

RF & MF Series

Installation, Operation & Maintenance Manual

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Preinstallation Check List

Water Pressure: 25 psi (172kPa) minimum is required. If pressure is over 100 psi (690 kPa), a pressure reducing valve should be installed.

Drain: The unit should be located close to a drain. The drain must be capable of disposing of water at the unit backwash rate for up to 20 minutes.

Space requirements: Make sure adequate floor space and headroom is available.

Electrical Requirements: 120 volt, 60 Hz, 3 amps, 230 volt, 50 Hz, 1.5 amps or 24VAC, 8 amps.

Location: Locate the softener on a firm level foundation, preferably concrete.

Locate the brine tank no more than 20 feet (6 m) from the softener tank. The floor should be smooth and level. If not, shim up a 3/4 inch (19 mm) plywood board to protect the brine tank.

Temperature: Minimum 34°F (1°C); maximum 120°F (49°C).

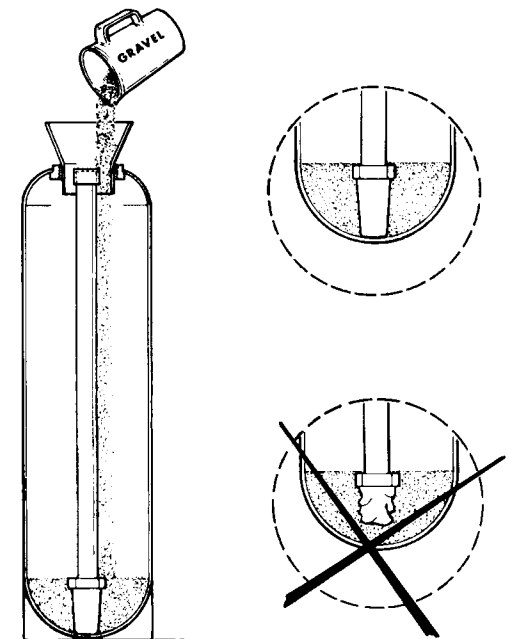


Figure 1

Valve and Tank Set-Up Fiberglass Units (Models 45 through 240)

Loading the Mineral Tank

1. Make sure the mineral tank is empty and clean.
2. Place mineral tank at the point of installation.
3. Install the distributor pipe in the mineral tank.
4. Place the plastic cap provided over the end of the distributor pipe.
5. Using the funnel (packed in the brine tank) pour in the gravel. (See Table 1 for correct amount of gravel for your unit.)



Caution

Do not raise the distributor pipe. If gravel is allowed to get under the distributor, it may cause the distributor to be crushed when the tank adapter is installed. Reference Figure 1.

6. Scoop the mineral into the funnel. With a garden hose, direct water to the side of the funnel. Wash in the amount of mineral shown in Table 1.
7. After positioning the tank, fill with water.

Table 1. Media Quantities

Model Size Capacity (Kgr)	Mineral		Gravel	
	cubic feet	(liters)	lbs	(kg)
45	1-1/3	(37.7)	15	(6.8)
70	2-1/4	(63.7)	30	(13.6)
100	3-1/4	(92.2)	40	(18.1)
120	4	(113.3)	55	(25.0)
150	5	(141.6)	140	(63.5)
240	8	(226.5)	200	(90.7)

Installing the Tank Adapter and Valve

1. Remove all the resin from the top of the tank, threads and plastic cap.
2. Remove the plastic cap from end of riser pipe.
3. Apply o-ring lubricant (silicone oil or silicone grease only) to the riser pipe seal located in the port of the tank adapter that accepts the riser pipe, the bevel on top of the tank, and the top 1 inch (25 mm) of the riser pipe. Reference Figure 2.



Caution

Do not use petroleum base lubricants such as vaseline or cosmolube. These substances will cause o-ring and seal deterioration.

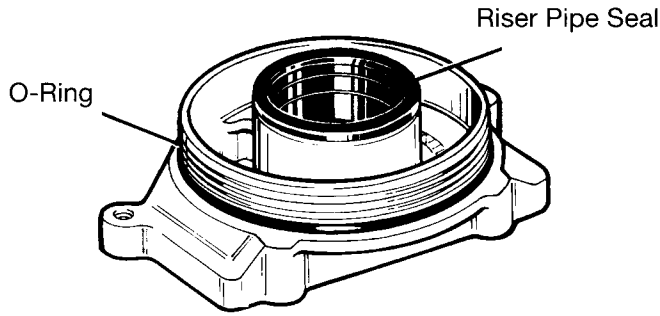


Figure 2

4. Install the tank adapter o-ring onto the tank adapter. Reference Figure 2. Make sure the riser pipe is 1/8 to 1/4 inch (3.2 to 6.3 mm) below the top of the tank. Reference Figure 3A.
5. Position the tank adapter in the opening of the tank with the riser pipe in the port provided. Thread the tank adapter into the tank and tighten until the tank adapter bottoms out on the tank.
6. Remove the control valve from the carton.
7. Place the gasket on the tank adapter and mount the valve. Install the 5 allen head screws and tighten evenly. Reference Figure 3B.

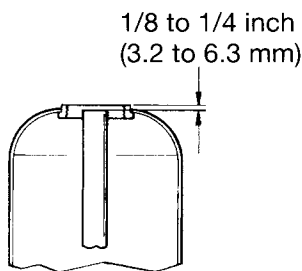


Figure 3A

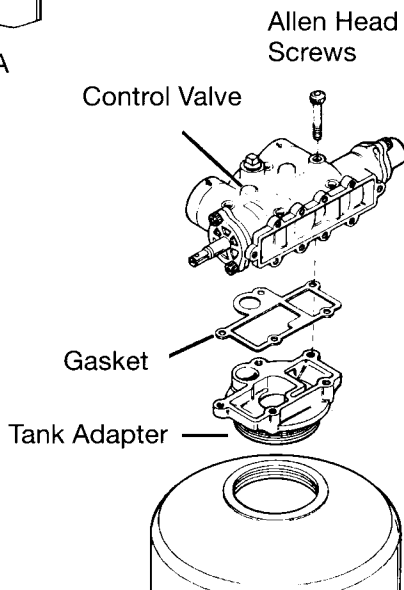


Figure 3B

Steel Tank Units (Models 120 through 750)

Installing the Valve

1. Position the valve body on the tank adaptor with the gasket in place.
2. Install the 5 allen head screws provided and tighten evenly.

Loading the Tank

Important

Position tank at the point of installation. Review entire installation procedure for steel tanks before starting.

1. Remove covers from the top and side openings of mineral tank. Inspect the bottom distributor inside the unit for damage. Reference Figure 4. Inspect the sealing surface of both tank openings. Remove any rough spots with a file.
2. Pour in the required amount of gravel supplied with the unit. Reference Table 2.



Caution

Pour gravel slowly to avoid damaging distributors.

3. Level gravel through side opening. The gravel should cover the distributor screens to a depth of 1 inch (25 mm). Reference Figure 4.
4. Install the gasket and cover to the side opening of the tank. Take care to insure that all sealing surfaces are clean of dirt or gravel.



Caution

Overtightening of cover clamp may cut the cover gasket.

5. Pour in the required amount of resin, supplied with the unit, through the top opening. Reference Table 2. Leveling of the resin bed is not required.
6. Replace top cover temporarily to prevent foreign materials from entering the tank during installation.

Installation Instructions

Single Tank Units

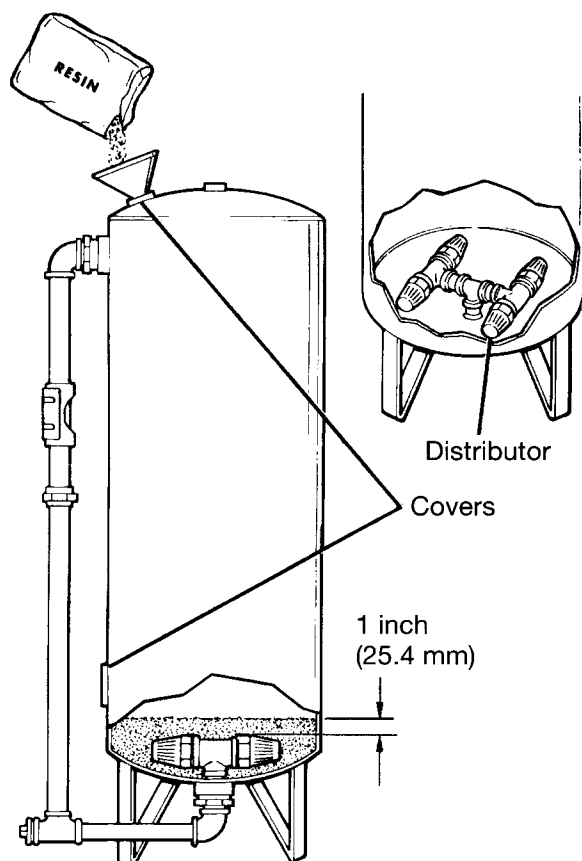


Figure 4

Table 2. Media Quantities

Model Size Capacity (Kgr)	Mineral		Gravel	
	cubic feet	(liters)	lbs	kg
120	4	(113.3)	100	(45.3)
150	5	(141.6)	100	(45.3)
180	6	(170.0)	100	(45.3)
200	6-2/3	(188.7)	150	(68.0)
225	7-1/2	(212.4)	150	(68.0)
240	8	(226.5)	150	(68.0)
300	10	(283.0)	250	(113.4)
450	15	(424.7)	250	(113.4)
600	20	(566.3)	350	(158.7)
750	25	(708.0)	350	(158.7)

1. Include a full bypass system in the installation.
2. Plumb the raw water to the inlet port of the valve, indicated by an arrow on the valve casting. Provide a union connection between the valve and the raw water piping.
3. If a water meter is included in the installation, it should be located in the conditioned water piping of the unit.
4. Plumb the outlet port of the valve to the conditioned water piping. Provide a union connection between the valve and the conditioned water piping.
5. Models MF-600 and MF-750 have external flow controls which must be installed in the drain line. Plumb the flow control into the drain line with the arrow on the flow control pointing in the direction of water flow. Plumb the drain line to waste. Install a union connection near the valve for easy removal and service. All other models are equipped with an internal flow control. Simply pipe the drain to waste. Install a union connection near the valve for easy removal and service.

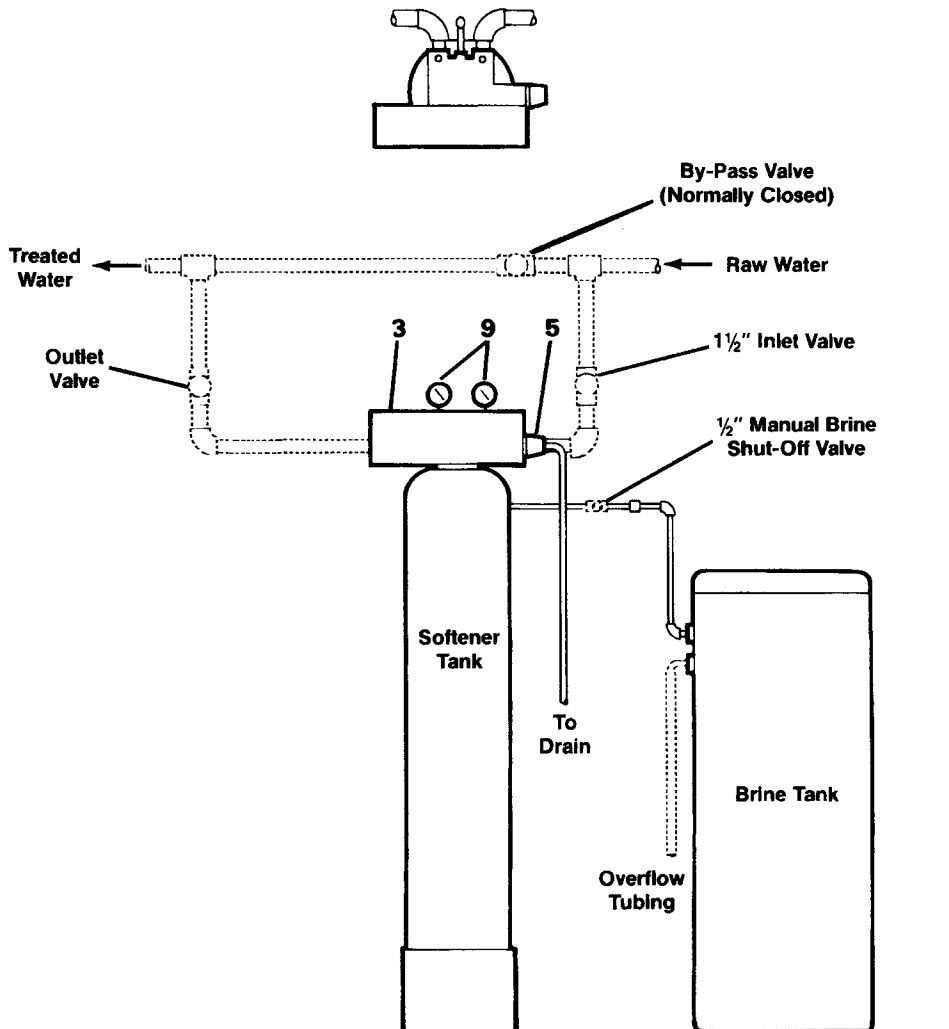
Note: The drain line on all models must be equal to or larger than the drain port opening of the drain casting. Failure to follow this requirement will cause poor performance and possible failure of the system.

Multiple Units

1. Install each unit in the same manner as a single unit. Each unit should have individual inlet and outlet shut-off valves. When the service line is greater in size than the valve size (1-1/2 inches [38 mm]) each unit should have its own individual inlet and outlet connection. A common line is not recommended.
2. When water meters are included in the installation, they should be located in the outlet line of each unit. For installation of meters, refer to appropriate installation manual. The outlet valve should be installed downstream of the flow meter. Installations using a common meter (alternating units) will have the flow meter installed in the common service line.
3. Each unit in a multiple system must have a separate drain line to waste. Be sure to locate a union connection near the valve on each drain line for easy removal and service.

Note: Reference drawings for typical installations of both single and twin units are on the following pages.

Single Unit (RF Series)



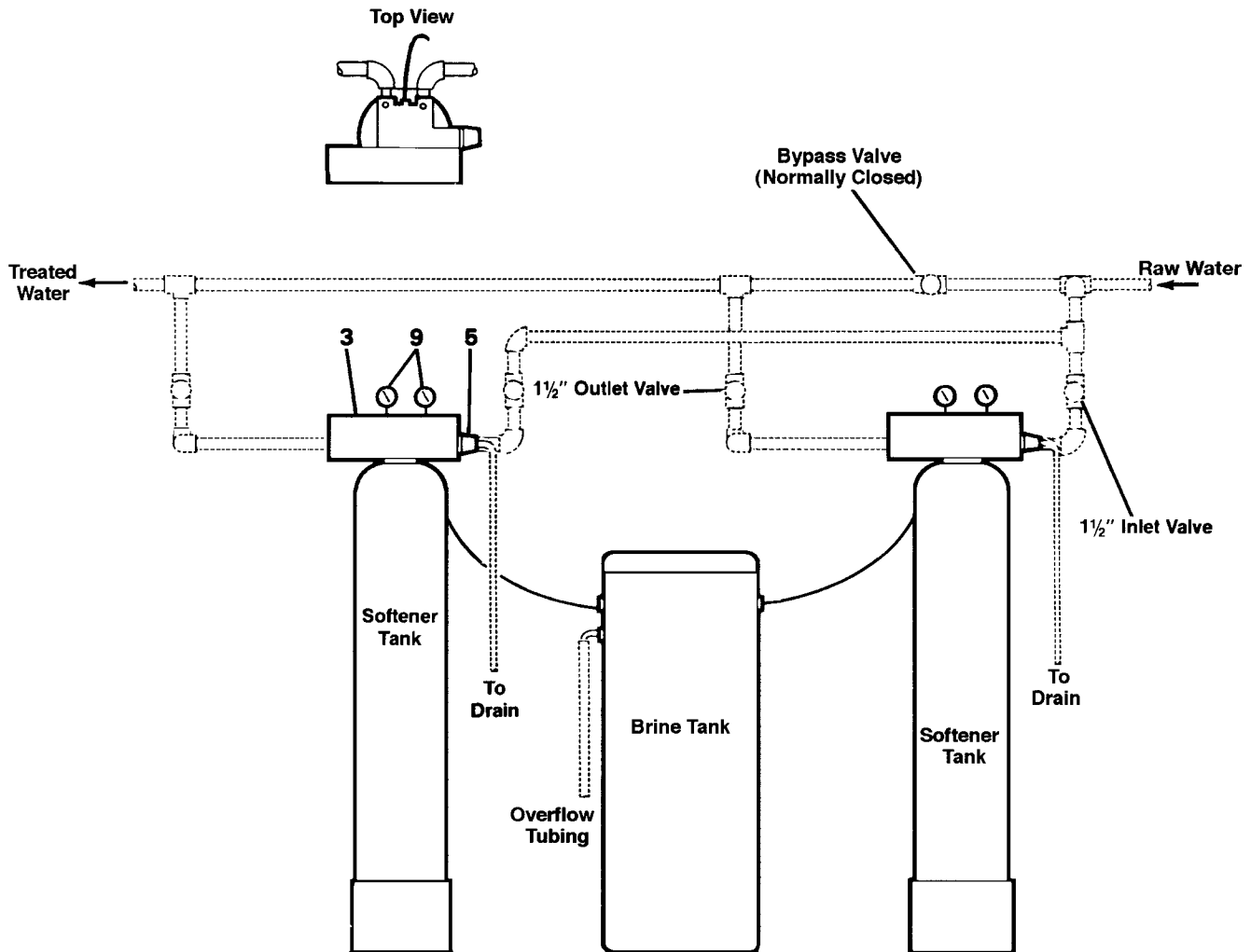
Note:

1. All pipe, fittings, etc. shown in broken lines to be furnished by others.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
5	Backwash Flow Controller
* 9	Pressure Gauge and Sample Tap

*Optional

Parallel Unit (RF Series)



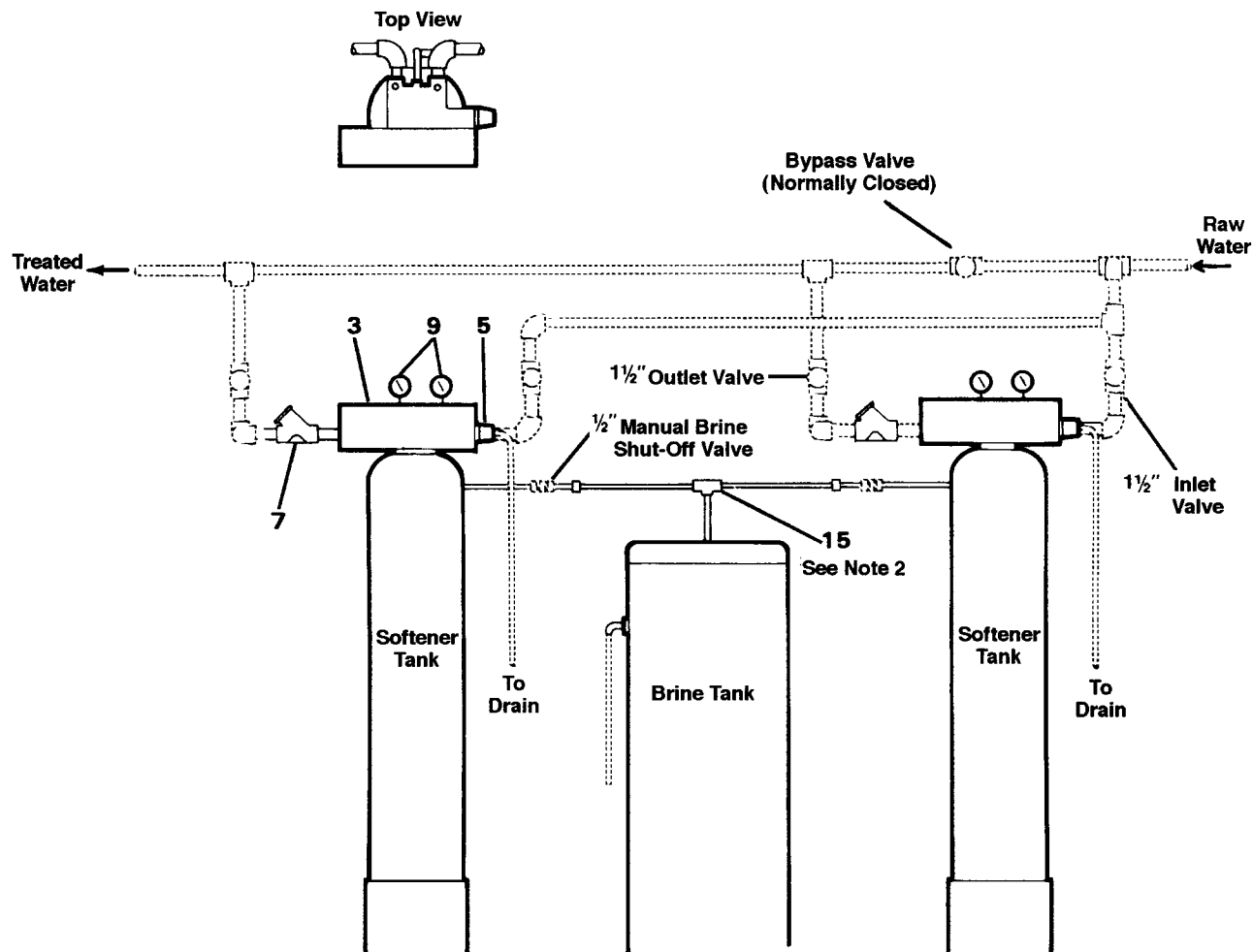
Note:

1. All pipe, fittings, etc. shown in broken lines to be furnished by others.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
5	Backwash Flow Controller
* 9	Pressure Gauge and Sample Tap

*Optional

Twin Alternating (RF Series)



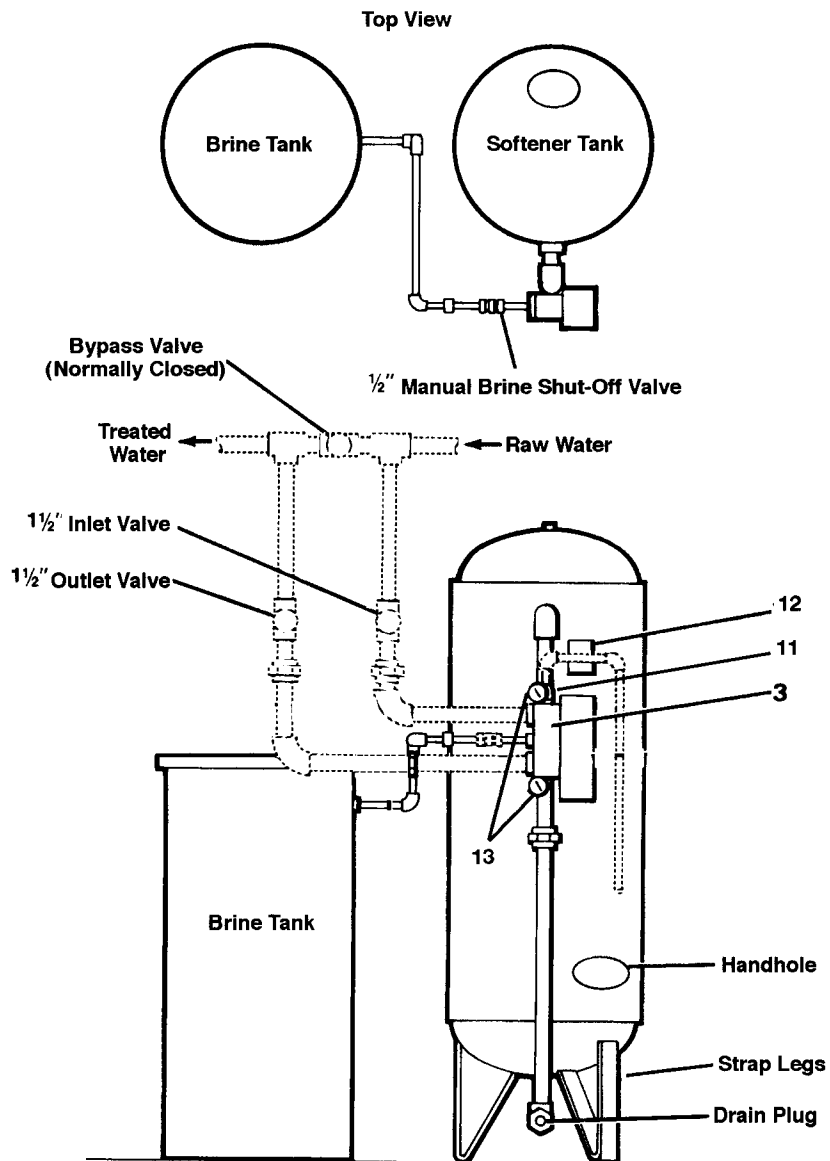
Note:

1. All pipe, fittings, etc. shown in broken lines to be furnished by others.
2. Brine director must be installed equidistant between softener tanks.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
5	Backwash Flow Controller
7	1-1/2 inch Alt. Shut-Off Kit
* 9	Pressure Gauge and Sample Tap
15	Brine Director (Not supplied)

*Optional

Single Unit (MF Series)



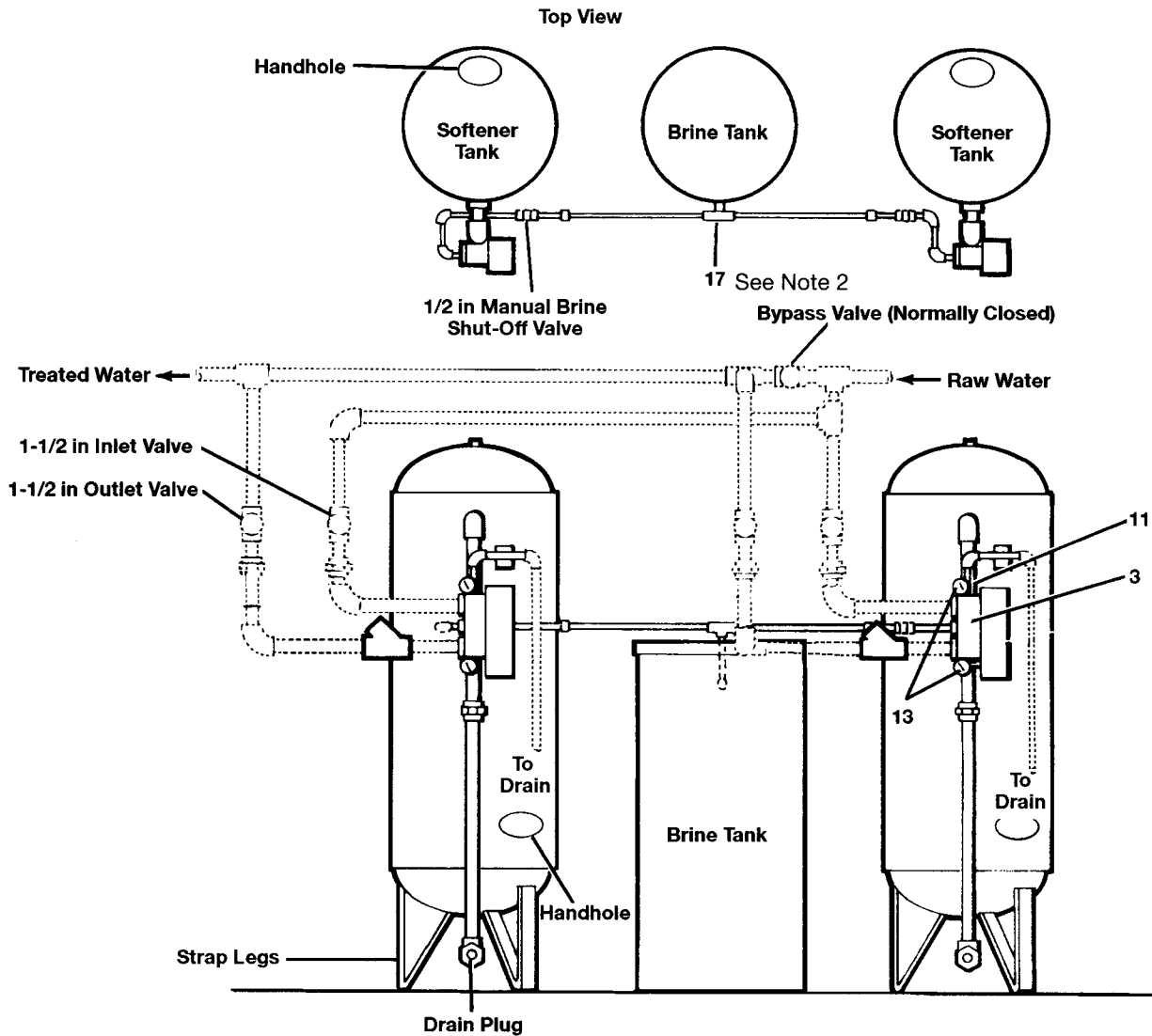
Note:

- . All pipe, fittings, etc. shown in broken lines to be furnished by others.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
11	Backwash Flow Controller
12	External Flow Control for MF600 and MF750
* 13	Pressure Gauge and Sample Tap

*Optional

Parallel Unit (MF Series)



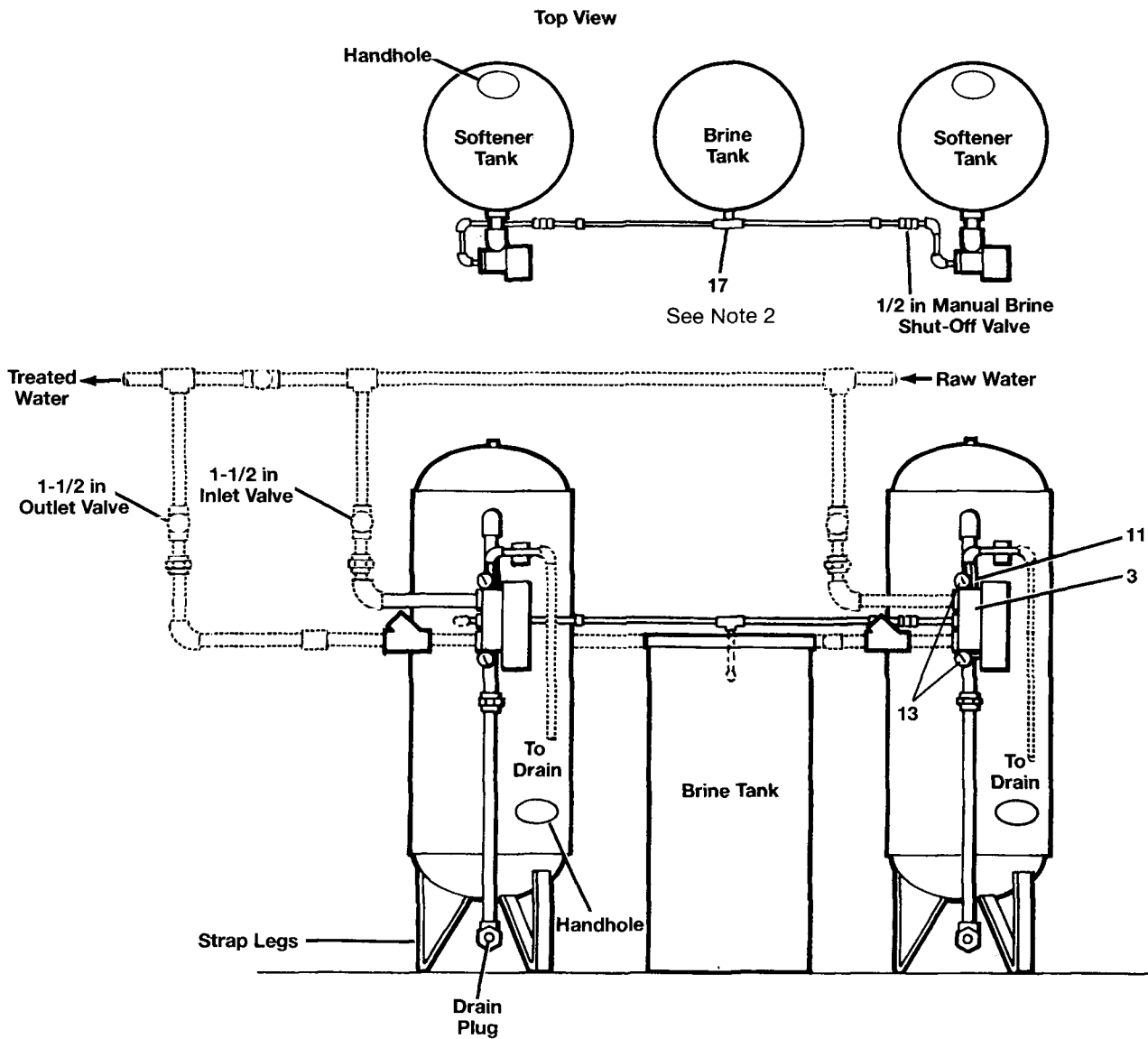
Note:

1. All pipe, fittings, etc. shown in broken lines to be furnished by others.
2. Brine director must be installed equidistant between softener tanks.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
11	Backwash Flow Controller
* 13	Pressure Gauge and Sample Tap
17	Brine Director (Not Supplied)

*Optional

Twin Alternating (MF Series)



Note:

1. All pipe, fittings, etc. shown in broken lines to be furnished by others.
2. Brine director must be installed equidistant between softener tanks.

Item No.	Description
3	1-1/2 inch Taskmaster II Control Valve
11	Backwash Flow Controller
* 13	Pressure Gauge and Sample Tap
17	Brine Director (Not Supplied)

*Optional

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Electrical Connections

100VAC, 115VAC and 230VAC Units:

Following local electrical codes, complete the wiring to terminals 2, 4 and 7 of the terminal block for a Series 440 Timer, or to terminals 1, 2, 4 and 7 for a Series 450 Impulse Timer.

100VAC and 115VAC units require a 5 amp fused circuit; 230VAC units require a 2.5 amp fused circuit.

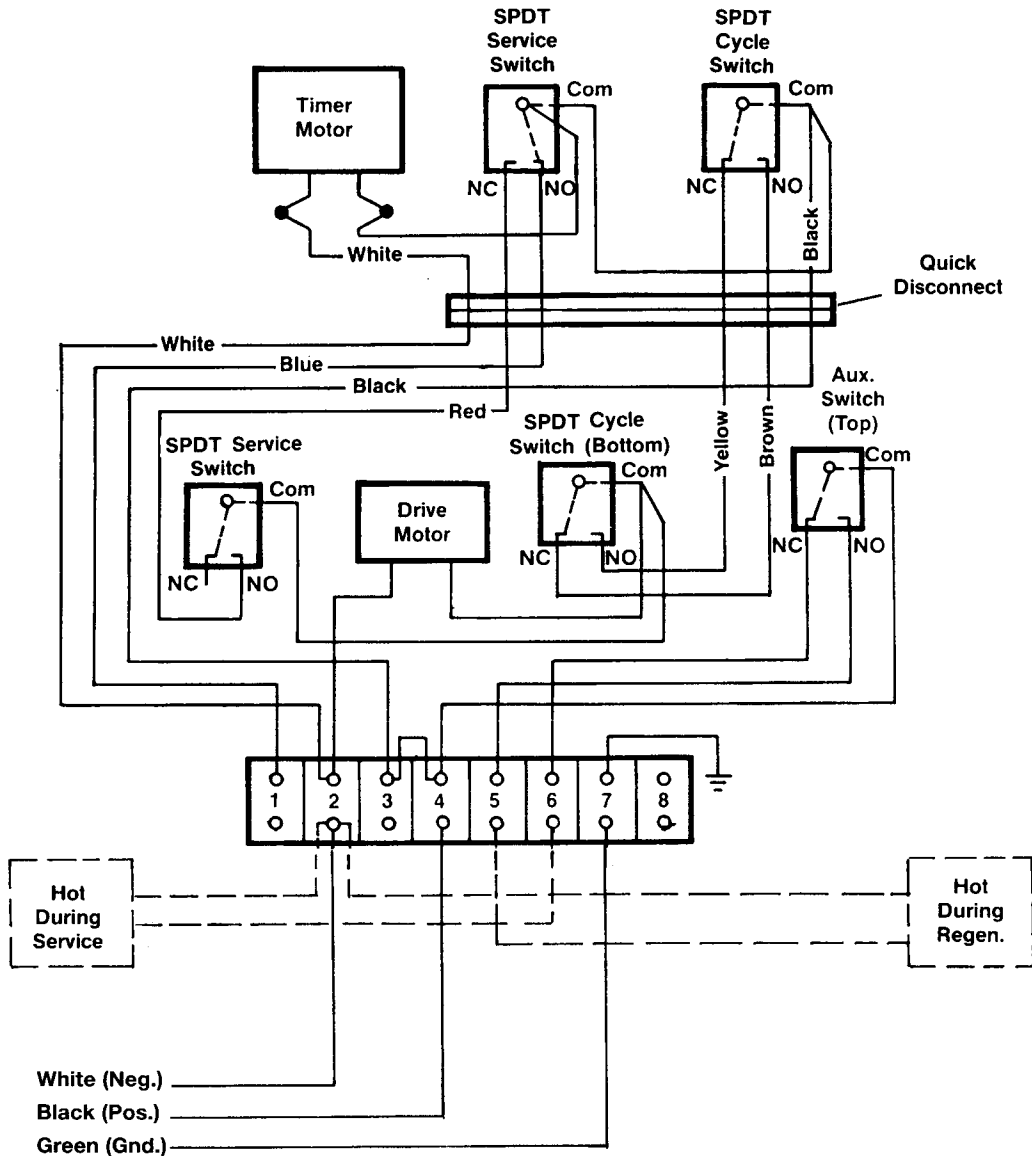
24VAC Units:

The power supply transformer should have a minimum rating of 90 volt-amps to run the drive motor and timer motor. If additional electrical components such as solenoid valves are connected to the terminal block, the volt-amp rating of the transformer must be increased to accommodate the added load.

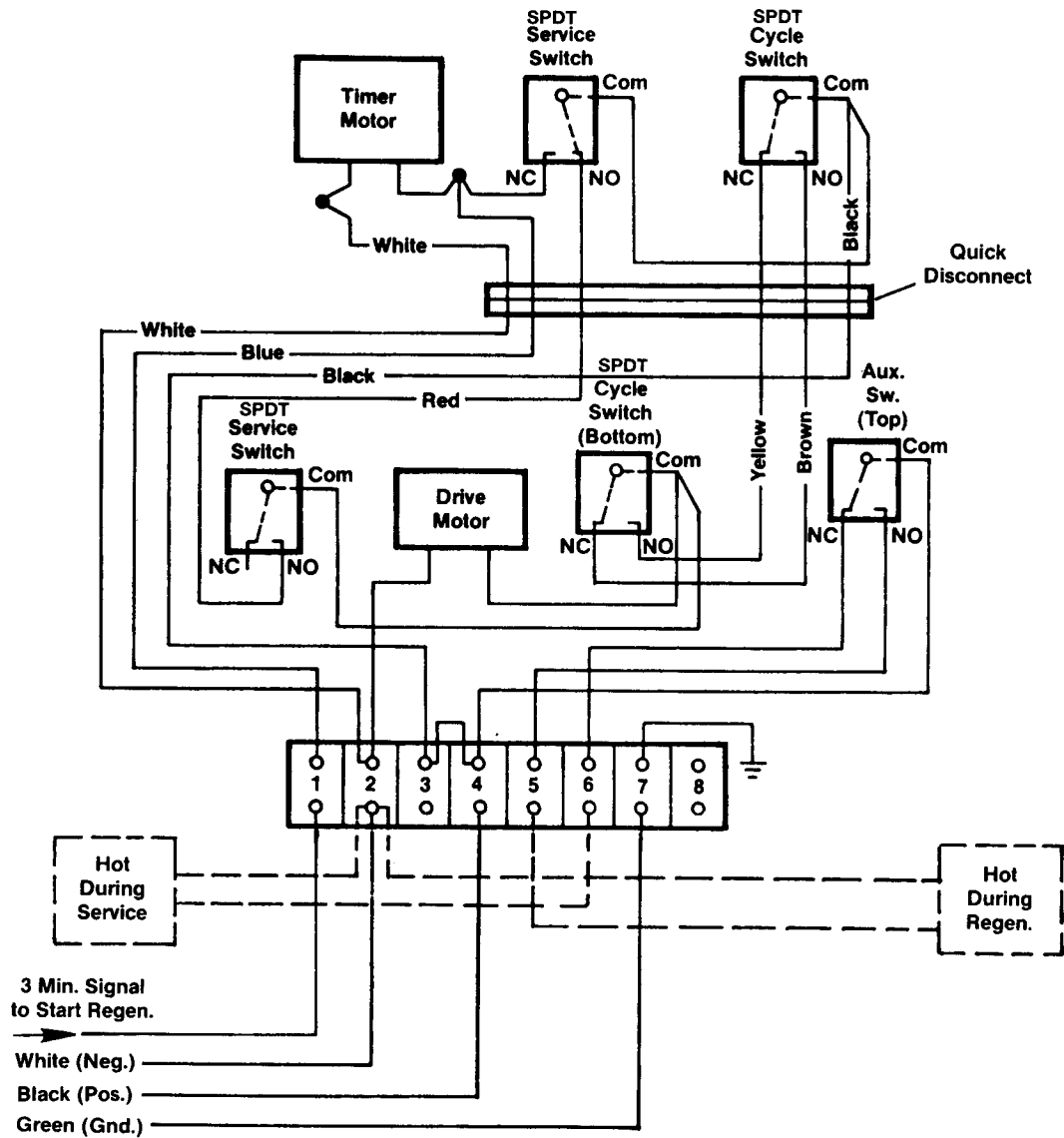
Following local electrical codes, complete the wiring to terminals 2, 4 and 7 of the terminal block for a Series 440 Timer or to terminals 1, 2, 4 and 7 of the terminal block for a Series 450 Impulse Timer.

Wiring Diagram

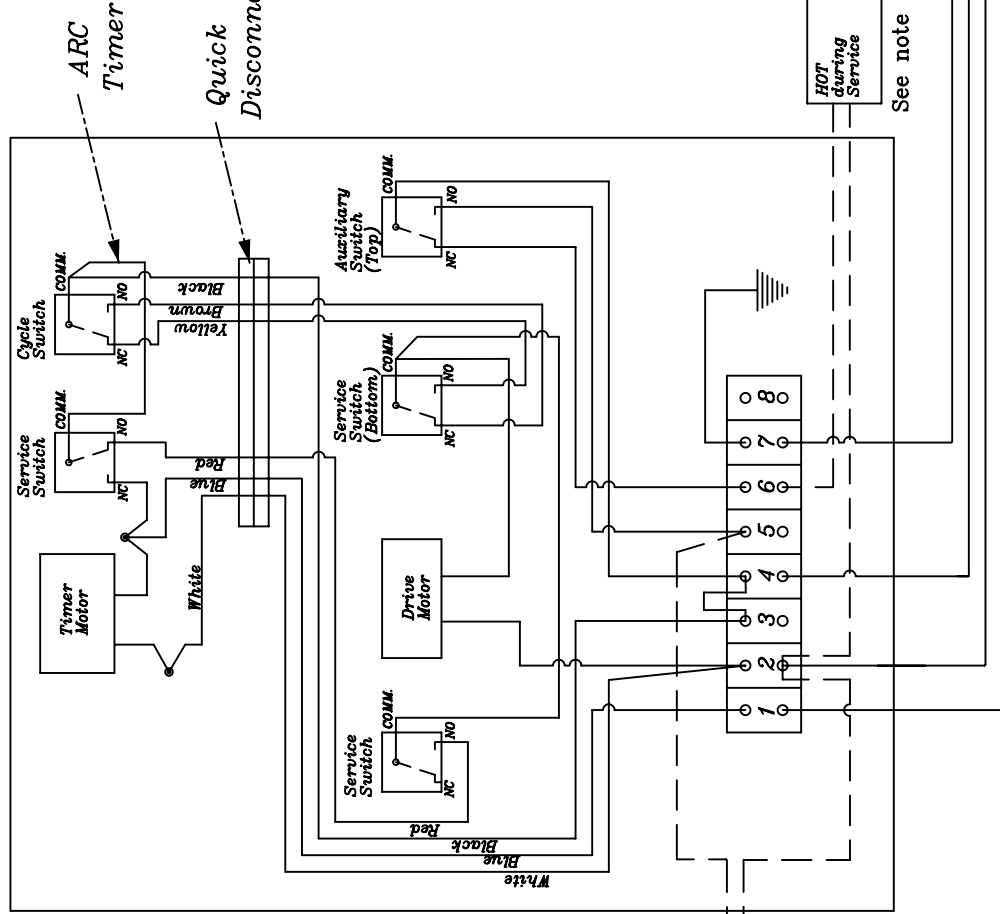
Six and Seven Day Series 440 Timer – 1-1/2 inch (38mm)



Wiring Diagram Series 450 Impulse Timer



UNIT 1

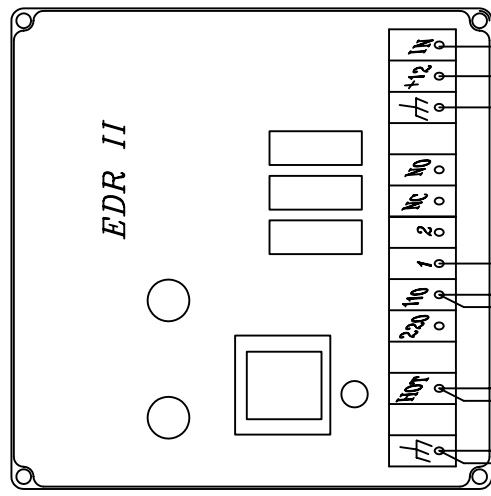


NOTES:
 1) Line power supply available to control Shut-off Kit or other auxiliary equipment during regeneration
 2) Line power supply available to control auxiliary equipment during service

ARC
 Timer
 Quick Disconnect

HOT during Regeneration
 See note #1

See note #2



#1 unit 1
 Grnd. Green
 L1 Black
 L2 White

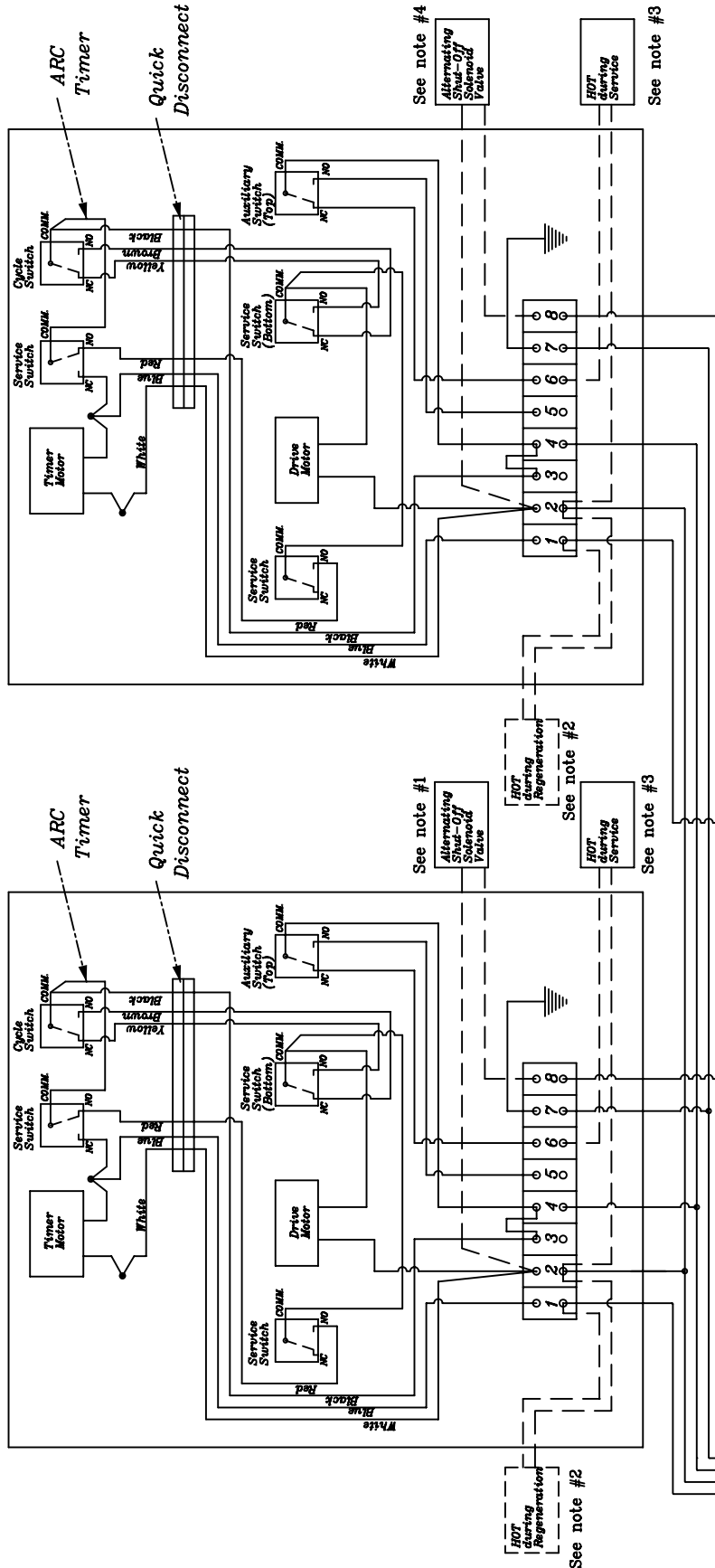
METER
 Yellow
 Red
 Green

LINE IN

SINGLE UNIT WIRING DIAGRAM

UNIT 1

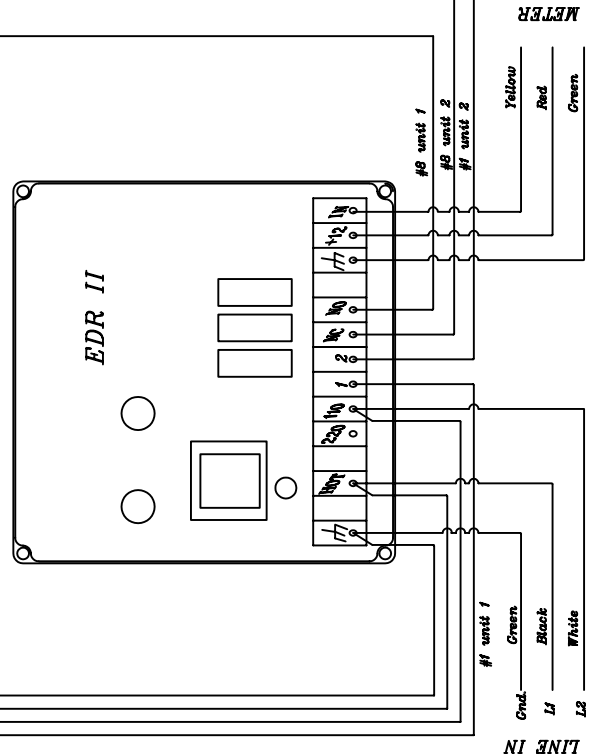
UNIT 2



TWIN ALTERNATING WIRING DIAGRAM

NOTES:

- 1) Terminals 8 + 2 are HOT during regeneration and standby modes. Wire these contacts to solenoid valve on service diaphragm valve on UNIT #1.
- 2) Auxiliary contacts, Line voltage available to operate auxiliary equipment only during regeneration cycle.
- 3) Auxiliary contacts, Line voltage available to operate auxiliary equipment only during service cycle.
- 4) Terminals 8 + 2 are HOT during regeneration and standby modes. Wire these contacts to solenoid valve on service diaphragm valve on UNIT #2
- 5) Terminal 1 on EDR to 1 on UNIT #1
- 6) Terminal 2 on EDR to 1 on UNIT #2
- 7) Terminal NC on EDR to 8 on UNIT #2
- 8) Terminal NO on EDR to 8 on UNIT #1



MODEL 3200 TIMER

timer setting procedure

How To Set Days On Which Water Conditioner Is To Regenerate:

Rotate the skipper wheel until the number "1" is at the red pointer. Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers. Each tab is one day. Finger at red pointer is tonight. Moving clockwise from the red pointer, extend or retract fingers to obtain the desired regeneration schedule.

How To Set The Time Of Day:

Press and hold the red button in to disengage the drive gear. Turn the large gear until the actual time of day is at the time of day pointer.

Release the red button to again engage the drive gear.

How To Manually Regenerate Your Water Conditioner At Any Time:

Turn the manual regeneration knob clockwise.

This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.

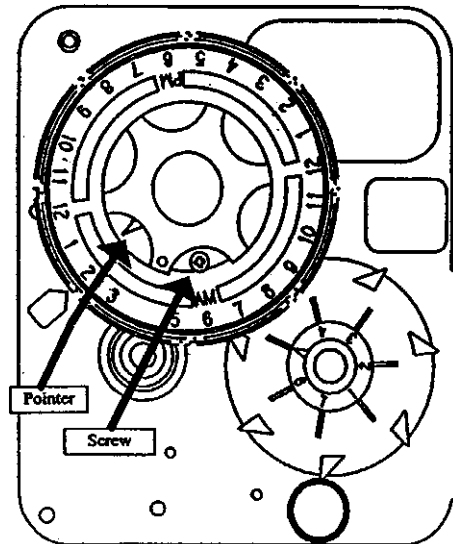
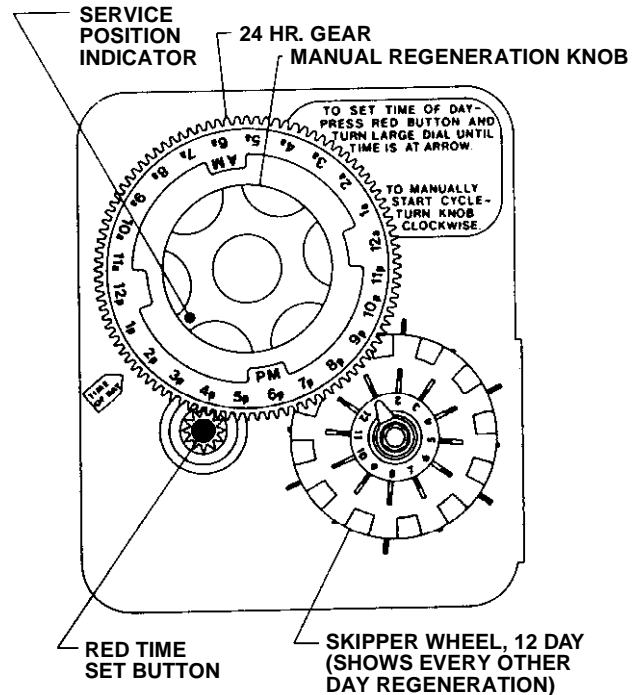
The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.

Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set only one half of this time.

In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

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.



3200 ADJUSTABLE REGENERATION TIMER

IMPORTANT!

SALT LEVEL MUST ALWAYS BE ABOVE WATER LEVEL IN BRINE TANK.

MODEL 3200 TIMER

regeneration cycle program setting procedure

(brine tank refill separate from rapid rinse - stf) Black drive cam and brine valve cam

How To Set Regeneration Cycle Program:

The regeneration cycle program on your water conditioner has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

To expose cycle program wheel, grasp timer in upper left-hand corner and pull, releasing snap retainer and swinging timer to the right.

To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs towards center, lift program wheel off timer. (Switch arms may require movement to facilitate removal.)

How To Change The Length Of The Backwash Time:

The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting a zero determines the length of time your unit will backwash.

FOR EXAMPLE: If there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). to change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes. **(Note: Do not add pins before "0" minutes designation.)**

How To Change The Length of Brine and Rinse Time:

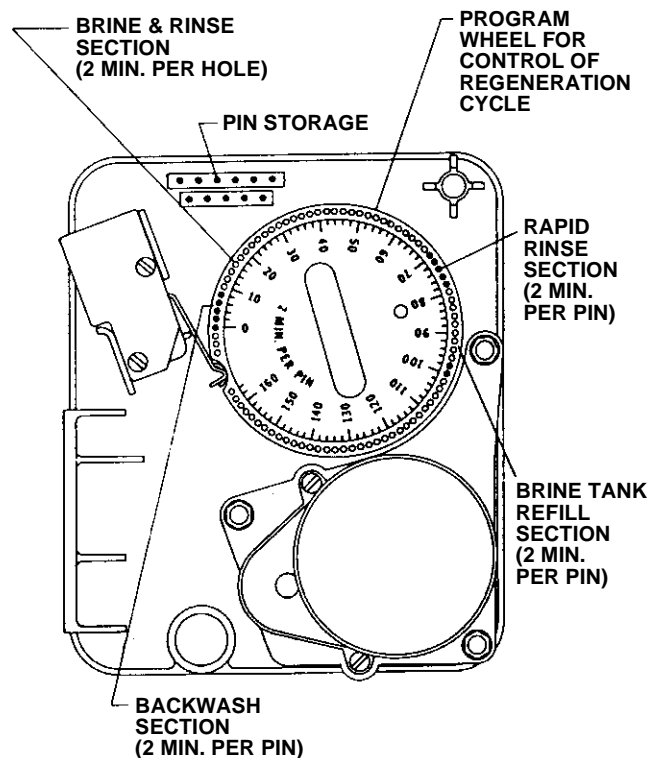
The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse. (2 min. per hole.)

To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.

How To Change The Length Of Rapid Rinse:

The second group of pins on the program wheel determines the length of time that your water conditioner will rapid rinse. (2 min. per pin.)

To change the length of rapid rinse time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse time in minutes.



How To Change The Length Of Brine Tank Refill Time:

The second group of holes on the program wheel determines the length of time that your water conditioner will refill the brine tank. (2 min. per hole.)

To change the length of refill time, move the two pins at the end of second group of holes as required.

The regeneration cycle is complete when the outer micro-switch is tripped by the two pin set at end of the brine tank refill section. The program wheel, however, will continue to rotate until the inner micro-switch drops into the notch on the program wheel.

Return timer to closed position engaging snap retainer in back plate. make certain all electrical wires locate above snap retainer post.

IMPORTANT!

SALT LEVEL MUST ALWAYS BE ABOVE WATER LEVEL IN BRINE TANK.

MODEL 3200 TIMER

regeneration cycle program setting procedure

(rapid rinse) White drive cam and brine valve cam

How To Set The Regeneration Cycle Program:

The regeneration cycle program on your water conditioner has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

The expose cycle program wheel, grasp timer in upper left-hand corner and pull, releasing snap retainer and swinging timer to the right.

To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs towards center, lift program wheel off timer. (Switch arms may require movement to facilitate removal.)

How To Change The Length Of The Backwash Time:

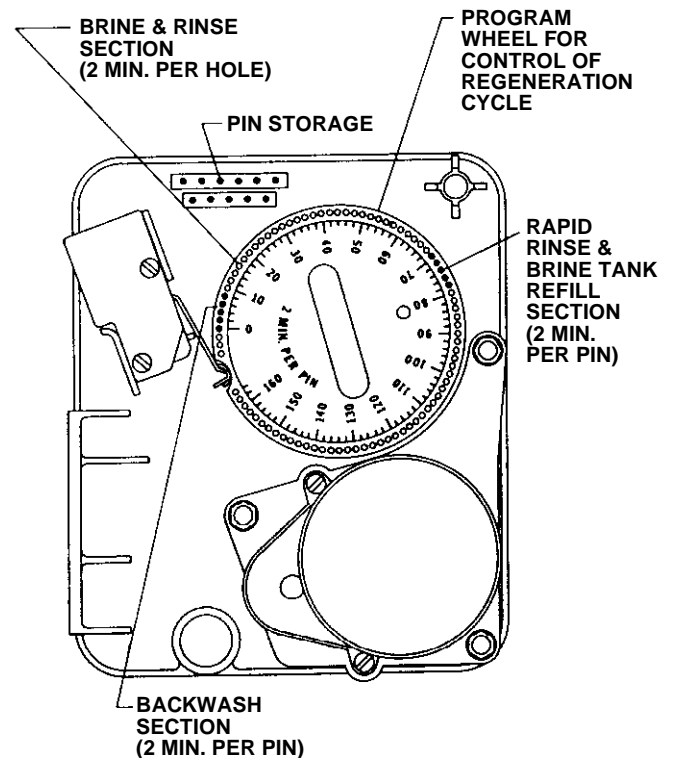
The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting at zero determines the length of time your unit will backwash.

FOR EXAMPLE: If there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). to change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes. **(Note: Do not add pins before "0" minutes designation)**

How To Change The Length of Brine and Rinse Time:

The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse. (2 min. per hole.)

To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.



How To Change The Length Of Rapid Rinse And Brine Tank Fill Time:

The second group of pins on the program wheel determines the length of time that your water conditioner will rapid rinse and brine tank fill. (2 min. per hole.)

To change the length of rapid rinse and brine tank fill time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse and brine tank fill time in minutes.

The regeneration cycle is complete when the outer micro-switch drops off the last pin in the rapid rinse and brine tank fill group of pins. The program wheel, however, will continue to rotate until the inner micro-switch drops into the notch on the program wheel.

Return timer to closed position engaging snap retainer in back plate. Make certain all electrical wires located above snap retainer post.

IMPORTANT!

SALT LEVEL MUST ALWAYS BE ABOVE WATER LEVEL IN BRINE TANK.

Conditioner Start Up

1. Close all inlet and outlet valves.
2. Close brine line valve if used.
3. Supply electrical power to unit(s). Fill brine tank(s) with water to a point 1 inch (2.5 cm) above grid using a hose or bucket. **Do not add salt to brine tank at this time.**



Caution

Keep hands away from drive linkage area when operating.

4. Push in red knob on timer, turn **COUNTERCLOCKWISE** until arrow points to the **START** position to move the piston to the **BACKWASH** position (Figure 8).
5. **Partially open inlet valve until a steady stream of water, free of air, is produced at the drain.** Open inlet valve fully.
Note: If top cover of conditioner tank can be removed to vent air, the tank may be filled more quickly.
6. Open brine line valve. Allow the unit to run to drain until the timer moves the valve to the next position in approximately 12 minutes.
7. After the timer has moved the valve out of the **BACKWASH** position, it will move to the **BRINE/ SLOW RINSE** position (Figure 9). Watch the level of water in the brine tank, it should move down at a steady rate. A drawdown of 2 to 3 inches is sufficient for checkout.
8. As in step 4, manually rotate the timer **COUNTERCLOCKWISE**, slowly, until the piston moves into the **FAST RINSE** position (Figure 10).
9. Allow the valve to remain in the **FAST RINSE** position until the timer automatically moves the piston to the **SERVICE** position (Figure 11) in approximately 11 minutes.

The unit is now ready to be put on line. Open the outlet valve, close the bypass valve and load the brine tanks with salt.

Note: If installation consists of multiple tanks, use steps 1 through 9 for each conditioner.

Loading the Brine Tank (Grid System)

1. The brine valve (located in the brine tank) will automatically fill and maintain the water level in the brine tank. The water level must be 1 to 2 inches above the salt platform. If that level is not achieved, remove the brine valve (after shutting off the manual brine line valve) and adjust the float on the float rod.
2. Fill the brine tank with salt to a level even with the top of the brine well. Use a clean grade of softener salt, (pellet salt or equivalent). Rock salt is not recommended. Rock salt contains impurities that can cause malfunction of the brine valve.

Valve Positions

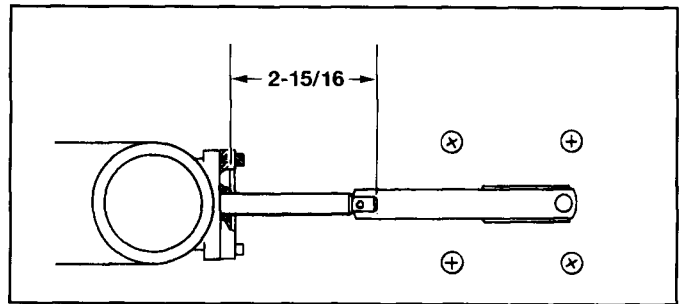


Figure 8 Backwash Position

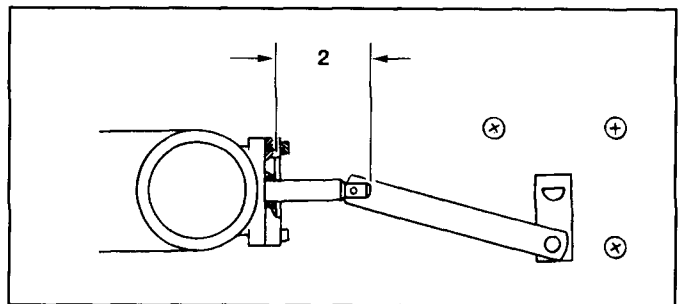


Figure 9 Brine and Slow Rinse Position

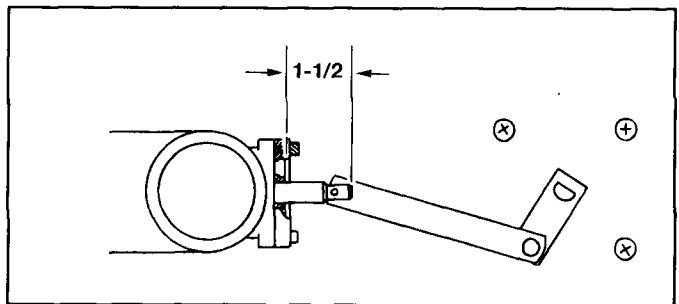


Figure 10 Fast Rinse Position

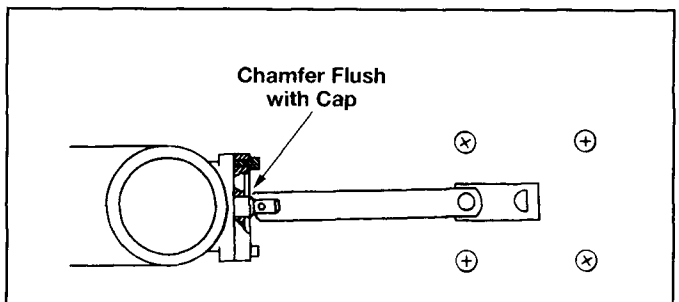


Figure 11 Service Position

Setting Series 440 Timers

Determine a regeneration schedule for the conditioner and adjust the automatic timer as follows (see Figures 7 and 8):

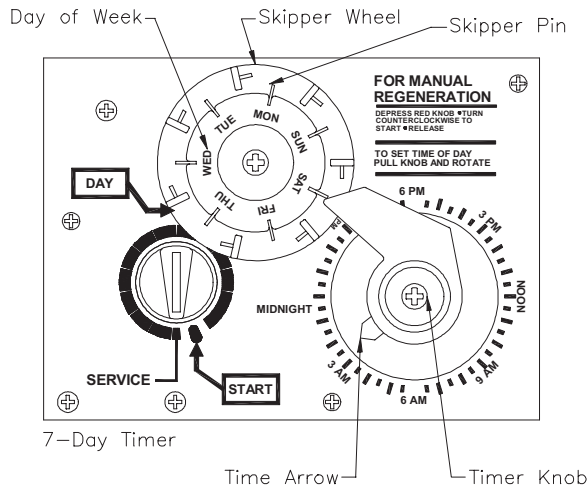


Figure 7

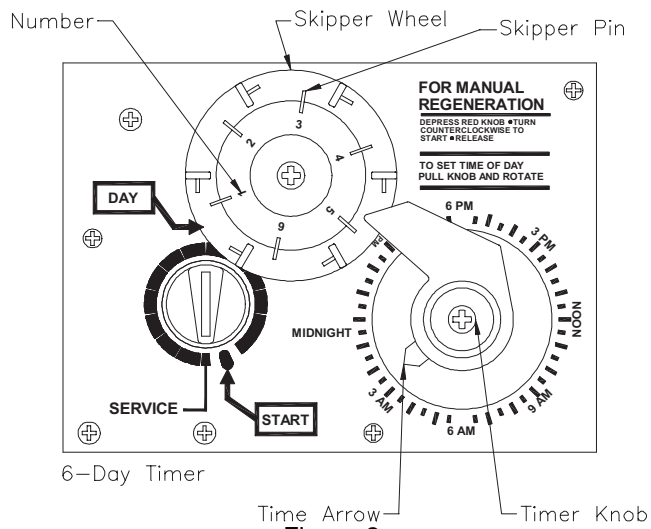


Figure 8

1. Pull all the skipper pins out (away from control).
2. Rotate skipper wheel until day arrow points to day of week or number 1.
3. Push in skipper pin(s) for day(s) regeneration is required.
4. Pull timer knob out (away from the timer face) and rotate until time arrow on timer knob points to correct time of day on face plate.
5. Timer will automatically initiate regeneration on preset days at 2:30 A.M. To alter time, simply reset timer knob to an earlier or later time which will change the time of regeneration by the same number of hours. (Time indicated at time arrow will no longer be correct).

Regeneration Cycle Time Instructions (440 and 450 Timers)

Pin Time Chart

Backwash or Fast Rinse		Brine/Rinse	
No. of Pins OUT	Time	No. of Pins IN	Time
1	8 min.	2	1.5 min.
2	11 min.	3	4.5 min.
3	14 min.	4	7.5 min.
4	17 min.	5	10.5 min.
5	20 min.	6	13.5 min.
6	23 min.	7	16.5 min.
7	26 min.	8	19.5 min.
8	29 min.	9	22.5 min.
9	32 min.	10	25.5 min.
10	35 min.	11	28.5 min.
11	38 min.	12	31.5 min.
12	41 min.	13	34.5 min.
13	44 min.	14	37.5 min.
14	47 min.	15	40.5 min.
15	50 min.	16	43.5 min.
*		*	

*Each additional pin either pulled out or pushed in equals 3 minutes.

Set Backwash Timing

Pull pins as shown for desired backwash time. Reference Pin Time Chart.

Set Brine/Rinse Timing

Depress pins as shown for desired brine/rinse time, minimum of two pins down. Reference Pin Time Chart.

Set Fast Rinse Timing

Pull pins as shown for desired fast rinse time. Reference Pin time Chart.

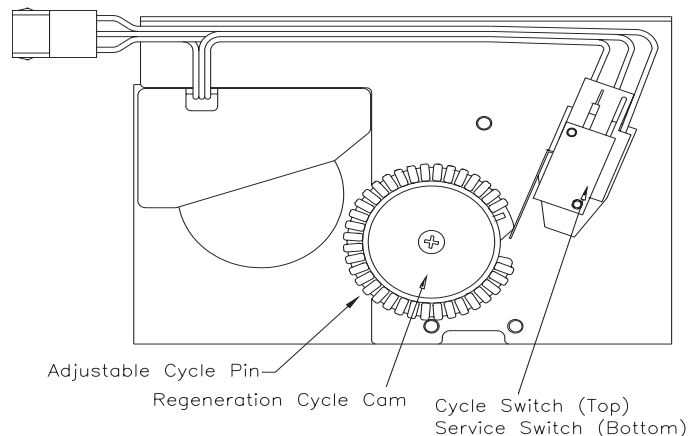
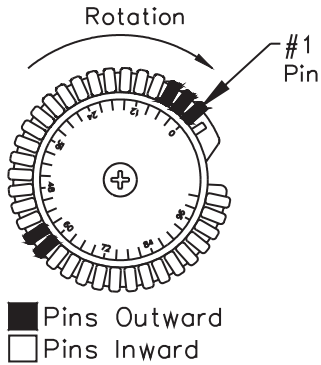


Figure 9 Timer, Rear View

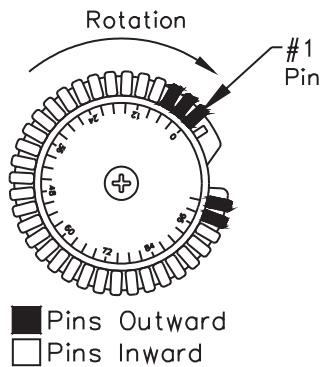
Typical Water Conditioning Cycle

Backwash	14 min.	3 pins outward
Brine/Rinse	40.5 min.	15 pins outward
Fast Rinse	11 min.	2 pins outward
		Remaining pins in



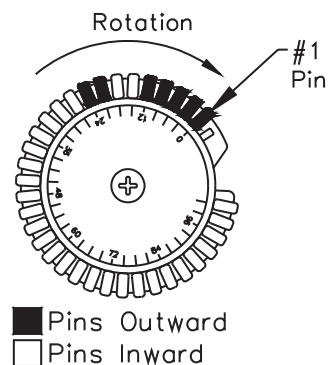
Variation Water Conditioning Cycle

Backwash	14 min.	3 pins outward
Brine/Rinse	85.5 min.	30 pins outward
Fast Rinse	11 min.	2 pins outward



Typical Filter Application Cycle

Backwash	20 min.	5 pins outward
Pause	1.5 min.	2 pins inward
Fast Rinse	11 min.	2 pins outward



Valve Positions

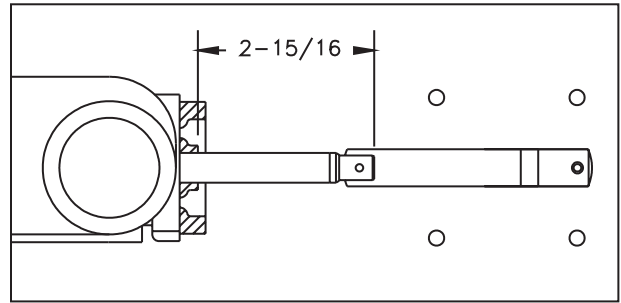


Figure 10 - Backwash Position

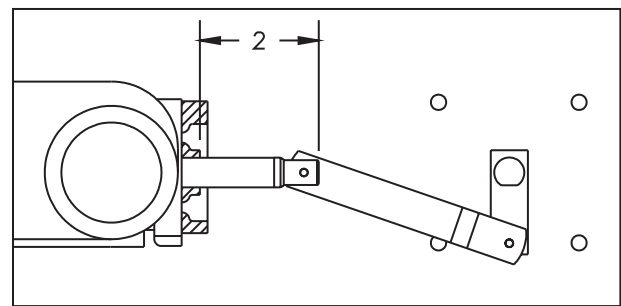


Figure 11 - Brine and Slow Rinse Position

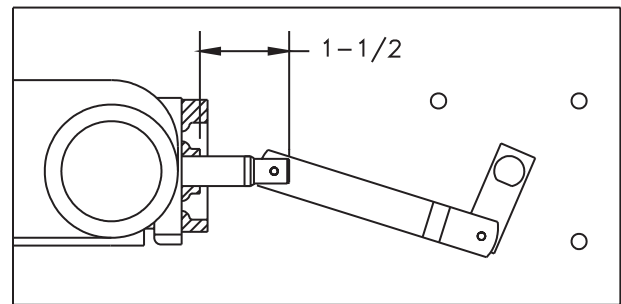


Figure 12 - Fast Rinse Position

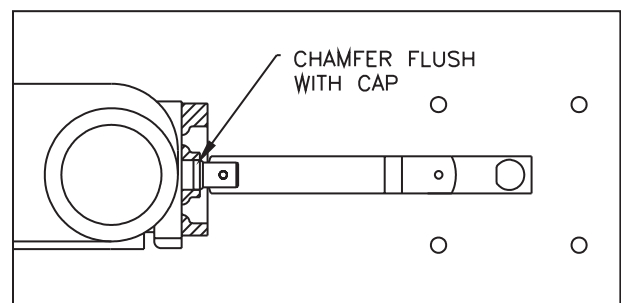


Figure 13 - Service Position

Specifications

Model Size	Continuous Flow Rate		Peak Flow Rate		Regeneration Flow Rates GPM	Mineral Content Cu Ft	Gravel Content Lbs	Brine Valve In	Dry Salt Storage Lbs
	GPM	PSI Drop	GPM	PSI Drop					
45	13.3	5.1	20	8.6	Backwash 2.5 Brine 1.0 Slow Rinse 0.4 Fast Rinse 2.5	1.33	15	3/8	250
70	23.0	6.6	35	11.0	Backwash 4.0 Brine 2.5 Slow Rinse 0.7 Fast Rinse 4.4	2.25	30	3/8	400
100	32.0	10.5	49	18.5	Backwash 5.0 Brine 2.5 Slow Rinse 0.7 Fast Rinse 5.0	3.25	40	3/8	400
120	40.0	11.5	60	21.0	Backwash 6.0 Brine 2.5 Slow Rinse 0.7 Fast Rinse 6.0	4.0	55	3/8	400
150	50.0	10.7	71	20.5	Backwash 10.0 Brine 2.8 Slow Rinse 1.8 Fast Rinse 10.0	5.0	140	3/8	400
240	61.0	14.5	81	25.0	Backwash 15.0 Brine 3.7 Slow Rinse 2.3 Fast Rinse 15.0	8.0	200	1/2	525
120	40.0	11.5	60	21.0	Backwash 10.0 Brine 2.5 Slow Rinse 0.7 Fast Rinse 10.0	4.0	100	3/8	600
150	50.0	10.5	75	22.3	Backwash 10.0 Brine 2.8 Slow Rinse 1.8 Fast Rinse 10.0	5.0	100	3/8	600
180	56.0	14.6	76	24.5	Backwash 10.0 Brine 2.8 Slow Rinse 1.8 Fast Rinse 10.0	6.0	100	3/8	600
200	64.0	15.0	81	24.5	Backwash 15.0 Brine 3.7 Slow Rinse 1.8 Fast Rinse 10.0	6.66	150	1/2	450
225	63.0	15.7	81	24.5	Backwash 15.0 Brine 3.7 Slow Rinse 2.3 Fast Rinse 15.0	7.5	150	1/2	450
240	61.0	15.2	81	25.0	Backwash 15.0 Brine 3.7 Slow Rinse 2.3 Fast Rinse 15.0	8.0	150	1/2	450
300	66.0	15.0	84	25.0	Backwash 25.0 Brine 4.5 Slow Rinse 2.8 Fast Rinse 25.0	10.0	250	1/2	450
450	64.0	15.0	81	25.0	Backwash 25.0 Brine 4.5 Slow Rinse 2.8 Fast Rinse 25.0	15.0	250	1/2	1000
600	70.0	15.0	90	25.0	Backwash 35.0 Brine 5.5 Slow Rinse 3.6 Fast Rinse 35.0	20.0	350	1/2	1650
750	70.0	15.0	90	25.0	Backwash 35.0 Brine 6.3 Slow Rinse 3.8 Fast Rinse 35.0	25.0	350	1/2	1650

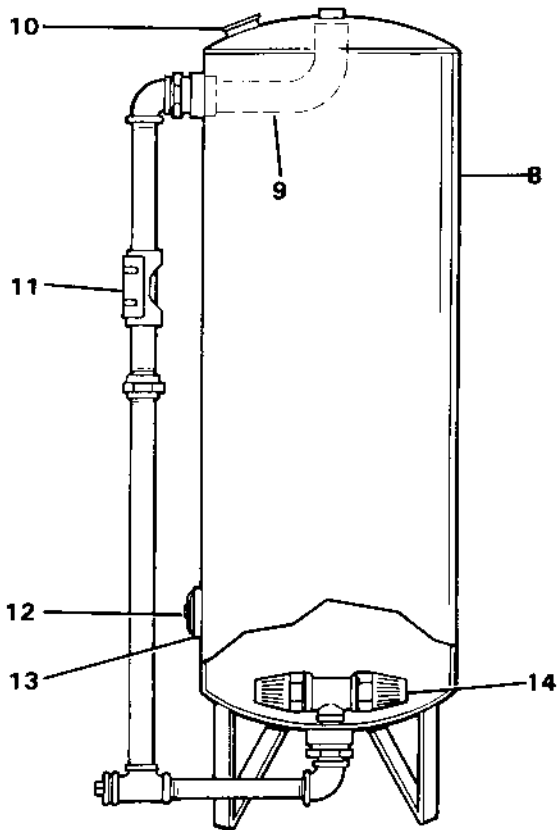
Note: Pipe Size All Models 1-1/2 inch

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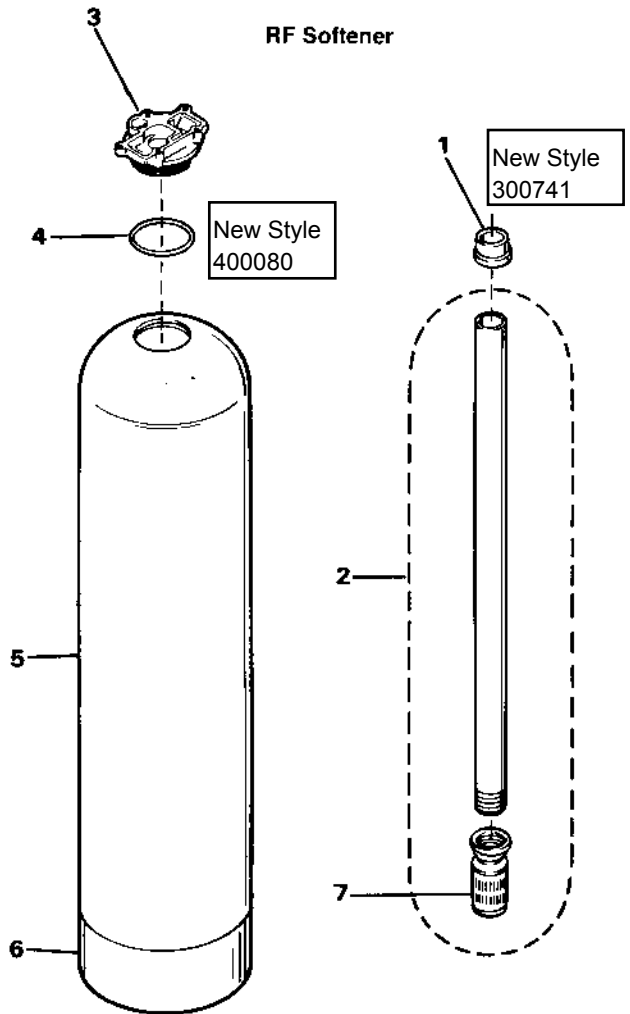
Repair Parts and Lists

RF Softener

Ref. No.	Part No.	Description
1	300740	Distributor Cup
2	703008	Manifold Assy. (Mod. 45 and 70)
	703006	Manifold Assy. (Mod. 100 and 120)
	703025	Manifold Assy. (Mod. 150)
	703045	Manifold Assy. (Mod. 240)
3	340033	Tank Adapter
	340036	Tank Adapter BSPP Threads
4	400079	O-Ring
5	100047	Mineral Tank (10" x 54")
	100046	Mineral Tank (13" x 54")
	100017	Mineral Tank (14" x 65")
	100087	Mineral Tank (16" x 65")
	100089	Mineral Tank (21" x 65")
	100187	Mineral Tank (24" x 71")
6	100099	Tank Foot For 10" x 54" M.T. Only
7	703023-2	



MF Softener



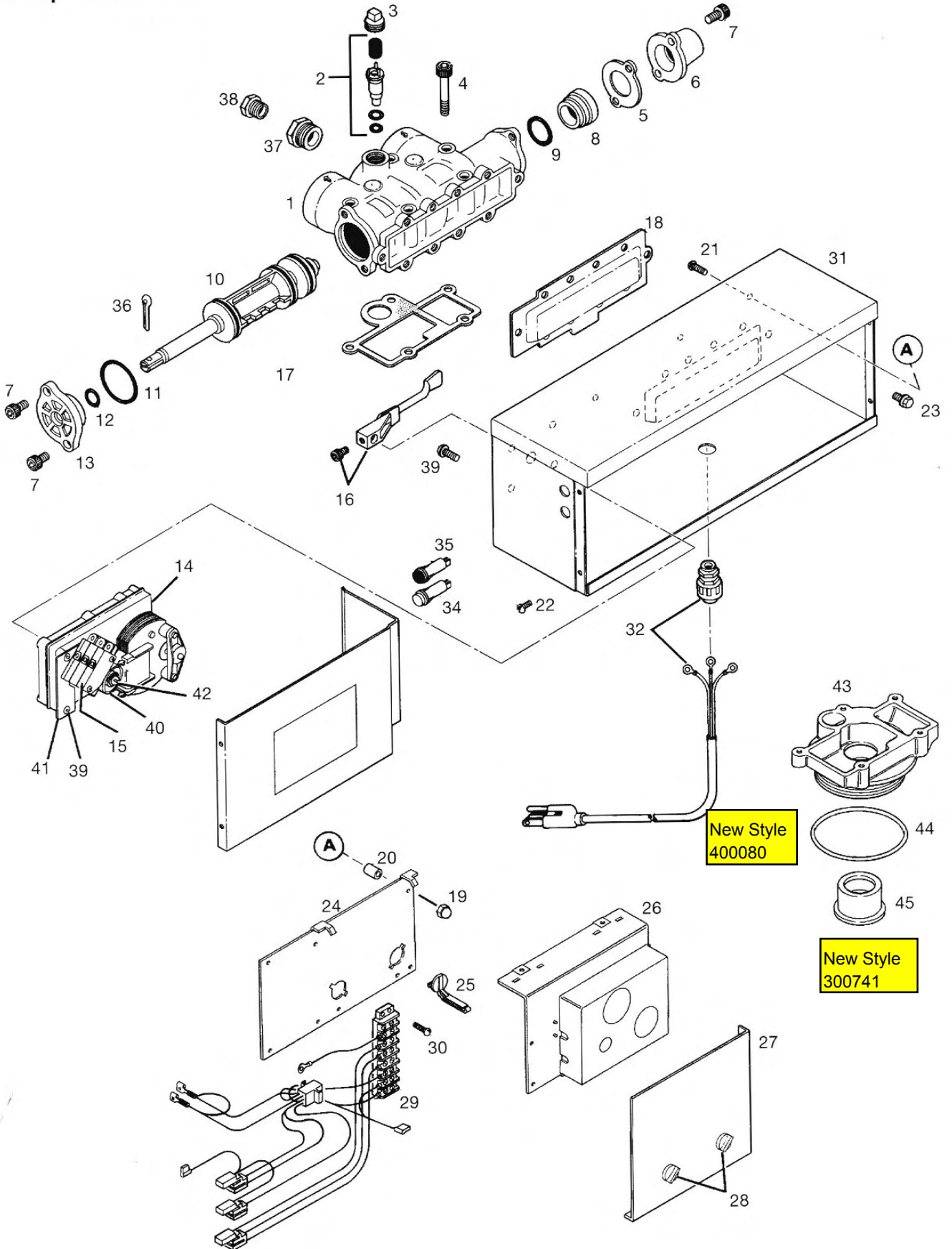
RF Softener

MF Softener

Ref. No.	Part No.	Description
8	—	Mineral Tank — Side Mt.
	100122	18" x 54"
	100123	20" x 54"
	100124	24" x 54"
	100126	30" x 60"
	100127	36" x 60"
	100135	36" x 72"
9	100349	Distributor Pipe (Sweep Assy.)
10	100095	Cap Assembly
11	340034	Side Mount Adapter
	340037	Tank Adapter BSPP Threads
12	100113	Hand Hole Cover (4 x 6)
	100114	Man Hole Cover (11 x 16)
13	400614	Gasket (4 x 6) Hand Hole
	400615	Gasket (11 x 15) Man Hole
14	703023-1	Bottom Distributor Assy. 18", 20" and 24" dia. (2 req'd.) 30" and 36" dia. (4 req'd.)

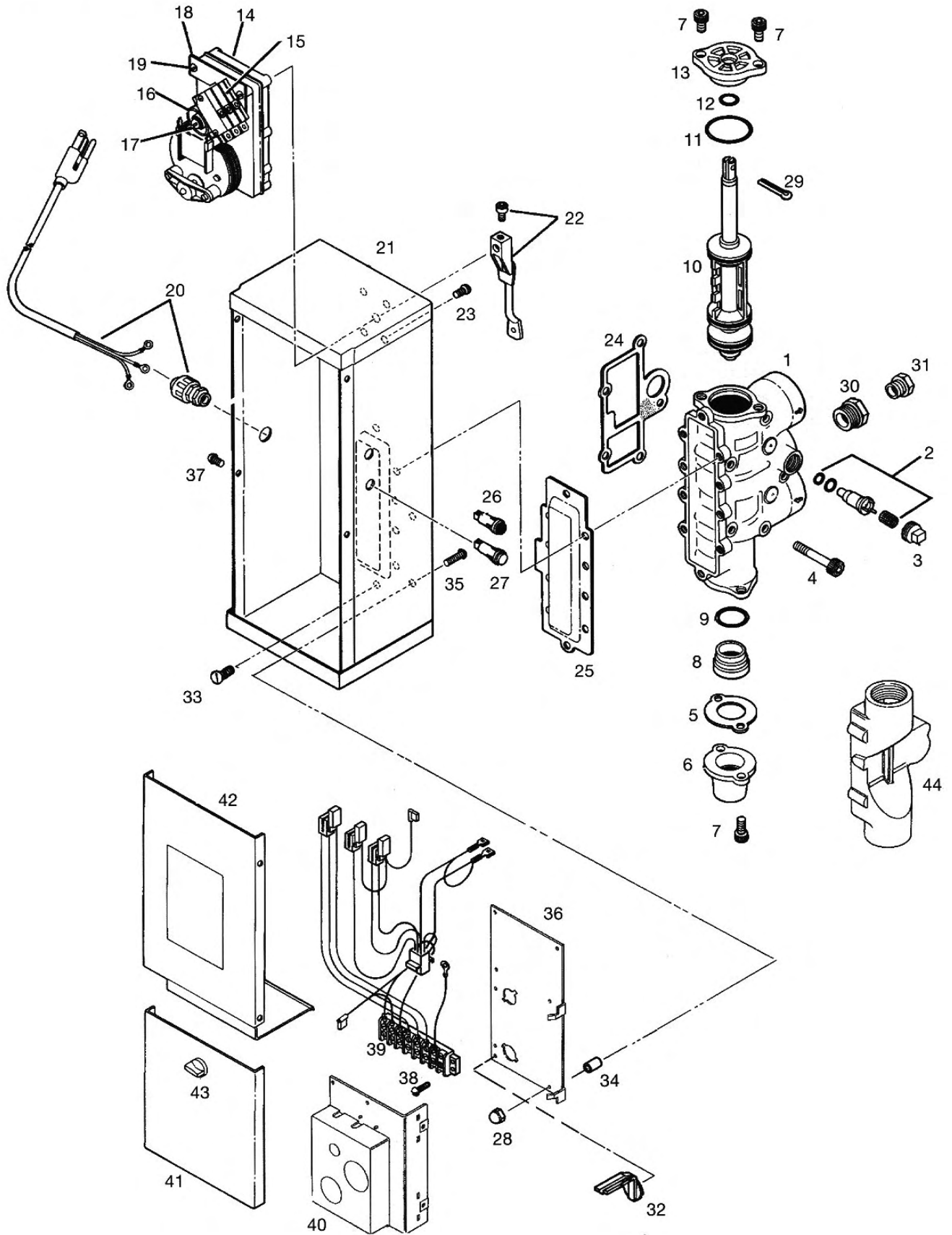
Replacement Parts

RF Top Mount Valve



Ref #	Part No.	Description	Ref #	Part No.	Description
1	340032	Valve Body:	17	400626	Gasket
	340035	NPT	18	400625	Gasket
		BSPP	19	300905	Nylon Nut
2	507121	Throat and Nozzle Assembly:	20	300906	Nylon Spacer
		#53 x #28 (Used on Models 45, 70, 100, 120) Top and Side Mount, Green	21	400238	Screw
	507122	#45 x #22 (Used on Models 150, 180) Side Mount, Orange	22	400738	Screw (4 Required)
	507123	#39 x #16 (Used on Models 200, 225, 240) White	23	400128	Screw (10 Required)
	507124	#36 x #10 (Used on Model 300) Red	24	1030452	Timer Mounting Plate
	507125	#31 X #7 (Used on Model 450) Gold	25	300138	Timer Lock
	507126	#29 x 15/64 (Used on Model 600) Dark Blue	26		Timer Assembly:
	507127	#27 x 1/4 (Used on Model 750) Brown		F60304-03	12-Day, 115V//60 Hz,
	507129	#50 x #22 (Used on Model 150) Top Mount, Yellow		F60303-03	7-Day, 115V/60 Hz,
				707200	6-day (440) 115V/60 Hz
				707200-3	7-day (440) 115V/60 Hz
3	420225	1/2 in Pipe Plug		1030426	6-Day, 230V/50 Hz,
4	400166	Cap Screws (5 required)		1030427	7-Day, 230V/50 Hz,
5	300853	Upper Cap Gasket			
6		Flow Package:			
	720300	3 gpm NPT		707200-4	ARC (440) 115V/60Hz
	720301	3 gpm BSPP		F60305-03	ARC 115V/60 Hz
	720302	4 gpm NPT		607132	ARC 230V/50 Hz
	720303	4 gpm BSPP			
	720304	5 gpm NPT	27	300875	Timer Cover
	720305	5 gpm BSPP	28	300867	Pawl Latch (2 Required)
	720306	6 gpm NPT	29		Wire Harness:
	720307	6 gpm BSPP		507877	120V
	720308	10 gpm NPT		507878	240V
	720309	10 gpm BSPP	30	400202	Self-Tapping Screw (2 Required)
	720310	15 gpm NPT	31	320594	Mounting Box
	720311	15 gpm BSPP	32	720268	Power Cord Kit
	720312	25 gpm NPT	33	300874	Motor Cover
	720313	25 gpm BSPP	34	300645	Service Light
	720322	35 gpm NPT	35	300644	Regeneration Light
7	400165	Cap Screw	36	400504	Cotter Pin
8	300851	Drain Shut-Off	37	420201	Hex Bushing 1/2 x 3/8 in
9	400051-9	O-Ring	38	420531	Male Connector 3/8 in Tube to 3/8 in NPT
10	514001-55	Piston Seal Kit # 514001-51	39	86109	Screw (6 Required)
11	400051-10	O-Ring	40	320203	Cam
12	400051-11	O-Ring (Included w/Item 13)	41	300745-1	Switch Bracket
13	507135	Lower Cap Assembly	42	400229	Screw
14			43	340033	Top Mount Adapter
	507244	110-120V/60 Hz	44	400079	O-Ring (After 2002 use # 400080)
	507245	240V/50 Hz	45	300740	Distributor Seal
15	320124	Micro Switches (3 Required, Included w/Item 14)		300741	Distributor Seal O-Ring (after 2002)
16	507239	Drive Link			

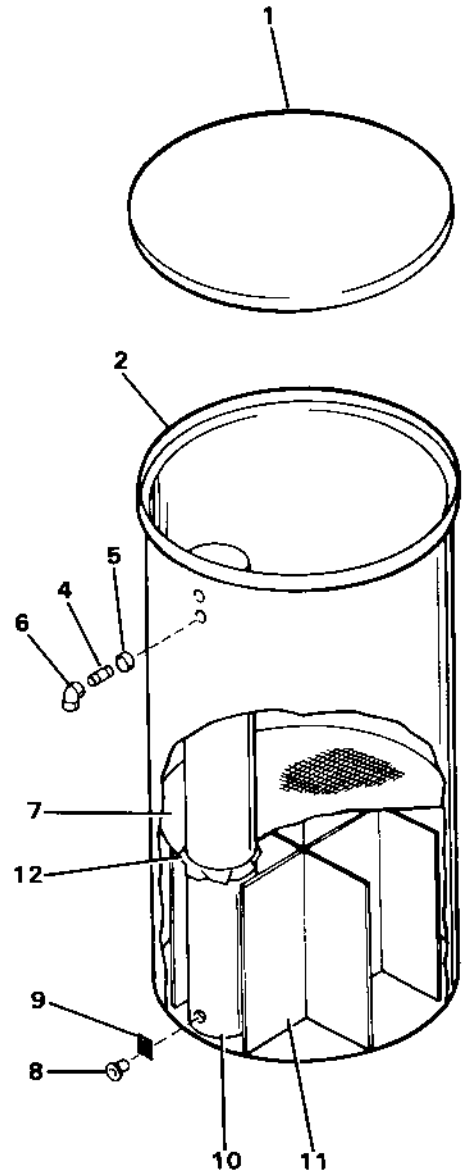
MF Side Mount Valve



Ref #	Part No.	Description	Ref #	Part No.	Description
1	340032	Valve Body:	17	400229	Screw
	340035	NPT	18	300745-1	Switch Plate
2		BSPP	19	86109	Screw
	507121	Throat and Nozzle Assembly:	20	720268	Power Cord Kit
		#53 x #28 (Used on Models 45, 70, 100,	21	300880	Mounting Box
	507122	120) Top and Side Mount, Green	22	507239	Drive Link
		#45 x #22 (Used on Models 150, 180)	23	86109	Screw
	507123	Side Mount, Orange	24	400626	Gasket
		#39 x #16 (Used on Models 200, 225, 240)	25	400625	Gasket
	507124	White	26	400644	Regeneration Light
	507125	#36 x #10 (Used on Model 300) Red	27	400645	Service Light
	507126	#31 X #7 (Used on Model 450) Gold	28	300905	Nylon Nut
		#29 x 15/64 (Used on Model 600)	29	400504	Cotter Pin
	507127	Dark Blue	30	420201	Hex Bushing
	507129	#27 x 1/4 (Used on Model 750) Brown	31	420531	Male Connector, 3/8 in Tube to 3/8 in NPT
3	420225	#50 x #22 (Used on Model 150)	32	300138	Timer Lock
4	400166	Top Mount, Yellow	33	400128	Screw (10 Required)
5	300853	1/2 in Pipe Plug	34	300906	Nylon Spacer
6		Cap Screws (5 required)	35	400238	Screw
		Upper Cap Gasket	36	1030452	Timer Mounting Plate
		Flow Package:	37	400738	Screw (4 Required)
	720300	3 gpm NPT	38	4000202	Self-Tapping Screw
	720301	3 gpm BSPP	39		Wire Harness:
	720302	4 gpm NPT		507877	110 Volt
	720303	4 gpm BSPP		507878	240 Volt
	720304	5 gpm NPT	40		Timer Assembly:
	720305	5 gpm BSPP		707201	6-Day, 115 V/60 Hz, 440
	720306	6 gpm NPT		707201-3	7-Day, 115V/60 Hz, 440
	720307	6 gpm BSPP		F60303-03	7-Day, 115V/60 Hz
	720308	10 gpm NPT		F60304-03	12-Day, 115V/60 Hz
	720309	10 gpm BSPP		F60305-03	ARC, 115V/60Hz
	720310	15 gpm NPT			
	720311	15 gpm BSPP		1030462	6-Day, 230V/50 Hz, 440
	720312	25 gpm NPT		1030463	7-Day, 230V/50 Hz, 440
	720313	25 gpm BSPP			
	720322	35 gpm NPT			
7	400165	Cap Screw			
8	300851	Drain Shut-Off			
9	400051-9	O-Ring			
10	514001-55	Piston Seal Kit # 514001-51			
11	400051-10	O-Ring		707201-4	ARC 115V/60 Hz
12	400051-11	O-Ring (Included w/Item 13)		607132	ARC 230V/50 Hz
13	507135	Lower Cap Assembly	41	300885	Timer Cover
14		Drive Motor:	42	300884	Motor Cover
	507244	110-120 Volt 60 Hz	43	300867	Pawl Latch
	507245	240 Volt 50 Hz	44		Side Mount Adapter:
15	320124	Micro Switches (3 Required, Included w/Item 14)		340034	1-1/2 in NPT
16	320203	Cam		340037	1-1/2 in BSPP

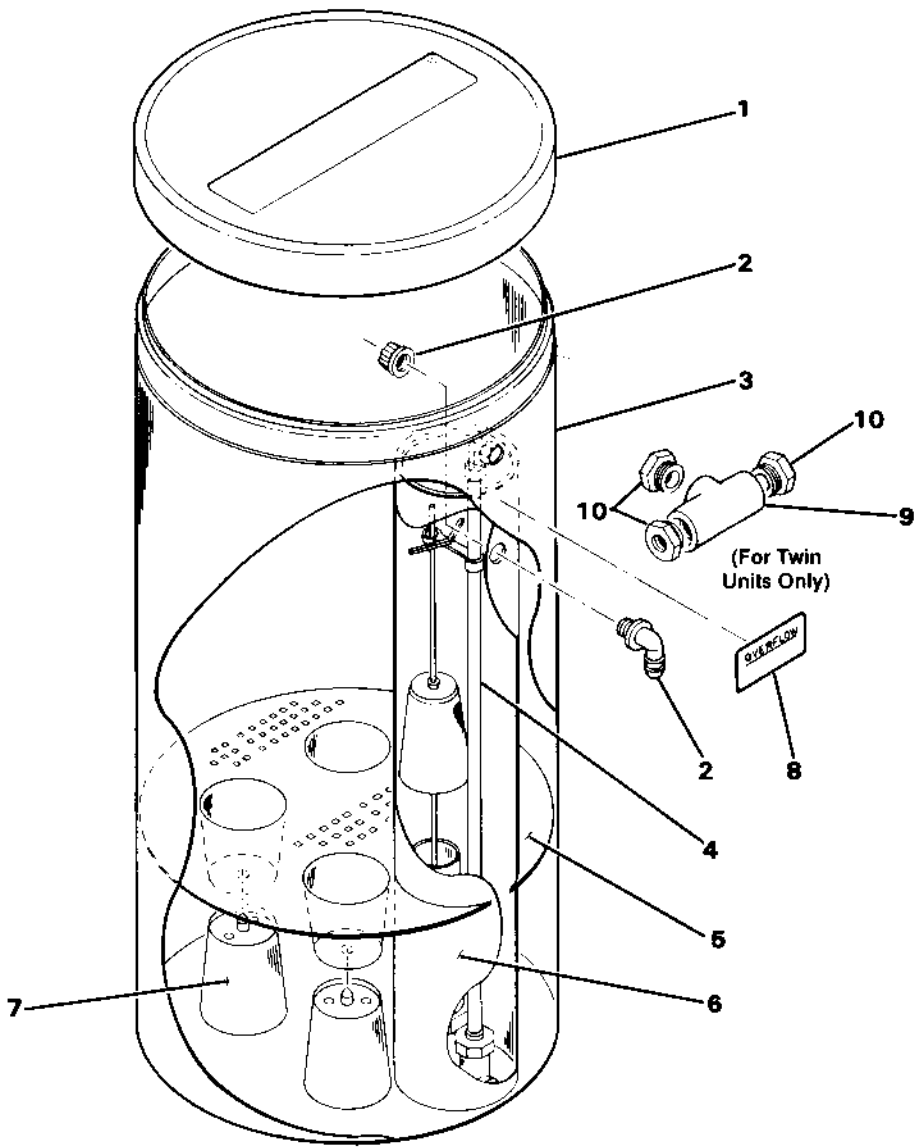
Brine Tank Assembly (24"-38" Diameter) Repair Parts and List

Ref. No.	Part No.	Description
1 & 2	—	Brine Tank and Cover
	200358	24" x 40" Single (for 16" SP)
	200505	24" x 40" Twin (for 16" SP)
	200359	24" x 50" Single (for 16" SP)
	200485	24" x 50" Twin (for 16" SP)
	200566	24" x 50" Single (for 19" and 24" SP)
	200588	30" x 60" Single and Twin (for 24" SP)
	200589	38" x 60" Single and Twin (for 24" SP)
3	—	Brine Well Assembly
	505007	3½" x 36" for 24" x 40" w/⅜" B.V.
	505011	3½" x 43" for 24" x 50" w/⅜" B.V.
	505014	5" for 24" x 50" w/½" B.V.
4	410575	Nipple ½" NPT
5	410576	Spacer
6	411016	Eil 90° x ⅛" PVC
7	—	Salt Platform
	200612	For 24" Tank w/⅜" B.V. (Approx. 24⅙" dia.)
	200616	For 24" Tank w/½" B.V. (Approx. 24⅙" dia.)
	200361	For 24" Tank w/⅜" B.V. (Approx. 23⅙" dia.)
	200387	For 24" Tank w/⅜" B.V. Twin (Approx. 24⅙" dia.)
	200515	For 24" Tank w/½" B.V. (Approx. 23⅝" dia.)
8	—	Bushing, Brine Well
	200088	For 3½" dia. Brine Well
	200232	For 5" dia. Brine Well
9	—	Screen, Brine Well
	200087	For 3½" dia. Brine Well
	200231	For 5" dia. Brine Well
10	—	Bottom Cap for Brine Well
	200213	For 3½" dia. Brine Well
	200233	For 5" dia. Brine Well
11	—	Salt Platform Supports (4 total)
	200374	16" for 24" dia. Tank (2 req'd.)
	200362	16" for 24" dia. Tank (2 req'd.)
	200366	24" for 24" dia. Tank (2 req'd.)
	200373	24" for 24" dia. Tank (2 req'd.)
	200266	24" for 30" dia. Tank (2 req'd.)
	200272	24" for 30" dia. Tank (2 req'd.)
	200273	24" for 38" dia. Tank (2 req'd.)
	200267	24" for 38" dia. Tank (2 req'd.)
12	200530	Brine Well - Seal (Not Shown)
	200145	Overflow Fitting for ⅜" B.V. Only
	—	Brine Tank Assemblies Compl. w/B.V.
	805076	24" x 40" w/16" SP w/⅜" B.V.
	805148	24" x 40" w/16" SP w/⅜" B.V. (Twin)
	805077	24" x 50" w/16" SP w/⅜" B.V.
	805101	24" x 50" w/16" SP w/⅜" B.V. (Twin)
	805149	24" x 50" w/24" SP w/½" B.V.
	805180	24" x 50" w/24" SP w/½" B.V.
	805177	30" x 60" w/24" SP w/½" B.V.
	805178	38" x 60" w/24" SP w/½" B.V.



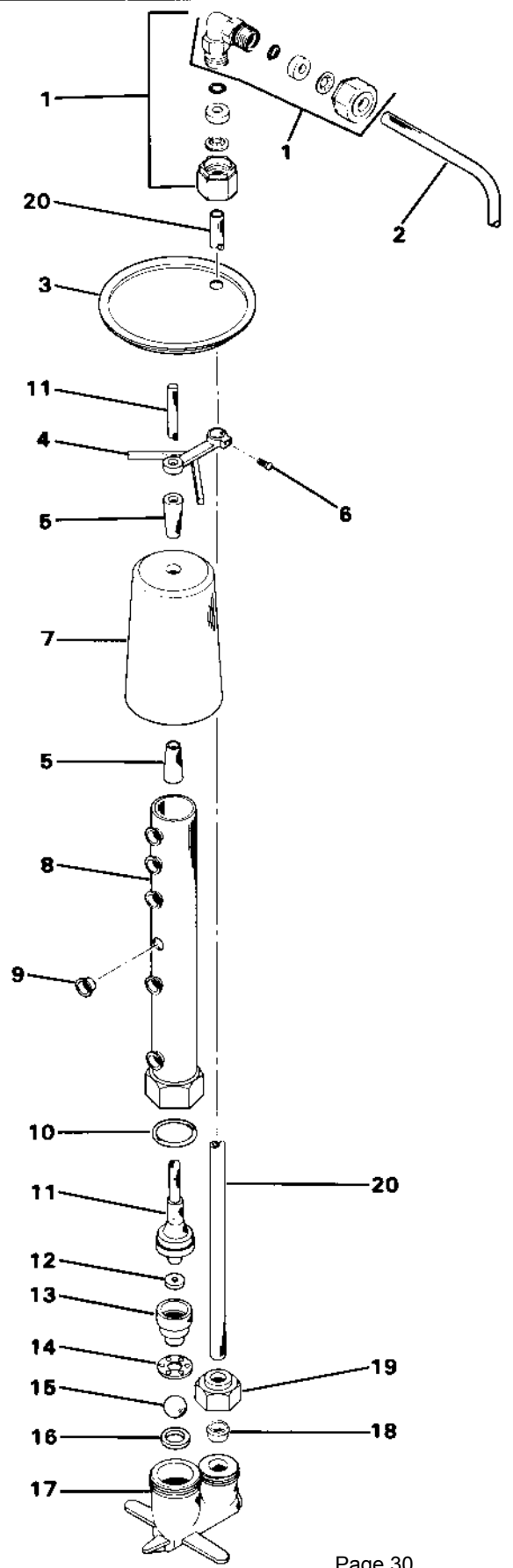
Brine Tank Assembly (18" Dia. x 40" Height) Repair Parts and List

Ref. No.	Part No.	Description
	805061	Brine Tank Assembly Complete w/Brine Valve 18" x 40"
1	200141-1	Brine Tank Cover
2	200145	Overflow Fitting
3	200478-1	Brine Tank 18" x 40"
4	706021-1	Brine Valve
5	200190-1	Grid Plate
6	505013-2	Brine Well
7	200629-1	Grid Support (4 req'd.)
8	400049-1	Overflow Decal
9	200442	Brine Director (for Twin Units Only)
10	411044-1	Reducer Bushings (3 req'd.)

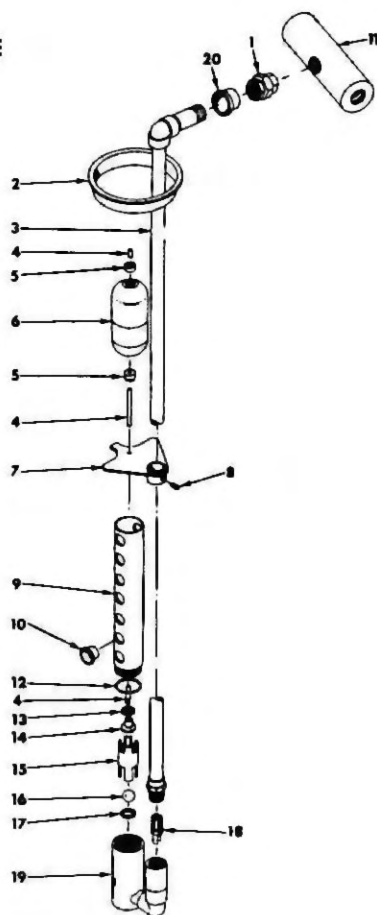


Repair Parts and List

Ref. No.	Part No.	Description
1	420530	ElI 3/8" Tube x 3/8" Tube
2	200126	Brine Line
3	200212-1	Brine Well Cap
4	506014	Float Rod Guide
5	400248	Rubber Float Locators (2 req'd.)
6	400100	Screw (Included w/Item 4)
7	200650	Float Plastic
8	506021	Riser
9	200086	Cap Plugs (Included w/Item 8)
10	400082	O-Ring
11	506016	Float Rod Stem and Seal Assy.
12	200189	Seal (Included w/Item 11)
13	200191	Brine Valve Insert
14	200192	Tension Washer
15	200155	Air Check Ball
16	400059	Tetra Seal
17	506015	Brine Valve Body Assy.
18	200125	Delrin Sleeve 3/8"
19	200066	Brine Valve Cap (Small)
20	200617	Brine Valve Pipe 46 3/8" Long
	200355	Brine Valve Pipe 50 3/8" Long
	200354	Brine Valve Pipe for 24" x 40"



½" BRINE VALVE

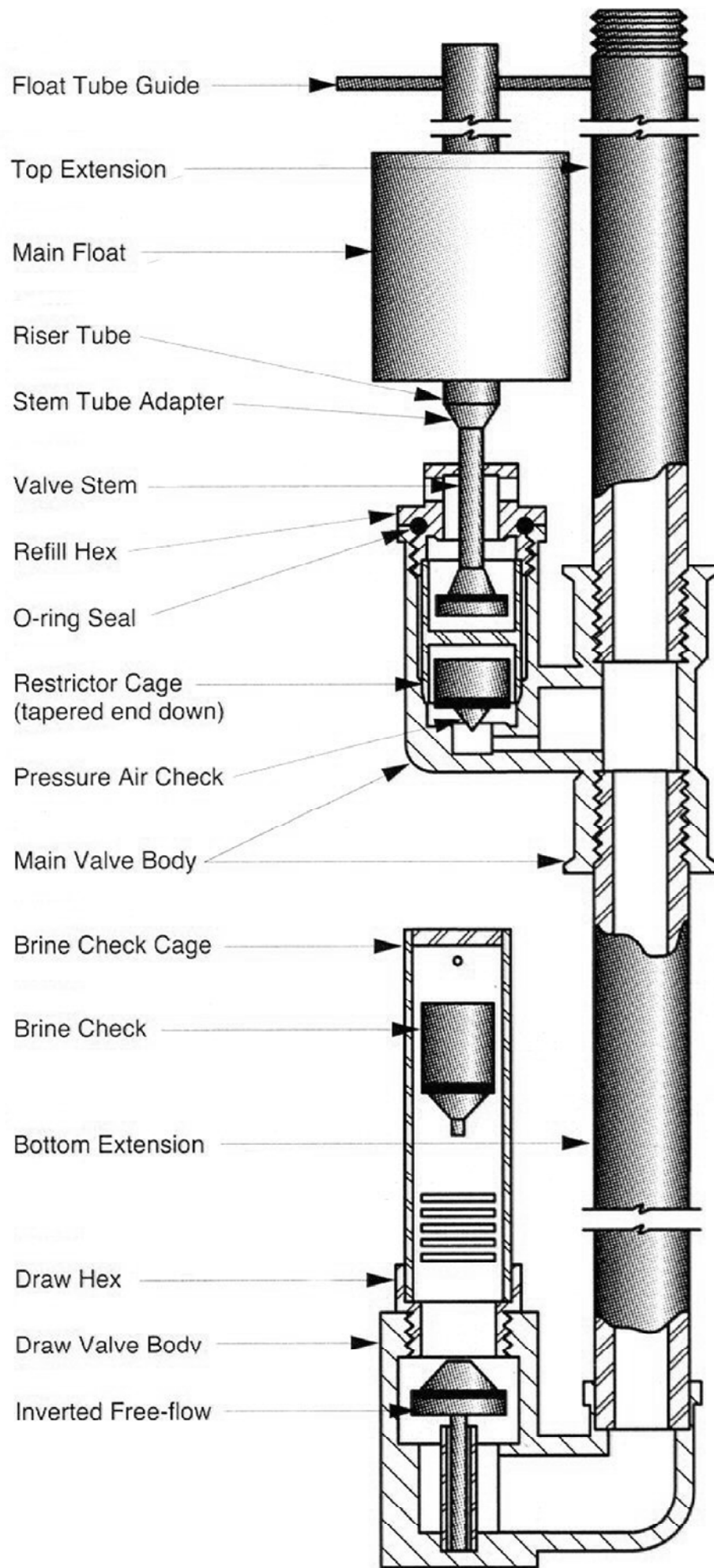


NOTE:

Item 17 has one side marked "up" in raised lettering. The "up" side must face the top of the assembly.

REPAIR PARTS LIST

Ref. No.	Part No.	Description
1	420518	Union - ½"
2	200296	Caplug
3	506023	Brine Valve Pipe Assembly
4	200290	Float Rod
5	200115	Float Locator (2)
6	200300	Brine Valve Float
7	506009	float Guide Assembly
8	400152	Set Screw
9	506012	Brine Riser Assembly
10	200230	Caplug (14)
11*	200442	Brine Director (Twin Units Only)
12	400085	"O" Ring
13	400087	Seal
14	200291	Brine Valve Stem
15	200288	Cage
16	200295	¾ Poly Ball
17	400086	Tetraseal
18	200293	Refill Check
19	506008	Valve Body Assembly
20	200527	Outlet Cap
	706042	Brine Valve Assembly Complete



Troubleshooting

The technology upon which the control valve is based is well established and proven in service over many years. However, should a problem or question arise regarding the operation of the system, the control can be very easily serviced. The control valve can be quickly replaced or adjustments can be made at the installation. For parts mentioned, refer to exploded views in the **Replacement Parts** section of this manual.

Problem	Possible Cause	Solution
<p>1. Failure to draw brine.</p>	<ul style="list-style-type: none"> a. Brine shut-off valve closed b. Low water pressure. c. Plugged nozzle. d. Air leaks in brine line. e. Worn piston seals. f. Restriction in brine valve or brine line. g. Restriction in flow control. h. Brine well fills too fast, shuts off brine valve prematurely. i. Sediment buildup in bottom of brine tank. j. Piston out of time. k. Service flow bypasses units, diaphragm valves not fully closing. 	<ul style="list-style-type: none"> a. Open the brine shut-off valve fully. b. Water pressure should be at least 25 psi (172 kPa). c. Remove the nozzle plug and clean the nozzle and throat. If they are removed, make sure the o-ring is sealed when it is reinstalled. d. Salt deposits or corrosion usually are evident at joints which will leak air. Clean the joints and use pipe tape on the threads to insure tight seals. Clean the union seats and tighten bonnet on the brine shut-off valve. e. Replace seals. f. Remove the restriction. g. Clean the flow control. Remove mineral deposits from the flow control buttons. h. Make sure refill ball check is in base of brine valve; if it is, then replace brine valve and check the brine well screens. Clean or replace. i. Clean the brine tank. j. Readjust piston and motor cam. Consult factory. k. Clean the diaphragm shaft and vent port (1/4 inch above the inlet) of the diaphragm valve. Do not plug the vent port.
<p>2. Mineral to service.</p>	<ul style="list-style-type: none"> a. Distributor missing in tank bottom. (Side mount tanks.) b. Unit installed backwards. Top Mount Tanks a. If the distributor is crushed when the mineral tank is loaded, gravel and/or mineral may enter the soft water pipes. 	<ul style="list-style-type: none"> a. Remove the plug at the bottom of the mineral tank. If mineral and gravel are present, a distributor is out of place. Remove the mineral and gravel from the tank and replace the distributor. Distributors should be checked immediately before the gravel is installed. Use Caution to avoid collapsing the distributors when using wrenches and pliers. b. Check plumbing and make sure the unit is properly installed. The inlet port on the control valve is marked with an arrow pointing into the valve. a. Remove the control valve. Remove the tank adapter. Remove mineral and gravel. Remove and inspect distributor.

Problem	Possible Cause	Solution
<p>3. Insufficient service flow rate. (Units equipped with optional bypass shut-off kits or alternating shut-off kits.)</p>	<p>a. Solenoid valve not closing.</p> <p>b. Diaphragm valve not opening fully.</p> <p>c. Vent port in the side of the diaphragm plugged.</p>	<p>a. The solenoid valve must seal when closed. Dirt, rust scale, etc., may prevent the valve from closing. Disassemble and clean. With the control valve in the Service position, disconnect tubing connection. No water should flow out of the solenoid valve.</p> <p>b. Build up of scale on the diaphragm shaft. Clean the shaft with fine emery paper.</p> <p>c. Clean the port with a fine wire or nail.</p>
<p>4. Hard water to service.</p>	<p>a. Salt.</p> <p>b. Salt bridging.</p> <p>c. Brine draw.</p> <p>d. Bypass valve.</p> <p>e. Float setting.</p> <p>f. Brine shut-off valve.</p> <p>g. Electrical power.</p> <p>h. Timer erratic (Does not regenerate at the proper time).</p> <p>i. Hot and cold water hardness.</p> <p>j. Sediment build up on grid plate.</p> <p>k. Improper salt dosage, low salting units.</p> <p>l. Remote bypass in plumbing.</p> <p>m. Twin units, one unit hard, one unit soft.</p>	<p>a. Make sure there is salt in the brine tank.</p> <p>b. Break up salt with a stick. Be careful not to damage the grid plate.</p> <p>c. Does the unit draw brine? (See No. 1 - Failure to draw brine.)</p> <p>d. Make sure the bypass valve is fully closed. To make sure the bypass valve seat is sealing, close the bypass and outlet valves. If water runs to service, disassemble the bypass valve and inspect the seat. Repair if necessary.</p> <p>e. Make sure the float is properly adjusted.</p> <p>f. Make sure the brine shut-off valve is fully opened.</p> <p>g. Make sure the timer is powered continually. Incorrect time of day indicates there has been an interruption in the power.</p> <p>h. Replace the timer.</p> <p>i. When the hot water tests hard, but less than the raw water, and the cold water tests soft, it is likely that the salt dosage is too small, and an additional plug should be removed from the brine valve, or the regeneration frequency should be increased.</p> <p>j. Clean the grid plate.</p> <p>k. Increase salt dosage.</p> <p>l. Check for bypass in other areas of building. Shut off the inlet, outlet and bypass of the conditioner, check for the flow of water at a soft water faucet.</p> <p>m. Check the brine director valve for proper operation. Foreign matter carried in from the brine tank can cause the brine director valve to lock in one position. Remove and clean.</p>
<p>5. Overflowing brine tank.</p>	<p>a. Contamination.</p> <p>b. Float binding.</p> <p>c. Faulty brine valve seal.</p> <p>d. Fittings defective.</p>	<p>a. Dirt from rock salt or other foreign material lodged in the brine valve seat. Empty the brine tank and clean. Flush valve. Refill the brine tank with a clean, bagged, evaporated, processed type of salt.</p> <p>b. Make sure the float is not binding on the brine well.</p> <p>c. Replace the brine valve seal.</p> <p>d. Loose or cracked fitting in the brine valve; tighten or replace.</p>

Problem	Possible Cause	Solution
<p>6. Unit will not regenerate automatically.</p>	<p>a. No power.</p> <p>b. Timer motor operation.</p> <p>c. Valve motor relay switches.</p> <p>d. Timer motor relay switches.</p> <p>Meter Initiated Units:</p> <p>a. Meter will not register.</p> <p>b. Meter registers will not initiate regeneration, will not reset.</p> <p>c. Terminal connections.</p> <p>Sensor Operated Unit:</p> <p>a. Regeneration will not initiate or regeneration is repeated.</p>	<p>a. Is there power to the unit? Is the power cord plugged in? Is a remote switch in the line shut off?</p> <p>b. Is the timer motor running? If not, replace the timer motor.</p> <p>c. Valve motor micro switch is not opening or closing. Adjust the micro switch stack. If the valve motor micro switch is burned out, replace the micro switch.</p> <p>d. Timer micro switch is not opening or closing. Adjust the micro switch. If the timer micro switch is burned out, replace the micro switch.</p> <p>a. Change the gear. If the adjusting plate is loose, align the gears and tighten the adjusting plate. If the change gears are not aligned, align the change gears.</p> <p>b. Adjust the register micro switches. Replace the micro switches.</p> <p>c. Tighten the connectors, (Refer to installation, operation and maintenance manual, Meter Registers Badger #53400.</p> <p>a. Recalibrate sensor board. Clean raw water probe. Replace sensor board. It is possible for the unit to double regenerate if it was starved of salt.</p>
<p>7. Control valve binds and will not complete cycle.</p>	<p>a. Sand and hot water backup will damage piston seals and may cause piston to bind.</p>	<p>a. If sand is present, water should be prefiltered. Prevent hot water from entering the conditioner.</p>
<p>8. Leak to drain.</p>	<p>a. Internal to control valve.</p> <p>b. Internal to drain shut-off valve.</p>	<p>a. Check the plunger position. See Figure X.</p> <p>b. Check drain shut-off.</p>
<p>9. Salt in service line.</p>	<p>a. Plugged injector.</p> <p>b. Low pressure.</p> <p>c. Drain line or flow control restricted.</p> <p>d. Brine line restricted or crimped.</p> <p>e. Excessive amount of brine in the brine tank.</p> <p>f. Insufficient rinse time.</p> <p>g. Intermittent pressure drop behind unit.</p>	<p>a. Clean the nozzle and throat of injector.</p> <p>b. Maintain a minimum pressure of 25 psi (172 kPa).</p> <p>c. Remove restriction.</p> <p>d. Remove restriction, free brine line.</p> <p>e. Adjust brine float. Check for loose or missing brine plugs.</p> <p>f. Increase fast rinse time.</p> <p>g. Install a check valve in the inlet line to the unit.</p>