

**If you have questions when installing, programming, operating or maintaining this system**

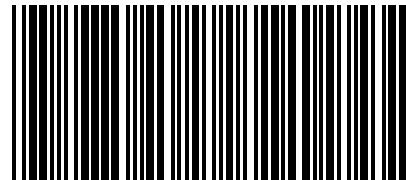
**CALL TOLL FREE  
1-800-627-3497**

**in Canada call  
1-800-752-3273**

Point-of-entry system tested and certified by NSF International under NSF/ANSI Standard 61 for materials safety requirements only. Not certified for contaminant reductions or structural integrity by NSF International. Certified under NSF/ANSI Standard 372 for low lead content.



Designed, Engineered &  
Assembled in the U.S.A.



7331761 (Rev. H 5/9/14)

# SHIPMENT INSPECTION

Thoroughly check the commercial system for possible shipping damage and/or parts loss. Also inspect and note any damage to shipping cartons, crating, etc. If damage is present, notify the transportation company. The manufacturer is not responsible for damage or parts loss in shipment.

**Note: Do not mistakenly discard small parts bags when unpacking the system.**

**All models are shipped in 3 cartons; (1) resin tank, (2) brine tank, and (3) controller. The mineral bed consists of 1 cubic foot bags of water softening resin, and 17 or 50 pound bags of various grades of gravel. Refer to the following chart.**

MODEL ▶ ▶		PA071	PA101	PA131	PA191	PA251	PA321
1 CU. FT. BAGS OF RESIN		2	3	4	6	8	10
BAGS OF GRAVEL (LBS)	fine	1 (17)	2 (17)	2 (17)	1 (50)	1 (50)	1 (50)
	medium				1 (50)	1 (50)	1 (50)
	coarse				1 (50)	1 (50)	1 (50)

## TABLE OF CONTENTS

	Page No.
Specifications .....	4 - 5
Dimensions .....	6
Resin Loading and Assembly .....	7 - 8
Planning Installation	
Installation Steps .....	8 - 9
Inlet - Outlet Plumbing Drawing .....	9
Notes and Cautions .....	10
Connecting Brine Tank .....	10
Connect Valve Drain Hose .....	11
Pressure Testing .....	11
Filling Brine Tank with Water and Salt .....	12
Programming the Controller at Startup .....	12
Programming the Controller - Softeners .....	12-14
Sanitizing Procedure .....	14
Programming the Controller - Filters .....	15
Water Softener Controller Setup Information .....	16
Resetting Time .....	17
Controller Features and Options .....	17-20
FCC Information .....	19
Operation	
Demand Controller and Water Meter .....	20
Water Flow Through the Conditioner .....	21 - 23
Service Information	
Salt, Recommended Type and Refilling .....	23
Removing a Salt "Bridge" .....	23
Cleaning the Nozzle / Venturi .....	24
Controller	
Wiring Schematic .....	25
Error Code Table .....	26
Troubleshooting .....	25-28
Repair Parts	
Brine Tanks and Brine Valves .....	29-31
Resin Tanks / Distributor / Controller .....	32-33
Valve Assembly .....	34-35

## SAFETY GUIDES

**Follow the installation instructions carefully. Failure to install the commercial system properly voids the warranty.**

Before you begin installation, read this entire manual. Then, obtain all the materials and tools you will need to make the installation.

**Check local plumbing and electrical codes. The installation must conform to them.**

**Use only lead-free solder and flux** for all sweat-solder connections, as required by state and federal codes.

Do not locate this system where freezing temperatures occur. Do not attempt to treat water over 120°F. **Freezing, or hot water damage voids the warranty.**

Avoid installing in direct sunlight. **Excessive sun heat may cause distortion or other damage** to non-metallic parts.

This system requires a minimum water pressure of 30 psi at the inlet. **MAXIMUM ALLOWABLE Inlet water pressure is 125 psi.** If daytime pressure is over 80 psi, nighttime pressure may exceed the maximum. Use a pressure reducing valve if necessary. (Adding a pressure reducing valve may reduce the flow.)

**The system works on 24 volt-60 Hz electrical power only.** Be sure to use the included transformer.

This system is not intended to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

## SPECIFICATIONS

EQUIPMENT SPECIFICATIONS							
MODEL		SOFTENERS					
		PA071	PA101	PA131	PA191	PA251	PA321
TANK SIZE (IN)		12" x 54"	17" x 58"	17" x 58"	24" x 71"	24" x 71"	24" x 71"
CAPACITY (GRAINS) @ SALT USAGE PER CU. FT. RESIN	4 LBS.	37,000	54,000	72,000	108,000	144,000	180,000
	6 LBS.	50,000	72,000	96,000	144,000	192,000	240,000
	8 LBS.	61,000	84,000	112,000	168,000	224,000	280,000
	10 LBS.	67,000	93,000	124,000	186,000	248,000	310,000
	12 LBS.	71,000	99,000	132,000	198,000	264,000	330,000
RECOMMENDED FLOW RATES <sup>1</sup>	5 GPM	2.9 ΔP	1.4 ΔP	1.5 ΔP	1.3 ΔP	1.3 ΔP	1.3 ΔP
	10 GPM	7.3 ΔP	4.2 ΔP	4.4 ΔP	3.4 ΔP	3.6 ΔP	3.8 ΔP
	15 GPM	13.0 ΔP	8.0 ΔP	8.6 ΔP	6.9 ΔP	7.3 ΔP	7.6 ΔP
	20 GPM	20.0 ΔP	13.0 ΔP	14.0 ΔP	11.6 ΔP	12.0 ΔP	12.4 ΔP
	25 GPM	28.6 ΔP	19.1 ΔP	20.5 ΔP	17.9 ΔP	18.4 ΔP	19.0 ΔP
	30 GPM	38.3 ΔP	26.5 ΔP	28.3 ΔP	24.0 ΔP	24.9 ΔP	25.6 ΔP
	35 GPM	N/A	35.0 ΔP	37.0 ΔP	32.0 ΔP	33.0 ΔP	34.0 ΔP
	40 GPM	N/A	N/A	N/A	41.0 ΔP	42.2 ΔP	43.4 ΔP
RESIN (CU. FT.)		2	3	4	6	8	10
BAGS OF GRAVEL (LBS)	FINE	1 (17#)	2 (17#)	2 (17#)	1 (50#)	1 (50#)	1 (50#)
	MEDIUM				1 (50#)	1 (50#)	1 (50#)
	COURSE				1 (50#)	1 (50#)	1 (50#)
SALT CAPACITY		340#	1000#	1000#	1500#	1500#	1500#
PIPE SIZE (IN)		1"	1"	1"	1"	1"	1"
BACKWASH/FST. RNS. FLOW RATES		3.0	7.0		10.0		

<sup>1</sup> psi pressure loss @ 


 continuous flow rates  
intermittent or peak flow rates  
flow rates not recommended (hardness leakage, reduced efficiency, etc.)

## SPECIFICATIONS

PROGRAMMING INFORMATION							
MODEL		SOFTENERS					
		PA071	PA101	PA131	PA191	PA251	PA321
RESIN QUANTITY (CU. FT.) <sup>②</sup>		2	3	4	6	8	10
REFILL RATE (GPM)		0.3	0.5	0.5	0.5	0.5	0.5
TURBINE SIZE (IN)		1"	1"	1"	1"	1"	1"
FILL FLOW PLUG LOCATION		See key no. 33, page 34	See key no. 16, page 31				
BRINE CYCLE FLOW RATE (GPM)		.33	.58	.57	1.1	1.1	1.1
BR. RNS. CYCLE FLOW RATE (GPM)		.22	.48	.47	.89	.89	.89
BKW. CYCLE & FAST RINSE CYCLE FLOW RATE (GPM)		3	7	7	10	10	10
BKW. FAST RINSE FLOW PLUG IDENTIFICATION & LOCATION		Black - tan dot (.5)	Brown (.7)		Orange (.10)		
		BEHIND DRAIN ELBOW OF 1" VALVE (SEE PAGE 34)					
FREEBOARD (INCHES) <sup>③</sup>		19	30	22	36	27	18
FILL CYCLE TIME (MIN.)	LOW	4.7	13.4	17.9	16.1	21.4	26.8
	HIGH	31.0	50.2	67.0	60.3	80.4	100.5
BRINING / BR. RINSE CYCLE TIME (MIN.)	LOW SALT	142	115	160	150	160	180
	HIGH SALT	112	95	130	125	130	150
BRINE TIME (MIN) @ SALT DOSE (LBS)	LBS	MINUTES					
	4, Auto Adj. or Salt Eff.	141	115	160	150	160	180
	6	137	110	150	145	150	175
	8	140	105	145	135	145	170
	10	135	100	135	130	135	160
BACKWASH TIME (MIN)		13	15	15	15	15	15
FAST RINSE TIME (MIN)		4	5	5	5	5	5

<sup>②</sup> Synthetic high capacity resin

<sup>③</sup> Nominal distance from top of resin bed to top of the tank. This dimension can vary several inches, depending on resin moisture content, degree of bed expansion or packing, resin tank diameter tolerances, etc.

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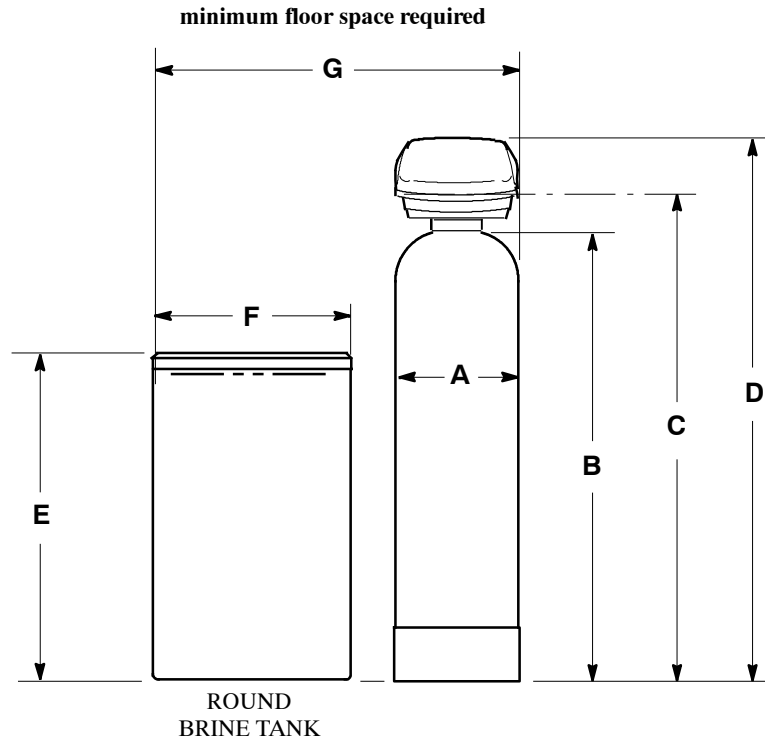
**in Canada call  
1-800-752-3273**

# SPECIFICATIONS

EQUIPMENT SPECIFICATIONS							
MODEL		FILTERS					
		MULTI-MEDIA	ALL PURPOSE		CARBON		GREENSAND
		PA121	PA121	PA171	PA121	PA171	PA121
TANK SIZE (IN)		12" x 54"	12" x 54"	17" x 58"	12" x 54"	17" x 58"	12" x 54"
CONTAMINANT REMOVAL		based on water analysis	based on water analysis		based on water analysis		maximum iron 20 ppm
SERVICE WATER FLOW RATE (GPM)		4 - 8	4 - 8	8 - 16	4 - 8	8 - 16	4 - 8
RECOMMENDED FLOW RATES (GPM @ PSI)	2 GPM	1.0 ΔP			1.0 ΔP	0.6 ΔP	1.0 ΔP
	4 GPM	2.3 ΔP			2.3 ΔP	1.1 ΔP	2.3 ΔP
	6 GPM	3.9 ΔP			3.9 ΔP	2.2 ΔP	3.9 ΔP
	8 GPM	5.7 ΔP			5.7 ΔP	3.3 ΔP	5.7 ΔP
	10 GPM	7.9 ΔP			7.9 ΔP	4.6 ΔP	7.9 ΔP
	12 GPM	N/A			N/A	5.9 ΔP	N/A
	14 GPM	N/A			N/A	7.4 ΔP	N/A
	16 GPM	N/A			N/A	9.7 ΔP	N/A
	18 GPM	N/A			N/A	13.7	N/A
MINERAL (CU. FT.)		2			2	4	2
BAGS OF MINERAL (LBS) *Use only partial bags of supplied mineral	ANTHRACITE	2 (65#)*	-	-	-	-	2 (61#)*
	FILTER SAND	1 (52#)	-	-	-	-	-
	GARNET	1 (33#)*	-	-	-	-	1 (33#)*
	ACTIVATED CARBON	-	-	-	2 (58#)	4 (116#)	-
	MANGANESE GREENSAND	-	-	-	-	-	4 (170#)
	GRAVEL	2 (17#)	2 (17#)	1 (50#)	1 (17#)	2 (34#)	1 (17#)
BKW/FR FLOW RATES	LOCATION	Key #10, page 34					
	(GAL/MIN)	12	12	15	5	5	12
PIPE SIZE (IN)	FA	1"	1"	1"	1"	1"	1"
	FB	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"
WATER PRESSURE LIMITS (PSI)		30 - 125	30 - 125		30 - 125		30 - 125
MAXIMUM WATER TEMPERATURE		35 - 100	35 - 100		35 - 100		35 - 100
ELECTRICAL RATING		24v 60Hz	24v 60Hz		24v 60Hz		24v 60Hz

dependant on media

# DIMENSIONS



MODEL	A	B	C	D	E	F	G		INLET-OUTLET	
	Resin Tank Diameter	Resin Tank Height	Inlet-Outlet Height	Overall Height	Brine Tank Height	Brine Tank Diameter	Single	Multiple <sup>1</sup>	Pipe Size <sup>2</sup>	Pipe Center lines
PA071	12.3"	55"	58"	63.75"	39"	17"	35.3"	70"	1"	3.8"
PA101 PA131	17.6"	59.5"	62.5"	68.25"	50"	24"	48"	102"	1"	3.8"
PA191 PA251 PA321	24"	76"	79.8"	85.5"	51"	30"	60"	90"	1"	3.8"

<sup>1</sup> Includes 6" between tanks.

<sup>2</sup> Sweat copper (1") fittings supplied. Optional 1-1/2" fittings available, part no. 7129211, package of 2.

## RESIN LOADING AND ASSEMBLY

1. Move the resin tank into installation location (see page 8). Set it on a flat, level surface. If a twin installation, keep tanks separated for ease of service.

2. Remove the shipping cap, top distributor and o-rings. On **all models**, place the *bottom* distributor into the resin tank. Check the distributor length as shown in Figure 1 and adjust if needed. Center the distributor in the tank.

3. With a pail or hose, fill the tank with 1 to 2 feet of water. The water acts as a cushion to protect the bottom distributor while filling the tank with gravel and resin.

4. Plug the end of the distributor tube with a clean rag, to keep gravel and resin out.

5. Using a larger neck funnel, add the specified (see pages 2 and 4) amount of gravel. **Be sure the distributor remains centered.**

**Note:** When coarse, medium and fine gravels are specified, add in that order.

6. Add the specified amount of resin, using water sparingly to speed flow through the funnel.

7. Flush the tank opening with water to clean resin beads from the top of the tank. Then, remove the rag from the distributor tube.

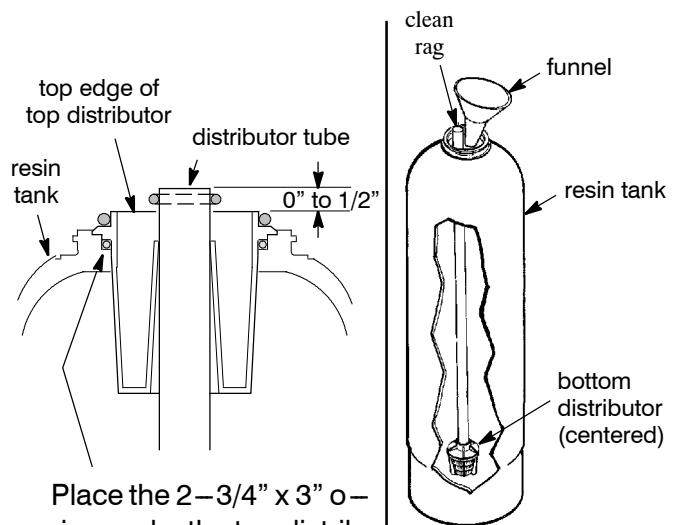
8. Finish filling the tank with water, up to the top of the tank.

**Important:** **Be sure to fill with water.** This will eliminate air space and prevent excessive air-head pressure when the water conditioner is pressurized.

9. Install the o-ring seals and top distributor exactly as shown in Figure 2. If the o-rings need lubrication, use a high quality silicone grease.

continued

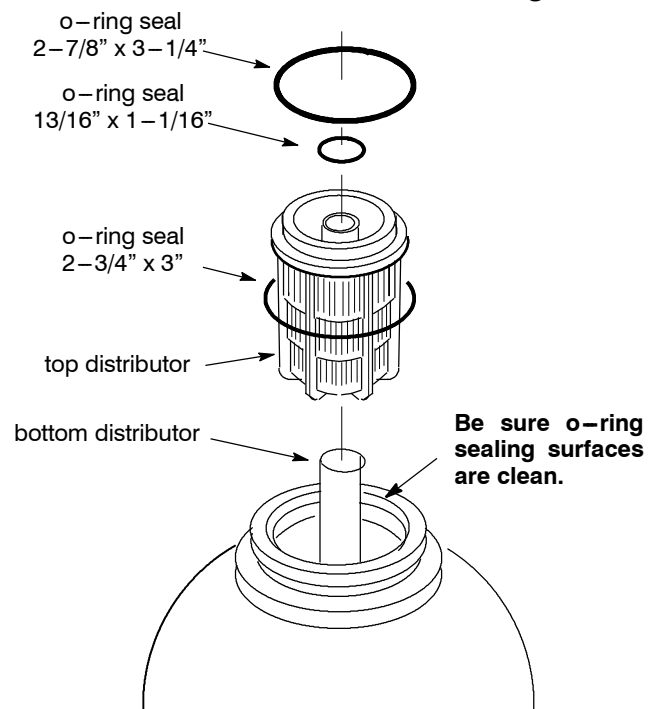
Figure 1



Place the 2-3/4" x 3" o-ring under the top distributor and slide top distributor assembly over distributor tube.

**Note:** Resin tank height can vary somewhat within manufacturing tolerance. **So the bottom distributor riser pipe has proper clearance with inside valve porting, check for the correct length as shown above.** Cut the riser if needed to adjust the length. Be sure to remove burrs and sharp edges.

Figure 2



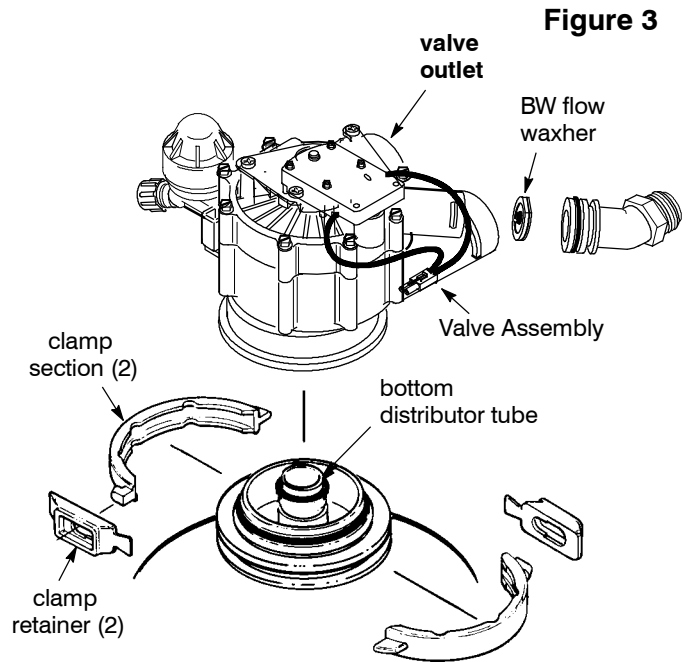
## RESIN LOADING AND ASSEMBLY

10. Lower the valve assembly onto the resin tank, centering over the bottom distributor tube. Push downward, against the o-ring, and install the clamp sections, securing with the retainers.

**Important:** Check the valve outlet to be sure the turbine and turbine support are securely in place.

11. Verify that the proper backwash flow washer is installed. If not, replace with correct flow washer from parts bag.

Model	BW Flow Washer	ID Mark
PA071	3 gpm	tan dot
PA101 & PA131	7 gpm	brown
PA191, PA251 & PA321	10 gpm	orange



## PLANS FOR LOCATION AND INSTALLATION OF SYSTEM

**WATER SUPPLY:** The system requires a potable water supply that will provide a continuous flow to meet regeneration flow specifications. A minimum pressure of 30 psi is required at the conditioner inlet.

**“FULL LINE” (both hot and cold water) WATER CONDITIONING:** Connect the system, to the water supply pipe, immediately *after* (downstream) the municipal supply water meter or well supply pressure tank.

**CONDITIONING HOT WATER ONLY:** Connect the system, to the water supply pipe, *before* (upstream) the water heater.

**CAUTIONS:** (1) **Do not install** the conditioner **after**, or downstream from **the water heater**. **Hot water will damage** inner parts of the system, and may cause the loss of the water softening resin bed. (2) **To reduce the risk of hot water flowing backwards**, into the conditioner, piping between the conditioner and water heater should be as long as possible.

**DRAIN:** A drain is needed nearby the conditioner, capable of carrying away backwash water at the rate of flow listed in the specifications. A floor drain is preferred. Other approved drain points are acceptable, if they do not cause a back-pressure on the conditioner drain hose or pipe.

**ELECTRICAL:** The system works on **24 volts only**. A transformer is included to reduce 120V–60Hz electrical power. An approved, grounded outlet is needed near the conditioner controller for the transformer. The conditioner includes a power cable to connect between the transformer and the controller. The controller may be mounted in any convenient location. You may either fasten to a wall using the mounting holes molded in the controller case, or wrap a chain around the tank and connected to the mounting holes on controller case.

**SPACE REQUIREMENTS:** Be sure to allow sufficient area around the resin and brine tanks for refilling with salt and other service. Minimum floor space and other dimensions are shown on page 6.



## MATERIALS YOU MAY NEED

Use the drawing at the right as a guide for your installation. The drawing shows typical connection using fittings included with the system, and with optional items available.

■ Be sure to install a 3-valve bypass system, or use the **optional bypass valve, #7214383**. Bypass valves allow you to turn off water to the system, for servicing, while having full-line bypass to the establishment.

■ A **5/8" minimum** inside diameter hose or pipe is required for the valve drain (see page 11). The drain fitting has standard garden hose threads, and hose barbs. Adaptors are available from most hardware stores to convert the fitting to accept rigid pipe. A garden hose is also needed for the drain on brine tanks.

■ For in and out pipes to the conditioner, use copper, CPVC plastic or threaded pipe and fittings. Avoid joining copper and galvanized together as corrosion will occur rapidly. Included inlet and outlet adaptors are 1" male copper. Optional fittings available are shown in Figure 5.

■ **Multiple Tank Installations:** To promote equal water flow, inlet and outlet plumbing configuration to each valve should be as identical as possible. Use the same fittings and pipe lengths for each connection.

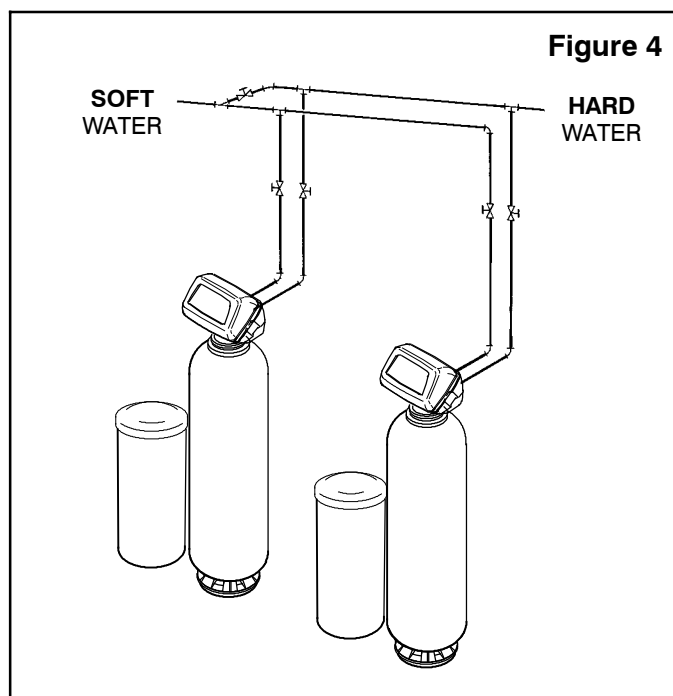
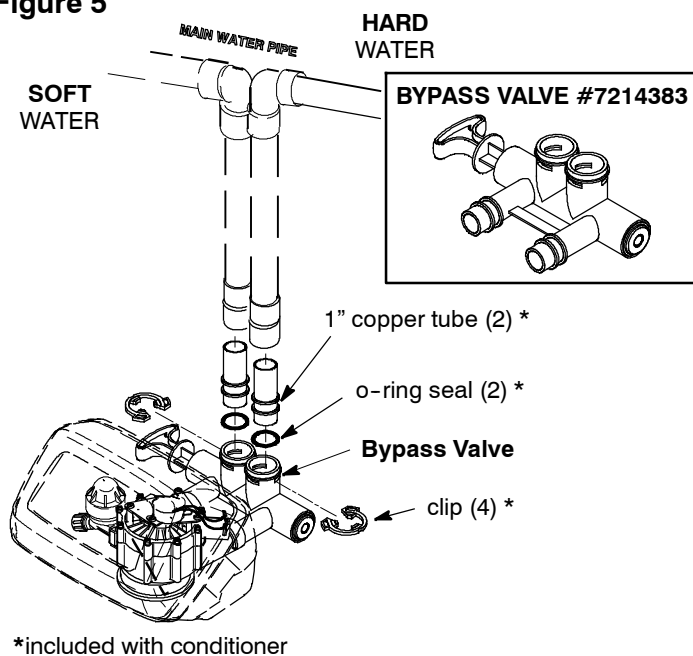





Figure 4

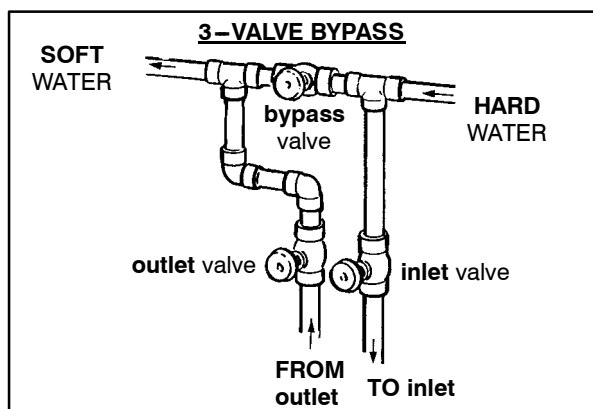
## TYPICAL INLET- OUTLET PLUMBING CONNECTIONS

Figure 5



### OPTIONAL INLET/OUTLET FITTINGS

-  — #7104546 CPVC Nipple – Use in place of included copper inlet and outlet tubes.
-  — #7129211 Adaptor Fitting, 1-1/2" (2) – Use in place of included copper inlet and outlet tubes.
-  — #7120259 Elbow – Extends inlet and/or outlet in any 90° direction.



## INSTALLATION STEPS

### PIPING ASSEMBLY NOTES AND CAUTIONS:

- BE SURE to **close the main water supply valve** before beginning.
- BE SURE to plumb so **hard water flows to the valve inlet** fitting.
- **CAUTION:** When soldering, make sub-assemblies as needed to **prevent soldering heat damage** to the conditioner valve or bypass valve. Be sure soldered piping has cooled before connecting to the conditioner.
- Use Teflon tape or pipe joint compound on external pipe threads.
- Lubricate o-ring seals with high quality silicone grease.

**1.** Looking at the illustrations on page 9, and observing the notes above, run piping from the main **water supply** pipe to the **valve inlet**. Then, run return piping from the valve outlet to the supply pipe. Be sure to include a 3-valve bypass, or use one of the optional bypass valves.

Note: When working with soldered copper, be sure to observe the caution above to avoid damage to non-metallic parts.

**Important:** Support in and out piping in an acceptable manner, to prevent weight stress on the conditioner valve.

**2.** Move the brine tank assembly into position nearby the resin tank. Enough tubing is included to allow locating the tank up to 10' away from the resin tank (Figure 6).

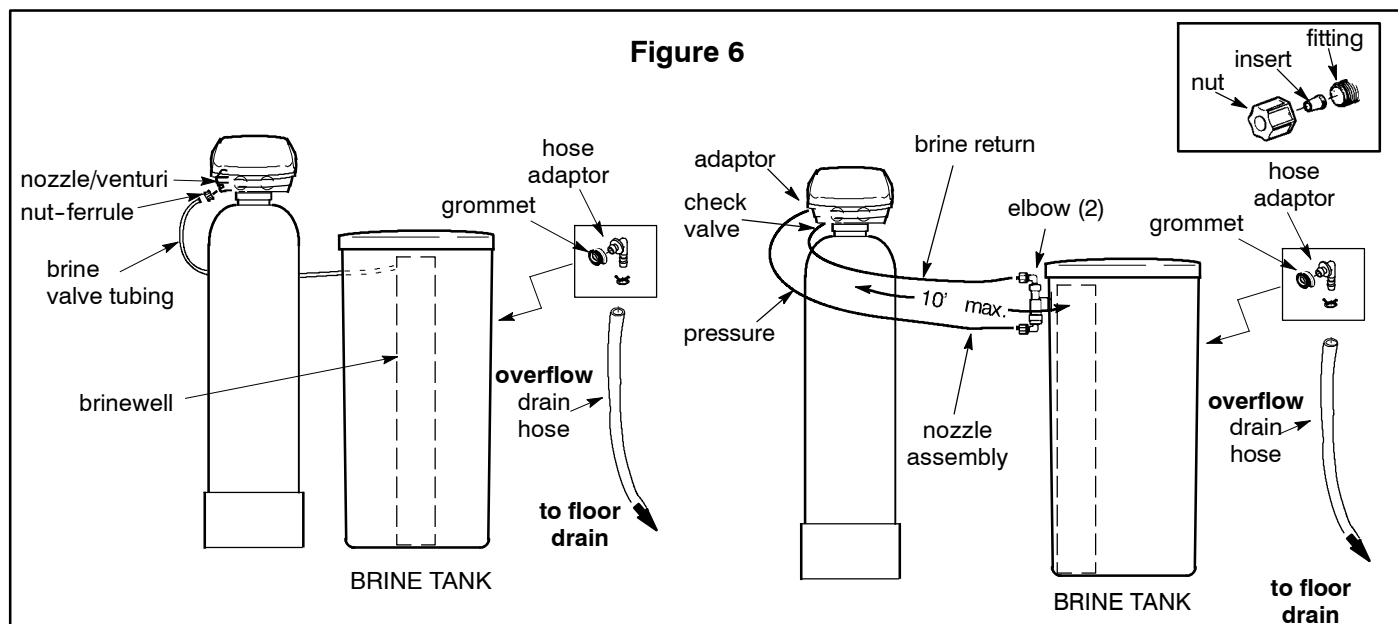
**3a.** Connect Tubing – Model PA071: Thread the brine tube through the hole of the brine tank sidewall. Fasten tubing to the nozzle assembly (Figure 6) using the compression nut-ferrule, tightening securely, by hand only.

**3b.** Connect Tubing – All other models: Verify that the proper nozzle & venturi are installed in nozzle assembly. If not, replace with correct pair.

Model	Venturi	Nozzle
PA101, PA131	Almond	White
PA191, PA251 & PA321	Gray	Gray

- 1 Install two elbows (in separate parts bag with the brine tank) into the top and bottom of the nozzle assembly (Figure 6).
- 2 Using tubing inserts and compression nuts, fasten lengths of tubing to the two elbows.
- 3 Connect tubing from the **bottom of the nozzle assembly, to the top adaptor** on the front of the conditioner valve assembly. Use a tubing insert and compression nut (tighten securely) as shown in the inset drawing.
- 4 Do the same to connect tubing from the top of the nozzle, to the bottom check valve fitting on the front of the conditioner valve assembly.

continued



## INSTALLATION STEPS

**4.** Push the elbow fitting, with garden hose threads on one end, into the grommet in the sidewall of a round brine tank. Attach a length of drain hose to the fitting as follows.

Attach a length of 5/8" I.D. garden hose to the elbow and run to the floor drain.

**Important:** This *gravity* drain is a safeguard to carry away excess water if the brine tank should overflow.

**5. Install Valve Drain Hose:** The drain fitting accepts a 5/8" I.D. **minimum** drain hose, either garden hose connection, or hose onto a barb fitting (Figure 7). To use the garden hose threads, cut the barbed section of the elbow off with a hack-saw.

Attach the drain hose to the drain elbow. If using the barbs, install an automotive type clamp to secure the hose to the elbow. Place the other end of the hose at the drain point, and observe the following.

- **Fasten the hose in place** at the drain point. Pressurized water, exiting the hose during regenerations, could cause it to "whip".
- Provide an air-gap of at least 1-1/2" between the end of the hose and the floor drain cover. The air-gap prevents a possible back siphon if sewer water should backup.
- For longer or raised drain hose runs, a 3/4" dia. hose (minimum) is recommended to reduce back-pressure. Back-pressure can restrict flow through the nozzle/venturi, affecting brine draw.
- If codes require a rigid drain pipe, purchase a *garden hose thread by compression* fitting, available from most hardware stores.

**6. Pressure Testing:** To prevent excessive air pressure in the resin tank and plumbing system, do the following steps in exact order.

- 1 Open two or more **soft** water faucets, both hot and cold.
- 2 Referring to Figure 8, place the bypass valve(s) in "service".
- 3 Slowly open the main water supply valve, pausing several times to allow the system to pressurize. When water from opened faucets runs smoothly, with no more air bubbles, close the faucets.
- 4 Check the installation for leaks. If any rework is needed, observe the cautions on page 10.

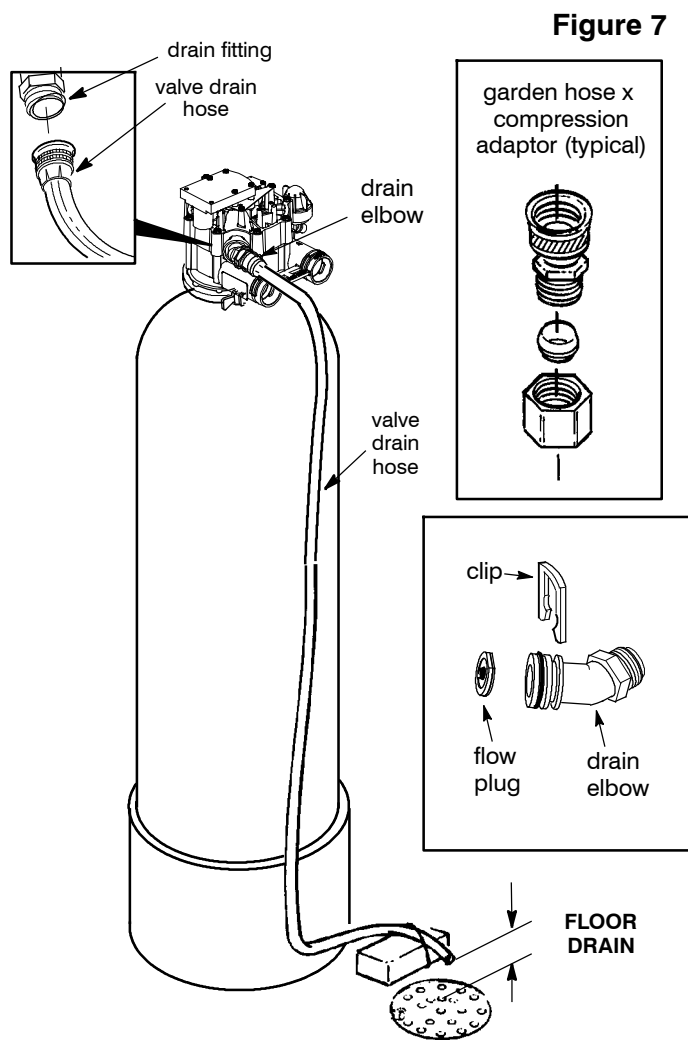


Figure 7

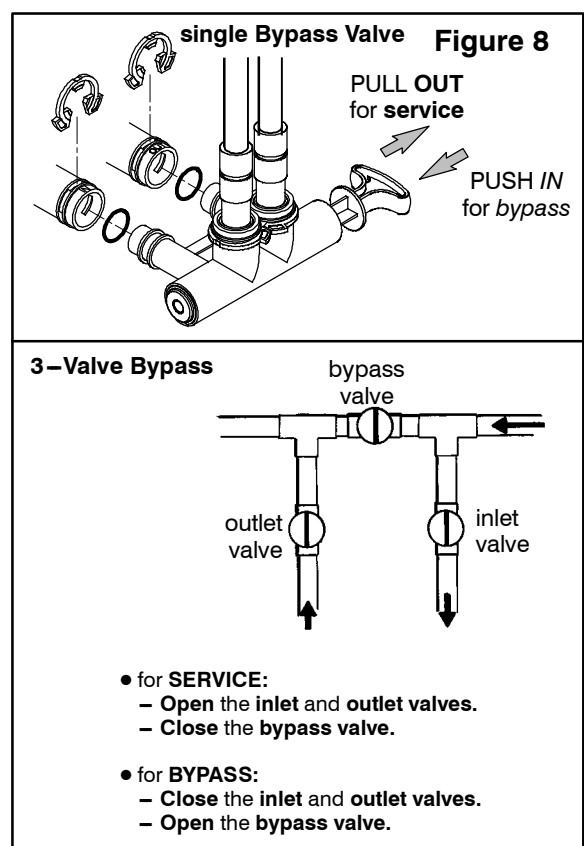


Figure 8

## INSTALLATION STEPS

**7. Fill the Brine Tank with Water and Salt:** Using a pail or hose, add about 3 gallons of water into the brine tank. Add about 7 gallons into a 24" dia. tank.

Salt capacities are shown in the specifications. Fill the tank with **clean water softener salt**. Recommended nugget, pellet, solar, or button salts have less than 1% impurities. See page 23 for additional salt information.

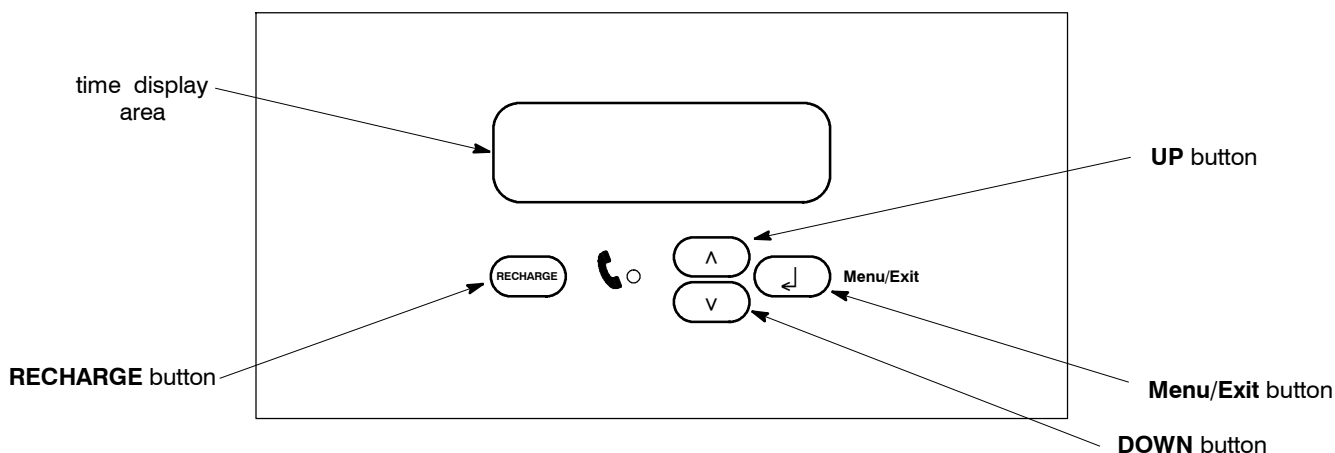
**8.** Connect the controller cable(s) to the controller. Be sure the screws are tight. Note: The transformer must be unplugged before connecting or disconnecting controller cables. If not, it may result in damage to the controller circuits.

**9.** Connect the power cable to the two screw terminals on the transformer. Be sure the screws are tight. Plug the transformer into a grounded, 120V–60HZ outlet.

**10. Program the controller.**

### PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP

(See page 17 to reset time and other settings, once programmed)



The electronic controller is a menu driven system with a dot matrix display. The Up (↑) and Down (↓) buttons move the cursor (>) up and down the menu choices. The Menu/Exit (⇐) button enters the value selected and returns the display back a level. The controller will return to the normal operating screen after 4 minutes if left in a menu and no selection has been made.

● **SOUND “BEEPER”**– A “beeper” sounds while pressing buttons for controller setup. One beep signals a change in the faceplate display. Repeated beeps means the controller will not accept a change from the button you have pressed, telling you to use another button.

When the transformer is first plugged in, a screen is displayed for approximately 8 seconds showing the software version, then the following screens are displayed to program the controller.

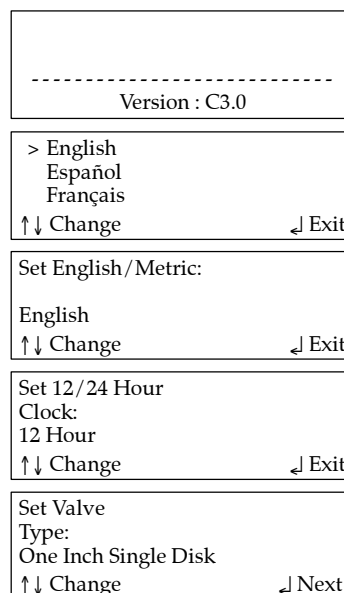
**1. SET LANGUAGE:** Using the up (↑) or down (↓) buttons, move the cursor (>) next to the preferred language. Press the Menu/Exit (⇐) button to select and advance to next setting.

**2. SET ENGLISH/METRIC:** Using the up (↑) or down (↓) button, set the controller to measure in either English or Metric units. Press the Menu/Exit (⇐) button to select and advance to next setting.

**3. SET 12/24 HOUR CLOCK:** Using the up (↑) or down (↓) button, set the time format to either a 12 or 24 hour clock. Press the Menu/Exit (⇐) button to select and advance to next setting.

**4. SET VALVE TYPE:** Use the up (↑) or down (↓) buttons to display 1 inch single rotor disc valve. When the correct application is shown, press the Menu/Exit (⇐) button to select and advance to next setting.

continued



# PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP – SOFTENERS

**5. SET NUMBER OF VALVES:** If one softener or filter is installed, set Simplex in the display using the up (↑) or down (↓) buttons, press the Menu/Exit (↵) button to select and advance to next setting. If multiple units are installed, set for Duplex, Triplex or Quadplex as applies for the installation.

Set Number of Valves: Quadplex	↵ Next
↑↓ Change	

**6. SET RECHARGE METHOD (for multiple tank applications only):** There are four choices for recharge method. Peak Flow, Alt. Immediate, Parallel Immediate or Parallel Delayed. When Peak Flow is selected, each tank recharges as capacity is used. Alt. Immediate initiates an immediate recharge on a tank as capacity is used. When that tank is finished recharging it is put in standby mode. Parallel Immediate recharges each tank in sequence immediately as capacity is used. Parallel Delayed recharges each tank in sequence at the scheduled recharge time. Using the up (↑) or down (↓) button, select recharge method and press the Menu/Exit (↵) button to select and advance to next setting.

Set Recharge Method: Parallel Delayed	↵ Next
↑↓ Change	

**7. SET SYSTEM TYPE:** Using the up (↑) or down (↓) button, select either softener or filter system type and press the Menu/Exit (↵) button to select and advance to next setting. If filter is selected, go to step 21 on page 15, for further settings.

Set System Type: Softener	↵ Next
↑↓ Change	

**8. SET RESIN QUANTITY:** Using the up (↑) or down (↓) button, select amount of resin, in increments of .5 cubic feet (per tank), that will be used in the system. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Resin Qty: 1.5 cu. ft.	↵ Next
↑↓ Change	

**9. SET REFILL RATE:** Using the up (↑) or down (↓) button, select refill rate to the suggested minutes from the table on page 4. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Refill Rate: 2.0 GPM	↵ Next
↑↓ Change	

**10. SET EFFICIENCY MODE:** Using the up (↑) or down (↓) button, select Salt Efficient, Boiler Option, Auto Adjusting or Actual Dose. Salt Efficient will obtain a salt efficiency of 4,000 grains or higher. Boiler Option will have 1 ppm soft water bleed or less. Auto Adjusting adjusts itself on 5 operating capacities, based on frequency of regenerations. Actual Dose allows user to set actual salt dose in lbs/cu. ft. If Actual Dose is selected, the controller will continue on to a Set Salt Dose screen. Press the Menu/Exit (↵) button to select and advance to next setting. Note: If Auto Adjusting is chosen, brine times will still need to be selected in step 12.

Set Efficiency Mode:  Actual Dose	↵ Next
↑↓ Change	

Set Salt Dose: 10 lb per ft3	↵ Next
↑↓ Change	

**11. SET FIXED RESERVE:** (Simplex or Parallel Delayed Systems, only if Actual Dose is selected, Step 8) If a minimum capacity must be available on any given day, use the up (↑) or down (↓) button to select the percentage of operating capacity required. See the chart on page 3 to determine actual capacity available. If Automatic is selected, the fixed reserve percentage varies, based on a weekly average of capacity used. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Fixed Reserve: Automatic	↵ Next
↑↓ Change	

**12. SET BRINE TIME:** Using the up (↑) or down (↓) button, select brine time to the suggested minutes from the table on page 4. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Brine Time: 180 Minutes	↵ Next
↑↓ Change	

**13. SET BACKWASH TIME:** Using the up (↑) or down (↓) button, select backwash time to the suggested minutes from the table on page 4. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Backwash Time: 15 Minutes	↵ Next
↑↓ Change	

**14. SET FAST RINSE TIME:** Using the up (↑) or down (↓) button, select fast rinse time to the suggested minutes from the table on page 4. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Fast Rinse Time: 5 Minutes	↵ Next
↑↓ Change	

**15. SET SALT MONITOR FEATURE:** Using the up (↑) or down (↓) button, display ON or OFF. If ON is selected, you must also enter the diameter of the brine tank. If this is a multiple valve application, and ON is selected, the number of Valves Per Brine Tank must be entered. Press the Menu/Exit (↵) button to select and advance to next setting. Note: When set to "ON", the first level menu includes "Set Salt Level".

Set Salt Monitor Feature: OFF	↵ Next
↑↓ Change	

continued

# PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP – SOFTENERS

**16. SET MINIMUM TANKS IN SERVICE (Triplex and Quadplex units only):** Using the up (↑) or down (↓) button, display the minimum number of tanks that are needed to be in service at a time. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Minimum Tanks In Service: 3 Tanks ↑↓ Change	↵ Next
--	--------

**17. SET PEAK FLOW TRIP POINT:** If Peak Flow is selected as method of recharge (step 4), this option is activated. Using the up (↑) or down (↓) button, select the GPM (1.0 minimum to 750 maximum) at which you **temporarily** require another unit to come into service. The unit will return to standby when the GPM falls below the set point after a period of 30 minutes. Press the Menu/Exit (↵) button to select and advance to next setting.

Peak Flow Trippoint: 8.0 GPM ↑↓ Change	↵ Next
---	--------

After these initial settings are completed, the monitor will display a screen stating the controller is being reset. The monitor will then show a screen with the current settings before moving to the next screen and required setting.

Softener 1 Inch Single Disk ----- Version : C3.0
---

**18. SET CLOCK:** Using the up (↑) or down (↓) button, set the present time, being sure AM or PM shows, as applicable. By pressing and holding either the up (↑) or down (↓) button, the display will scroll at faster increments. Press the Menu/Exit (↵) button to select and advance to next setting. Note: Clock will need to be reset only if power was out longer than 72 hours.

Set Clock: 12: 00PM ↑↓ Change	↵ Exit
-------------------------------------	--------

**19. SET HARDNESS:** Using the up (↑) or down (↓) button, set the water hardness level, from 1 to 160 grains or 10 to 2740 PPM (parts per million). By pressing and holding either the up (↑) or down (↓) button, the display will scroll at faster increments. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Hardness: 25 Grains ↑↓ Change	↵ Exit
---	--------

**20. SET RECHARGE TIME:** This screen is active only if a single valve system or Parallel Delayed recharge setting. Using the up (↑) or down (↓) button, set the time when regenerations should start. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Recharge Time: 2:00AM ↑↓ Change	↵ Exit
--	--------

The monitor returns to the normal operating screen when programming has been completed.

Recharge Tonight At: 2:00AM	12:03 PM ↵ Menu
-----------------------------------	--------------------

**To complete the installation, do the sanitizing below.**

## SANITIZING PROCEDURE

Care is taken at the factory to keep your water softener clean and sanitary. However, during shipping, storage, installing and operating, bacteria could get into the softener. For this reason, sanitizing as follows is suggested\* when installing.

1. Be sure to complete all installation steps, including electronic controller programming.
2. Pour about 3/4 oz. of common 5.25% household bleach (Clorox, Linco, Bo Peep, White Sail, Eagle, etc.) **into the brinewell** (Figure 6, Page 10).
3. **Start a recharge:** On the electronic controller, press the RECHARGE button. Move the cursor (>) down to "Recharge Now" and press the Menu/Exit (↵) button. In this menu, move the cursor (>) down to "Recharge All" and press the Menu/Exit (↵) button to start an immediate regeneration. This recharge draws the sanitizing bleach into and through the water softener to sanitize it. Any air remaining in the unit is purged to drain.
4. After the recharge has completed, fully open a cold water faucet, downstream from the softener, and allow 50 gallons of water to pass through the system. This should take at least 20 minutes. Close the faucet.

**NOTE:** When the above sanitizing regeneration is over, all remaining bleach is flushed from the conditioner and your house's COLD water supply is fully soft immediately. However, **your water heater is filled with hard water** and, as hot water is used, it will refill with soft water. When all the hard water is replaced in the water heater, hot and hot mixed with cold water will be fully soft. If you want totally soft water immediately, after the above regeneration, drain the water heater until the water runs cold. **If you do drain the water heater, use extreme care, as hot water could cause severe burns.**

\*Sanitizing is recommended by the Water Quality Association for disinfecting. On some water supplies, they suggest periodic sanitizing.

## PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP – FILTERS

**21. SET FILTER CAPACITY:** Using the up (↑) or down (↓) button, select OFF, or a pre chosen number of gallons, in 1000 gallon increments, at which you want the filter to backwash. If OFF is selected, the filter will not backwash automatically, and it must be initiated manually. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Filter Capacity: 1000	↵ Next
↑↓ Change	

**22. SET BACKWASH TIME:** Using the up (↑) or down (↓) button, select backwash time from 1 minute minimum to 30 minutes maximum. The minimum time for filters is about 20 minutes. Increase the time as needed to thoroughly clean the filter bed. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Backwash Time: 15 Minutes	↵ Next
↑↓ Change	

**23. SET FAST RINSE TIME:** Using the up (↑) or down (↓) button, select fast rinse time from 1 minute minimum to 30 minutes maximum. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Fast Rinse Time: 5 Minutes	↵ Next
↑↓ Change	

**24. SET MINIMUM TANKS IN SERVICE (Triplex and Quadplex units only):** Using the up (↑) or down (↓) button, display the minimum number of tanks that are needed to be in service at a time. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Minimum Tanks: In Service: 3 Tanks	↵ Next
↑↓ Change	

After these initial settings are completed, the monitor will display a screen stating the controller is being reset. The monitor will then show a screen with the current settings before moving to the next screen and required setting.

Filter 1 Inch Single Disk ----- Version : C3.0
---

**25. SET CLOCK:** Using the up (↑) or down (↓) button, set the present time, being sure AM or PM shows, as applicable. By pressing and holding either the up (↑) or down (↓) button, the display will scroll at faster increments. Press the Menu/Exit (↵) button to select and advance to next setting. Note: Clock will need to be reset only if power was out longer than 72 hours.

Set Clock: 12: 00PM	↵ Exit
↑↓ Change	

**26. SET RECHARGE TIME:** This screen is active only if a single valve system or Parallel Delayed recharge setting. Using the up (↑) or down (↓) button, set the time when regenerations should start. Press the Menu/Exit (↵) button to select and advance to next setting.

Set Recharge Time: 2:00AM	↵ Exit
↑↓ Change	

The monitor returns to the normal operating screen when programming has been completed.

Water Flow Rate: 2.0 GPM	12:03 PM ↵ Menu
-----------------------------	--------------------

**The installation, and programming steps are complete.**

## WATER SOFTENER CONTROLLER SETUP INFORMATION

MODEL	Resin Quantity (cu ft)	Fill Rate (gpm)	Salt Dosage (lbs/cu ft resin)	Grains Capacity	Brining Minutes	Backwash Minutes	Fast Rinse Minutes
PA071	2	0.3	4, Auto Adj. or Salt Eff.	37,000	144	12	5
			6	50,000	129		
			8	61,000	114		
			10	67,000	99		
			12	71,000	84		
PA101	3	0.5	4, Auto Adj. or Salt Eff.	54,000	115	12	5
			6	72,000	110		
			8	84,000	105		
			10	93,000	100		
			12	99,000	95		
PA131	4	0.5	4, Auto Adj. or Salt Eff.	72,000	150	12	5
			6	96,000	145		
			8	112,000	135		
			10	124,000	130		
			12	132,000	125		
PA191	6	0.5	4, Auto Adj. or Salt Eff.	108,000	110	14	10
			6	144,000	105		
			8	168,000	100		
			10	186,000	95		
			12	198,000	80		
PA251	8	0.5	4, Auto Adj. or Salt Eff.	144,000	145	14	10
			6	192,000	140		
			8	224,000	130		
			10	248,000	125		
			12	264,000	120		
PA321	10	0.5	4, Auto Adj. or Salt Eff.	180,000	180	14	10
			6	240,000	175		
			8	280,000	170		
			10	310,000	160		
			12	330,000	150		

If you have questions when installing, programming, operating or maintaining this system

**CALL TOLL FREE**  
**1-800-627-3497**

**in Canada call**  
**1-800-752-3273**



# ELECTRONIC CONTROLLER, RESETTING CONTROLLER, FEATURES AND OPTIONS

## RESETTING TIME

To set the time if incorrect, or if the display is flashing after a power outage longer than 72 hours, reset as follows. When power is lost, all other settings are maintained by the computer and do not require setting (see Program Memory).

1. Press the Menu/Exit button (↵) to enter the Primary Menu. Using the up (↑) or down (↓) buttons, move the cursor (>) to Set Clock and press (↵) to enter this menu.

EXIT > Set Clock Set Hardness Set Recharge Time
--

2. Use the up (↑) and down (↓) buttons to set the correct time, being sure AM or PM shows, as applicable. Up (↑) advances the time; down (↓) moves the time backward.

Set Clock:  9:32PM ↑↓ Change <span style="float: right;">↵ Exit</span>
---

3. When the correct time shows, press Menu/Exit (↵) to set the clock and return to the primary menu. Using the up (↑) or down (↓) buttons, move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Water <span style="float: right;">9:32 PM</span> Flow Rate: 2.0 GPM <span style="float: right;">↵ Menu</span>
---

## FEATURES AND OPTIONS

**RECHARGE:** By pressing this button, the controller enters into the recharge menu. The options are Online/Offline, Recharge Now or Recharge Tonight. Move the cursor (>) next to selection and press Menu/Exit (↵) button. Online/Offline allows a specific tank to be put online or taken offline. In the Recharge Now menu, you can select one or all tanks to start an immediate recharge. Move the cursor (>) next to the specific tank and press the Menu/Exit (↵) button. This will toggle between Service and Scheduled. In the Recharge Tonight menu, you can schedule a recharge or cancel a recharge tonight. Move the cursor (>) next to the specific tank and press the Menu/Exit (↵) button. This will toggle between Service or Tonight.

>EXIT Online / Offline Recharge Now Recharge Tonight
---

The following is a description of the features and options in the Primary Menu. To enter the Primary Menu, press the Menu/Exit (↵) button. Using the up (↑) or down (↓) button, move the cursor to the feature or option that you would like to change and press the Menu/Exit (↵) button to enter screen. To return to the normal operating screen, move the cursor (>) to EXIT and press Menu/Exit button (↵).

**SET SALT LEVEL:** This is activated if Salt Monitor feature is set to ON. Using the up (↑) or down (↓) button, set the salt level number from 0 to 10 or pressing the down (↓) button past 0 will toggle Salt Monitor to OFF. This number corresponds with the numbered decal on the brinewell that the salt level is closest to. Press the Menu/Exit (↵) button to set and return to the Primary menu. Note: This feature is not shown if System Type is set to Filter.

Set Salt Level:  8 ↑↓ Change <span style="float: right;">↵ Exit</span>
---

**SET CLOCK:** Use the up (↑) and down (↓) buttons to set the correct time. If 12 hour clock is set, be sure AM or PM shows, as applies. Up (↑) advances the time; down (↓) moves the time backward. By pressing and holding either the up (↑) or down (↓) button, the display will scroll at faster increments. Press the Menu/Exit (↵) button to set and return to the Primary menu.

Set Clock:  9:32PM ↑↓ Change <span style="float: right;">↵ Exit</span>
---

**SET HARDNESS:** (Softeners only) Using the up (↑) or down (↓) button, set the water hardness level, from 1 to 160 grains, or 10 to 2740 PPM (parts per million). By pressing and holding either the up (↑) or down (↓) button, the display will scroll at faster increments. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Set Hardness:  25 Grains ↑↓ Change <span style="float: right;">↵ Exit</span>
---

**SET RECHARGE TIME:** Using the up (↑) or down (↓) button, set the time when regenerations should start. Press the Menu/Exit (↵) button to set and return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen. Note: This feature is available only on single valve or parallel delayed systems.

Set Recharge Time: 2:00AM ↑↓ Change <span style="float: right;">↵ Exit</span>
--

continued

## FEATURES AND OPTIONS

**FLOW RATE:** This screen is for viewing the flow rate, in GPM or LPM, through each individual tank, depending on the configuration (simplex, duplex, etc.). Press the Menu/Exit (↵) button to return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

T1: 2.5 GPM	↵ Exit
T2: 3.1 GPM	
T3: 1.6 GPM	
T4: 2.8 GPM	

**WATER USED TODAY:** This screen displays the number of gallons or liters that have been used in each individual tank per 24 hour time period, depending on the configuration (simplex, duplex, etc.). Press the Menu/Exit (↵) button to return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

T1: 5 Gallons
T2: 8 Gallons
T3: 4 Gallons
T4: 6 Gallons

**AVG DAILY WATER USE:** This screen displays the *average* number of gallons or liters that have been used in a 24 hour time period. Press the Menu/Exit (↵) button to return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

System Average Daily Water Use: 300 Gallons	↵ Exit
---	--------

**CAPACITY REMAINING:** This screen displays the percent capacity remaining in each individual tank, depending on the configuration (simplex, duplex, etc.). Press the Menu/Exit (↵) button to return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen. Note: Not available for filters that have Filter Gallons set to OFF (step 18). Screen will show "Filtering Water".

Capacity Remaining %:	
T1: 25%	T3: 48%
T2: 33%	T4: 37%
↵ Exit	

Filtering Water	12:22PM
↵ Exit	

**WATER TOTALIZER:** This screen displays the number of gallons or liters that have flowed through each individual tank since the last time the totalizer was reset. To reset (zero) the total for a particular tank, move the cursor (>) next to the tank number and press Menu/Exit (↵) button. Move the cursor (>) to EXIT and press Menu/Exit (↵) button to return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

>EXIT
T1: 111719 Gallons
T2: 124816 Gallons
T3: 132329 Gallons

**SET 12/24 HOUR CLOCK:** Using the up (↑) or down (↓) button, set the time format to either a 12 or 24 hour clock. Press the Menu/Exit (↵) button to set and return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Set 12/24 Hour Clock: 12 Hour	↵ Exit
↑↓ Change	

**SET ENGLISH/METRIC:** Using the up (↑) or down (↓) button, set the controller to measure in either English or Metric units. Press the Menu/Exit (↵) button to set and return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Set English/Metric:	
English	
↵ Exit	
↑↓ Change	

**SET ROLLING SCREEN:** Using the up (↑) or down (↓) button, set this ON or OFF. If set to ON, the normal operating screen will scroll from Soft Water Available, which shows the capacity remaining in each tank, to Water Flow Rate and Salt Level is Low (if applicable). If there is a recharge scheduled, Recharge Tonight will also be displayed. Press the Menu/Exit (↵) button to set and return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Set Rolling Display Screens:	
OFF	
↵ Exit	
↑↓ Change	

**REMOTE STATUS:** This is a new optional feature for use. A remote monitor can be conveniently placed for viewing your conditioners status. This screen will show if the remote monitor setting has been turned on, and the status of the system (OK, low salt, check system). Press the Menu/Exit (↵) button to set and return to the Primary menu. Move the cursor (>) to EXIT and press Menu/Exit button (↵) and return to the normal operating screen.

Remote: Installed	
Status: System OK	
↵ Exit	

**SEND SERVICE MESSAGE:** This option may or may not be available. Press the Menu/Exit (↵) button and the controller automatically starts sending the service message in a series of beeps to be transmitted by phone. The display shows the how much of the message has been sent and a progress bar. To cancel the transmission press the Menu/Exit (↵) button. When message has been sent, the controller returns to the normal operating screen. Contact your installer for more information on service messages.

Sending Message	
56%	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="width: 100%; height: 10px; background-color: black; position: relative;"> <span style="position: absolute; right: 0; top: -5px; font-size: 8px;">□□□□□□</span> </div> </div>	↵ Exit

continued



# FEATURES AND OPTIONS

**SET 97% FEATURE:** Press ( ↑ ) or ( ↓ ) to set either OFF or On. If ON is selected, the unit will automatically recharge when 97% capacity has been used, at any time of the day. Press the Menu/Exit ( ↵ ) button to select and return to the Advanced/Service menu. Note: This feature is available for single tank or Parallel Delayed configurations only.

```

Set 97% Recharge
Feature:
OFF
↑↓ Change                               ↵ Exit
    
```

**SET CHLORINE/BYPASS:** This feature is for European units. Press ( ↑ ) or ( ↓ ) to set on Bypass, Chlorine – Half Wave or Chlorine – Full Wave. Press the Menu/Exit ( ↵ ) button to select and return to the Advanced/Service menu.

```

Set Chlorine/Bypass:
Bypass
↑↓ Change                               ↵ Exit
    
```

**VALVE CONFIGURATION:** This option allows you to reprogram the controller. After all valve configuration selections have been made, all other settings (clock, water hardness, etc.) will need to be reset. Note: The controller will also reset all counts back to zero (number of recharges, etc.), except for the number of days in service.

```

Set Valve
Type:
Two Inch Upflow
↑↓ Change                               ↵ Next
    
```

**LOCKOUT FEATURE:** This feature is available to prevent unauthorized modification of parameters that affect performance. The unit is shipped from the factory with the lockout feature off. After programming is complete, the lockout feature can be turned on to prevent changes to the following:

- Hardness
- Rolling screens (on/off)
- Maximum days
- Valve configuration
- Recharge start time
- Language
- between recharges
- Water totalizer (reset to 0)
- 12/24 hour time format
- Remote channel
- 97% feature (on/off)
- Chlorine/bypass
- English/metric units
- Salt level trip point

**To turn on the lockout feature:** From any status screen, press the Menu/Exit ( ↵ ) button to display the Primary Menu. Using the down ( ↓ ) button, move the cursor to Advanced/Service and press the Menu/Exit ( ↵ ) button. The warning screen will show. Press the Recharge button to toggle the padlock icon. Press Menu/Exit button ( ↵ ) to return to the Primary Menu.

```

WARNING: Changes
could affect unit
performance.
↑ Continue                               ↵ Cancel
    
```

While the lockout feature is on, a padlock  icon will appear instead of the usual arrow ( > ) in front of locked items in the Primary and Advanced menus.

```

WARNING: Changes
could affect unit
performance.
↑ Continue                               ↵ Cancel
    
```

**To turn off the lockout feature:** Repeat the procedure above. Pressing the Recharge button while in the warning screen will toggle on/off the lockout feature.

```

EXIT
Set Clock
Set Hardness
Set Recharge Time
    
```

## OPERATION

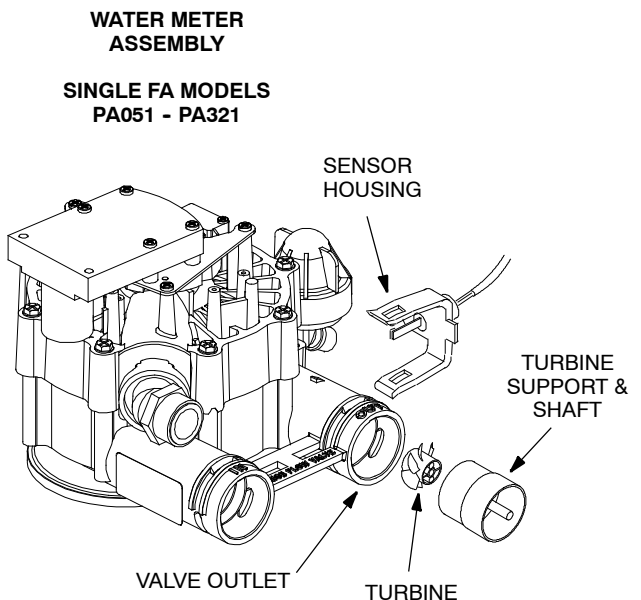
### ELECTRONIC CONTROLLER AND WATER METER

The controller is actually a small computer. As it receives pulses from the water meter it converts them to gallons of water passing through the unit. It multiplies this water usage information times the water hardness (preprogrammed into timer) to continually calculate the conditioned water capacity required. The computer adjusts daily to water using habits, seeking to supply conditioned water for the longest time, using the least (and most efficient) amount of salt and water to regenerate.

When the computer determines more capacity is needed, at the next regeneration starting time (2:00 a.m., or as otherwise preset), it will schedule a regeneration. RECHARGE TONIGHT shows in the display to inform of the coming regeneration.

The water meter is located in the 1" valve outlet on single units only. It consists of a turbine, turbine mounting assembly, and a sensor housing pickup (Figure 9). The turbine and sensor pickup are oriented in-line, centered in the water stream. Water flow turns the turbine, which houses two small magnets. As the turbine spins, the magnets cause the sensor pickup to switch back and forth. This switching sends an electrical pulse through the sensor leads, to the circuit board computer. The computer counts the pulses and converts them to gallons. The sensor is in a sealed chamber to keep out dirt, moisture and corrosion.

Figure 9



## OPERATION – WATER FLOW THROUGH THE SYSTEM

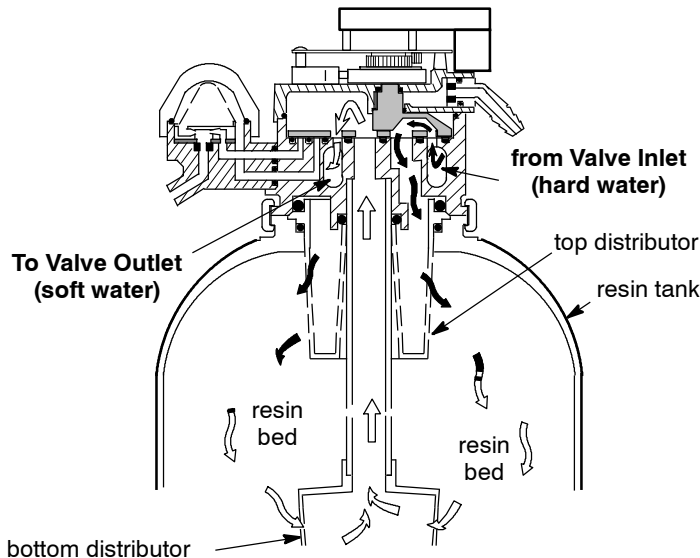
The unit is filled with a man-made resin material called the resin bed. Resin looks somewhat like coarse sand, but the resin beads are round and smooth. This resin has the ability to remove hardness minerals from water by ion-exchange. The resin bed is supported by a layer of one or more grades of quartz gravel that fills the bottom dome of the tank and covers the bottom distributor.

**SERVICE (Figure 10)** : Hard water enters the unit, passes through the valve, and flows down into the resin tank and resin bed. As it passes through the bed, hardness minerals are extracted from the water and held by the resin beads. Conditioned water exits the resin tank through the bottom distributor, flows up the internal standpipe, into the valve, then out to faucets or other points of usage.

In time, the resin beads hold all of the hardness minerals they can, and cleaning with a salt solution (brine) is needed. Regeneration and recharge are words used to describe this cleaning.

### SERVICE

Figure 10



**REGENERATION, or RECHARGE:** The programmed faceplate timer starts regenerations at 2:00 AM, or other preset time. Regeneration consists of 5 steps, or cycles. These are **fill, brining, brine rinse, backwash** and **fast rinse**.

**FILL (Figure 11):** Salt dissolved in water is called brine. Brine is the cleaning agent to remove hardness minerals from the resin bed. To make brine, water is fed in the brine tank salt storage area. A controlled water flow to the brine tank occurs during **fill**. The 1" valve repositions slightly (motor energized). A passage opens allowing conditioned water to flow through the nozzle/venturi, to the brine valve, and into the brine tank.

Fill cycle length is regulated automatically by the controller.

**BRINING/BRINE RINSE (Figure 12):** The timer energizes the valve motor moving the valve into brining. A port opens to route water to the nozzle. Flow through the nozzle and venturi creates a suction on the brine tubing and brine valve, drawing brine from the salt storage area. Brine mixes with water at the nozzle/venturi, and travels back to the valve. Flow continues down the internal standpipe and into the resin bed. As brine passes through the resin bed, hardness minerals are released from the resin and carried with the flow of water, to the drain.

After all brine is drawn from the brine tank, the brine valve float seats to prevent air induction. Water flow continues in the same direction to slowly rinse brine and hardness minerals to the drain. Brining/brine rinse times are shown in the tables on page 4.

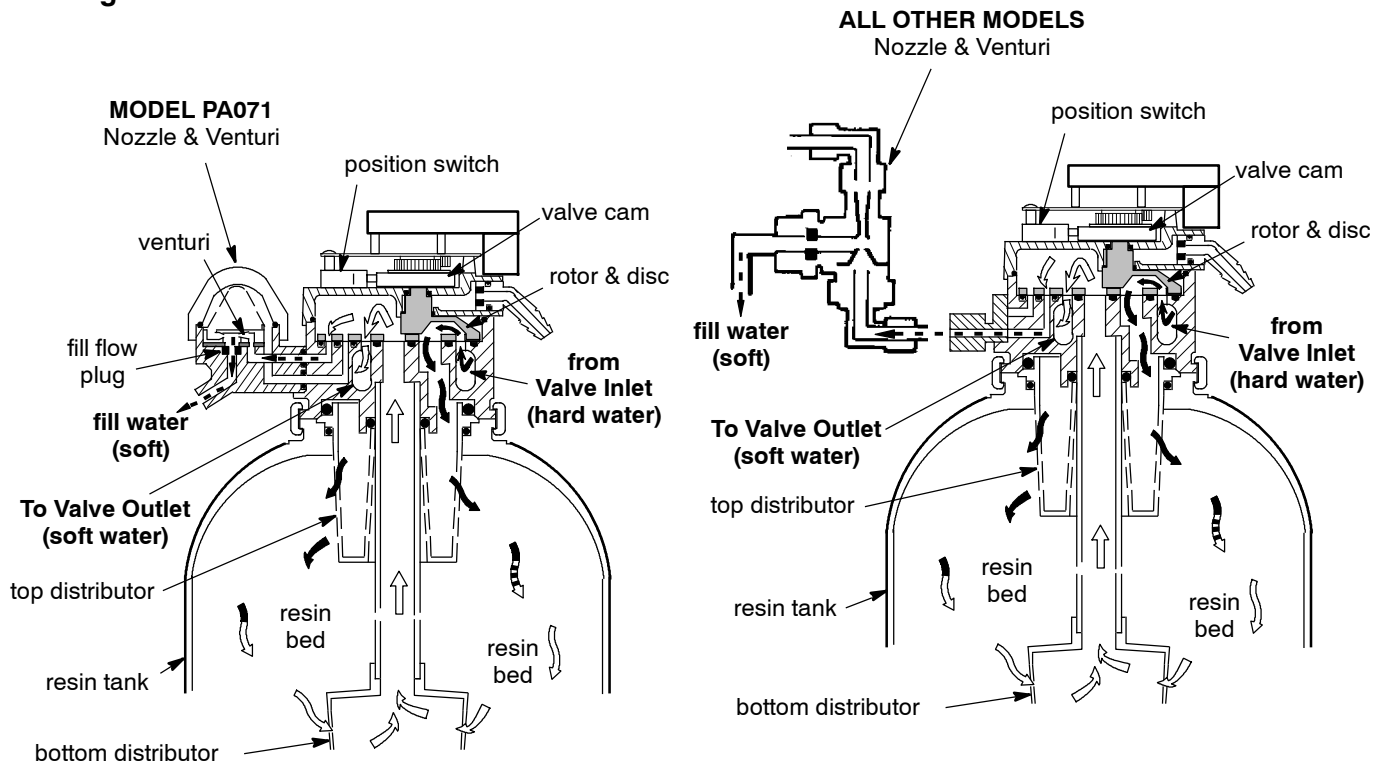
**BYPASS HARD WATER\*:** During the brining, brine rinse, backwash and fast rinse cycles of regeneration, *hard* water is bypassed through the valve and is available if needed. You should **avoid using hot water**, if possible, because the water heater will refill with hard water.

\* See Repair Parts List, page 35, for more information on hard water bypass.

continued, page 23

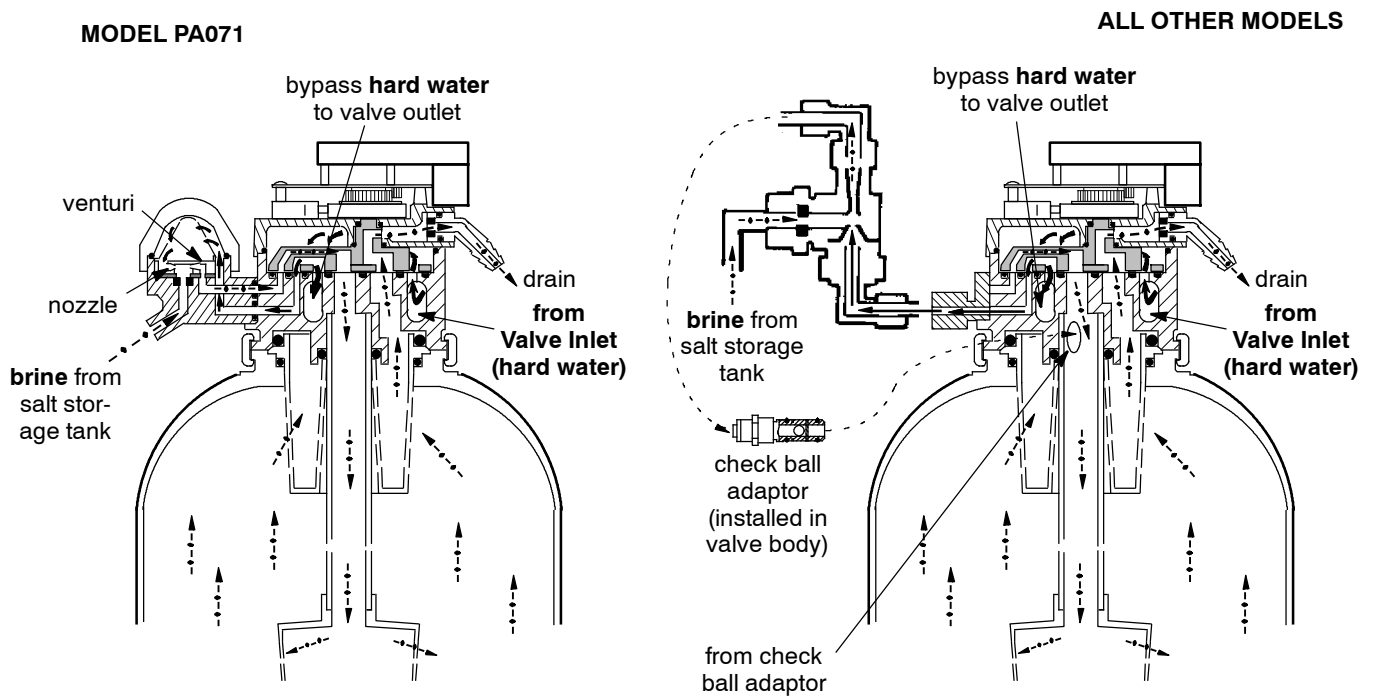
# OPERATION – WATER FLOW THROUGH THE SYSTEM

**FILL**  
Figure 11



# BRINING and BRINE RINSE

Figure 12

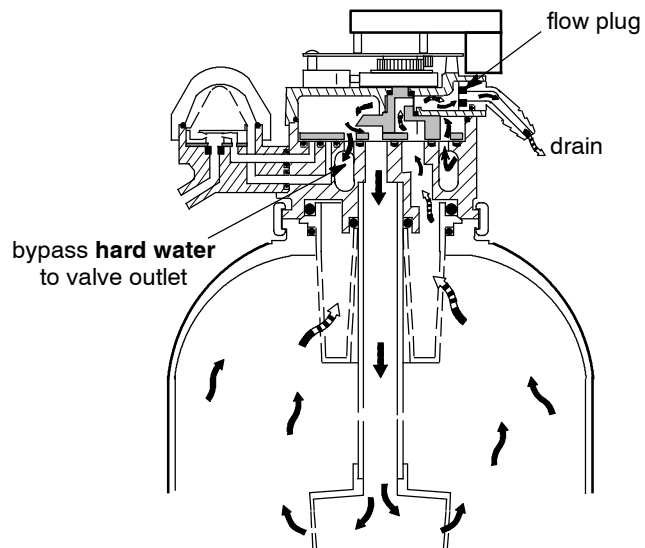


## OPERATION – WATER FLOW THROUGH THE SYSTEM

### BACKWASH

Figure 14

The motor drives the valve to end brine rinse and reposition in backwash. In backwash, a fast upward flow of water through the resin bed flushes remaining hardness minerals, brine, dirt, sediments, iron deposits, etc., from the bed and to the drain. The fast flow lifts and expands the resin bed for maximum cleaning.

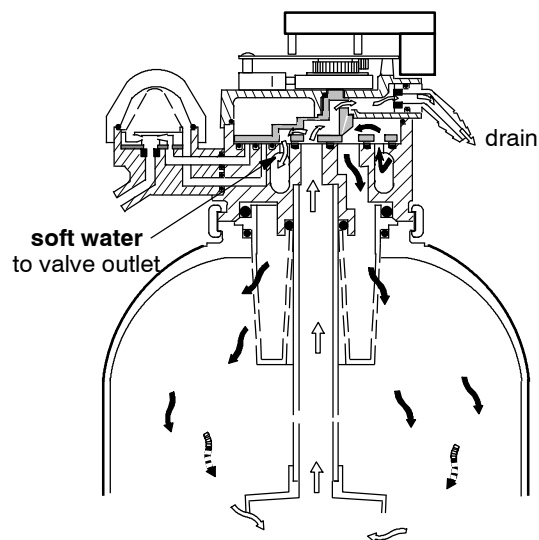


### FAST RINSE

Figure 13

After backwash, valve rotation places the unit in fast rinse. A continued fast flow of water reverses direction, flowing down through the bed. Any hardness minerals, brine, etc., remaining at the bottom of the bed are flushed up the standpipe, and to the drain. The fast flow packs the resin bed in preparation for service.

The valve motor is energized a final time to drive the valve to service position.



## SERVICE INFORMATION

### REFILLING WITH SALT

Remove the brine tank cover and check the salt storage level frequently. Always refill if less than 1/2 full. BE SURE THE BRINEWELL COVER IS ON.

**NOTE:** In humid areas, it is best to keep the salt storage level lower, and to refill more often.

**RECOMMENDED SALT:** Nugget, pellet, solar, button, etc. water conditioner salt is recommended. This type of salt is formed, or compressed into briquets, from high purity evaporated crystals. It has less than 1% insoluble (will not dissolve in water) impurities. Clean, high grade rock salts are acceptable, but may require frequent brine tank cleaning to remove the "sludge" residue (insolubles).

**SALT NOT RECOMMENDED:** Rock salt, high in impurities, block, granulated, table, ice melting, ice cream making salts, etc., are not recommended.

**SALT WITH IRON REMOVAL ADDITIVES:** Some salts have an additive to help the unit handle iron in the water supply. Although this additive may help keep the units' resin clean, it may also release corrosive fumes that will weaken and shorten the life of some softener parts.

### BREAKING A SALT BRIDGE

Sometimes, a hard crust or salt bridge forms in the brine tank. It is usually caused by high humidity or the wrong kind of salt. When the salt bridges, an empty space forms between the water and salt. Then salt will not dissolve in the water to make brine. Without brine, the resin bed does not regenerate and you will have hard water. If the storage tank is full of salt, it is hard to tell if you have a salt bridge. Salt is loose on top, but the bridge is under it. Take a broom handle, or like tool, and push it straight down into the salt. If a hard object is felt, it's most likely a salt bridge. Carefully push into the bridge in several places to break it.

# SERVICE INFORMATION

## CLEANING THE NOZZLE & VENTURI

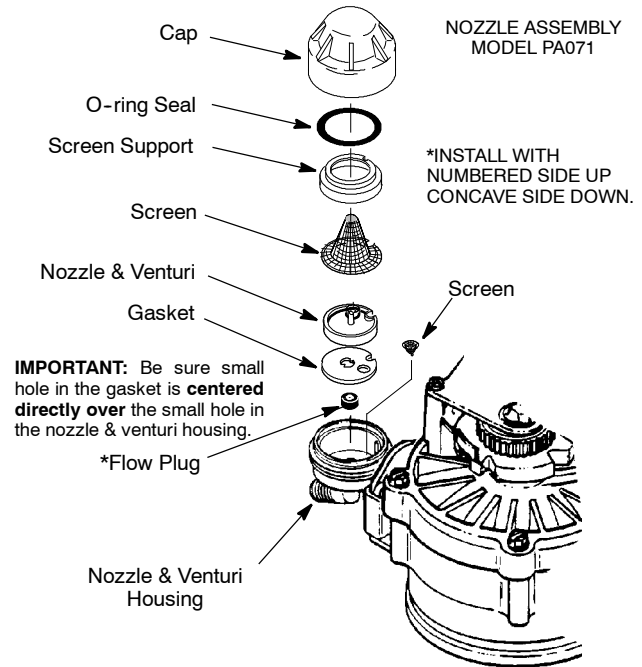
A clean nozzle and venturi is a must for unit to work right. This small unit moves brine from the brine tank to the resin tank during regeneration. If it becomes plugged with sand, silt, dirt, etc., the softener will not work and you will get hard water.

1" valve models use two different nozzle assembly designs. Figure 15 shows the assembly used on Model PA071. All other models use the nozzle assembly in Figure 16.

**Figure 15**

To get to the nozzle venturi, remove the units' top cover. Be sure the softener is in service cycle (no water pressure at nozzle and venturi), then turn off the cap from the nozzle and venturi housing. **DO NOT LOOSE THE LARGE O-RING SEAL.** Lift out the screen support and screen, then the nozzle and venturi. Wash and rinse the parts in warm water until clean. If needed, use a small brush to remove iron or dirt. Also check and clean the gasket and flow plug if dirty.

Carefully replace all parts in the correct order. Lubricate the o-ring seal with silicone grease and place in position. Install and tighten the cap, **BY HAND ONLY.** **DO NOT OVER TIGHTEN AND BREAK THE CAP OR HOUSING.**

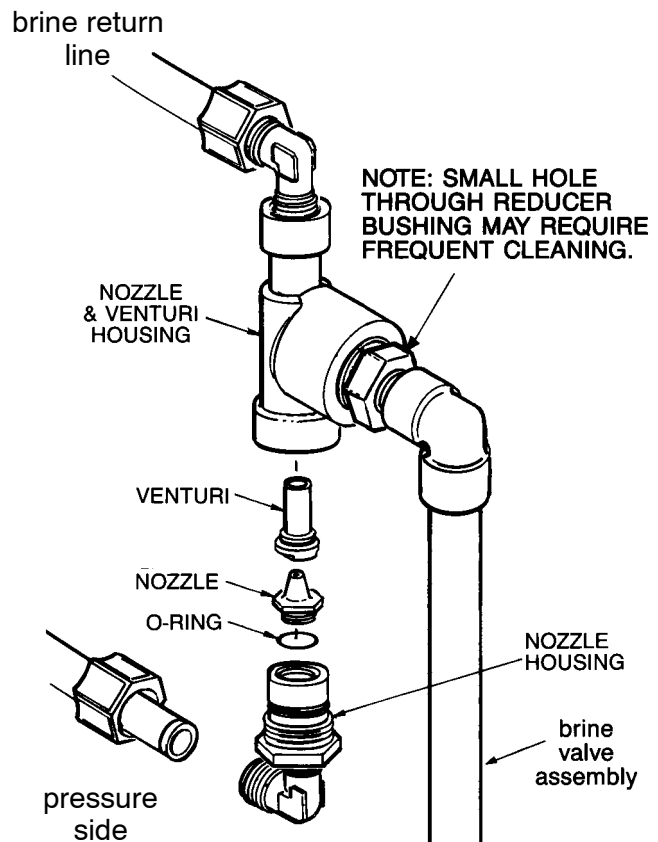


**Figure 16**

### NOZZLE ASSEMBLY ALL MODELS EXCEPT PA071

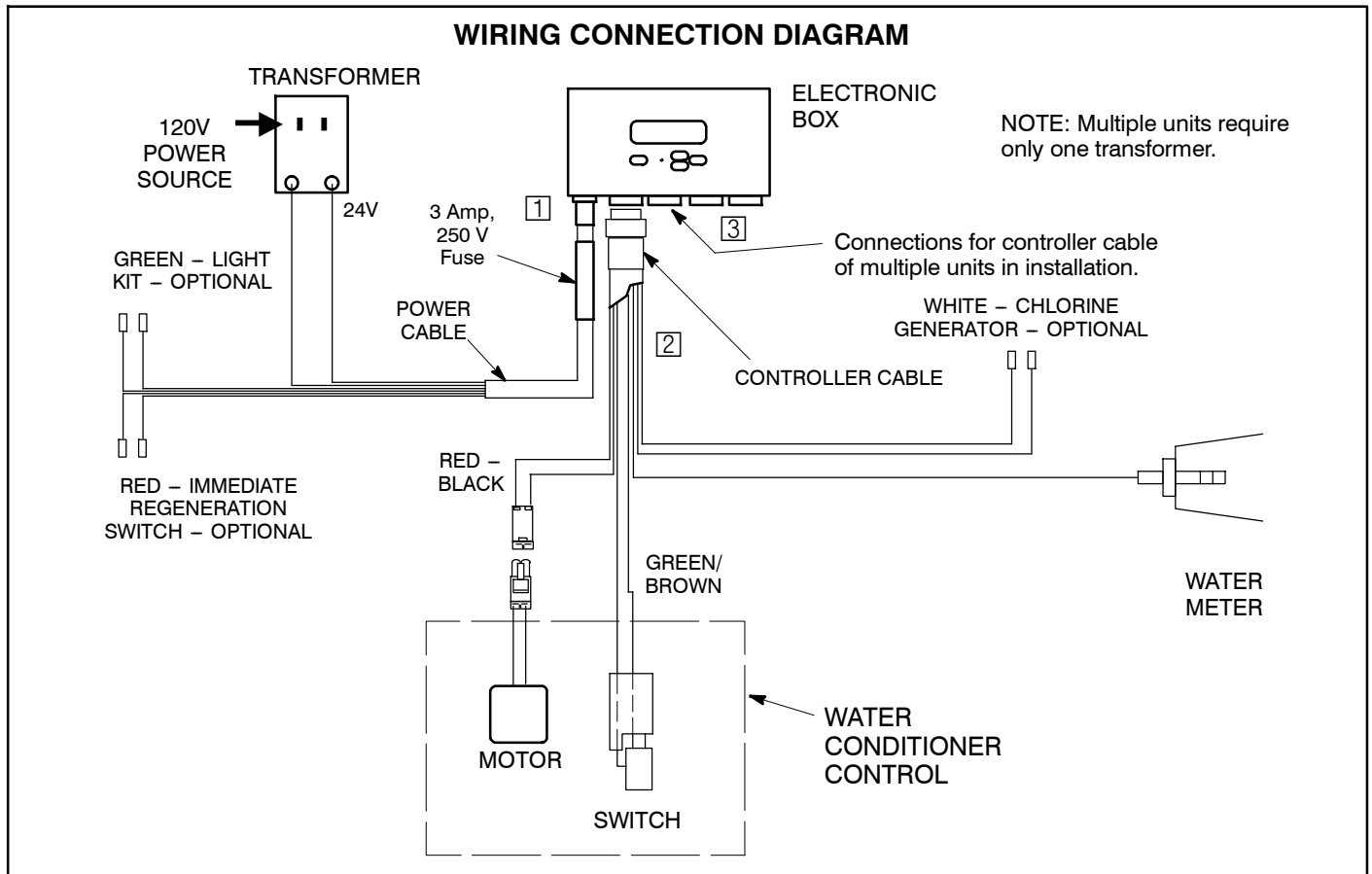
BE SURE THE SOFTENER IS IN SERVICE POSITION (NO WATER PRESSURE AT NOZZLE ASSEMBLY).

1. Disconnect bottom tubing at the nozzle assembly and turn nozzle housing out of nozzle and venturi housing.
2. Turn nozzle out of nozzle housing. Remove venturi with a long, needle-nose pliers, if needed (can clean center hole of venturi without removing).
3. Clean parts in hot soapy water. Use a small wire to clean holes in the nozzle venturi. USE EXTREME CARE NOT TO SCRATCH OR MISHAPE THE HOLES, OR SURFACES AROUND THEM. Flush parts in fresh, clean water.
4. Reassemble all parts, being sure to seat the nozzle and venturi in their respective locations. DON'T OMIT THE O-RING SEAL ON THE NOZZLE.
5. Replace the nozzle housing and reconnect the tubing.





## SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS



### TROUBLESHOOTING

ALWAYS MAKE THE INITIAL CHECKS FIRST:

1. Does the time display show the correct time of day?  
 ...If display is blank, check power source to the conditioner.  
 ...If display is blank, check the fuse on the power cord.  
 ...If time is flashing, power was off for longer than the built-in program memory. The conditioner resumes normal operation, when power returns, but regenerations occur at the wrong time.  
 ...If an error code shows in the display (example: Error3), go to AUTOMATIC ELECTRONIC DIAGNOSTICS, page 26.
2. Plumbing bypass valve(s) must be in service position (all the way open or closed, as applies. . . see page 11).
3. Inlet outlet and drain pipes must connect to the conditioner as typically shown on page 9.
4. Is the transformer plugged into a "live", grounded wall outlet, and the power cable fastened securely?
5. Is there salt in the brine tank? Check to be sure it is not bridged or caked (see page 23).
6. Is the brine tubing connected? See step 3, page 10.
7. Double check the Hardness setting. Press the Menu/Exit (↵) button, move the cursor (>) to Set Hardness and press the Menu/Exit (↵) button. Be sure it is the correct setting for the water supply. Make a hardness test of the raw water and compare with the hardness setting. If the water contains iron, be sure to add 5 to the hardness number for each 1 ppm. Also test a conditioned water sample to verify if a problem exists. Press the Menu/Exit (↵) button to return to Primary menu, move cursor to EXIT and return to normal operating screen.

If you do not find a problem after making the initial checks, do MANUAL ELECTRONIC DIAGNOSTICS, and the MANUAL ADVANCE REGENERATION CHECK, page 27.

# SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS

## AUTOMATIC ELECTRONIC DIAGNOSTICS

The timer computer has a self-diagnostic function for the electrical system (except input power and water meter). The computer monitors electronic components and circuits for correct operation. If a malfunction occurs, an error code appears in the timer display area of the electronic box.

Error # 3  
Tank #1  
Recharge to Retry


↵ Menu

The chart below shows the error codes that could appear, and the possible defects for each code.

While an error code appears in the display, the tank is taken offline and either the Recharge button or Menu/Exit (↵) can be used. Menu/Exit (↵) remains operational so the service person can make the Manual Electronic Diagnostics to further isolate the defect, and check the water meter.

If Recharge is pressed, the display will show the diagnostics screen and cycle the valve through all positions to try to correct the error itself. After it is done retrying, the display reverts back to the run screen (either showing error code again or normal run screens).

If the controller successfully fixes the problem in the diagnostics display, the unit automatically is placed back online by the software. There would be no need to go into the online/offline screen to put the unit back online.

PROBLEM	POSSIBLE DEFECT	POSSIBLE SOLUTION
No display.	No power to outlet.	Check the outlet by plugging in another appliance.
	Fuse blown.	Check fuse in power cable. REPLACE WITH SAME TYPE AND VALUE: AGC 3A 250V.
	Internal transformer fuse blown.	Plug the transformer into an outlet and measure output voltage with a multi-meter. Should be between 24 and 30 volts AC.
Fuse keeps blowing.	Wiring harness shorted or not connected properly.	Check connections at controller box and valve. Connect all other wires before plugging transformer into outlet.
Cannot set some control parameters and display shows a padlock icon: 	Lockout feature is on.	Turn off lockout feature (see page 20)
Error code 1, 3 or 4.	Wiring harness not connected or not connected properly.	Check connections at controller box and valve. Check for corrosion at connection points.
	Incorrect position switch connections.	Check valve switch connections.
	Incorrect valve type selected on new install or upgrade to system.	Check proper valve configuration is selected controller box.
	Valve motor running slow, or not at all.	Initiate a recharge and step valve through all positions. Check motor for consistent movement. If slow, check motor and valve seals.
Error code 6	Optional immediate regeneration switch is stuck in the on position.	Check red wires from power cable for possible shorts, check immediate regeneration switch.

**Procedure for removing error code from faceplate:** Press the RECHARGE button, or: 1. Unplug transformer – – – 2. Correct defect – – – 3. Plug in transformer – – – 4. Wait for 6 minutes. The error code will return if the defect was not corrected.

# SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS

## MANUAL ELECTRONIC DIAGNOSTICS

1. Do the preceding (page 25) INITIAL CHECKS first.
2. Enter the diagnostics screen on the controller (pg 26) and using the down (↓) button,

Pos: SERVICE 0:00	↑
Req Pos: SERVICE	
Motor: ON Sw:OPEN	
Trbn: 000 Gals: 0	↓

The 3 digits after “Trbn:” indicate water meter operation as follows.

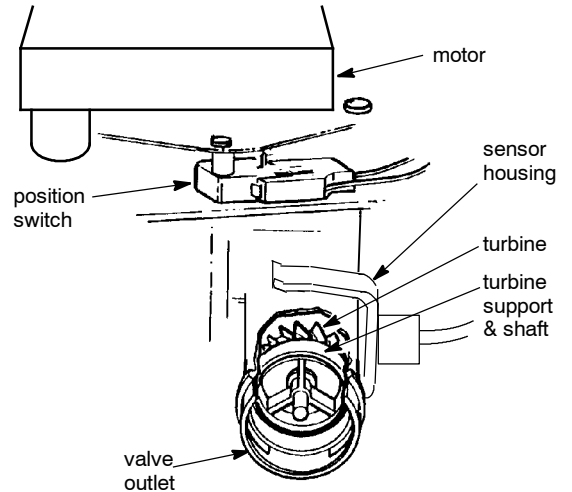
**000 (steady)** = conditioned water not in use...no flow through the meter.

- open a nearby **conditioned water faucet** -

**000 to 140 (continual)** = repeats display for each gallon of water passing through the meter.

If you don't get a reading in the display, check the turbine connection to the electronic box. If the connection is okay and good contact is made, pull the sensor from the valve outlet port. Pass a small magnet back and forth in front of the sensor. You should get a reading in the display. If you get a reading, unhook the in and out plumbing and check the turbine for binding.

**NOTE:** The position switch is closed when the plunger is depressed, open when extended.



## MANUAL ADVANCE REGENERATION CHECK

This check verifies proper operation of the gear–motor, brine tank fill, brine draw, regeneration flow rates, and other controller functions. *Always make the initial checks, and the manual initiated diagnostics first.*

**NOTE:** A steady time (not flashing) must show in the display.

1. Use the recharge button to manually advance the valve into each cycle and check the various valve cycles. Move the cursor next to the tank and press the Recharge button. The valve will start the sequence for recharge. Press the Recharge button to advance the valve through each position.

>EXIT
Online/Offline
Recharge Now
Recharge Tonight

**FILL:** Remove the brinewell cover and, using a flashlight, observe fill water entering the tank.

- a. If water does not enter the tank, look for an obstructed nozzle and venturi, fill flow control, screen(s) or brine tubing.

**CAUTION:** Softener must be depressurized before removing aspirator assembly.

**BRINING:** A slow flow of water to the drain will begin. Verify brine draw from the brine tank by shining the flashlight into the brinewell and observing a noticeable drop in the liquid level.

**NOTE:** Be sure water is in contact with the salt, and not separated by a salt bridge...see page 23.

- a. If the unit does not draw brine, check for...
  - ...dirty or defective nozzle and venturi, page 24
  - ...restriction in valve drain, causing a back-pressure (bends, kinks, elevated too high, etc.)
  - ...obstruction in brine valve or brine tubing
  - ...inner valve failure (obstructed or defective o–ring seals, rotor or disc)

**BACKWASH:** Look for a fast flow of water from the drain.

- a. If flow is slow, check for a plugged top distributor screen, internal riser pipe, backwash flow controls, drain piping, fouled resin bed, etc.

**FAST RINSE:** Again look for a fast drain flow. Allow the unit to rinse for several minutes to flush out any brine that may remain from the brining cycle test.

2. To return the valve to service position, press Recharge button once again.

**Note:** On multiple tank systems, the first tank advances to service before the second tank then manually advances to fill and all other cycles.

### **OTHER SERVICE**

**HARD WATER BYPASS** (hard water “bleeds” into conditioned water supply).

1. Defective disc, seal or wave washer (see key nos. 18, 13 and 39, page 34).
2. Missing or defective o–ring(s) at resin tank to valve connection (see key no. 9 or 11, page 32).

**WATER LEAKS FROM DRAIN HOSE** (during service).

1. Defective disc, seal or wave washer.

**WATER HAS SALTY TASTE**

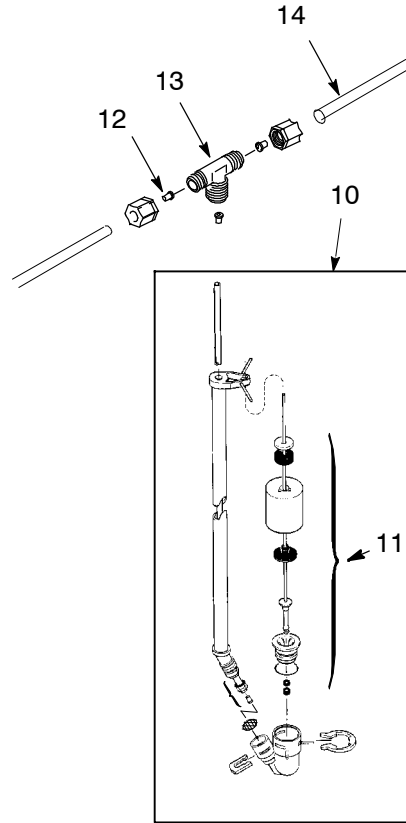
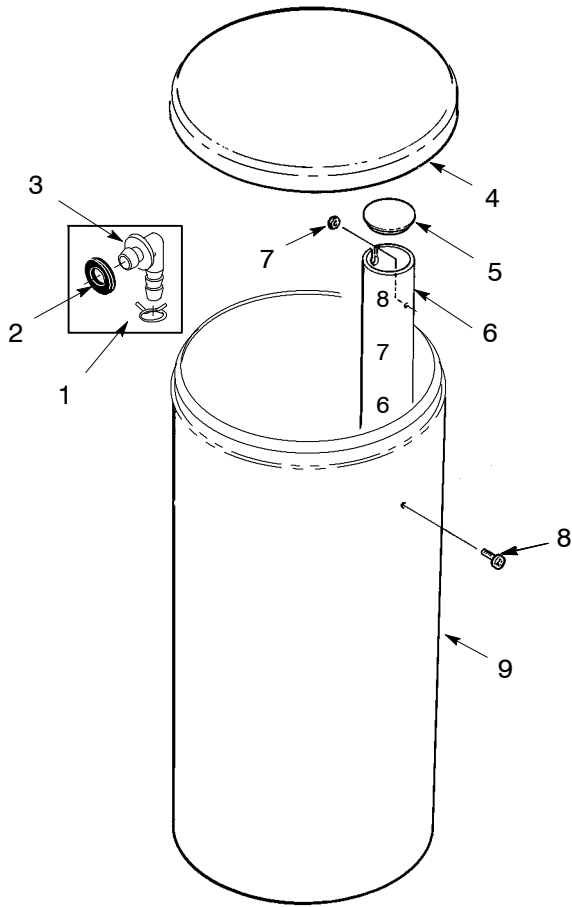
1. House water pressure low (adjust pump if well system).
2. Partially restricted valve drain hose, top distributor, backwash flow plug, resin tank internal riser or bottom distributor.

**If you have questions when installing, programming, operating or maintaining this system**

**CALL TOLL FREE  
1–800–627–3497**

**in Canada call  
1–800–752–3273**

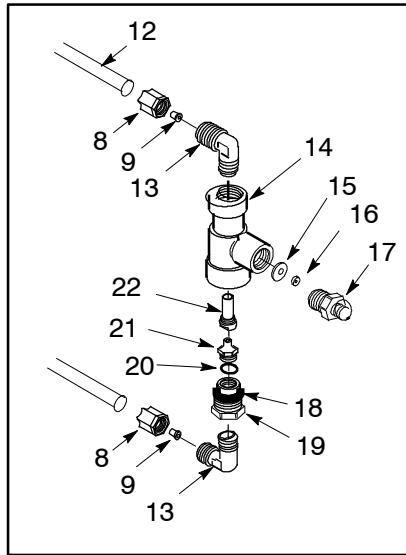
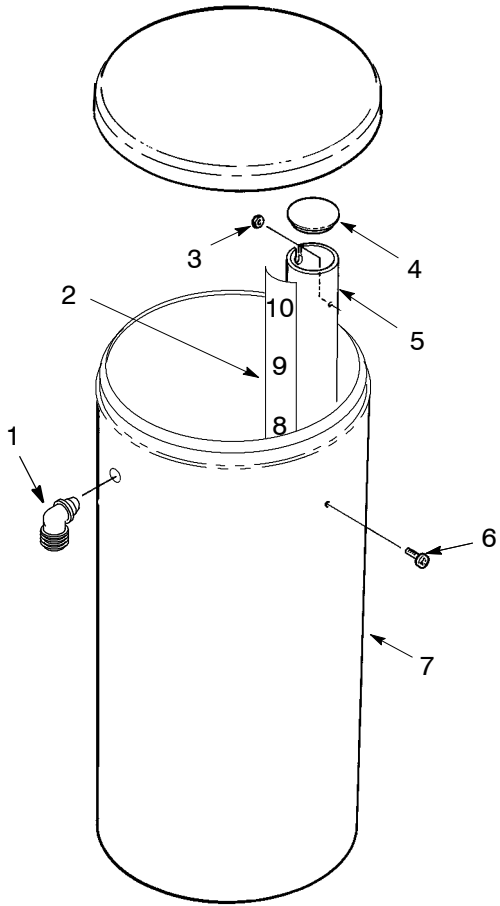
## REPAIR PARTS . . . BRINE TANKS MODEL PA071



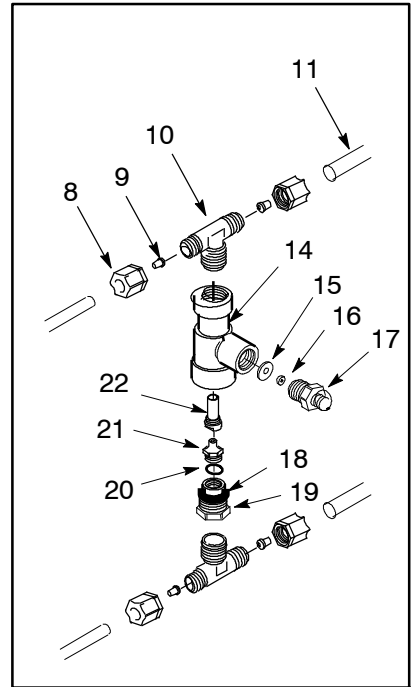
KEY NO.	PART NUMBER	DESCRIPTION OF PART
—	7331258	Overflow Hose Adaptor Kit (incl. Key Nos. 1–3)
1	↑	Hose Clamp
2	↑	Grommet
3	↑	Adaptor Elbow
4	7180437	Brine Tank Cover
5	7155115	Cover, Brinewell
6	7338145	Brinewell

KEY NO.	PART NUMBER	DESCRIPTION OF PART
—	7331648	Brinewell Mounting Hardware Kit (includes Key Nos. 7 & 8)
7	↑	Nut, 1/4–20
8	↑	Screw, 1/4–20 x 5/8"
9	7112612	Brine Tank (includes Key Nos. 6–8)
10	7310210	Brine Valve Assembly
11	7327568	Float, Stem & Guide Assembly
<b>MULTIPLE TANK SYSTEMS</b>		
12	7094979	Insert, 5/16" (3 req.)
13	7056612	Tee, w/Nuts
14	7094961	Tubing, 5/16" X 3 ft. (2 req.)

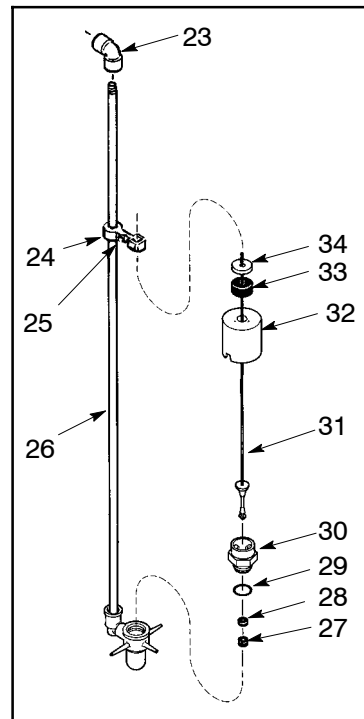
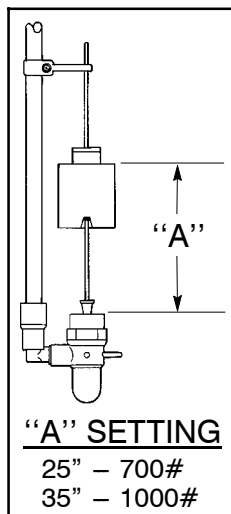
# REPAIR PARTS . . . BRINE TANKS - ALL OTHER MODELS



SINGLE SYSTEMS



MULTIPLE SYSTEMS

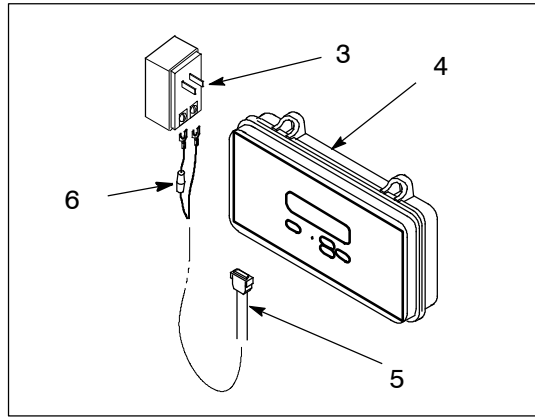
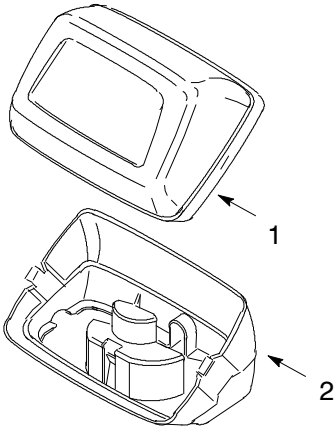


## REPAIR PARTS . . . BRINE TANKS - ALL OTHER MODELS

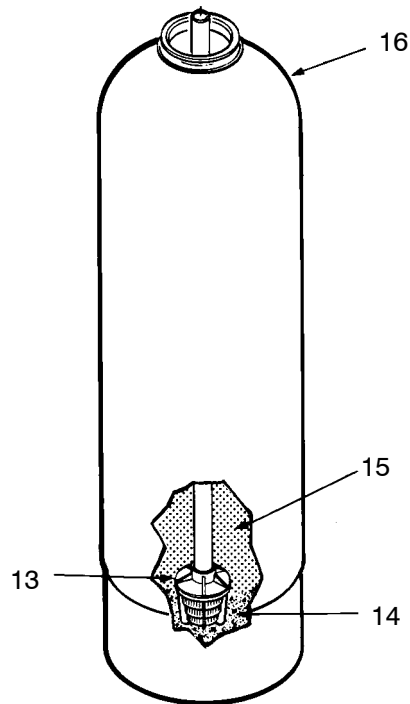
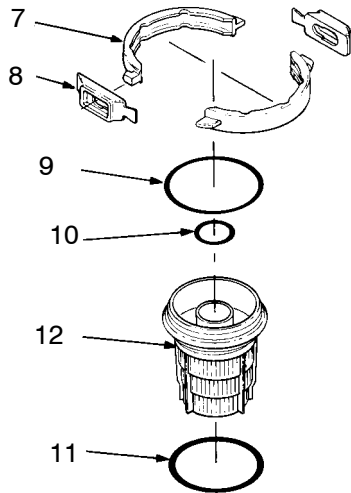
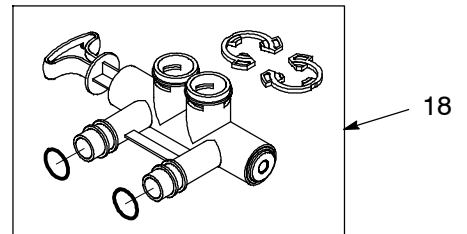
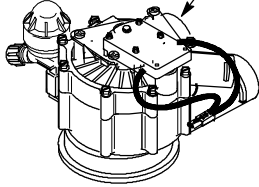
KEY NO.	PART NUMBER	DESCRIPTION OF PART
1	0523819	Drain Elbow
2	7243853	Brinewell Decal
3	7082150	Wing Nut
4	7222051	Cover, Brinewell
5	0980062	Brinewell, PA 101 & 131
	0980067	Brinewell, PA 191, 251 & 321
6	7178634	Screw, 1/4-20 x 5/8"
7	7227027	Brine Tank (includes cover), PA 101 & 131
	7227035	Brine Tank (includes cover), PA 191, 251 & 321
8	9003203	Nut, 3/8"
9	7131349	Tubing Insert
10	7226966	Tee, 3/8 NPT x 3/8" Tube (2 req.)
11	7092781	Tubing, 3/8" x 10' (4 req.)
12	7168435	Tubing, 3/8" x 5-1/2' (2 req.)
13	9004503	Elbow (2 req.)
14	1109600	Housing, Nozzle & Venturi
15	1135200	Seal Disc
16	1148800	Flow Plug, PA 101 & 131
	7128396	Flow Plug, PA 191, 251 & 321
17	7028871	Bushing, 1/2" NPT
18	7170327	O-ring, 5/8" x 13/16"

KEY NO.	PART NUMBER	DESCRIPTION OF PART
19	1109700	Nozzle Housing
20	0900060	O-Ring Seal, 3/8" x 1/2"
21	7126637	Nozzle (white), PA 101 & 131
	7127764	Nozzle (gray), PA 191, 251 & 321
22	7126645	Venturi (almond), PA 101 & 131
	7127772	Venturi (gray), PA 191, 251 & 321
23	9007700	Elbow, 1/2" NPT
24	1112200	Float Rod Guide
25	9006071	Screw, #6-20 x 7/8"
26	7234595	Riser Pipe & Elbow Assembly
27	0516924	Retainer, Bottom Seal
28	0516211	Bottom Seal
29	9000804	O-Ring, 7/8" x 1"
30	0517030	Brine Valve Nut
31	2174500	Float Rod & Stem
32	2220300	Float Assembly
33	0513860	Float Stop
34	7168647	Ceramic Washer
-	7231254	Brine Valve Assembly (includes Key Nos. 14-34), PA 101 & 131
-	7231262	Brine Valve Assembly (includes Key Nos. 14-34), PA 191, 251 & 321

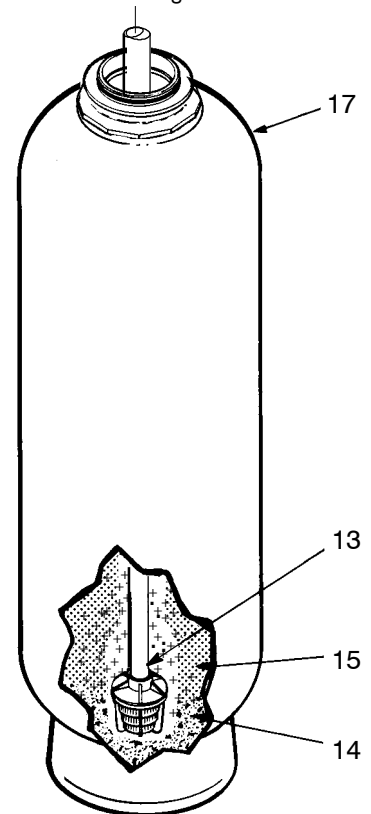
# REPAIR PARTS . . . RESIN TANK ASSEMBLIES



valve asm, see  
pages 34 & 35




Note: Tank adaptor is  
glued to resin tank.





## REPAIR PARTS . . . RESIN TANK ASSEMBLIES

KEY NO.	PART NO.	DESCRIPTION
1	7174868	Cover
–	7285148	Decal, Cover
2	7189449	Cover, Bottom
3	7085297	Transformer, 24V – 40 VA
4	7331737	Control Box
5	7286314	Power Cable
6	–	Fuse, AGC 3A 250V, Purchase locally, replace with same type and value only. 
–	7331177	Tank Neck Clamp Kit (includes 2 ea. of Key Nos. 7 & 8)
7	↑	Clamp Section (2 req.)
8	↑	Retainer Clip (2 req.)
–	7112963	Distributor O–ring Kit (includes Key Nos. 9–11)
9	↑	O–Ring, 2–7/8" I.D. x 3–1/4"
10	↑	O–Ring, 13/16" I.D. x 1–1/16"
11	↑	O–Ring, 2–3/4" I.D. x 3"
12	7077870	Top Distributor
13	7127895	Repl. Distributor (bottom) ②
14	7124415	Gravel, Fine – 17 lbs. ③
	7124423	Gravel, Fine – 50 lbs. ③
	7127073	Gravel, Medium – 50 lbs. ③
	4104600	Gravel, Course – 50 lbs. ③
15	0502272	Resin, 1 cu. ft. ③
16	7169457	Resin Tank (12" Dia. x 54") Model PA071
	7169465	Resin Tank (17" Dia. x 58") Models PA101 & PA131
17	7141409	Resin Tank (24" Dia. x 72") Models PA191, PA251 & PA321 ①

### ACCESSORIES

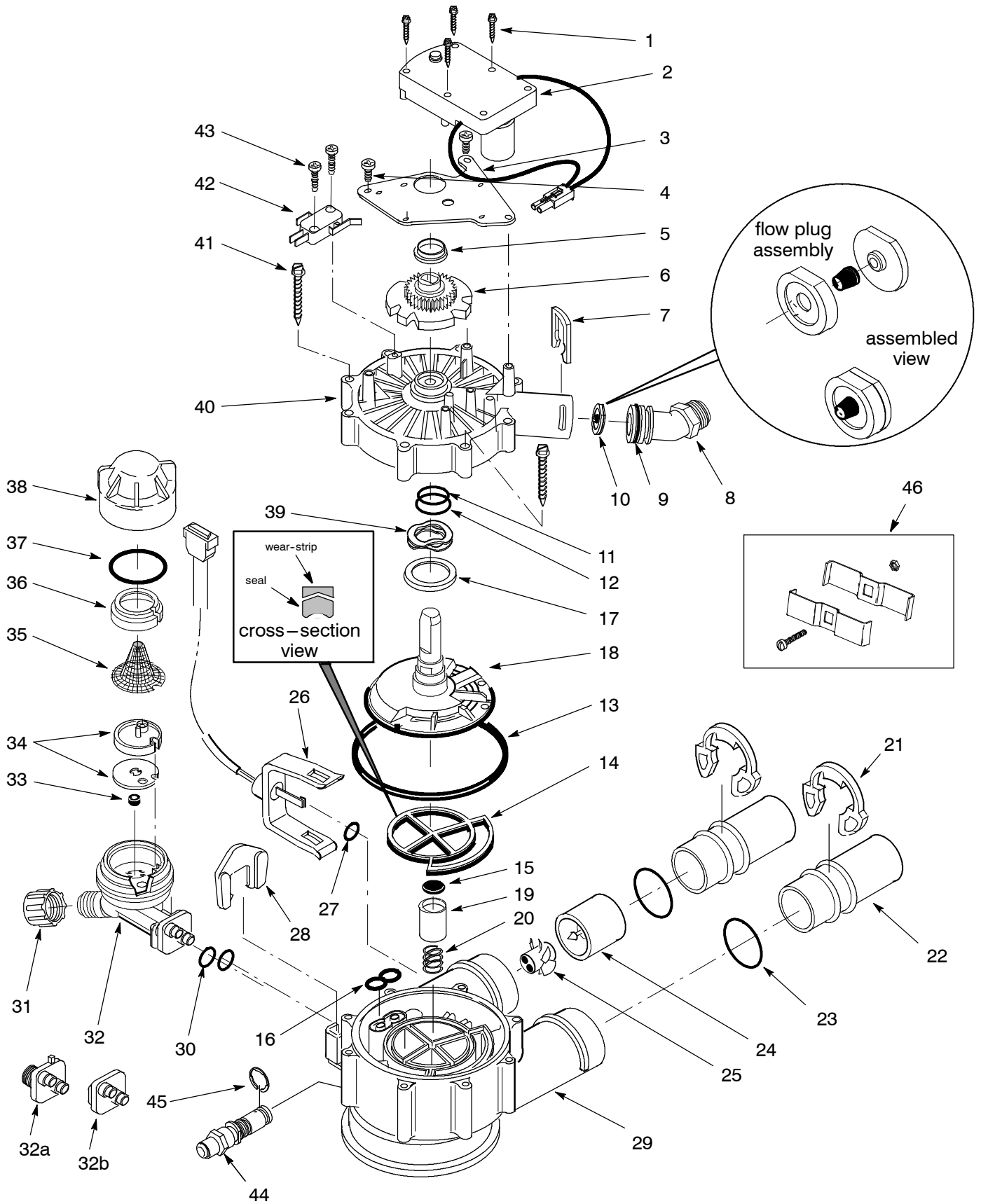
18	7214383	Bypass Valve
–	7285902	Remote Monitor Kit
–	7286005	Controller Extension Cable, 20 ft.

① Includes key nos. 8 through 14.

② Be sure to check length...page 6.

③ See page 3 for amount required.

# REPAIR PARTS . . . VALVE ASSEMBLY

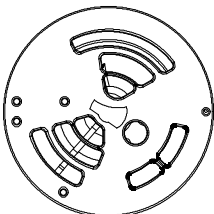


## REPAIR PARTS . . . VALVE ASSEMBLY

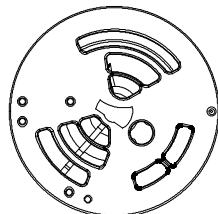
KEY NO.	PART NUMBER	DESCRIPTION
1	7224087	Screw, #8-32 x 1" (4 req.)
2	7286039	Motor (incl. 4 ea. of Key No. 1)
3	7231393	Motor Plate
4	0900857	Screw, #6-20 x 3/8" (3 req.)
5	7171250	Bearing
6	7283502	Cam and Gear
7	7169180	Clip (Drain)
8	7172793	Drain Hose Adaptor
9	7170288	O-ring, 15/16" x 1-3/16", single
	7336402	O-ring, 15/16" x 1-3/16", pack of 20
10	7197808	Flow Plug, Model PA071 (3.0)
	7178202	Flow Plug, Models PA100 & PA130 (7.0)
	7178210	Flow Plug, Models PA191, PA251 & PA321 (10.0)
-	7185487	Seal Kit (includes Key Nos. 11-16)
11	↑	O-ring, 5/8" x 13/16"
12	↑	O-ring, 1-1/8" x 1-1/2"
13	↑	O-ring, 4-1/2" x 4-7/8"
14	↑	Rotor Seal
15	↑	Seal
16	↑	Seal (Nozzle & Venturi)
17	7174313	Bearing, Wave Washer
18	7185500	Rotor & Disc, Model PA071 †
	7229590	Rotor & Disc, Model PA071, multiple tanks †
	7229582	Rotor & Disc, All other models †
	7229605	Rotor & Disc, All other <i>multiple</i> models †
19	7171187	Plug (Drain Seal)
20	7129889	Spring
21	7089306	Clip, 1", single (2 req.)
	7336428	Clip, 1", pack of 20
22	7077642	Copper Tube, 1", single (2 req.)
	7344138	Copper Tube, 1", pack of 10 (includes 10 ea. of Key No. 23)

KEY NO.	PART NUMBER	DESCRIPTION
23	7311127	O-ring, 1-1/16" x 1-5/16", sngl. (2 req.)
	7336410	O-Ring, 1-1/16" x 1-5/16", pack of 20
-	7331703	Turbine & Support Asm. (incl. 1 ea. of Key Nos. 24, 25 & 2 ea. of Key No. 23)
24	↑	Turbine Support & Shaft
25	↑	Turbine
26	7322372	Controller Cable & Sensor Housing Asm.
27	0900060	O-ring, 3/8" x 1/2"
28	7081201	Retainer (Nozzle & Venturi)
29	7171145	Valve Body (Model PA071 & all filter models)
	7222988	Valve Body (All other models)
30	7170319	O-ring, 1/4" x 3/8" (2 req.)
31	1202600	Nut — Ferrule
-	7085247	Nozzle & Venturi Assembly, Model PA071 (incl. Key Nos. 32, 33-38)
32	7081104	Housing, Nozzle & Venturi, Model PA071
32a	7128760	Adaptor (All other <i>softener</i> models)
32b	7100940	Plug (All <i>filter</i> models)
33	1148800	Flow Plug, .3 gpm
34	7114533	Nozzle and Venturi — Gasket Kit (Model PA071)
	7204362	Gasket (only)
35	7146043	Screen
36	7167659	Screen Support
37	7170262	O-ring, 1-1/8 x 1-3/8
38	7199729	Cap
39	7175199	Wave Washer
40	7171161	Valve Cover
41	7172997	Screw, #10 x 2-5/8" (8 req.)
42	7305150	Switch
43	7140738	Screw, #4-24 x 3/4" (2 req.)
44	7222938	Check Ball Insert
45	7222954	E-Ring
46	7248706	Ground Clamp

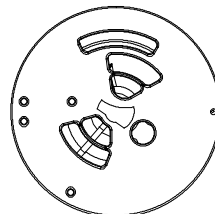
† Multiple Tank Systems use special rotor & discs to prevent the use of hard water during regeneration. The illustrations below show the different rotors for identification.



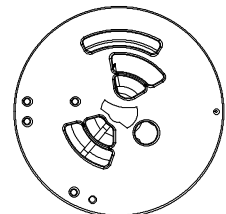
Rotor & Disc,  
Model PA071



Rotor & Disc,  
All other Single Models



Rotor & Disc,  
Model PA071  
Multiple Tanks



Rotor & Disc,  
All other Multiple Models

