MARLO INCORPORATED ®

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

MAT 60M–450M

METERED 1-½”

XT SERIES
TWIN ALTERNATING
WATER CONDITIONERS

FILL IN FOR FUTURE REFERENCE

MODEL NO:_____

SERIAL NO:_____

DATE INSTALLED:_____

DEALER:_____

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MARLO INCORPORATED®

MAT 60M–450M XT SERIES METERED 1-1/2”

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MAT 60M–450M XT SERIES METERED 1-1/2”

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:

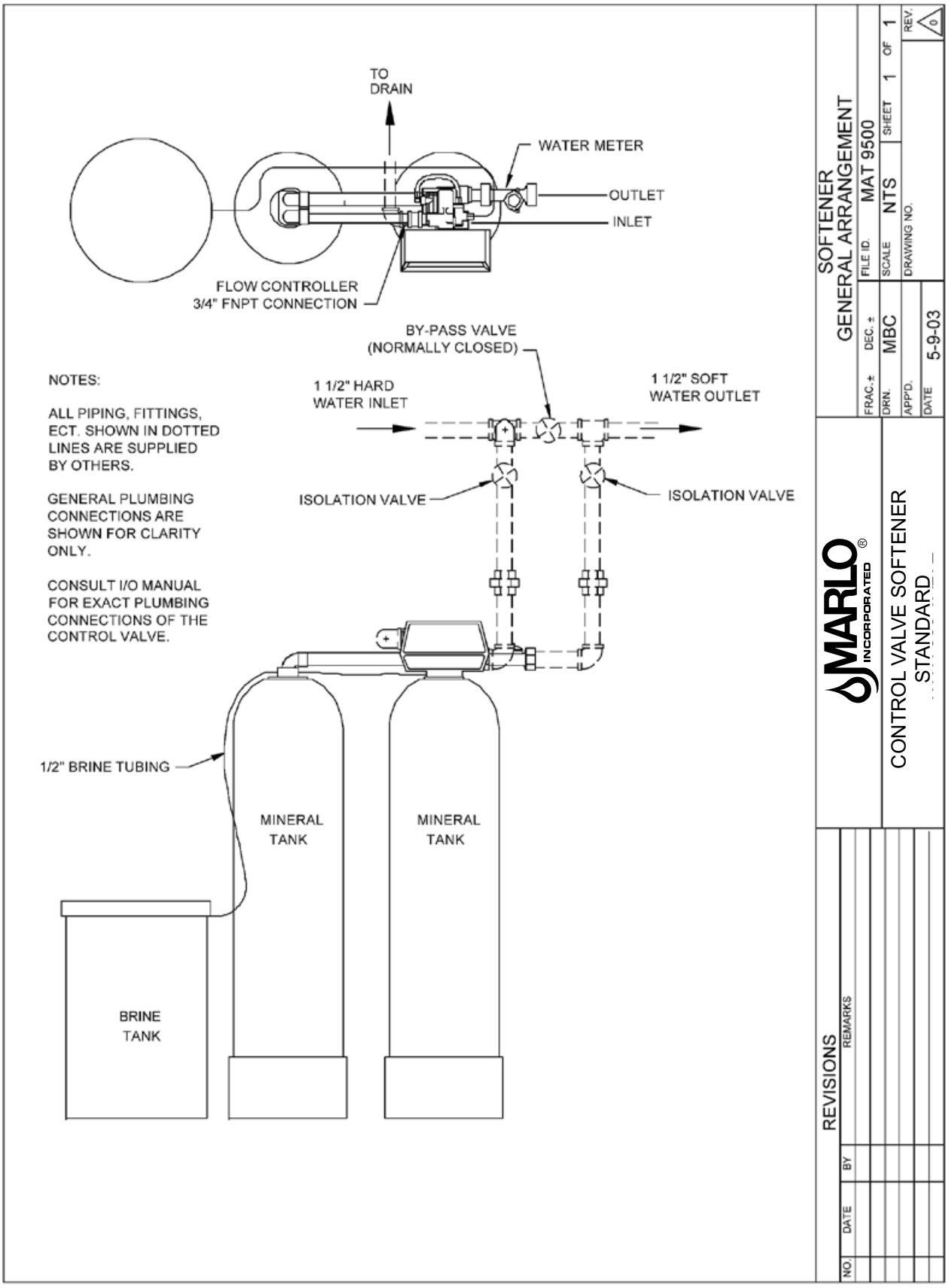
1. Any other obligations or liabilities arising out of breach of contract or out of warranty.
2. Any obligations whatsoever arising from tort claims (including negligence and strict liability) or arising under other theories of law with respect to products sold or services rendered by Marlo Inc. or any 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 30 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.

MARLO INCORPORATED®

MAT 60M–450M XT SERIES METERED 1-1/2”

SPECIFICATION TABLE

		MODEL	60	90	120	150	180	210	240	270	300	450
SYSTEM SIZE		VALVE SIZE (IN)	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
		MAX CAPACITY (KILOGRAINS)	60	90	120	150	180	210	240	270	300	450
		MIN CAPACITY (KILOGRAINS)	40	60	80	100	120	140	160	180	200	300
FLOWRATE (GPM)		SERVICE - CONTINUOUS (GPM)	28	31	34	38	41	39	43	42	41	45
		SERVICE - PEAK (GPM)	39	42	46	50	54	52	57	55	55	62
		BACKWASH & FAST FLUSH (GPM)	3.5	5	6	8	12	12	15	15	15	25
		BRINE DRAW & RINSE (GPM)	0.8	0.8	0.8	1.3	2.0	2.0	3.2	3.2	3.2	3.2
		BRINE TANK REFILL (GPM)	1	1	1	2	2	2	2.2	2	2	5
TIMER SETTINGS		BACKWASH & FAST FLUSH (MIN)	10	10	10	10	10	10	10	10	10	10
		BRINE DRAW & RINSE (MIN)	60	60	60	60	60	60	60	60	60	60
		FAST FLUSH (MIN)	10	10	10	10	10	10	10	10	10	10
		BRINE TANK REFILL (MIN)	10	16	20	14	16	18	20	22	26	16
SOFTENER TANK		SIZE (IN)	13x54	14x65	16x65	18x65	21x62	21x62	24x72	24x72	24x72	30x72
		GRAVEL (LBS)	0	30	35	40	80	80	120	120	120	225
		RESIN (FT^3)	2	3	4	5	6	7	8	9	10	15
		FREEBOARD (IN)	16	21	21	24	23	18	30	25	21	22
BRINE SYSTEMS	EQUIPMENT	TANK SIZE	18x40	18x40	24x40	24x50	24x50	24x50	24x50	24x50	24x50	30x50
		MAX SALT STORAGE (LBS)	270	270	550	630	600	550	530	500	420	640
		INJECTOR CODE	2	3	3	3C	4C	4C	5C	5C	5C	5C
		INJECTOR COLOR	BLU	YEL	YEL	YEL	GRN	GRN	WHT	WHT	WHT	WHT
	SALT	SALT DOSAGE- MAX (LBS)	30	45	60	75	90	105	120	135	150	225
		SALT DOSAGE- MIN (LBS)	12	18	24	30	36	42	48	54	60	90
	REFILL	REFILL TIME - MAX (MIN)	10	16	20	14	16	18	20	22	26	16
		REFILL TIME - MIN (MIN)	4	6	8	6	6	8	8	10	10	6
	REGEN	REGEN PER SALT REFILL-MAX	9	6	9	8	6	5	4	3	2	2
		REGEN PER SALT REFILL-MIN	26	15	23	17	17	17	10	8	6	7
		REGENERATION WASTE VOLUME (GAL)	126	156	188	228	272	366	520	536	544	860

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 then 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

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.

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 then 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, nonelevated, open drain.

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.

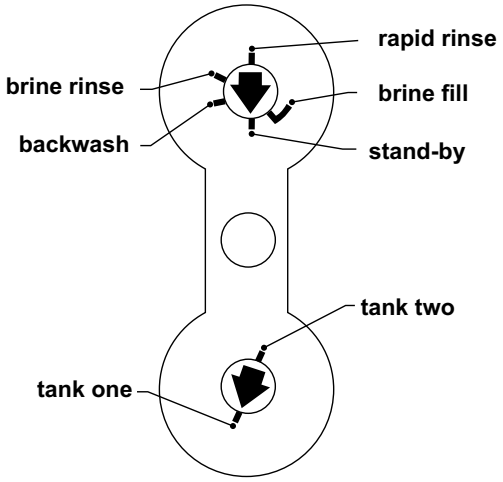
3. Make sure inlet and outlet isolation valves are closed. Turn on power to the system.

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

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.

Batch Size = Softener Capacity / Water Hardness

SAMPLE CALCULATION - TREATED WATER CAPACITY

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

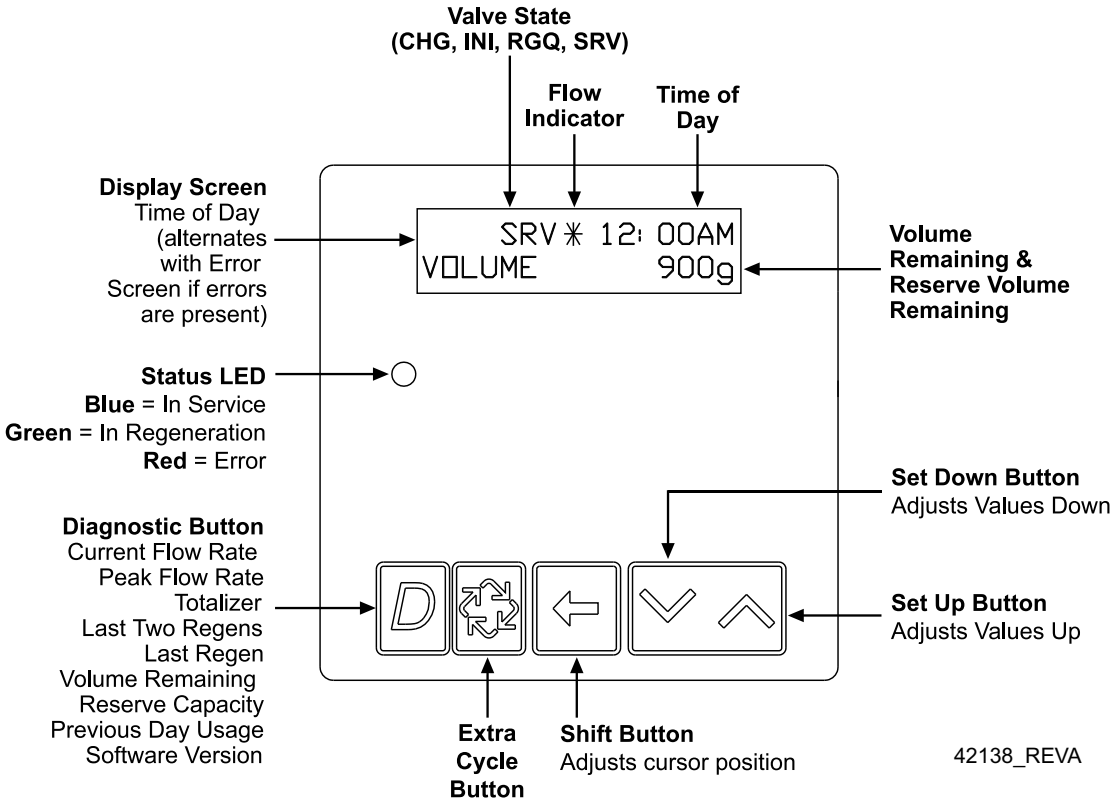
Using our equation
Batch size = 60,000 / 20 or 3,000 gallons.

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% reserve capacity = 300 gallons.

3,000 gallons – 300 gallons = 2,700 gallons (batch size)

TIMER OPERATION



Valve State:

CHG (Change of State)
CHG will be displayed when the lower drive changes from one state to another in dual piston valves.

INI (Initializing)
INI will display on the screen for 30 to 45 seconds when initializing after a power failure reset or programming.

RGQ (Regeneration Queued)
RGQ indicates that the reserve has been entered in a delayed system and regeneration has been queued. When in the main screen, press the Shift button to toggle service (SRV) with RGQ.

Service (SRV)
SRV will display when the unit is in service.

LED Status Lights:

Blue LED:
Illuminates while the unit is in service and no errors exist. The unit will always be in service unless a regeneration trigger has occurred (green LED light will be displayed).

Green LED:
Illuminates when the unit is in Regeneration mode, unless an error condition exists.

Red LED:
Illuminates when there is an error.

Flow Indicator:

A rotating line (appearing as a rotating star shape) will display on the screen when flow is going through the the meter.

TIMER OPERATION

Regeneration:

- A time initiated control valve regenerates when the number of programmed days has been reached
- A flow initiated control valve regenerates when the volume count is zero or is below reserve capacity

System Type	Regeneration Trigger
Time Clock Delayed	A) Day override parameter is reached and B) the time of day matches the regeneration day override time
Meter Immediate	Regenerates as soon as the volume remaining has been depleted
Meter Delayed Fixed Reserve	A) Volume remaining has been depleted to the fixed reserve volume and B) the regeneration time has been reached
Meter Delayed Variable Reserve	A) Volume remaining has been depleted to the variable reserve volume and B) the regeneration time has been reached
Meter Delayed Weekly Reserve	A) Volume remaining has been depleted to the weekly variable reserve volume and B) the regeneration time has been reached
Remote Signal Start Immediate	Immediately once a valid remote signal is asserted continuously for the programmed period of time
Remote Signal Start Delayed	Once a valid remote signal is asserted continuously for the programmed period of time and regeneration time has been reached
Volume Override Immediate	As soon as the programmed volume remaining has been depleted from the tank
Volume Override Delayed	As soon as soon as the programmed volume remaining has been depleted from the tank and the regeneration time has been reached
Twin Tank	Regenerates immediately once volume remaining has been depleted

TIMER OPERATION

Setting the Time of Day

1. Press and hold the Up or Down button for 2 seconds.
2. Press the Shift button to select the digit you want to modify.
3. Press the Up or Down buttons to adjust the value.
4. Press the Extra Cycle button to return to the normal display screen, or after a 5 second timeout.

NOTE: The “D” button (Diagnostic) can be pressed to exit without saving.

Manually Initiating a Regeneration

1. When timer is in service, press the Extra Cycle button for 5 seconds on the main screen.
2. The timer advances to Regeneration Cycle Step #1, and begins programmed time count down.
3. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #2 (if active).
4. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #3 (if active).
5. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #4 (if active).
6. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #5 (if active).
7. Press the Extra Cycle button once more to advance the valve back to in service.

NOTE: A manually initiated or queued regeneration can be cleared by pressing the Extra Cycle button for less than 5 seconds. A system queued regeneration can only be cleared by stepping through a manual regeneration. If regeneration occurs for any reason prior to the delayed regeneration time, the manual regeneration request shall be cleared. Pressing the Extra Cycle button while in regeneration will cause the upper drive to advance to the next step immediately.

Queued Regeneration (RGQ)

From the display screen, while the unit is in service, hold down the Extra Cycle button until “RGQ” displays. The valve will regenerate when the set regeneration time has been reached.

Timer Operation During Regeneration

In the main display screen, the timer shows the current regeneration cycle and the time for that step. The **green LED light** will display when the unit is in regeneration. Once all regeneration steps are complete, the timer returns to in service, displays a **blue LED light**, and resumes normal operation.

Timer Operation During Programming

The timer enters program mode (unit must be in service). While in the program mode the timer continues to operate normally, monitoring water usage. Timer programming is stored in memory permanently upon a normal exit from programming mode.

Timer Operation During A Power Failure

All program settings are stored in permanent memory. Current valve position, cycle step time elapsed, and time of day are stored during a power failure, and will be restored upon power re-application. Time is kept during a power failure, and time of day is adjusted upon power up (as long as power is restored within 12 hours).

NOTE: The time of day on the main display screen will flash for 5 minutes when there has been a power outage. The flashing of the time of day can be stopped by pressing any button on the display.

Regeneration Day Override Feature

If the Day Override option is turned on and the valve reaches the set Regeneration Day Override value, the Regeneration Cycle starts at the programmed regeneration time.

TIMER OPERATION

Flow Meter Equipped Timer

As treated water is used, the Volume Remaining display counts down from the calculated system capacity, less the reserve volume. Once capacity reaches zero or reserve, if the immediate system the unit will regenerate immediately. If it is a Fixed, Variable, or Weekly reserve, the unit will queue a regeneration (RGQ) and count down Reserve Volume until the set regeneration time.

NOTE: Reserve Volume is only available in a RGQ system.

Volume Remaining (Less Reserve)

```
   SRV ✳ 08:45AM
VOLUME      1000G
```

Reserve Volume

```
   RGQ ✳ 09:32AM
VOLUME       100G
```

WARNING

Transformer must be grounded and ground wire must be terminated to the back plate where grounding label is located before installation.

MASTER PROGRAMMING MODE FLOW CHART

NOTE: Depending on current option settings, some displays cannot be viewed or set.

To Set Time of Day:

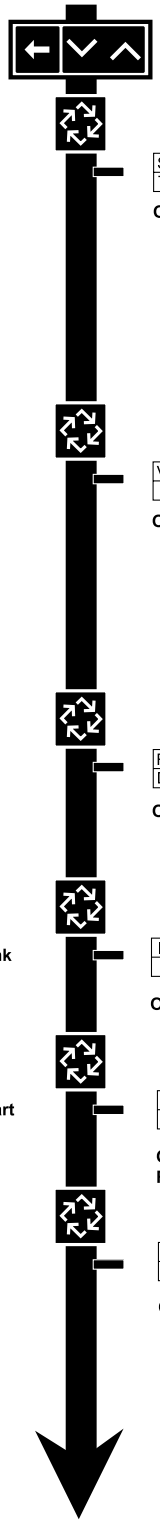
Press and hold the Up and Down buttons for 2 seconds. Press the Shift button to select the digit you want to modify.

Entering Master Programming Mode:

1. Press and hold the Shift and Up buttons for 5 seconds.

   OR

2. Set the Time of Day display to **12:01 P.M. or 12:01HR**. Then go to the main display screen, press the Up and Down buttons at the same time for 5 seconds.



SYSTEM TYPE:
TIME CLK DELAYED

Options: Time Clock Delayed [TIME CLK DELAYED] (Default)
Meter Immediate [METER IMMEDIATE]
Meter Delayed Fixed Reserve [MTR DLY FIX RSV]
Meter Delayed Variable Reserve [MTR DLY VAR RSV]
Meter Delayed Week Reserve [MTR DLY WEEK RSV]
Remote Signal Start Immediate [RSS IMMEDIATE]
Remote Signal Start Delayed [RSS DELAYED]
Volume Override Immediate [VOL OVERRIDE IMM]
Volume Override Delayed [VOL OVERRIDE DLY]
Twin Tank [TWIN TANK]

VALVE TYPE:
2510/2850

Options: 2510/2850 [2510/2850] (Default)
2750 [2750]
2900 [2900]
3150 [3150]
3900 [3900]
9000/9100/9500 [9000/9100/9500]
Proprietary A [PROPRIETARY A]
Proprietary B [PROPRIETARY B]
Proprietary E [PROPRIETARY E]

REGENERANT FLOW:
DOWN FLOW

Options: Down Flow [DOWN FLOW] (Default)
Back Wash Filter [BACK WASH FILTER]
Up Flow [UP FLOW]
Up Flow Variable Fill [UF VARIABLE FILL]

NOTE: Only shown when System Type is Twin Tank

INITIAL TANK:
TANK 1

Options: Tank 1 [TANK 1] (Default)
Tank 2 [TANK 2]

NOTE: Only shown when System Type is Remote Signal Start

REMOTE SIGNAL
START: 0:01:00

Options: Remote Signal Start [0:01:00] (Default)
Range: 1 second to 10 hours

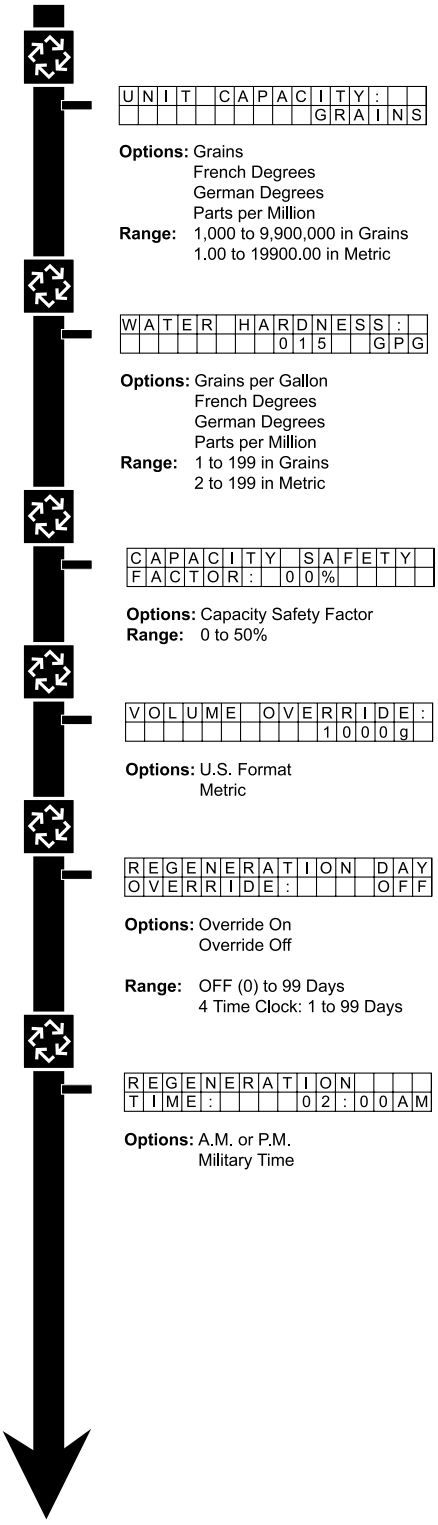
DISPLAY FORMAT
US-GALLONS

Options: Grains per Gallon [US-GALLONS] (Default)
French Degrees [METRIC - M3, F°TH]
German Degrees [METRIC - M3, G°TH]
Parts per Million [METRIC - M3, PPM]

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

MASTER PROGRAMMING MODE FLOW CHART

NOTE: Depending on current option settings, some displays cannot be viewed or set.



UNIT CAPACITY:
GRAINS

Options: Grains [30000 GRAINS] (Default)
French Degrees [30.00 F°TH] (Default)
German Degrees [30.00 D°TH] (Default)
Parts per Million [30.00 PPM] (Default)
Range: 1,000 to 9,900,000 in Grains
1.00 to 19900.00 in Metric

WATER HARDNESS:
015 GPG

Options: Grains per Gallon [30 GPG] (Default)
French Degrees [30 F°TH] (Default)
German Degrees [30 D°TH] (Default)
Parts per Million [30 PPM] (Default)
Range: 1 to 199 in Grains
2 to 199 in Metric

NOTE: Only shown when System Type is Meter Delayed Fixed Reserve or Volume Override Delayed

CAPACITY SAFETY
FACTOR: 00%

Options: Capacity Safety Factor [00%] (Default)
Range: 0 to 50%

NOTE: Only shown when System Type is Volume Override Immediate or Volume Override Delayed

VOLUME OVERRIDE:
1000g

Options: U.S. Format [1000g] (Default)
Metric [m3]

REGENERATION DAY
OVERRIDE: OFF

Options: Override On [3 DAYS](Default)
Override Off [OFF]

Range: OFF (0) to 99 Days
4 Time Clock: 1 to 99 Days

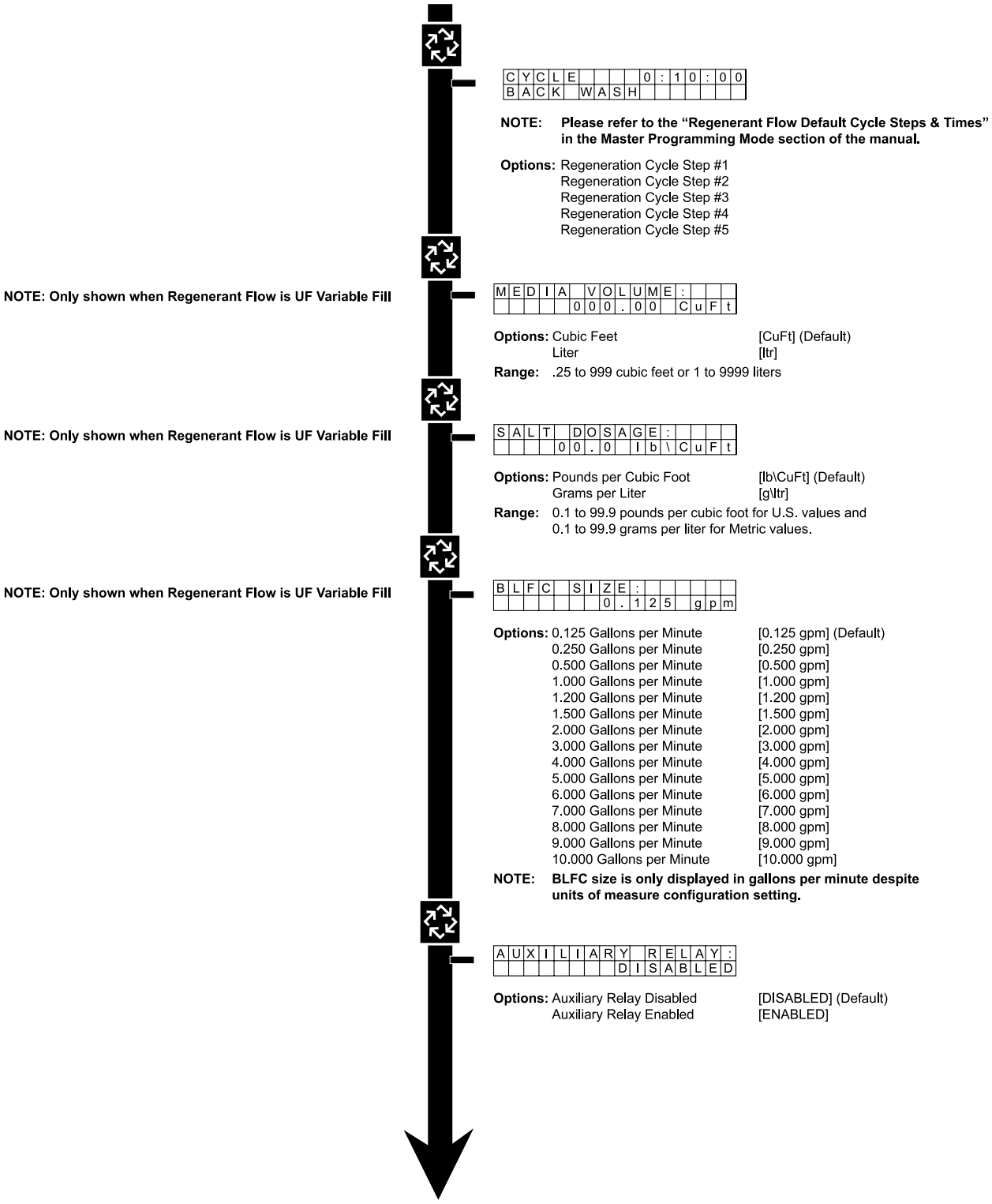
REGENERATION
TIME: 02:00AM

Options: A.M. or P.M. [02:00AM] (Default)
Military Time [02:00 HR] (Default)

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

MASTER PROGRAMMING MODE FLOW CHART

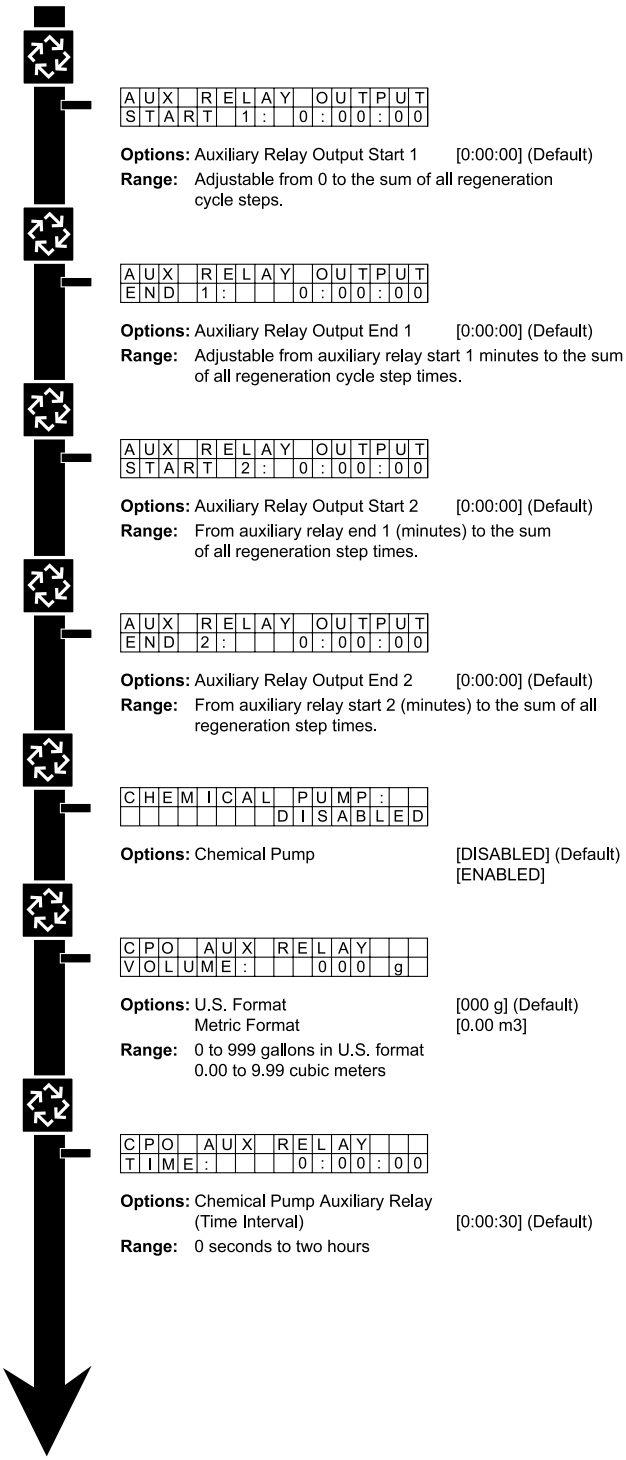
NOTE: Depending on current option settings, some displays cannot be viewed or set.



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

MASTER PROGRAMMING MODE FLOW CHART

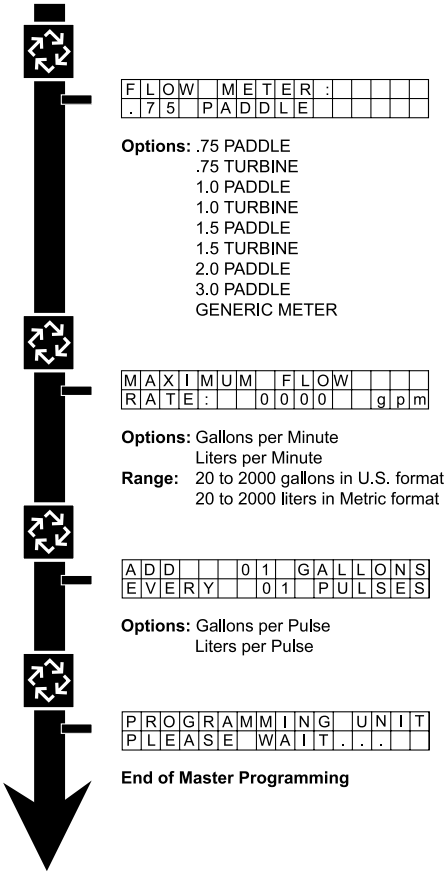
NOTE: Depending on current option settings, some displays cannot be viewed or set.



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

MASTER PROGRAMMING MODE FLOW CHART

NOTE: Depending on current option settings, some displays cannot be viewed or set.



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

MASTER PROGRAMMING MODE

When the Master Programming Mode is entered, parameters can be set to make the timer function as needed.

NOTE: Depending on current option settings, some displays cannot be viewed or set.

Entering Master Programming Mode:

1. Press and hold the Shift and Up buttons for 5 seconds.
   OR
2. Set the time of day display to **12:01 PM or 12:01HR** (See the User Programming section to learn how to do this). Then go to the main display screen, press the Up and Down buttons at the same time for 5 seconds.

Exiting Master Programming Mode:

1. Press the Extra Cycle button once per display until all are viewed. Master Programming Mode is exited and the normal display screen appears.
2. To exit the Master Programming Mode without saving, press the Diagnostic button.

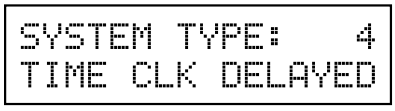
NOTE: If no keypad activity is made for 5 minutes while in the Master Programming Mode, or if there is a power failure, no changes will be made, and the unit will go back to the main display screen.

Resets:

Soft Reset: Press and hold the Up and Down buttons for 25 seconds until 12:00PM (or 12:00HR) appears. This resets all parameters except for the flow meter totalizer volume.
Master Reset: Hold the Shift button while powering up the unit. This resets all of the parameters in the unit. Check and verify the choices selected in Master Programming Mode.

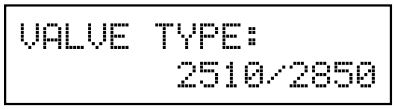
1. System Type

This program step selects the system type.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.



2. Valve Type

This program step selects the valve type.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.



3. Regenerant Flow

This program step selects how the regenerant flows through the tank (must match cam). The selections available will vary depending on the previously chosen valve model.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

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

MASTER PROGRAMMING MODE

4. Display Format

This program step selects the display format.

— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
DISPLAY FORMAT:
US - GALLONS
```

5. Unit Capacity

This program step selects the timer’s total capacity of hardness that can be removed.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
UNIT CAPACITY:
  0030000 GRAINS
```

6. Feed Water (Hardness)

This program step is used to set the feed water hardness. The system will automatically calculate volume remaining based on the unit capacity, capacity safety factor (reserve systems only), and feed water hardness entered.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
WATER HARDNESS:
          030 GPG
```

7. Capacity Safety Factor

This program step is used to set the reserve capacity of the unit. This is a percentage by which the unit’s capacity is reduced.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
CAPACITY SAFETY
FACTOR: 00%
```

8. Volume Override

This program step is used to set the volume override of the unit.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

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

MASTER PROGRAMMING MODE

9. Regeneration Day Override

This program step sets the maximum amount of time (in days) the unit can be in service without a regeneration.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
REGENERATION DAY
OVERRIDE:01 DAYS
```

10. Regeneration Time

This program step sets the time of day for the regeneration to occur in delayed systems.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
REGENERATION
TIME:     02:00AM
```

11. Regeneration Cycle Step Programming

This program step programs the Regeneration Cycle step times 1 through 5. Please refer to the chart below for regenerant flow default cycle steps and times.

```
CYCLE 1 00:10:00
BACK WASH
```

DEFAULT CYCLE TIMES

Regenerant Flow	Cycle 1	Time	Cycle 2	Time	Cycle 3	Time	Cycle 4	Time	Cycle 5	Time
Down Flow	Back Wash	10 Minutes	Brine & Slow Rinse	1 Hour	Rapid Rinse	10 Minutes	Brine Tank Fill	12 Minutes	N/A	N/A
Back Wash Filter	Back Wash	15 Minutes	Draw	0	Settling Rinse	10 Minutes	Refill	0	N/A	N/A
UF Variable Fill	Brine & Slow Rinse	10 Minutes	Pause & Delay	1 Hour	Variable Rapid Rinse	N/A	Brine Tank Fill	12 Minutes	Rapid Rinse	10 Minutes
Upflow	Brine & Slow Rinse	1 Hour	Back Wash	10 Minutes	Rapid Rinse	10 Minutes	Brine Tank Fill	12 Minutes	N/A	N/A

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

MASTER PROGRAMMING MODE

12. Media Volume

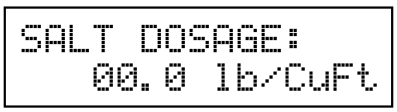
This program step sets the volume of the media in the resin tank.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

13. Salt Dosage

This program step sets the salt dosage in the unit.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.



14. Brine Line Flow Control Size

This program step allows the selection of the desired brine line flow control size in the unit (must match physical brine line flow control).

— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

15. Auxiliary Relay Output

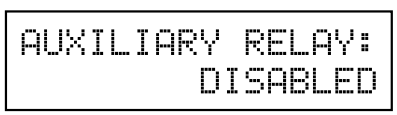
The next two displays are part of a series of settings used to program the optional relay output. The first setting turns the output on/off during regeneration only. The second turns the output on during service only, every time a set volume of water used has accumulated.

NOTE: When auxiliary outputs are in the OFF (default) setting, press the Up or Down buttons to set the first setting. Then press the Extra Cycle button to advance to the second setting.

a. Timed Auxiliary Relay Output Window (Start & End Time Setting)

This option setting consists of two displays. The first display sets the turn-on time of the output, referenced to the start of the first regeneration cycle. The second display sets the output turn-off time, referenced again to the start of the first regeneration cycle. An OFF setting cancels this setting. All settings are in minutes and output timing is synchronized with regeneration cycle timing.

Start Time: Any time during regeneration.
End Time: At start time, and anytime during the regeneration cycle.



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

MASTER PROGRAMMING MODE

b. Chemical Pump Auxiliary Relay Output Window

This option setting consists of two displays. The first display sets the volume of water flow at which the output turns on. The second display sets the on time (in seconds) of the output.

— Activate output after volume set is reached.
— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
CHEMICAL PUMP:
         DISABLED
```

16. Flow Meter Size

This program step sets the size of the flow meter.

— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

```
FLOW METER:
.75 TURBINE
```

17. Maximum Flow Rate

This program step sets maximum flow rate of the generic flow meter.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

18. Pulses per Gallon/Liter

This program step sets the pulses per gallon/liter for generic flow meters.

— Press the Shift button to select the digit you want to modify.
— Press the Up or Down buttons to adjust this value.
— Press the Extra Cycle button.

19. End of Master Programming Mode

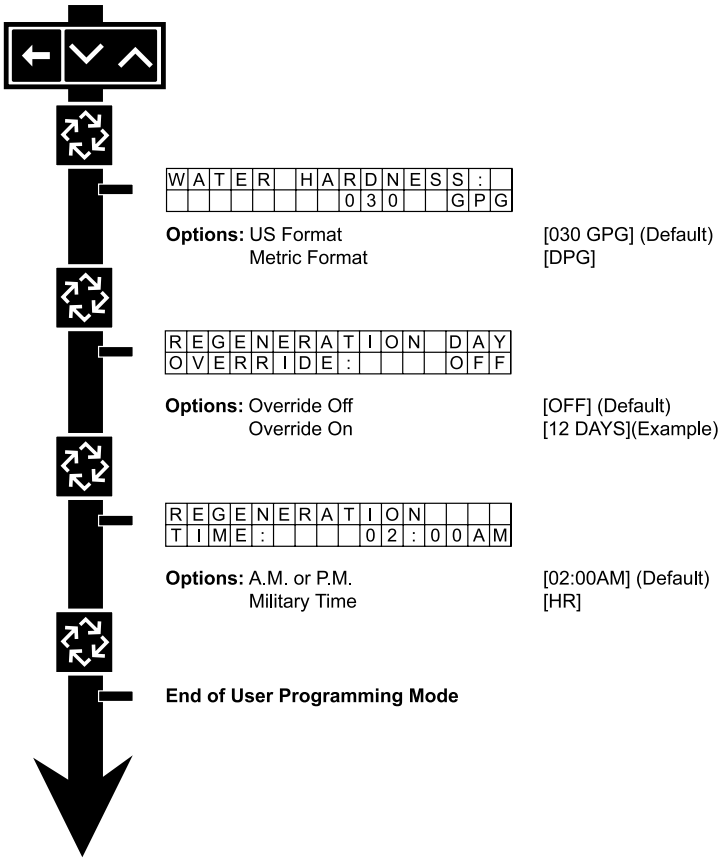
CAUTION: Before entering Master Programming, please contact your local professional water dealer.

USER PROGRAMMING FLOW CHART & MODE

NOTE: Depending on current option settings, some displays cannot be viewed or set.

Entering User Mode:

Press and hold the Up and Down buttons for 5 seconds.



NOTE: Depending on current option settings, some displays cannot be viewed or set.

1. Enter User Mode

— Press and hold the Up and Down buttons for 5 seconds.

2. Set Feed Water Hardness

— Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
— Press the Extra Cycle button to proceed to the next step.
NOTE: Only displayed when a metered option is chosen under System Type.

3. Set Regeneration Day Override

— To turn on and set the days, press the Down button.
— Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
— Press the Extra Cycle button to proceed to the next step.

4. Regeneration Time

— Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
— Press the Extra Cycle button

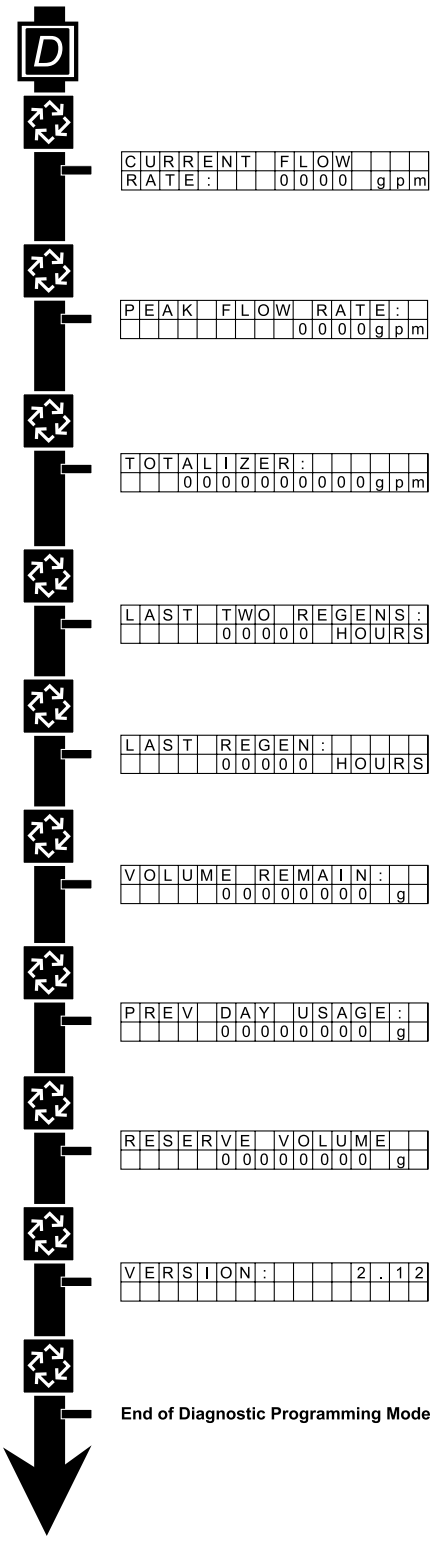
5. End of User Programming Mode

DIAGNOSTIC PROGRAMMING MODE FLOW CHART

NOTE: Depending on current option settings, some displays cannot be viewed or set.

Entering Diagnostic Mode:

1. Press and release the “D” button.
2. Press the Extra Cycle button once per display until all displays are viewed and the normal display screen appears.
3. Press and release the “D” button during this mode to exit the Diagnostic Mode.
4. Depending on current option settings, some displays cannot be viewed.



DIAGNOSTIC PROGRAMMING MODE

NOTE: Depending on current option settings, some displays cannot be viewed.

Overview Diagnostic Mode

The current Diagnostic Programming Mode screen will display until either the Extra Cycle button is pressed through for each screen, or the Diagnostic button is pressed. In the event of regeneration occurring while in the Diagnostic Programming Mode, the regeneration step and time remaining will be displayed. When regeneration completes, the display will return to the normal time of day display screen.

Entering and Exiting Diagnostic Mode

Press and release the “D” button to enter the Diagnostic Programming Mode. Pressing the Extra Cycle button will move to the next diagnostic screen. Press the Extra Cycle button once per display until all are viewed. Pressing the Diagnostic button while in Diagnostic Mode will cause the unit to leave the Diagnostic Mode and return to the normal time of day display screen.

1. **Current Flow Rate**
   This program step displays the calculated flow rate for the timer. The below flow rates are the maximum flow rate the timer will read for each meter.

.75” Paddle:	15 gpm (0.06 m3/m)	**.75” Turbine:**	15 gpm (0.06 m3/m)
1” Paddle:	40 gpm (0.15 m3/m)	**1” Turbine:**	90 gpm (0.34 m3/m)
1.5” Paddle:	180 gpm (0.68 m3/m)	**1.5” Turbine:**	90 gpm (0.34 m3/m)
2” Paddle:	350 gpm (1.32 m3/m)		
3” Paddle:	500 gpm (1.89 m3/m)		

   — Press the Extra Cycle button.

2. **Peak Flow Rate**
   This program step displays the peak flow rate (1 minute average) since the last regeneration.
   — Press the Extra Cycle button.

3. **Totalizer**
   This program step displays the total volume of treated water that passes through the meter.
   — Reset to zero by holding the Up and Down buttons for five seconds while in the totalizer screen.
   — Press the Extra Cycle button.

4. **Hours Between Last Two Regenerations**
   This program step displays the time between the last two regenerations saved.
   — Press the Extra Cycle button.

5. **Hours Since Last Regeneration**
   This program step displays the hours since the last regeneration.
   — Press the Extra Cycle button.

6. **Volume Remaining**
   This program step displays the volume remaining. The timer will regenerate if the volume remaining is set to zero. The maximum ranges are the same as the maximum volume calculated on the main screen.
   — Press the Extra Cycle button.

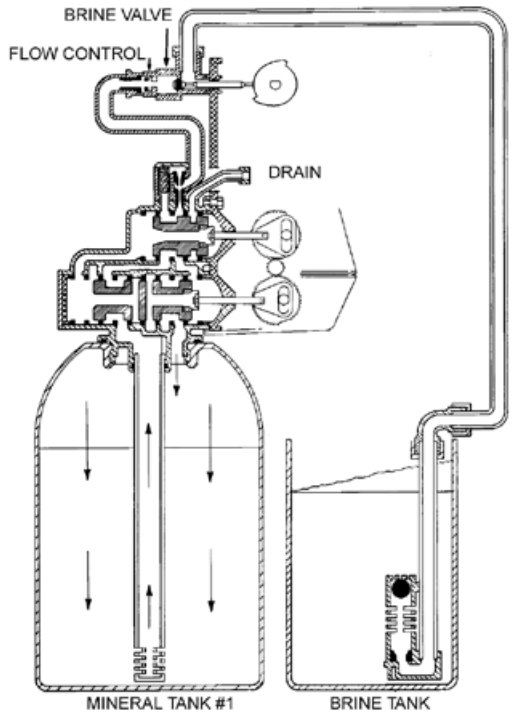
7. **Previous Day’s Water Usage**
   This program step displays the previous day’s water usage.
   — Press the Extra Cycle button.

8. **Reserve Volume**
   This program step displays the reserve capacity, ensuring soft water is available at all times.
   — Press the Extra Cycle button.

9. **Software Version**
   This program step displays the timer’s software program version number.
   — Press the Extra Cycle button to exit.

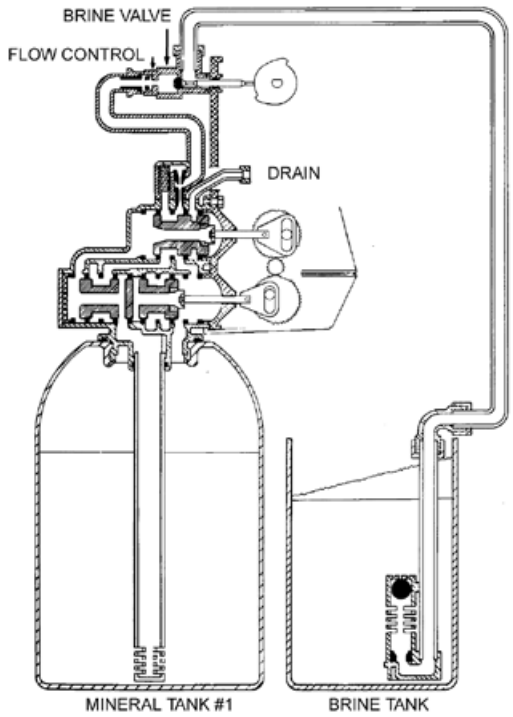
NOTE: Diagnostic Programming Mode will stop if the system goes into a regeneration.

MAT FLOW DIAGRAMS



1 - SERVICE POSITION

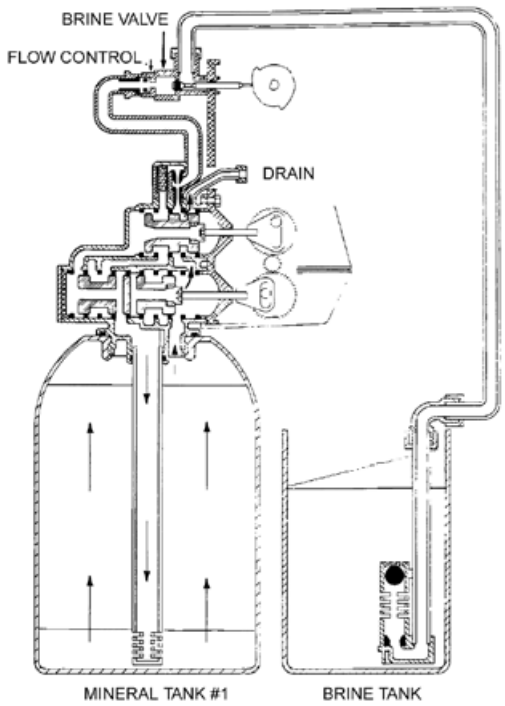
Hard water enters the unit at the valve inlet, flows around the lower piston, and down through the mineral in the first tank. Conditioned water enters the center tube through the bottom distributor, flows up through the center tube, around the lower piston, through the meter, and out the valve outlet.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



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

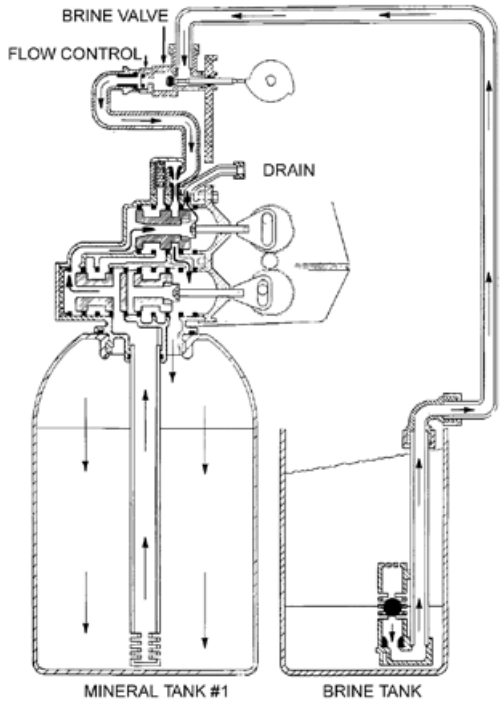
Hard water enters the unit at the valve inlet, flows around the lower piston, through the pipe leading to the second mineral tank, and down through the mineral in the second tank. Conditioned water enters the center tube of the second tank through the bottom distributor, flows up through the center tube, 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

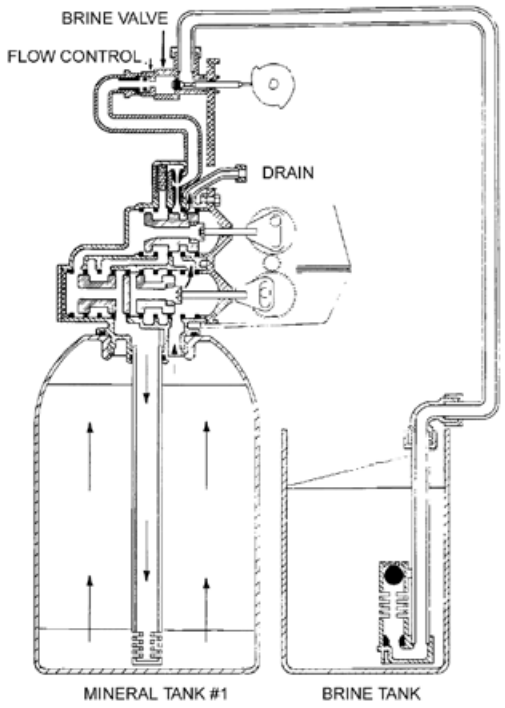
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, through the center of the lower piston, down the center tube, up through the mineral, around the upper piston, and out the drain line.



4 - BRINE DRAW

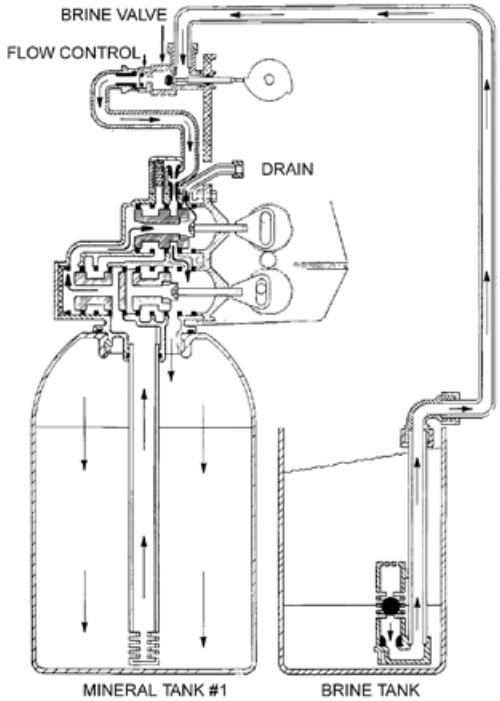
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, and down through the nozzle and throat to draw brine from the brine tank. Brine flows around the upper piston, down through the mineral, into the center tube through the bottom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

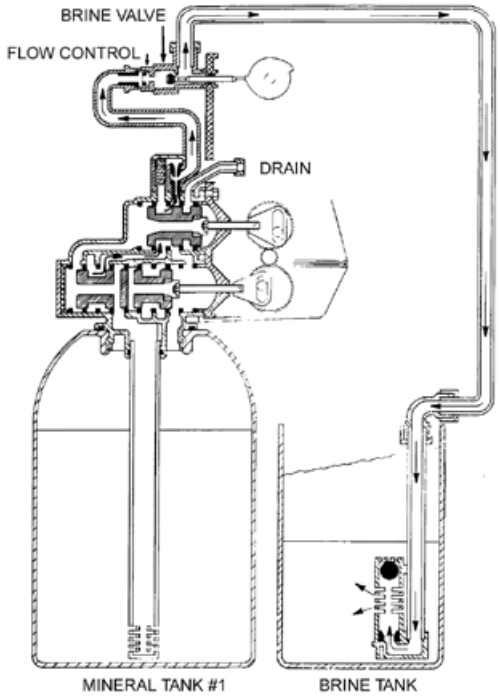
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, down through the nozzle and throat, around the upper piston, down through the mineral, into the center tube through the bottom distributor, up the center tube, through the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



6 - RAPID RINSE

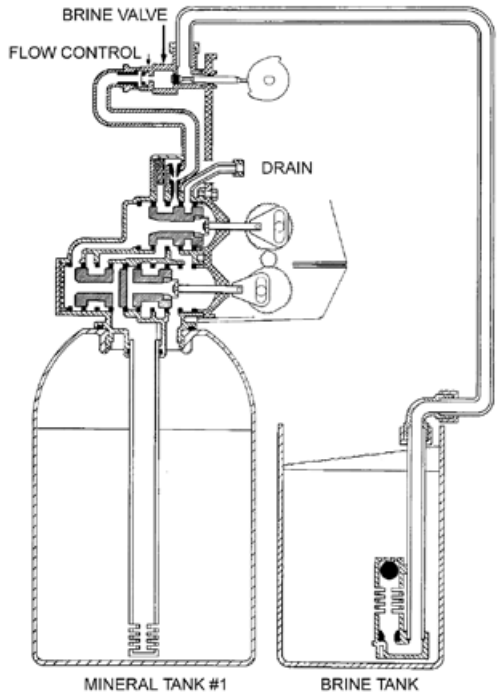
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, and down through the mineral in the first tank. Rinse water from the mineral bed enters the center tube through the bottom distributor, flows up the center tube, through the center of the lower piston,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

MAT FLOW DIAGRAMS



7 - BRINE TANK FILL POSITION

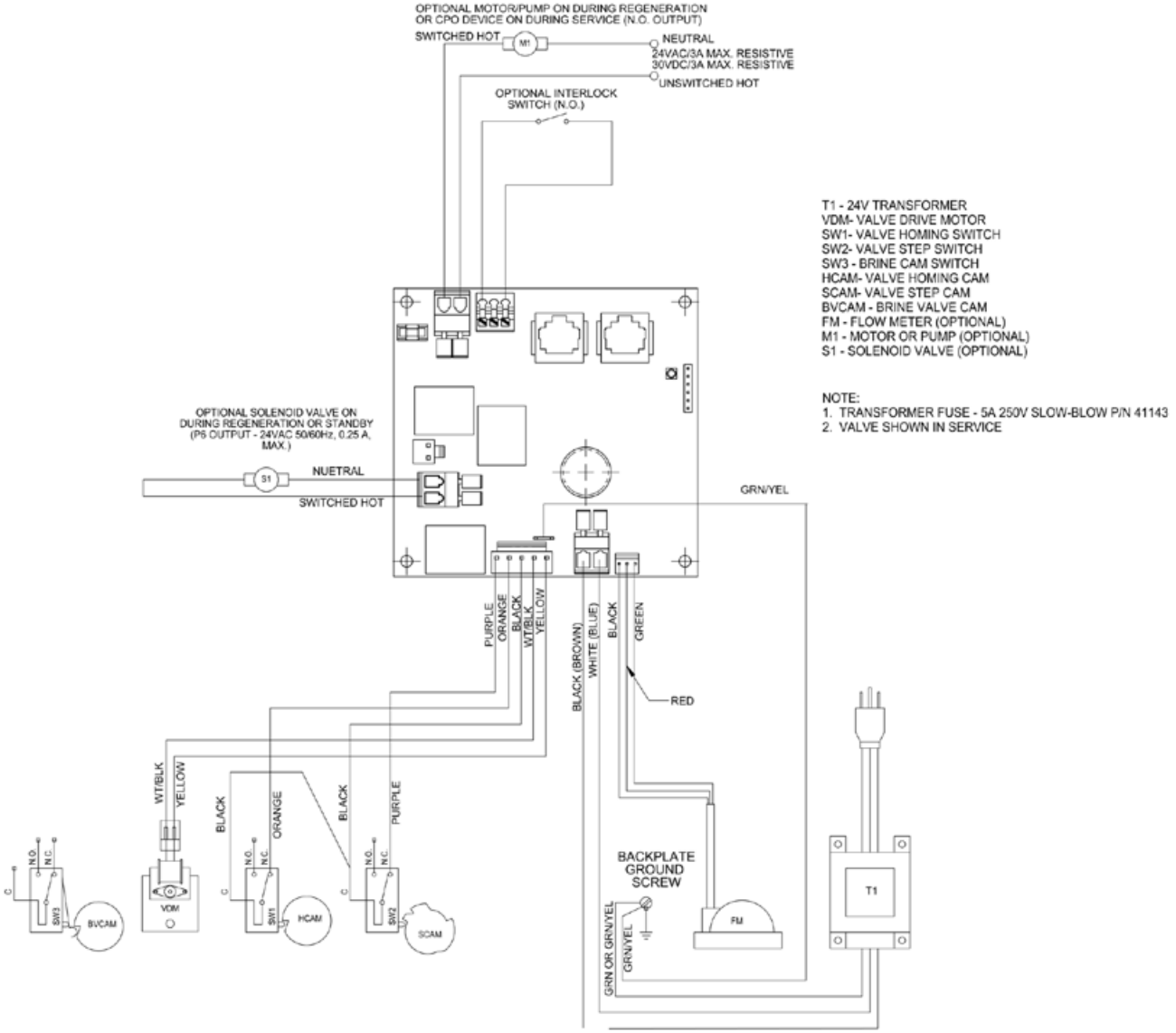
Conditioned water from the second mineral tank flows around the lower piston, around the upper piston, into the injector housing, through the brine line flow control, through the brine valve, and into to brine tank. No water flows through the first mineral tank.



8 - SERVICE (TANKS SWITCHED)

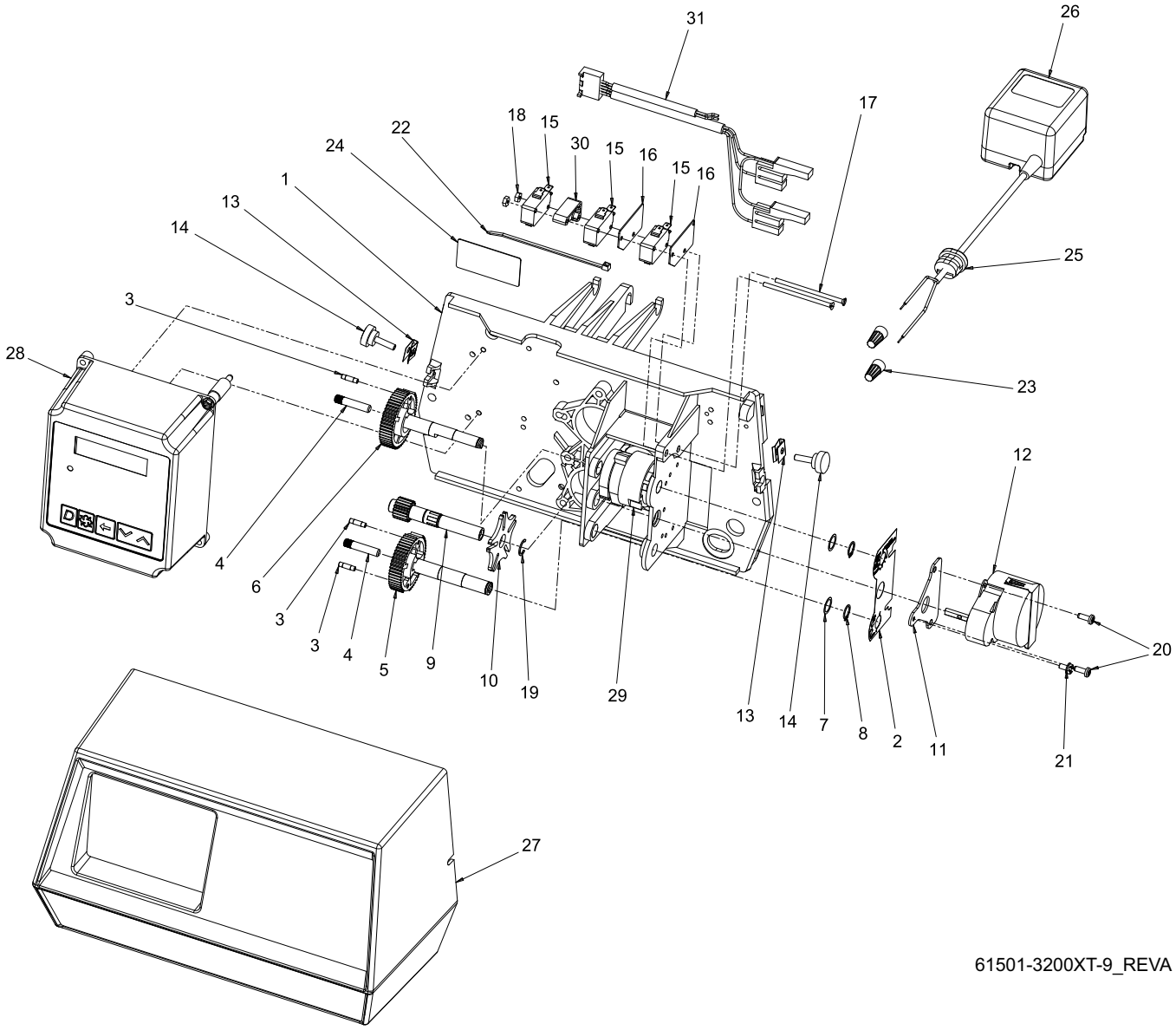
Hard water enters the unit at the valve inlet, flows around the lower piston, through the pipe leading to the second mineral tank, and down through the mineral in the second tank. Conditioned water enters the center tube of the second tank through the bottom distributor, flows up through the center tube, 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.

9500 XT WIRING



42140_2750XT_2850XT_REVA

9000/9100/9500 POWER HEAS ASSEMBLY

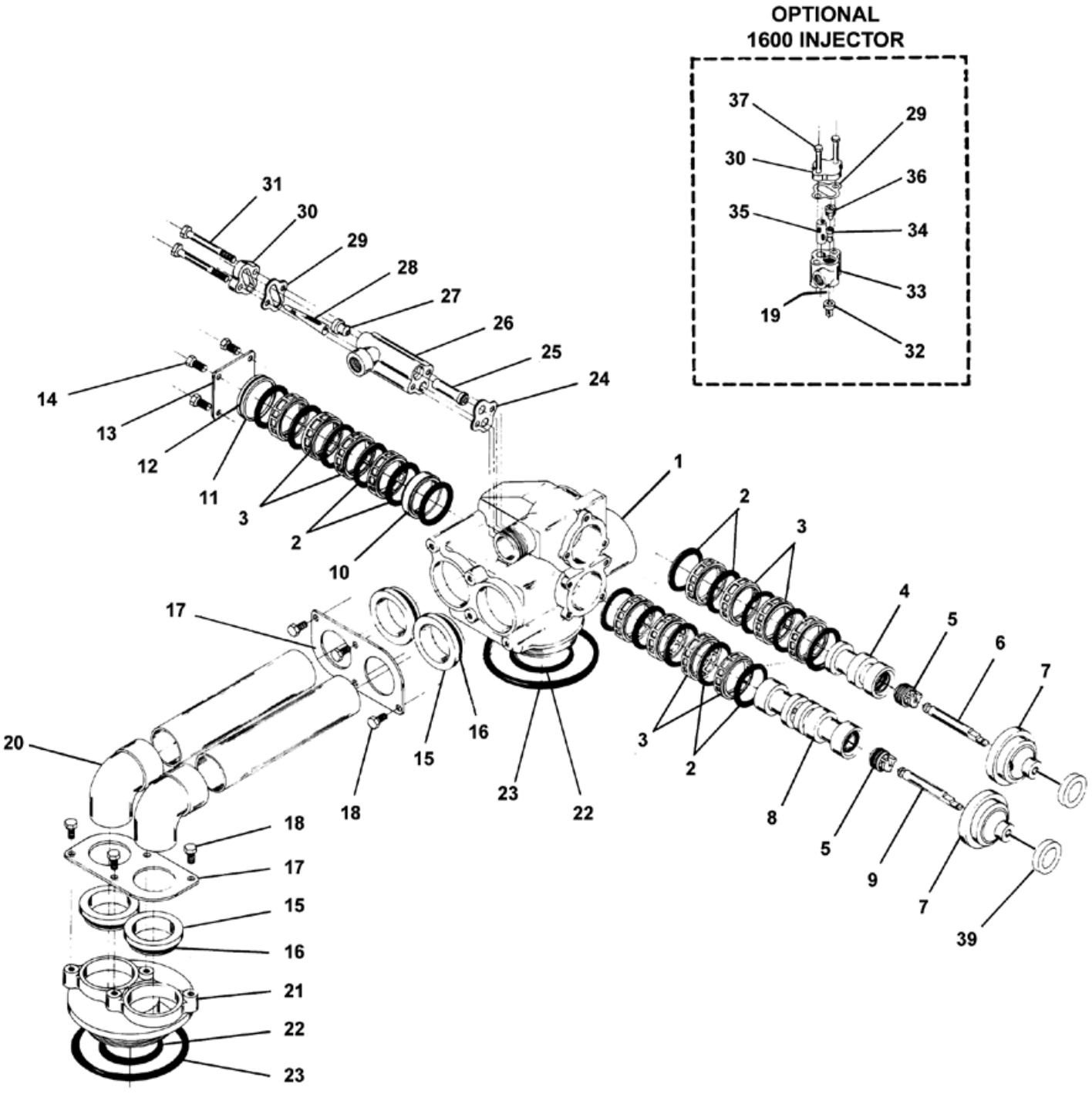


9000/9100/9500 POWER HEAS ASSEMBLY

Item No.	Quantity	Part No.	Description
1	1	17784-05	Panel, Control, 9000/9500, ET
2	1	15175	Label, Shaft Position
3	3	15209	Pin, Roll, 1/8 x 1/2 SS
4	2	15367	Pin, Dowel, 9000
5	1	17869	Gear, Drive, 1/2” Stroke
6	1	17868	Gear, Drive, 3/4” Stroke, 9000
7	2	15692	Washer, Plain, 3/8”
8	2	14917	Ring, Retaining
9	1	15135	Gear, Drive, 9000
10	1	14896	Wheel, Geneva
11	1	15199	Plate, Ground, 9000/9500
12	1	18737	Motor, 24V, 50/60 Hz, 1 RPM
13	2	18728	Nut, Tinneman, U Type, 8-32
14	2	19367	Screw, Designer Cover, Thumb
15	3	16433	Switch, Miniature
16	2	10302	Insulator, Limit Switch
17	2	16442	Screw, Slot Flat Hd, 4-40 x 2.12”
18	2	10339	Nut, Hex, 4-40 Zinc Plated
19	1	15810	Ring, Retaining
20	2	19160	Screw, Phil Pan, Thread, 6-32 x 3/8
21	1	14430	Screw, Hex Wsh St, 6 x 1/4
22	1	14044	Tie, Cable, Heyco VNT# 4-18
23	2	40422	Nut, Wire, Tan
24	1	41587	Label, Serial Number, Stock
25	1	13547-01	Strain Relief, Euro Round Cord
26	1	19674	Transformer, 24V, 9.6VA
27	1	60232-112	Cover, Designer, 1 Pc Black
28	1	42466-01	Timer Assy, XT, Left Hand
29	1	17765	Cam Assy, Aux Switch, 9500
30	1	18803-01	Spacer, Switch, Machd
31	1	42197	Wire Harness, 5066

NOTE: For all other service part numbers, see the Service Manual that accompanies the control valve.

9500 CONTROL VALVE ASSEMBLY

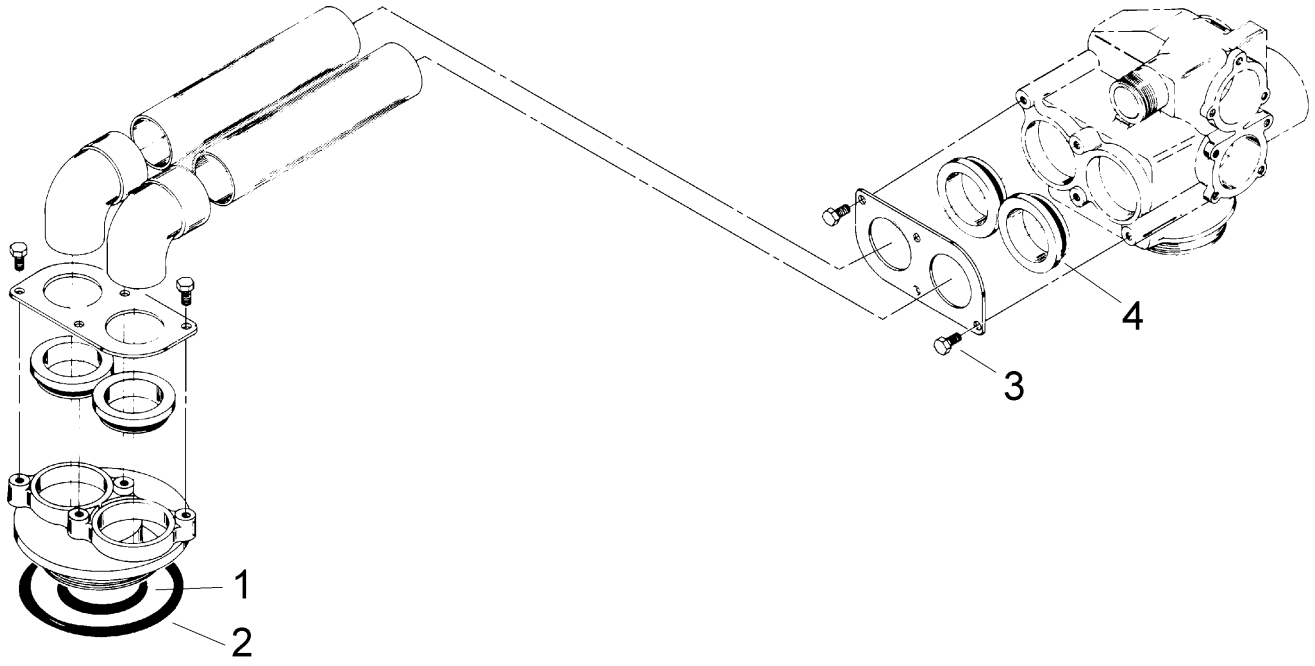


9500 CONTROL VALVE ASSEMBLY

Item No.	Quantity	Part No.	Description
1	1	16919-01	Valve Body
2	16	16101	Seal
3	12	16638-01	Spacer
		16638	Spacer Hot Water
4	1	17110	Upper Piston
5	2	14309	Retainer, Piston Rod
	2	15110	Retainer, Piston Rod, H.W.
6	1	16957	Upper Piston Rod
7	2	17212	End Plug Assy.
	2	17212-01	End Plug Assy. H.W.
8	1	17111	Lower Piston
9	1	16956	Lower Piston Rod
10	1	17092	Spacer Disk
11	1	16955	End Plug
12	3	16394	O-Ring -029
13	1	14906	End Plate
14	4	15137	Screw, End Plate
		17657	Metric
15	4	17052	Coupling, Pipe
16	4	17224	O-Ring -224
17	1	17061	Coupling Retainer
18	8	10231	Screw, Retainer
		17659	Metric
19	1	11475	Injector Body Gasket, 1600
20	2	17353	90° Copper Elbow
21	1	16916-01	Second Tank Adapter
22	2	13577	O-Ring -226
23	2	16455	O-Ring -347
24	1	14805	Injector Body Gasket, 1700
25	1	*14802	Injector Throat
26	1	17777	Injector Body
27	1	*14801	Injector Nozzle
28	1	14803	Injector Screen
29	1	10229	Injector Cover Gasket
30	1	11893	Injector Cover
31	2	14804	Screw, Injector Body
		17655	Metric
32	1	16221	Air Dispenser
33	1	17776	Injector Body
34	1	10914-3	Injector Throat #3, Yellow
35	1	10227	Injector Screen
36	1	10913-3	Injector Nozzle #3, Yellow
37	2	10692	Screw, Injector Body
		17656	Metric
38	1	60366	D.L.F.C. 1″ NPT (not shown) - Specify Size
39	2	17558	Spacer
40	2	19608-15	Disperser, Upper (not shown)
41	1	11248	Pin (not shown)

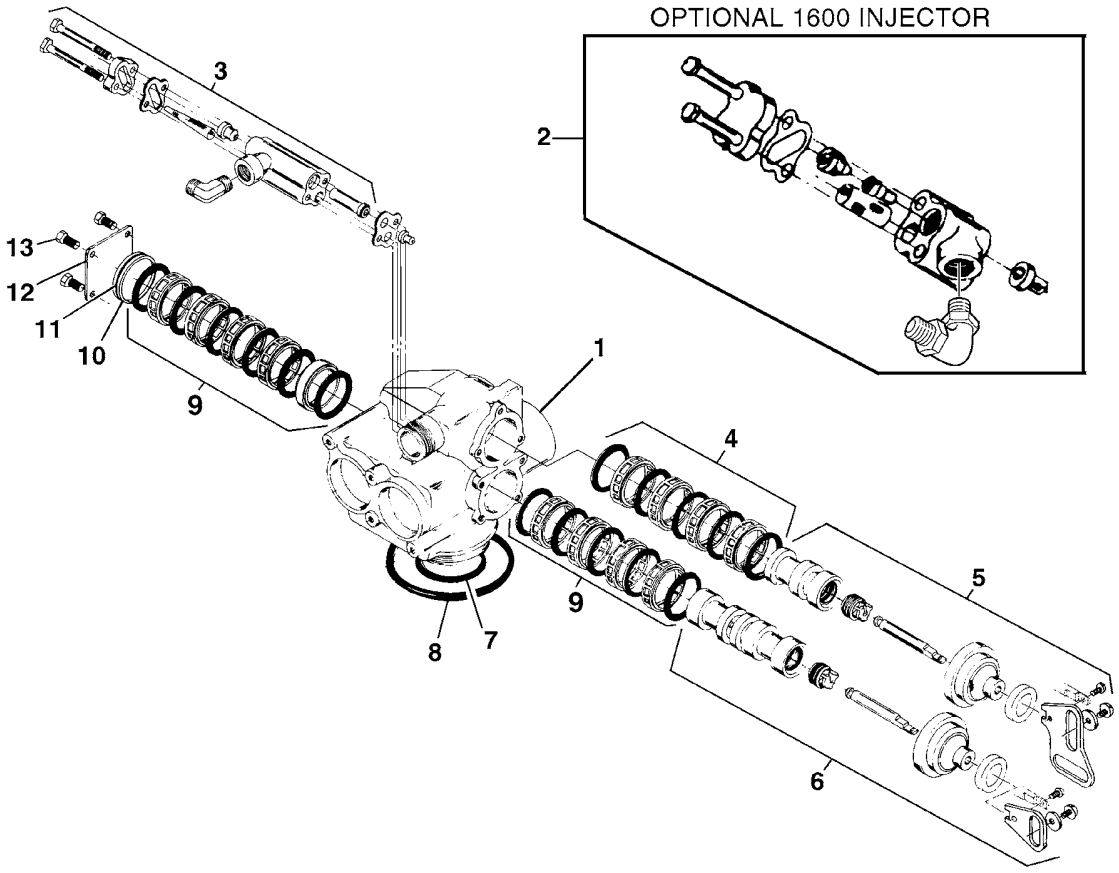
*Injector Throat	Injector Nozzle	Size	Color
14802-03	14801-03	#3C	Yellow
14802-04	14801-04	#4C	Green
14802-05	14801-05	#5C	White
14802-06	14801-06	#6C	Red

9500 SECOND TANK ASSEMBLY



Item No.	Quantity	Part No.	Description
1	1	13577	O-ring, -226
2	1	16455	O-ring, -347
3	8	10231	Screw, Slot Hex, 1/4 - 20 x 1/2
4	4	17224	O-ring, -224

9500 SERVICE ASSEMBLIES

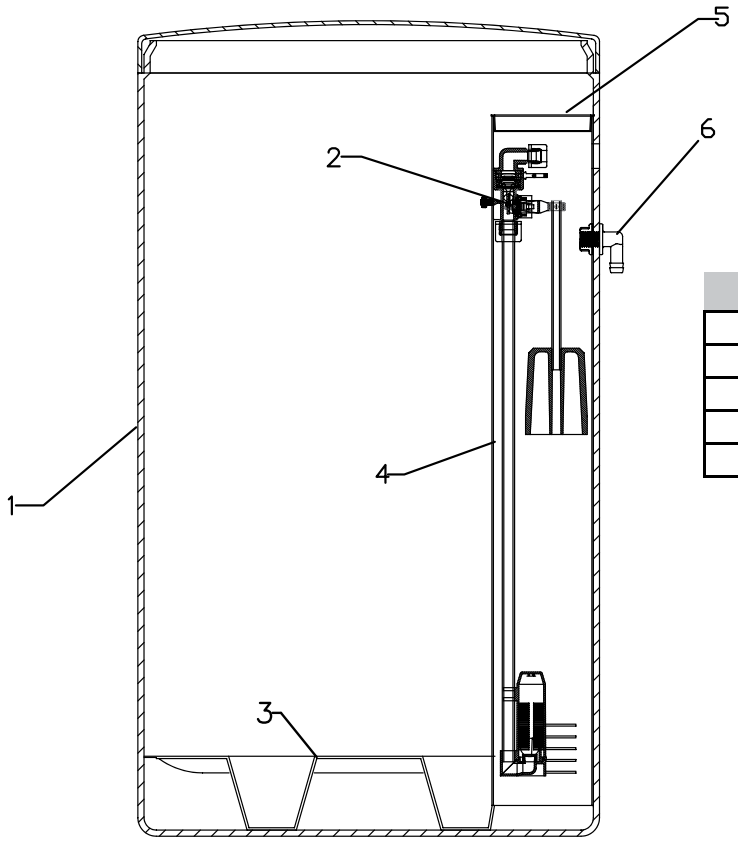


Item	*Quantity*	*Part Number*	*Description*
1	1	16919-01	valve body ***9500*** NPT, mechanical base
		16919-01NP	valve body ***9500*** NPT, mechanical base, nickel-plated
		16919-21	valve body ***9500*** BSP/Metric, mechanical base
		16919-21NP	valve body ***9500*** BSP/Metric, mechanical base, nickel-plated
2	1	60080-XX	injector assembly (see chart for dash numbers)
3	1	60039-XX	injector assembly (see chart for dash numbers)

injector	*number*
blue #2	02
yellow #3	03
green #4	04
white #5	05

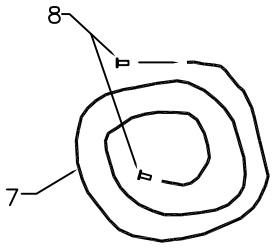
4	1	60134	seal and spacer kit, top
		60134-01	seal and spacer kit, top, hot water
		60134	seal and spacer kit, top, silicone
5	1	60108	piston assembly, top
		60108-01	piston assembly, top, hot water
6	1	60109	piston assembly, bottom
		60109-01	piston assembly, bottom, hot water
7	1	60133	seal and spacer kit, bottom
		60133-01	seal and spacer kit, bottom, hot water
		60133-10	seal and spacer kit, bottom, silicone
8	1	16455	O-ring, 347
9	1	13577	O-ring, 226
10	1	16955	end plug
11	1	16394	O-ring, 029
12	1	14906	end plate
13	4	15137	screw, hex washer machine, 1-24 x 3/8
		17657	screw, hex M5-40, Metric
Not Shown			
14		16516	tool, seal and spacer stuffer
15		17623	tool, spacer puller

BRINE SYSTEM FOR MAT 15M-90M



BRINE TANK ASSEMBLIES
MAT 15M-90M

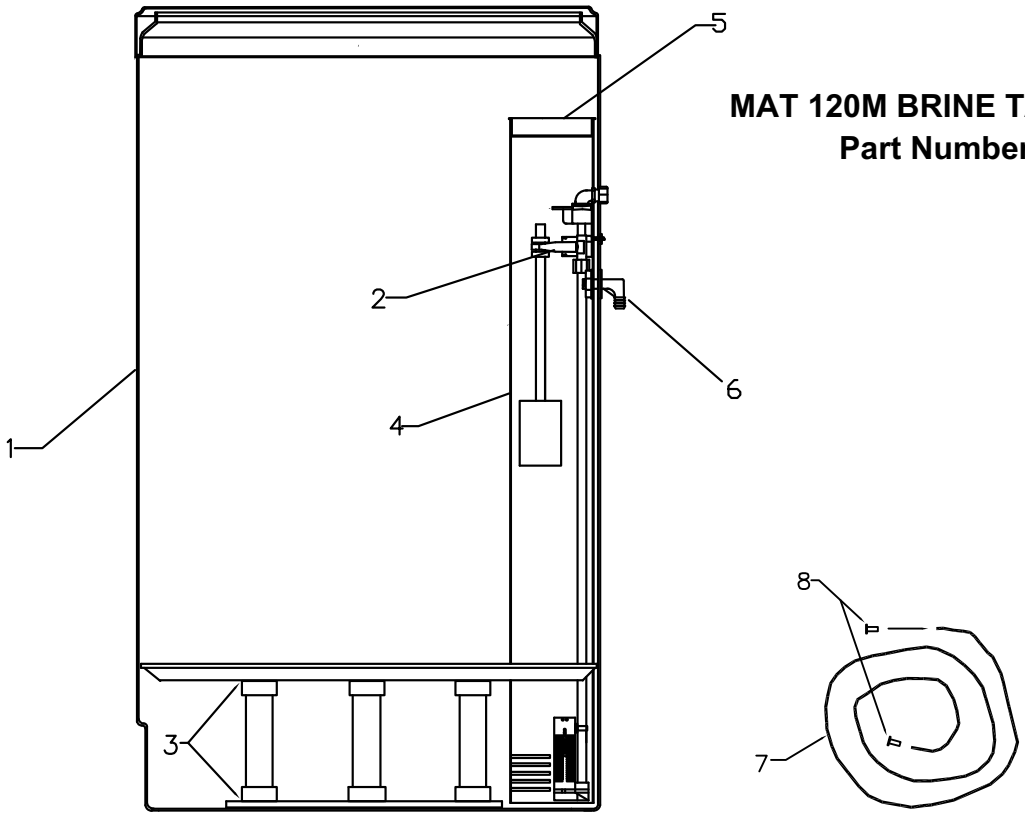
Models	Part Number
MAT 15	A2042062
MAT 30	A2042062
MAT 45	A2042064
MAT 60	A2042064
MAT 90	A2042064



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

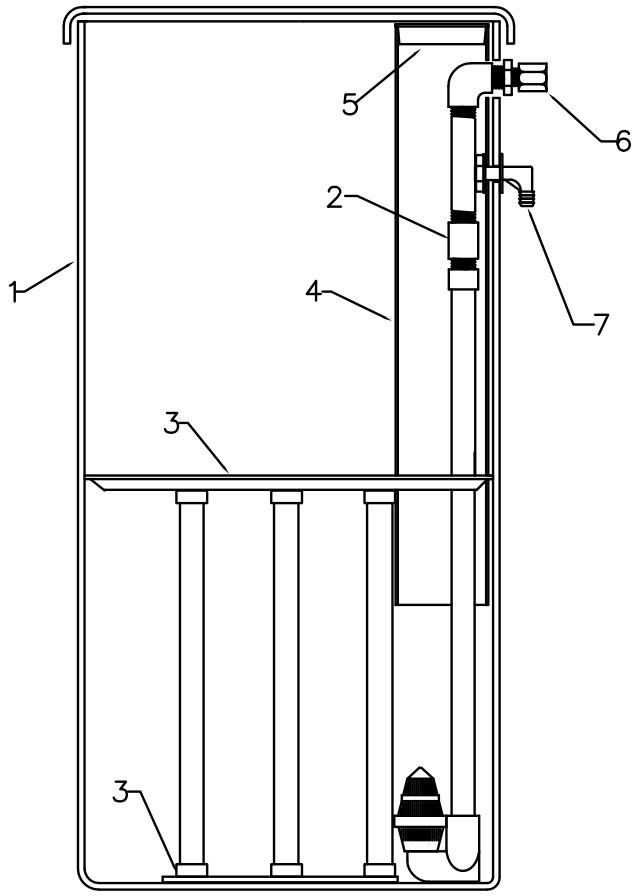


MAT 120M BRINE TANK ASSEMBLY
Part Number B1295002

PARTS LIST

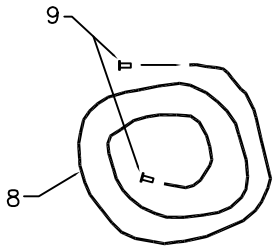
Item Number	Part Number	Item Description
1	B1002039	BRINE TANK AND COVER 24x41
2	B1180005	BRINE VALVE AIR CHECK ASSEMBLY
3	A2284006	SALT SHELF 24" DIA, 4" WELL HOLE
4	B1015010	BRINEWELL 4"x36"
5	A2072003	CAP, BRINEWELL
6	A2250003	ELBOW OVERFLOW W/NUT
7	A2129060	TUBING, POLYETHYLENE, BLACK
8	A2476001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

BRINE SYSTEM FOR MAT 150M-300M



BRINE TANK ASSEMBLIES
MAT 150M-300M

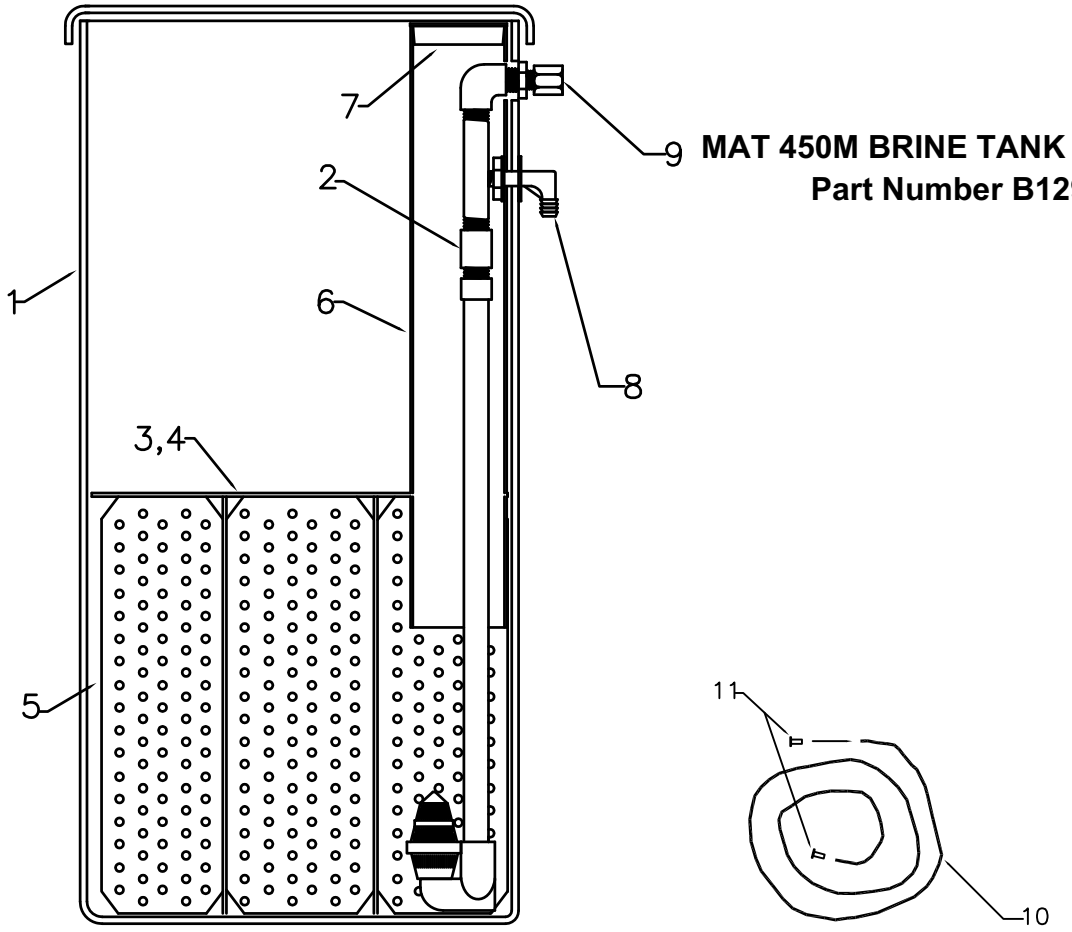
Models	Part Number
MAT 150	B1294002
MAT 180	B1294003
MAT 210	B1294004
MAT 240	B1294005
MAT 270	B1294006
MAT 300	B1294007



PARTS LIST

Item Number	Part Number	Item Description
1	B1002016	BRINE TANK AND COVER 24x50
2	B1238001	BRINE VALVE AIR CHECK ASSEMBLY - MAT 150M
	B1238002	BRINE VALVE AIR CHECK ASSEMBLY - MAT 180M
	B1238003	BRINE VALVE AIR CHECK ASSEMBLY - MAT 210M
	B1238004	BRINE VALVE AIR CHECK ASSEMBLY - MAT 240M
	B1238005	BRINE VALVE AIR CHECK ASSEMBLY - MAT 270M
	B1238006	BRINE VALVE AIR CHECK ASSEMBLY - MAT 300M
3	A2284007	SALT SHELF 24" DIA, 5" WELL HOLE
4	B105006	BRINEWELL 5"x37" - (MAT 150M)
	B105008	BRINEWELL 5"x46" - (MAT 180M-300M)
5	A2072001	CAP, BRINEWELL
6	A2129060	CONNECTOR, MALE, POLY TUBEx3/4"
7	A2250003	ELBOW OVERFLOW W/NUT
8	A2129060	TUBING, POLYETHYLENE, BLACK
9	A2476001	INSERT, TUBE

BRINE SYSTEM FOR MAT 450M

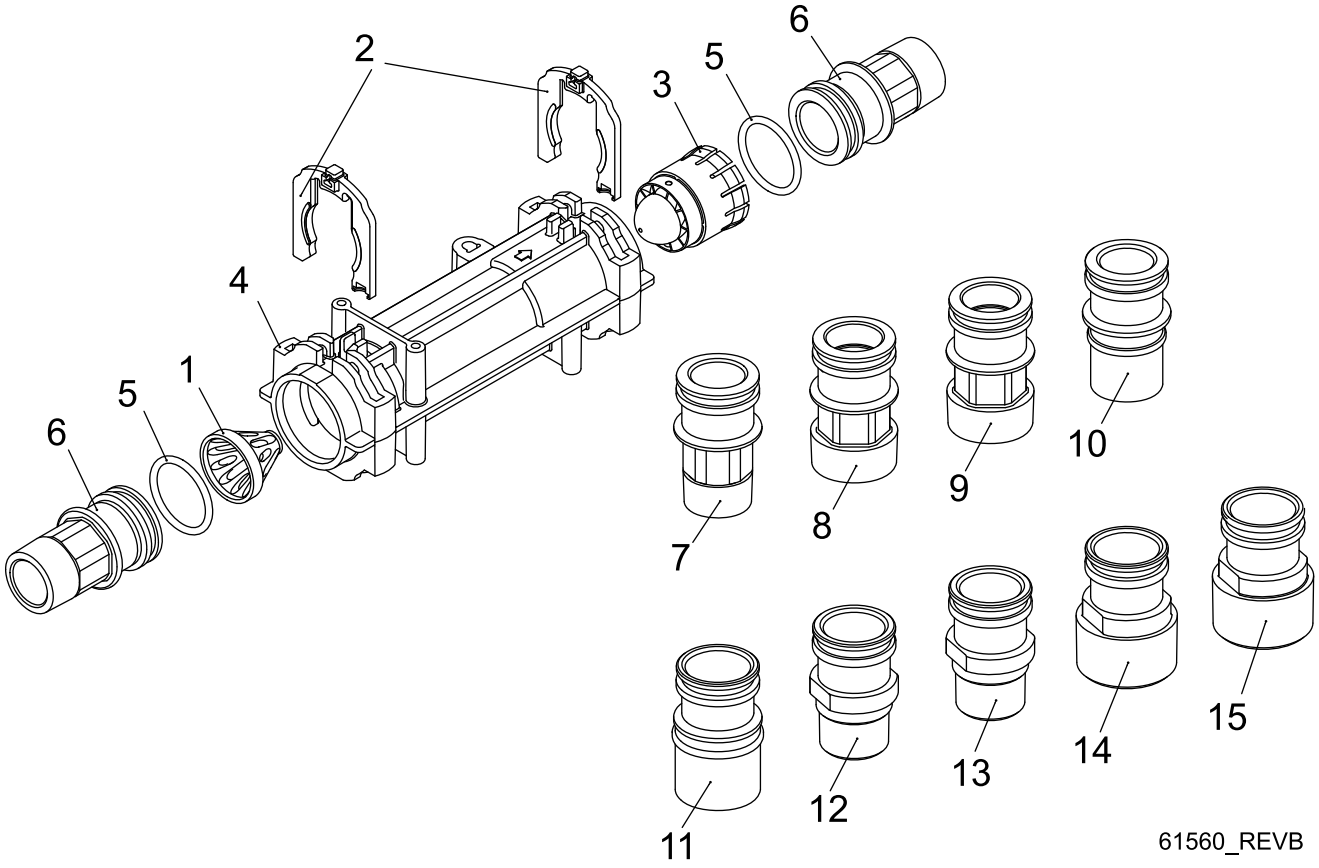


MAT 450M BRINE TANK ASSEMBLY
Part Number B1290007

PARTS LIST

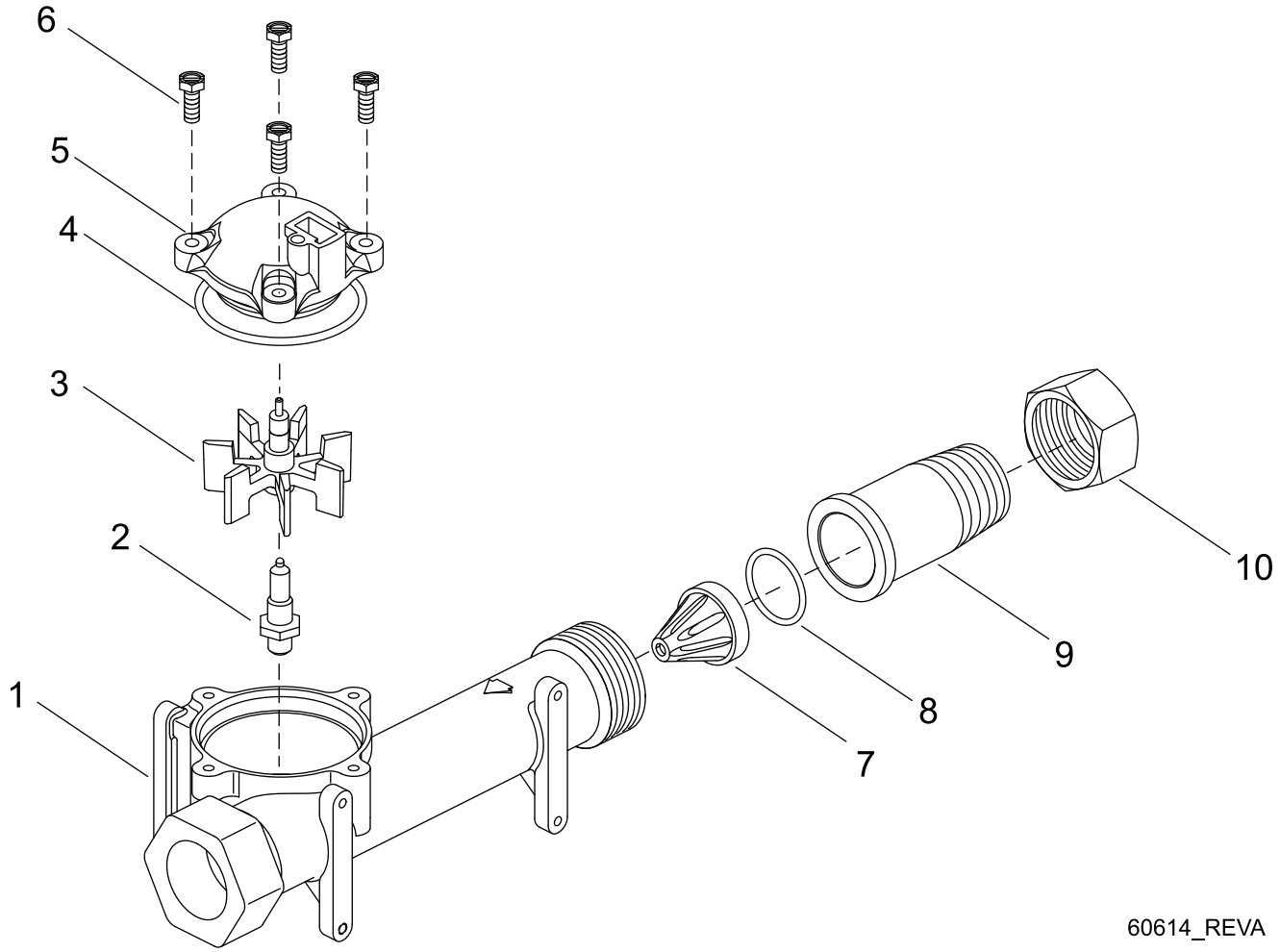
Item Number	Part Number	Item Description
1	B1002017	BRINE TANK AND COVER 30x48
2	B1239011	BRINE VALVE AIR CHECK ASSEMBLY
3	B1041002	SALT SHELF
4	B1040002	SALT SCREEN
5	B1043017	GRID PANEL SET
6	B1015007	BRINEWELL 5"x44"
7	A2072001	CAP, BRINEWELL
8	A2250003	ELBOW OVERFLOW W/NUT
9	A2129025	MALE CONNECTOR, 1/2"x3/4" MPT
10	A2165042	TUBING, POLYETHYLENE, BLACK
11	A2476001	INSERT, TUBE

INLINE PLASTIC METER ASSEMBLY



Item No.	Quantity	Part No.	Description
1	1	17542	Flow Straightener
2	2	40576	Clip, H, Plastic, 7000
3	1	40577	Turbine Meter Assy, 7000
4	1	41555	Body, Remote Meter
5	2	40951	O-ring, -220
6	2	40563	Connector, 1” NPT, 7000
7	2	40563-10	Connector, 1” BSP, 7000
8	2	40565	Connector, 1 1/4” NPT, 7000
9	2	40565-10	Connector, 1 1/4” BSP, 7000
10	2	41242	Connector, 1” & 1 1/4” Sweat
11	2	41243	Connector, 1 1/4 & 1 1/2” Sweat
12	2	41596	Connector, Brass, 1” NPT
13	2	41596-10	Connector, Brass, 1” BSP
14	2	41597	Connector, Brass, 1 1/2” NPT
15	2	41597-10	Connector, Brass, 1 1/2” BSP

1 1/2” BRASS PADDLE METER ASSEMBLY



Item No.	Quantity	Part No.	Description
1	1	17569	Body, Meter, 2850/9500
2	1	13882	Post, Meter Impeller
3	1	13509	Impeller, Meter
4	1	13847	O-ring, -137, Std/560CD, Meter
5	1	14716	Meter Cap Assy, ET/NT
6	4	12112	Screw, Hex Hd Mach, 10-24 x 1/2
7	1	17542	Flow Straightener, 1 1/2”
8	1	12733	O-ring, -132
9	1	17544	Fitting, 1 1/2” Quick Connector
10	1	17543	Nut, 1 1/2”, QC

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 - TIMER

If an error is detected, an error screen will alternate with the main display screen every few seconds, and the **LED light will be red.**

During an error condition, the unit continues to monitor the flow meter and update the remaining capacity. Once an error condition is corrected, the unit returns to the operating status it was in prior to the error, and regeneration resumes according to normal programming. If an error is cleared by reprogramming the unit in the Master Programming Mode, the volume remaining may be reset to the full unit capacity (as though it had just regenerated). If an error is present, a regeneration can only occur manually by pressing and holding the Extra Cycle button for 5 seconds. If the unit was in regeneration when the error occurred, it will complete the regeneration cycle and go into service.

When the problem is corrected, and the error no longer displays (it may take several seconds for the unit to stop displaying the error message), the unit will return to normal operation. The **LED light** will no longer be **red**, and will turn **Green** if the unit is regenerating, or **Blue** if the unit is in service.

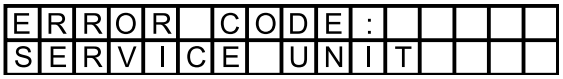
Problem	Correction
A. Flashing/blinking display	A. Power outage has occurred. Either wait 5 minutes for blinking to stop, or press any key on the keypad.
B. Unit not responding after going into regeneration	B. Verify the unit is configured correctly (ex: wiring valve type). Perform a Master Reset by holding the Shift button and cycling power. Check and verify the choices selected in Master Programming Mode.
C. Unit displays “ERROR CODE: REPLACE UNIT” (corrupted UAP)	C. Contact your local water treatment professional.

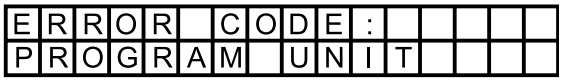
Error Codes

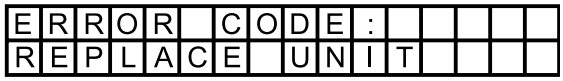
Error Code	Display Message	Correction
01	ERROR CODE: PROGRAM UNIT	Go through all screens in Master Programming Mode.
02	ERROR CODE: PROGRAM UNIT	Go through all screens in Master Programming Mode.
03	ERROR CODE: SERVICE UNIT	Perform a Master Reset by holding the Shift button and cycling power. Go through all screens in Master Programming Mode. Manually initiate a regeneration cycle by pressing the Extra Cycle button for 5 seconds.
04	ERROR CODE: SERVICE UNIT	Perform a Master Reset by holding the Shift button and cycling power. Go through all screens in Master Programming Mode. Manually initiate a regeneration cycle by pressing the Extra Cycle button for 5 seconds.
05	ERROR CODE: SERVICE UNIT	Call your local water treatment professional as soon as possible. Leave the unit running (do not unplug).

NOTE: If the above corrections do not work, please contact your local water treatment professional.

Error Display Screen Examples







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 toForeign 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

PROBLEM	CAUSE	CORRECTION
	D. Foreign Material In Brine Valve.	D. Replace Brine Valve Seat And Clean Valve.
	E. Foreign Material In Brine Line Flow Control.	E. Clean Brine Line Flow Control.
	F. Power Loss During Brine Fill.	F. Check Power Source.
8. Softener Fails To Draw Brine.	A. Drain Line Flow Control Is Plugged.	A. Clean Drain Line Flow Control.
	B. Injector Is Plugged.	B. Clean Injector.
	C. Injector Screen Plugged.	C. Clean Screen.
	D. Line Pressure Is Too Low.	D. Increase Line Pressure To 25 P.S.I. Min.
	E. Internal Control Leak.	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.	A. Check Timer Program and Positioning of Control. Replace Power Head Assembly If not Positioning Properly.
	B. Foreign Material In Control.	B. Remove Power Head Assembly And Inspect Bore, Remove Foreign Material and Check Control In Various Regeneration Positions.
	C. Internal Control Leak.	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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