Capital

Since 1936

Eliminator II

Iron Filtration System

Installation and Operation Manual

MODELS

HPFE-10

HPFE-13

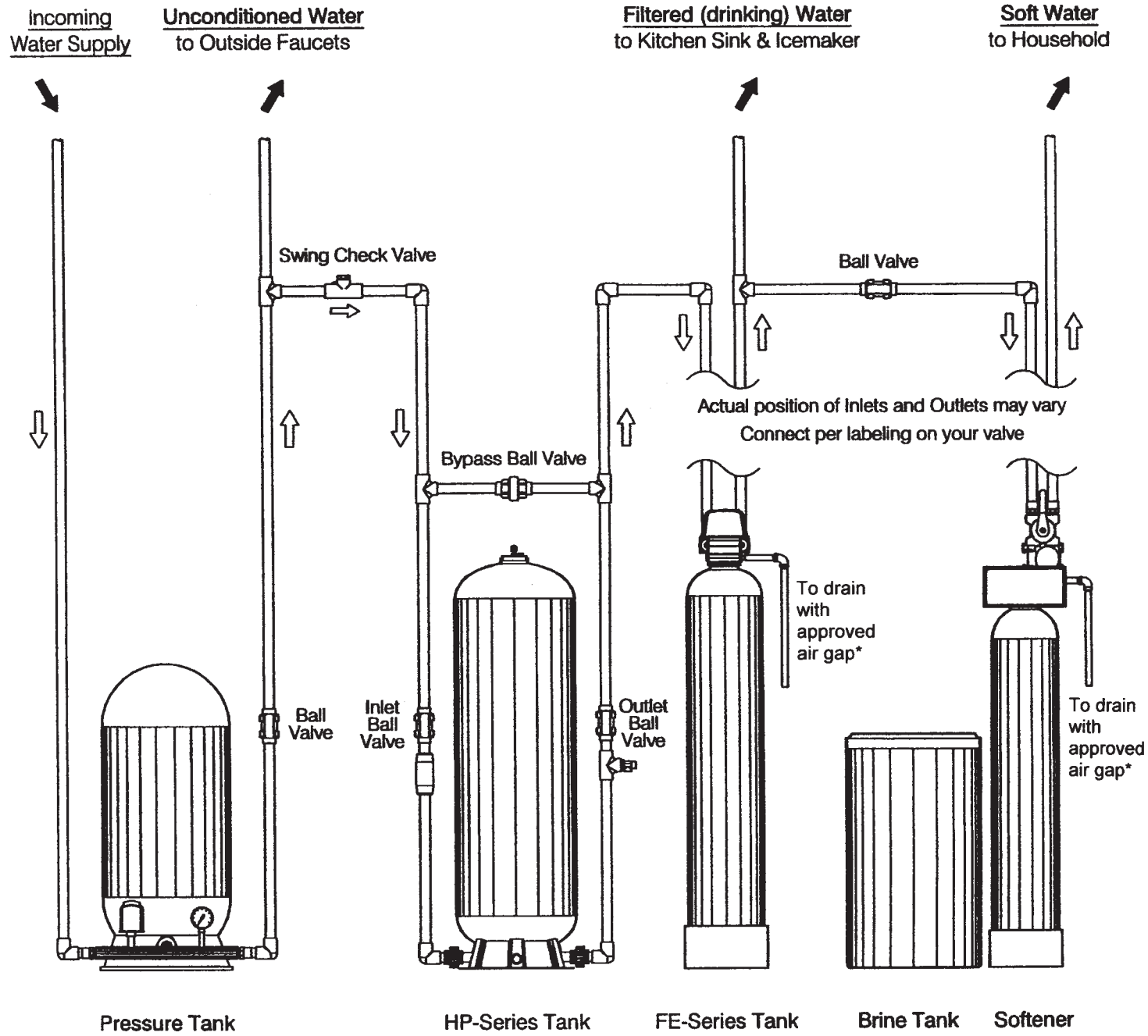
HPFE-14

HPFE-16

Capital Water Softener, Inc.

2096 Helena Street Madison, Wisconsin 53704 (608) 241-1511 FAX (608) 241-5709

Typical System Installation



*Drain outlet shall be constructed to provide for connection to the sanitary waste system through an air gap of 2 pipe diameters or 1 inch, whichever is larger.

The Eliminator II Iron Filtration System

Principles of operation: From the raw water supply (city or private well), the water enters the inlet supply to the HP-series tank, flows thru the micronizer which injets air as an oxidizer.The water then flows to the HP-series tank, rises thru a distributor and sprays the water air mix into the top portion of the HP-series tank, which has a controlled amount of air allowing the iron present in the raw water to precipitate and become large enough for particles to be filtered out in the FE-series tank. The FE-series tank has a maximum iron removal level and must be backwashed periodically to keep the FE-series tank filter material clean.

Operating Conditions: The Eliminator II Iron filtration system has been tested and validated by the Water Quality Association. It conforms to the WQA S-200 for specific water claims as verified and substantiated by test data.

Contaminants other than iron may limit the filters ability to remove the iron and must be addressed before installing the Eliminator Series.

Iron Bacteria must be treated with chlorination and a carbon filter installed prior to the Eliminator II system being installed as the chlorine will damage the filtering material in the FE-series tank.

Tannins present in the water will not allow the oxidation process to occur and will not precipitate out the iron.

TDS is a good test to perform as it is an indicator of potential water problems. If the water tests at 700 TDS or above, please consult factory before installing the Eliminator II Series.

Pre- Installation Check List

Plumbing connections: All plumbing materials and the installation must conform to state and local plumbing codes.

Water Supply: A minimum of 20 psi and a maximum of 70 psi is required for proper operation. If incoming water supply is greater than 70 psi a pressure reducing valve must be installed.This system is to be supplied with cold water only.

Flow Rates: The flow rate must be sufficient to backwash the FE-series tank. The backwash rates are listed for each model in the Eliminator II specifications on this page of the manual. The pump flow rate is critical for the proper operation of the Eliminator series.

Electrical: A continuous 110 volt 60 hertz AC current is needed for power supply. Be sure power supply is uninterrupted and not on a switched outlet.

Existing Plumbing: Should be free of all foreign matter such as lime, iron or buildup of any materials. Be sure flowrate is sufficient to backwash FE-series tank.

Installation Location: The units should be located as close to a drain and water supply as possible. If it is possible other water treatment equipment is needed, be sure there is adequate space allowed. Do not locate equipment where it will be subject to freezing conditions or where temperature will exceed 110 degrees F.

Bypass Valves: The installation of a bypass valve is recommended to provide for occasions when unit(s) must be serviced.

WS1TC Control Valve (Used to back wash FE-series tank).
Minimum/Maximum operating pressure: 20 to 70 psi.Minimum/ Maximum operating temperature: 35 to 110 degrees F. Electrical current draw and voltage: 0.5 amperes-110 volts 60 hertz.

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. Do not use pipe dope or sealants on threads. Teflon tape must be used on any threaded fittings. Teflon tape is not necessary on any of the nuts or caps, they are O-ring sealed.

Soldered joints must be done prior to connecting to the drain line flow control fitting. Leave at least 6" between the fitting and any solder joint. Failure to do this will cause damage to the drain line flow control fitting.

Check Valve: A 1" swing check valve is provided and must be installed before the HP-series tank. This allows for non filtered water to be supplied to outside hosebibs or any water lines feeding other homes on a joint well, or any outbuildings where non-filtered water is wanted.

Outside Watering: If outside filtered water is desired for lawn sprinkling, to protect house siding, concrete drives or walks from staining please consult factory for proper equipment sizing.

For questions, service or parts contact the installing Water Conditoning dealer, Plumbing Contractor or Capital Water Softener, Inc.

Eliminator II Specifications

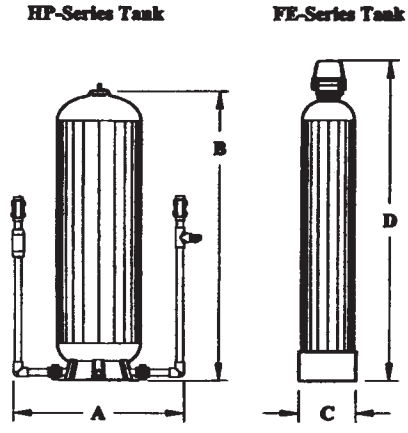
Model Number	HPFE-10	HPFE-13	HPFE-14	HPFE-16
Rated Service Flow (gpm)	6.5	9.3	12.5	16.0
psi Drop @ Service Flow	3	4	6	9
Backwash Flow Rate (gpm)	5.3	9.0	10.0	12.0
Min.-Max. Pressure psi)	20-70	20-70	20-70	20-70
Min.-Max. Temp. (degrees)	35-110	35-110	35-110	35-110
Rated Capacity (gallons)	475	800	920	1200
Rated Capacity (ppm)	3990	6370	7210	9310
Shipping Weight (lbs.)	129	189	222	265

Floor Space Inches

Model Number	Width	Depth	Height
HPFE-10	43 Inches	20 Inches	68 Inches
HPFE-13	46 Inches	20 Inches	68 Inches
HPFE-14	47 Inches	20 Inches	79 Inches
HPFE-16	48 Inches	20 Inches	79 Inches

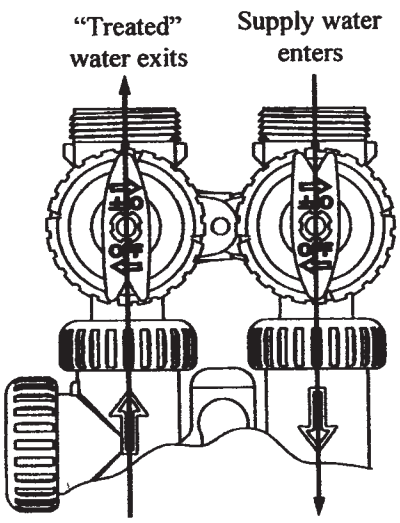
Dimensions

Model Number	A	B	C	D
HPFE-10	27 Inches	59 Inches	12 Inches	68 Inches
HPFE-13	27 Inches	59 Inches	15 Inches	68 Inches
HPFE-14	27 Inches	59 Inches	16 Inches	79 Inches
HPFE-16	27 Inches	59 Inches	18 Inches	79 Inches

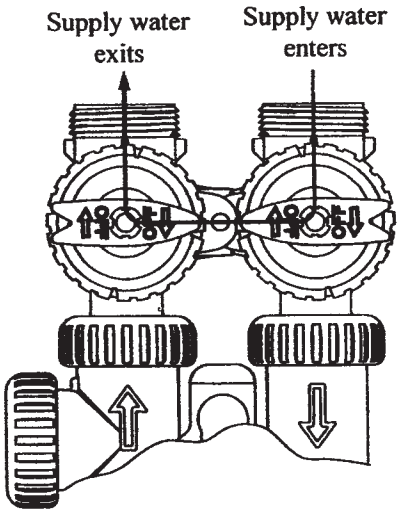


Bypass Valve Positions

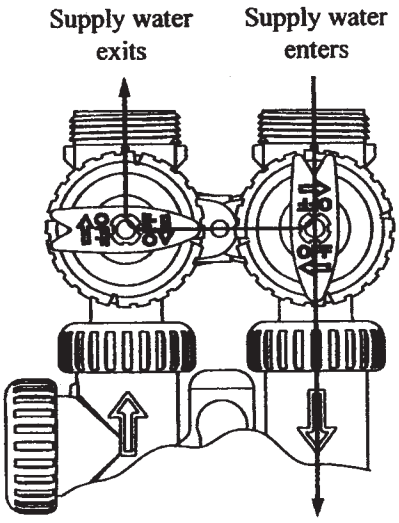
Normal Operation



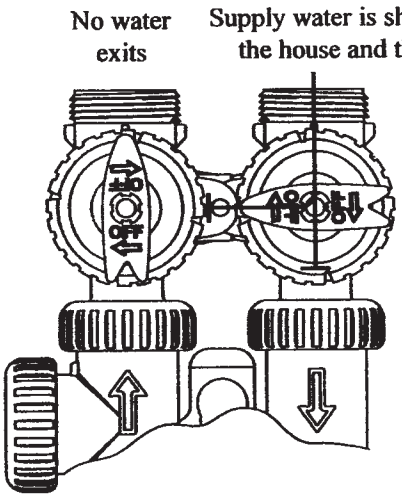
Bypass Operation

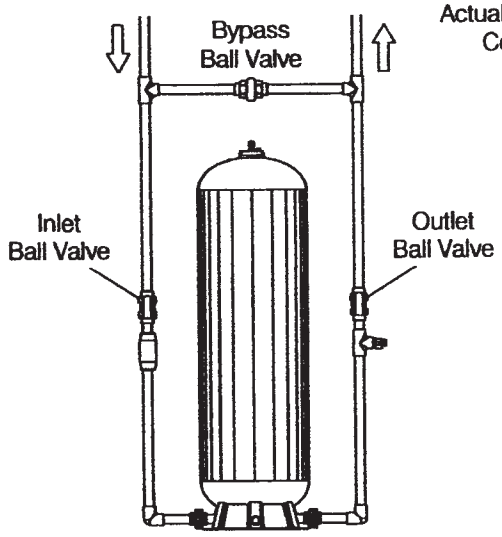


Diagnostic Mode



Shut Off Mode





HP-Series Tank

Actual position of Inlet and Outlet may vary
Connect per labeling on your valve

*Drain outlet shall be constructed to provide for connection to the sanitary waste system through an air gap of 2 pipe diameters or 1 inch, whichever is larger.

FE-Series Tank

Startup procedure for HP-Series Tank

1. **HP-Series tank:** Close inlet ball valve and outlet ball valve, and open bypass ball valve. (See **HP-Series Tank** diagram on facing page).
   FE-Series tank: Place bypass valve in **Bypass Operation** position (see **Bypass Valve Positions** diagram on facing page).

2. Open incoming water supply slowly and allow water to run to all unconditioned water lines and outside faucets, and through swing check to inlet ball valve of **HP-Series tank.**

3. Open **HP-Series tank** inlet ball valve slowly and allow water to fill and pressurize tank. Check for leaks. Close **HP-Series tank** bypass ball valve.

4. With **FE-Series tank** bypass valve in **Bypass Operation** position as described in step 1 above, open outlet ball valve of **HP-Series tank** slowly to fill and pressurize lines past **FE-Series tank.** Check for leaks.

Startup procedure for FE-Series Tank

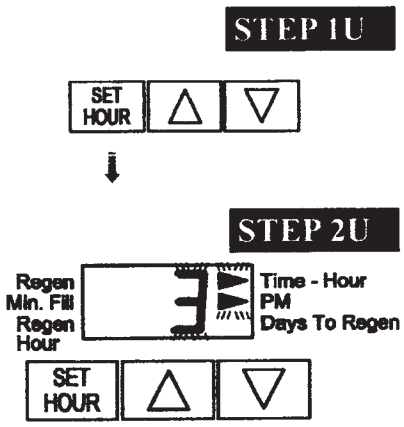
IMPORTANT: Do not plug in electricity until instructed to do so.

1. Open **FE-Series tank** bypass valve so it is in the **Diagnostic Mode** position (see **Bypass Valve Positions** diagram on facing page). This will allow water to fill the **FE-Series tank** and water will begin to flow at the drain after approximately 1 minute.

2. When there is a steady flow of water at the drain receptacle you may plug the valve in to a 110 volt 60 cycle electrical outlet. Unit will continue to run water for approximately 10 minutes before valve returns to service position and water stops flowing to drain. Place bypass valve in **Normal Operation** position (see **Bypass Valve Positions** diagram on facing page).

3. Run water at a cold filtered but un-softened supply to home (such as kitchen faucet) until the water runs clear (it will be gray and cloudy for a few minutes). Shut water off when clear. The unit is now in service.

4. Set the timer at the correct hour of the day following STEP 1U and STEP 2U below: Installation Complete.



Set Time of Day

STEP 1U – Press SET HOUR

STEP 2U – Current time: Set the clock to the closest hour by using the UP or DOWN button. An arrow points to PM after 12. After a power outage, the time of day will need to be reset. Press SET HOUR to exit.

NOTE: The FE-Series tank will backwash water to the drain on a scheduled timed setting. The filtering material contains fines which flush out of the filter during the backwash cycle. This material may be dark gray or black in color. There is no need to be alarmed. Such discoloration of the backwash water is normal, and may occur for up to a year after installation

Instructions for setting Timer follow this section

Programming Instructions

For

WS1TC
Control Valve

Backwash Control

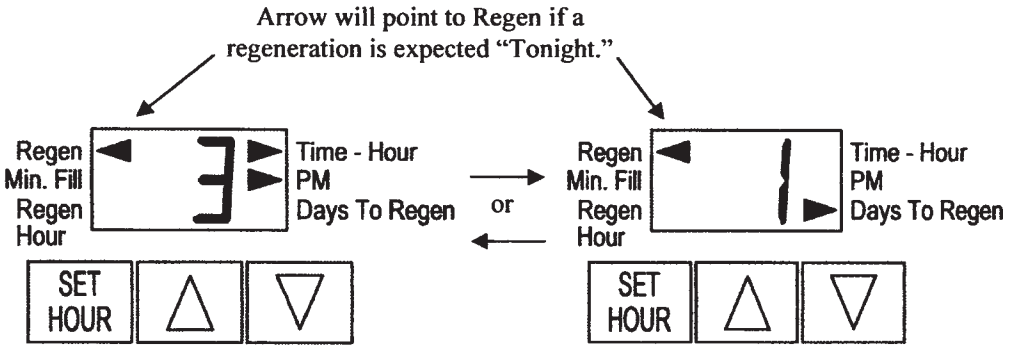
For

FE-Series Filter

User Screens: Introduction

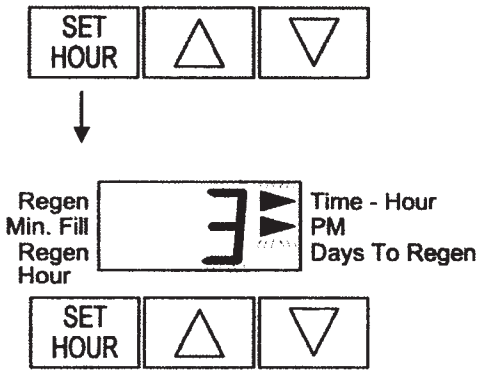
GENERAL OPERATION:

When the system is operating, one of two displays will be shown: Time of Day or Days Until the Next Regeneration. Pressing UP or DOWN will toggle between the two choices.



TO SET TIME OF DAY:

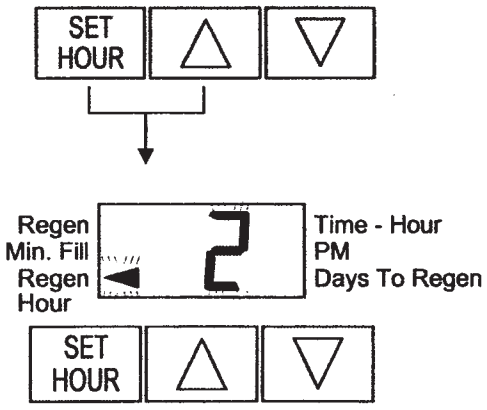
In the event of a power outage, time of day will need to be reset. All other information will be stored in memory no matter how long the power outage. Please complete the steps as shown to the right. To access this mode, press SET HOUR.



1. Accessed by pressing SET HOUR.
2. Adjust to the nearest hour using UP or DOWN. An arrow points to PM during p.m. hours.
3. Press SET HOUR to complete and return to normal operation.

TO SET TIME OF REGENERATION:

For initial set-up or to make adjustments, please complete the steps as shown to the right. Access this mode by pressing SET HOUR and UP simultaneously until display begins to flash (approximately 3 seconds).



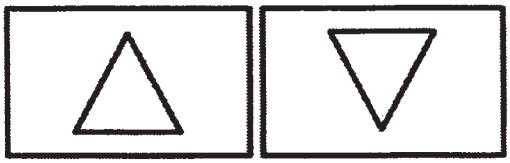
1. Accessed by pressing SET HOUR and UP buttons simultaneously until display begins to flash (approximately 3 seconds).
2. Adjust time of regeneration hour using UP or DOWN button. An arrow points to PM during p.m. hours. Simultaneously press SET HOUR and DOWN buttons to return to normal operation.

User Screens: Time of Day, Gallons/Days Remaining

Button Functions:

Set time

Move to the next display in programming mode



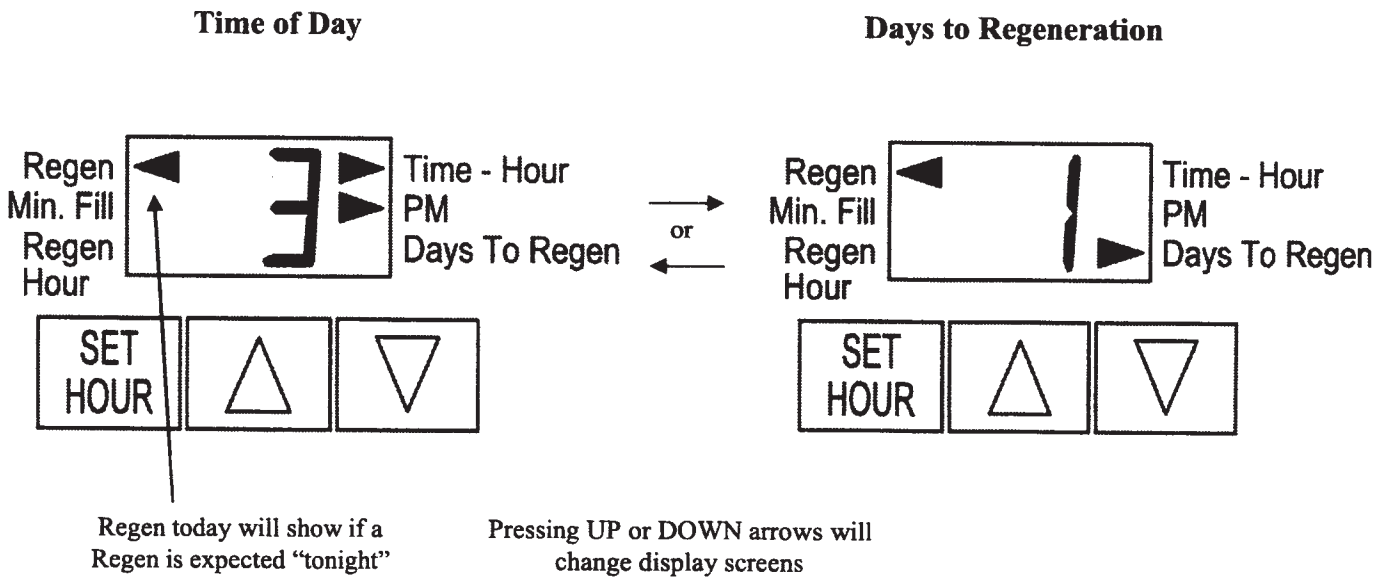
Toggles between Days to Regen and time

Change variable being displayed in programming mode

Toggles scheduled regen on/off

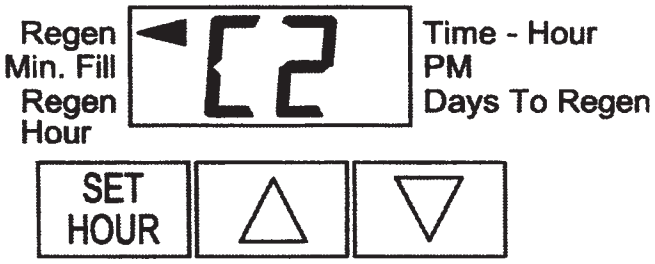
Hold for more than 3 seconds starts immediate regen

User Screens: Time of Day, Days to Regeneration



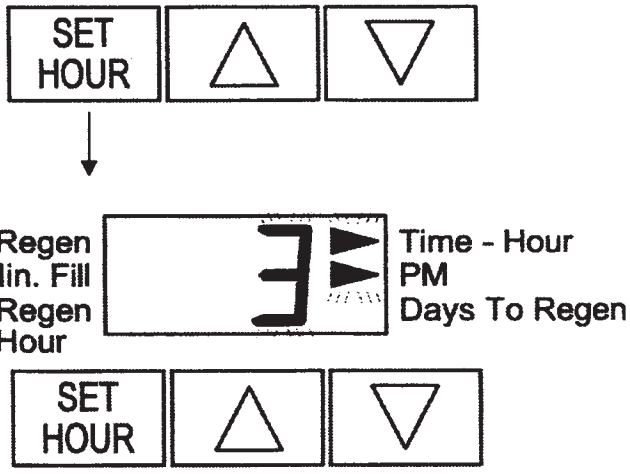
User Screens: Time of Day, Regeneration, Error

Regeneration screen:



Displays current regeneration cycle

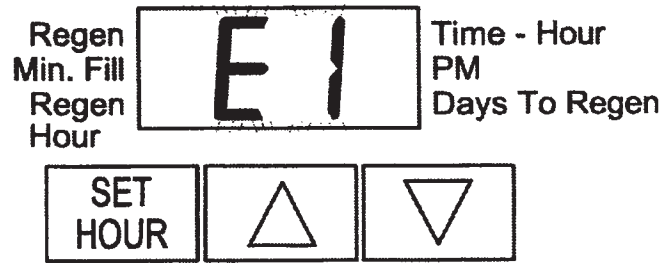
Set clock:



Press SET HOUR

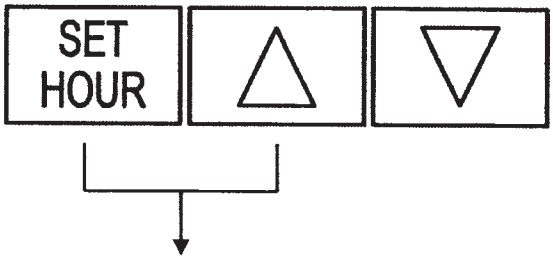
Current time: Set the clock to the closest hour by using the UP and DOWN button. An arrow points to PM after 12. After a power outage, the time of day will need to be reset. Press SET HOUR to exit.

Error message:

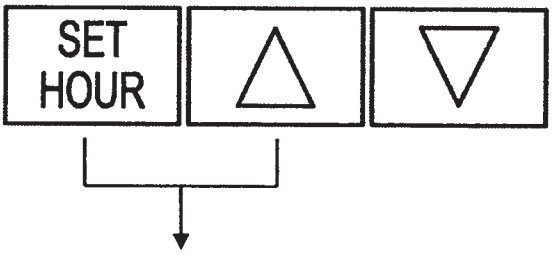


If "E1," E2" or "E3" appears on the display contact the OEM for help. This indicates that the valve did not function properly.

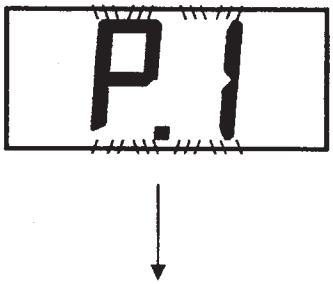
System Set Up Screens



To access System Set Up Screens, press and hold SET HOUR and UP buttons simultaneously until display flashes (approx. three seconds) then release.



Press SET HOUR and UP buttons simultaneously again until display shows the letter P and a number, then release again.



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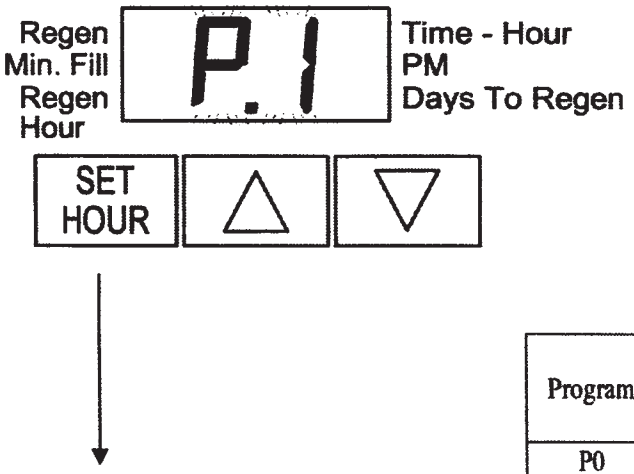
System Set Up Screens

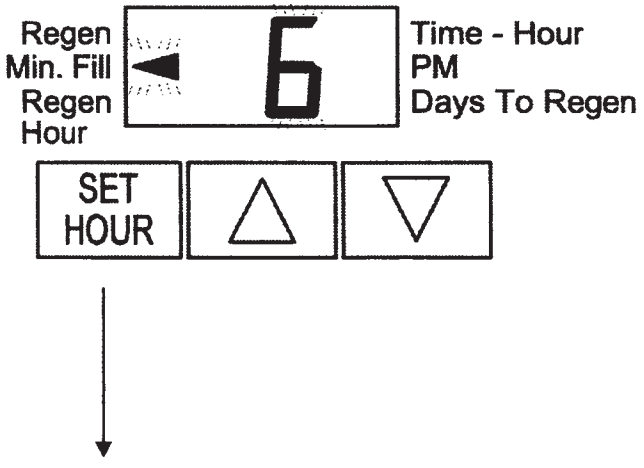


Choose the desired program by pressing the UP or DOWN buttons. Press SET HOUR button to go to the next step.

Table 3
Regeneration Cycles and Times for Different Programs

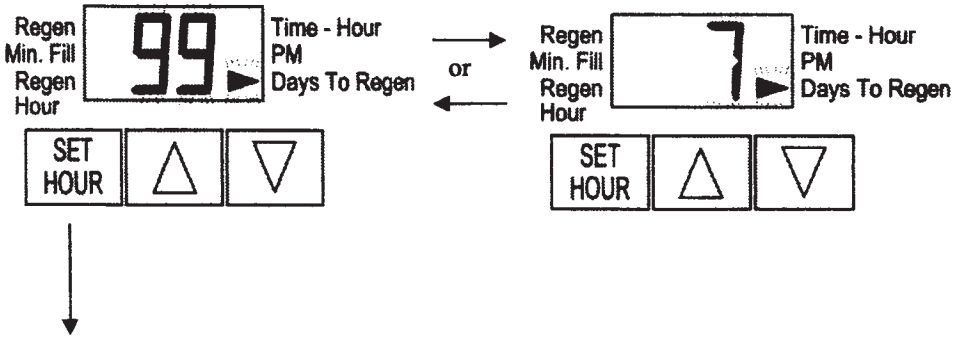
Program	All Times in Minutes				
	C1 1st Backwash	C2 Regenerate	C3 2nd Backwash	C4 Rinse	C5 Fill
P0	3	50	3	3	1-99
P1	8	50	8	4	1-99
P2	8	70	10	6	1-99
P3	12	70	12	8	1-99
P4	10	50	Skipped	8	1-99
P5	4	50	Skipped	4	1-99
P6	12	6	Skipped	12	1-99
P7	6	Skipped	Skipped	4	Skipped
P8	10	Skipped	Skipped	6	Skipped
P9	14	Skipped	Skipped	8	Skipped

Note: During regeneration the display will show C1, C2, etc. If the cycle is skipped, that cycle number will not be displayed.

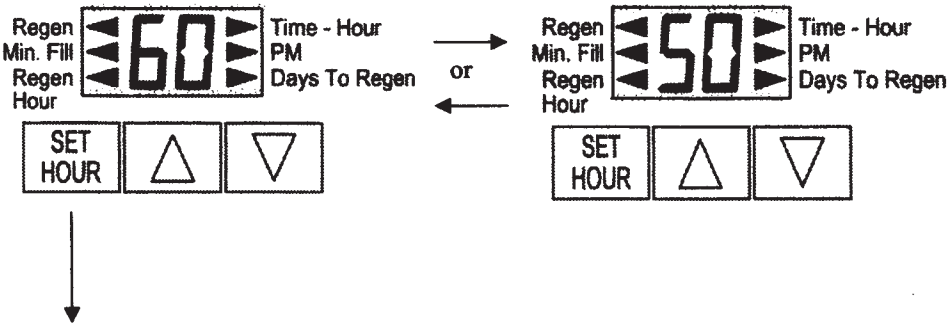


If program P0 through P6 was selected, enter in the minutes of fill using the UP or DOWN buttons. The allowable values vary from a low of 1 to a high of 99. If program P7, P8 or P9 was selected, dashes will appear for minutes of fill. Press SET HOUR button to go to the next step.
Note: For each minute of fill 0.5 gallons of water is added to the solution tank. With salt (sodium chloride) this equates to approximately 1 1/2 pounds of salt per minute of fill.
(Continued on next page)

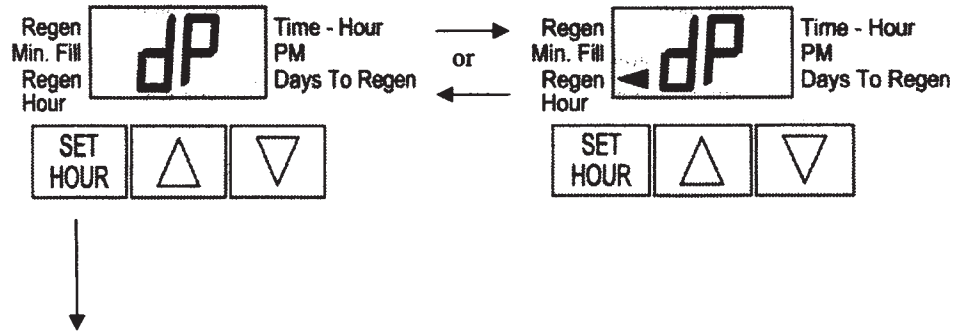
System Set Up Screens



Use UP or DOWN buttons to switch between:
• 1-99 Days Between Regen; or
• 7-Day Regen.
Press SET HOUR button to go to next step.



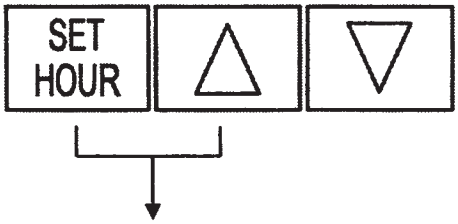
Use UP or DOWN buttons to switch between 60 Hz or 50 Hz option. Supply your own transformer if using 50 Hz option. Press SET HOUR button to go to next step.



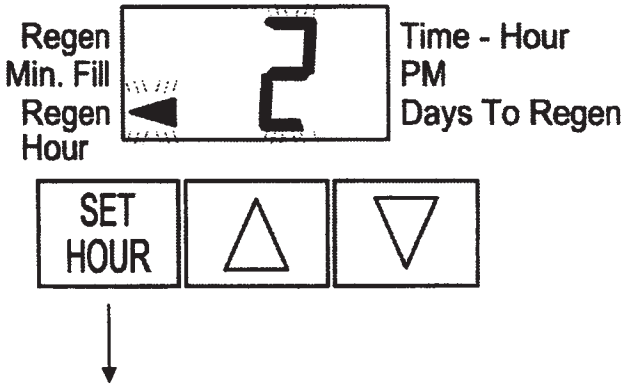
If a differential pressure switch is installed and actuated:
• a regeneration will occur immediately if no arrow points at Regen Hour; or
• a regeneration will occur at the delayed regeneration hour if an arrow points at Regen Hour.
Use UP or DOWN buttons to switch between the two choices. If a differential switch is not installed the settings in this display are ignored. Press SET HOUR to exit OEM system setup.

Installer Screens: Days Between Regeneration, Time of Regeneration

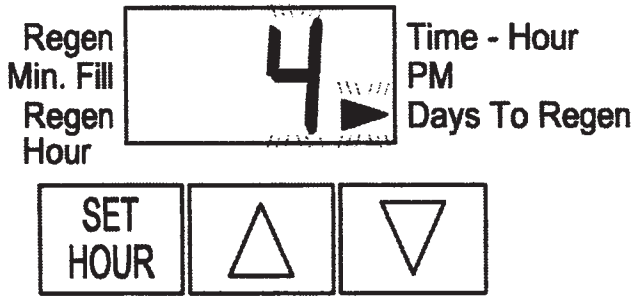
1-99 Days Between Regeneration



From normal mode, press SET HOUR + UP buttons simultaneously for 3 seconds and release.



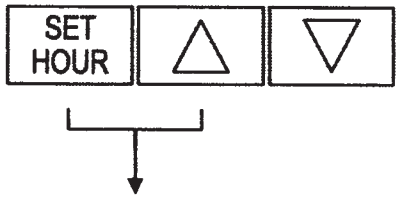
Regeneration Time: Set the clock to the hour the regeneration should occur by using the UP or DOWN buttons. An arrow points to PM after 12. Press SET HOUR to go to next step.



Days To Regen: Set the number of days between regenerations. The allowable range is 1 to 99. Press SET HOUR to exit Installer Displays & Settings.

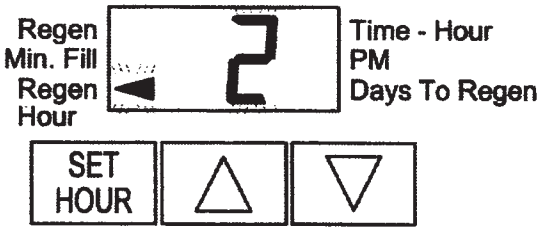
Installer Screens: Days Between Regeneration, Time of Regeneration

7-Day Option

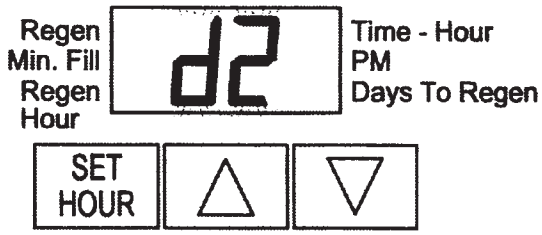


From normal mode, press SET HOUR + UP buttons simultaneously for 3 seconds and release.

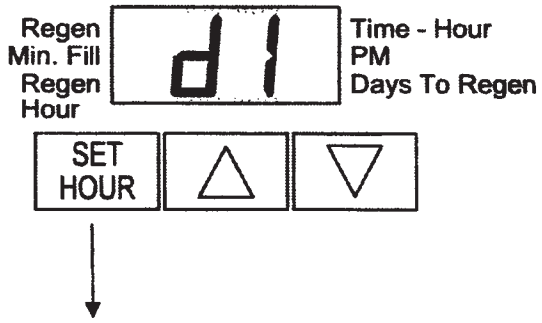
Display	Day of Week
d1	Sunday
d2	Monday
d3	Tuesday
d4	Wednesday
d5	Thursday
d6	Friday
d7	Saturday



Regeneration Time: Set the clock to the hour the regeneration should occur by using the UP or DOWN buttons. An arrow points to PM after 12. Press SET HOUR to go to next step.



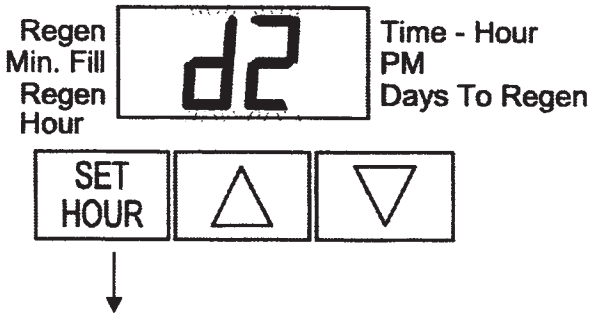
Current Day of Week: Set the current day of the week by using the UP or DOWN buttons (See chart at left for date codes). Press SET HOUR to go to next step.



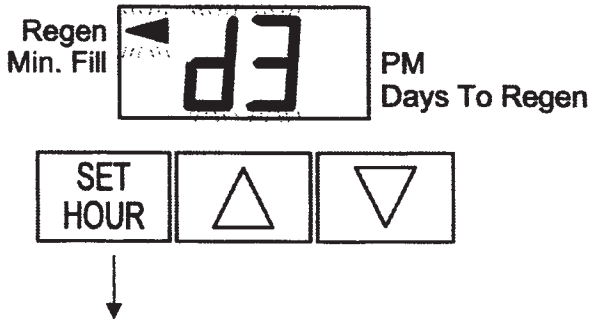
Sunday Regeneration: To regenerate on Sunday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Sunday. Press SET HOUR to go to next step.
(Continued on next page)

Installer Screens: Days Between Regeneration, Time of Regeneration

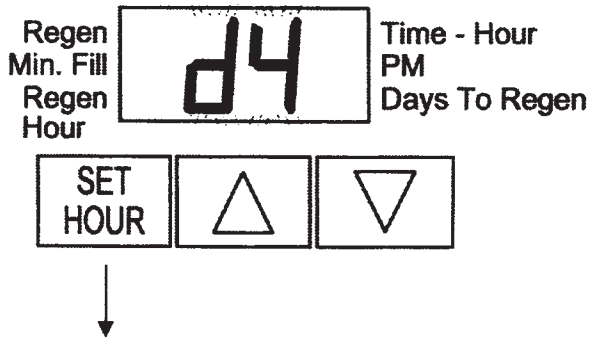
7-Day Option



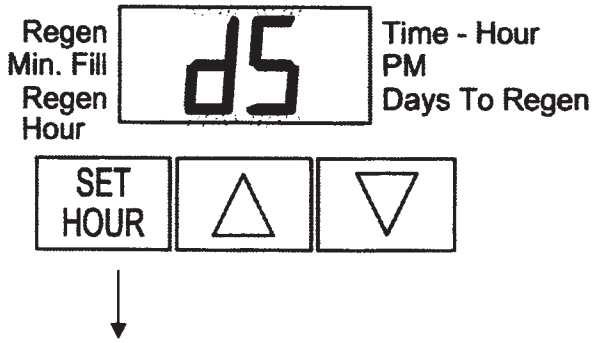
Monday Regeneration: To regenerate on Monday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Monday. Press SET HOUR to go to next step.



Tuesday Regeneration: To regenerate on Tuesday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Tuesday. Press SET HOUR to go to next step.



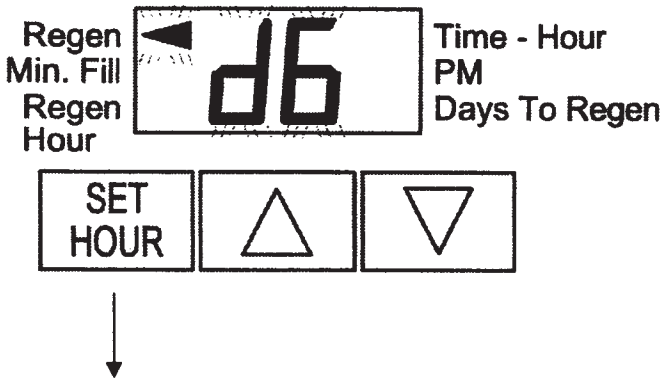
Wednesday Regeneration: To regenerate on Wednesday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Wednesday. Press SET HOUR to go to next step.



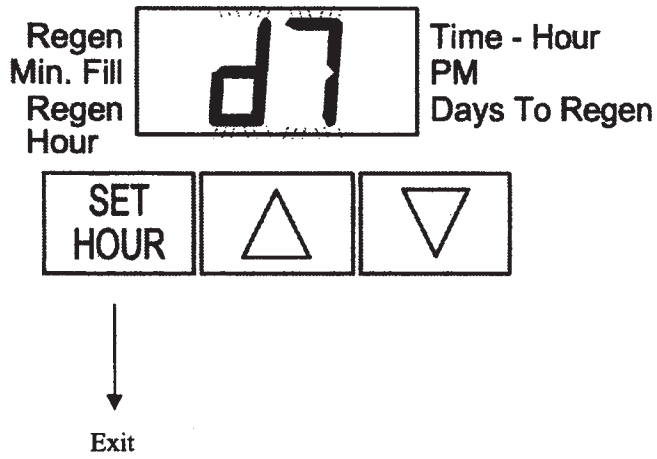
Thursday Regeneration: To regenerate on Thursday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Thursday. Press SET HOUR to go to next step.
(Continued on next page)

Installer Screens: Days Between Regeneration, Time of Regeneration

7-Day Option



Friday Regeneration: To regenerate on Friday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Friday. Press SET HOUR to go to next step.



Saturday Regeneration: To regenerate on Saturday use the UP or DOWN button until the arrow points to Regen. If the arrow does not point to Regen a regeneration will not occur on Saturday. Press SET HOUR to exit Installer Displays & Settings.
NOTE: If all arrows are turned off in d1-d7, Days to Regen in the User Displays will always read 7 and a regeneration will never occur.

Drawings
And Order Numbers

For

WS1TC
Control Valve

Backwash Control

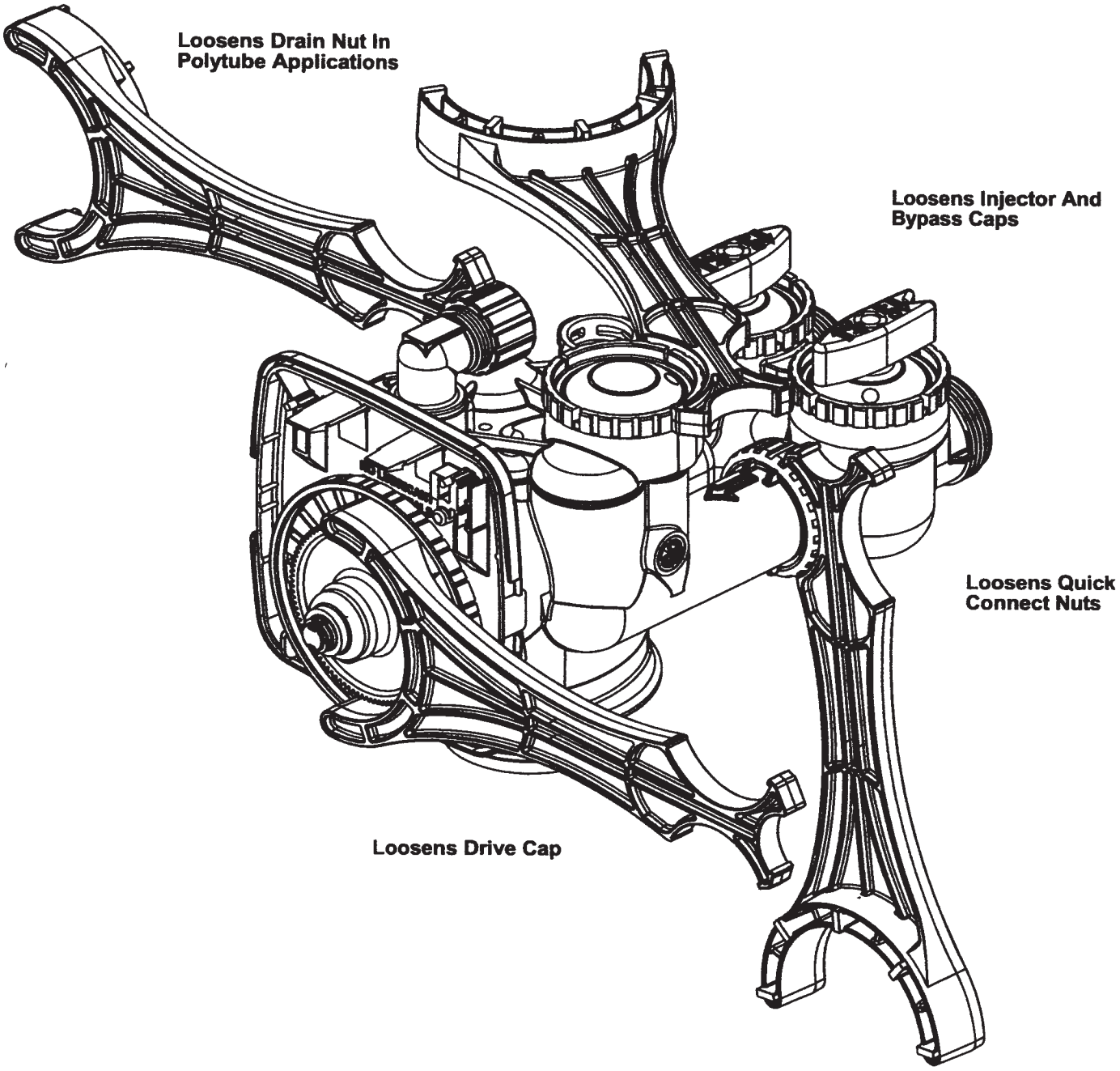
For

FE-Series Filter

WS1 Wrench

(Order No. V3193)

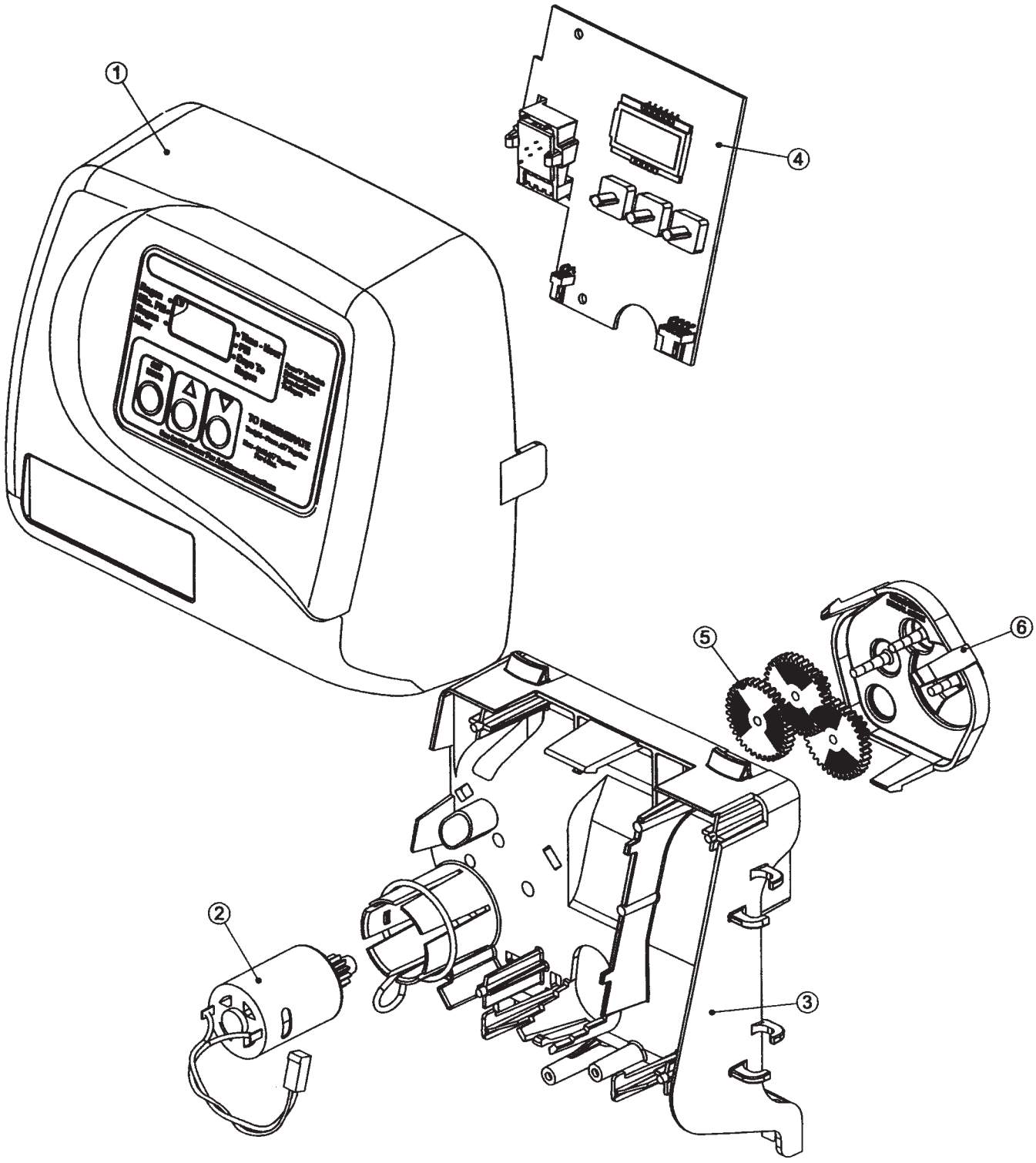
Although no tools are necessary to assemble or disassemble the valve, the WS1 wrench (shown in various positions on the valve) may be purchased to aid in assembly or disassembly.



Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175TC-01	WS1TC Front Cover ASY	1
2	V3107-01	WS1 Motor	1
3	V3106-01	WS1 Drive Bracket&Spring Clip	1
4	V3108TC	WS1TC PC Board	1
5	V3110	WS1 Drive Gear 12x36	3
6	V3109	WS1 Drive Gear Cover	1
	V3002TC	WS1TC Drive ASY	*
Not Shown	V3186	WS1 Transformer 110V-12V	1

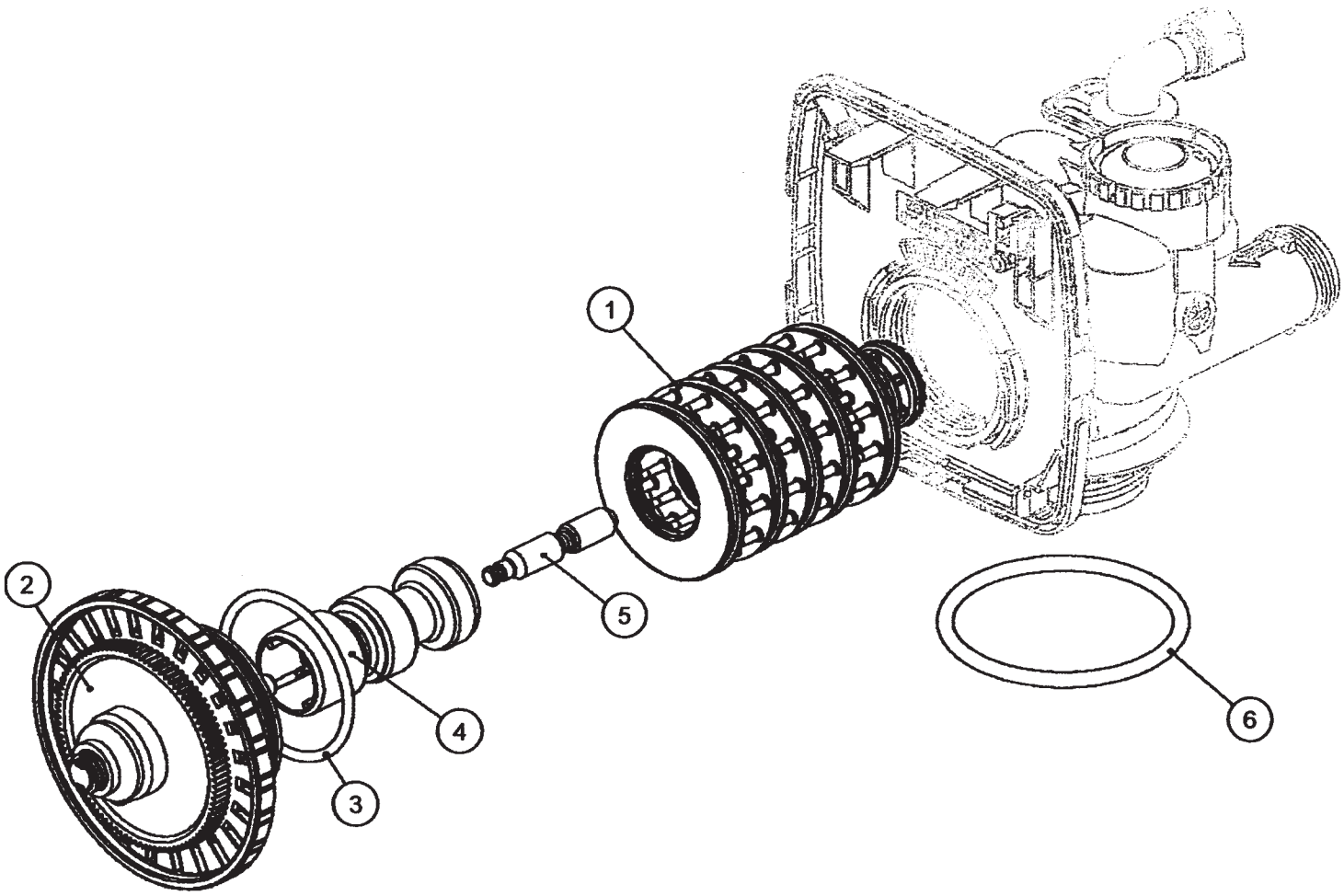
* Drawing number parts 2 through 6 may be purchased as a complete assembly, part V3002TC.



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

Drawing No.	Order No.	Description	Quantity
1	V3005	WS1 Spacer Stack Assembly	1
2	V3004	Drive Cap ASY	1
3	V3135	O-Ring 228	1
4	V3011	WS1 Piston Downflow ASY	1
5	V3174	WS1 Regenerant Piston	1
6	V3180	O-Ring 337	1

Note: The Regenerant Piston is not used in backwash-only applications.

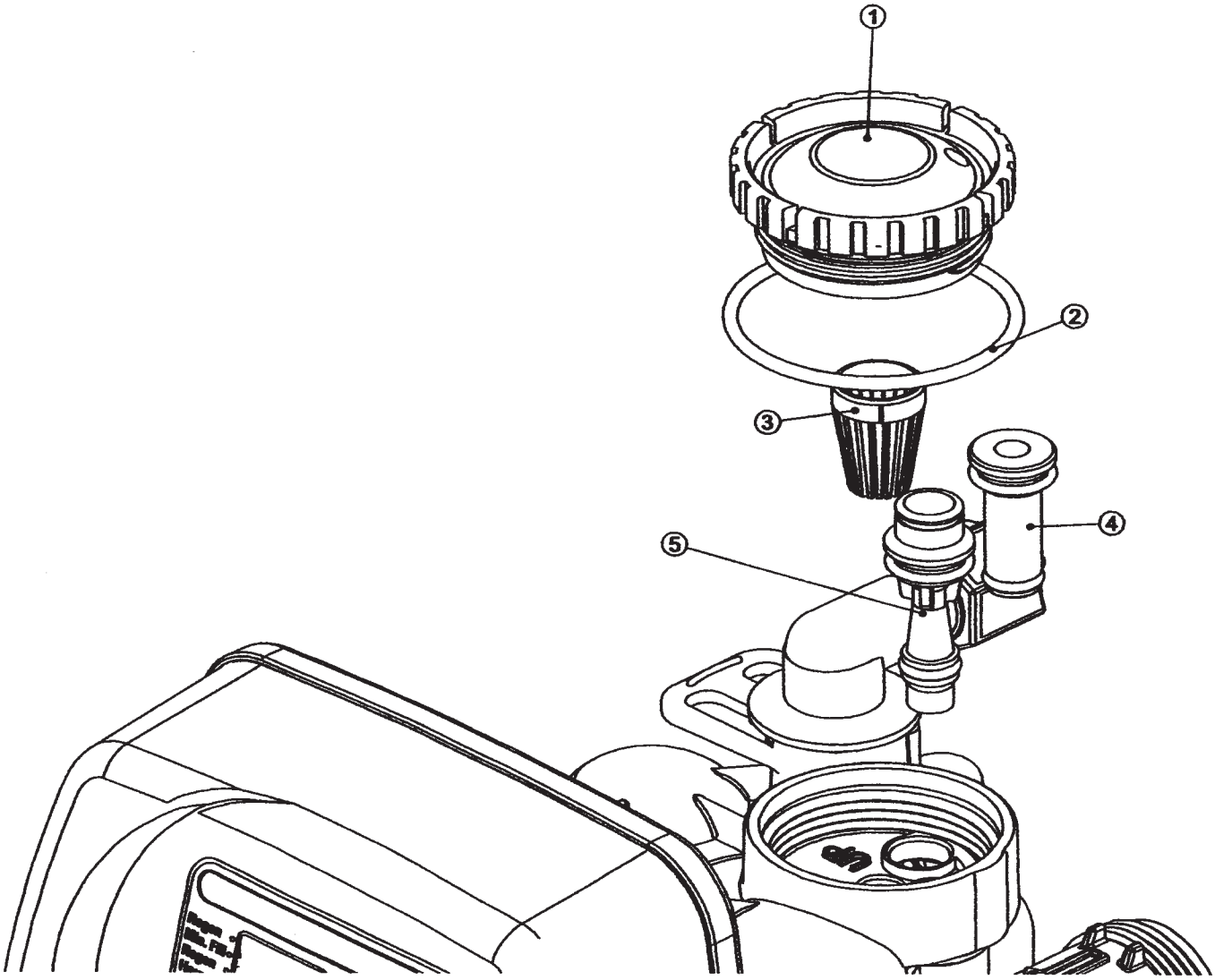


Injector Cap, Injector Screen, Injector, Plug and O-Ring

Drawing No.	Order No.	Description	Quantity
1	V3176	Injector Cap	1
2	V3152	O-ring 135	1
3	V3177	Injector Screen	1
4	V3010-1Z	WS1 Injector ASY Z Plug	1
5	V3010-1A	WS1 INJECTOR ASY A BLACK	1
	V3010-1B	WS1 INJECTOR ASY B BROWN	
	V3010-1C	WS1 INJECTOR ASY C VIOLET	
	V3010-1D	WS1 INJECTOR ASY D RED	
	V3010-1E	WS1 INJECTOR ASY E WHITE	
	V3010-1F	WS1 INJECTOR ASY F BLUE	
	V3010-1G	WS1 INJECTOR ASY G YELLOW	
	V3010-1H	WS1 INJECTOR ASY H GREEN	
	V3010-1I	WS1 INJECTOR ASY I ORANGE	
	V3010-1J	WS1 INJECTOR ASY J LIGHT BLUE	
	V3010-1K	WS1 INJECTOR ASY K LIGHT GREEN	
Not Shown	V3170	O-ring 011	*
Not Shown	V3171	O-ring 013	*

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

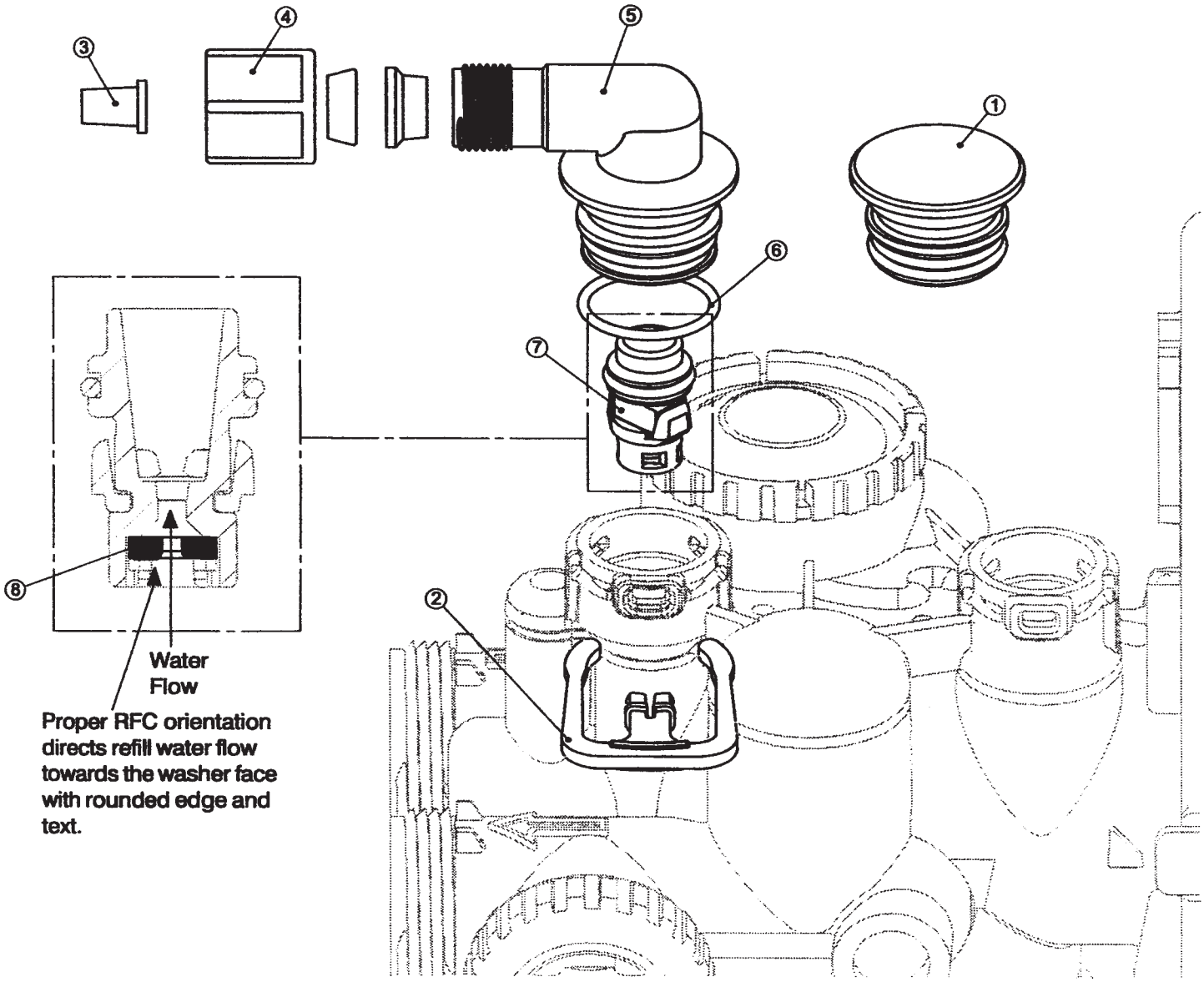
Note: For downflow, injector is located in the down hole and injector plug in the up hole. For a filter that only backwashes, injector plugs are located in both holes, and regenerant piston must be removed.



Refill and Refill Port Plug

Drawing No.	Order No.	Description	Quantity
1	V3195-01	WS1 Refill Port Plug ASY	This part is required for backwash only systems
2	H4615	Elbow Locking Clip	1
3	JCP-P-6	Polytube insert 3/8	1
4	JCPG-6PBLK	Nut 3/8	1
5	H4613	Elbow Cap 3/8	1
6	V3163	0-ring 019	1
7	V3165-01*	WS1 RFC Retainer ASY	1
8	V3182	WS1 RFC	1
Not Shown	H4650	Elbow ½" with nut and insert	Option

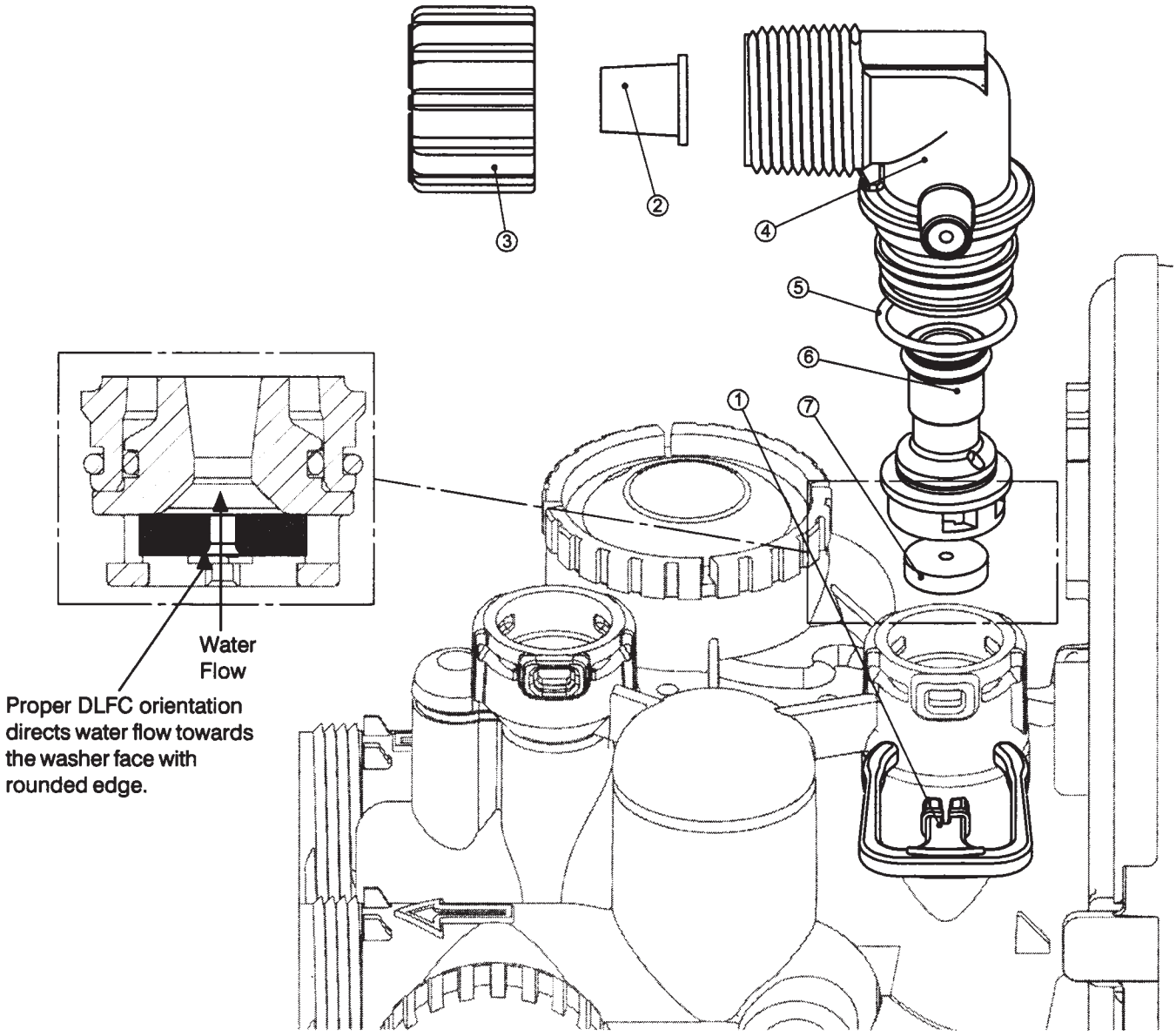
*Assembly includes WS1 RFC.



Drain Line – 3/4"

Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	PKP10TS8-BULK	Polytube insert 5/8	Option
3	V3192	WS1 Nut ¾ Drain Elbow	Option
4	V3158-01	WS1 Drain Elbow ¾ Male ASY	1
5	V3163	0-ring 019	1
6	V3159-01	WS1 DLFC Retainer ASY	1
7	V3162-007	WS1 DLFC 0.7 gpm for 3/4	One DLFC must be used if ¾" fitting is used
	V3162-010	WS1 DLFC 1.0 gpm for 3/4	
	V3162-013	WS1 DLFC 1.3 gpm for 3/4	
	V3162-017	WS1 DLFC 1.7 gpm for 3/4	
	V3162-022	WS1 DLFC 2.2 gpm for 3/4	
	V3162-027	WS1 DLFC 2.7 gpm for ¾	
	V3162-032	WS1 DLFC 3.2 f gpm or 3/4	
	V3162-042	WS1 DLFC 4.2 gpm for 3/4	
	V3162-053	WS1 DLFC 5.3 gpm for 3/4	
	V3162-065	WS1 DLFC 6.5 gpm for 3/4	
	V3162-075	WS1 DLFC 7.5 gpm for 3/4	
	V3162-090	WS1 DLFC 9.0 gpm for 3/4	
	V3162-100	WS1 DLFC 10.0 gpm for 3/4	

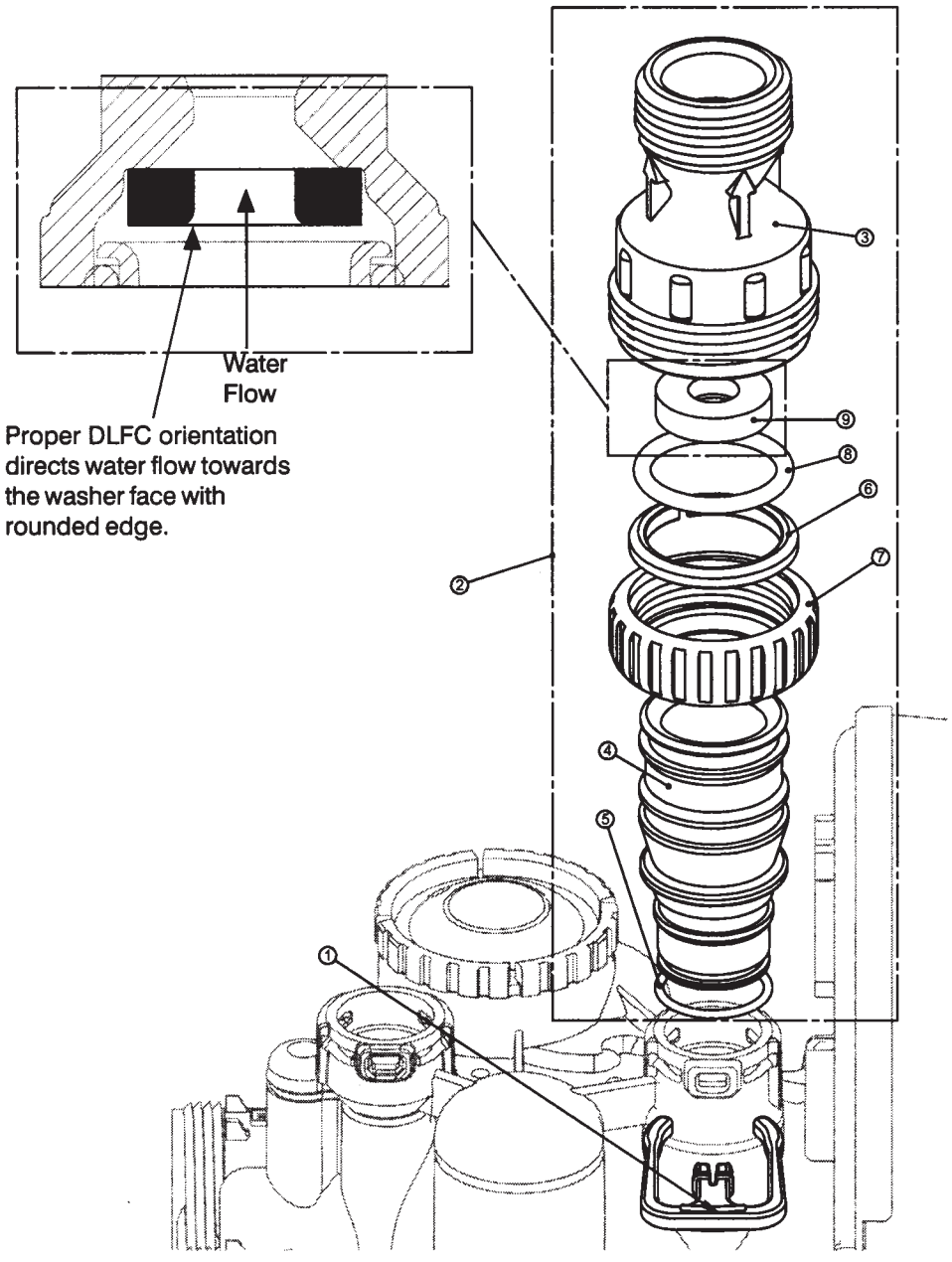
Valves are shipped without drain line flow control (DLFC) – install DLFC before using. Valves are shipped without ¾" nut for drain elbow (polytube installation only) and 5/8" polytube insert (polytube installation only).



Drain Line – 1”

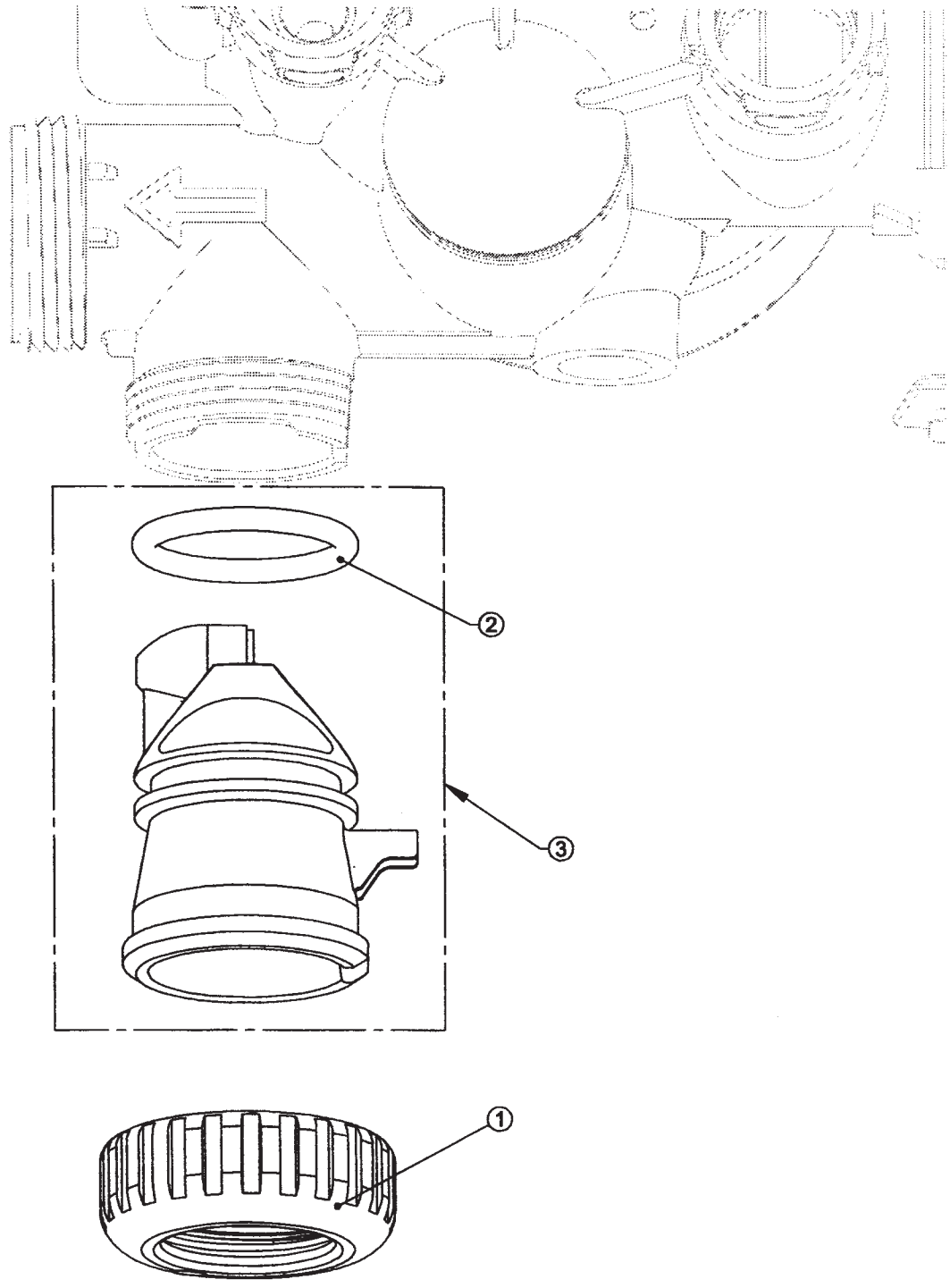
Drawing No.	Order No.	Description	Quantity
1	H4615	Elbow Locking Clip	1
2	V3008-02	WS1 Drain FTG 1 Straight	1
3*	V3166	WS1 Drain FTG Body 1	1
4*	V3167	WS1 Drain FTG Adapter 1	1
5*	V3163	0-ring 019	1
6*	V3150	WS1 Split Ring	1
7*	V3151	WS1 Nut 1" QC	1
8*	V3105	O-ring 215	1
9	V3190-090	WS1 DLFC 9.0 gpm for 1	One DLFC must be used if 1” fitting is used
	V3190-100	WS1 DLFC 10.0 gpm for 1	
	V3190-110	WS1 DLFC 11.0 gpm for 1	
	V3190-130	WS1 DLFC 13.0 gpm for 1	
	V3190-150	WS1 DLFC 15.0 gpm for 1	
	V3190-170	WS1 DLFC 17.0 gpm for 1	
	V3190-200	WS1 DLFC 20.0 gpm for 1	
	V3190-250	WS1 DLFC 25.0 gpm for 1	

* Can be ordered as a set order number V3008-02, description: WS1 Drain FTG 1 Straight.



Meter Plug

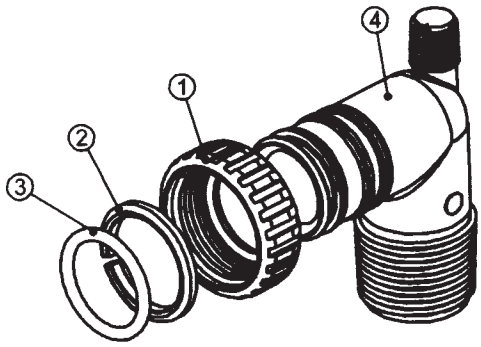
Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" QC	1
2	V3105	0-ring 215	1
3	V3003-01	WS1 Meter Plug ASY	1



Installation Fitting Assemblies

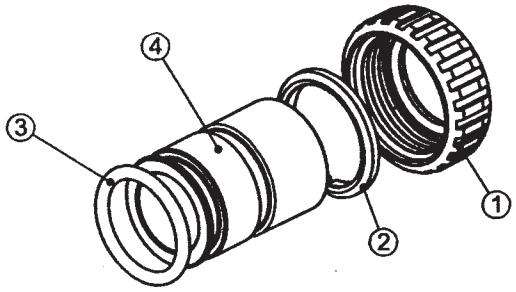
Description: WS1 Fitting 1" PVC Male NPT Elbow Assembly
Order Number: V3007

Drawing Number	Order Number	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring (215)	2
4	V3149	WS1 Fitting 1" PVC Male NPT Elbow	2



Description: WS1 Fitting 1" PVC Male NPT Elbow Assembly
Order Number: V3007-02

Drawing Number	Order Number	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring (215)	2
4	V3188	WS1 Fitting 1" Brass Sweat	2

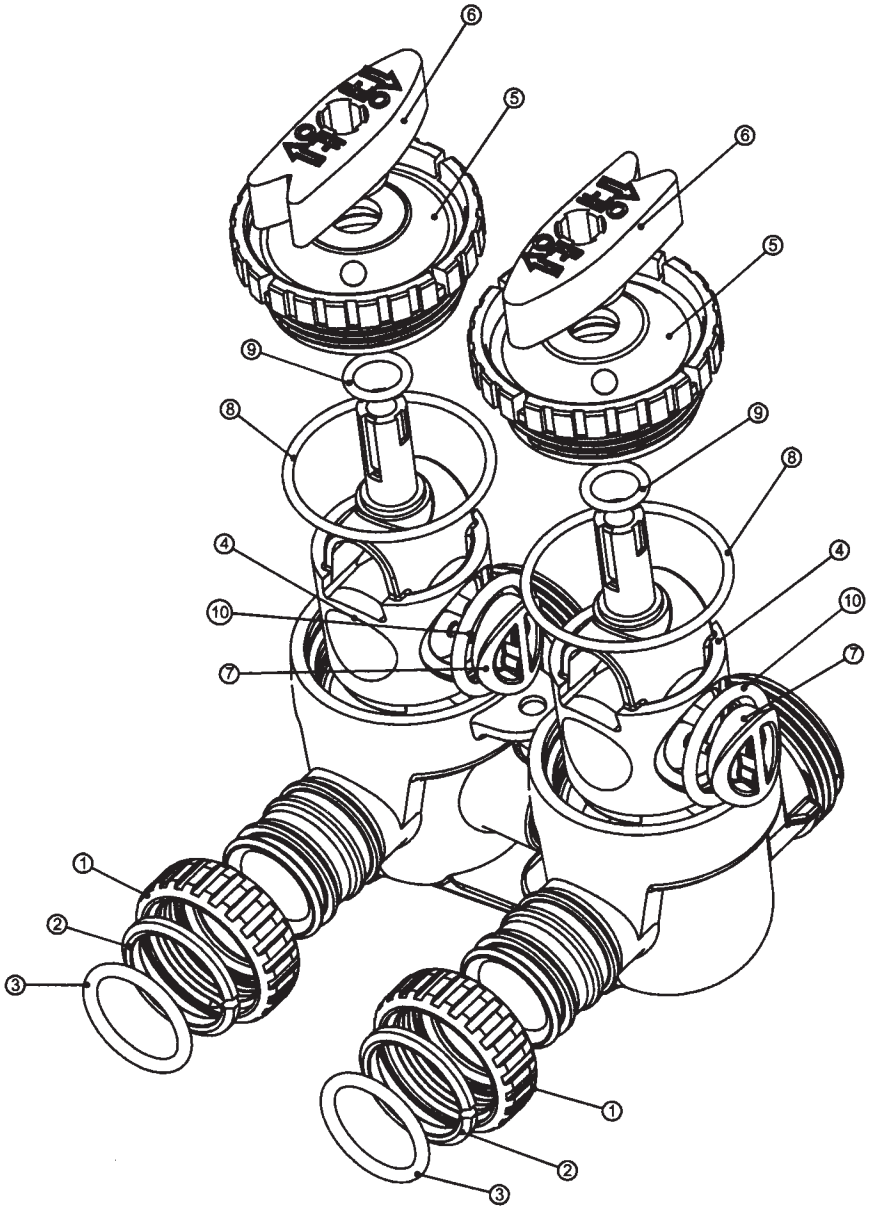


Bypass Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" Quick Connect	2
2	V3150	WS1 Split Ring	2
3	V3105	O-Ring 215	2
4	V3145	WS1 Bypass 1" Rotor	2
5	V3146	WS1 Bypass Cap	2
6	V3147	WS1 Bypass Handle	2
7	V3148	WS1 Bypass Rotor Seal Retainer	2
8	V3152	O-ring 135	2
9	V3155	O-ring 112	2
10	V3156	O-ring 214	2

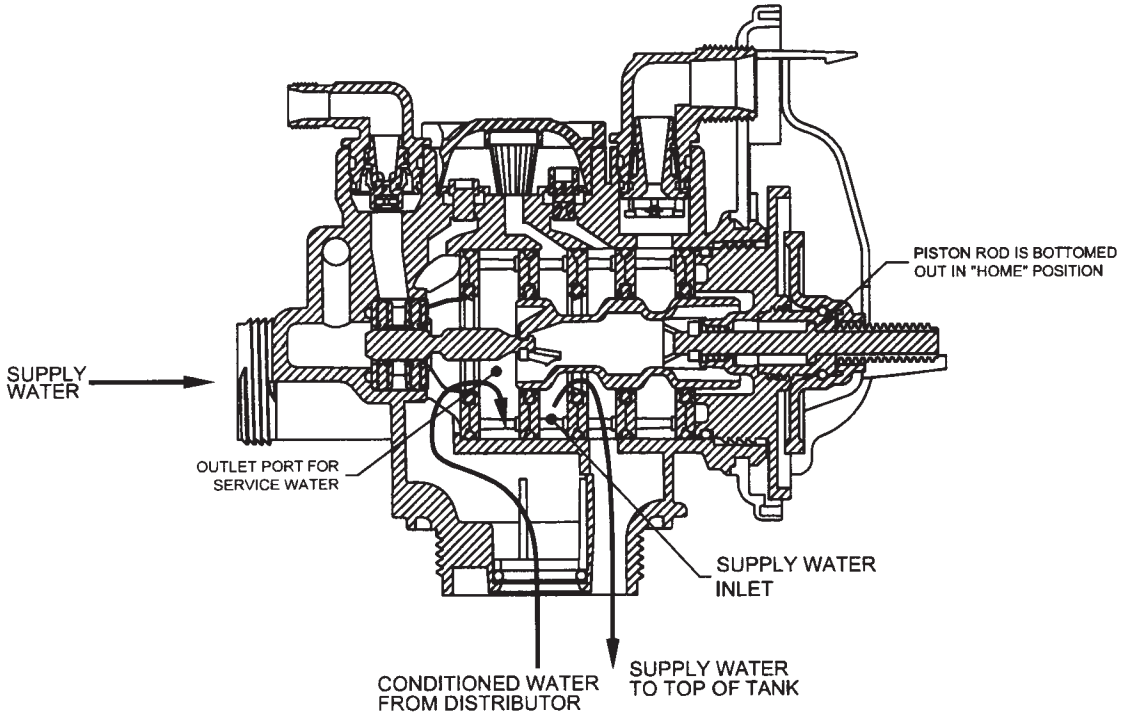
(Not Shown) Order No. V3191-01, Description: WS1 Bypass Vertical Adapter Assembly

Order No.	Description	Quantity
V3151	WS1 Nut 1" Quick Connect	2
V3150	WS1 Split Ring	2
V3105	O-Ring 215	2
V3191-01	WS1 Bypass Vertical Adapter Assembly	2

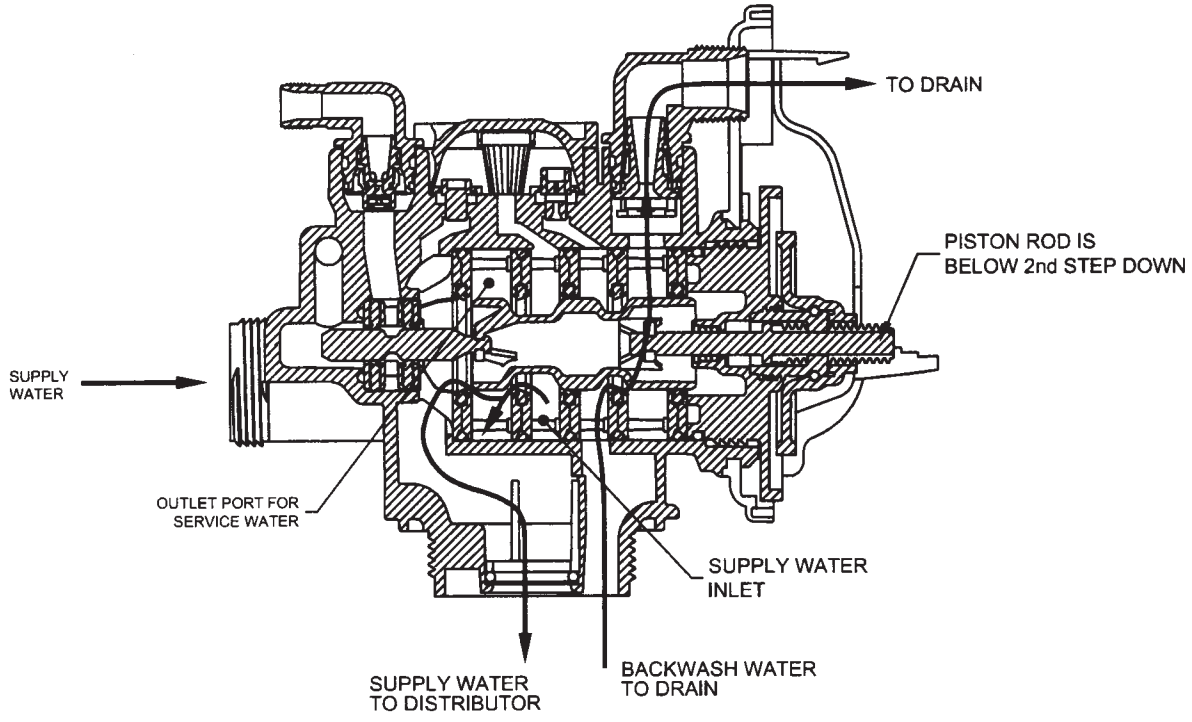


Flow Diagrams – Service and Backwash

flow diagram...service

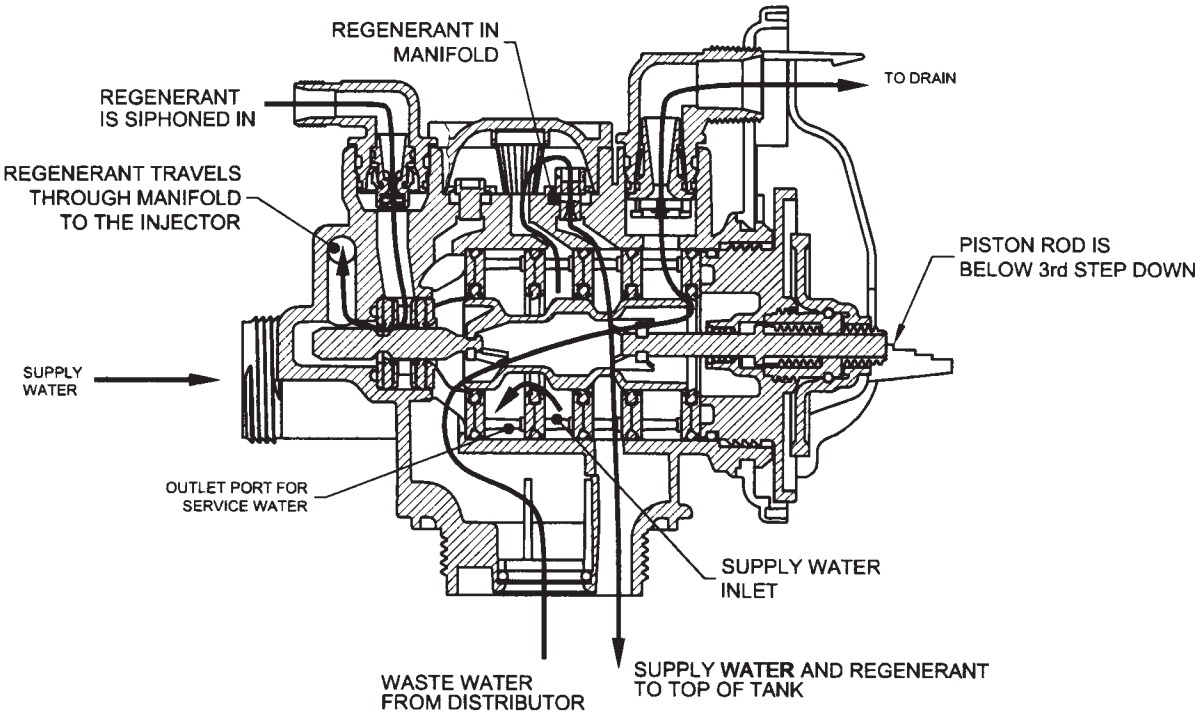


flow diagram...backwash

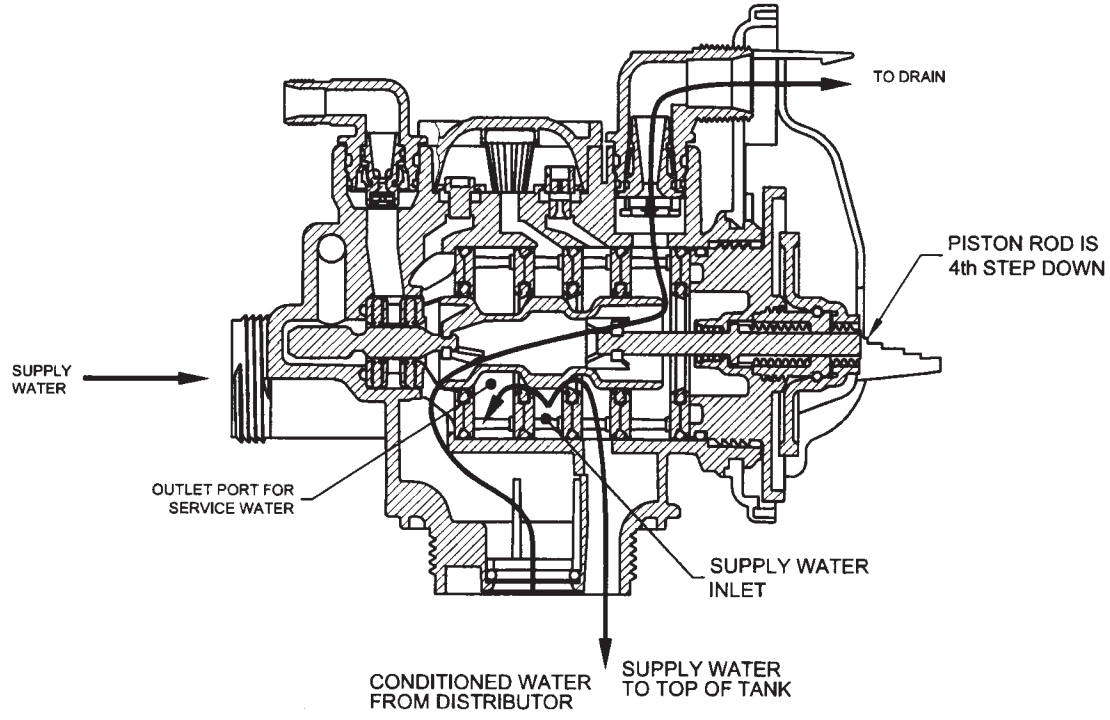


Flow Diagrams – Downflow Brine and Rinse

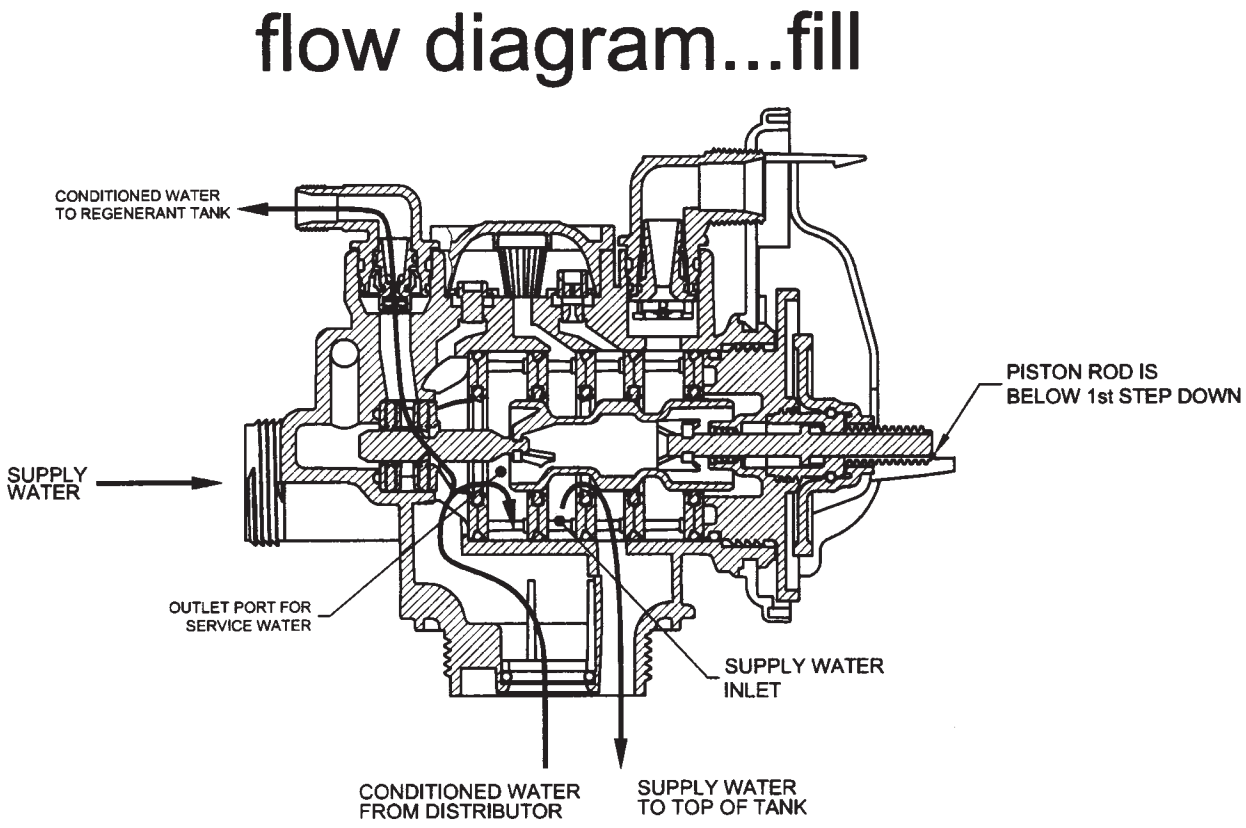
flow diagram...downflow brine



flow diagram...rinse



Flow Diagrams – Fill



Service Instructions

Disconnect the 12 volt 60 Hertz transformer from 110 Volt 60 Hertz outlet to be sure there is no electrical supply to the WS1TC valve before performing any service.

Tools:

The only tools needed to service the WS1TC valve are a ¼" to ½" wide flatbed screwdriver, and a pliers (channel locks type, medium size). The WS1 wrench may also be purchased to disassemble or assemble the valve. This wrench is shown on page 19 of the manual can be ordered from your Water Conditioning Dealer, Plumbing Contractor or Capital Water Softener, Inc. Order part no. V3193.

Front Cover: See page 20 of manual, Drawing No. 1.

Spread tabs on vertical side of cover pull forward to remove cover.

Drive Motor: See page 20 of manual, Drawing No. 2.

Unplug motor wires from two pronged PC board power supply, press the spring clip to the right and hold, rotate motor either clockwise or counter clockwise so wires are vertical, gently pull the motor to remove. Pulling the motor without rotating the motor will break the wires off the motor.

PC Board: See page 20 of manual, Drawing No. 4.

Unplug the motor wire (2 pronged plug) and the power source wire (4 pronged plug) from the PC board. Lift the middle latch on the drive bracket and pull the PC board forward by its edges. The PC board is located on a plastic pin on the lower left of the drive bracket and when pulled forward at about a 45 degree angle will come off the pin. Handle PC board by its edges.

Drive Bracket: See page 20 of manual, Drawing No. 3.

It is not necessary to remove the PC board from the drive bracket. Start by removing the plug for the power source. Unweave the wire from the side holders. Two tabs on the top of drive backplate 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 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 the 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 power wire is jammed between the drive bracket and drive backplate, or the gear is not engaging the drive cap assembly.

Drive Gears: See page 20 of manual drawing No. 5.

To inspect the drive gears, the drive gear cover (Drawing No. 6) needs to be removed. The drive gear cover is held in place by three clips. The largest of the clips is oriented to the bottom of the drive bracket. Before trying to remove the drive gear cover, the drive bracket must be removed from the drive backplate. 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.

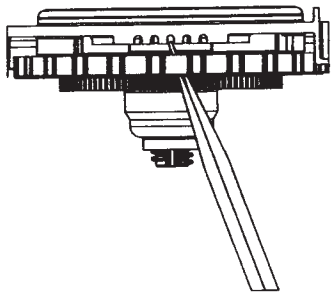
Replace broken or damaged drive gears. Do not lubricate any of the gears. Avoid getting any foreign matter on the reflective coating because dirt, oils or grease may interfere with pulse counting.

The drive gear cover only fits one way, with the large clip oriented 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.

Drive Cap Assembly: See page 21 of manual Drawing No. 2

The drive bracket assembly must be removed to access the drive cap assembly.

To remove the drive cap assembly from the control valve body, use the WS1 wrench as shown on page 19 of the manual or insert a ¼" to ½" flat bed 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 as shown in the drawing below. The notches are visible through the holes. Lever the screwdriver so the drive cap assembly turns counter clockwise. Once loosened, unscrew the drive cap assembly by hand and pull straight out.



The drive cap assembly contains the drive cap, the main drive gear, drive cap spline, piston rod and various other parts that should not be disassembled in the field. The only replaceable part on the drive cap assembly is the o-ring (page 21 of manual Drawing No. 3). Attached to the drive cap assembly also is the main piston (page 21 of manual Drawing No. 4.

Main Piston: See page 21 of manual Drawing No. 4.

Rotate the piston rod by holding the threaded portion of the drive cap assembly and turning geared white portion counter clockwise to expose the main piston fully. Then, unsnap the main piston from its latch by pressing on the side and rotating main piston. Do not lubricate the piston rod or main piston.

The piston may be chemically cleaned in dilute sodium bisulfate or vinegar, or it may be replaced.

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 the WS1 wrench or screwdriver until the black o-ring is no longer visible through the drain port. Excessive force can break the notches molded into the drive back plate. Make certain 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.

Spacer Stack Assembly: See page 21 of manual Drawing No. 1

To access the spacer stack assembly remove the drive bracket assembly, drive cap assembly and the 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 spacer stack assembly if necessary. Do not disassemble the stack.

The spacer stack assembly may be cleaned with sodium bisulfate, vinegar or wiped clean with a soft cloth.

The control valve body may be lubricated with silicone grease to allow the spacer stack assembly to slide easily into the control valve body. The spacer stack assembly is properly seated when about four threads are exposed (approximately 5/8"). Do not force the spacer stack assembly in. Do not use silicone or any other type lubricant on clear or red lip seals or piston.

Injector Cap and Plug: See page 22 of the manual Drawing No. 1 and 4.

Using a medium sized pliers or the WS1 wrench remove the injector cap. There are no serviceable parts except the o-ring (Drawing No. 2), which would have to replaced if the injector cap leaked. The holes labeled UP and DN are both plugged for backwashing filters as in the HPFE-Series units.

Refill Port Plug: See page 23 of the manual Drawing No. 1.

Remove elbow locking clip (Drawing No. 2) to remove plug. If there is leaking at control valve replace o-ring (Drawing No. 6).

Drain Line ¾": See page 24 of manual Drawing No. 4.

Remove elbow locking clip (Drawing No. 1). If there is leaking at control valve replace o-ring (Drawing No. 5).

Drain Line 1": See page 25 of manual.

Remove elbow locking clip (Drawing No. 1). If there is leaking at control valve replace o-ring (Drawing No. 5).

Meter Plug: See page 26 of manual.

Using a medium size pliers or the WS1 wrench remove (Drawing No. 1) quick connect nut. pull the meter plug out by hand. If there is leaking at control valve replace o-ring (Drawing No. 2).

Bypass Valve: See page 28 of manual.

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 medium sized pliers or the WS1 wrench can be used to unscrew the nut or cap. 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; or
2. Arrows point toward each other in the bypass position (see page 4 of the manual).

Since the handles can be pulled off, they could accidentally be reinstalled 180 degrees from 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.

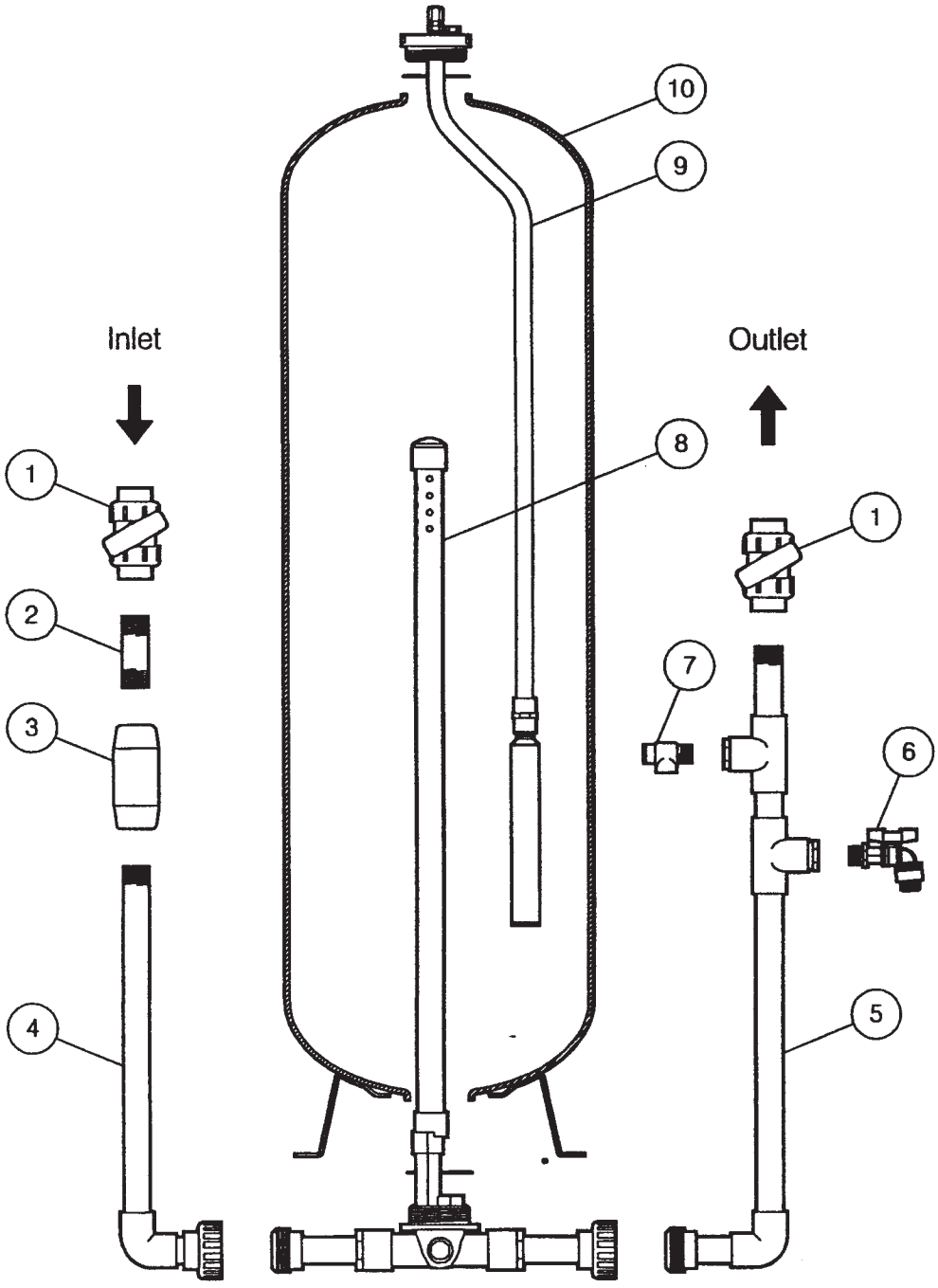
After completing valve maintenance, plug the 12 volt 60 hertz transformer into the 110 volt 60 hertz outlet. This resets the electronics and establishes the control valve back to the service position. If the hour display is flashing on the PC board, press Set Hour using up or down arrows set the hour of day to the closest hour. Press Set Hour again, unit stops flashing, hour of day is set. Valve maintenance is complete.

Troubleshooting Procedures

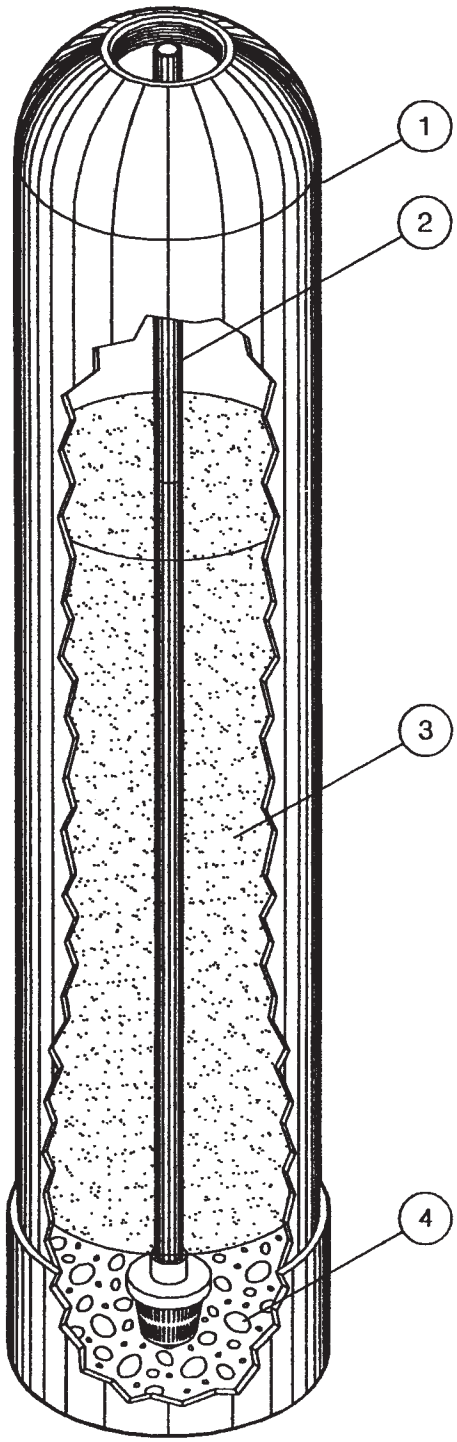
Problem	Possible Cause	Solution
1. Timer does not display time of day	a. Transformer unplugged	a. Connect power
	b. No electric power at outlet	b. Repair outlet or use working outlet
	c. Defective transformer	c. Replace transformer
	d. Defective PC board	d. Replace PC board
2. Timer does not display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

HP-Series Tank Subassemblies and Descriptions

Drawing No.	Order No.	Description	Quantity
1	HPST-1	1" Ball Valve	2
2	HPST-2	1" X 3" Nipple	1
3	HPST-3	U102002 Micronizer	1
4	HPST-4	Glued Inlet Riser Asy.	1
5	HPST-5	Glued Oultlet Riser Asy.	1
6	HPST-6	½" Ball Drain Valve	1
7	HPST-7	½" 75 psi Relief Valve	1
8	HPST-8	HP9 Glued Tank Distributor	1
9	HPST-9	HP9 Air Volume Control	1
10	HPST-10	HP9 Series Tank	1

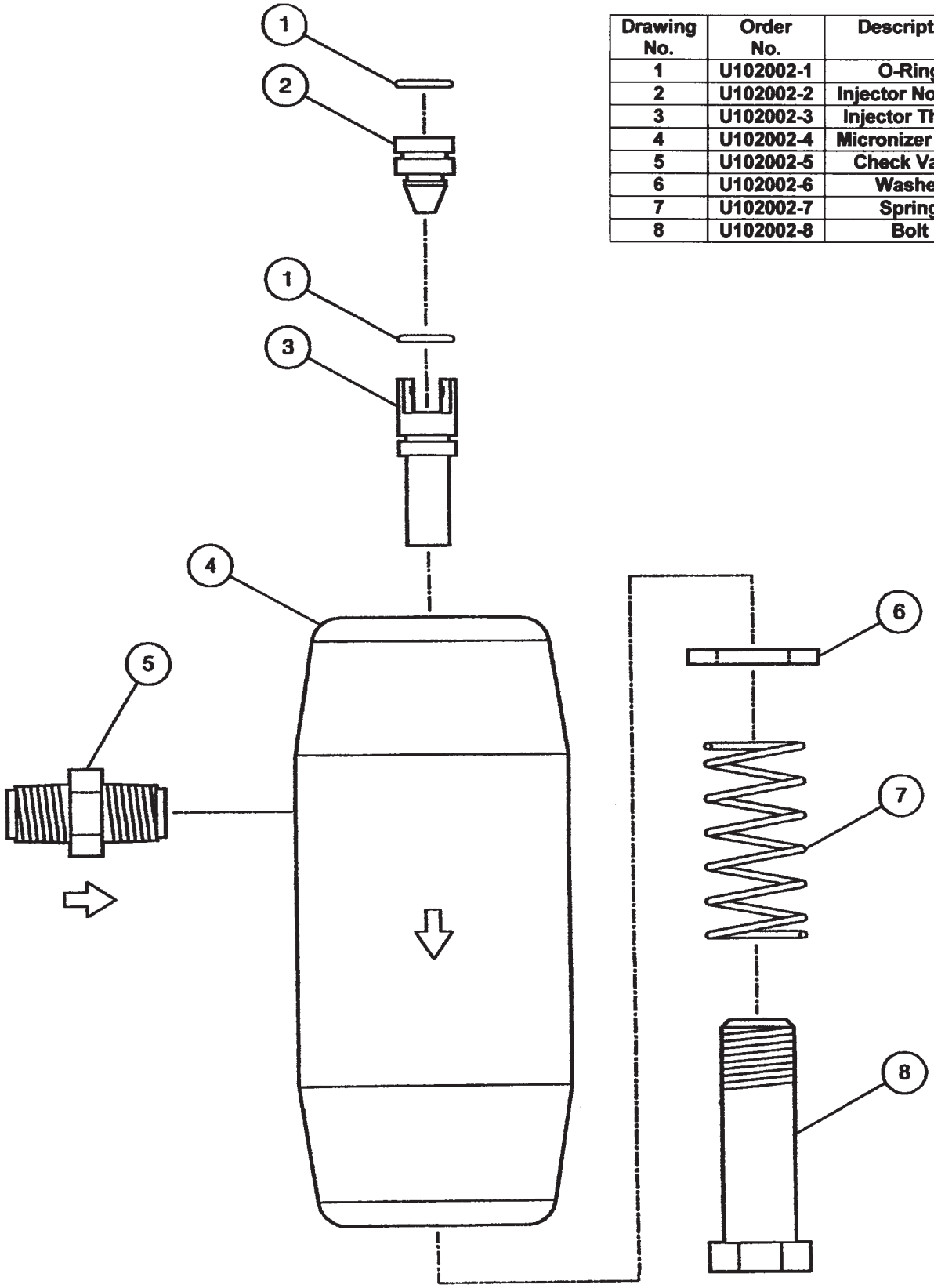


Models HPFE-10-13-14-16 Mineral Tank Descriptions



Drawing No.	Order No.	Description	QTY.
1	HPFE050	Filter Tank HPFE-10	1
1	HPFE060	Filter Tank-HPFE-13	1
1	HPFE070	Filter Tank HPFE-14	1
1	HPFE080	Filter Tank HPFE-16	1
2	HPFE330	Distributor Tube HPFE-10 & 13	1
2	HPFE360	Distributor Tube HPFE-14 & 16	1
3	HPFE140	Filter Material HPFE-10	1
3	HPFE150	Filter Material HPFE-13	1
3	HPFE160	Filter Material HPFE-14	1
3	HPFE170	Filter Material HPFE-16	1
4	HPFE255	Underbedding HPFE-10	1
4	HPFE265	Underbedding HPFE-13	1
4	HPFE275	Underbedding HPFE-14	1
4	HPFE285	Underbedding HPFE-16	1

U102002 Micronizer Description



Drawing No.	Order No.	Description	QTY.
1	U102002-1	O-Ring	2
2	U102002-2	Injector Nozzle I	1
3	U102002-3	Injector Throat	1
4	U102002-4	Micronizer Body	1
5	U102002-5	Check Valve	1
6	U102002-6	Washer	1
7	U102002-7	Spring	1
8	U102002-8	Bolt	1