

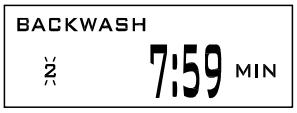
If the system has called for a regeneration that will occur at the preset time of regeneration, the words REGEN TODAY will alternate with the header on the display.



Regeneration Mode

Typically, a system is set to regenerate at a time of low water usage. An example of a time with low water usage is when a household is asleep. If there is a demand for water when the system is regenerating, untreated water will be used.

When the system begins to regenerate, the display will change to include information about the step of the regeneration process and the time remaining for that step to be completed. The system runs through the steps automatically and will reset itself to provide treated water when the regeneration has been completed.

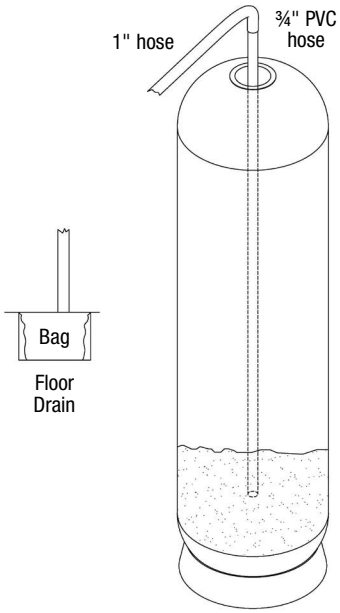


Replacing the Media

1. Mark the location of the mineral tanks on the floor incase they need to be moved once all water, media and gravel has been removed. This will help with realignment of the plumbing after media replacement. DO NOT attempt to move a mineral tank that contains media and or water.
2. Open the bypass valve.
3. Close the inlet and outlet isolation valves for the mineral tank needing media replacement
4. Locate “Manual Regeneration” on page 18 for the controller.
5. Follow the steps to place the system in the backwash position. This relieves any pressure inside the mineral tank. Once the system cycles into the backwash position, unplug the control valve from the power outlet to keep the system in the backwash position.
6. Disconnect the inlet, outlet, and drain union plumbing fittings. Then, if necessary for the removal of the control valve from the mineral tank, remove the remaining plumbing from the inlet, outlet and drain ports of the control valve.
7. Remove the control valve from the mineral tank by turning the control valve counter-clockwise when viewed from above. Keeping a firm grip on the control valve, continue to rotate until it can be lifted off of the top of the mineral tank. Store the control valve in a safe location.
8. Note the top of the distributor tube. It must be flush with the top of the tank. If it is above the top of the tank by more than 1/2" the distributor tube may have become disconnected from the distributor screen in the bottom of the mineral and must be reconnected.
9. Obtain a length of 3/4" sch. 40 PVC that is the same height as the mineral tank and a length of 1" clear braided poly-vinyl hose. The hose must be long enough to reach the nearest floor drain. (Both of these can be acquired at a local hardware store).
10. Insert one end of the pipe inside the hose and the other end of the pipe into the top of the mineral tank and down into the media. Put the other end of the hose inside a water permeable bag and locate the bag over the floor drain.
11. Insert a garden hose into the bag side of the poly-vinyl hose to fill the hose and PVC pipe with water. Air will bubble out of the tank. Once all the air is out of the hose and pipe, remove the garden hose from the polyvinyl hose to establish a siphon. The media can then be siphoned into the bag. Use the garden hose to maintain a full water level in the mineral tank to. The bag end of the poly-vinyl hose must remain lower in elevation then the end of the PVC pipe in the mineral tank to maintain the siphon. The bag will retain the media while the water flows down the drain. Use caution not to allow media to enter the floor drain.
12. Continue to siphon media until it is completely evacuated from the mineral tank. Gravel will clogged the siphon hose and, if it must be removed due to fouling, or to repair or replace a damaged distributor tube and screen, must be evacuated by other means.
13. If replacing gravel, inspect lower distributor screens for damage and replace if necessary.
14. To add new media and reconnect control valve to mineral tank follow General Installation step H located on page 8 of this manual.
15. Reconnect inlet, outlet, and drain plumbing to the control valve and tighten the plumbing union fittings on each of these plumbing lines.
16. Open the inlet isolation valve slightly until water can be heard flowing through the isolation valve and allow the mineral tank to fill with water. Air will come out of the drain line until the mineral tank is full of water. Once full, close the inlet isolation valve and let the tank sit for 24 hours to allow the media to thoroughly soak.
17. After 24 hours of pre-soaking, open the inlet valve fully and allow water to flow to the drain, initiating the initial backwash to flush the media bed of any color or fines. Continue flushing the media bed until the water at the drain runs clear.
18. Plug the system back in to the power outlet so that it will return to the service position.
19. Fully open inlet and outlet isolation valves and close bypass valve.
20. Check for leaks and repair as required.
21. Open hot and cold side of a treated water faucet to flush any air from the plumbing system.

NOTICE

If this is a multi-tank system replace media in each mineral tank according to this media replacement procedure.



System Components Described

Components:

The control valve consists 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. Drain Line Flow Control and Fitting Assembly
6. Air Draw Valve and Check Valve Assembly
7. Installation Fitting Assemblies
8. Bypass Valve (optional)

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 displays/settings, diagnostics, and valve history or user displays/settings.

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 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.

One of two main pistons is always used:

1. The down flow piston which is used when the control valve is used as a down flow softener, regenerating filter or non regenerating filter:
2. The up flow piston, which is used when the control valve is used as an up flow softener.

If the control valve is used as a softener or a regenerating filter, a regenerant piston must be attached to the main piston. If the control valve is to be used on 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 (patent pending) 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 red or clear in color and have a special slippery coating so that the piston does not need to be coated or lubricated.

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 (68104901) 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, sodium hydroxide, hydrochloric acid, 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. The color coded injectors give different regenerant draw, slow rinse and total flow rates over the pressure range. See Table below for color codes.

Injector Order Information

PART #	COLOR	TANK DIA.
68104893	RED	9"
68104894	WHITE	10"
68104895	BLUE	12"
68104896	YELLOW	13"
68104898	ORANGE	16"
68104900	GREEN	21"

System Components Described (Continued)

Drain Line Flow Control/Fitting

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 ± 10% over the pressure range of 10 psi to 125 psi. The flexible washer-like parts are identified with three numbers, which correspond to the flow rate in gallons per minute. See the tables below.

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

Drain Line Flow Control (3/4" Fitting)

PART #	NUMBER ON BACKWASH FLOW RATE	
	Fitting	GPM
68104943	42	4.2
68104944	53	5.3
68104946	75	7.5
68104947	90	9.0
68104948	100	10

Drain Line Flow Control (1" Fitting)

PART #	NUMBER ON BACKWASH FLOW RATE	
	Fitting	GPM
68104961	110	11
68104963	150	15
68104964	170	17
68104965	200	20
68104966	250	25

The drain line flow control can be installed in the standard 1/4" drain line elbow, which accommodates 5/8" poly tube or 3/4" NPT drain line connections. The optional nut and poly tube insert for the 3/4" drain line elbow is designed for use with flexible poly tube 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.

System Components Described (Continued)

Installation Fitting Assemblies

The installation fittings are used to connect the optional bypass or the control to the plumbing system. There are four installation-fitting assemblies available:

1. 1" NPT elbow
2. 3/4" & 1" PVC solvent weld elbow fitting
3. 1" straight brass sweat fitting
4. 3/4" straight brass fitting
5. 1 1/4" & 1 1/2" PVC Solvent

Both elbow fittings have a unique drill out feature to allow a 1/4" NPT connection to the inlet and/or outlet which can be used for a RO feed, test ports, pressure tap ports, etc.

The installation fitting assemblies are sold in pairs and consist of two fittings, two nuts, two split rings and two O-rings. The installation fitting assemblies and the bypass valve are sold separately from the control valve.

Figure 13:

NORMAL OPERATION

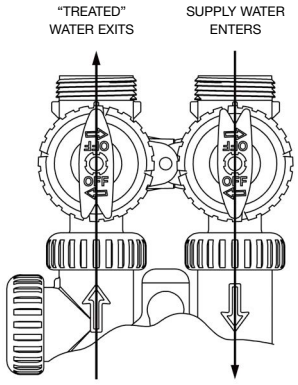


Figure 14:

BYPASS OPERATION

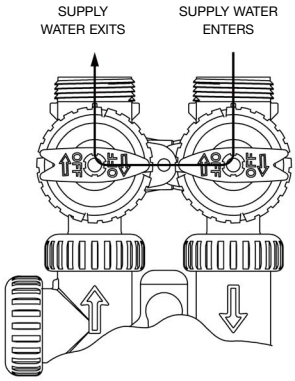


Figure 15:

DIAGNOSTIC MODE

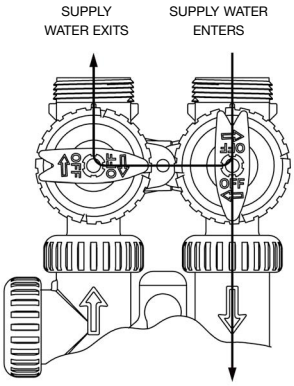
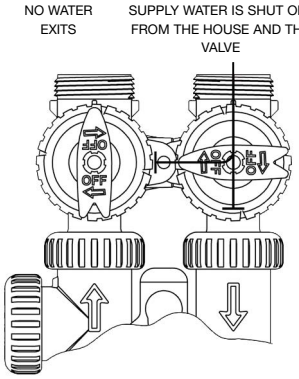


Figure 16:

SHUT OFF MODE



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 Locksmith 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 bypass 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 thermoplastic 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.

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 13)
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 14)
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 15)
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 systems. If water is available on the outlet side of the filter system it is an indication of water bypass around the system (i.e. a plumbing connection somewhere in the building bypasses the system). (See Figure 16)

* Some semiconductor materials exhibit a phenomenon in the presence of a magnetic field that is adaptable to sensing devices. When a current is passed through one pair of wires attached to a semiconductor, another pair of wires properly attached and oriented with respect to the semiconductor will develop a voltage proportional to the magnetic field present and the current in the other pair of wires. Holding the exiting current constant and moving a permanent magnet near the semiconductor produces a voltage output proportional to the movement of the magnet. Hall-effect devices provide a high-speed response, excellent temperature stability and no physical contact.

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 motor plug connects to the two-pin jack on the left-hand side of the PC board. The power source plug connects to the four-pin jack. The four-pin jack is between the two-pin and three-pin jacks. The water meter plug (gray wire) connects to the three-pin jack.

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 towards your body. 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 towards 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 drive gears, the drive gear cover needs to be removed. 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. Before trying to remove the drive gear cover, the drive bracket must be removed from the drive back plate. The drive gear cover can be removed from the drive bracket without removing the motor or the PC board. Simultaneously, push in and down on the large clip at the bottom and the clip on the left-hand side of the drive bracket behind the PC board. Keep your other fingers behind the drive gear cover so the drive gears do not drop on the ground. 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 1/4 turn in either direction 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. When reinstalling the motor gently turn the motor while inserting so that the gear on the motor meshes with the gears under the drive gear cover and the small plastic bulge engages one of the slots on the motor housing. Reconnect the motor plug to the two-pronged jack on the lower left-hand side of the PC board. If motor will not easily engage with drive gear when reinstalling, lift and slightly rotate motor before reinserting.

Replace the valve cover. After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version (e.g. 154) 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" flat bladed 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. See Figure 17. 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.

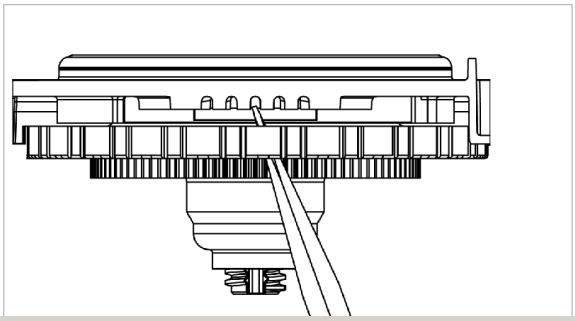


Figure 17: To remove drive cap

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.

The regenerant piston (the small diameter one behind the main piston) is removed from the main piston by unsnapping it from its latch. Chemically clean in dilute sodium bisulfite or vinegar or replace the regenerant piston if needed. To remove the main downflow or upflow 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. Do not lubricate the piston rod, main piston or regenerant piston. Lubricant will adversely affect the red or clear lip seals. 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, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version (e.g. 154) 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 red or clear lip seals for wear or damage. Replace the entire stack if necessary. The spacer stack assembly has been 100% tested at the factory to insure proper orientation of one-way seals. 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 property 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. Do not use silicone or any other type of lubricant on the red or clear lip seals or the piston.

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

After completing any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording, then flash the software version (e.g. 154) 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 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 with one of the following:

a. For downflow systems, the appropriate size injector is located in the “DN” hole, a plug is in the “UP” hole and the piston is a combination of the downflow main piston and the regenerant piston.

b. For upflow systems, the appropriate size injector is located in the “UP” hole, a plug is in the “DN” hole and the piston is a combination of the upflow main piston and the regenerant piston.

c. For backwash only systems, a plug is in the “DN” hole and in the “UP” hole, and the piston only has a downflow main piston (the regenerant piston must be removed) and a plug is in the refill flow control position.

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

Service Instructions (Continued)

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 rotors, make sure the system is depressurized. Turn the red arrow shaped handles towards 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 tightened by hand. If necessary a pair of 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: one under the rotor cap, one on the rotor stem and the rotor seal. Replace worn O-rings. Clean rotor. Reinstall rotor.

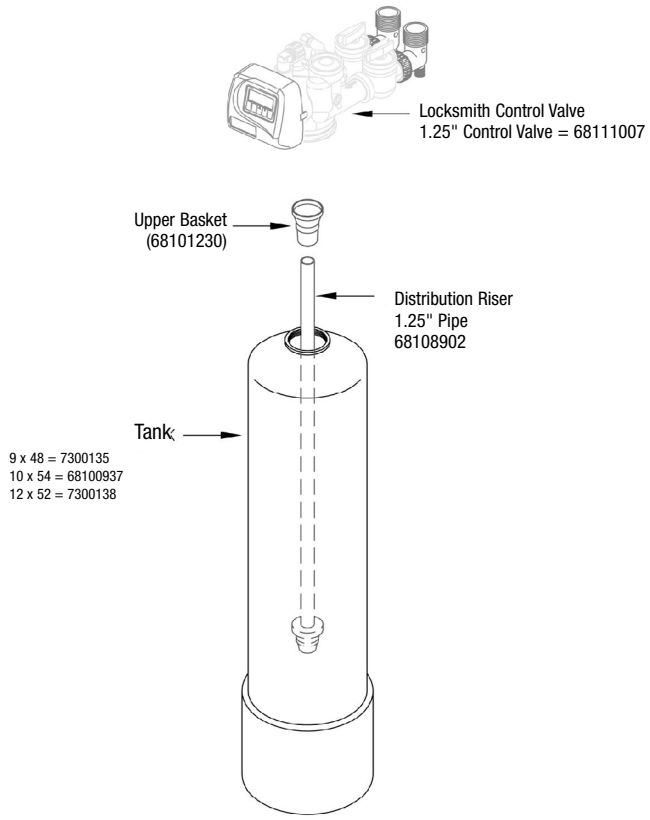
When reinstalling the red arrow handles be sure that:

1. 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.
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.

After completing, any valve maintenance, press and hold NEXT and REGEN buttons for 3 seconds or unplug power source jack (black wire) and plug back in. This resets the electronics and establishes the service piston position. The display should flash all wording then flash the software version (e.g. 154) and then reset the valve to the service position.

Drawings and Part Numbers

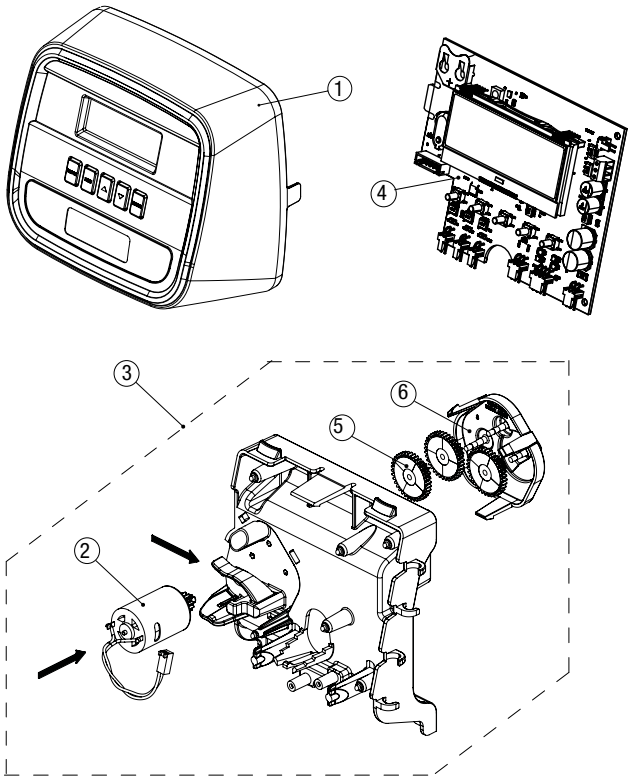
Mineral Tank



Front Cover and Drive Assembly

DRAWING #	ORDER #	DESCRIPTION	QTY
1	68111063	Locksmith Front Cover ASY	1
2	7300833	KC11V3107-01 Motor ASY	1
3		KC11V3002 Drive Bracket ASY w/ Motor	1
4	68111064	Locksmith Thru2 PCB Replace	1
5		KC12V3110 Drive Reducing Gear 12x36	3
6		KC12V3109 Drive Gear Cover	1
Not Shown	7300838	KC11V3186-06 Power Supply US 15VDC HOCP	1
	68111065	Locksmith Backplate	

*Contact your dealer or installer for assistance with order numbers not listed.

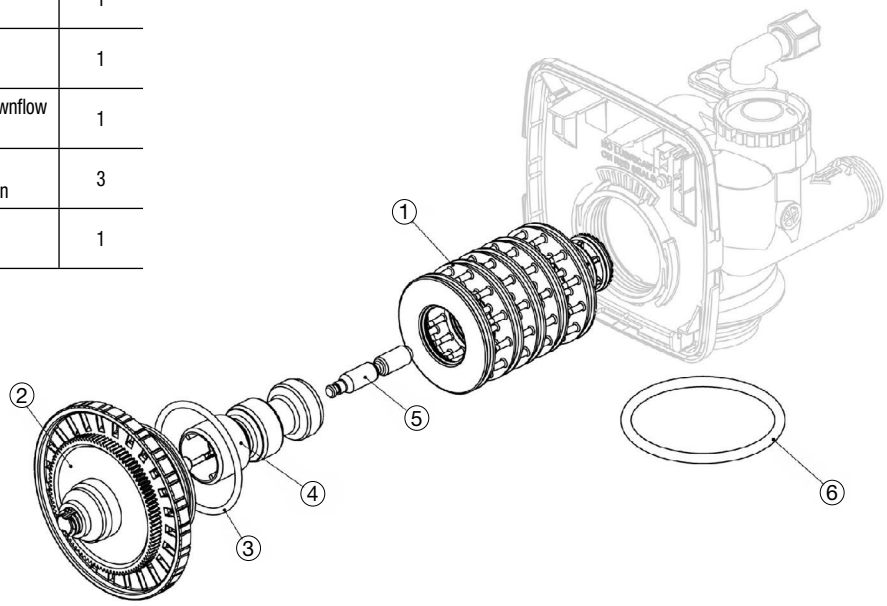


Drawings and Part Numbers (Continued)

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

DRAWING #	ORDER #	DESCRIPTION	QTY
1	68104870	KC12V3005 Spacer Stack Assembly	1
2	68105004	KC12V3004 Drive Cap ASY	1
3	68105006	KC12V3135 O-ring 228	1
4	68104911	KC12V3011 Piston Downflow ASY	1
5*	68104950	KC12V3174 Regenerant Piston	3
6	68105010	KC12V3180 O-ring 337	1

*The regenerant piston is not used in backwash only

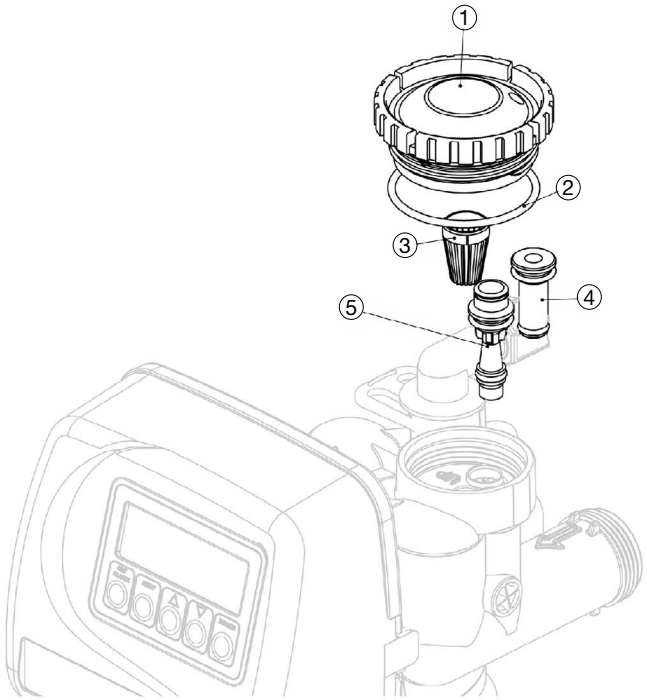


Injector Cap, Injector Screen, Injector, Plug and O-ring

DRAWING #	ORDER #	DESCRIPTION	QTY
1		KC12V3176 Injector Cap	1
2	68105007	KC12V3152 O-ring 135	1
3		KC12V3177 Injector Screen	1
4	68104901	KC11V3010-1Z Injector ASY Z Plug	1
5	68104893	KC11V3010-1D Injector ASY D Red	1
	68104894	KC11V3010-1E Injector ASY E White	
Not Shown		KC12V3170 O-ring 011	*
Not Shown		KC12V3171 O-ring 013	*

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

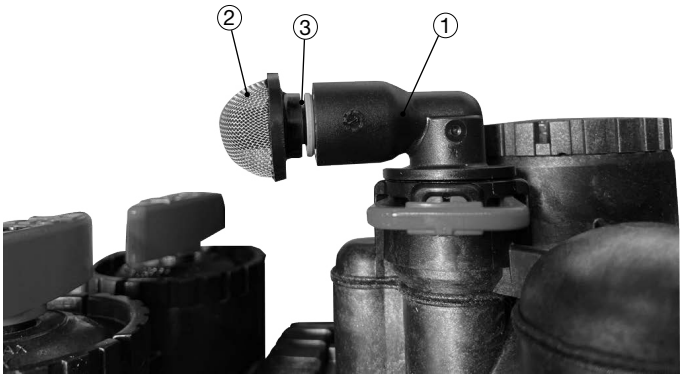
Note: For upflow position, injector is located in the up hole and injector plug in the down hole. For a filter that only backwashes injector plugs are located in both holes.



Drawings and Part Numbers (Continued)

Air Draw Valve and Check Valve

DRAWING #	ORDER #	DESCRIPTION	QTY
1		V4144-01 3/8" Quick Connect Fitting	1
2	68111071	SUCTION LINE BALL .375 STRAINER	1
3	68103418	I8030 TUBING POLYETHYLENE .375OD LD BLK 100	0.003333
Not Shown	68111046	INLET CHECK VALVE	1
Not Shown	68111070	CHECK VALVE 0V15/DN15	1

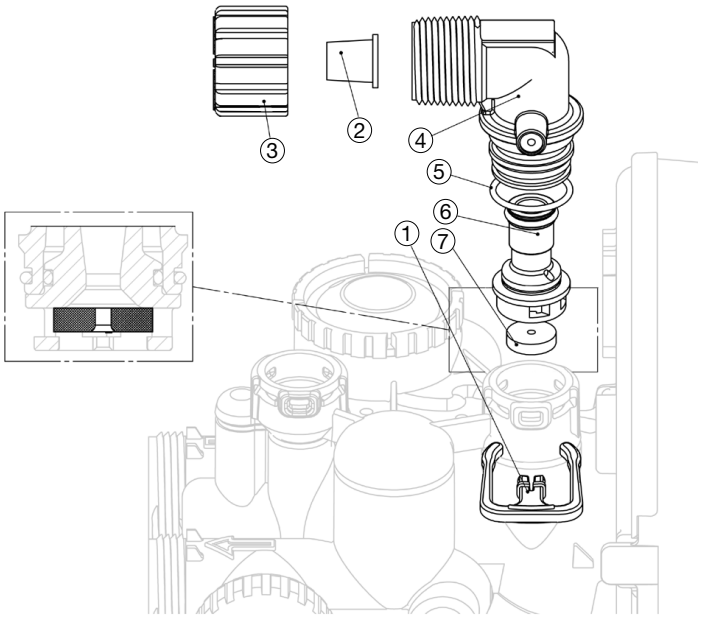


Drawings and Part Numbers (Continued)

Drain Line - 3/4"

DRAWING #	ORDER #	DESCRIPTION	QTY
1	68104867	KC12H4615 Elbow Locking Clip	1
2	68105003	KC12PKP10T58 Polytube insert 5/8	Option
3	68105012	KC12V3192 Nut 3/4 Drain Elbow	Option
4	68105008	KC12V3158-01 Drain Elbow 3/4 Male ASY	1
5		KC12V3163 O-ring 019	1
6	68105009	KC12V3159-01 DLFC Retainer ASY	1
7	68104946	KC11V3162-075 DLFC 7.5 gpm for 3/4"	
	68104948	KC11V3162-100 DLFC 10.0 gpm for 3/4"	

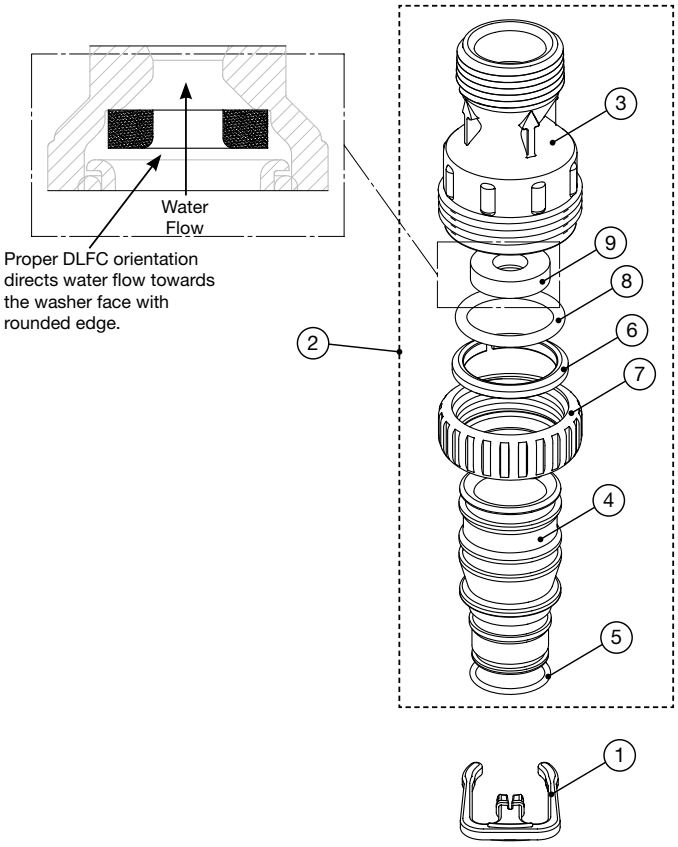
* Refer to specification table for BKW (Backwash) gpm flow rate for correct ordering code for your system.



Drain Line - 1"

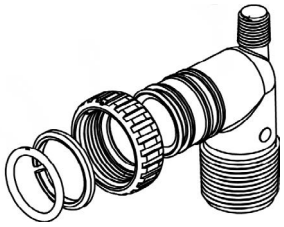
DRAWING #	ORDER #	DESCRIPTION	QTY
1	68104867	KC12H4615 Elbow Locking Clip	1
2	68104884	KC11V3008-02 Drain FTG 1" Straight	1
3	*	KC11V3166 Drain FTG Body 1"	1
4	*	KC11V3167 Drain FTG Adapter 1"	1
5	*	KC12V3163 O-ring 019	1
6	*	KC11V3150 Split Ring	1
7	*	KC11V3151 Nut 1" QC	1
8	*	KC11V3105 O-ring 215	1
9†	68104963	KC11V3190-150 DLFC 15.0 gpm for 1"	

* Can be ordered as a set under order # 68104884 (KC11V3008-02)
† Refer to specification table for BKW (Backwash) gpm flow rate for correct ordering code for your system.

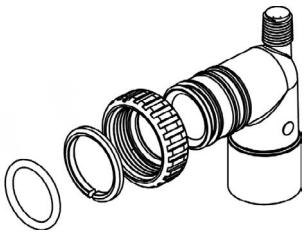


Drawings and Part Numbers (Continued)

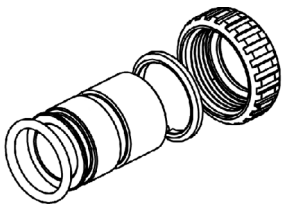
Installation Fitting Assemblies



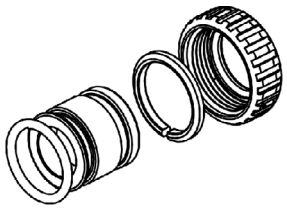
ORDER #	DESCRIPTION	QTY
0002169	KC11V3007 Fitting 1" PVC Male NPT Elbow	2



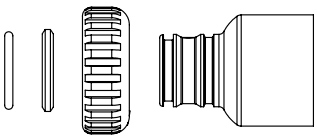
ORDER #	DESCRIPTION	QTY
7301310	KC11V3007-01 Fitting 3/4" & 1" PVC Socket 90 Elbow	2



ORDER #	DESCRIPTION	QTY
0002170	KC11V3007-02 Fitting 1" Brass Sweat	2



ORDER #	DESCRIPTION	QTY
0002171	KC11V3007-03 Fitting 3/4" Brass Sweat	2



ORDER #	DESCRIPTION	QTY
7300896	KC11V3007-07 Fitting 1 1/4" & 1 1/2" PVC Solvent	2

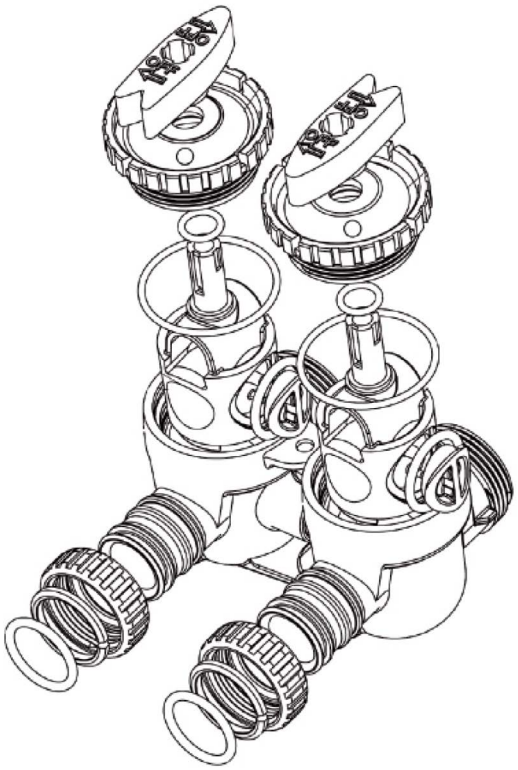
Drawings and Part Numbers (Continued)

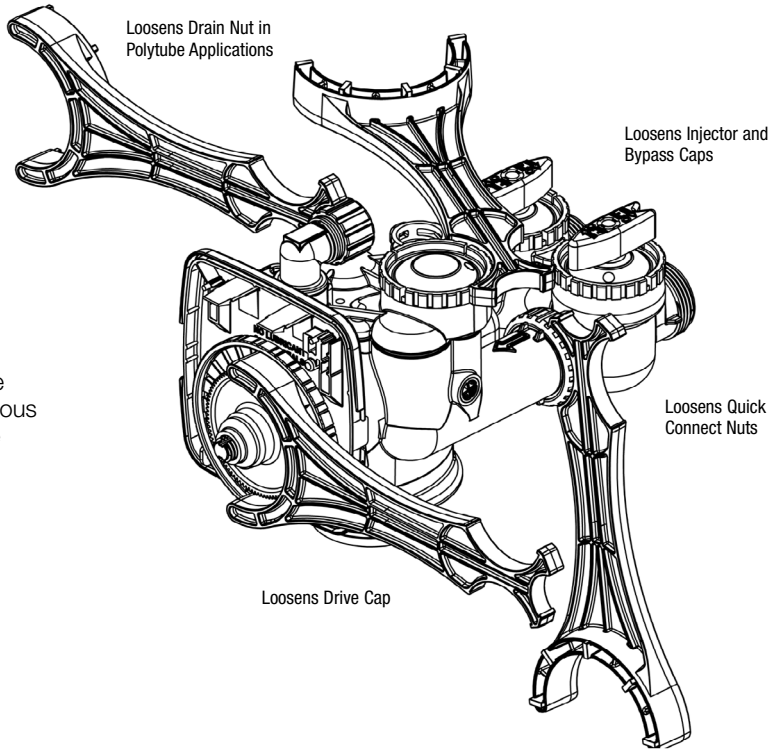
Locksmith By-Pass Valve

ORDER #	DESCRIPTION	QTY
0002167	KC11V3006 Bypass Valve Assembly	1

(Not Shown) Order No. 0002168.
(Description: KC11V3191-01 Bypass Vertical Adapter Assembly.)

ORDER #	DESCRIPTION	QTY
0002168	KC11V3191-01 Bypass Vertical Adapter 1 Assembly	1





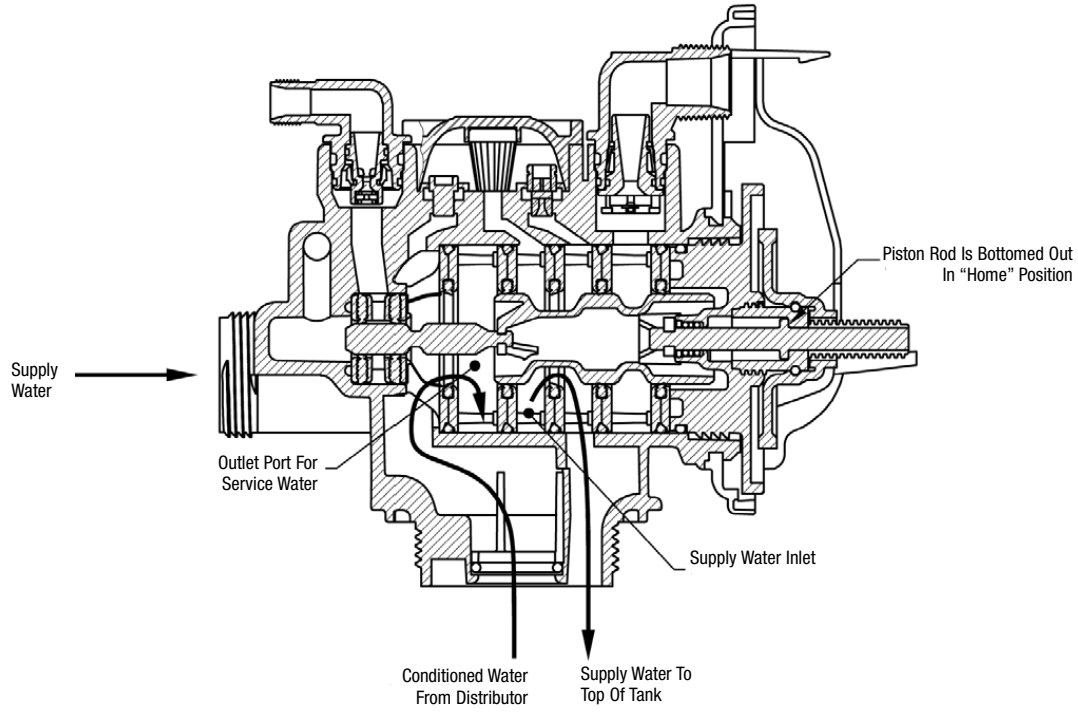
Locksmith Control Valve Wrench

(Order No. 7300839)

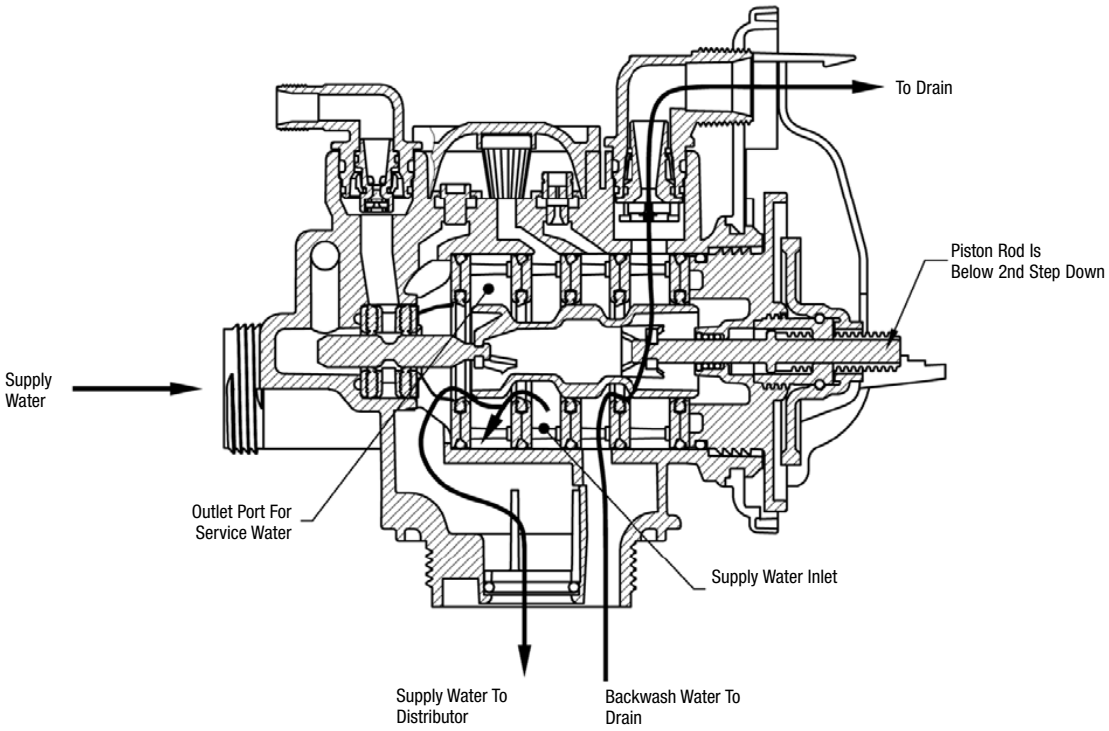
Although no tools are necessary to assemble or disassemble the valve, the Locksmith Control Valve wrench (shown in various positions on the valve) may be purchased to aid in assemble or disassembly.

Flow Diagrams

Service

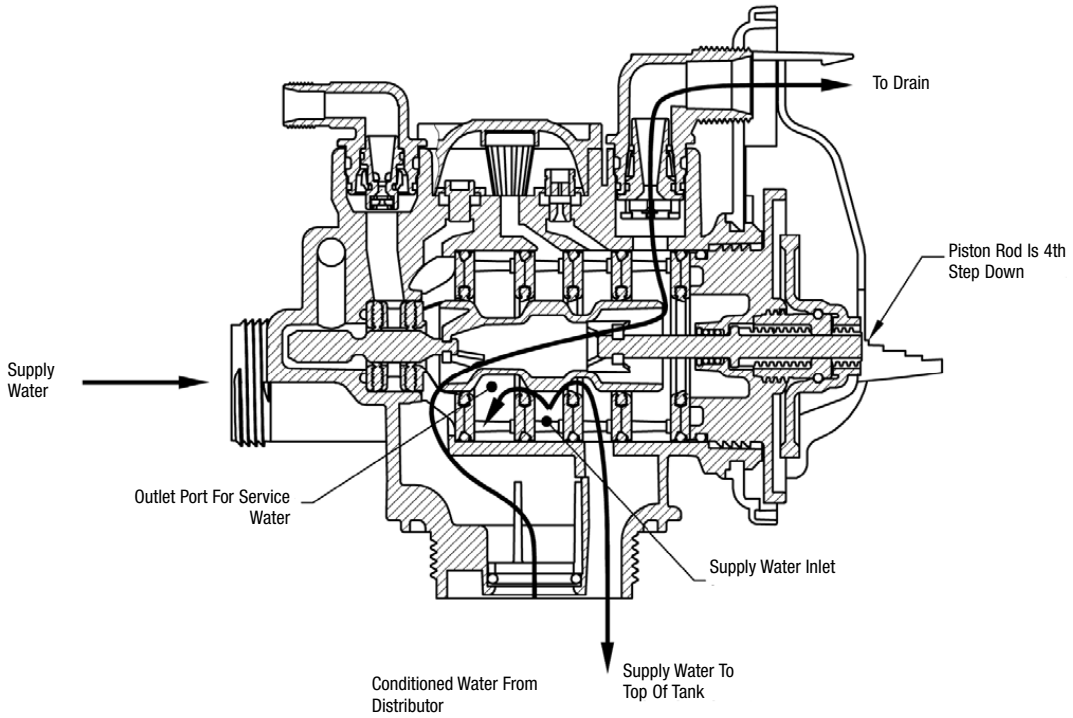


Backwash



Flow Diagrams (Continued)

Rinse



Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
No Display on PC Board	No power at electric outlet	Repair outlet or use working outlet
	Control valve Power Adapter not plugged into outlet or power cord end not connected to PC board connection	Plug Power Adapter into outlet or connect power cord end to PC Board connection
	Improper power supply	Verify proper voltage is being delivered to PC Board
	Defective Power Adapter	Replace Power Adapter
	Defective PC Board	Replace PC Board
PC Board does not display correct time of day	Power Adapter plugged into electric outlet controlled by light switch	Use uninterrupted outlet
	Tripped breaker switch and/or tripped GFI	Reset breaker switch and/ or GFI switch
	Power outage	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.
	Defective PC Board	Replace PC Board
Display does not indicate that water is flowing. Refer to user instructions for how the display indicates water is flowing	Bypass valve in bypass position	Turn bypass handles to place bypass in service position
	Meter is not connected to meter connection on PC Board	Connect meter to three pin connection labeled METER on PC Board
	Restricted/ stalled meter turbine	Remove meter and check for rotation or foreign material
	Meter wire not installed securely into three pin connector	Verify meter cable wires are installed securely into three pin connector labeled METER
	Defective meter	Replace meter
	Defective PC Board	Replace PC Board
Control valve regenerates at wrong time of day	Power outage	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.
	Time of day not set correctly	Reset to correct time of day
	Time of regeneration set incorrectly	Reset regeneration time
	Control valve set at “on 0” (immediate regeneration)	Check programming setting and reset to NORMAL (for a delayed regen time)
	Control valve set at “NORMAL + on 0” (delayed and/ or immediate)	Check programming setting and reset to NORMAL (for a delayed regen time)
Time of day flashes on and off	Power outage	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.
Control valve does not regenerate automatically when the REGEN button is depressed and held.	Broken drive gear or drive cap assembly	Replace drive gear or drive cap assembly
	Broken Piston Rod	Replace piston rod
	Defective PC Board	Defective PC Board
Control valve does not regenerate automatically but does when the REGEN button is depressed and held.	Bypass valve in bypass position	Turn bypass handles to place bypass in service position
	Meter is not connected to meter connection on PC Board	Connect meter to three pin connection labeled METER on PC Board
	Restricted/ stalled meter turbine	Remove meter and check for rotation or foreign material
	Incorrect programming	Check for programming error
	Meter wire not installed securely into three pin connector	Verify meter cable wires are installed securely into three pin connector labeled METER
	Defective meter	Replace meter
	Defective PC Board	Replace PC Board

Troubleshooting (Continued)

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

Troubleshooting (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
E1, Err – 1001, Err – 101 = Control unable to sense motor movement	Motor not inserted full to engage pinion, motor wires broken or disconnected	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.
	PC Board not properly snapped into drive bracket	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.
	Missing reduction gears	Replace missing gears
E2, Err – 1002, Err – 102 = Control valve motor ran too short and was unable to find the next cycle position and stalled	Foreign material is lodged in control valve	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.
	Mechanical binding	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.
	Main drive gear too tight	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.
	Improper voltage being delivered to PC Board	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.
E3, Err – 1003, Err – 103 = Control valve motor ran too long and was unable to find the next cycle position	Motor failure during a regeneration	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.
	Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	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.
	Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	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.
Err – 1004, Err – 104 = Control valve motor ran too long and timed out trying to reach home position	Drive bracket not snapped in properly and out enough that reduction gears and drive gear do not interface	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.
Err -1006, Err – 106, Err - 116 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too long and unable to find the proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	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	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.
	MAV/ NHBP motor wire not connected to PC Board	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.
	MAV/ NHBP motor not fully engaged with reduction gears	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.
	Foreign matter built up on piston and stack assemblies creating friction and drag enough to time out motor	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.
Err – 1007, Err – 107, Err - 117 = MAV/ SEPS/ NHBP/ AUX MAV valve motor ran too short (stalled) while looking for proper park position Motorized Alternating Valve = MAV Separate Source = SEPS No Hard Water Bypass = NHBP Auxiliary MAV = AUX MAV	Foreign material is lodged in MAV/ NHBP valve	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.
	Mechanical binding	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.

Notes

Notes

Warranty

WATER SOFTENERS/FILTERS Limited Warranty:

The Company warrants each fiberglass tank 13 inches in diameter and smaller to be free from defects in material and workmanship under normal usage for a period of ten years from the date of original shipment.
The Company warrants each fiberglass tank 14 inches in diameter and larger to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.
The Company warrants any size Salt Tank (Brine Tank) to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.
The Company warrants each Control valve to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.
The Company warrants diaphragm valve nests and related controls to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment.
The Company warrants all other components to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment.
Water softener resins subjected to iron, manganese and chlorine levels greater than 1ppm are expressly not covered by this warranty. Manganese greensand media and expendable media such as activated carbon, Filox®, Micro-Z® and neutralizing media are also not covered by this warranty. In the event of a covered defect within the warranty period, the Company will, at its option, replace or recondition the product without charge.
Disclaimer of Warranty. **THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**
Limitation of Liability. The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product
Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**

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