Series 255 Valve / 460i

Water Conditioning Control System

Installation, Operation and Maintenance Manual

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Introduction

Series 255/460i Demand Control System

The Series 255/460i demand control system combines design simplicity with reinforced Noryl* construction to provide the user with an uncommonly reliable appliance. The inherent reliability of the system means a long life of efficient, trouble-free, uninterrupted soft water luxury.

Should maintenance become necessary, the Series 255 offers a unique “separation” capability illustrated in this manual.

Of interest to both the owner and the water conditioning dealer are the design and operation benefits detailed below.

Superior Design

- **Fewer parts** than any control system of comparable function and most controls of lesser function.
- **Single synchronous electric motor** provides all the power needed to turn the camshaft.
- **460i timer utilizes a microprocessor** to provide a time-proven logic analysis to initiate regeneration.
- **Electrical wiring is factory assembled.** System cannot be connected incorrectly.
- **System indexes manually with or without power** to any one of its service or regeneration positions. Readout on timer face plate indicates control valve position.
- **No dynamic seals** that could cause leakage through wear or fatigue.
- **Control accepts Noryl or brass manifold or modular bypass valve without modification**, offering complete versatility and easy plumbing for any installation.
- **Brining control valve built into system** eliminates need for an external brine valve.
- **Automatic drain flow controller** is incorporated into the system.

Superior Operation

- **Direct acting system** functions independently of water pressure. No pistons or diaphragms that require a minimum water pressure to operate.
- **Five-cycle operation** provides for downflow service, upflow backwash, downflow brining, downflow rinse, downflow purge, or fast rinse. A sixth position is included for timed refill of the brine tank.
- **Valve discs are held closed by water pressure** and therefore are leak tight. The sealing forces are increased as the water pressure is increased. Valve seats are in a vertical position, which is the design position least vulnerable to plugging.
- **System operation cannot get out of phase** or sequence. Control always returns to a fixed service position after regeneration regardless of where in the regeneration cycle it was started.
- **Bypass water is automatically available** during regeneration.

*Noryl is a trademark of General Electric Company

460i Electronic Demand System

The two key components of the 460i electronic demand system are the microprocessor, a miniature computer located on the circuit board, and a water meter located at the valve outlet. The flow of conditioned water through the meter generates electrical impulses that tell the computer the amount of water being used.

Every day, at 2:00 a.m., the past seven days' water usage is statistically averaged to anticipate the amount of water that will be used the next day. The computer then determines if the water conditioner has enough remaining capacity to supply the next day's needs. If not, the unit will regenerate.

If the water usage pattern changes, the computer automatically compensates for the change and regenerates only when needed. This results in higher operating efficiency and lower salt usage than a conventional conditioner operating on a fixed regeneration schedule.

Special Features

Memory Retention

During a power outage, all of the data in the microprocessor's memory is stored in a special electronic chip called NOVRAM, Nonvolatile Random Access Memory. This data includes the time of day, water usage amounts, and the number of days since the last regeneration. When power is restored, the NOVRAM returns the data to the microprocessor and operation resumes as if an outage never occurred.

The time of day will be late by the length of the power outage. Most power outages are less than one minute in duration. Therefore, it may be months or years before the time display would require resetting. If an outage of one or more hours occurs, the time of day should be reset. No other reprogramming is necessary.

"Reserve" and High Water Usage

"Reserve" refers to the amount of soft water that may be needed for the next 24 hours. The microprocessor calculates how much soft water was used and adjusts the reserve capacity accordingly at the end of each day. As a result, the reserve is kept at a minimum for optimum economy. The reserve amount is calculated by multiplying the average past seven days' usage by 1.2. Regeneration decisions are based on the calculated reserve.

Self-Adjusting Reserve

The 460i is programmed to react to a sudden increase in water usage. If a day's usage is more than double the current average, the computer anticipates that a second day of high usage is likely to occur. The high usage amount will be used as the reserve when the 460i performs its regeneration computation.

Low or No Water Usage

The 460i is programmed to recognize a day of very little or no water usage as an abnormality. It will not use data from such a day to compute the average usage. For example, if the family is on vacation for a week, the prior average will be maintained. When household activity resumes, the 460i will operate as if the vacation had not occurred.

Design Reliability

Solid-state electronics assure many years of trouble-free performance. The metering system has only one moving part: the rotating turbine that measures water usage and generates electrical pulses that are continually counted by the microprocessor to determine the need to regenerate.

Time Display

The correct time will continually appear in the time display during normal conditioning operation. To change the hour display, press the TIME SET BUTTON until the present hour appears. The PM light will be on when the time is between 12:00 noon and midnight. The light is off during the AM hours.

Flow Indicator

The water flow indicator on the time display flashes whenever conditioned water is flowing through the valve. This allows an easy determination of proper meter operation.

Hardness and Capacity Settings

Once the hardness and capacity settings have been set, the information cannot be lost due to a power outage; reprogramming is not necessary.

Guest Cycle

An extra regeneration can be achieved at any time by depressing the pointer knob. It will take a few minutes for the regeneration to start. The unit will return to service in two hours. This feature is beneficial when you expect to use more than the normal amount of water, for example: guest visits, extra heavy laundry days, etc.

Programmable Calendar Override

The 460i controller has a unique feature that allows a calendar override of 1 to 15 days. This override will initiate a regeneration at the programmed interval if the water usage has not been enough to initiate regeneration.

Control Module

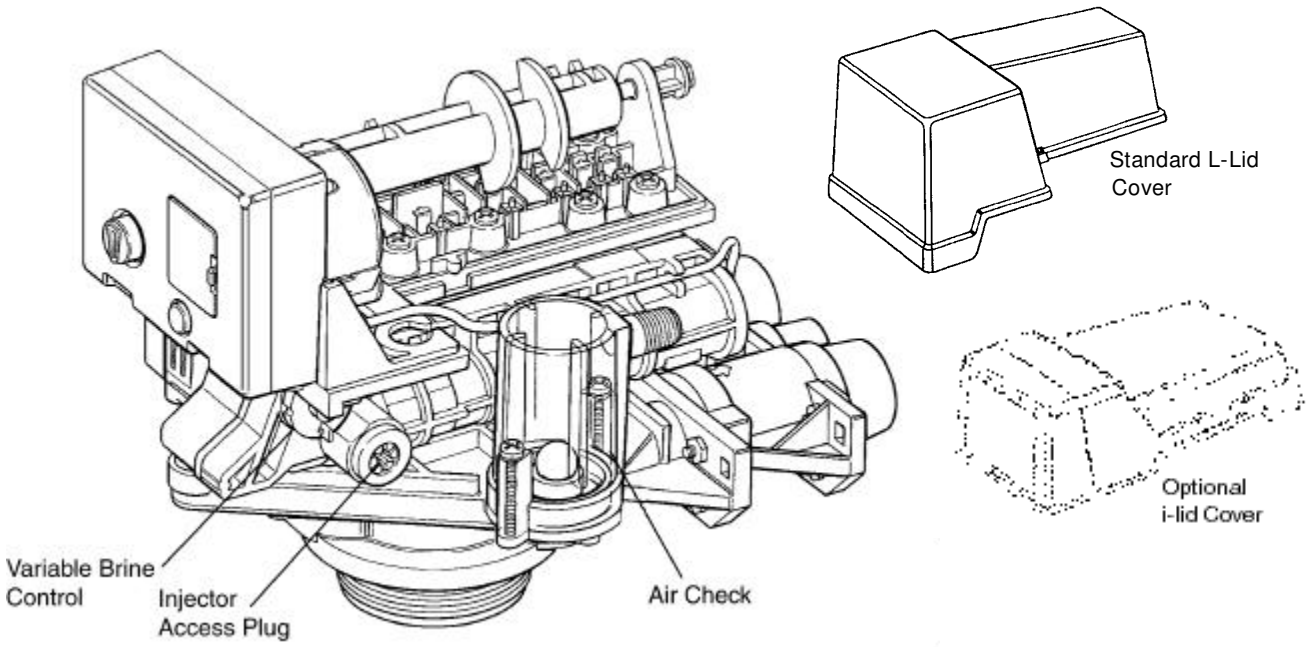


Figure 1

Tank Adapter Module

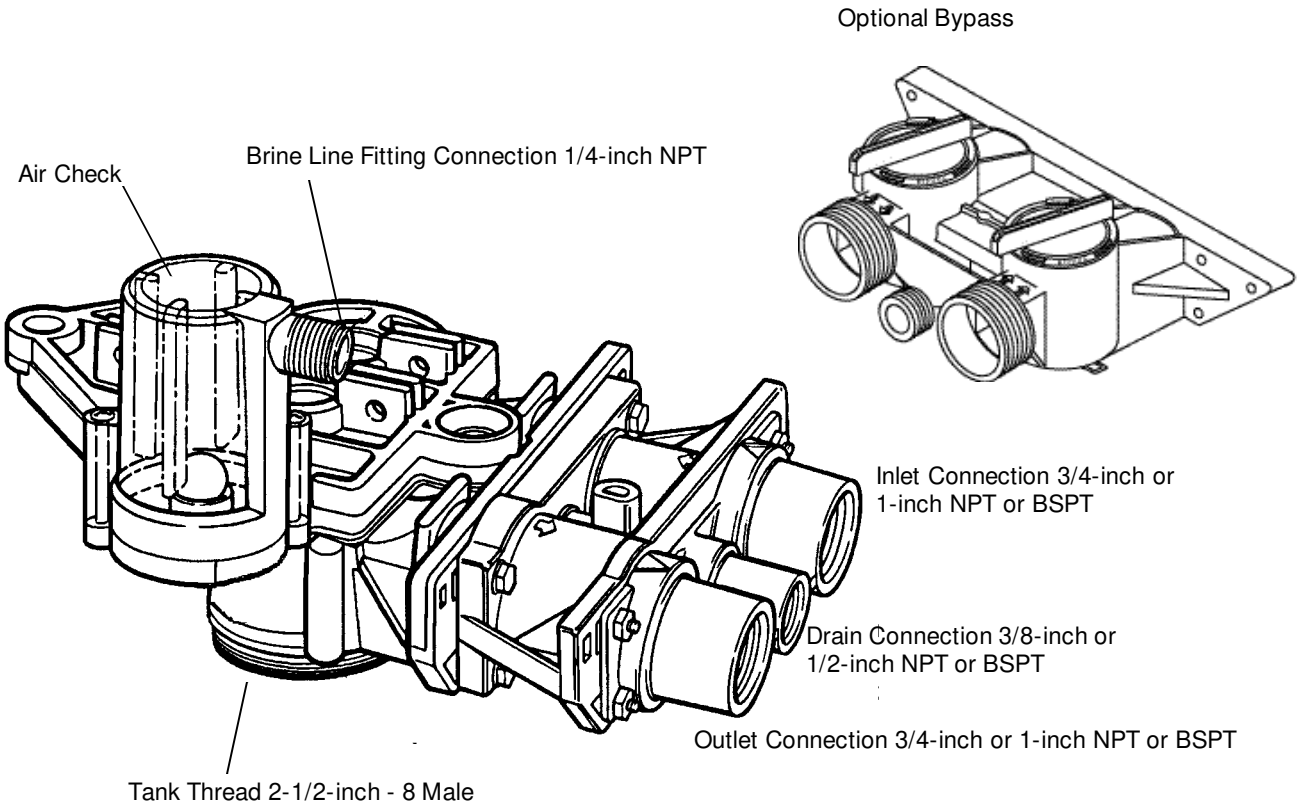


Figure 2

Installation

All plumbing must conform to local codes.

Inspect unit carefully for carrier shortage or shipping damage.

Location Selection

1. The distance between the unit and a drain should be as short as possible.
2. If it is likely that supplementary water treating equipment will be required, make certain adequate additional space is available.
3. Since salt must be added periodically to the brine tank, the location should be easily accessible.
4. Do not install any unit closer to a water heater than a total run of 10 feet (3 m) of piping between the outlet of the conditioner and the inlet to the heater. Water heaters can sometimes overheat to the extent they will transmit heat back down the cold pipe into the unit control valve.

   Hot water can severely damage the conditioner. A 10-foot (3-m) total pipe run, including bends, elbows, etc., is a reasonable distance to help prevent this possibility. A positive way to prevent hot water from flowing from heat source to the conditioner, in the event of a negative pressure situation, is to install a check valve in the soft water piping from the conditioner. If a check valve is installed, make certain the water heating unit is equipped with a properly rated temperature and pressure safety relief valve. Also, be certain that local codes are not violated.
5. Do not locate unit where it or its connections (including the drain and overflow lines) will ever be subjected to room temperatures under 34°F (1°C) or over 120°F (49°C).
6. Do not install unit near acid or acid fumes.

Water Line Connection

A bypass valve system must be installed since there will be occasions when the water conditioner must be bypassed for hard water or for servicing.

The most common bypass systems are the Autotrol® Series 256 bypass valve (Figure3) and plumbed-in globe valves (Figure4). Though both are similar in function, the 256 Autotrol bypass offers simplicity and ease of operation.

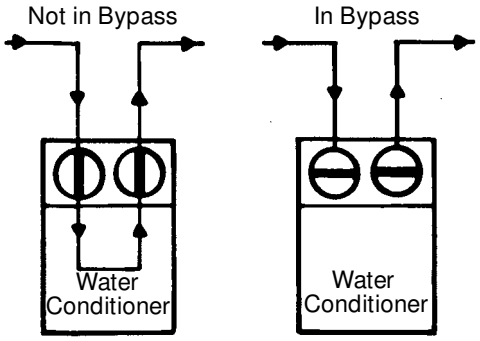


Figure 3 – Autotrol Series 256 Bypass Valve

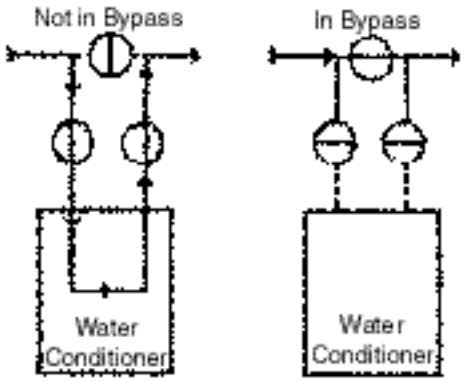


Figure 4 – Typical Globe Valve Bypass System

Drain Line Connection

1. Ideally located, the unit will be above, and not more than 20 feet (6.1 m) from the drain. For such installations, using an appropriate adapter fitting (not supplied), connect 1/2-inch (1.3-cm) plastic tubing to the drain connection located on the control.
2. If the unit is located more than 20 feet (6.1 m) from drain, use 3/4-inch (1.9-cm) tubing for runs up to 40 feet (12.2 m).
3. If the unit is located where the drain line must be elevated, you may elevate the line up to 6 feet (1.8 m) providing the run does not exceed 15 feet (4.6 m) and water pressure at conditioner is not less than 40 psi (2.3 bar). You may elevate an additional 2 feet (61 cm) for each additional 10 psi (0.69 bar).
4. Where the drain line is elevated but empties into a drain below the level of the control valve, form a 7-inch (18-cm) loop at the far end of the line so that the bottom of the loop is level with the drain connection. This will provide an adequate siphon trap.
5. Where the drain empties into an overhead sewer line, a sink-type trap must be used.

Important: Never connect drain line into a drain, sewer line or trap. Always allow an air gap between the drain line and the wastewater to prevent the possibility of sewage being back-siphoned into conditioner.

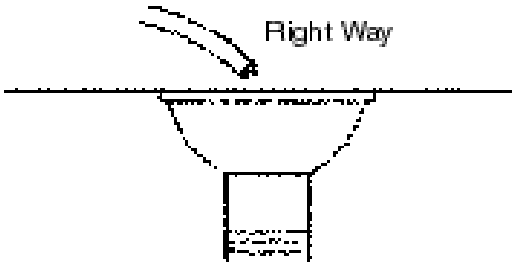


Figure 5

Note: Standard commercial practices have been expressed here. Local codes may require changes to these suggestions.

Brine Line Connection

It will be necessary to install the brine tube and connect the line to a fitting installed on the air check.

Be sure all fittings and connections are tight so that premature checking does not take place. Premature checking is when the ball in the air check falls to the bottom before all brine is drawn out of the brine tank. See **Placing Conditioner into Service** section.

Overflow Line Connection

To connect overflow, locate the hole on the side of the brine tank. Insert overflow fitting (not supplied) into tank and tighten with plastic thumb nut and gasket as shown (Figure6). Attach length of 1/2-inch (1.3-cm) I.D. tubing (not supplied) to fitting and run to drain. Do not elevate overflow line higher than 3 inches (7.6 cm) below bottom of overflow fitting.

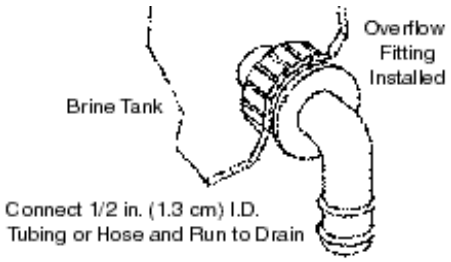


Figure 6

Electrical Connection

12VAC:

The power supply transformer should have a minimum rating of 3 volt-amps. Connect the plug of the transformer secondary cable to the mating socket on the bottom of the controller.

Be certain the transformer is plugged into a source that is not controlled by a wall switch and cannot be accidentally turned off.

Splicing the Low Voltage Transformer Cord

If it is necessary to extend the length of the transformer cord, an optional 15-foot (4.6-m) extension cord is available (P/N 1000907), or the cord may be spliced as follows:

1. Strip insulation from wire 5/16 inch (.8 cm) from wire end.
2. Insert stripped wire into barrel of connector and crimp. For best results, crimp twice per wire as shown in Figure7.

Splice connectors or extension wire is not supplied. They are available at hardware or electrical stores.

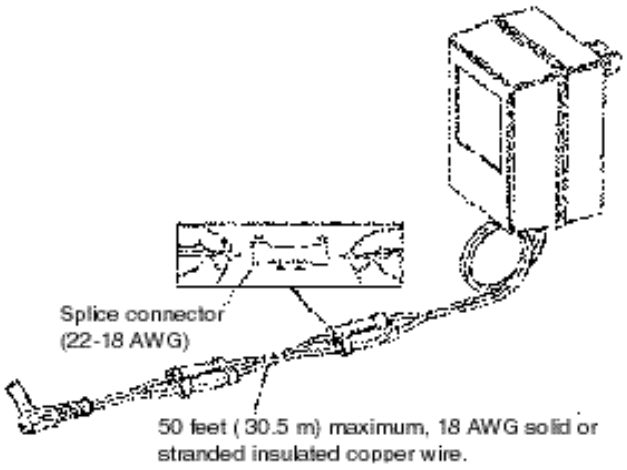


Figure 7

Placing Conditioner into Operation

After all previous steps have been completed, the unit is ready to be placed into operation. Follow these steps carefully:

1. Remove control valve cover (Figure 14).
   Note: The following steps will require turning the pointer knob (Figure 9) to various positions. Insert a wide-blade screwdriver into arrow slot in pointer knob and press in firmly. With knob held in, rotate **COUNTERCLOCKWISE** only until arrow or knob points to desired position. (Rotation is made much easier if you grasp the camshaft with your free hand and turn it at the same time.) Then permit knob to spring back out.
2. Insert screwdriver into slot in pointer knob (Figure9). Press in and rotate knob

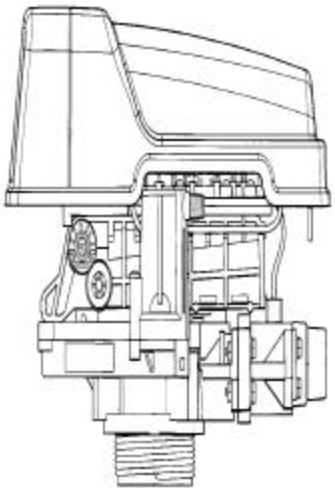
COUNTERCLOCKWISE until arrow points directly to the word **BACKWASH**.

3. Fill resin tank with water.
   A. With water supply off, place the bypass valve(s) into the "not in bypass" position.
   B. Open water supply valve very slowly to approximately the 1/4 open position.

Important: If opened too rapidly or too far, resin may be lost. In this position, you should hear air escaping slowly from the drain line.

   C. When all of the air has been purged from the tank and clear water begins to flow steadily from the drain, close main supply valve.
   D. With the water supply off, let the unit stand for about five minutes. This will allow all trapped air to escape from the tank.
   E. Proceed to step 4.

4. Add water to brine tank (initial fill). With a bucket or hose, add approximately four gallons (15 liters) of water to brine tank. If the tank has a salt platform above the bottom of the tank, add water until the level is approximately 1 inch (25 mm) above the platform.



255/460i shown with optional i-lid cover (PN 1000062)

Figure 8

5. Put into operation.
   A. Open water supply valve slowly to full open position.
   B. Carefully advance pointer knob **COUNTERCLOCKWISE** to center of **FAST RINSE**/**REFILL** position and hold there until air check (Figure1) fills with water and water starts to flow through brine line into brine tank. Do not run for more than two minutes.
   C. Advance pointer knob **COUNTERCLOCKWISE** until arrow points to the center of the **BRINE**/**SLOW RINSE** position.
   D. With the conditioner in this position, check to see if water is being drawn from the brine tank. The water level in the brine tank will recede very slowly. Observe for at least three minutes. If the water level does not recede or goes up, or if air enters the transparent air check chamber and the ball falls and seats, reference **Troubleshooting** section.
   E. Advance pointer knob **COUNTERCLOCKWISE** to **CONDITIONED WATER**.
   F. Run water from a nearby faucet until the water is clear and soft.

Programming the 460i

Plug the wall mount transformer into a functioning electrical outlet that is not controlled by a switch. Plug the transformer plug into the transformer plug receptacle on the timer.

Note: If the included transformer cord is not long enough, a 15-foot (4.6-m) extension is available. See **Splicing the Low Voltage Transformer Cord** section of this manual.

Open the access door by pushing the raised tab on the door toward the left while pulling the tab out (Figure9).

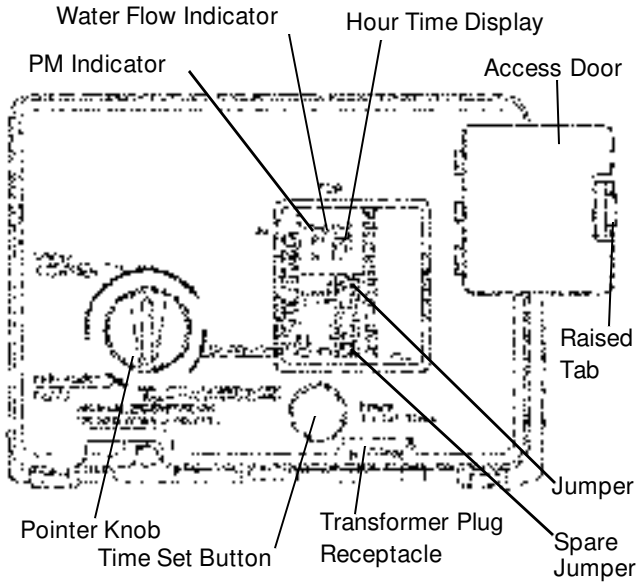


Figure 9

Time of Day Setting

With the jumper on the set of pins next to the word TIME (Figure 10), set the time of day to the closest hour by pressing the black TIME SET button. PM hours are indicated by a light next to the letters PM on the display window.

Note: The use of a small needle nose pliers or tweezers will aid in moving the jumper.

Note: The unit is factory set to regenerate at 2:00 a.m. If you prefer to have the unit regenerate at an earlier or later time, simply set the current time of day accordingly. To have the unit regenerate at 4:00 a.m., two hours later, set the clock two hours earlier than the actual current time.

Hardness Setting

Move the jumper to the set of pins next to the word HARDNESS (Figure 11). Press the black TIME SET button until the correct hardness is displayed. The hardness range is from 1 to 99 grains per gallon.

To change water hardness stated in parts per million (PPM) to grains per gallon (GPG) use this formula:

$$\frac{\text{Parts per Million}}{17.1} = \text{Grains per Gallon}$$

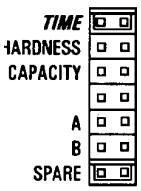


Figure 10

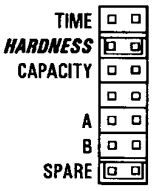


Figure 11

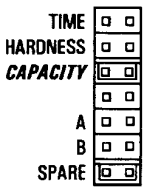


Figure 12

Capacity Setting

Move the jumper to the set of pins next to the word CAPACITY (Figure 12). Press the black TIME SET button until the correct capacity value is displayed. The capacity range is 1 to 99 kilograins. Refer to the Suggested Salt Dial Settings table.

Return the jumper to the top set of pins next to the word TIME and replace the access door. The next three sets of pins are used for factory testing and are not used in normal operation. The jumper must NOT be left on any pins other than the top pair next to the word TIME. Otherwise, the unit may not function.

Note: A spare jumper is located on the bottom set of pins.

In the event that the hardness or capacity setting must be changed, simply follow the appropriate steps described above.

Calendar Override Setting

1. Disconnect power.
2. Place jumper on Pin A and reconnect power.
3. Move jumper to Pin B. A zero will appear, indicating zero days of calendar override. All 460i controllers are preprogrammed in this manner at the manufacturer.
4. Depress the black TIME SET button. The numbers will roll from "0" to "15." Release the switch at the desired number of days for the calendar override. For example, releasing the switch at "10" would program a 10-day calendar override.
5. Disconnect power.
6. Place jumper back on TIME and reconnect power.
7. The calendar override program is maintained during power outages by the NOVRAM circuitry.
8. To remove the calendar override, follow the same steps above and program back to "0."

Manual Regeneration

Electricity is used only to run the timer and to rotate the camshaft. All other functions are operated by water pressure. Therefore, in the event of a power outage, all the regeneration positions may be dialed manually by depressing the pointer knob with a straight blade screwdriver and turning **COUNTERCLOCKWISE**.

Manual time cycle:

- **Backwash**–14 minutes
- **Brine**/**Slow Rinse**–52 minutes
- **Brine Refill**–10 minutes
- **Fast Rinse**/**Refill**–6 minutes.

Do not exceed 10 minutes for the refill cycle as this will cause excessive salt usage during the next regeneration and possibly a salt residue in the softened water.

DO NOT advance the pointer knob directly to the conditioned water position (6 o'clock) after a manual regeneration or when servicing the conditioner. Advance it to just past the purge position, approximately 7 o'clock. The timer will then advance itself to the conditioned water position where the internal switch will turn the motor off. The internal switch will not be operated and the motor will continue to run if advanced directly to the conditioned water position.

If power fails during a conditioner regeneration, the cycle will be completed normally when the power is restored.

Adjustment of Brine Control

The amount of salt placed into the regenerant storage tank has nothing to do with the amount of salt used during the regeneration cycle. Water will dissolve and absorb salt only until it becomes saturated. A given amount of brine (salt-saturated water) contains a specific amount of salt.

The salt dial controls the amount of brine used during the regeneration cycle, e.g., when set at 15 lbs. (6.8 kg) the amount of brine the conditioner will use for each cycle will contain 15 lbs. (6.8 kg) of salt. Never let the amount of salt in the brine tank be less than the amount required for the next regeneration.

Refer to the Suggested Salt Dial Settings Table (Table 1) for proper salt settings. To set the salt dial, insert a screwdriver into the slot (Figure 13) and move the pointer to the proper setting.

Note: To convert the salt settings from English to metric, divide by 2.2 (e.g., 12 pounds ÷ 2.2 = 5.5 kg. of salt).

Figure 13

Table 1 – Suggested Salt Dial Settings (Pounds of Salt) For Various Size Softeners

Capacity Setting (Kilograins)	0.5 Ft^3	0.75 Ft^3	1.0 Ft^3	1.25 Ft^3	1.5 Ft^3	1.75 Ft^3	2.0 Ft^3	2.5 Ft^3
12	4.5	—	—	—	—	—	—	—
16	9.0	5.5	—	—	—	—	—	—
20	—	8.5	6.0		—	—	—	—
24	—	14.0	8.5	7.0	—	—	—	—
30	—	—	15.0	11.0	9.0	—	—	—
32	—	—	18.5	12.5	10.0	9.0	—	—
35	—	—	—	16.0	12.0	10.0	9.0	—
40	—	—	—	11.5*	17.0	14.0	12.0	—
48	—	—	—	—	14.0*	10.5*	17.0	13.0
60	—	—	—	—	—	—	15.0*	10.5*

*This setting requires the use of "XS" (extra salt) cam and doubles the amount of the setting.

Removing the Series 255 Control Module for Servicing

1. Unplug the transformer cable from the control.
2. Shut off water supply or put bypass valve(s) into bypass position.
3. Remove cover (Figure14) and with a screwdriver, relieve tank pressure by pushing open valve number 6 (at rear) (Figure15).

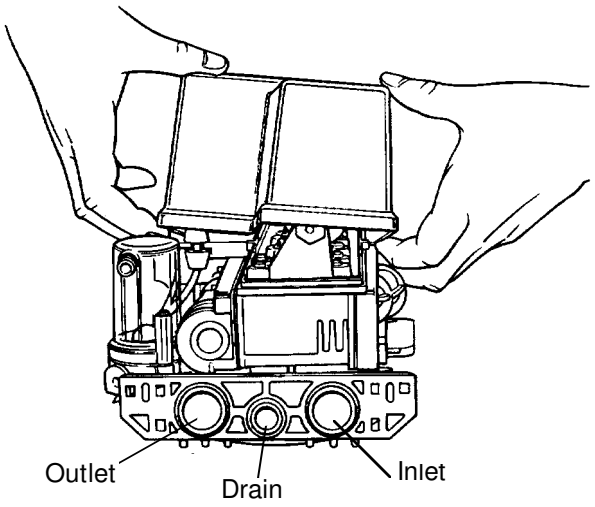


Figure 14

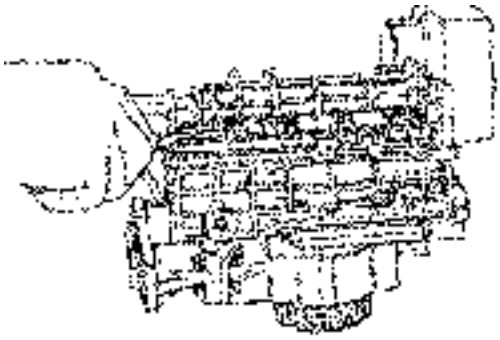


Figure 15

4. Remove screw in locking bar (Figure 16).

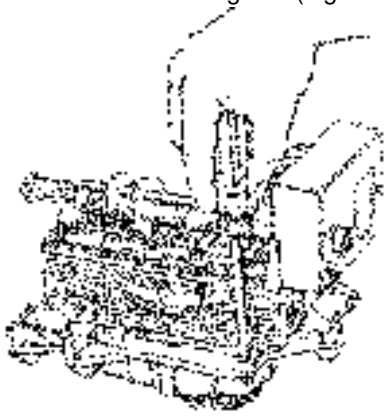


Figure 16

5. Apply downward hand pressure on control and pull locking bar out (Figure17).

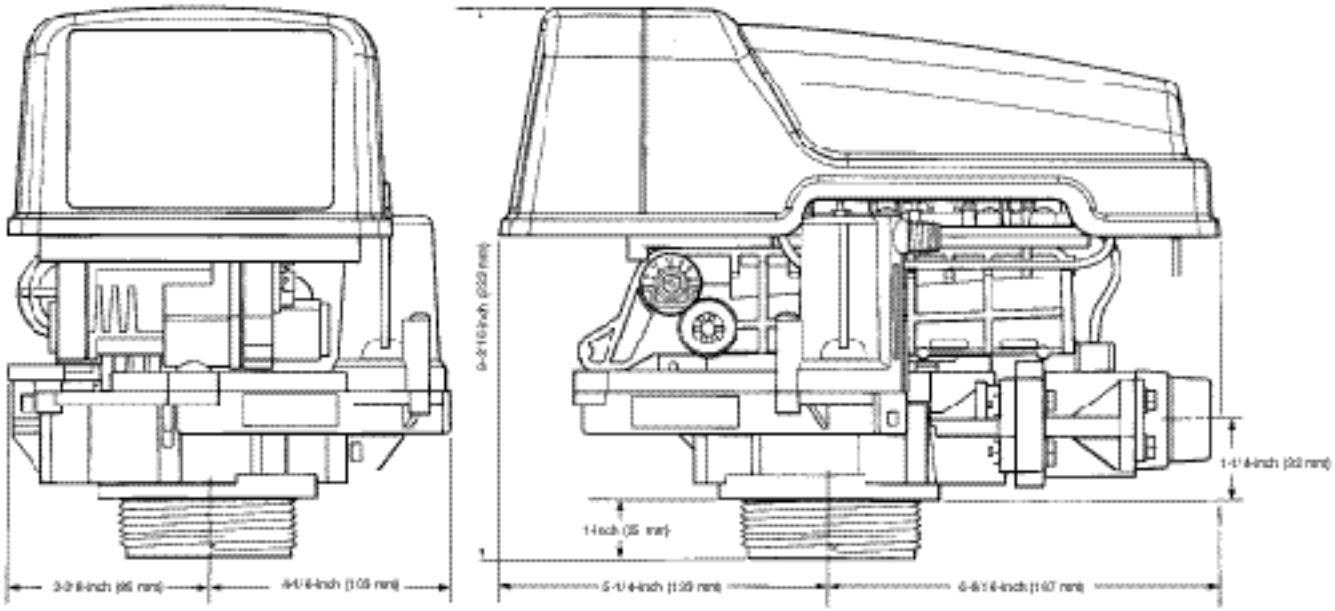
Figure 17

6. Using a rocking motion, lift control from the tank adapter (Figure18). If O-rings come off with the control put them back into tank adapter sockets. Lubricate O-rings with silicone lubricant.

Figure 18

7. To replace control module, reverse above procedure.

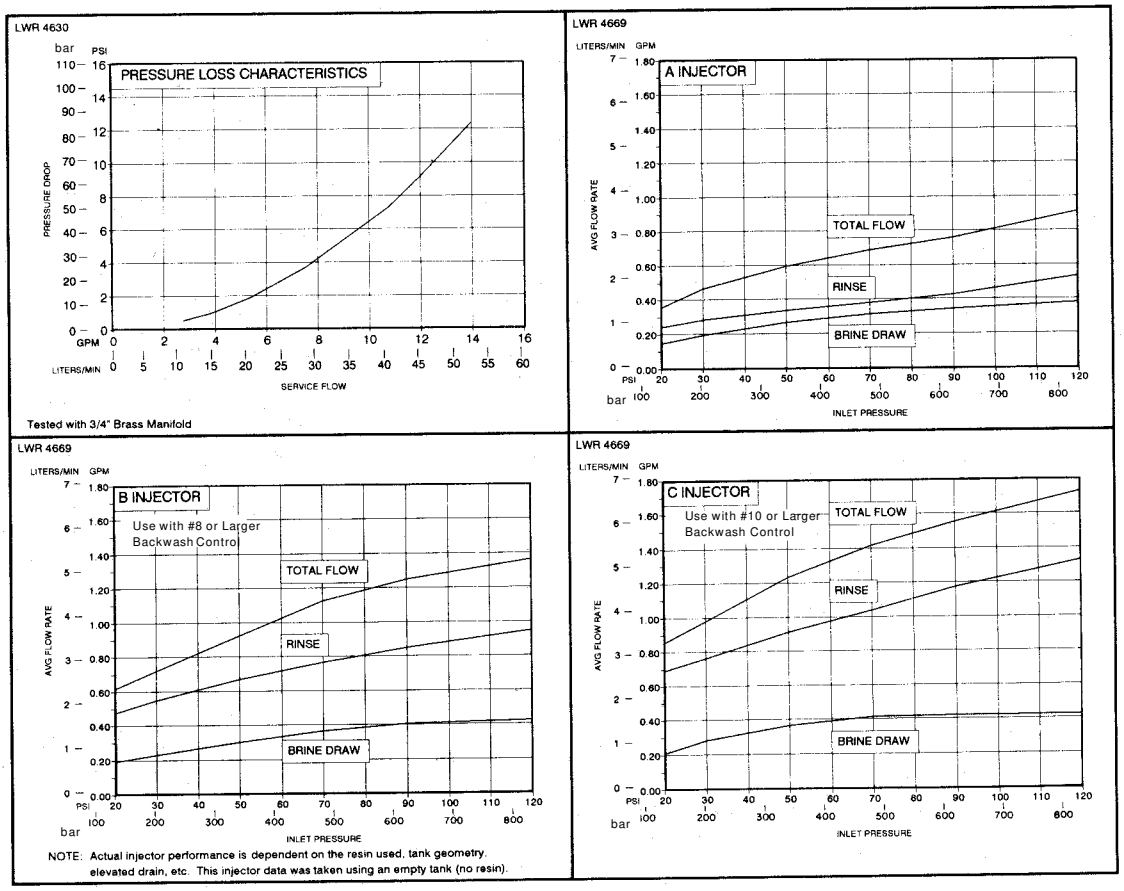
Specifications



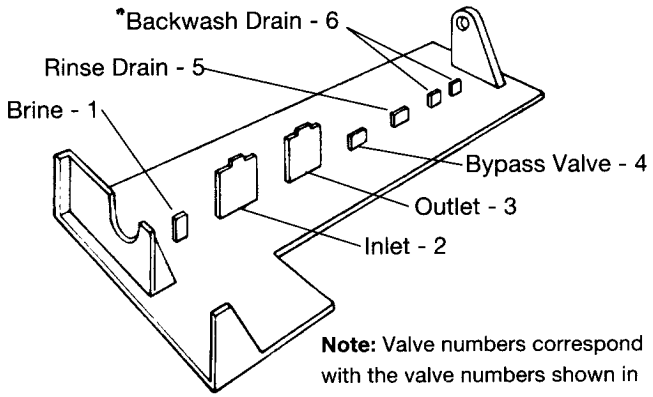
Shown with optional i-lid cover PN 1000062.

Hydrostatic Test Pressure	300 psi (20.69 bar)
Working Pressure	20-127 psi (1.38-8.76 bar)
Standard 12 Volt Transformer Input Electrical Rating	115V 60Hz
Optional 12 Volt Transformer Input Electrical Rating	115V 50 Hz, 230V 50 Hz, 230V 60 HZ, 100V 60Hz, 100V 50 HZ
Transformer Cord	120 inch (1.5m) long
Pressure Tank Thread	2 1/2 inch 8 male
Brine Line Thread	1/4 inch NPT male
Distributor Tube Diameter Required	13/16 OD (20.6 mm)
Distributor Tube Length	1 1/4 inch (31.8 mm) higher than top of mineral tank
Standard Manifold Connection	3/4-inch NPT inlet-outlet, 3/8-inch NPT drain
Optional Manifold Connection	1-inch NPT inlet-outlet, 1/2-inch NPT drain 3/4-inch BSPT inlet-outlet, 3/8-inch BSPT drain 1-inch BSPT inlet-outlet, 1/2-inch BSPT drain
Optional Bypass Valve	3/4-inch (19.1 mm) or 1-inch (25.4 mm) copper tailpiece, 1/2-inch NPT male drain
Control Module, Tank Adapter, Optional Bypass Valve	Reinforced NORYL
Inlet-Outlet Manifold	Brass or reinforced NORYL
Rubber Goods	Compounded for cold water service
Brine Refill Control	1 to 10 lbs (0.45 to 4.5 kg) of salt or 3 to 19 lbs (1.3 to 8.6 kg) of salt
Injector Size “A” White	Nozzle .042 inch (1.1 mm) Diameter, Throat .089 inch (2.3 mm) Diameter
Injector Size “B” Blue	Nozzle .052 inch (1.3 mm) Diameter, Throat .099 inch (2.5 mm) Diameter
Injector Size “C” Red	Nozzle .059 inch (1.5 mm) Diameter, Throat .099 inch (2.5 mm) Diameter
Backwash Controllers Available for	6, 7, 8, 9, 10, 12, 13, 14 inch (15.2, 17.8, 20.3, 22.9, 25.4, 30.5, 33.0, 35.6 cm) diameter mineral tanks. All are sized to flow 4.5 gpm/sq ft (183 L/m/m^2) of bed area.

Pressure Graphs

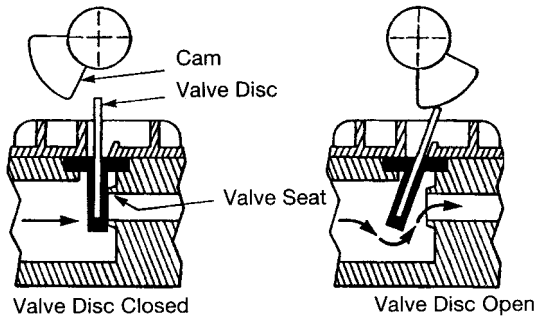


Control Valving Identifications



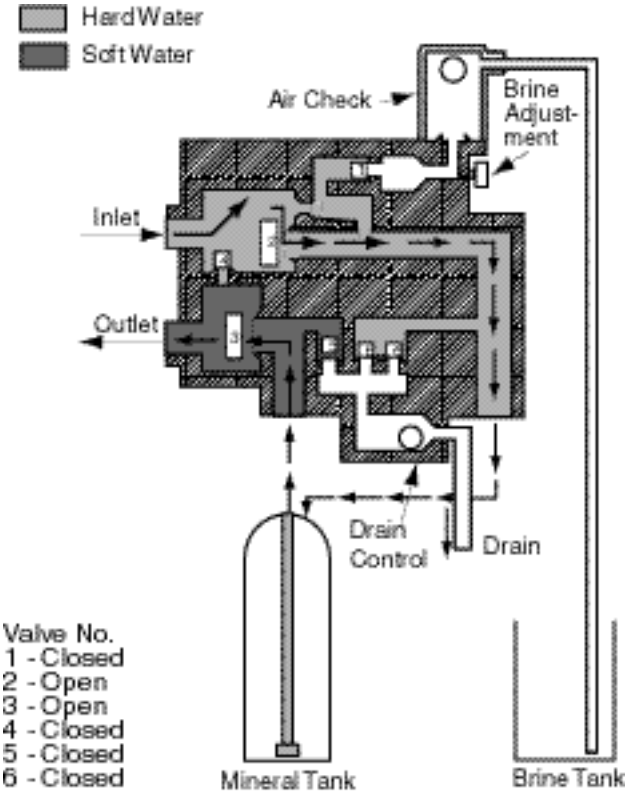
Note: Valve numbers correspond with the valve numbers shown in **Flow Diagrams** section.

Valve Disc Operation

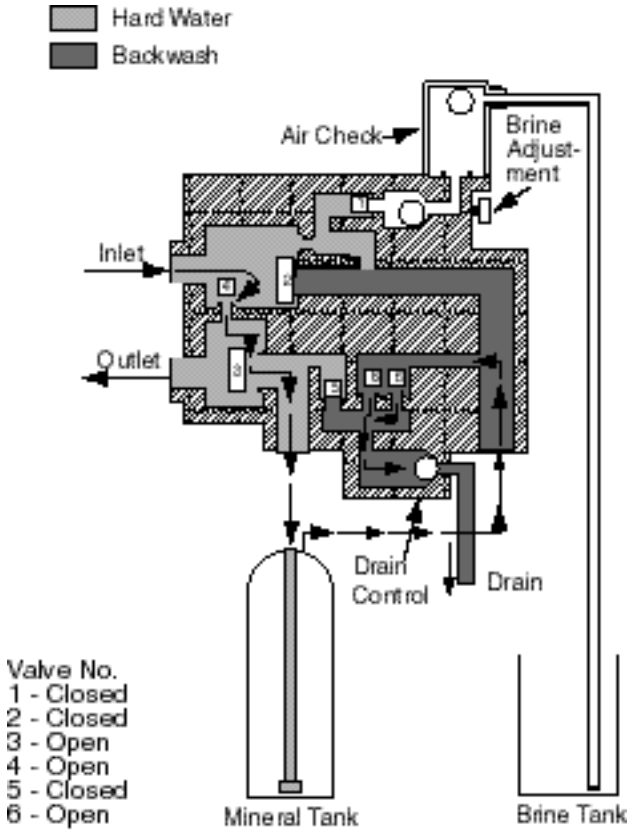


Flow Diagrams

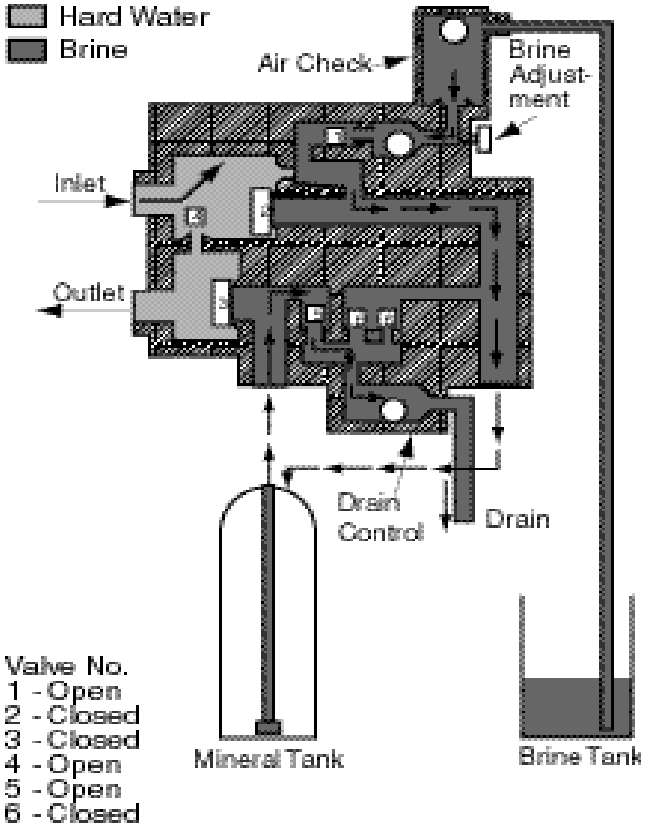
1–Conditioned Water Position



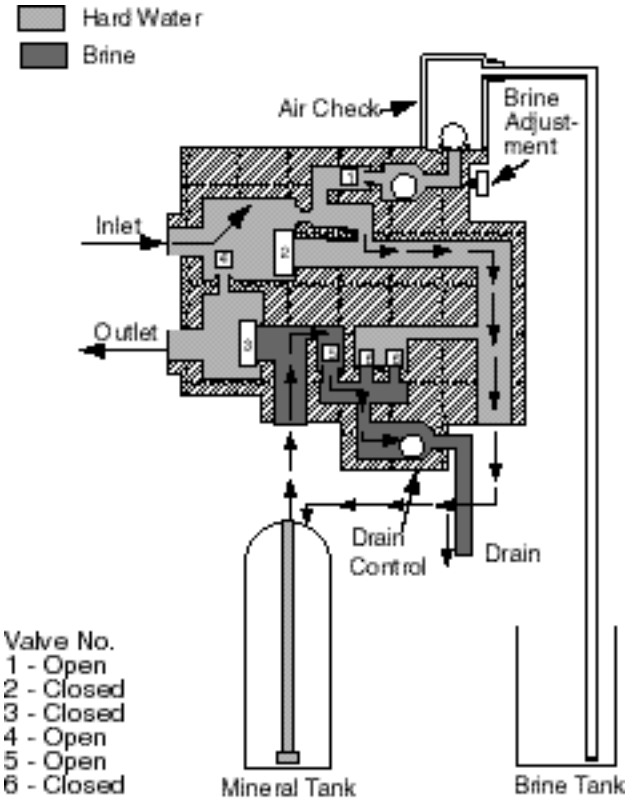
2–Backwash Position



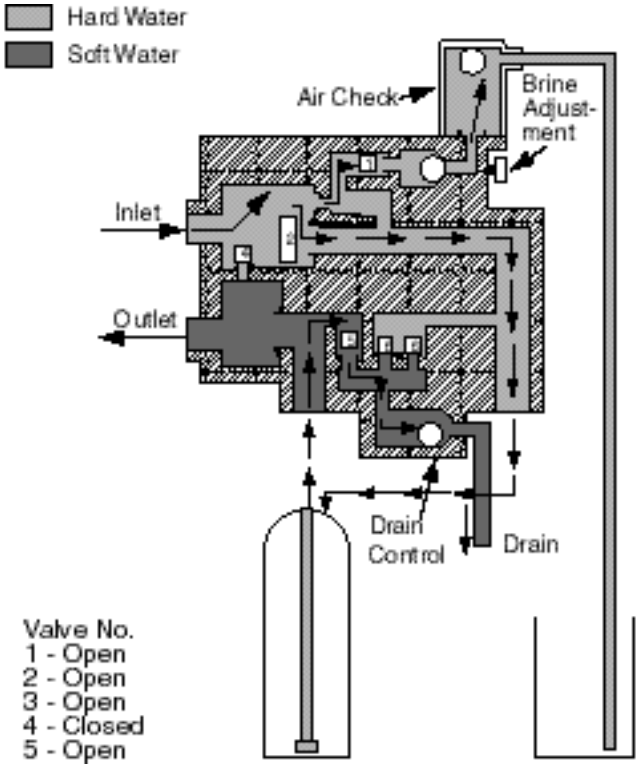
3–Brining Position



4–Slow Rinse Position

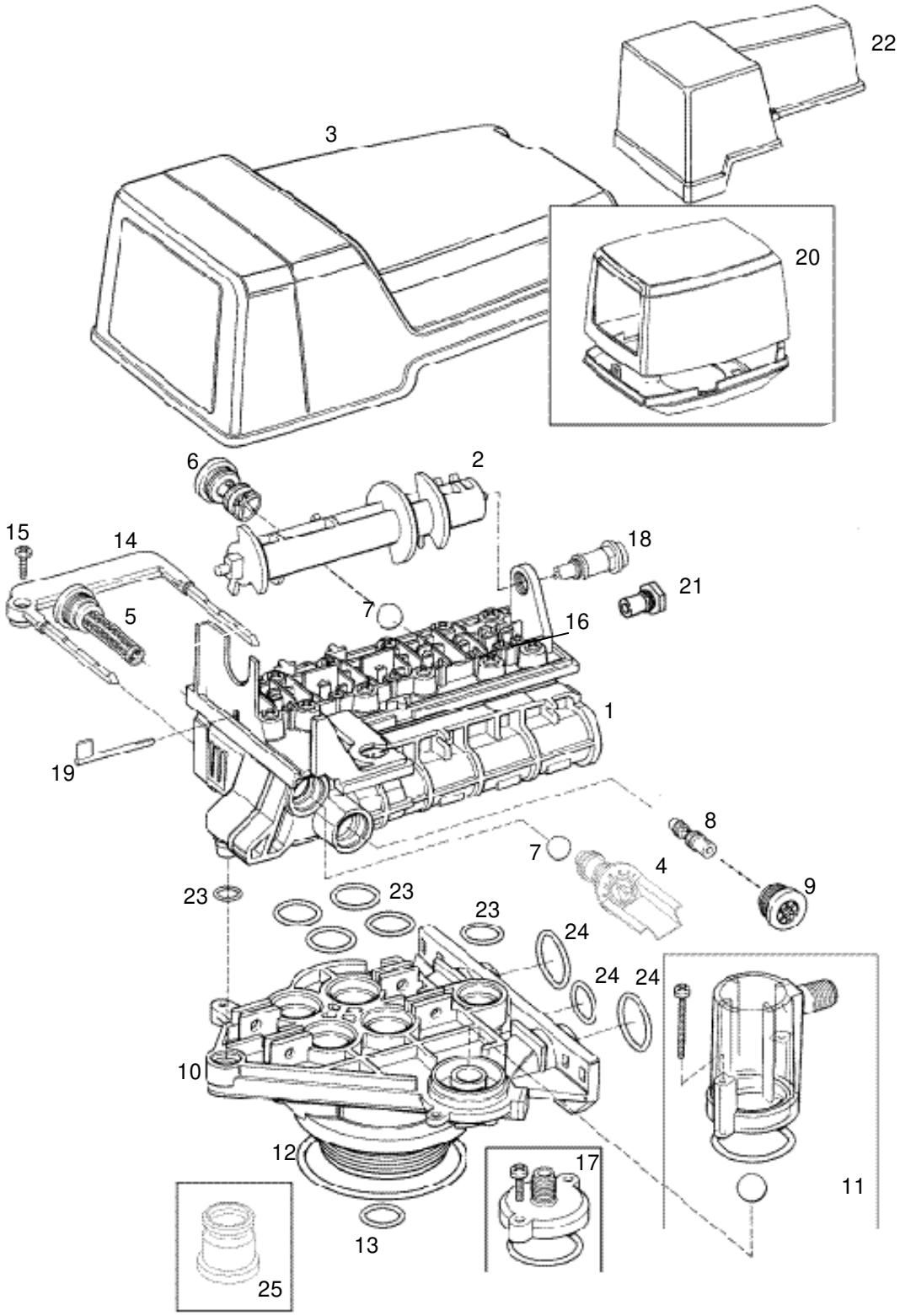


5–Brine Refill and Purge Position



Replacement Parts

Valve Body and Tank Adapter Module

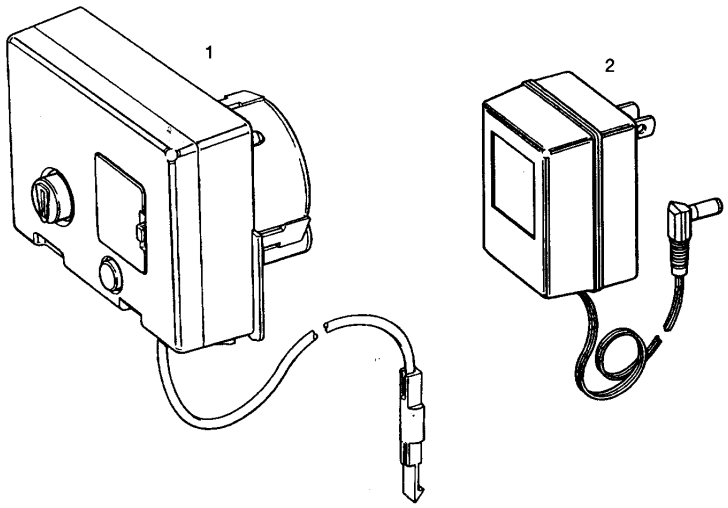


Valve Body and Tank Adapter Module

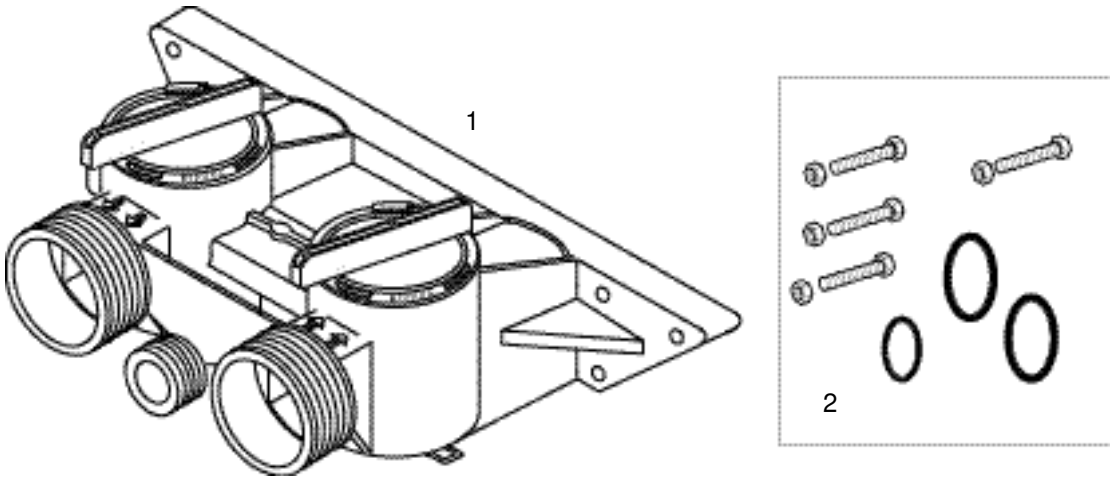
Code	Part No.	Description	Qty.
1	1000232	Valve Assembly, w/o Flow Controls	1
2	1031950	Camshaft, Standard, One-Piece	1
3	1000062	Valve Cover, Black with transparent window	1
4		Brine Refill Flow Control Assembly:	1
	1034261	1 to 10 lbs Salt	
	1034263	3 to 19 lbs Salt	
5	1000226	Screen/Cap Assembly with O-Ring	1
6		Backwash Control Assembly with O-Rings:	1
	1034162	No. 6 for 6 in Diameter Tank	
	1000209	No. 7 for 7 in Diameter Tank	
	1000210	No. 8 for 8 in Diameter Tank	
	1000211	No. 9 for 9 in Diameter Tank	
	1000212	No. 10 for 10 in Diameter Tank	
	1000213	No. 12 for 12 in Diameter Tank	
	1000214	No. 13 for 13 in Diameter Tank	
	1000215	No. 14 for 14 in Diameter Tank	
7	1030502	Ball, Flow Control	1
8		Injector Assembly with O-Rings:	1
	1032970	“A” Injector - White	
	1032971	“B” Injector - Blue	
	1032972	“C” Injector - Red	
9		Injector Cap with O-Ring:	1
	1000217	“A” Cap	
	1000218	“B” Cap	
	1000219	“C” Cap	
10	1033784	Tank Adapter Assembly	1
11	1032416	Air Check Assembly	1
12	1010429	O-Ring BN	1
13	1010428	O-Ring EP	1
14	1031402	Locking Bar: English Language	1
15	1006093	Screw, No. 8 x 9/16 inch	1
16	1001580	Spring, Valve Disc Kits:	9
17	1033066	New to Old Aircheck Adapter Kit	1
18	1000297	Extended Bearing, Camshaft	1
19	1031391	Pin, Locking, Timer, Black	1
20		Covers, High Style:	
	1041087	Beige/Tan	
	1041088	Black/White	
	1041091	Beige/Black	
21	1030501	Bearing, Camshaft for use with Cover (Code 22)	
22	1032565	Cover, L-lid	
23	1001404	O-Ring Group: Tank Adapter	
24	1040459	O-Ring Group: Piping Boss	
25	1041010	13/16-inch Riser Insert (optional)	
*	1000250	Valve Disc Replacement	

* Not shown

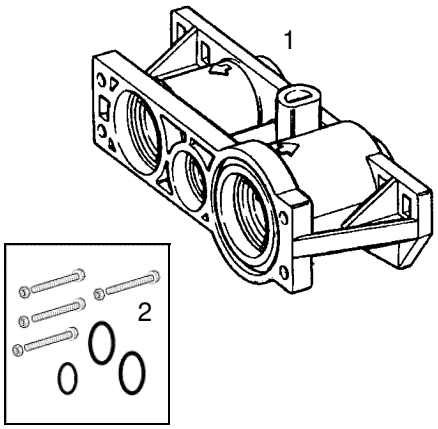
460i Timer



Bypass Valve

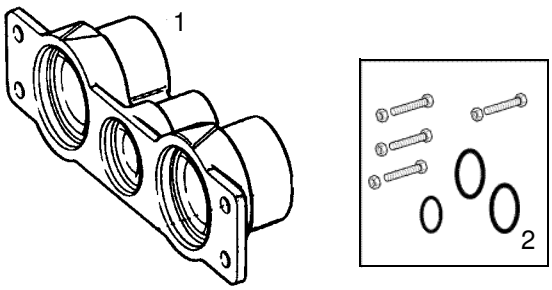


Meter Adapter



Piping Boss

Note: Do not use pipe joint compound when threading pipe into the Noryl piping boss. Use only Teflon* pipe tape. Do not overtighten pipe into Noryl piping boss.



*Teflon is a registered trademark of E.I. Dupont de Nemours and Company, Inc.

460i Timer

Code	Part No.	Description	Qty.
1		460i Timer	1
2		Transformer	1
	1000810	Japanese	
	1000811	North American	
	1000812	Australian	
	1000813	British	
	1000814	European	
*	1000907	Transformer Extension Cord 15 foot (4.6 m)	1

Bypass Valve

Code	Part No.	Description	Qty.
1	1040769	Bypass Body Assembly	1
2	1040524	Install Kit	1
*		Tube Adapter Kits	
	1001606	3/4-inch Copper Tube Adapter Kit	
	1001670	1-inch Copper Tube Adapter Kit	
	1001608	22-mm Copper Tube Adapter Kit	
	1001609	28-mm Copper Tube Adapter Kit	
	1001613	3/4-inch CPVC Tube Adapter Kit	
	1001614	1-inch CPVC Tube Adapter Kit	
	1001615	25-mm CPVC Tube Adapter Kit	
	1001769	3/4-inch NPT Plastic Pipe Adapter Kit	
	1001603	1-inch NPT Plastic Pipe Adapter Kit	
	1001604	3/4-inch BSPT Plastic Pipe Adapter Kit	
	1001605	1-inch BSPT Plastic Pipe Adapter Kit	
	1001611	3/4-inch BSPT Brass Pipe Adapter Kit	
	1001610	1-inch NPT Brass Pipe Adapter Kit	
	1001612	1-inch BSPT Brass Pipe Adapter Kit	

Piping Boss

Code	Part No.	Description	Qty.
1		Kit Piping Boss (Includes Hardware):	1
	1040277	3/4-inch NPT, Brass	
	1040278	1-inch NPT, Brass	
	1040281	3/4-inch BSPT, Brass	
	1040282	1-inch BSPT, Brass	
	1040279	3/4-inch NPT, Noryl	
	1040280	1-inch NPT, Noryl	
	1040283	3/4-inch BSPT, Noryl	
	1040284	1-inch BSPT, Noryl	
2	1040339	Piping Boss Install Kit	1

Meter Adapter

Code	Part No.	Description	Qty.
1	1032350	Kit, Meter Adapter	1
2	1032351	Meter Install Kit	1

* Not Shown

Preventive Maintenance

Inspect and clean brine tank and screen filter on end of brine pickup tube once a year or when sediment appears in the bottom of the brine tank.

Injector Screen and Injector

The injector is the component which creates the vacuum necessary to draw the brine into the water conditioner. Clean the injector and injector screen once a year in order to maintain proper water conditioning. Some locations may require more frequent injector and screen servicing. Refer to Figure 19 and complete the following steps to clean the injector screen and injector.

1. Unplug the wall mount transformer.
2. Shut off water supply or put bypass valve(s) into bypass position and remove the rear cover.
3. Relieve system pressure by opening valve number 6 (at rear) with a screwdriver (Figure 15).
4. Using a screwdriver, unscrew and remove the injector screen and the injector cap.
5. Clean screen with a fine brush. Flush with water until clean.
6. Using a needle-nose pliers, pull the injector straight out.
7. Squirt water into the injector screen recess of the valve body to flush debris out.
8. Clean and flush injector.
9. Lubricate the O-rings on the injector, injector cap, and injector screen with silicone lubricant and reinstall.

Important: Do not overtighten the plastic cap. Seat the cap lightly into position. Overtightening may cause breakage of the plastic cap that may not be immediately evident.

10. Reinstall cover, reconnect electric power, and reset the time of day.
11. Slowly open the water supply valve or return the bypass valve(s) to the “not in bypass” position.

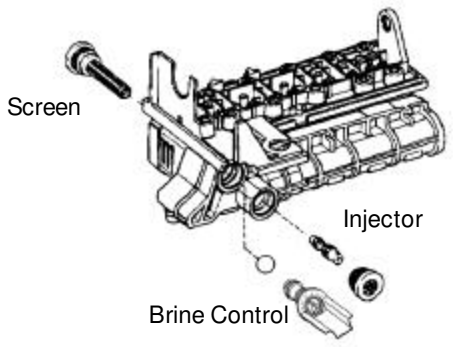


Figure 19

Water Meter

In rare instances, the turbine wheel of the water meter may collect small particles of oxidized iron, eventually preventing the wheel from turning. The turbine wheel may be serviced as follows (Figure 20):

1. Shut off the water supply or put bypass valve(s) into bypass position.
2. Relieve system pressure by opening valve number 6 (at rear) with a screwdriver (Figure 15).
3. Loosen and remove the fasteners that hold the meter adapter to the tank adapter and the fasteners that hold the piping boss or bypass valve to the meter adapter.
4. Remove the meter adapter, being careful not to misplace any of the O-rings.
5. Using a needle-nose pliers, grasp one of the four vanes of the gland and, pulling straight out, remove the gland from the adapter.
6. Carefully remove the turbine wheel from the housing. Using a toothbrush, lightly scrub the iron off the magnet. Iron buildup on the wheel surfaces may be removed by soaking the wheel in a mild sodium hydrosulfite (e.g., RoVer*) solution for a few minutes, then flushing thoroughly with water.
7. Carefully reinstall the turbine wheel into the adapter, being certain that the shaft of the wheel seats into the bearing of the adapter and that the “dimple” on the wheel faces you.
8. Carefully reinstall the gland into the adapter, being certain that the shaft of the wheel seats into the bearing of the gland; press the gland all the way in, being sure the wheel rotates freely.
9. Reinstall the meter adapter, O-rings, piping boss, or bypass valve, tighten all fasteners and re-establish the water supply to the system.
10. Check for proper water meter operation by opening a downstream faucet and observing the water flow indicator light on the 460i display.

*RoVer is a trademark of Hach Chemical Company.

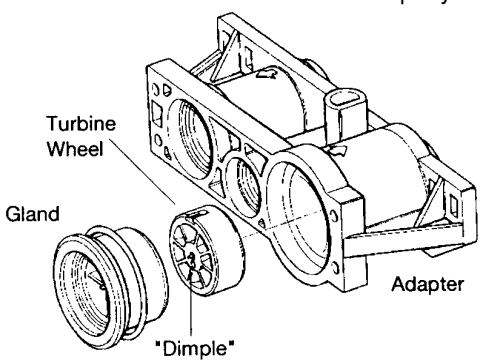


Figure 20

Troubleshooting

Your water conditioning system is designed and manufactured for efficient, low maintenance service. However, if problems occur, this section provides a list of possible causes and solutions. You can solve some problems yourself, such as low salt in the salt storage tank or a blown household fuse. However, some problems require installer or dealer assistance.

Important: Service procedures that require the water pressure to be removed from the system are marked with a **!**. To remove water pressure from the system, put the bypass valve or three-valve bypass into the bypass position and open the backwash drain valve (the sixth valve back from the control) with a screwdriver. Restore system water pressure when the service work is complete.

Problem	Possible Cause	Solution
1. Clock does not display time of day.	a. Transformer cord unplugged.	a. Connect power.
	b. No electric power at outlet.	b. Repair outlet or use working outlet.
	c. Defective transformer.	c. Replace transformer.
	d. Defective circuit board.	d. Replace timer.
2. Clock does not display correct time of day.	a. Outlet operated by switch.	a. Use outlet not controlled by switch.
	b. Incorrect voltage or frequency (Hz).	b. Replace timer with one of correct voltage and frequency (Hz).
	c. Power outages.	c. Reset clock.
3. Time display continues to advance.	a. Defective time set switch.	a. Replace timer.
4. Time display shows something other than time of day.	a. Electrical interference.	a. Disconnect power to unit. Restore power and reset time of day display.
	b. Defective circuit board.	b. Replace timer.
5. No water flow display when water is flowing.	a. Bypass valve in bypass.	a. Shift bypass valve to not-in-bypass position.
	b. Meter probe disconnected or not fully connected to meter housing.	b. Fully insert probe into meter housing.
	c. Restricted meter turbine rotation due to foreign material in meter **!**	c. Remove meter housing, free up turbine and flush with clean water. Turbine should spin freely. If not, replace meter.
	d. Defective meter probe.	d. Replace timer.
	e. Defective circuit board.	e. Replace timer.
6. Control regenerates at wrong time of day.	a. Power outages.	a. Reset clock to correct time of day.
	b. Clock set incorrectly.	b. Reset clock to correct time of day.
7. Timer stalled in regeneration cycle.	a. Motor dead.	a. Replace timer.
	b. Motor runs backward.	b. Replace timer.
	c. No electric power at outlet.	c. Repair outlet or use working outlet.
	d. Broken gear.	d. Replace timer.
	e. Defective switch.	e. Replace timer.
	f. Air leak in brine connections.	f. Check all junction points and make appropriate corrections.
	g. Binding of camshaft.	g. Remove foreign object obstruction from valve discs or camshaft.
	h. Water pressure greater than 25 psi (1.72 bar) during regeneration **!**	h. Install pressure regulator.
	i. Defective circuit board.	i. Replace timer.
8. Continuous regeneration. Camshaft does not stop at the end of regeneration.	a. Broken switch actuator on gear.	a. Replace timer.
	b. Defective switch.	b. Replace timer.

Problem	Possible Cause	Solution
9. Control will not regenerate automatically or when button is pressed.	a. Electric cord or transformer unplugged.	a. Connect power.
	b. No electric power at outlet.	b. Repair outlet or use working outlet.
	c. Defective motor.	c. Replace timer.
	d. Broken gear.	d. Replace timer.
	e. Binding in gear train.	e. Replace timer.
	f. Defective switch.	f. Replace timer.
10. Control will not regenerate automatically but will regenerate when button is pressed.	a. If water flow display is not operative, refer to Item 5.	a. Same as Item 5.
	b. Defective circuit board.	b. Replace timer.
	c. Incorrect hardness and capacity settings.	c. Set to correct values. See Programming section.
11. Run out of soft water between regenerations.	a. Improper regeneration.	a. Repeat regeneration, making certain that correct salt dosage is used.
	b. Fouled softener resin.	b. Use resin cleaner. See Note 1.
	c. Incorrect salt setting.	c. Set salt control to proper level. See salt setting chart.
	d. Incorrect hardness or capacity settings.	d. Set to correct values. See Programming section.
	e. Water hardness has increased.	e. Set hardness to new value. See Programming section.
	f. Restricted meter turbine rotation due to foreign material in meter **!**	f. Remove meter housing, free up turbine and flush with clean water. Turbine should spin freely; if not, replace meter.
	g. Excessive water usage below 1/5 gallon per minute.	g. Repair leaky plumbing and/or fixtures.
12. Control will not draw brine.	a. Low water pressure.	a. Make correct setting according to instructions.
	b. Restricted drain line.	b. Remove restriction.
	c. Injector plugged **!**	c. Clean injector and screen.
	d. Injector defective **!**	d. Replace injector and cap.
	e. Valve disc 2 and/ or 3 not closed.	e. Remove foreign matter from disc and check disc for closing by pushing in on stem. Replace if needed.
	f. Air check valve prematurely closed.	f. Put control momentarily into brine refill. Replace or repair air check if needed.
13. Brine tank overflow.	a. Brine valve disc 1 being held open by foreign matter.	a. Manually operate valve stem to flush away obstruction.
	b. Uncontrolled brine refill flow rate.	b. Remove variable salt controller to clean it and the ball.
	c. Valve disc 2 not closed during brine draw causing brine refill.	c. Flush out foreign matter holding disc open by manually operating valve stem.
	d. Air leak in brine line to air check.	d. Check all connections in brine line for leaks. Refer to instructions.
	e. Improper drain control for injector.	e. Too small of a drain control with a “B” or “C” injector will reduce draw rates. Reference Pressure Graphs.
	f. Drain control clogged with resin or other debris.	f. Clean drain control.

Problem	Possible Cause	Solution
14. System using more or less salt than salt control is set for.	a. Inaccurate setting. b. Foreign matter in controller causing incorrect flow rates. c. Defective controller.	a. Make correct setting. b. Remove variable salt controller and flush out foreign matter. Manually position control to brine draw to clean controller (after so doing, position control to “purge” to remove brine from tank). c. Replace defective part.
15. Intermittent or irregular brine draw.	a. Low water pressure. b. Defective injector **!**	a. Set pump to maintain at least 20 psi (1.38 bar) at softener. b. Replace both injector and injector cap.
16. No conditioned water after regeneration.	a. Unit did not regenerate. b. No salt in brine tank. c. Plugged injector **!** d. Air check valve closed prematurely.	a. Check for power. b. Add salt to brine tank. c. Remove injector and flush it and injector screen. d. Put control momentarily into refill to free air check. Replace or repair air check if needed. Refer to Instructions.
17. Control backwashes at excessively high or low rate.	a. Incorrect backwash controller used.!. b. Foreign matter affecting controller operation **!**	a. Replace with correct size controller. b. Remove controller and clean it and the ball.
18. Flowing or dripping water at drain or brine after regeneration.	a. Drain valve (5 or 6) or brine valve (1) held open by foreign matter. b. Valve stem return spring on top plate weak.	a. Manually operate valve stem to flush away obstruction. b. Replace spring.
19. Hard water leakage during conditioned water.	a. Improper regeneration. b. Leaking of bypass valve **!** c. O-ring around riser tube damaged **!**	a. Repeat regeneration making certain correct salt dosage is used. b. Replace O-ring. c. Replace O-ring.

Note 1: The use of resin cleaners in an unvented enclosure is not recommended. This may cause damage to the timer.

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