

Installation Instructions and Owner's Manual

FS, FSM, & FES Series Water Softening System



MODEL NUMBERS:

Time Clock

FSL Series

FS Series

High Efficiency

FSL-HE Series

FS-HE Series

Mechanical Metered

FSLM Series

FSM Series

High Efficiency

FSLM-HE Series

FSM-HE Series

MODEL NUMBERS:

Electronic Metered

FECS Series FES Series

High Efficiency

FECS-HE Series FES-HE Series

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Pre-installation Instructions

Description of the water softener system

This water softener system includes a brine (salt) tank and a resin (media) tank with a backwashing control valve. Incoming water flows into the control valve and is directed down through the ion exchange softening resin. This resin exchanges the hardness ions for softer ions. The softened water then returns to the control valve where it is directed into the service lines.

Periodically the control valve will go through a regeneration cycle. The frequency of this regeneration process will depend on the size of water softener, incoming water quality and amount of water used. This cycle is factory preset to begin at 2:00 A.M. At this time the control valve will draw the brine solution out of the salt tank and flush both the accumulated hardness and excess salt to the drain. The control valve will then put fresh water back into the salt tank to make brine for the next regeneration cycle.

Water Quality

The water should be tested to determine the concentration, or levels of the items listed below:

Hardness - Hardness in drinking water is defined as those minerals that dissolve in water having a positive electrical charge (cat ions). The primary components of hardness are calcium (Ca^{++}) and magnesium (Mg^{++}) ions. But dissolved iron (Fe^{++}) and manganese (Mn^{++}) also contribute to total "adjusted" hardness. Hardness produces scale, soap scum and white mineral deposits which shorten the life of water using appliances, plumbing and fixtures. Water that has less than 1 grain of hardness is considered to be "soft" water.

pH - A measurement of the acidity of the water. pH is reported on a scale from 0 to 14. Neutral water has a pH of 7.0, lower values indicate acidic water. If your pH is below 6.8 you may consider installing an acid neutralizer before the water softener to elevate the pH.

Iron - A naturally occurring metallic element. Iron levels in excess of 0.3 milligrams/liter (mg/l) combine with oxygen causing orange or red (rust) stains on plumbing fixtures. Iron exists in some water sources in clear water (ferrous) state, red water (ferric) state or bacterial form. Iron levels that exceed 2.0 mg/l require special ion exchange resin for reduction, or if bacterial or ferric (red water) iron is present or iron level exceeds 4.0 mg/l, an iron filter should be installed ahead of this water softener.

Manganese - A naturally occurring metallic element. Manganese levels as low as 0.05 milligrams/liter (mg/l) can combine with oxygen to cause dark brown or black staining on fixtures. Additionally, manganese can cause an odor in the water similar to a "rotten egg" smell. This water softener may reduce manganese as well as iron; however, an iron filter may be required in some cases.

Tannin - A naturally occurring humic acid. Tannin is caused by water passing through decaying vegetation. Coffee and Tea are prime examples of tannin in water. Tannin levels as low as 0.5 milligrams per liter can cause a yellow discoloration in water. Consult your dealer for a system designed to remove both tannin and hardness.

Hydrogen Sulfide - A naturally occurring gas. Hydrogen sulfide, more commonly referred to as sulfur gas, causes a distinct odor similar to "rotten eggs." Due to its gaseous nature, hydrogen sulfide must be tested at the well site within 1 minute of drawing the sample. If sulfur is present additional equipment will be required. The OXY3 iron filter can typically treat up to 2 milligrams per liter of sulfur gas.

Pre-installation Instructions (cont.)

Location Considerations

The proper location to install the water softener system will ensure optimum performance and satisfactory water quality. The following factors should be considered in selecting the location of the equipment.

1. The water softener should be installed after the pressure tank on a private well system or after the water meter on municipal water. Operating pressure of the softener must be limited to within 30 – 100 psi range.
2. The water softener should be installed as close as possible (preferably within 15') to an adequate floor or laundry drain capable of handling the backwash cycle volume and flow rate (refer to unit specifications).
3. All water conditioning equipment should be installed prior to the water heater. Water temperatures exceeding 100°F can damage the internal components of the control valve and filter tank. Install with at least 10' of pipe before the water heater to prevent thermal damage to the equipment. An expansion tank may need to be installed in the line to the water heater in order to allow for thermal expansion and comply with local plumbing codes.
4. The water softener should not be subject to freezing temperatures.
5. Ensure that any cartridge or in-line type filter installed prior to the water softener does not restrict the water flow and pressure available for backwash and interfere with normal operation.
6. Appliances requiring extended periods of continuous or high flow water use (i.e. geothermal heat pumps, swimming pools, lawn irrigation, outside hose bibs, etc.) should bypass the water softener. (see installation diagram Fig. 1).

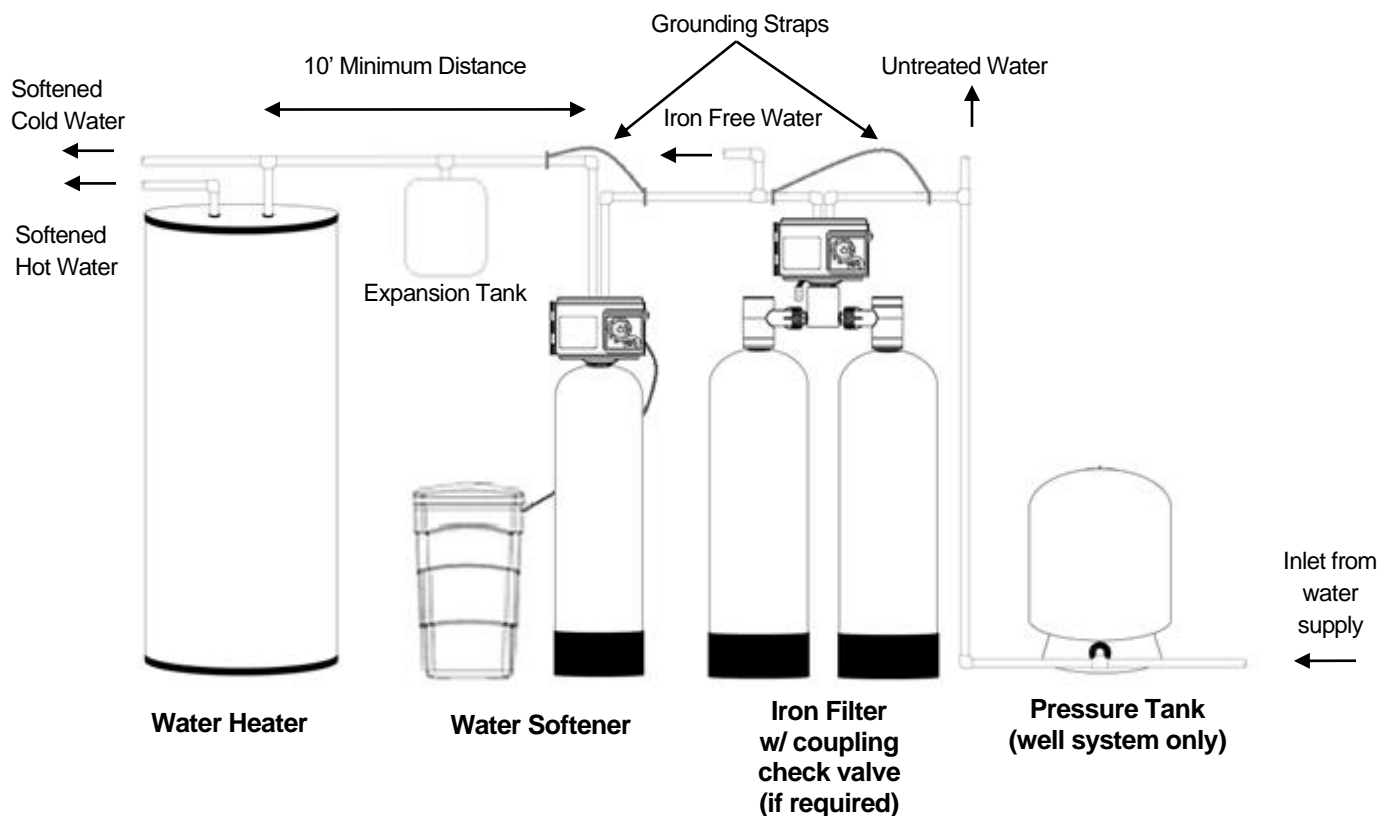


FIGURE 1: Typical Installation

Installation Instructions

STEP 1: Carefully remove all components from packaging. **DO NOT DISCARD PACKAGING** until all water softener components and fittings have been located.

STEP 2: Use clips and screws provided and attach bypass valve to the inlet/outlet of the control valve. See figure 2 below.

IMPORTANT: Mechanical metered (FSM) units require the installer to insert the meter cable into the top of the meter module.

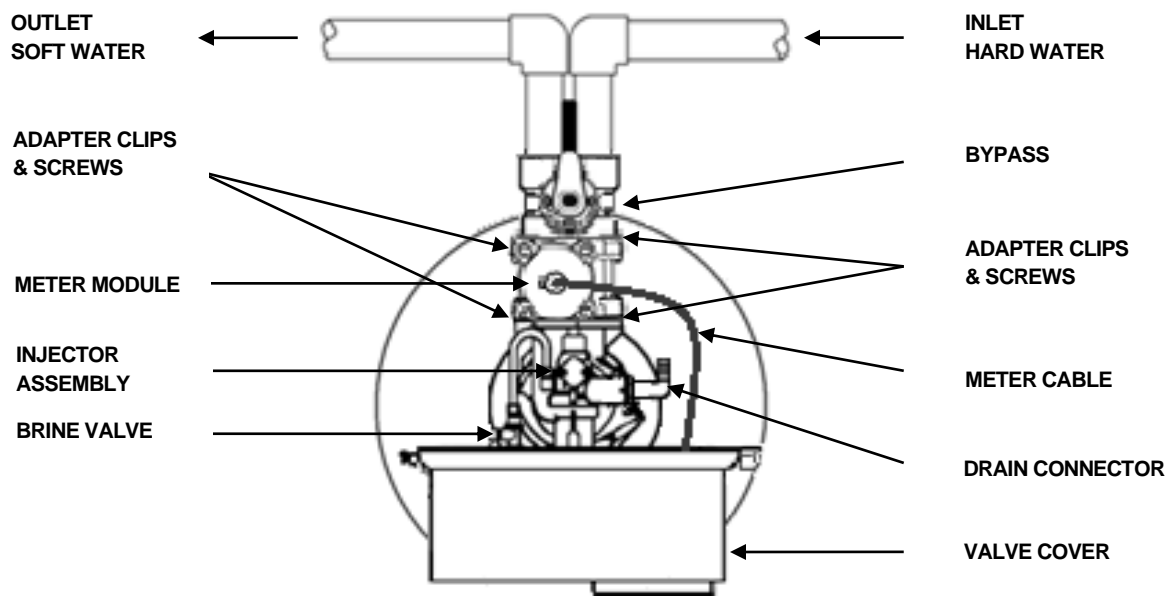


FIGURE 2: Top View of FSM Series Mechanical Metered Control Valve with Bypass

STEP 3: Place unit at desired installation position. **DO NOT plug into electrical outlet at this time (see STEP 10 on page 6). DO NOT put salt into brine tank at this time (see STEP 16 on page 6).**

STEP 4: Shut off water at main supply. Relieve pressure by opening nearest faucet. On private well systems, turn off power to pump and drain pressure tank. **SHUT OFF POWER OR FUEL SUPPLY TO WATER HEATER.**

STEP 5: Cut main supply line as required to fit plumbing to inlet and outlet of bypass valve. **DO NOT PLUMB INLET AND OUTLET BACKWARDS.** Piping should be supported. Do not apply heat to any fitting attached to the bypass or control valve.

STEP 6: Use polyethylene drain line tubing provided (**NO VINYL TUBING**) to run drain line from control valve discharge fitting to floor drain or sump pit capable of handling the backwash rate of the softener (refer to specifications and flow rate on page 15). **DISCHARGE END OF THE DRAIN LINE MUST BE FIRMLY SECURED!** There must be an air gap at the end of the drain line to prevent siphoning of waste water and meet plumbing code. Total length of drain line should be 15' or less. **AVOID OVERHEAD DRAINS.**

Installation Instructions (cont.)

- STEP 7:** Connect one end of the provided 3/8" brine line to the control valve quick connect fitting. Insert the other end of the brine line through the hole in the brine tank and into the quick connect fitting on the safety brine valve. Remove the quick connect collet retainer clip (if included) before inserting the brine line into each fitting, press the tube in very firmly and replace the retainer clip behind the collet. **NOTE: THE BRINE TUBING SHOULD BE INSERTED 5/8" INTO THE FITTING. DO NOT PUT SALT INTO THE BRINE TANK AT THIS TIME.**

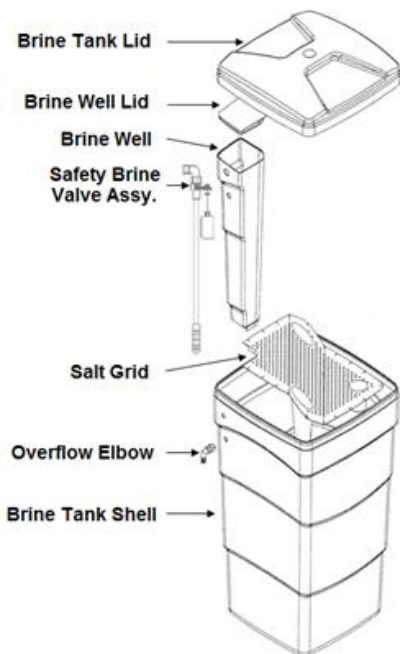


FIGURE 3: Brine Tank Components

- STEP 8:** Install overflow tubing from overflow elbow on brine tank to floor drain. Tubing must be lower than overflow elbow at all times. **DO NOT CONNECT DRAIN LINE FROM SOFTENER CONTROL VALVE TO BRINE TANK OVERFLOW. DO NOT CONECT BRINE TANK DRAIN LINE TO THE SOFTENER DRAIN LINE.**
- STEP 9:** Place bypass valve in the "Bypass" position (refer to Figures 4 below). Open main supply valve or turn on power to pump on private well systems.

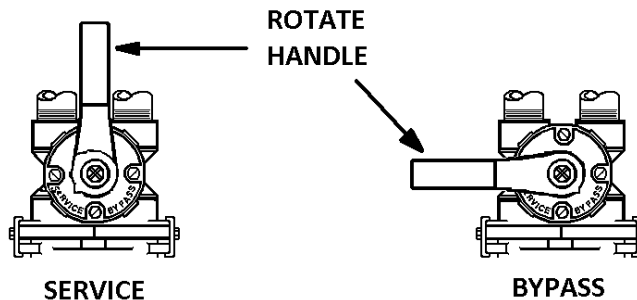


FIGURE 4: Stainless Steel Bypass Valve Operation

Installation Instructions (cont.)

- STEP 10:** **For all models except FES Series**, plug the softener into an unswitched electrical outlet and slowly rotate the Manual Regeneration Knob (see Fig. 5, page 7 or Fig. 6, page 10) clockwise until two clicks are heard. This is the “BACKWASH” position.
- For the FES Series**, plug the transformer into an un-switched electrical outlet and attach the power cord into the control valve. Then press and hold down the center “ADVANCE” button until “GO TO BW” appears on the screen (see Fig. 8, page 12). Wait until the valve reaches the backwash position before going to STEP 11 (a countdown timer will appear on the display).
- STEP 11:** Unplug the softener from the electrical outlet to keep it in the backwash position.
- Refer to Figure 4 (page 5) for appropriate bypass valve operation. Rotate bypass lever of stainless steel bypass $\frac{1}{4}$ of the way to “Service” allowing unit to fill slowly. You should hear water trickling into the mineral tank. Filling the mineral tank in this position will force any trapped air to the drain. **When all air has been purged from the system and only water is running to the drain, slowly open the bypass valve fully to the service position.**
- STEP 12:** Add enough water to the brine tank to a level approximately 1” above the top level of the salt grid.
- STEP 13:** Plug the softener back into the electrical outlet.
- For all models except FES Series**, slowly rotate the Manual Regeneration Knob clockwise until two clicks are heard. This is the “BRINE DRAW” position. Verify that the water level in the brine tank is dropping. Allow water level to drop below the top level of the salt grid before continuing. If the water level does not drop, refer to page 25 for Troubleshooting. Otherwise, advance the control valve to the “FAST RINSE” position by continuing to rotate the knob clockwise until seven more clicks are heard. Allow the softener to complete the remainder of the regeneration cycles automatically which includes “BRINE REFILL” to put water into the brine tank.
- For the FES Series**, press the center “ADVANCE” button briefly and the control valve will go to the “BRINE DRAW” position (“GO TO DR” will display). Once the cycle countdown begins, verify that the water level in the brine tank is dropping. Allow water level to drop below the salt grid before continuing. If the water level does not drop, refer to page 26 of Troubleshooting. Otherwise, advance the control valve to the “BRINE REFILL” cycle by continuing to press the “ADVANCE” button briefly each time a cycle countdown begins until the “GO TO BR” is displayed. Allow the softener to complete the “BRINE REFILL” cycle automatically to put water into the brine tank.
- STEP 14:** Check for leaks and correct as necessary.
- STEP 15:** Turn on power or fuel supply back on to water heater.
- STEP 16:** Set the current time of day on the timer (note AM and PM) (refer to Fig. 5, Fig. 6 or Fig. 8, depending on the model number).
- STEP 17:** Set the regeneration frequency (refer to Fig. 5, Fig. 6, or Fig. 8 depending on the model number).
- STEP 18:** Fill the brine tank with salt.

FS Series Time Clock Setting Instructions

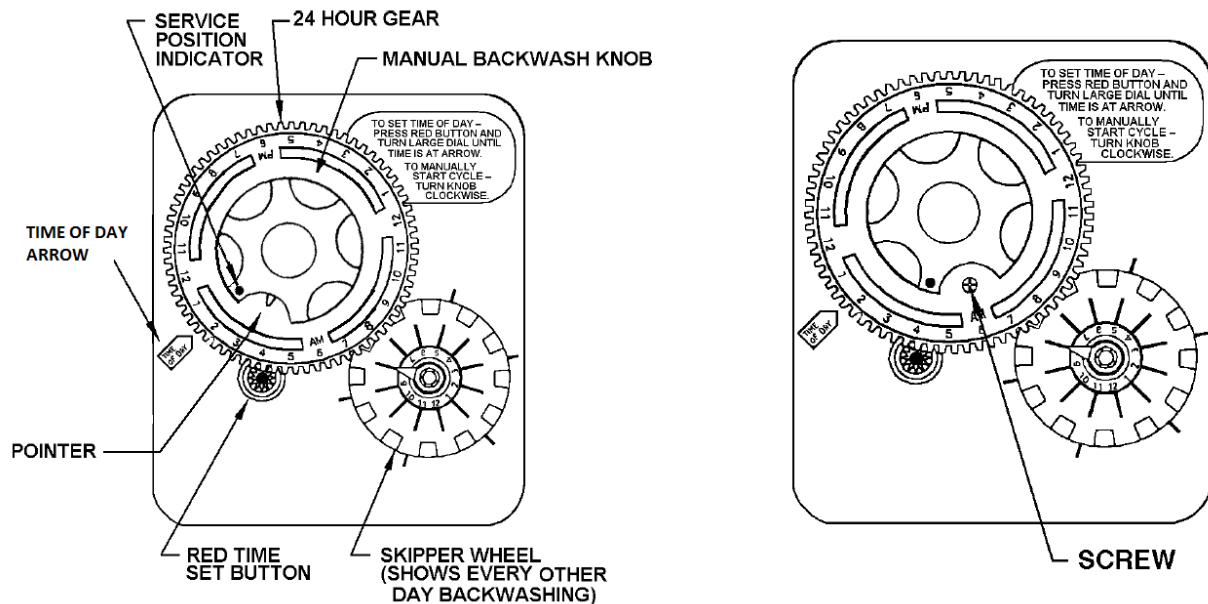


FIGURE 5: Front of Time Clock Timer Assembly

How to set Time of Day:

1. Press and hold the red button to disengage the 24 hour gear.
2. Turn the large 24 hour gear until the actual time of day is at the time of day arrow.
3. Release the red button to again engage the 24 hour gear.

How to set the Days of Regeneration:

Calculate the Adjusted Hardness by multiplying the iron concentration (ppm) by 3, the manganese concentration (ppm) by 5 and adding to the water hardness test results (grains).

Example: Hardness = 25 gpg (grains per gallon)
 Iron = 1.0 ppm (parts per million)
 Manganese = 0.2 ppm (parts per million)

$$\text{Adjusted Hardness} = 29 \text{ gpg} \quad [25 + (3 \times 1.0) + (5 \times 0.2)]$$

$$25 + 3 + 1 = 29$$

1. Refer to the appropriate table for your water softener model number (pages 8 and 9) to determine how many TIMES in a 12 day cycle the softener should regenerate. If the adjusted hardness falls between two numbers on the chart always use the higher number (never round down).

Example: Water Softener Model FS30
 3 people in family
 Adjusted hardness 29 gpg

Result: Set softener to regenerate 4 TIMES in 12-day cycle (once every 3 days)

2. Rotate the skipper wheel until the number 1 is at the red pointer. Each number represents a day. The number by the red pointer is tonight.
3. Slide the metal tabs outward on the desired days of regeneration.

How to Manually Initiate a Regeneration Cycle:

1. Grab the manual regeneration knob and turn clockwise SLIGHTLY. The drive gear will engage the backwash knob which will make a complete revolution and return to the "Service" position after the regeneration cycle.

FS Series Time Clock Setting Instructions (cont.)

People	Adjusted Hardness -- Grains per Gallon							
	5	10	15	20	25	30	35	40
1	1	1	1	1	2	2	2	2
2	1	1	2	2	3	3	4	4
3	1	2	3	3	4	6	6	6
4	1	2	3	4	6	6		
5	2	3	4	6				
6	2	3	6	6				
7	2	4	6					

TABLE 1: Model Number FS24, FSL24

People	Adjusted Hardness -- Grains per Gallon									
	5	10	15	20	25	30	35	40	45	50
1	1	1	1	1	1	2	2	2	2	2
2	1	1	2	2	2	3	3	3	4	4
3	1	2	2	3	3	4	4	6	6	6
4	1	2	3	3	4	6	6	6		
5	1	2	3	4	6	6				
6	2	3	4	6	6					
7	2	3	4	6						
8	2	3	6	6						
9	2	4	6							
10	2	4	6							

TABLE 2: Model Number FS30, FSL30, FSI34

People	Adjusted Hardness -- Grains per Gallon									
	5	10	15	20	25	30	35	40	45	50
1	1	1	1	1	1	1	1	1	2	2
2	1	1	1	1	2	2	2	2	3	3
3	1	1	2	2	2	3	3	3	4	4
4	1	1	2	2	3	3	4	4	6	6
5	1	2	2	3	4	4	6	6	6	
6	1	2	3	3	4	6	6	6		
7	1	2	3	4	6	6				
8	1	2	3	4	6	6				
9	2	3	4	6	6					
10	2	3	4	6						

TABLE 3: Model Number FS45, FSI48

FS Series Time Clock Setting Instructions (cont.)

People	Adjusted Hardness -- Grains per Gallon											
	5	10	15	20	25	30	35	40	45	50	55	60
1	1	1	1	1	1	1	1	1	1	1	2	2
2	1	1	1	1	1	2	2	2	2	2	3	3
3	1	1	1	2	2	2	2	3	3	3	4	4
4	1	1	2	2	2	3	3	3	4	4	6	6
5	1	1	2	2	3	3	4	4	6	6	6	6
6	1	2	2	3	3	4	4	6	6	6		
7	1	2	2	3	4	4	6	6	6			
8	1	2	3	3	4	6	6	6				
9	1	2	3	4	6	6	6					
10	1	2	3	4	6	6						

TABLE 4: Model Number FS60, FSI68

People	Adjusted Hardness -- Grains per Gallon													
	5	10	15	20	25	30	35	40	45	50	55	60	65	70
1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
2	1	1	1	1	1	1	2	2	2	2	2	2	2	3
3	1	1	1	1	2	2	2	2	3	3	3	3	3	4
4	1	1	1	2	2	2	3	3	3	3	4	4	4	6
5	1	1	2	2	2	3	3	3	4	4	6	6	6	6
6	1	1	2	2	3	3	4	4	6	6	6	6	6	
7	1	2	2	3	3	4	4	6	6	6	6			
8	1	2	2	3	3	4	6	6	6	6				
9	1	2	3	3	4	6	6	6						
10	1	2	3	3	4	6	6	6						

TABLE 5: Model Number FS75

FSM Series Meter Setting Instructions

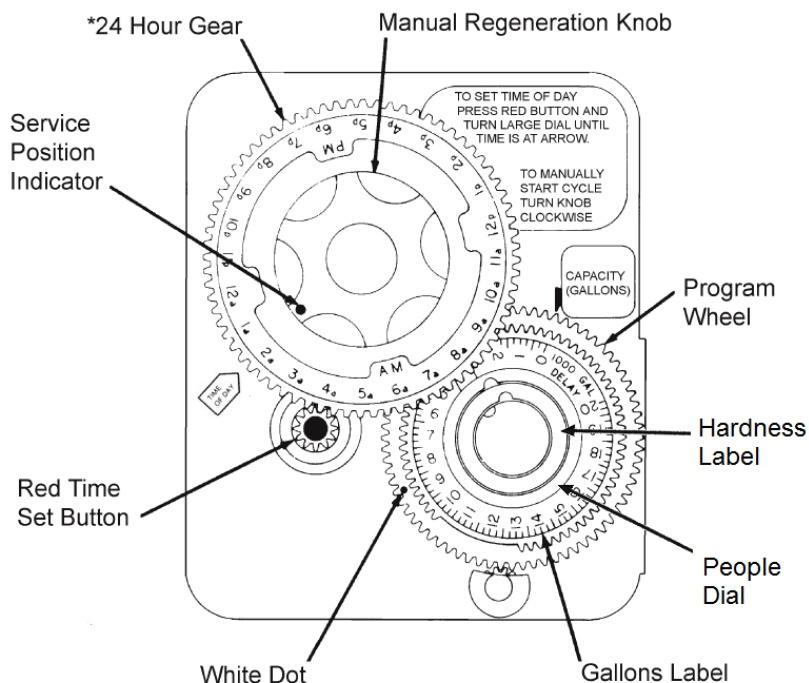


FIGURE 6: Front of Meter Timer Assembly

How to set Time of Day:

1. Press and hold the red button to disengage the 24 hour gear.
2. Turn the large 24 hour gear until the actual time of day is at the time of day arrow.
3. Release the red button to again engage the 24 hour gear.

How to set the Frequency of Regeneration:

1. Calculate the Adjusted Hardness by multiplying the iron concentration (ppm) by 3 and adding to the water hardness test results.

Example: Hardness = 25 gpg (grains per gallon)
 Iron = 1.0 ppm (part per million)
 Manganese = 0.2 ppm (parts per million)

$$\text{Adjusted Hardness} = 29 \text{ gpg} \quad [25 + (3 \times 1.0) + (5 \times 0.2)]$$

$$25 + 3 + 1 = 29$$

2. Lift the "People Dial" on the gallon setting wheel.
3. Rotate the "People Dial" until the number of people in the household is aligned with the adjusted water hardness.
4. Release the "People Dial" and ensure that it reengages the gallon wheel.

How to Manually Initiate a Regeneration Cycle:

1. Grab the manual regeneration knob and turn clockwise SLIGHTLY.
 The drive gear will engage the backwash knob which will make a complete revolution and return to the "Service" position after the regeneration cycle.

FS & FSM Series Adjustable Regeneration Time Instructions

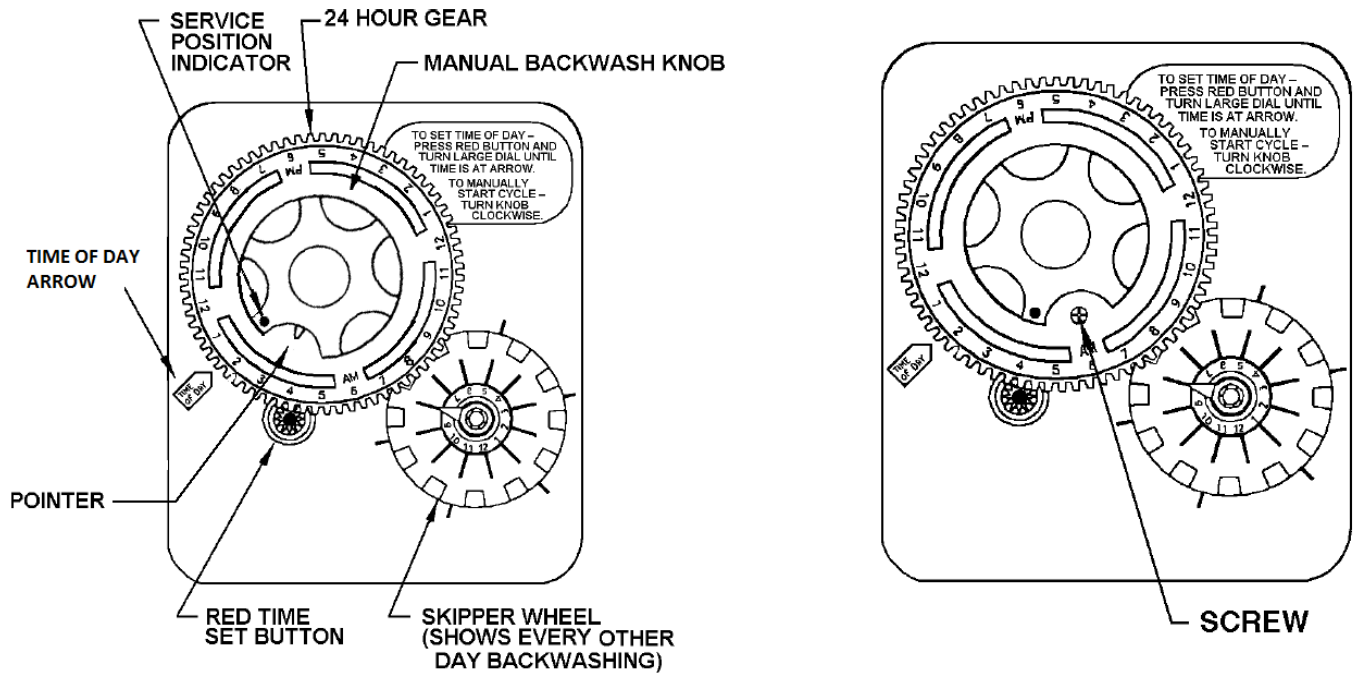


FIGURE 7: Front of Timer Assembly (Time Clock Assembly Shown)

How to Adjust Regeneration Time:

1. Disconnect the power source.
2. Locate the three screws behind the manual regeneration knob by pushing the red button in and rotating the 24 hour dial until each screw appears in the cut out portion of the manual regeneration knob.
3. Loosen each screw slightly to release the pressure on the time plate from the 24 hour gear.
4. Locate the regeneration time pointer on the inside of the 24 hour dial in the cut out.
5. Turn the time plate so the desired regeneration time aligns next to the raised arrow.
6. Push the red button in and rotate the 24 hour dial. Tighten each of the three screws.
7. Push the red button and locate the pointer one more time to ensure the desired regeneration time is correct.
8. Reset the time of day and restore power to the unit.

FECS & FES Series Programming

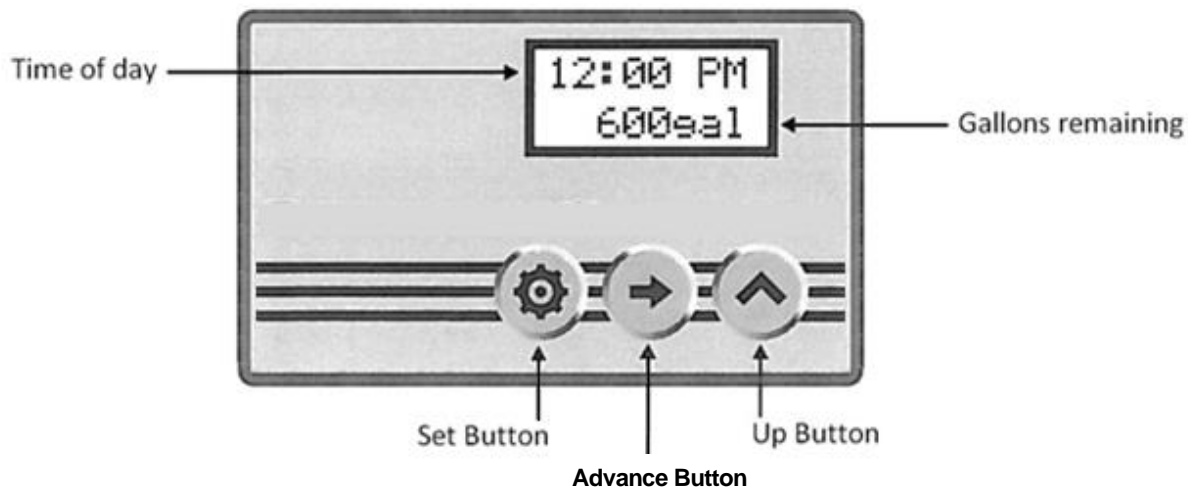


FIGURE 8: Front of Electronic Meter Timer Assembly



SET BUTTON

1. Press and hold "Set Button" for 5 seconds to enter Programming Mode.
2. When valve is in Programming Mode, press "Set Button" to confirm setting and advance to next menu option.



ADVANCE BUTTON

1. Press and hold "Advance Button" for 5 seconds to initiate an immediate regeneration cycle.
2. Press and release "Advance Button" during a regeneration cycle to immediately advance the valve to the next step in the regeneration process.
3. When the valve is in Programming Mode, press the "Advance Button" to move the cursor.



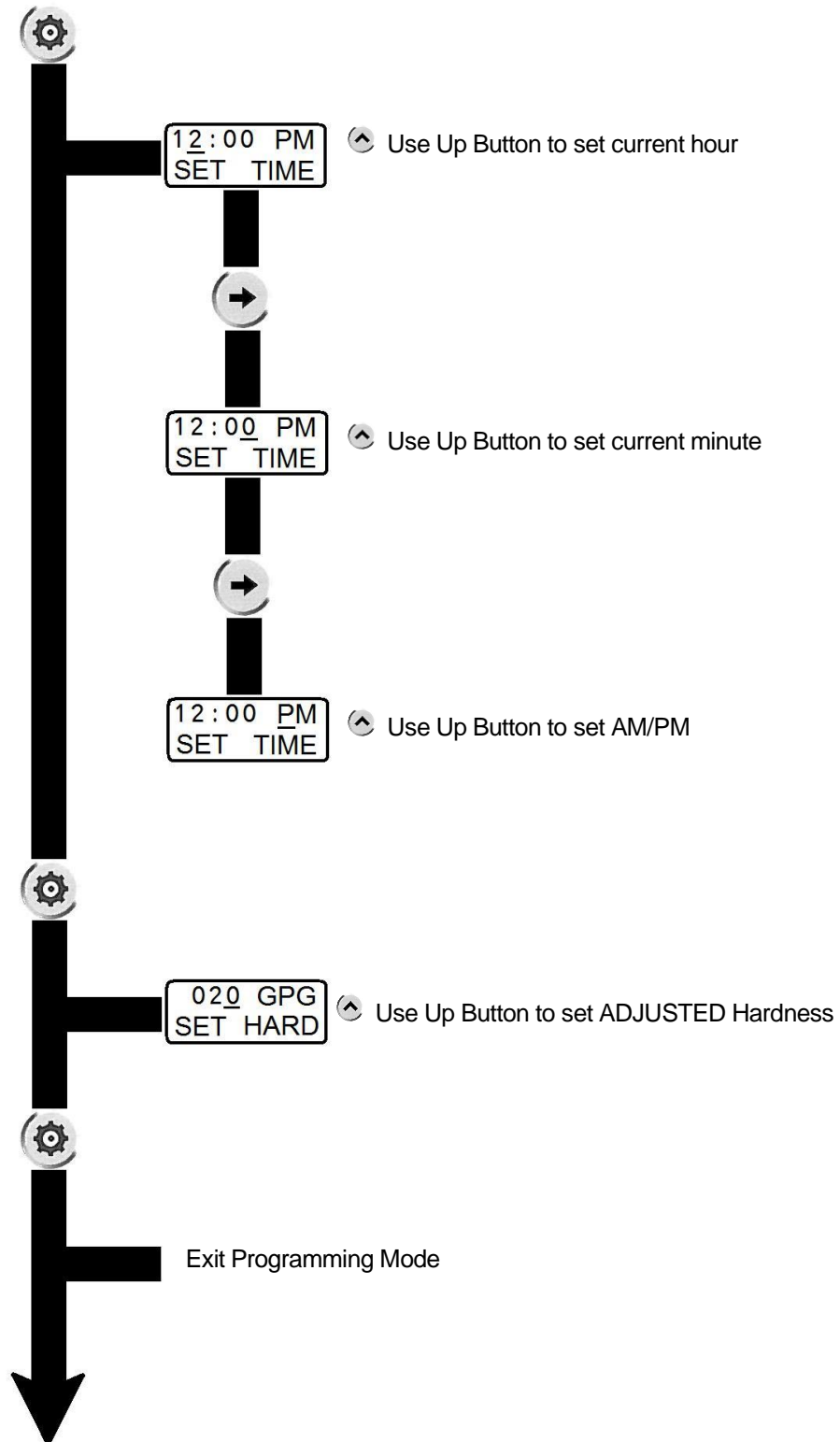
UP BUTTON

1. When the valve is in the Programming Mode, press "Up Button" to adjust setting.

FECS & FES Series Programming

Enter Programming Mode:

Press and Hold the SET Button for 5 seconds.



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Specifications

DESCRIPTION	UNIT MODEL NUMBER						
	FSL24 FSLM24	FSL30 FSLM30	FS24 FSM24	FS30 FSM30	FS45 FSM45	FS60 FSM60	FS75 FSM75
MEDIA VOLUME, ft³	0.75	1.0	0.75	1.0	1.5	2.0	2.5
CAPACITY, grains							
@Factory Salt - 9lb/ft³	18,000	24,000	18,000	24,000	36,000	48,000	60,000
@Max. Salt - 15lb/ft³	22,500	30,000	22,500	30,000	45,000	60,000	75,000
SERVICE FLOW RATES, gpm							
Continuous (3 gpm/ ft³)	2	3	2	3	5	6	8
Service (8 gpm/ ft³)	6	8	6	8	12	13	14
Peak*	16	16	13	14	14	16	16
BACKWASH & RAPID RINSE, gpm	2.4	3.0	1.5	2.4	3.0	4.0	4.0
INJECTOR	#1 - white	#1 - white	#1 - white	#1 - white	#1 - white	#2 - blue	#2 - blue
SERVICE PIPE LINES, inches	¾"	¾"	¾"	¾"	¾"	¾"	¾"
For 1" add "-1S" suffix to model #							
TOTAL WATER USED, gallons	43	48	36	43	56	93	95
DIMENSIONS in.							
Mineral Tank (diameter x height)	10 x 35	10 x 35	8 x 44	9 x 48	10 x 54	12 x 48	13 x 54
Brine Tank (diameter x height)	12 x 34	12 x 34	14 x 34	14 x 34	14 x 34	18 x 33	18 x 33
Overall (depth x width x height)	12 x 23 x 44	12 x 23 x 44	14 x 23 x 53	14 x 24 x 57	14 x 25 x 63	18 x 27 x 57	18 x 32 x 63
APPROX. SHIP WEIGHT lbs.	86	104	86	107	140	165	216

DESCRIPTION	UNIT MODEL NUMBER						
	FSL24-HE FSLM24-HE	FSL30-HE FSLM30-HE	FS24-HE FSM24-HE	FS30-HE FSM30-HE	FS45-HE FSM45-HE	FS60-HE FSM60-HE	FS75-HE FSM75-HE
MEDIA VOLUME, ft³	0.75	1.0	0.75	1.0	1.5	2.0	2.5
CAPACITY, grains							
@Factory Salt - 6lb/ft³	20,250	27,000	20,250	27,000	40,500	54,000	67,500
@Max. Salt - 15lb/ft³	27,000	36,000	27,000	36,000	54,000	72,000	90,000
SERVICE FLOW RATES, gpm							
Continuous (3 gpm/ ft³)	2	3	2	3	5	6	8
Service (8 gpm/ ft³)	6	8	6	8	12	15	15
Peak*	18	18	16	17	17	18	18
BACKWASH & RAPID RINSE, gpm	2.4	3	1.5	2.4	3.0	4.0	4.0
INJECTOR	#1 - white	#1 - white	#1 - white	#1 - white	#1 - white	#2 - blue	#2 - blue
SERVICE PIPE SIZE, inches	¾"	¾"	¾"	¾"	¾"	¾"	¾"
For 1" add "-1S" suffix to model #							
TOTAL WATER USED, gallons	42	47	35	42	55	91	92
DIMENSIONS in.							
Mineral Tank (diameter x height)	10 x 35	10 x 35	8 x 44	9 x 48	10 x 54	12 x 48	13 x 54
Brine Tank (diameter x height)	12 x 34	12 x 34	14 x 34	14 x 34	14 x 34	18 x 33	18 x 33
Overall (depth x width x height)	12 x 23 x 44	12 x 23 x 44	14 x 23 x 53	14 x 24 x 57	14 x 25 x 63	18 x 27 x 57	18 x 32 x 63
APPROX. SHIP WEIGHT lbs.	86	104	86	107	140	165	216

GENERAL REQUIREMENTS:

Water Temperature	33°F - 100°F
Water Pressure	30 - 100 psi
Electrical Requirements	110v/60hz
Electrical Current Draw	0.5 amps

NOTES:

*The control valve can handle flow rates greater than peak flow rates shown above.

Specifications (cont.)

DESCRIPTION	UNIT MODEL NUMBER		
	FSI34 FSIM34	FSI48 FSIM48	FSI68 FSIM68
MEDIA VOLUME, ft³	1	1.5	2
CAPACITY, grains			
@Factory Salt - 9lb/ft ³	24,000	36,000	48,000
@Max. Salt - 15lb/ft ³	30,000	45,000	60,000
SERVICE FLOW RATES, gpm			
Continuous (2 gpm/ ft ³)	2	3	4
Service (5 gpm/ ft ³)	5	8	10
Peak*	14	14	16
BACKWASH & RAPID RINSE, gpm	1.5	2.4	3.5
INJECTOR	#1 - white	#1 - white	#2 - blue
SERVICE PIPE SIZE, inches	¾"	¾"	¾"
For 1" add "-1S" suffix to model #			
TOTAL WATER USED, gallons	36	51	88
DIMENSIONS in.			
Mineral Tank (diameter x height)	9 x 48	10 x 54	12 x 48
Brine Tank (diameter x height)	14 x 34	14 x 34	18 x 33
Overall (depth x width x height)	14 x 24 x 57	14 x 25 x 63	18 x 27 x 57
APPROX. SHIP WEIGHT lbs.	107	140	165

DESCRIPTION	UNIT MODEL NUMBER						
	FECS24	FECS30	FES24	FES30	FES45	FES60	FES75
MEDIA VOLUME, ft³	0.75	1.0	0.75	1.0	1.5	2.0	2.5
CAPACITY, grains							
@Factory Salt - 9lb/ft ³	18,000	24,000	18,000	24,000	36,000	48,000	60,000
@Max. Salt - 15lb/ft ³	22,500	30,000	22,500	30,000	45,000	60,000	75,000
SERVICE FLOW RATES, gpm							
Continuous (3 gpm/ ft ³)	2	3	2	3	5	6	8
Service (8 gpm/ ft ³)	6	8	6	8	12	13	14
Peak*	16	16	13	14	14	16	16
BACKWASH & RAPID RINSE, gpm	2.4	3.0	1.5	2.4	3.0	4.0	4.0
INJECTOR	#1 - white	#1 - white	#1 - white	#1 - white	#1 - white	#2 - blue	#2 - blue
SERVICE PIPE LINES, inches (cm)	¾"	¾"	¾"	¾"	¾"	¾"	¾"
For 1" add "-1S" suffix to model #							
FACTORY REGENERATION SETTINGS							
Default size setting	SMALL	SMALL	SMALL	SMALL	MEDIUM	LARGE	LARGE
Backwash (minutes)	6	6	6	6	6	8	8
Brine draw (minutes)	55	55	55	55	60	60	60
Fast Rinse (minutes)	4	4	4	4	6	6	6
Brine Refill (minutes)	3	3	3	3	4	6	6
TOTAL WATER USED, gallons	43	48	36	43	56	93	95
DIMENSIONS in.							
Mineral Tank (diameter x height)	10 x 35	10 x 35	8 x 44	9 x 48	10 x 54	12 x 48	13 x 54
Brine Tank (diameter x height)	12 x 34	12 x 34	14 x 34	14 x 34	14 x 34	18 x 33	18 x 33
Overall (depth x width x height)	12 x 23 x 44	12 x 23 x 44	14 x 23 x 53	14 x 24 x 57	14 x 25 x 63	18 x 27 x 57	18 x 32 x 63
APPROX. SHIP WEIGHT lbs.	86	104	86	107	140	165	216

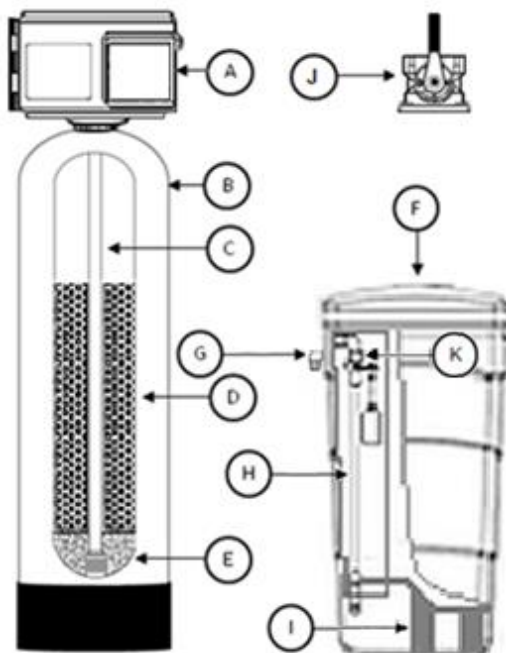
GENERAL REQUIREMENTS:

Water Temperature	33°F - 100°F
Water Pressure	30 - 100 psi
Electrical Requirements	110v/60hz
Electrical Current Draw	0.5 amps

NOTES:

*The control valve can handle flow rates greater than peak flow rates shown above.

Component Parts Breakdown



Ref	Description	Model Number						
		FSL24 ² FSLM24 ² FECS24 ²	FSL30 ² FSLM30 ² FECS30 ²	FS24 ² FSM24 ² FES24 ²	FS30 ² FSM30 ² FES30 ²	FS45 ² FSM45 ² FES45 ²	FS60 ² FSM60 ² FES60 ²	FS75 ² FSM75 ² FES75 ²
A	Timeclock Valve w/ 3/4"SS bypass	FSL24 ² Vlv Assy W/BP	FSL30 ² Vlv Assy W/BP	FS24 ² Vlv Assy W/BP	FS30 ² Vlv Assy W/BP	FS45 ² Vlv Assy W/BP	FS60 ² Vlv Assy W/BP	FS60 ² Vlv Assy W/BP
	Metered Valve w/ 3/4" SS bypass	FSLM24 ² Vlv Assy W/BP	FSLM30 ² Vlv Assy W/BP	FSM24 ² Vlv Assy W/BP	FSM30 ² Vlv Assy W/BP	FSM45 ² Vlv Assy W/BP	FSM60 ² Vlv Assy W/BP	FSM60 ² Vlv Assy W/BP
	Elect. Meter Vlv w/3/4" SS bypass	FECS24 ² Vlv Assy W/BP	FECS30 ² Vlv Assy W/BP	FES24 ² Vlv Assy W/BP	FES30 ² Vlv Assy W/BP	FES45 ² Vlv Assy W/BP	FES60 ² Vlv Assy W/BP	FES60 ² Vlv Assy W/BP
B	Mineral Tank	MTP1035GR	MTP1035GR	MTP0844GR	MTP0948GR	MTP1054GR	MTP1248GR	MTP1354GR
C	Distributor	D100S-48	D100S-48	D100S-48	D100S-48	D100S-54	D100S-48	D100S-54
D	Resin	(1.5) H05P	(2) H05P	(1.5) H05P	(2) H05P	(3) H05P	(4) H05P	(5) H05P
E	1/4" X 1/8" Gravel	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1.5) QC20
F	Brine Tank Assy.	BT1234ASSY-FS	BT1234ASSY-FS	BT1434ASSY-FS	BT1434ASSY-FS	BT1434ASSY-FS	BT1434ASSY-FS	BT1434ASSY-FS
G	Overflow Fitting	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO
H	Safety Brine Valve	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY
I	Salt Platform	BTSG12	BTSG12	BTSG14	BTSG14	BTSG14	BTSG18SQ	BTSG18SQ
J	Bypass ² Stainless Steel	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²

- Notes:
1. Refer to pages 19 - 24 for complete control valve breakdown.
 2. -1S suffix for 1" FPT stainless steel bypass (60041SS)

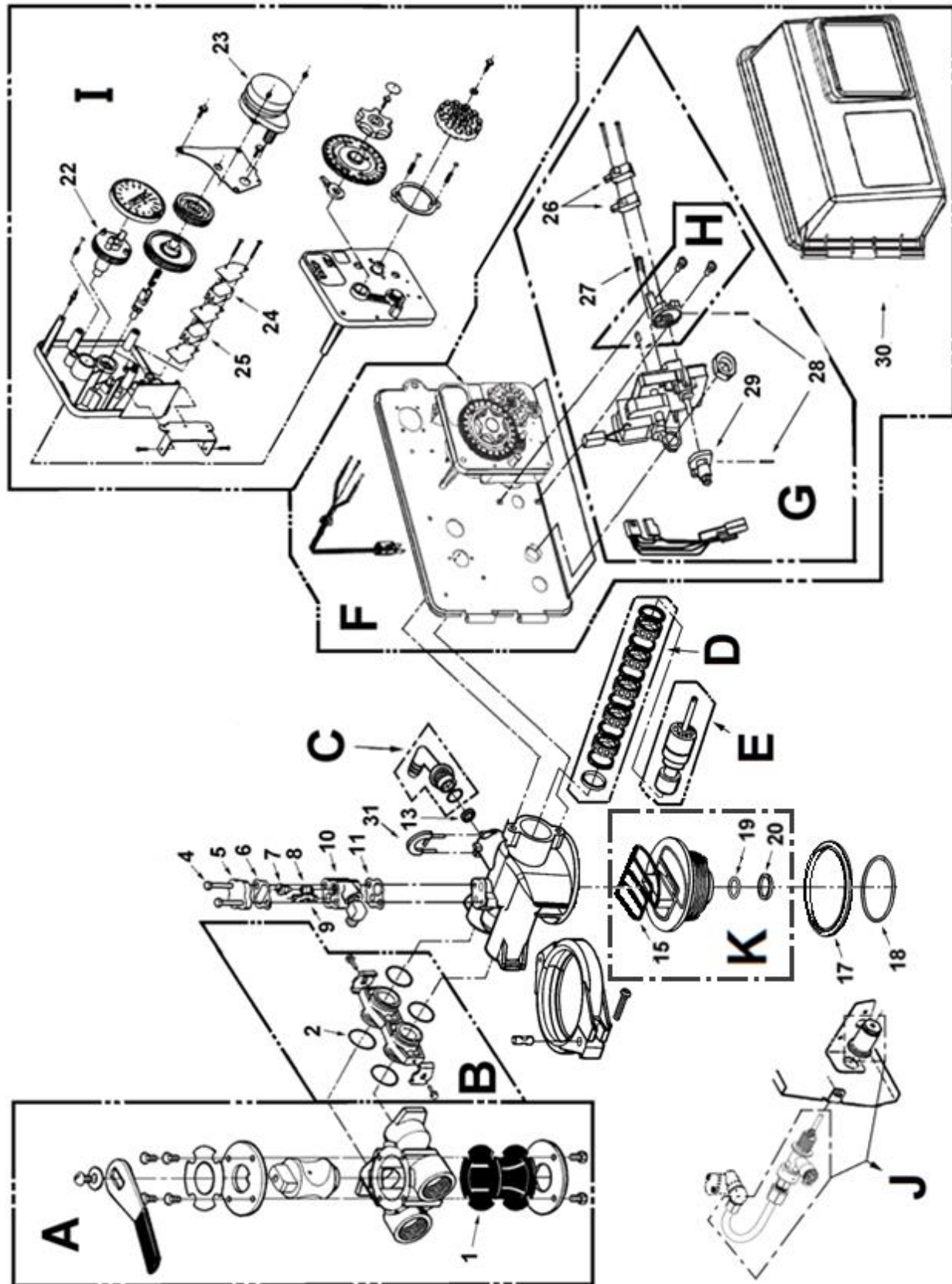
Component Parts Breakdown (cont.)

Ref	Description	Model Number						
		FSL24-HE ² FSLM24-HE ²	FSL30-HE ² FSLM30-HE ²	FS24-HE ² FSM24-HE ²	FS30-HE ² FSM30-HE ²	FS45-HE ² FSM45-HE ²	FS60-HE ² FSM60-HE ²	FS75-HE ² FSM75-HE ²
A	Timeclock Valve w/ 3/4" SS bypass	FSL24-HE ² Vlv Assy W/BP	FSL30-HE ² Vlv Assy W/BP	FS24-HE ² Vlv Assy W/BP	FS30-HE ² Vlv Assy W/BP	FS45-HE ² Vlv Assy W/BP	FS60-HE ² Vlv Assy W/BP	FS60-HE ² Vlv Assy W/BP
	Metered Valve w/ 3/4" SS bypass	FSLM24-HE ² Vlv Assy W/BP	FSLM30-HE ² Vlv Assy W/BP	FSM24-HE ² Vlv Assy W/BP	FSM30-HE ² Vlv Assy W/BP	FSM45-HE ² Vlv Assy W/BP	FSM60-HE ² Vlv Assy W/BP	FSM60-HE ² Vlv Assy W/BP
B	Mineral Tank	MTP1035GR	MTP1035GR	MTP0844GR	MTP0948GR	MTP1054GR	MTP1248GR	MTP1354GR
C	Distributor	D100S-48	D100S-48	D100S-48	D100S-48	D100S-54	D100S-48	D100S-54
D	Resin	(1.5) UHE05P	(2) UHE05P	(1.5) UHE05P	(2) UHE05P	(3) UHE05P	(4) UHE05P	(5) UHE05P
E	1/4" X 1/8" Gravel	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1) QC20	(1.5) QC20
F	Brine Tank Assy.	BT1234ASSY-FS	BT1234ASSY-FS	BT1433ASSY-FS	BT1433ASSY-FS	BT1433ASSY-FS	BTSQ1833ASSY-FS	BTSQ1833ASSY-FS
G	Overflow Fitting	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO
H	Safety Brine Valve	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY	SBV33ASSY
I	Salt Platform	BTSG12	BTSG12	BTSG14	BTSG14	BTSG14	BTSG18SQ	BTSG18SQ
J	Bypass ² (stainless steel)	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²	60040SS ²

Ref	Description	Model Number		
		FSI34 ² FSIM34 ²	FSI48 ² FSIM48 ²	FSI68 ² FSIM68 ²
A	Timeclock Valve w/ 3/4" SS bypass	FSI34 ² Vlv Assy W/BP	FSI48 Vlv Assy W/BP	FSI68 ² Vlv Assy W/BP
	Metered Valve w/ 3/4" SS bypass	FSIM34 ² Vlv Assy W/BP	FSIM48 ² Vlv Assy W/BP	FSIM68 ² Vlv Assy W/BP
B	Mineral Tank	MTP0948GR	MTP1054GR	MTP1248GR
C	Distributor	D100S-48	D100S-54	D100S-48
D	Resin	(2) FH05P	(3) FH05P	(4) FH05P
E	1/4" X 1/8" Gravel	(1) QC20	(1) QC20	(1) QC20
F	Brine Tank Assy.	BT1434ASSY-FS	BT1434ASSY-FS	BTSQ1833ASSY-FS
G	Overflow Fitting	BT-OVERFLO	BT-OVERFLO	BT-OVERFLO
H	Safety Brine Valve	SBV33ASSY	SBV33ASSY	SBV33ASSY
I	Salt Platform	BTSG14	BTSG14	BTSG18SQ
J	Bypass ² (stainless steel)	60040SS ²	60040SS ²	60040SS ²

- Notes:
1. Refer to pages 19 - 24 for complete control valve breakdown.
 2. -1s suffix for 1" FPT stainless steel bypass (60041SS)

FS (Time Clock) Control Valve Breakdown

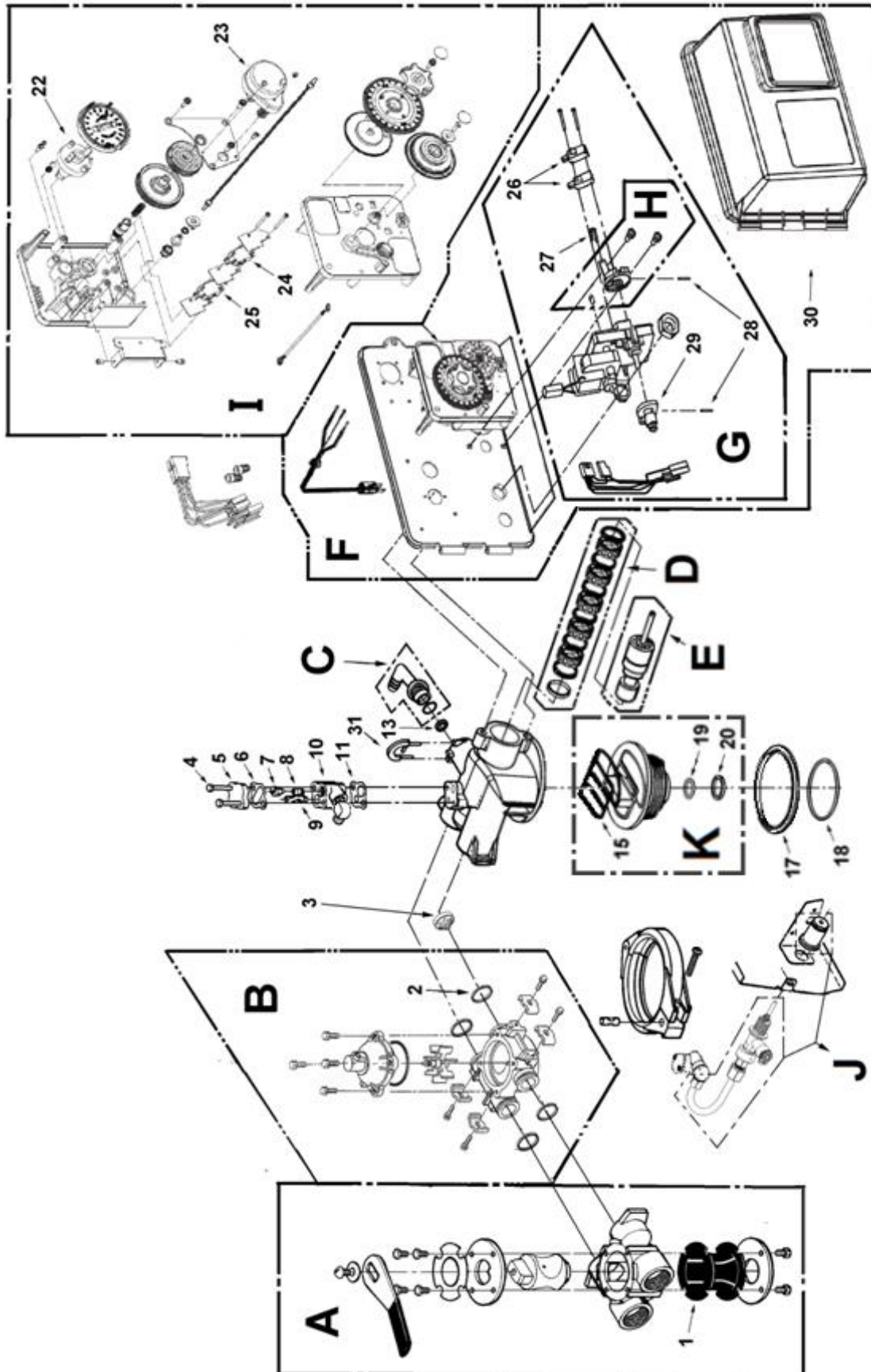


FS (Time Clock) Control Valve Parts List

REF #	Part Number	Description
A	60040SS	Stainless Steel Bypass, ¾" FPT
	60041SS	Stainless Steel Bypass, 1" FPT
B	60900-41	Coupling Kit
Not Shown	60705-00	DLFC Housing, less flow button (Old Style)
C	60705-00A	DLFC Elbow, less flow button
D	60121	Seal and Spacer Kit
E	60090	Piston Assembly
F	FV2510-1PH	Power Head Assembly, 2510 TC with cover
G	60050-21	Drive Motor Assembly
H	60160-10	Drive Cam Assembly, STF
I	60304-13	Timer Assembly, 3200, 12 Day, STF, 120/60
J	60011-050ASSY	Brine Valve, 1650 Short Stem, 0.5 BLFC with J Tube
K	19322	2510 Adapter Base
1	14105	Bypass Valve Seal, Single Lever
2	13305	Coupling O-Ring, -019
4	10692	Injector cover screw 2510 valve
5	11893	Injector Cover
6	14805	Injector Body Gasket
7	10913-1	Injector Nozzle, #1, White (FS24, FS30, FS45, FSI34, FSI48, FSL24, FSL30)
	10913-2	Injector Nozzle, #2, Blue (FS60, FS75, FSI64)
8	10914-1	Injector Throat, #1, White (FS24, FS30, FS45, FSI34, FSI48, FSL24, FSL30)
	10914-2	Injector Throat, #2, Blue (FS60, FS75, FSI64)
9	10227	Injector Screen
10	17776/10328	Injector Body Plastic w/ o-ring & brass elbow
Not Shown	21257253	O-ring for PN: 17776/10328
11	14805	Injector Body Gasket

REF #	Part Number	Description
13	12086	1.5 GPM DLFC (FS24, FSI34)
	12088	2.4 GPM DLFC (FSL24, FS30, FSI48)
	12089	3.0 GPM DLFC (FSL30, FS45)
	12090	3.5 GPM DLFC (FSI68)
	12091	4.0 GPM DLFC (FS60, FS75)
Not Shown	12338	Drain Fitting, Hose Barb, 90 Deg Elbow, 1/2" x 1/2" (Old Style)
15	19936	Base Seal (2510)
17	19197	Slip Ring
18	18303	Tank O-Ring, 2510 Valve
19	13304	Distributor O-Ring, -121
20	13030	Distributor Retainer
Not Shown	40027	J tube for 2510 valve (Old Style)
22	13911	Main Drive Gear
23	18743-1	Timer Motor, 120v/60Hz, 2510/5600 Valve
24	15320	Micro Switch, Homing
25	10896	Micro Switch, Step
26	10218	Micro Switch, Drive Motor
27	10909	Connecting Link Pin
28	10338	Roll Pin
29	12777	Brine Cam, STF
30	60219-02	Valve Cover, Environmental, Black with Window (Old Style)
	SCA-925	Valve Cover, Environmental, Black with Window, (New Style)
31	18312	Retainer, Drain

FSM (Mechanical Metered) Control Valve Breakdown

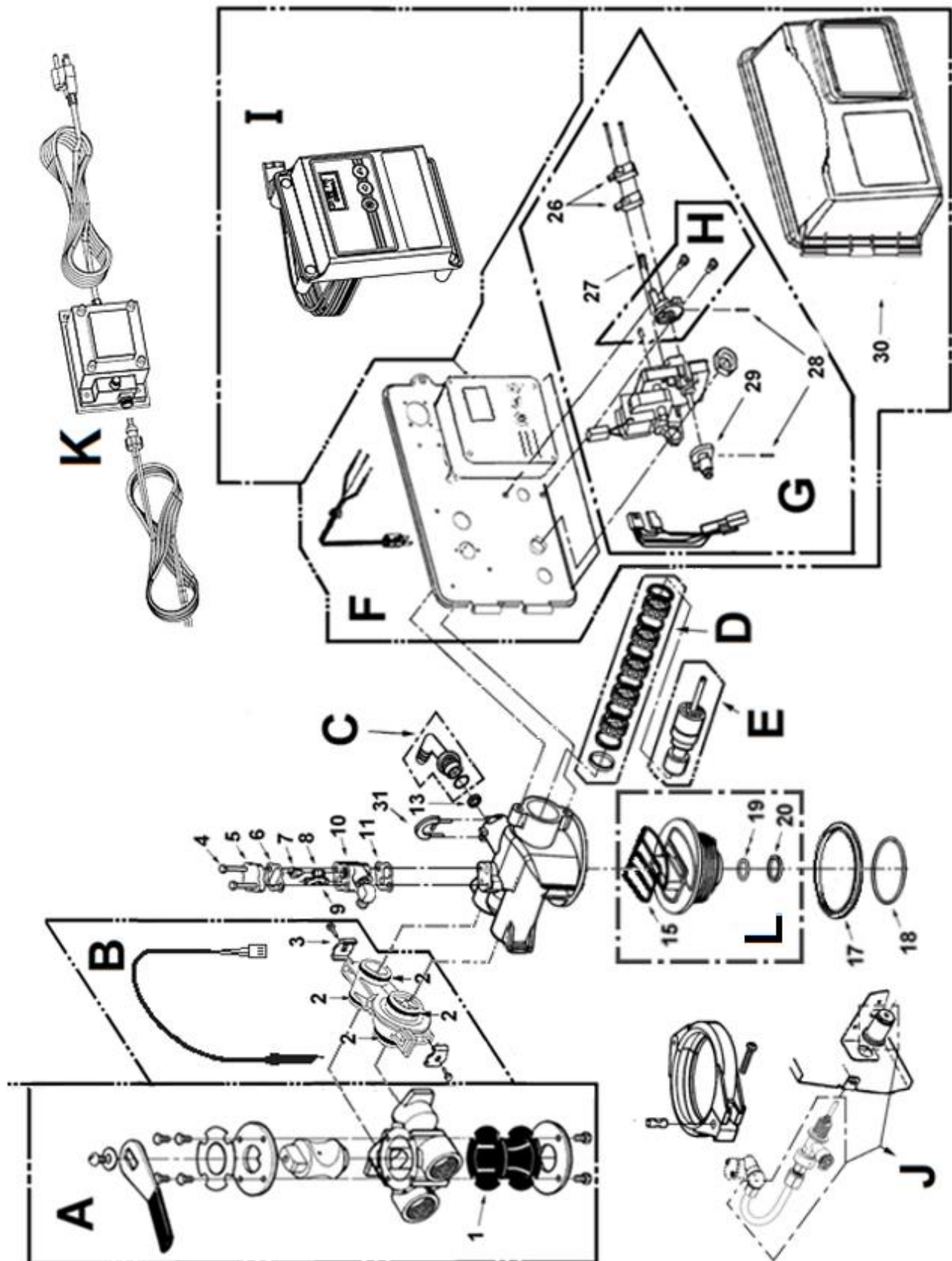


FSM (Mechanical Metered) Control Valve Parts List

REF #	Part Number	Description
A	60040SS	Stainless Steel Bypass, ¾" FPT
	60041SS	Stainless Steel Bypass, 1" FPT
B	60088	Meter Module, Rt Angle, Std Rge
Not Shown	60705-00	DLFC Housing, less flow button (Old Style)
C	60705-00A	DLFC Elbow, less flow button
D	60121	Seal and Spacer Kit
E	60090	Piston Assembly
F	FV2510M-1PH	Power Head Assembly, 2510 M with Cover
G	60050-21	Drive Motor Assembly
H	60160-10	Drive Cam Assembly, STF
I	60306-13	Timer Assembly, 3210, Std Rge Mtr, 120/60
J	60011-050ASSY	Brine Valve, 1650 Short Stem, 0.5 BLFC With J Tube
K	19322	2510 Adapter Base
1	14105	Bypass Valve Seal, Single Lever
2	13305	Coupling O-Ring, -019
3	14613	Flow Straightener
4	10692	Injector cover screw 2510 valve
5	11893	Injector Cover
6	14805	Injector Body Gasket
7	10913-1	Injector Nozzle, #1, White (FSM24, FSM30, FSM45, FSIM34, FSIM48, FSLM24, FSLM30)
	10913-2	Injector Nozzle, #2, Blue (FSM60, FSM75, FSIM64)
8	10914-1	Injector Throat, #1, White (FSM24, FSM30, FSM45, FSIM34, FSIM48, FSLM24, FSLM30)
	10914-2	Injector Throat, #2, Blue (FSM60, FSM75, FSIM64)
9	10227	Injector Screen
10	17776/10328	Injector Body Plastic w/ o-ring & brass elbow
Not Shown	21257253	O-ring for PN: 17776/10328

REF #	Part Number	Description
11	14805	Injector Body Gasket
13	12086	1.5 GPM DLFC (FSM24, FSIM34)
	12088	2.4 GPM DLFC (FSLM24, FSM30, FSIM48)
	12089	3.0 GPM DLFC (FSLM30, FSM45)
	12090	3.5 GPM DLFC (FSIM68)
	12091	4.0 GPM DLFC (FSM60, FSM75)
Not Shown	12338	Drain Fitting, Hose Barb, 90 Deg Elbow, 1/2" x 1/2" (Old Style)
15	19936	Base Seal (2510)
17	19197	Slip Ring
18	18303	Tank O-Ring, 2510 Valve
19	13304	Distributor O-Ring, -121
20	13030	Distributor Retainer
Not Shown	40027	J tube for 2510 valve (Old Style)
22	13911	Main Drive Gear
23	18743-1	Timer Motor, 120v/60Hz, 2510/5600 Valve
24	15320	Micro Switch, Homing
25	10896	Micro Switch, Step
26	10218	Micro Switch, Drive Motor
27	10909	Connecting Link Pin
28	10338	Roll Pin
29	12777	Brine Cam, STF
30	60219-02	Valve Cover, Environmental, Black with Window (Old Style)
	SCA-925	Valve Cover, Environmental, Black with Window (New Style)
31	18312	Retainer, Drain

FES (Electronic Metered) Control Valve Breakdown



FES (Electronic Metered) Control Valve Parts List

REF #	Part Number	Description
A	60040SS	Stainless Steel Bypass, ¾" FPT
	60041SS	Stainless Steel Bypass, 1" FPT
B	FES-MTR	Meter Module for FES Model
Not Shown	60705-00	DLFC Housing, less flow button (Old Style)
C	60705-00A	DLFC Elbow, less flow button
D	60121	Seal and Spacer Kit
E	60090	Piston Assembly
F	FV2510E-1PH	Power Head Assembly, 2510 E with Cover
G	60050-23	Drive Motor Assembly
H	60160-10	Drive Cam Assembly, STF
I	60308-13	2510E Timer Assembly
J	60011-050ASSY	Brine Valve, 1650 Short Stem, 0.5 BLFC With J Tube
K	FE-TRANS	Transformer for 2510E
L	19322	2510 Adapter Base
1	14105	Bypass Valve Seal, Single Lever
2	NE-CON	Coupling O-Ring
3	NE-CLIPS	Clips and screws set for NES & FES
4	10692	Injector cover screw 2510 valve
5	11893	Injector Cover
6	14805	Injector Body Gasket
7	10913-1	Injector Nozzle, #1, White (FES24, FES30, FES45, FECS24, FECS30)
	10913-2	Injector Nozzle, #2, Blue (FES60, FES75)

REF #	Part Number	Description
8	10914-1	Injector Throat, #1, White (FES24, FES30, FES45, FECS24, FECS30)
	10914-2	Injector Throat, #2, Blue (FES60, FES75)
9	10227	Injector Screen
10	17776/10328	Injector Body Plastic w/ o-ring & brass elbow
Not Shown	21257253	O-ring for PN: 17776/10328
11	14805	Injector Body Gasket
13	12087	2.0 GPM DLFC (FES24)
	12088	2.4 GPM DLFC (FECS24, FES30)
	12089	3.0 GPM DLFC (FECS30, FES45)
	12090	3.5 GPM DLFC
	12091	4.0 GPM DLFC (FES60, FES75)
15	19936	Base Seal (2510)
17	19197	Slip Ring
18	18303	Tank O-Ring, 2510 Valve
19	13304	Distributor O-Ring, -121
20	13030	Distributor Retainer
26	10218	Micro Switch, Drive Motor
27	10909	Connecting Link Pin
28	10338	Roll Pin
29	12777	Brine Cam, STF
30	SCA-925	Valve Cover, Environmental, Black with Window (New Style)
31	18312	Retainer, Drain

Troubleshooting

PROBLEM	CAUSE	SOLUTION
1. Softener fails to regenerate	A. Electrical service to unit has been interrupted	A. Ensure permanent electrical service to unit (switch, circuit breaker, plug, etc.)
	B. Faulty timer motor or micro switch	B. Replace defective component
	C. Defective drive motor or micro switch	C. Replace defective component
	D. Improper unit configuration	D. Meter cable unplugged (FSM) or no tabs pushed outward on the skipper wheel (FS)
2. Softener delivers hard water	A. Bypass valve is open	A. Close bypass valve
	B. No salt in brine tank or salt is "bridged"	B. Verify salt is not "bridged" and add salt to brine tank and maintain salt level above water level
	C. Injectors or screen plugged	C. Clean or replace injectors and screen
	D. Insufficient water flowing into brine tank	D. Check brine tank fill time and clean brine line flow control
	E. Leak at distributor tube	E. Check length of distributor tube and pilot tube o-ring
	F. Internal valve leak	F. Replace piston and seals/spacer kit
	G. Flow meter obstructed	G. Clean flow meter
	H. Softener not regenerating	H. See Problem 1 above
	I. Flow rate exceeds rated service flow	I. Verify the softener is properly sized
3. Unit uses too much salt	A. Improper configuration	A. Verify proper salt setting, meter setting (FSM), skipper wheel setting (FS)
	B. Excessive water in brine tank	B. See Problem # 7
4. Loss of water pressure	A. Softener too small for application	A. Check application requirements and resize water softener as required
	B. Foreign material buildup in plumbing system or water softener	B. Clean or replace plumbing, as necessary, additional treatment equipment may be required
5. Loss of resin through drain line	A. Air in water system	A1. Check for low water table conditions in well A2. Check for positive seal on brine line connections
	B. Drain line flow control is too large	B. Ensure proper drain line flow control is installed
6. Iron in softened water	A. Iron exceeds recommended parameters or iron bacteria is present	A. Test incoming water supply and install OXY Series iron filter prior to softener, as needed
	B. Iron fouled resin	B. Check and lengthen backwash, brine draw and brine fill times. Increase frequency of regeneration. Use resin cleaner in brine tank.
7. Excessive water level in brine tank	A. Restricted drain flow control	A. Clean drain line flow control
	B. Drain line too long or installed overhead or restricted	B. Verify drain line is not restricted or improperly installed
	C. Vinyl drain line was used	C. Replace drain line with rigid or semi-rigid material with no kinks and as few elbows as possible
	D. Brine valve sticking	D. Replace brine valve assembly
	E. Injector/screen plugged	E. Clean or replace injectors and screen
	F. Improper configuration	F. Verify the salt setting
	G. Either end of the brine line is loose	G. Completely push in 3/8" brine line at both ends

Troubleshooting (cont.)

PROBLEM	CAUSE	SOLUTION
8. Salty water after regeneration	A. Injectors or screen plugged	A. Clean or replace injectors and screen
	B. Restricted drain flow control	B. Clean drain line flow control
	C. Brine valve sticking	C. Replace brine valve assembly
	D. Brine tank is overfilled	D. See Problem # 7
	E. Rinse cycle too short	E. Lengthen rinse cycle
9. Water leaks to drain continuously	A. Foreign material in control valve	A. Remove and inspect piston and seal kit. Replace as necessary
	B. Drive motor stopped during regeneration cycle	B. Check for obstruction in piston and seals. Replace drive motor. Inspect condition of power head gears
	C. Control valve continuously cycling	C. See Problem #10
	D. Internal valve seal leak	D. Replace seals and/or piston
10. Control valve continuously cycling	A. Faulty homing switch	A. Replace homing switch

TEN YEAR LIMITED WARRANTY

WARRANTY – First Sales. warrants this water conditioner against any defects that are due to faulty material or workmanship during the warranty period. This warranty does not include damage to the product resulting from accident, neglect, misuse, misapplication, alteration, installation or operation contrary to printed instructions, or damage caused by freezing, fire, flood, or Acts of God. From the original date of consumer purchase, we will repair or replace, at our discretion, any part found to be defective within the warranty period described below. Purchaser is responsible for any shipping cost to our facility and any local labor charges.

- One year on the entire water conditioner
- Five years on the control valve
- Ten years on the mineral tank

GENERAL CONDITIONS – Should a defect or malfunction occur, contact the dealer that you purchased the product from. If you are unable to contact the dealer, contact First Sales. @ (260)693-1972. We will require a full description of the problem, model number, date of purchase, and selling dealer's business name and address.

We assume no warranty liability in connection with this water conditioner other than specified herein. This warranty is in lieu of all other warranties, expressed or implied, including warranties of fitness for a particular purpose. We do not authorize any person or representative to assume for us any other obligations on the sale of this water conditioner.

FILL IN AND KEEP FOR YOUR RECORDS

Original Purchaser	Date of Purchase	Model #	
Address of Original Installation		City	State
Dealer Purchased From	Dealer Address	City	State

First Sales
12630 U.S. 33 North, Churubusco, IN 46723
Phone: (260)693-1972 Fax: (260)693-0602