



INSTALLATION, OPERATION, AND
MAINTENANCE MANUAL

MAT 15M-120M

METERED 3/4" - 1"

SE SERIES

TWIN ALTERNATING

WATER CONDITIONERS

FILL IN FOR FUTURE REFERENCE

| | |
|-----------------|-------|
| MODEL NO: | _____ |
| SERIAL NO: | _____ |
| DATE INSTALLED: | _____ |
| DEALER: | _____ |

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WATER TREATMENT PRODUCT WARRANTY

Marlo, Inc. warrants all water treatment products manufactured and/or distributed by it to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. The fiberglass mineral tank(s) alone have a warranty for a period of five (5) year from the date of shipment. If within that period any products shall be proven to Marlo, Inc.'s satisfaction to be defective, those products will be replaced, or their price refunded at Marlo Inc.'s option.

Marlo Inc.'s obligations or nonperformance, defective, or any damage caused by its products or their use, and buyer's exclusive remedy therefore, shall be limited to product replacement or refund and shall be conditioned upon Marlo Inc.'s receiving written notice together with a demand for such replacement or refund:

The foregoing warranty is exclusive and in lieu of all other expressed implied warranty (except of title) including but not limited to implied warranty of merchantability and fitness for particular purpose.

Marlo Inc. will not be subject to and disclaims the following:

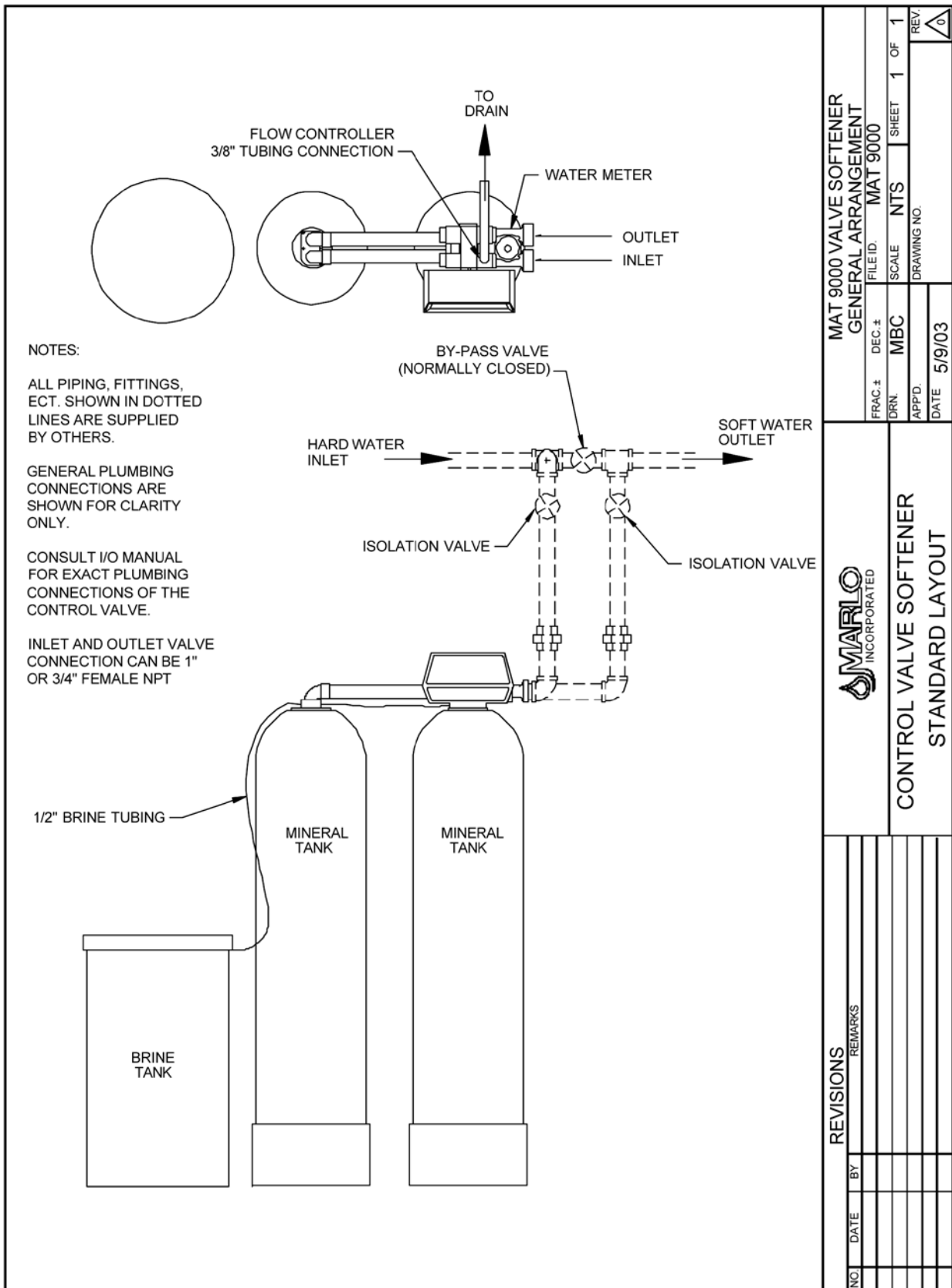
1. Any other obligations or liabilities arising out of breach of contract or out of warranty.
2. Any obligations whatsoever arising from tort claims (including negligence and strict liability) or arising under other theories of law with respect to products sold or services rendered by Marlo Inc. or any undertakings, acts, or omissions relating thereto.
3. All consequential, incidental, and contingent damages.
Labor charges, changebacks or handling charges are excluded from Marlo Inc.'s warranty provisions.

WATER SOFTENER GUARANTEE

Under normal operating conditions:

1. The softener effluent shall be zero soft as determined by a soap test.
2. The loss of softening resin through attrition during the first three (3) years shall not exceed 3% per year.
3. The softening resin shall not be washed out of the system during backwash.
4. The color and turbidity of the softener effluent shall not be greater than the incoming water. Any mechanical equipment proving defective in workmanship or material within one year after installation or (18) months after shipment, whichever comes first, shall be replaced FOB factory.

GENERAL ARRANGEMENT DRAWING



SPECIFICATION NOTES

Maximum salting is 15 pounds of salt per cubic foot of resin. This setting gives the longest time between regenerations and the highest capacity. It has an efficiency of 2,000 grains of hardness removed per pound of salt. The regeneration timer is setup for maximum salting at the factory.

Minimum salting is 6 pounds of salt per cubic foot of resin. It has an efficiency of 3,300 grains of hardness removed per pound of salt.

On continuous flow rates pressure loss does not exceed 15 psig.

On peak flow rates pressure loss does not exceed 25 psig.

Minimum operating pressure is 30 psi.

Maximum operating pressure is 120 psi.

Standard units are designed to soften unheated water within the range of 35-100°F.

Power requirements are 120 Volt, 60 Hertz, Single Phase, 2 amps non-interrupted.

Freeboard is the distance between the surface of the resin and the top of the tank.

Salt specifications are pelletized or solar salt, 99% pure, containing less than 1% insolubles.

The Pinwheel Setting time intervals are factory set and user adjustable.

The 1" water meter has a capacity range of 1,550 – 26,350 gallons and a flow range of 0.7 – 40 GPM with accuracy $\pm 5\%$.

The $\frac{3}{4}$ " water meter has a capacity range of 625 – 10,625 gallons and a flow range of 0.25 – 15 GPM with accuracy $\pm 5\%$.

SPECIFICATION TABLE

| MODEL | MAT | 15 | 22 | 30 | 45 | 60 | 60 | 90 | 120 | |
|------------------------------|-----------------------|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Valve Size | inches | 3/4 | 3/4 | 3/4 | 3/4 | 3/4 | 1 | 1 | 1 | |
| Capacity (Kgrains) | Maximum | 15 | 22 | 30 | 45 | 60 | 60 | 90 | 120 | |
| | Minimum | 10 | 15 | 20 | 30 | 40 | 40 | 60 | 80 | |
| FLOW RATE (GPM) | Service | Continuous | 12 | 13 | 14 | 13 | 14 | 16 | 17 | 18 |
| | | Peak | 16 | 17 | 19 | 18 | 19 | 1 | 22 | 23 |
| | Backwash & Fast Flush | 1.2 | 1.6 | 2.0 | 2.4 | 3.5 | 3.5 | 5.0 | 6.0 | |
| | Brine Draw & Rinse | 0.31 | .045 | .045 | 1.0 | 1.0 | 1.0 | 1.0 | 1.2 | |
| | Brine Tank Refill | 0.25 | 0.25 | 0.50 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| TIMER SETTINGS | Backwash | Minutes | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | Brine Draw & Rinse | Minutes | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| | Fast Flush | Minutes | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| | Brine Tank Refill | Minutes | 10 | 16 | 10 | 8 | 10 | 10 | 16 | 20 |
| SOFTENER TANK | Size | Dia x Height Inches | 7x44 | 8x44 | 9x40 | 10x54 | 12x52 | 12x52 | 14x65 | 16x65 |
| | Gravel Subfill | Pounds | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 35 |
| | Resin | Cubic Feet | 1/2 | 3/4 | 1 | 1 1/2 | 2 | 2 | 3 | 4 |
| | Freeboard | Inches | 17 | 15 | 8 | 17 | 16 | 16 | 21 | 21 |
| BRINE SYSTEM | Tank Size | Dia x Height Inches | 18x33 | 18x33 | 18x33 | 18x40 | 18x40 | 18x40 | 18x40 | 24x40 |
| | Injector | Code | 0 | 1 | 1 | 3 | 3 | 3 | 3 | 4 |
| | | Color | RED | WHT | WHT | YEL | YEL | YEL | YEL | GRN |
| | Maximum Salt Storage | Pounds | 290 | 290 | 290 | 320 | 320 | 320 | 270 | 550 |
| | Salt Dosage | Maximum | 7.5 | 11.3 | 15 | 22.5 | 30 | 30 | 45 | 60 |
| | | Minimum | 3 | 4.5 | 6 | 9 | 12 | 12 | 18 | 24 |
| | Refill Time | Maximum | 10 | 16 | 10 | 8 | 10 | 10 | 16 | 20 |
| | | Minimum | 4 | 4 | 4 | 4 | 4 | 4 | 6 | 8 |
| Regeneration per Salt Refill | Maximum | 40 | 25 | 20 | 15 | 10 | 10 | 6 | 9 | |
| | Minimum | 100 | 64 | 50 | 38 | 26 | 26 | 15 | 23 | |
| Regeneration Waste Volume | Gallons | 40 | 52 | 64 | 116 | 126 | 126 | 156 | 188 | |

INSTALLATION INSTRUCTIONS

GENERAL INFORMATION

1. Minimum operating pressure is 30 psi. If pressure less than 30 psi is encountered, a regulator must be installed.

NOTE: The control valve will not operate correctly if feeding into an atmospheric tank. A pressure control device must be added to the outlet to maintain the minimum pressure.

2. Maximum operating pressure is 120 psi.
If pressure greater than 120 psi is encountered, a pressure regulator must be installed.
3. Power requirements are shown on a voltage sticker on the motor inside cover of the control valve. You can also tell by wire color on the motor: Black wires are 115 volt. Yellow wires are 220 volt. Blue wires are 24 volt
4. Standard units are designed to soften unheated water not to exceed 100° F.
Special valve assemblies are available to handle heated water supplies exceeding 100°F.
Consult factory if applicable.
5. Each softener tank is shipped with distributor manifold and control valve preassembled.
Take care when uncrating and erecting so that no items are damaged.
6. The distributor assembly has been shipped inside the fiberglass mineral tank.
Check to make sure that there is no damage to the riser pipe, baskets, laterals, or hub prior to loading media.

LAYOUT REQUIREMENTS

1. Select a location that is accessible and near a floor drain that has adequate carrying capacity to handle the softener regeneration flow. See specification table for the flow rate. Allow a minimum of 24" above the tank for loading media.
2. Erect each the softener tanks on a concrete or other firm foundation and level.

NOTE: If the system is skid mounted, it will be prepiped and preloaded at the factory. Skip the following instructions and go to the section "Installation of Connection Piping".

3. Position the brine tank according to the illustration and supplementary brine tank information.
Keep the brine tank as close as possible to the softener tanks.

NOTE: The distance between the softener and brine tanks will affect the brine injector performance, as the distance increases the injector performance decreases. This may cause an inadequate regeneration. Maximum recommended distance is 5 ft.

4. A grounded electric receptacle is required for the control valve transformer.

INSTALLATION INSTRUCTIONS

Note: If the system is skid mounted, it will be prepiped and preloaded at the factory. Skip the following instructions and go to the section of “Installation of connection piping”.

1. On Models MAT-15, 30, 45, and 60 the softening media has been pre-loaded at the factory. Skip this section and go to “Mounting Control Valve Assembly”.
2. Fill a tank approximately 1/3 full of water using a hose, bucket, etc. Plug the PVC distributor manifold pipe using a plastic cap, cork, rag, etc. No gravel or resin should go into this distributor manifold pipe.
3. Verify the distributor manifold is center in the tank with the distributor resting on the bottom of the tank. Verify the riser pipe is still plugged.

Note: Reference the specification table in the front of this manual for the correct quantities of gravel and resin. These quantities are for each tank. Make sure you have the required amounts on site before you begin.

4. With care not to damage any lateral, pour in the gravel provided for each tank through the top opening in the tank and level out evenly. This will cover the distributor assembly.

Note: Wetting the gravel in the bags before loading will eliminate the normal amount of dust.

5. When gravel is loaded and leveling is completed, proceed as follows:
6. With the distributor riser pipe still plugged, add the proper amount of resin supplied for each tank through the top opening in the tank.

Caution: The softener resin is very slippery. Take care when stepping on any spilled resin. Remove spilled resin from standing surface immediately.

7. When loading is complete, remove plastic cap, cork, or rag that was used to plug the distributor riser pipe. Be careful not to let any foreign debris fall into the pipe. The result could be damage to system.
8. Repeat instruction steps 1-7 for the second softener tank.

INSTALLATION INSTRUCTIONS

Note:

- Use thread sealing tape on all threaded piping connections.
- Install the piping conforming to federal, provincial, and local codes.
- Unions or flanges are recommended at the control valve's inlet and outlet connections
- To enhance the monitoring of the system's performance sample valves and pressure gauges can be installed at the inlet and outlet piping of the softening unit (not provided).
- If distance of drain line is over 10 ft. vertical or 25 ft. horizontal run, increase drain line one pipe size over that provided on the control valve.
- Do not make a direct connection to the drain. Provide an air gap of at least four times the diameter of the pipe to conform to sanitation codes and to permit observation of the flow.
- It is not recommended that an overhead or a long horizontal drain run be used. The increase of backpressure will cause problems when drawing brine.

Caution: All piping must be properly supported. The tank and valve assemblies are not meant to support the connecting piping.

1. Install piping as shown on installation diagram. It is recommended that unions be installed before the inlet and outlet valves to facilitate service of unit. Be sure piping is free of thread chips and other foreign matter. The connecting piping should be the same size or larger than the service inlet and outlet of the control valve.
2. Verify that the flow arrow stamped on the drain flow controller is pointing away from the control valve. See installation diagram or valve manual for the location. Install a drain line from backwash control assembly to an appropriate drain using a minimum of elbows. Install a union near the backwash control to facilitate cleaning. Do not install a valve on the drain line.
3. Interconnect the brine line tubing between the control valve and the brine tank. Verify that the brine line tubing is not kinked or restricted
4. Run flexible tubing (not provided) from the brine tank's over flow fitting to an appropriate, non-elevated, open drain.

INSTALLATION INSTRUCTIONS

MOUNTING CONTROL VALVE ASSEMBLY

1. On the right side tank, verify that the distributor riser pipe is not plugged.
2. Lubricate the distributor o-ring on the bottom of the control valve with silicone.
3. Screw the control valve into top opening of tank making sure the distributor riser pipe slides easily through the distributor o-ring. Care must be taken not to “nick” this o-ring as hard water leakage could result.
4. Tighten down the control valve to ensure positive o-ring seal at top of tank.
5. On the left side tank, verify that the distributor riser pipe is not plugged on the second softener tank.
6. Lubricate the distributor o-ring on the bottom of the second tank adapter assembly with silicone.
7. Screw the second tank adapter assembly into top opening of tank making sure the distributor riser pipe slides easily through the distributor o-ring. Care must be taken not to “nick” this oring as hard water leakage could result.
8. Attach the second tank adapter assembly to the control valve.

MOUNTING WATER METER ASSEMBLY (may be factory connected)

1. Locate the meter. The water meter has a flow arrow stamped on it. The flow arrow on the meter should be pointing away from the control valve.
2. Attach the meter to the control valve’s outlet water connection.
3. Interconnect meter cable between the control valve timer and water meter dome.

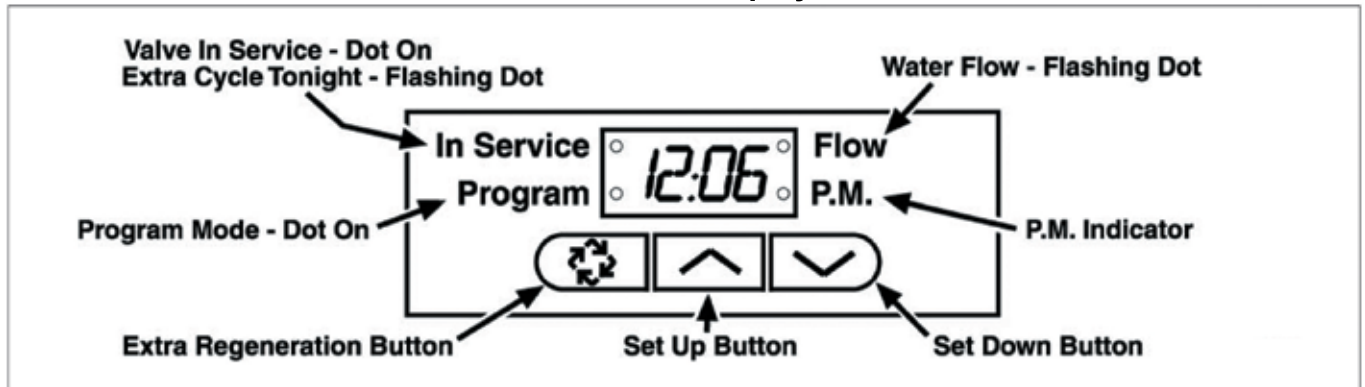
START-UP

1. Again, make sure all plumbing is complete and tight including drain line and brine line. Make sure all electrical connections are complete per wiring diagrams provided.
2. Using a bucket or hose, fill brine tank with water to 2" above salt platform. Do not add salt at this time.
3. Make sure inlet and outlet isolation valves are closed. Turn on power to the system.

Note: Start up only one (1) tank at a time.

In **Service Mode** the **Time of Day** display alternates with **Volume Remaining** and **Tank In Service** display light is illuminated. As treated water is used, the **Volume Remaining** display counts down from the input value to zero or (----). Once this occurs a **Regeneration** cycle initiates immediately. Water flow through the valve is indicated by the flashing **Flow Dot Indicator**.

SE Timer Display



SE Timer Screens

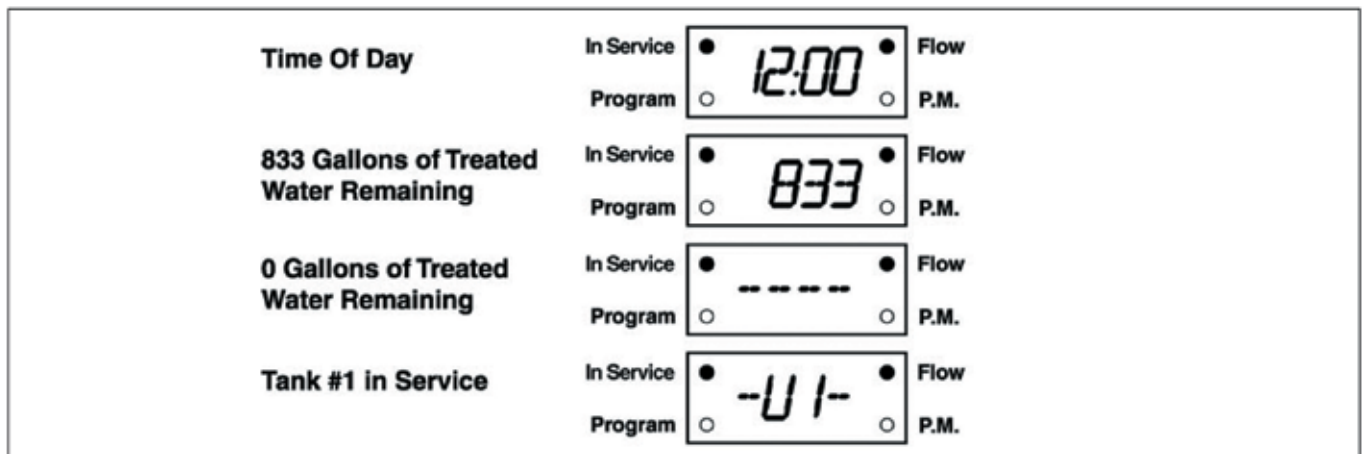
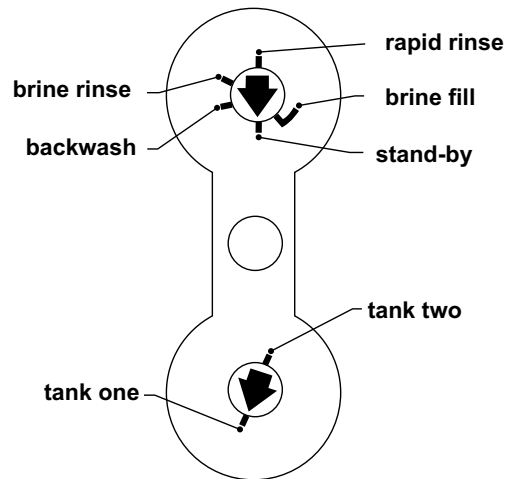


Figure 18: SE Timer Display During Normal Operation

START-UP continued

The softening cycle steps are as follows:

- Service
- Step 1 (Backwash)
- Step 2 (Brine Draw/ Slow Rinse)
- Step 3 (Fast Rinse)
- Step 4 (Brine Tank Refill)
- Return to Service




REGENERATION STEPS

- **Backwash:** The cycle duration is factory set at 10 minutes for clean feed water applications. Increase time duration to 15 minutes when turbidity is present in the feed water.
- **Brine Draw/Rinse:** The cycle duration is factory is set at 60 minutes to assure the required amount of brine is introduced and rinsed from the resin. Increase time duration when the injector feed pressure is below 40 psi.
- **Fast Flush:** The cycle duration is factory set at 10 minutes to rinse chlorides from the resin prior to the softener is placed online. Increase time duration to 15 minutes if traces of chlorides are present in the service outlet water.
- **Brine Tank Refill:** The cycle duration is factory set at the maximum salt to achieve maximum softener capacity. The published minimum salt can be programmed to reduce salt consumption by 50% and reduced softening capacity by 30%.
- **Cycle End:** The cycle duration is factory set at 4 minutes. Its purpose is to identify the end of regeneration and advance the softener control valve to the Standby position.

Note: Brine Draw / Slow Rinse step is actually two events. The brine is suctioned from the brine tank until the level falls to the bottom of the brine valve. An air check in the valve will close once the brine is to low. This is the end for the Brine Draw step and should last about twenty (20) minutes. The rest of the time in Step 2 is Slow Rinse.

START-UP continued

4. Locate the extra regeneration button  on the front side of the timer. Press the button for 5 seconds. The softener control valve will advance to Backwash position. Be patient this will take several minutes.
5. Remove electrical power from unit, and then slowly open inlet water valve approximately half open. Water will begin to fill through bottom distributor into tank. When tank is full, water will begin to flow out of drain line. Slowly open inlet valve until full open. Allow water to flow from drain line for approximately 15 minutes.

Warning: Monitor this drain water flow carefully. There is a problem if you see softener resin in the drain water. Turn off inlet water immediately and then consult factory.

6. Restore electrical power to unit. Advance the control valve to Brine Draw / Slow Rinse position, using the same method as step 5. Make sure unit draws water from brine tank. There should also be reduced flow at the drain line.
7. Advance the control valve to the Fast Rinse position. Remove electrical power to the unit. Let water run to drain position for approximately 5 minutes or until water runs clear.
8. Restore electrical power to unit. Advance the control valve to Brine Refill position. Water should begin to refill brine tank. Allow the brine tank to refill until water in salt tank is again 2" above the salt platform. There should be no flow to drain in this valve position.
9. Advance control valve to Service position. Brine tank refill should stop. Open outlet valve and run water at the nearest cold water faucet to the water softener system for
10. Repeat instruction steps 1-10 for each softener tank.
11. Add salt to the brine tank. **Use pelletized or solid salt**, 99.0 – 99.8% pure salt containing less than 0.5% insoluble.
12. Use the test kit provided to check water for softness. Check the water hardness daily the first week in order to establish how often the softener should be regenerated. approximately 5 minutes.

PROGRAMMING CONTROLLER

CALCULATING WATER TREATMENT VOLUME - BATCH SIZE

“Batch size” is the term used for the amount of water the softener can condition before it needs to regenerate. This is a simple calculation provided two pieces of information are known:

- **Softener Model** (i.e. MAT-60 has 60,000 grains capacity per tank).
- **Hardness** of the raw water being treated by the water softener.

$$\text{Batch Size} = \text{Softener Capacity} / \text{Water Hardness}$$

SAMPLE CALCULATION - TREATED WATER CAPACITY

Example:

Water hardness is 20 grains hard and the installed unit is a Marlo Model MAT-60.

Using our equation

$$\text{Batch size} = 60,000 / 20 \text{ or } 3,000 \text{ gallons.}$$

The treated water capacity would be 3,000 gallons. This value is commonly adjusted to 90 percent of the actual value (in this example 2,700 gallons) to assure not over-running the softener.

$$10\% \text{ reserve capacity} = 300 \text{ gallons.}$$

$$3,000 \text{ gallons} - 300 \text{ gallons} = 2,700 \text{ gallons (batch size)}$$

Use this value for Step #2 of the programming sequence (see below).

Set Control Programming

1. Press and hold both the **Set Up** and **Set Down** buttons for 5 seconds.



2. Set the Treated Water Capacity. Using the **Set Up** or **Set Down** buttons, set the amount of treated water to flow through the unit before a **Regeneration** is required.

Volume Remaining (No Display Code)

Press the Extra Cycle button. Use this display to set the amount of water (gallons/liters/cubic meters) that can be treated by the unit before a regeneration cycle is required. With Meter Delayed Regeneration Type set, it is necessary for the programmer to determine a reserve capacity and subtract that value from the calculated full capacity of the unit. This display cannot be viewed with Timeclock Regeneration Type set. Use the Set Up and Set Down buttons to adjust this value.

Range = t10.0 - t60.0 = 10,000 - 60,000 gallons

Range = t10.0 - t60.0 = 10,000 - 60,000 liters

Range = t10.0 - t60.0 = 10,000 - 60,000 cubic meters



3. Press the **Extra Regeneration** button.



PROGRAMMING CONTROLLER continued

- Set the **Regeneration Time**. Use the **Set Up** or **Set Down** buttons to set the desired time of day for **Regeneration** to occur.

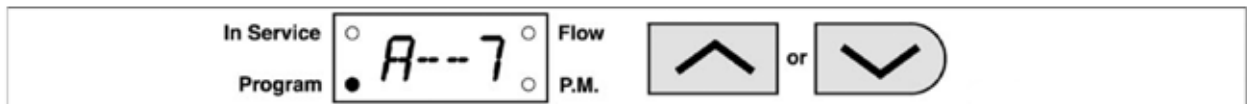
NOTE: This does not display if **Regeneration** occurs immediately.



- Press the **Extra Regeneration** button.



- Set **Regeneration Day Override**. Use the **Set Up** or **Set Down** buttons to set the maximum number of days before a **Regeneration** cycle must occur.



- Press the **Extra Regeneration** button to exit the program.*



NOTE: If setting up the system for the first time, perform the following **Fast Cycle Regeneration**:

- Press the **Extra Regeneration** button for 5 seconds to force an **Extra Regeneration** immediately.
- Once the valve reaches Regen Step #1, let water run to drain for approximately 5 minutes.
- Press the **Extra Regeneration** button once to advance valve to Regen Step #2.
- Press the **Extra Regeneration** button once to advance valve to Regen Step #3 (if active).
- Press the **Extra Regeneration** button once to advance valve to Regen Step #4 (if active).
- Press the **Extra Regeneration** button once to advance valve to Regen Step #5 (if active).
- Press the **Extra Regeneration** button once more to advance the valve back to **In Service**.

Set Time of Day



When the valve is **In Service**, press either the **Set Up** or **Set Down** button once to adjust the **Time Of Day** by one digit. Press and hold to adjust by several digits.

START-UP NOTES

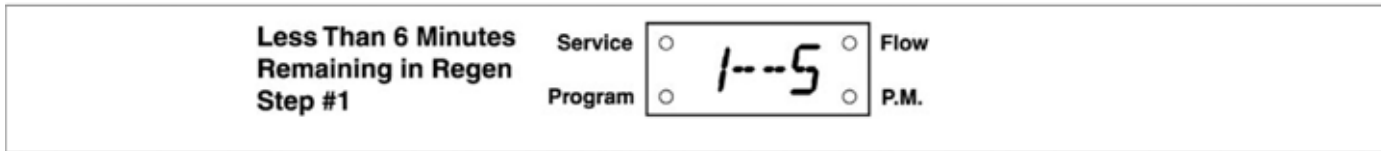
Immediate Regeneration Valves With Days Between Regeneration Override Set

When the valve reaches its set **Days Since Regeneration Override** value, a **Regeneration** cycle initiates immediately. This event occurs regardless of the **Volume Remaining** display reaching zero gallons.

Control Operation During Regeneration

In **Regeneration** the control displays a special **Regeneration** display. While in **Regeneration** the control shows the current **Regeneration** step number to which the valve is advancing or has reached, and the time remaining in that step. The displayed step number flashes until the valve completes driving to this **Regeneration** step position. Once all **Regeneration** steps are complete the valve returns to **In Service** and resumes normal operation.

Example:



Pressing the **Extra Cycle** button during a **Regeneration** cycle immediately advances the valve to the next cycle step position and resumes normal step timing.

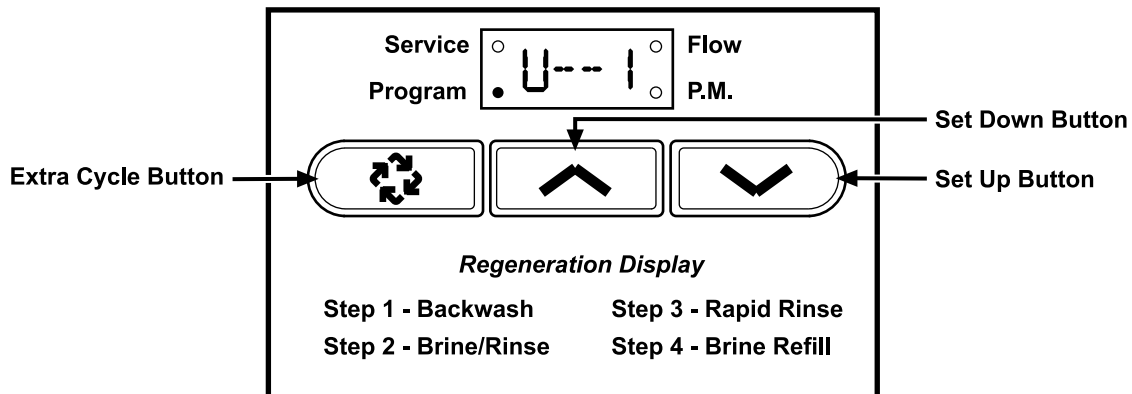
Control Operation During Programming

The control only enters the **Program Mode** with the valve **In Service**. While in the **Program Mode** the control continues to operate normally monitoring water usage and keeping all displays up to date. Control programming is stored in memory permanently. There is no need for battery backup power.

Control Operation During A Power Failure

During a power failure all control displays and programming are stored for use upon power re-application. The control retains these values for years, if necessary, without loss. The control is fully inoperative and any calls for **Regeneration** are delayed. The control, upon power re-application, resumes normal operation from the point that it was interrupted. An inaccurate or flashing **Time of Day** display indicates that a power outage has occurred.

MASTER PROGRAMMING MODE



When the Master Programming Mode is entered, all available option setting displays may be viewed and set as needed. Depending on current option settings, some displays cannot be viewed or set.

Entering Master Programming Mode

Set the Time Of Day display to 12:01 P.M. Press and hold the Set Up and Set Down buttons together until the Program Dot turns on (about 5 seconds). Depending on current option settings, some displays cannot be viewed or set.

Exiting Master Programming Mode

Press the Extra Cycle button once per display until all are viewed. The Program Mode is exited and normal operation resumes.

Resetting Permanent Programming Memory

There are two ways to reset the timer:

- Press and hold the Set Up and Set Down buttons for 25 seconds until the Time Of Day display resets to 12:00 P.M. All option settings are reset to default values. Control programming must be reset as necessary.
- Press and hold the Extra Cycle button while applying power. Release the Extra Cycle button. When the timer powers up, "P3.0" (the software version) will be displayed for 2 seconds on the LED display.

1. Display Format (Display Code U)

Press the Extra Cycle button. This display is used to set the desired display format. This option setting is identified by the "U" in the first digit. There are two possible settings:

US Format uses gallons for volume with a 12 hour timekeeping format. Regeneration timing is in minutes. Use the Set Up and Set Down buttons to adjust this value.

Example: [U - - 1]

Metric Format uses liters for volume and a 24 hour timekeeping format. Regeneration timing is in tenths of minutes. Use the Set Up and Set Down buttons to adjust this value.

Example: [U - - 2]

Cubic Metric Format uses cubic meters for volume and a 24 hour timekeeping format. Regeneration timing in tenths of minutes. Use the Set Up and Set Down buttons to adjust this value.

Example: [U - - 4]

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING MODE

2. Regeneration Type (Display Code 7)

Press the Extra Cycle button. Use this display to set the Regeneration Type. This option setting is identified by the number “7” in the first digit. There are three possible settings:

Timeclock Delayed

The control determines the day that a regeneration is required by the Regeneration Day Override setting (A). Once this day is reached, a regeneration cycle starts at the set Regeneration Time.

NOTE: The display will alternate between the “Time of Day” and “Days to Regeneration” when Timeclock Delayed is selected.

Example: [7 - - 1]

Meter Immediate

The control determines that regeneration is required when the available volume of treated water drops to zero. Regeneration begins immediately.

Example: [7 - - 2] This setting is typically used on the Twin Tank Control Valves.

Meter Delayed

The control determines that regeneration is required when the available volume of treated water drops to zero. Regeneration begins immediately at the set regeneration time. Use the Set Up and Set Down buttons to adjust this value.

Example: [7 - - 3]

3. Volume Remaining (No Display Code)

Press the Extra Cycle button. Use this display to set the amount of water (gallons/liters/cubic meters) that can be treated by the unit before a regeneration cycle is required. With Meter Delayed Regeneration Type set, it is necessary for the programmer to determine a reserve capacity and subtract that value from the calculated full capacity of the unit. This display cannot be viewed with Timeclock Regeneration Type set. Use the Set Up and Set Down buttons to adjust this value.

Range = t10.0 - t60.0 = 10,000 - 60,000 gallons

Range = t10.0 - t60.0 = 10,000 - 60,000 liters

Range = t10.0 - t60.0 = 10,000 - 60,000 cubic meters

4. Regeneration Time (Clock Display Without a Flashing Colon)

Press the Extra Cycle button. The next display that appears is the option setting for Regeneration Time. It is identified by a clock display without a flashing colon. Set the desired time of day that a regeneration may occur. This display cannot be viewed with Meter Immediate Regeneration Type set. Use the Set Up and Set Down buttons to adjust this value.

Range = Anytime

Example: 2 o'clock A.M. Regeneration Time — [2: 0 0] (A.M. Indicator Dot On)

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING MODE

5. Regeneration Day Override (Display Code A)

Press the Extra Cycle button. The next display that appears is the option setting for Regeneration Time. It is identified by a clock display without a flashing colon. Set the desired time of day that a regeneration may occur. This display cannot be viewed with Meter Immediate Regeneration Type set. Use the Set Up and Set Down buttons to adjust this value.

- With Timeclock or Meter Delayed Regeneration Type selected, regeneration begins at the set regeneration time.
- With Meter Immediate Regeneration Type selected, regeneration begins at the same time of day that the last regeneration cycle was initiated. An OFF setting cancels this feature with all regeneration types except Timeclock Regeneration where it must be used. Use the Set Up and Set Down buttons to adjust this value.

Range = 1-99 (Timeclock Delayed)

Range = OFF, 1-99 (All Meter Regeneration Types)

Example: Override every 7 days — [A - - 7]

Cancel setting — [A O F F] (Meter Immediate or Delayed Regeneration Types Only)

6. Regeneration Cycle Step Programming (Display Code 1-5)

Press the Extra Cycle button. The next 2-6 displays that appear are part of a series of option settings used to program the Regeneration Cycle. Each display is used to set in minutes (or tenths of minutes for Metric). A step # turns on for the regeneration cycle step being programmed.

Range = OFF, 100-199 minutes (US Format)

Range = OFF, 100-199 minutes (Metric Format)

- Skip regeneration steps by setting the display to 0
- End a regeneration cycle by setting the step # after the last active step to OFF, as shown below:

Example: Regeneration Cycle Step #1, 8 minutes — [1 - - 8] (US Format)

Regeneration Cycle Step #2, skipped — [2 - - 0] (US Format)

Regeneration Cycle Step #3, 8.5 minutes — [3 - 8.5] (Both Metric Formats)

Regeneration Cycle Step #4, cancelled — [4 O F F] (All Format)

- Press the Extra Cycle button once per display to advance through Regeneration Cycle Step Programming.
- Use the Set Up and Set Down buttons to adjust this value.

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING MODE

7. Flow Meter Size (Display Code F)

Press the Extra Cycle button. The next display sets the flow meter size. Use this display to set the proper amount of pulses generated by the flow meter for each gallon of liter of water flow. This setting cannot be viewed with Timeclock Regeneration Type selected.

Range = 1-999 pulses (US Format)

Range = .1-99.9 pulses (Metric Format)

| | | |
|------------------|-------------|--|
| Examples: | [F 1 2 6] | 3/4" Turbine Flow Meter used with the 2510SE (US Format) |
| | [F 3 3.2] | 3/4" Turbine Flow Meter used with the 2510SE (Metric Format) |
| | [F 1 3 3] | 3/4" Turbine Flow Meter used with the 9000SE (US Format) |
| | [F 3 5.1] | 3/4" Turbine Flow Meter used with the 9000SE (Metric Format) |
| | [F - 2 0] | 3/4" Paddle Wheel Flow Meter (US Format) |
| | [F - 5.3] | 3/4" Paddle Wheel Flow Meter (Metric Format) |
| | [F - - 8] | 1.0" Paddle Wheel Flow Meter (US Format) |
| | [F - 2.1] | 1.0" Paddle Wheel Flow Meter (Metric Format) |
| | [F - - 4] | 1-1/2" Paddle Wheel Flow Meter (US Format) |
| | [F 1.0] | 1-1/2" Paddle Wheel Flow Meter (Metric Format) |
| | [F 80.0] | 1" & 1-1/2" Inline Meter (US Format) |
| | [F 21.1] | 1" & 1-1/2" Inline Meter (Metric Format) |

— Use the Set Up and Set Down buttons to adjust this value.

8. Valve Type (Display Code o)

— Press the Extra Cycle button. Use this display to set the type of valve used with the control. This option setting is identified by the letter "o" in the first digit. When #2 is selected, the current Tank # in Service must be entered in the next display.

| | | |
|-----------------|-------------|--|
| Example: | [o - - 1] | 2510, 2750 or 2850 Single Tank Valve Operation. |
| | [o - - 2] | 9000, 9100 or 9500 Twin Tanks Valve Operation. |
| | [o - U 1] | Unit #1 Tank in Service. (viewed only when set to [o - - 2]) |

— Use the Set Up and Set Down buttons to adjust this value.

9. Line Frequency (Display Code LF)

— Press the Extra Cycle button. Use this display to set the frequency of the power applied to the control. When properly set, all timekeeping functions remain accurate. This option setting is identified by the letters "LF" in the first two digits. There are two possible selections.

Example: [L F 5 0] 50Hz Line Frequency Operation.

Example: [L F 6 0] 60Hz Line Frequency Operation.

— Use the Set Up and Set Down buttons to adjust this value.

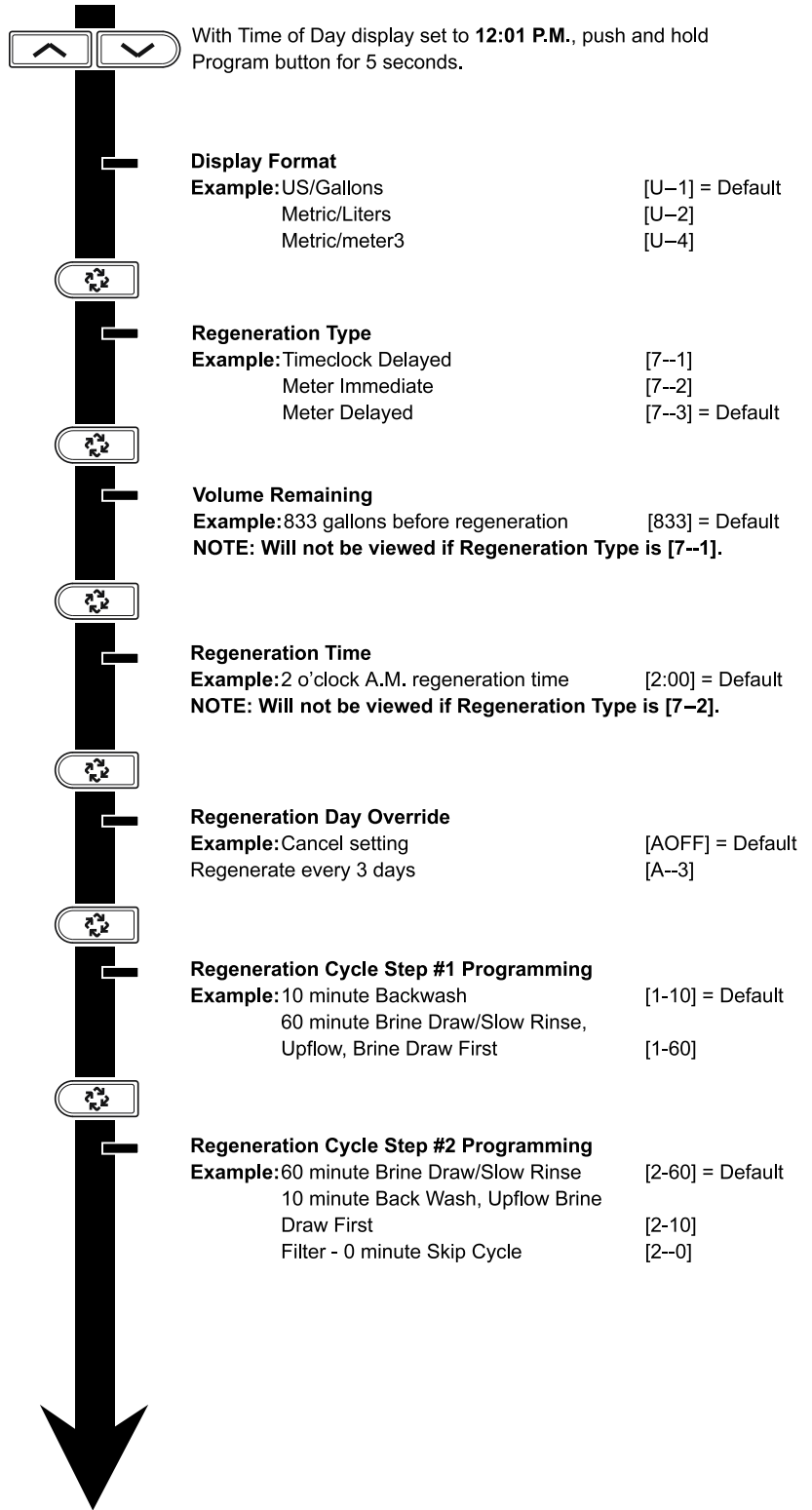
— Press the Extra Cycle button once more to exit this programming mode.

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING FLOW CHART

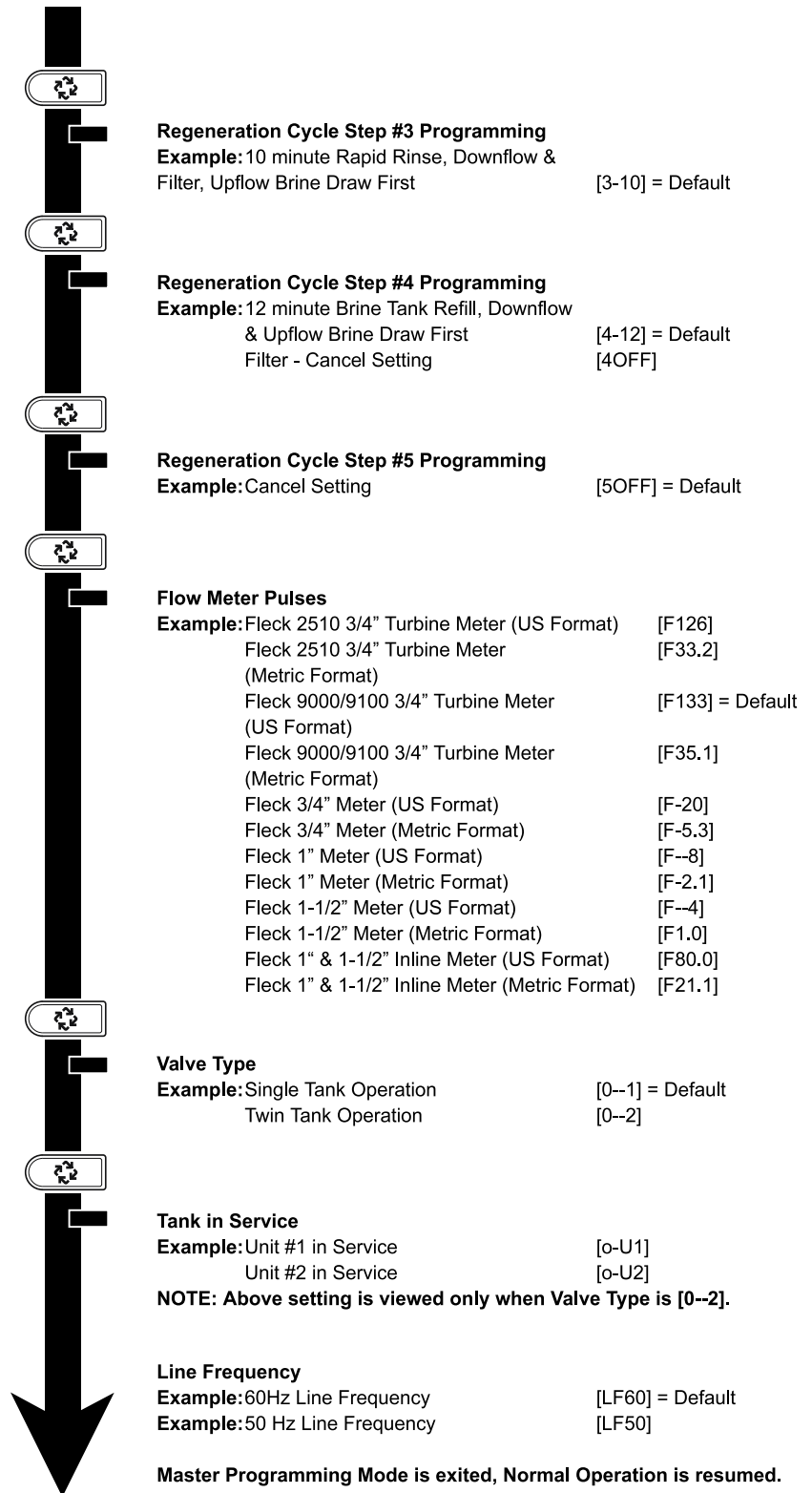
NOTE:

1. Set Time of Day display to **12:01 P.M.**
2. Press and hold the Set Up and Set Down buttons for 5 seconds.
3. Press the Extra Cycle button once per display until all displays are viewed and normal operation is resumed.
4. Option setting displays may be changed as required by pressing either the Set Up or Set Down button.
5. Depending on current programming, certain displays will not be able to be viewed or set.
6. Reference the programming instructions for a complete list of available settings.



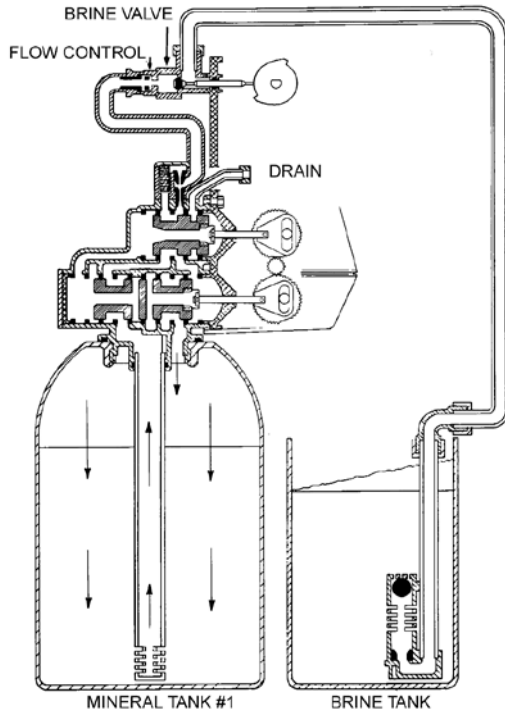
CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING FLOW CHART



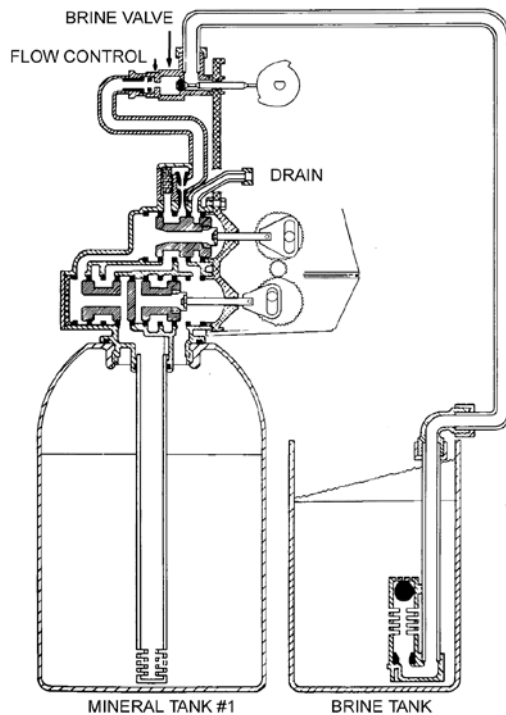
CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MAT FLOW DIAGRAMS



1 - SERVICE POSITION

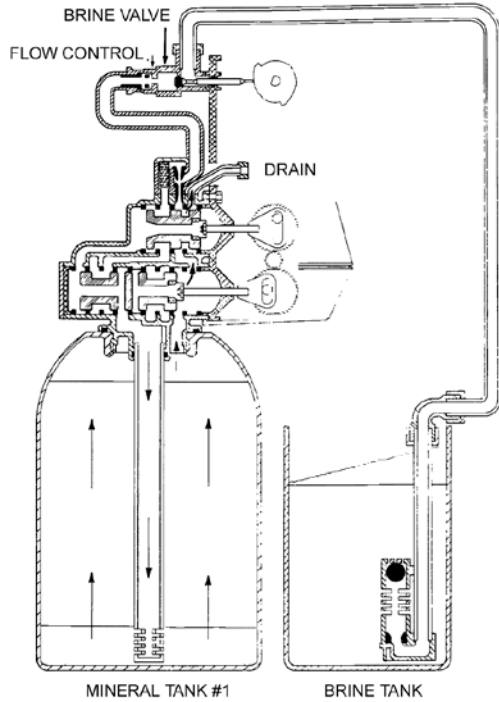
Hard water enters the unit at the valve inlet, flows around the lower piston, and down through the mineral in the first tank. Conditioned water enters the center tube through the bottom distributor, flows up through the center tube, around the lower piston, through the meter, and out the valve outlet. The second mineral tank is regenerated and on standby.



**2 - TANKS SWITCHING
(the meter has initiated a regeneration)**

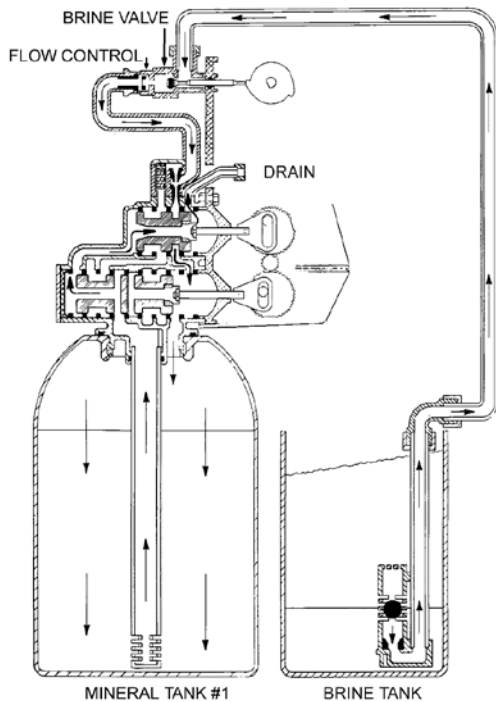
Hard water enters the unit at the valve inlet, flows around the lower piston, through the pipe leading to the second mineral tank, and down through the mineral in the second tank. Conditioned water enters the center tube of the second tank through the bottom distributor, flows up through the center tube, through the pipe leading back to the main valve, around the lower piston, through the meter, and out the valve outlet. The depleted first mineral tank is out of the flow path, and ready for regeneration.

MAT FLOW DIAGRAMS



3 - BACKWASH

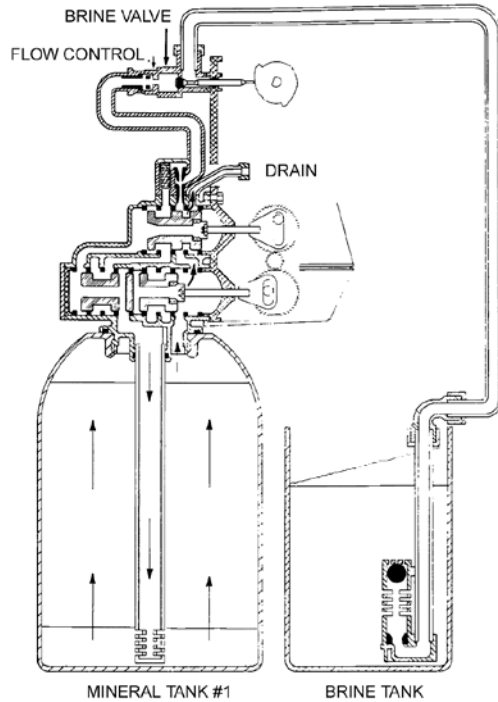
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, through the center of the lower piston, down the center tube, up through the mineral, around the upper piston, and out the drain line.



4 - BRINE DRAW

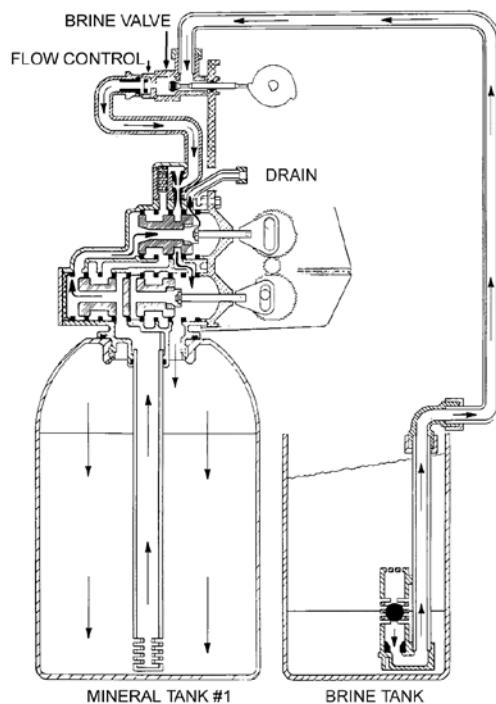
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, and down through the nozzle and throat to draw brine from the brine tank. Brine flows around the upper piston, down through the mineral, into the center tube through the bottom distributor, up the center tube, through the center of the lower piston, through the center of the upper piston, and out through the drain line.

MAT FLOW DIAGRAMS



5 - SLOW RINSE

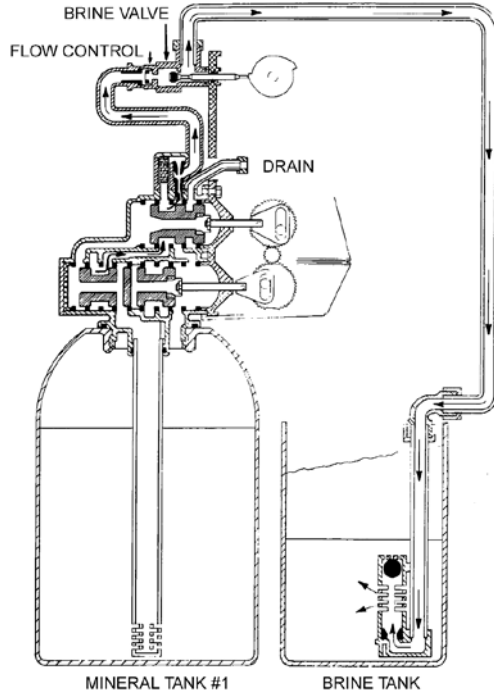
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, down through the nozzle and throat, around the upper piston, down through the mineral, into the center tube through the bottom distributor, up the center tube, through the center of the lower piston, through the center of the upper piston, and out through the drain line.



6 - RAPID RINSE

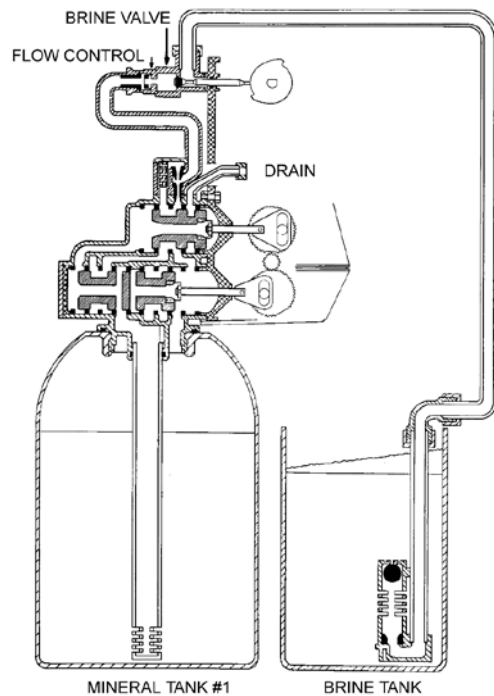
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, and down through the mineral in the first tank. Rinse water from the mineral bed enters the center tube through the bottom distributor, flows up the center tube, through the center of the lower piston, through the center of the upper piston, and out through the drain line.

MAT FLOW DIAGRAMS



7 - BRINE TANK FILL POSITION

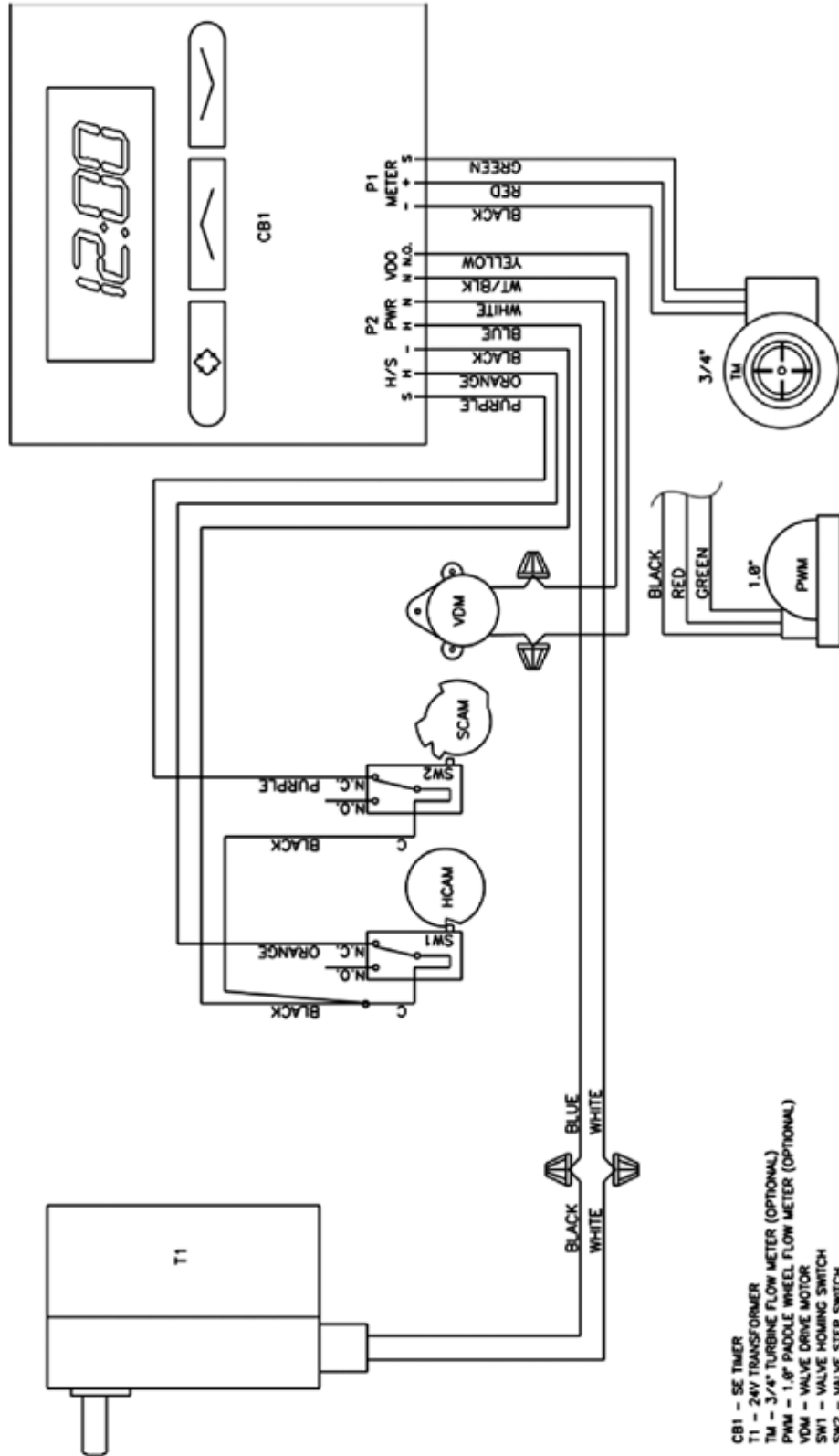
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, through the brine line flow control, through the brine valve, and into to brine tank. No water flows through the first mineral tank.



8 - SERVICE (TANKS SWITCHED)

Hard water enters the unit at the valve inlet, flows around the lower piston, through the pipe leading to the second mineral tank, and down through the mineral in the second tank. Conditioned water enters the center tube of the second tank through the bottom distributor, flows up through the center tube, through the pipe leading back to the main valve, around the lower piston, through the meter, and out the valve outlet. The regenerated first mineral tank is out of the flow path, and ready for use when the second mineral tank becomes depleted.

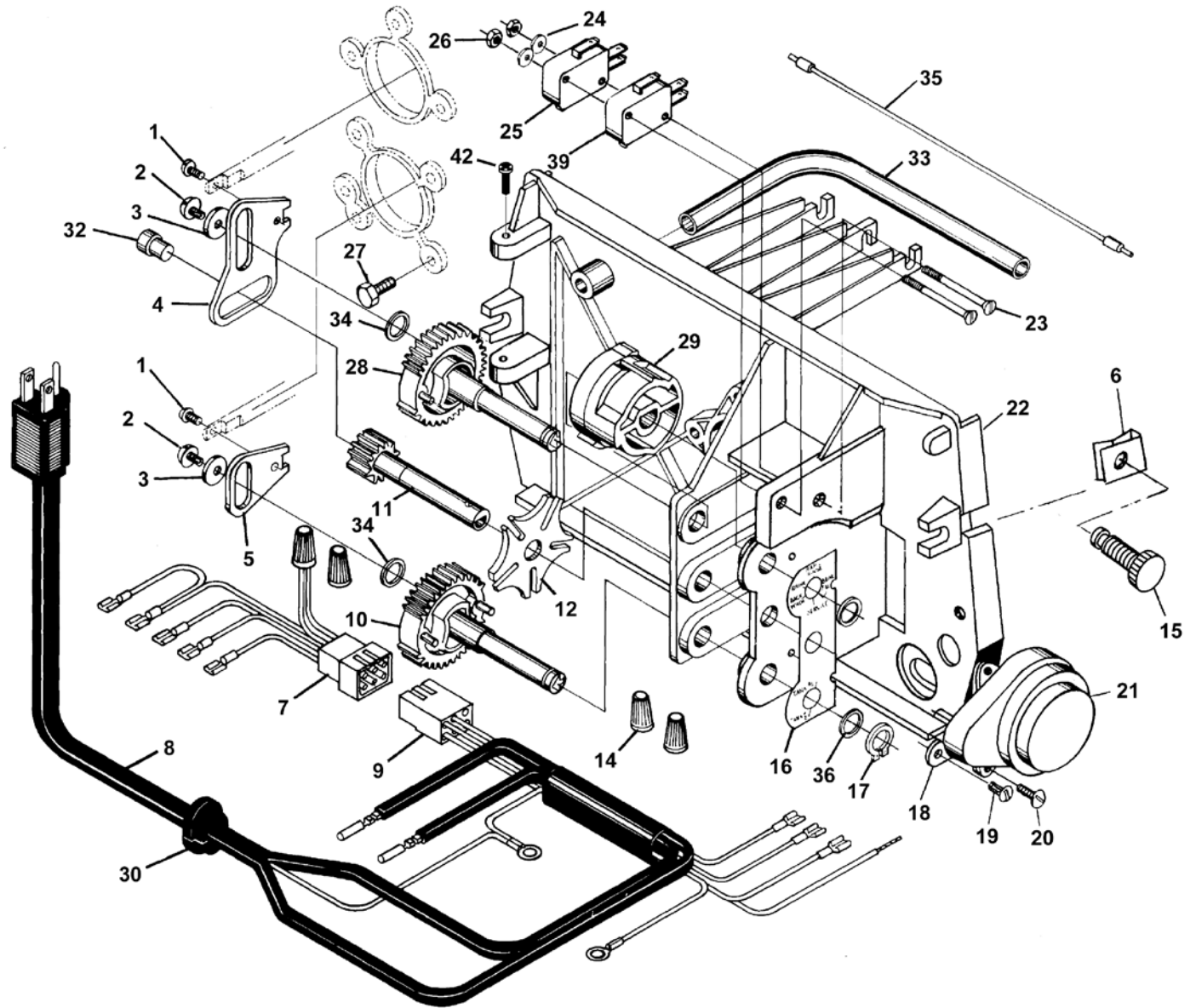
WIRING DIAGRAM - 9100 SE VALVE



- CB1 - SE TIMER
- T1 - 24V TRANSFORMER
- TM - 3/4" TURBINE FLOW METER (OPTIONAL)
- PWM - 1.8" PADDLE WHEEL FLOW METER (OPTIONAL)
- VDM - VALVE DRIVE MOTOR
- SW1 - VALVE HOMING SWITCH
- SW2 - VALVE STEP SWITCH
- HCCAM - VALVE HOMING CAM
- SCAM - VALVE STEP CAM

NOTE:
DEPENDENT ON APPLICATION, VALVE STEP CAM APPEARANCE WILL VARY.
REGARDLESS OF CAM TYPE USED, WIRING TO SWITCHES SW1 AND SW2 WILL REMAIN AS SHOWN.

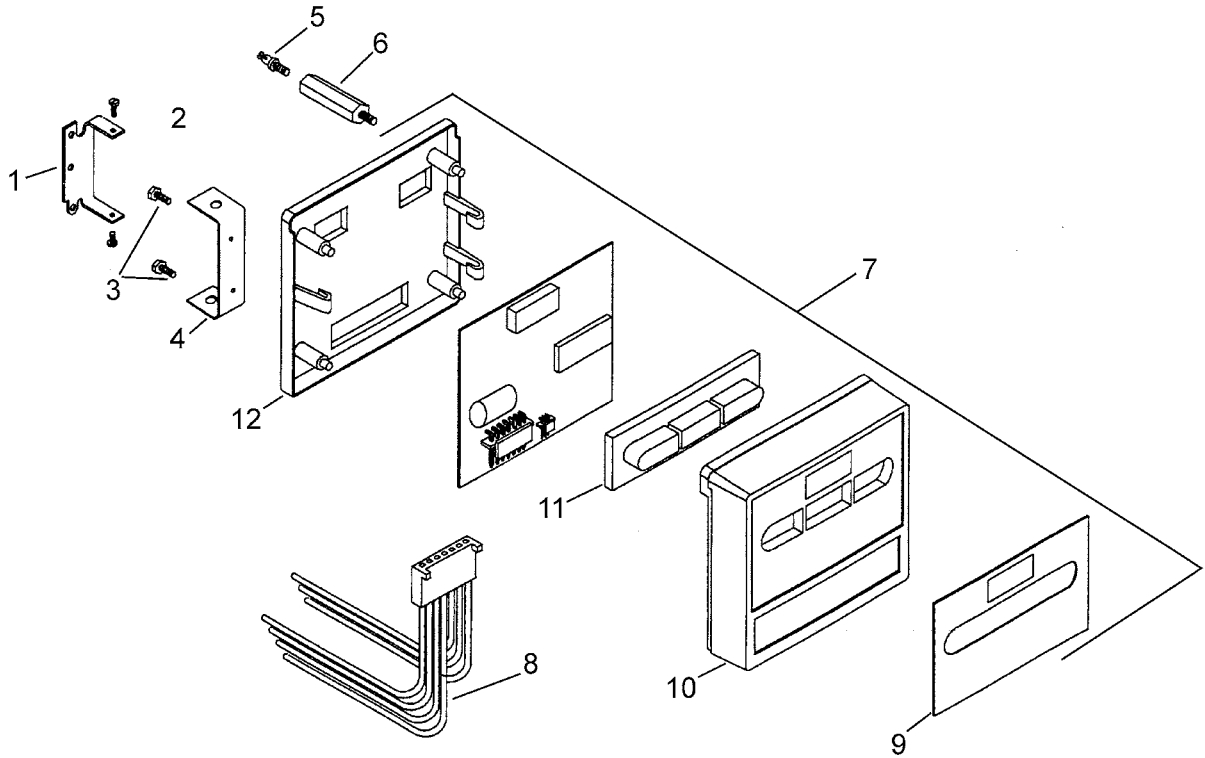
9100 VALVE POWERHEAD ASSEMBLY



9100 VALVE POWERHEAD ASSEMBLY

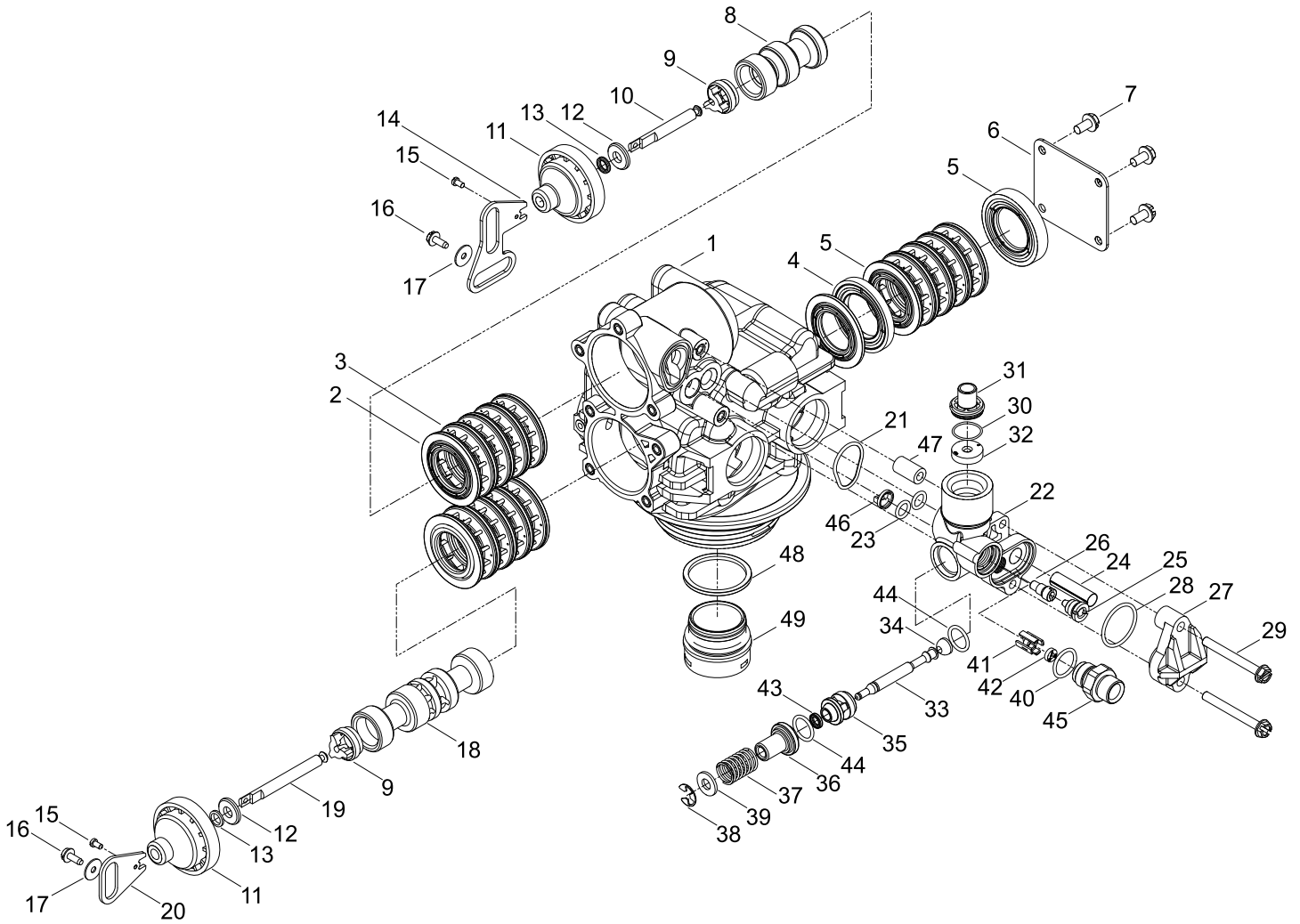
| Item No. | Quantity | Part No. | Description |
|----------|----------|-----------------|--|
| 1..... | 2 | 11335 | Screw, #4-40 |
| 2..... | 2 | 18564 | Screw, Hex Washer #6-20 |
| 3..... | 2 | 13363 | Washer |
| 4..... | 1 | 14921 | Piston Rod Link, Upper |
| 5..... | 1 | 15019 | Piston Rod Link, Lower |
| 6..... | 2 | 18728 | Nut, Clip, #8-32 |
| 7..... | 1 | 15203 | Wiring Harness - Timer |
| 8..... | 1 | 11838 | Power Cord |
| 9..... | 1 | 15202 | Wiring Harness - Drive |
| 10..... | 1 | 15134 | Drive Gear, Assembly, Lower |
| 11..... | 1 | 15135 | Drive Gear |
| 12..... | 1 | 14896 | Geneva Wheel |
| 14..... | 4 | 12681 | Wire Connector |
| 15..... | 2 | 19367 | Cover Screw Assembly |
| 16..... | 1 | 15175 | Position Decal |
| 17..... | 2 | 14917 | Retaining Ring |
| 18..... | 1 | 15199 | Ground Plate |
| 19..... | 1 | 14430 | Screw, Hex Washer #6 |
| 20..... | 2 | 13602 | Screw, Round Hd #6-32 |
| 21..... | 1 | 18739 | Drive Motor - 220V., 50 Hz |
| | 1 | 18738 | Drive Motor - 120V., 60 Hz |
| | | 18737 | Drive Motor 24V., 50-60 Hz |
| 22..... | 1 | 15131 | Control Panel |
| 23..... | 2 | 15172 | Screw, Flat Hd #4-40 |
| 24..... | 2 | 10340 | Washer, Lock #4 |
| 25..... | 1 | 10218 | Micro Switch |
| 26..... | 2 | 10339 | Nut, Hex #4-40 |
| 27..... | 7 | 15331 | Screw, Hex Washer #10-24 |
| 28..... | 1 | 15133 | Drive Gear, Assembly, Upper |
| 29..... | 1 | 15132 | Triple Cam |
| 30..... | 1 | 13547 | Strain Relief |
| 31..... | 1 | 15810 | Retaining Ring, Drive Gear (not shown) |
| 32..... | 1 | 15323 | Guide Pin Upper Piston Rod Link |
| 33..... | 1 | 15368 | Cable Guide |
| 34..... | 2 | 15372 | Washer, Thrust |
| 35..... | 1 | 15216 | Meter Cable Assy. - 1" Meter |
| | 1 | 15425 | Meter Cable Assy. - 3/4" Meter |
| 36..... | 2 | 15692 | Spacer |
| 37..... | 1 | 10302 | Insulator (not shown) |
| 38..... | | | Not Assigned |
| 39..... | 1 | 16433 | Micro Switch, Program |
| 40..... | 1 | 18699-XX | Cover, Top (Now Shown) |
| 41..... | 1 | 14779-XX | Cover, Bottom (Not Shown) |
| 1..... | | 19291-020 | Cover, 1 Piece, Black |
| 42..... | 2 | 15173 | Screw |

SE TIMER ASSEMBLY



| Item No. | Quantity | Part No. | Description |
|----------|----------|---------------|-----------------------------------|
| 1..... | 1 | 13881 | Bracket, Hinge Timer |
| 2..... | 2 | 11384 | Screw, Phil, 6-32 x 1/4 |
| 3..... | 2 | 13296 | Screw, Hex Wsh, 6-20 x 1/2 |
| 4..... | 1 | 41233 | Bracket, Mounting, 9000SE Timer |
| 5..... | 1 | 14265 | Clip, Spring |
| 6..... | 1 | 26983 | Stand-Off, Timer, 9000SE, FE |
| 7..... | 1 | 61464 | Timer, SE, 2510/2750/9000, D/F |
| 8..... | 1 | 19474-01..... | Harness, Power, 8500SE/4200SE |
| 9..... | 1 | 19697-01..... | Label, Display, 5600SE |
| 9A | 1 | 27793 | Label, Front, SE, D/F, Pictogram |
| 10..... | 1 | 19471-02..... | Cover, Front Panel, 5600SE, Black |
| 11..... | 1 | 40376 | Button, Conductive Rubber |
| 12..... | 1 | 19889 | Housing, Circuit Board |

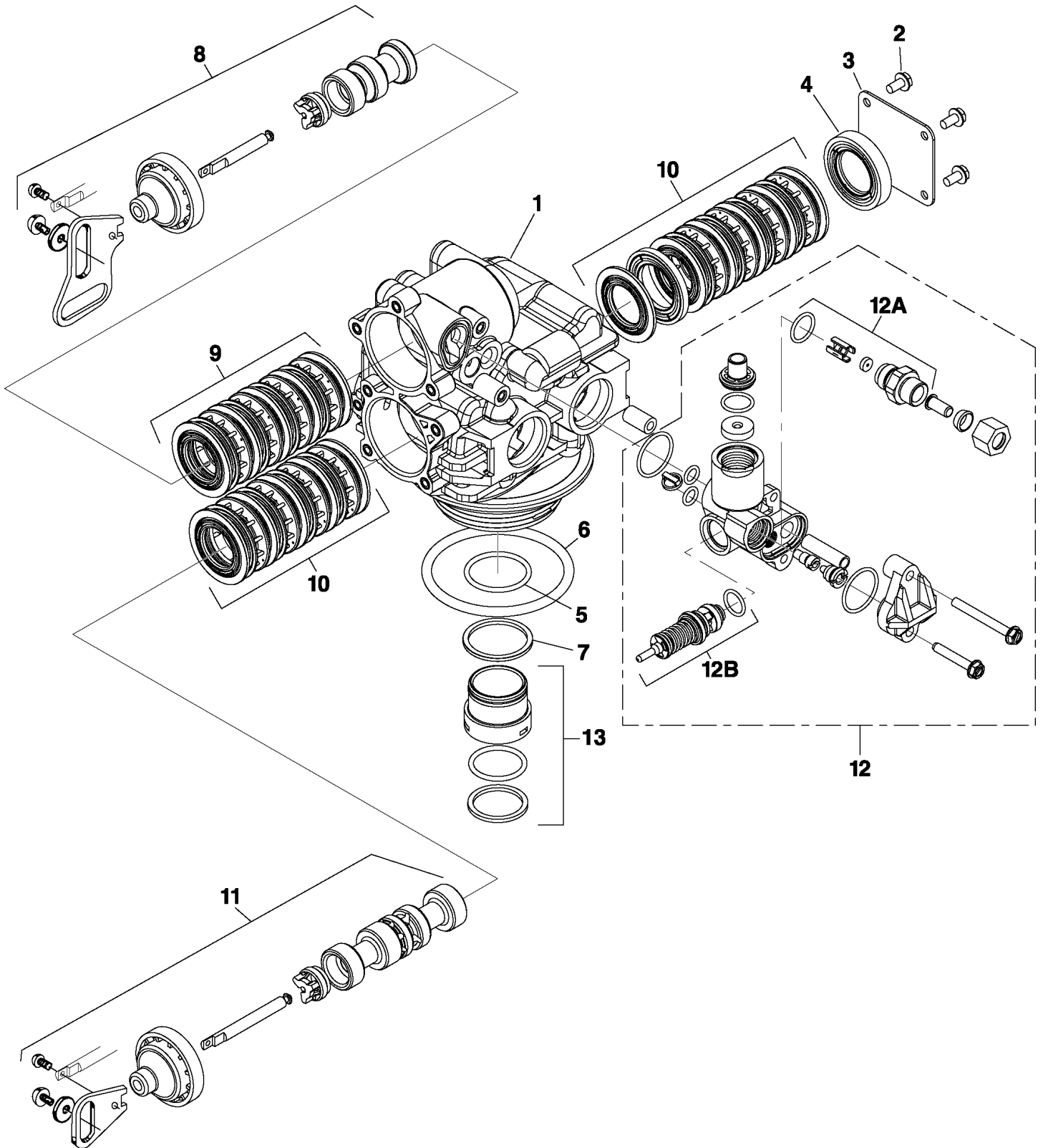
9100 CONTROL VALVE ASSEMBLY



9100 CONTROL VALVE ASSEMBLY

| Item No. | Quantity | Part No. | Description |
|----------------|----------|---------------|------------------------------------|
| 1..... | 1..... | 40688..... | Valve Body Assy, 9100. |
| 2..... | 16..... | 13242..... | Seal, 5600. |
| 3..... | 12..... | 14241..... | Spacer, 5600. |
| 4..... | 1..... | 16595..... | Spacer, 9000. |
| 5..... | 1..... | 14928..... | Plug, End Stub, 9000. |
| 6..... | 1..... | 14906..... | Plate, End, 9000. |
| 7..... | 4..... | 15137..... | Screw, Hex Wsh Mach, 10-24 x 3/8. |
| 8..... | 1..... | 14914..... | Piston, 9000, Upper. |
| 9..... | 2..... | 14309..... | Retainer, Piston Rod. |
| 10..... | 1..... | 14919..... | Rod, Piston, Upper. |
| 11..... | 2..... | 13243..... | Plug, End, 5600. |
| 12..... | 2..... | 13008..... | Retainer, End Plug Seal. |
| 13..... | 2..... | 10209..... | Quad Ring, -010. |
| 14..... | 1..... | 14921..... | Link, Piston Rod. |
| 15..... | 2..... | 11335..... | Screw, Slot Phil Hd, 4-40 x 3/16. |
| 16..... | 2..... | 17020..... | Screw, Slot Ind Hex, 6-20 x 3/8. |
| 17..... | 2..... | 13363..... | Washer, Plain, .145 ID SS. |
| 18..... | 1..... | 14905..... | Piston, 9000. |
| 19..... | 1..... | 14920..... | Rod, Piston, Lower, 9000. |
| 20..... | 1..... | 15019..... | Link, Piston Rod, 9000/9500. |
| 21..... | 1..... | 41500..... | O-ring, Drain, 9100. |
| 22..... | 1..... | 15215..... | Body, Injector, 9000. |
| 23..... | 2..... | 13301..... | O-ring, -011, Injector. |
| 24..... | 1..... | 10227..... | Screen, Injector. |
| 25..... | 1..... | 10913-1..... | Nozzle, Injector, #1, White. |
| 26..... | 1..... | 10914-1..... | Throat, Injector, #1, White. |
| 27..... | 1..... | 13166..... | Cap, Injector, 5600. |
| 28..... | 1..... | 13303..... | O-ring, -021. |
| 29..... | 2..... | 13387..... | Screw, Hex Hd Wash, 10-24 x 1 3/4. |
| 30..... | 1..... | 15348..... | O-ring, -563. |
| 31..... | 1..... | 13173..... | Retainer, DLFC Button. |
| 32..... | 1..... | 12085..... | Washer, Flow, 1.2 GPM. |
| 33..... | 1..... | 14925..... | Brine Valve Stem, 9000. |
| 34..... | 1..... | 12626..... | Seat, Brine Valve. |
| 35..... | 1..... | 13167..... | Spacer, Brine Valve. |
| 36..... | 1..... | 13165..... | Cap, Brine Valve. |
| 37..... | 1..... | 11973..... | Spring, Brine Valve. |
| 38..... | 1..... | 11981-01..... | Ring, Retaining. |
| 39..... | 1..... | 16098..... | Washer, Nylon Brine. |
| 40..... | 1..... | 12977..... | O-ring, -015. |
| 41..... | 1..... | 13245..... | Retainer, BLFC. |
| 42..... | 1..... | 129095..... | Washer, Flow, .50 GPM. |
| 43..... | 1..... | 12550..... | Quad Ring, -009. |
| 44..... | 2..... | 13302..... | O-ring, -014. |
| 45..... | 1..... | 13244..... | Adapter, BLFC. |
| 46..... | 1..... | 13497..... | Disperser, Air, 5600. |
| 47..... | 1..... | 13361..... | Spacer, 4650/9000/WCC. |
| 48..... | 1..... | 40538..... | Retainer, 32mm, O-ring Dist, 7000. |
| 49..... | 1..... | 61419..... | Kit, 1.05" Distributor, Adapter |
| Not Shown..... | 1..... | 13333..... | Label, Injector, Blank |
| Not Shown..... | 1..... | 10759..... | Label, .5 GPM, 1.5 LBS Salt/Min |

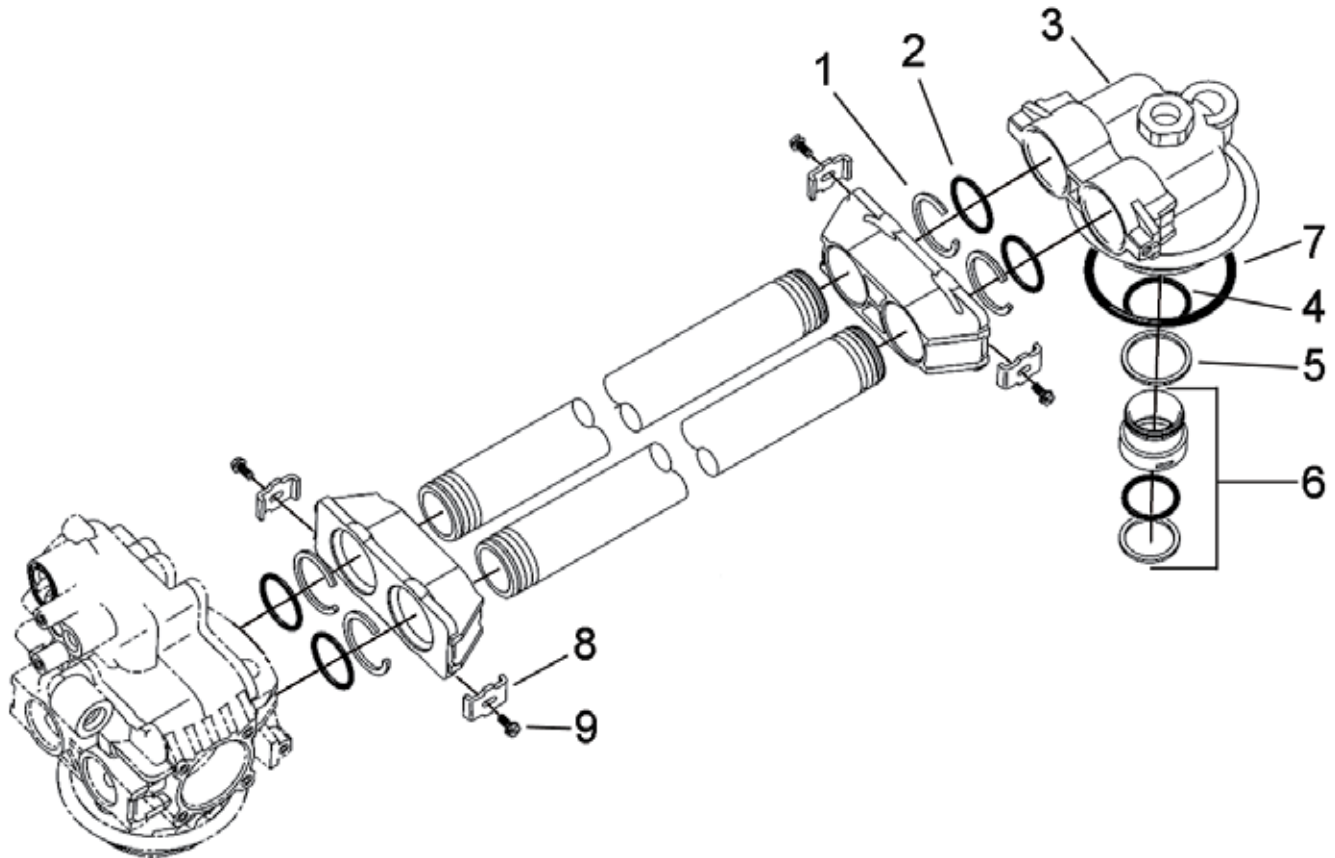
9100 VALVE - SERVICE ASSEMBLIES



9100 VALVE - SERVICE ASSEMBLIES

| <i>Item</i> | <i>Quantity</i> | <i>Part Number</i> | <i>Description</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------|-----------------|--------------------|---|-----------------|---------------|-------------|---------------|-------------|---------------|--------|----|-------|---|-------|---|----------|----|-----|---|------|---|---------|----|-----|---|------|---|-----------|----|-----|---|------|---|----------|----|-----|---|--|--|--|--|-----|---|--|--|--|--|-----|---|--|--|--|--|-----|---|--|--|--|--|-----|---|--|--|--|--|-----|---|--|--|
| 1 | 1 | 40688 | valve body assembly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 4 | 15137 | screw, hex washer #10-24 x 3/8" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 1 | 14906 | end plate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 1 | 14928 | end plug | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 1 | 19054 | O-ring, 124 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 1 | 18303 | O-ring, 336 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 1 | 40538 | retainer, 32mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 1 | 60400 | piston top assembly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 1 | 60125 | seal and spacer kit, top | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 60125-20 | seal and spacer kit, top (559PE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 1 | 60421 | seal and spacer kit, bottom | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 60421-20 | seal and spacer kit, bottom (559PE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | 1 | 60401 | piston assembly, bottom | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 1 | 60385-XXXX | injector assembly (see following chart for dash numbers) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | <table border="1"> <thead> <tr> <th><i>injector</i></th> <th><i>number</i></th> <th><i>DLFC</i></th> <th><i>number</i></th> <th><i>BLFC</i></th> <th><i>number</i></th> </tr> </thead> <tbody> <tr> <td>red #0</td> <td>00</td> <td>Blank</td> <td>0</td> <td>Blank</td> <td>0</td> </tr> <tr> <td>white #1</td> <td>01</td> <td>1.2</td> <td>1</td> <td>0.25</td> <td>1</td> </tr> <tr> <td>blue #2</td> <td>02</td> <td>1.5</td> <td>2</td> <td>0.50</td> <td>2</td> </tr> <tr> <td>yellow #3</td> <td>03</td> <td>2.0</td> <td>3</td> <td>1.00</td> <td>3</td> </tr> <tr> <td>green #4</td> <td>04</td> <td>2.4</td> <td>4</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>3.0</td> <td>5</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>3.5</td> <td>6</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>4.0</td> <td>7</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>5.0</td> <td>8</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>7.0</td> <td>9</td> <td></td> <td></td> </tr> </tbody> </table> | <i>injector</i> | <i>number</i> | <i>DLFC</i> | <i>number</i> | <i>BLFC</i> | <i>number</i> | red #0 | 00 | Blank | 0 | Blank | 0 | white #1 | 01 | 1.2 | 1 | 0.25 | 1 | blue #2 | 02 | 1.5 | 2 | 0.50 | 2 | yellow #3 | 03 | 2.0 | 3 | 1.00 | 3 | green #4 | 04 | 2.4 | 4 | | | | | 3.0 | 5 | | | | | 3.5 | 6 | | | | | 4.0 | 7 | | | | | 5.0 | 8 | | | | | 7.0 | 9 | | |
| <i>injector</i> | <i>number</i> | <i>DLFC</i> | <i>number</i> | <i>BLFC</i> | <i>number</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| red #0 | 00 | Blank | 0 | Blank | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| white #1 | 01 | 1.2 | 1 | 0.25 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| blue #2 | 02 | 1.5 | 2 | 0.50 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| yellow #3 | 03 | 2.0 | 3 | 1.00 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| green #4 | 04 | 2.4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.0 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 3.5 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 4.0 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5.0 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 7.0 | 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12A | 1 | 60022-12 | brine line flow control assembly, 0.125 gpm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 60022-25 | brine line flow control assembly, 0.250 gpm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 60022-50 | brine line flow control assembly, 0.500 gpm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 60022-100 | brine line flow control assembly, 1.00 gpm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12B | 1 | 60350 | brine valve assembly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 1 | 61419 | distributor adapter kit, 1.05" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Not Shown</i> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | 12763 | seal and space stuffer tool | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | 13061 | spacer puller tool | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | 13759 | DLFC retainer tool | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

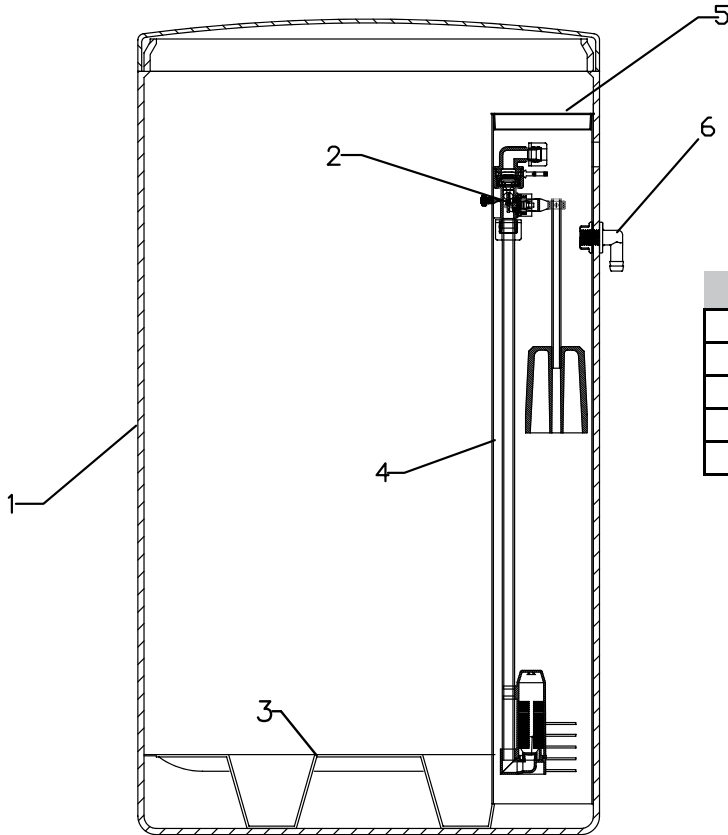
9100 SECOND TANK ADAPTER ASSEMBLY



PARTS LIST

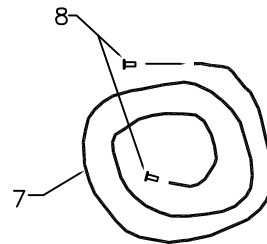
| Item No. | Quantity | Part No. | Description |
|----------|----------|---------------|------------------------------------|
| 1..... | 4..... | 40678..... | Ring, 9100, Yoke Retainer. |
| 2..... | 4..... | 13287..... | O-ring, -123. |
| 3..... | 1..... | 14865..... | Adapter Assy, 2nd Tank, 9100. |
| 4..... | 1..... | 19054..... | O-ring, -124. |
| 5..... | 1..... | 40538..... | Retainer, 32mm, O-ring Dist, 7000. |
| 6..... | 1..... | 61419..... | Kit, 1.05" Distributor, Adapter. |
| 7..... | 1..... | 18303..... | O-ring, -336. |
| 8..... | 4..... | 13255..... | Clip, Mounting. |
| 9..... | 4..... | 14202-01..... | Screw, Hex Wsh Mach, 8-32 x 5/16 |

BRINE SYSTEM FOR MAT 15M-90M



**BRINE TANK ASSEMBLIES
MAT 15M-90M**

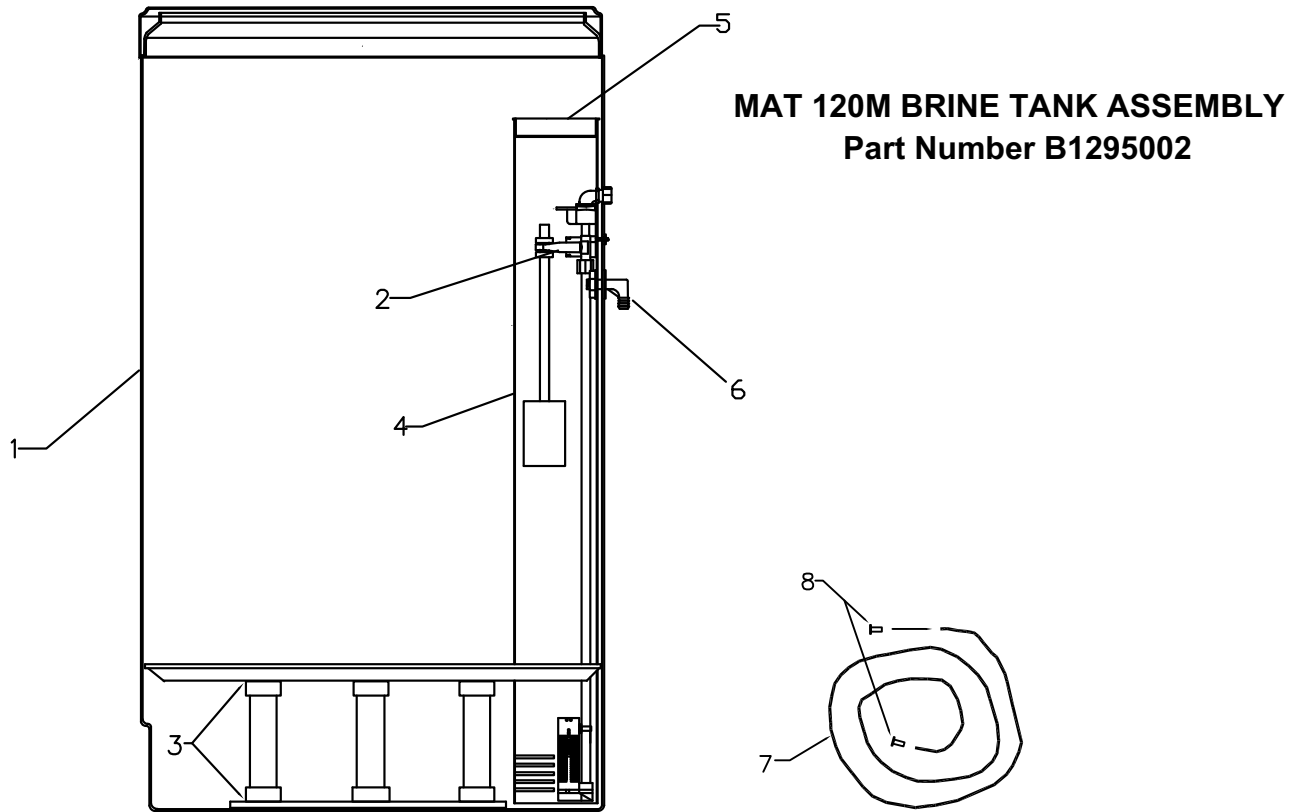
| Models | Part Number |
|--------|-------------|
| MAT 15 | A2042062 |
| MAT 30 | A2042062 |
| MAT 45 | A2042064 |
| MAT 60 | A2042064 |
| MAT 90 | A2042064 |



PARTS LIST

| Item Number | Part Number | Item Description |
|-------------|-------------|----------------------------------|
| 1 | A2042020 | BRINE TANK 18x33 BLACK MLD CVR |
| | A2042028 | BRINE TANK 18x40 BLACK MLD CVR |
| 2 | A2005058 | BRINE SAFETY VALVE ASSEMBLY 3/8" |
| 3 | A2284017 | GRID PLATE PLASTIC 3" HIGH |
| | A2284002 | GRID PLATE PLASTIC 5" HIGH |
| 4 | A2071005 | BRINE WELL 4x28 SLOT ONE END |
| | A2071003 | BRINE WELL 4x36 SLOT ONE END |
| 5 | A2118010 | CAP, BRINEWELL |
| 6 | A2165007 | ELBOW OVERFLOW 1/2 W/NUT |
| 7 | A2207018 | TUBING 3/8x1/4 BLACK POLY |
| 8 | A2250003 | INSERT 3/8 TUBE BRASS |

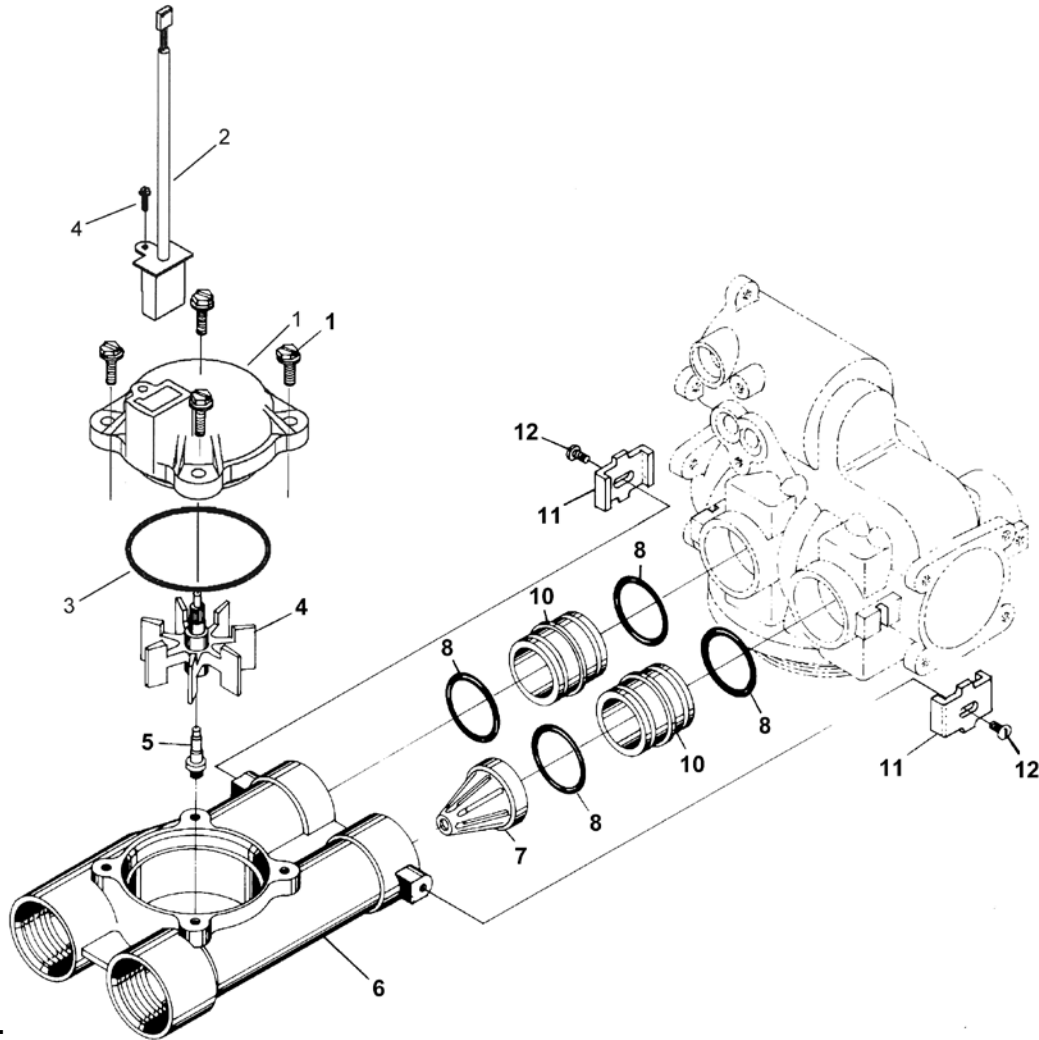
BRINE SYSTEM FOR MAT 120M



PARTS LIST

| Item Number | Part Number | Item Description |
|-------------|-------------|----------------------------------|
| 1 | B1002039 | BRINE TANK AND COVER 24x41 |
| 2 | B1180005 | BRINE VALVE AIR CHECK ASSEMBLY |
| 3 | A2284006 | SALT SHELF 24" DIA, 4" WELL HOLE |
| 4 | B1015010 | BRINEWELL 4"x36" |
| 5 | A2072003 | CAP, BRINEWELL |
| 6 | A2250003 | ELBOW OVERFLOW W/NUT |
| 7 | A2129060 | TUBING, POLYETHYLENE, BLACK |
| 8 | A2476001 | INSERT, TUBE |

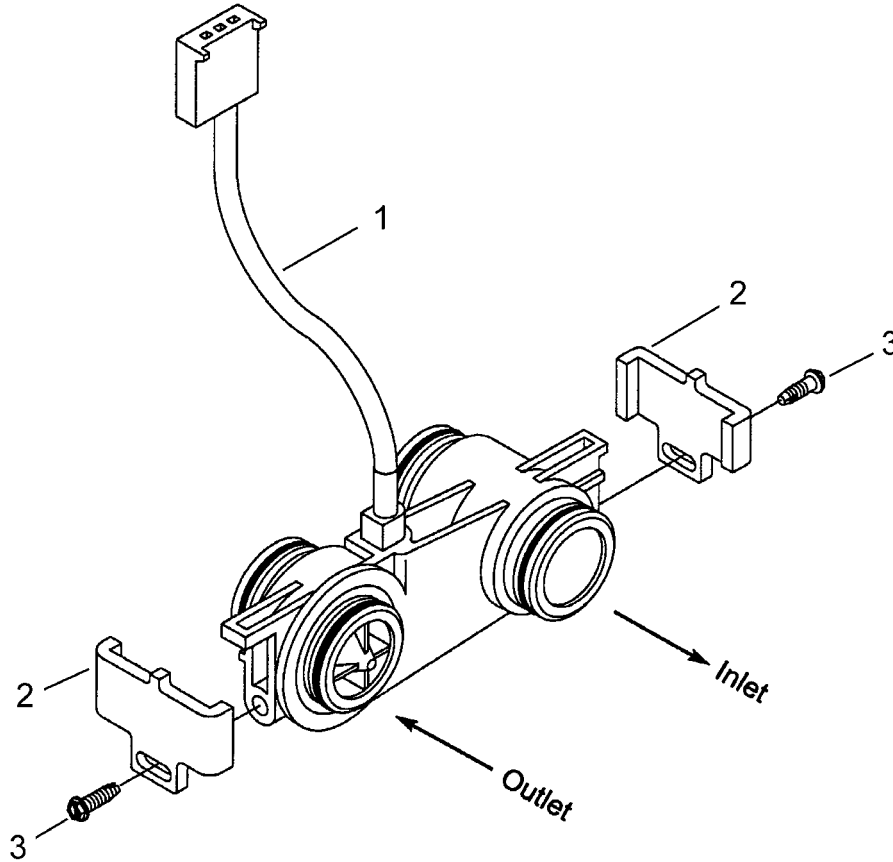
1" METER ASSEMBLY



PARTS LIST

| Item No. | Quantity | Part No. | Description |
|----------|----------|---------------|--------------------------------|
| 1..... | 4..... | 12112..... | Screw, Hex Hd #10-24 |
| 2..... | 1..... | 15218..... | Meter Cover Assy. |
| | | 15237..... | Meter Cover Assy. (Ext. range) |
| 3..... | 1..... | 13847..... | O-Ring, -137 |
| 4..... | 1..... | 13509..... | Impeller |
| 1..... | | 13509-01..... | Impeller, HW |
| 5..... | 1..... | 13882..... | Impeller Post |
| 6..... | 1..... | 15043..... | Meter Body 1" - 11-1/2 N.P.T. |
| 1..... | | 15043-10..... | Meter Body 1" - 11 B.S.P. |
| 7..... | 1..... | 14960..... | Flow Straightener |
| 8..... | 4..... | 13305..... | O-Ring, -119 |
| 9..... | | | Not Assigned |
| 10..... | 2..... | 15078..... | Coupling |
| 11..... | 2..... | 13255..... | Adapter Clip |
| 12..... | 2..... | 14202..... | Screw, Hex Hd #8-32 |

3/4" PLASTIC TURBINE METER ASSEMBLY



PARTS LIST

| Item No. | Quantity | Part No. | Description |
|----------|----------|---------------|---------------------------------|
| 1..... | 1..... | 19791-01..... | Meter Cable Assy, Turbine/SE |
| 2..... | 2..... | 19569..... | Clip, Flow Meter |
| 3..... | 2..... | 13314..... | Screw, Slot Ind Hex, 8-18 x .60 |

DISINFECTING AND CLEANING PROCEDURES

Disinfecting a Water Softener

Sodium Hypochlorite 5.25% (bleach)
For resinous ion exchange material 1.2 fluid oz. per cu. ft.
For non-resinous materials, 0.8 fluid oz. per cu. ft.

First backwash conditioner, and then add the required amount of hypochlorite to the brine well. (The brine tank should have water in it to permit the solution to be carried into the resin bed). Once solution is drawn into resin bed (approximately 10 mins.) disconnect power.

After sufficient time (min. 20 minutes) has elapsed reconnect power, the softener should then be allowed to finish cycle. If the odor of chlorine can be detected in water draining from the softener, it is an indication that the amount you used was adequate. If not, you know that the chlorine you added was exhausted (used up) by materials requiring disinfection in the tanks and that you should have added more. The process must then be repeated.

Some manufacturers suggest adding a dry chlorine compound to the salt when filling the salt container. This would provide for disinfection with each recharging cycle. After disinfection, the rinse should be so complete that chlorine can no longer be detected. A chemical chlorine detector could be used for detection of chlorine residuals, but checking for odor and taste is a satisfactory method.

Water Softener Resin Cleaning Procedure Items Required

- a. Resin Cleaner -18 oz. (Zip)
 - b. 5 Gallon pail
 - c. Warm water (under 100° F.) 1/2 Gallon
1. The softener must be fully installed and connected to a source of electrical power.
 2. Fill a 5 gallon pail with 1/2 gallon of warm water (Max 100° F. - Non steaming). Add 18 oz. (Volume) of ZIP water softener cleaner and mix until fully dissolved. Do this in a well ventilated area.
 3. Manually start the regeneration sequence by setting the control valve into the backwash cycle.
 4. Pour the cleaning solution (1/2 gallon) directly over the salt.
 5. Allow the unit to complete the regeneration automatically.
 6. Instruct the customer to run a cold soft water tap for approximately 2 minutes after the unit completes the regeneration cycle to remove any traces of cleaner that may be present following the regeneration.
 7. If desired, the **Sterilization** procedure with chlorine may be performed after resin cleaning. Refer to the **Softener Disinfecting Procedure**.

CAUTION: Do not use this procedure on Manganese Greensand or Activated Carbon Filters or combine it with chlorine sterilization.

TROUBLESHOOTING TIPS

| PROBLEM | CAUSE | CORRECTION |
|--|---|---|
| 1. Softener Fails To Regenerate. | A. Electrical Service To Unit Has Been Interrupted. | A. Assure Permanent Electrical Service (Check Fuse, Plug, Pull Chain or Switch). |
| | B. Timer Is Defective. | B. Replace Timer. |
| 2. Hard Water. | A. By-Pass Valve is Open. | A. Close By-Pass Valve. |
| | B. No Salt in Brine Tank. | B. Add Salt To Brine Tank and Maintain Salt Level Above Water |
| | C. Injector Screen Plugged. | C. Clean Injector Screen. |
| | D. Insufficient Water Flowing Into Brine Tank | D. Check Brine Tank Fill Time And Clean Brine Line Flow Control If Plugged. |
| | E. Hot Water Tank Hardness. | E. Repeated Flushings Of The Hot Water Tank is Required. |
| | F. Leak At Distributor Tube. | F. Make Sure Distributor Tube Is Not Cracked. Check O-Ring And Tube Pilot. |
| | G. Internal Valve Leak. | G. Replace Seals and Spacers And/Or Piston. |
| 3. Unit Used Too Much Salt. | A. Improper Salt Setting. | A. Check Salt Usage and Salt Setting. |
| | B. Excessive Water in Brine Tank. | B. See Problem No. 7. |
| 4. Loss Of Water Pressure. | A. Iron Buildup In Line To Water Conditioner. | A. Clean Line To Water Conditioner. |
| | B. Iron Buildup In Water Conditioner. | B. Clean Control and Add Mineral Cleaner to Mineral Bed. Increase Frequency of Regeneration and/or Backwash Time. |
| | C. Inlet of Control Plugged Due to Foreign Material Broken Loose From Pipes By Recent Work Done On Plumbing System. | C. Remove Pistons and Clean Control. |
| 5. Loss of Mineral Through Drain Line. | A. Air In Water System. | A. Assure That Well System Has Proper Air Eliminator Control. Check For Dry Well Condition. |
| 6. Iron In Conditioned Water. | A. Fouled Mineral Bed. | A. Check Backwash, Brine Draw And Brine Tank Fill. Increase Frequency Of Regeneration. |
| 7. Excessive Water In Brine Tank. | A. Plugged Drain Line Flow Control. | A. Clean Flow Control. |
| | B. Plugged Injector System. | B. Clean Injector and Screen. |
| | C. Timer Not Cycling. | C. Replace Timer. |

TROUBLESHOOTING TIPS (cont'd)

| PROBLEM | CAUSE | CORRECTION |
|----------------------------------|---|--|
| 8. Softener Fails To Draw Brine. | D. Foreign Material In Brine Valve. E. Foreign Material In Brine Line Flow Control. F. Power Loss During Brine Fill. A. Drain Line Flow Control Is Plugged. B. Injector Is Plugged. C. Injector Screen Plugged. D. Line Pressure Is Too Low. E. Internal Control Leak. | D. Replace Brine Valve Seat And Clean Valve. E. Clean Brine Line Flow Control. F. Check Power Source. A. Clean Drain Line Flow Control. B. Clean Injector. C. Clean Screen. D. Increase Line Pressure To 25 P.S.I. Min. E. Change Seals, Spacers and Piston Assembly. |
| 9. Control Cycles Continuously. | A. Broken or Shorted Switch. | A. Determine If Switch or Timer Is Faulty and Replace it or Replace Complete Power Head. |
| 10. Drain Flows Continuously. | A. Valve Is Not Programming Correctly. B. Foreign Material In Control. C. Internal Control Leak. | A. Check Timer Program and Positioning of Control. Replace Power Head Assembly If not Positioning Properly. B. Remove Power Head Assembly And Inspect Bore, Remove Foreign Material and Check Control In Various Regeneration Positions. C. Replace Seals and Piston Assembly. |

General Service Hints

Problem: Softener Delivers Hard Water.

Cause could be that . . . Reserve Capacity Has Been Exceeded.

Correction: Check salt dosage requirements and reset program wheel to provide additional reserve.

Cause could be that . . . Program Wheel Is Not Rotating With Meter Output.

Correction: Pull cable out of meter cover and rotate manually. Program wheel must move without binding and cycle actuator must start the cycle before the clutch releases.

Cause could be that . . . Meter Is Not Measuring Flow.

Correction: Check output by observing rotation of small gear on front of timer (Note — program wheel must not be against regeneration stop for this check). Each tooth is approximately 75 gallons on 1" installations. If not performing properly, replace meter.

Cause could be that . . . Trip Dog On Program Wheel Is Beyond Cycle Actuator Arm.

- Correction:**
1. If power failed during regeneration; reset program wheel and cycle manually.
 2. If exceeding system capacity before regeneration was completed; either a) increase system capacity, b) restrict flow rates, or c) change timer from 164 min./cycle to 82 min./cycle.
 3. If defective timer; replace timer.

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