

MANUAL

to Install, Program, Operate and Maintain



NORTH STAR™
WATER TREATMENT SYSTEMS

MODEL PA SERIES

COMMERCIAL WATER SOFTENERS / FILTERS

with 1" Single Disc Valve

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

CALL TOLL FREE: 1-800-627-3497



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

Manufactured by
Water Channel Partners
1890 Woodlane Drive
Woodbury, MN 55125

7397026 (Rev. C 5/15/24)

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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 100°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.

The 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 **24V DC** electrical power only. Be sure to use the included power supply.

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.

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.

Softener models are shipped in 3 cartons, and filter models in 2 cartons. Shipments include:

- Resin/Mineral tank
- Brine tank (Softeners only)
- Controller

The mineral bed consists of one cubic foot bags of water softening resin (or filtering media), and 17 or 50 pound bags of various grades of gravel. Refer to the charts below.

		Water Softener Model					
		071	101, 101-1	131, 131-1	191, 191-1	251, 251-1	321, 321-1
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)

		Media Shipped with Filters						
		Gravel 7124415 17 lb. Bag	Gravel 7124423 50 lb. Bag	Garnet 993090 50 lb. Bag	Filter Sand 993080 50 lb. Bag	Manganese Greensand 7331101 1/2 cu.ft. Bag	Anthracite 993070 1 cu.ft. Bag	Carbon 7336834 1 cu.ft. Bag
Empty	121XS	2	—	—	—	—	—	—
	121XD	4	—	—	—	—	—	—
	121XT	6	—	—	—	—	—	—
	121XQ	8	—	—	—	—	—	—
	171XS, 171XS-1	—	2	—	—	—	—	—
	171XD, 171XD1	—	4	—	—	—	—	—
	171XT, 171XT-1	—	6	—	—	—	—	—
	171XQ, 171XQ-1	—	8	—	—	—	—	—
Carbon	121CS	1	—	—	—	—	—	2
	121CD	2	—	—	—	—	—	4
	121CT	3	—	—	—	—	—	6
	121CQ	4	—	—	—	—	—	8
	171CS, 171CS-1	—	2	—	—	—	—	4
	171CD, 171CD-1	—	4	—	—	—	—	8
	171CT, 171CT-1	—	6	—	—	—	—	12
	171CQ, 171CQ-1	—	8	—	—	—	—	16
Multimedia	121MS	2	—	1*	1	—	1	—
	121MD	4	—	1	2	—	2	—
	121MT	6	—	2*	3	—	3	—
	121MQ	8	—	2	4	—	4	—
Greensand	121GS	1	—	1*	—	3	1*	—
	121GD	2	—	1	—	6	1	—
	121GT	3	—	2*	—	9	2*	—
	121GQ	4	—	2	—	12	2	—

* Partial bag used, see loading table on page 9.

SPECIFICATIONS

Equipment Specifications									
MODEL		Softeners							
		071	101	101-1	131	131-1	191, 191-1	251, 251-1	321, 321-1
Tank Size (in.)		12" x 54"	17" x 58"	16" x 65"	17" x 58"	16" x 65"	24 x 72"	24 x 72"	24 x 72"
Capacity (grains) @ Salt Usage	4 lbs. / cu.ft.	37,000	54,000		72,000		108,000	144,000	180,000
	6 lbs. / cu.ft.	50,000	72,000		96,000		144,000	192,000	240,000
	8 lbs. / cu.ft.	61,000	84,000		112,000		168,000	224,000	280,000
	10 lbs. / cu.ft.	67,000	93,000		124,000		186,000	248,000	310,000
	12 lbs. / cu.ft.	71,000	99,000		132,000		198,000	264,000	330,000
Amount of Resin (cu. ft.)		2	3		4		6	8	10
Salt Storage Capacity (lbs.)		340	1000		1000		1500	1500	1500
Recommended Flow Rates①		Water Pressure Loss (PSI)							
	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		35.0 ΔP		37.0 ΔP		32.0 ΔP	33.0 ΔP	34.0 ΔP
	40 gpm						41.0 ΔP	42.2 ΔP	43.4 ΔP
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#)
Pipe Size (In.)		1"							
Backwash / Fast Rinse Flow Rates (gpm)		3.0	7.0				10.0		

①	Continuous flow rates
	Intermittent or peak flow rates
	Flow rates not recommended (hardness leakage, reduced efficiency, etc.)

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SPECIFICATIONS

Programming Information							
MODEL		Softeners					
		071	101, 101-1	131, 131-1	191, 191-1	251, 251-1	321, 321-1
Resin Amount (cu. ft.) ^①		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. 134, page 38	See Key No. 45, page 34				
Brine Cycle Flow Rate (gpm)		0.33	0.58	0.57	1.1	1.1	1.1
Br. Rinse Cycle Flow Rate (gpm)		0.22	0.48	0.47	0.89	0.89	0.89
Bkw. Cycle & Fast Rinse Cycle Flow Rate (gpm)		3	7	7	10	10	10
Backwash & Fast Rinse Flow Plug Identification & Location		Black - Tan dot (0.5)	Brown (0.7)		Orange (0.10)		
		See Key No. 109, page 38					
Freeboard (inches) ^②		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 / Brine 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		Minutes					
	4, Auto Adj. or Salt Eff.	141	115	160	150	160	180
	6 lbs.	137	110	150	145	150	175
	8 lbs.	140	105	145	135	145	170
	10 lbs.	135	100	135	130	135	160
	12 lbs.	129	95	130	125	130	150
Backwash Time (min.)		13	15	15	15	15	15
Fast Rinse Time (min.)		4	5	5	5	5	5

① Synthetic high capacity resin

② Nominal distance from top of resin bed to top of tank. This dimension can vary several inches, depending on resin moisture content, degree of bed expansion or packing, resin tank tolerances, etc.

SPECIFICATIONS

Equipment Specifications (based on single units)									
MODEL		Filters							
		All Purpose			Carbon			Multimedia	Greensand
		121XS	171XS	171XS-1	121CS	171CS	171CS-1	121MS,	121GS,
Tank Size (in.)		12" x 54"	17" x 58"	16" x 65"	12" x 54"	17 x 58"	16 x 65"	12" x 54"	12" x 54"
Recommended Service Water Flow Rate (gpm)		4 - 8	8 - 16		4 - 8	8 - 16		4 - 8	4 - 8
Contaminant Removal		Based on Water Analysis							Maximum Iron 20 ppm
Flow Rates (gpm @ psi)	2 gpm				1.0 ΔP	0.6 ΔP		1.0 ΔP	1.0 ΔP
	4 gpm				2.3 ΔP	1.1 ΔP		2.3 ΔP	2.3 ΔP
	6 gpm				3.9 ΔP	2.2 ΔP		3.9 ΔP	3.9 ΔP
	8 gpm				5.7 ΔP	3.3 ΔP		5.7 ΔP	5.7 ΔP
	10 gpm				7.9 ΔP	4.6 ΔP		7.9 ΔP	7.9 ΔP
	12 gpm				NA	5.9 ΔP		NA	NA
	14 gpm				NA	7.4 ΔP		NA	NA
	16 gpm				NA	9.7 ΔP		NA	NA
	18 gpm				NA	NA		NA	NA
Mineral Loading Cubic Feet of Mineral (lbs)	Anthracite	—	—		—	—		1 (52#) ①	0.5 (26#) ①
	Filter Sand	—	—		—	—		0.5 (50#) ①	—
	Garnet	—	—		—	—		0.19 (25#) ①	0.19 (25#) ①
	Activated Carbon	—	—		2 (84#)	4 (168#)		—	—
	Manganese Greensand	—	—		—	—		—	3 (128#)
	Gravel	0.17 (17#)	1 (100#)		0.17 (17#)	1 (100#)		0.34 (34#)	0.17 (17#)
Backwash / Fast Rinse Flow Rates	Location	See Key No. 109, page 38							
	Gal./min.	7	15		7	15		10	10
Pipe Size (in.)		1"							
	w/Adaptor ②	1-1/2"							
Water Pressure Limits (psi)		30 - 125							
Water Temperature Limits (°F)		35 - 100							
Electrical Rating		24V DC							

Dependent on media

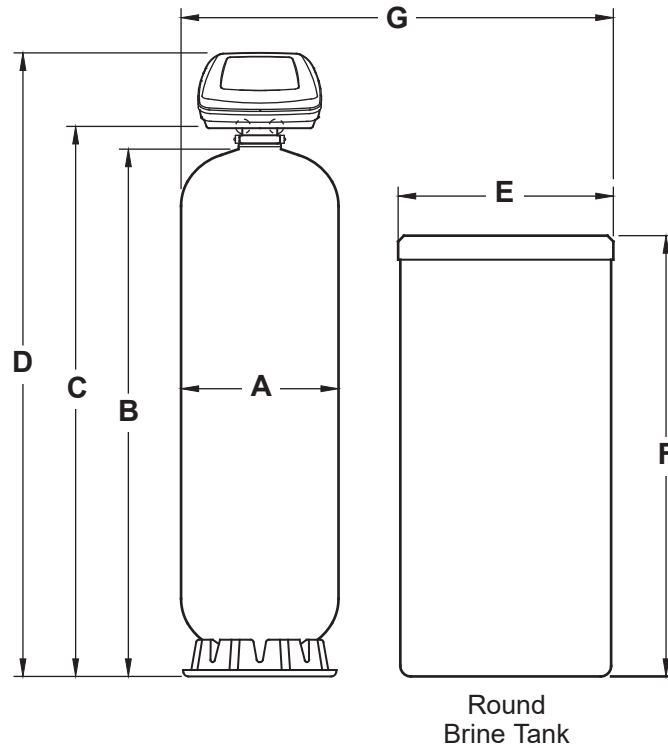
① Use only partial bags of supplied media

② Optional sweat fittings available: P/N 7129211 (package of 2)

NOTE: Pressure drop figures are valid only with a clean bed

DIMENSIONS

Minimum Floor Space Required



	MODEL	A Nominal Resin Tank Diameter	B Nominal Resin Tank Height	C Inlet - Outlet Height	D Overall Height	E Brine Tank Height	F Brine Tank Diameter	G		INLET - OUTLET	
								Single ^①	Multiple	Pipe Size ^②	Center Lines
Softeners	071	12"	54"	56-3/4"	66"	39"	17"	35-1/4"	70"	1"	3-3/4"
	101, 131	17"	58"	61-1/4"	70-1/2"	50"	24"	48"	102"	1"	3-3/4"
	101-1, 131-1	16"	65"	68-3/8"	77-11/16"	50"	24"	48"	102"	1"	3-3/4"
	191, 251, 321	24"	72"	75-3/4"	85"	51"	30"	60"	90"	1"	3-3/4"
	191-1, 251-1, 321-1	24"	72"	78-1/8"	87-3/8"	51"	30"	60"	90"	1"	3-3/4"
Filters	121	12"	54"	57"	65-3/4"	NA	NA	NA	NA	1"	3-3/4"
	171	17"	58"	81"	70-1/4"	NA	NA	NA	NA	1"	3-3/4"
	171-1	16"	65"	68-3/8"	77-11/16"	NA	NA	NA	NA	1"	3-3/4"

① Includes 6" between tanks

② Sweat copper (1") fittings supplied. Optional 1-1/2" fittings available: P/N 7129211 (package of 2)

MEDIA LOADING & ASSEMBLY

TANK NECK ADAPTER INSTALLATION (for models ending with "-1")

IMPORTANT: Cut the riser pipe to the correct length BEFORE filling the tank with mineral/resin and gravel, and BEFORE installing the valve.

NOTE: Do not use any thread sealant or tape on the tank neck adapter's threads. The seal is made by the o-ring against the tank's flat top edge.

1. Insert the bottom distributor down into the tank and center it.
2. Slide the adapter over the top of the riser pipe and screw the adapter into the tank

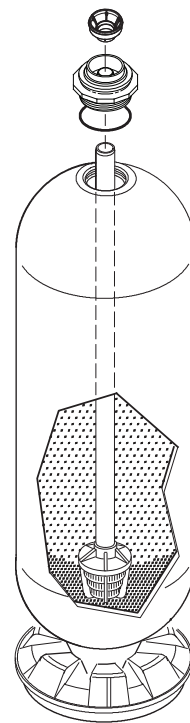
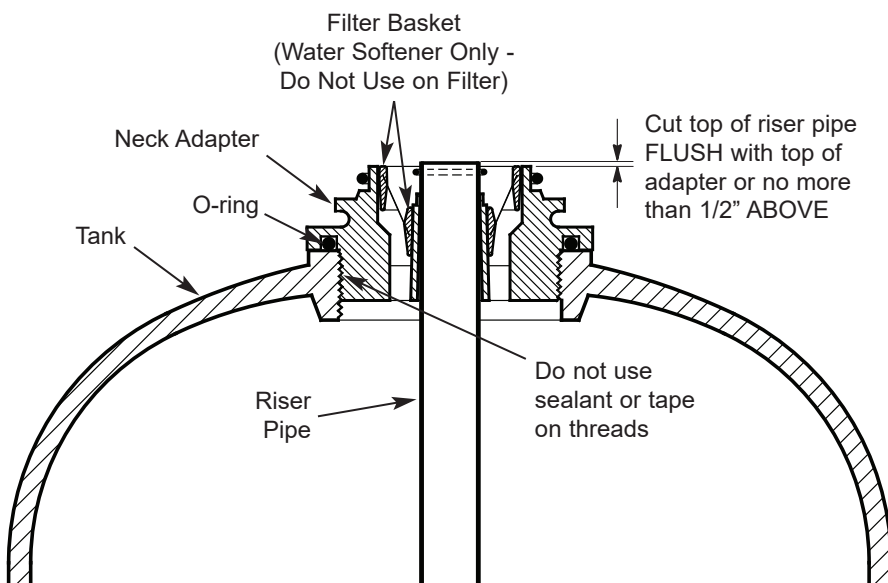
neck until it bottoms on the tank's flat top edge.

3. Use a ruler to measure, and mark, the riser pipe FLUSH with the top of the adapter, or no more than 1/2" ABOVE.
4. Unscrew the adapter and remove the bottom distributor from the tank. Cut the riser pipe at the mark, being careful not to crush the riser pipe.
5. Insert the bottom distributor again and load media into the tank.
6. Lubricate the 4-1/2" O.D. o-ring that is

included with the tank neck adapter kit and install it into the groove just above the threads.

7. Screw the tank neck adapter onto the tank until the o-ring seals against the tank's flat top edge.

8. **Water Softener Only:** Slide the filter basket onto the end of the riser pipe and push it down until it seats in the adapter. Do not install this on tank filter systems.



1. Move the resin/mineral tank into installation location (see page 10). Set it on a flat, level surface. If a multiple installation, allow space between tanks for servicing equipment.

2. Remove the shipping cap, top distributor and o-rings. On all models, place the bottom distributor into the 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 media.

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

5. Using a larger neck funnel, add the specified amount of gravel (see page 3). **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 (see page 3) or filtration media (see page 9) in the correct sequence, as shown in Figure 2. Use water sparingly to speed flow through the funnel. It may be necessary to siphon from the bottom of the distributor if tank becomes full of water.

7. Flush the tank opening with water to clean media 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.

MEDIA LOADING & ASSEMBLY

9. Install the o-ring seals and top distributor exactly as shown in Figure 3. If the o-rings need lubrication, use a high quality silicone grease.

NOTE: The strainer-style top distributor that is included with the mineral tank assembly is only used on softener models. For filter models, replace it with the top distributor packed with the valve. It has three large, square openings.

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. On softener models, verify that the proper backwash flow plug is installed. If not, replace with correct flow washer from parts bag.

MODEL	Backwash Flow Plug	ID Mark
071	3 gpm	Tan dot
101, 101-1, 131 & 131-1	7 gpm	Brown
191, 191-1, 251, 251-1, 321 & 321-1	10 gpm	Orange

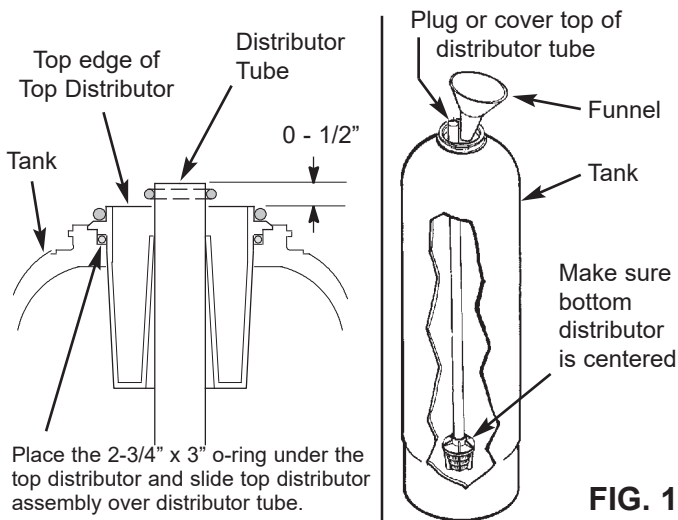


FIG. 1

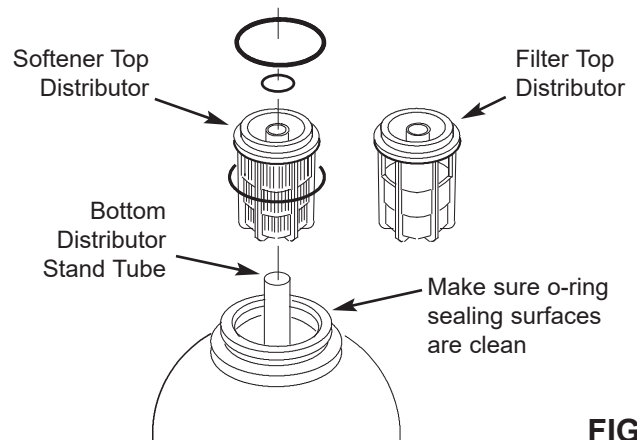


FIG. 3

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.

BEDDING SEQUENCE OF GRAVEL AND MINERALS

NOTE: Make sure distributor assembly is centered in tank before filling.

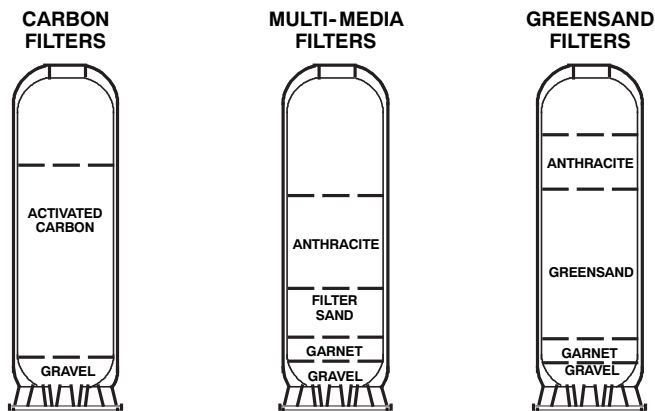


FIG. 2

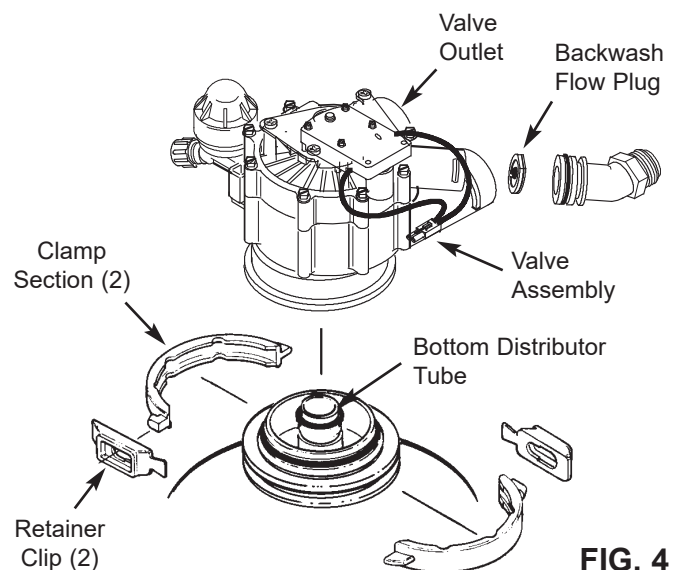


FIG. 4

MEDIA LOADING & ASSEMBLY

Individual Filter Tank Loading								
			Empty Models 121XS	Carbon Models 121CS	Multimedia Models 121MS	Manganese Greensand Models 121GS	Empty Models 171XS, 171XS-1	Carbon Models 171CS, 171CS-1
Media	Part Number	Cubic ft. per Bag	No. of Bags	No. of Bags	No. of Bags	No. of Bags	No. of Bags	No. of Bags
Gravel	7124415	0.17	2	1	2	1	—	—
	7124423	0.5	—	—	—	—	2	2
Garnet	993090	0.38	—	—	0.5*	0.5*	—	—
Filter Sand	993080	0.5	—	—	1	—	—	—
Manganese Greensand	7331101	0.5	—	—	—	3	—	—
Anthracite	993070	1	—	—	1	0.5*	—	—
Carbon	7336834	1	—	2	—	—	—	4

* Not all media shipped with the unit will be loaded into tanks - 1/2 bag will be unused

PLANNING FOR LOCATION & 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.

BOTH HOT & COLD WATER CONDITIONING

Connect the system to the water supply pipe, immediately after (downstream of) the municipal supply water meter or well supply pressure tank. To provide unconditioned water to isolated faucets, if desired, run separate pipes from the water supply before (upstream of) the system.

CONDITIONING HOT WATER ONLY

Connect the system to the water supply pipe before (upstream of) the water heater.

CAUTIONS: (1) Do not install the conditioner after (downstream of) the water heater. **Hot water will damage** inner parts of the system, and may cause the loss of the water conditioner mineral bed. (2) To reduce the risk of hot water backing up 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 pipe or hose. A floor drain is needed for the overflow on the salt tank.

ELECTRICAL

The system works on **24V DC only**. A direct plug-in power supply is included to reduce 120V AC, 60 Hz electrical power to 24V DC. An approved, grounded outlet is needed near the system controller. The system includes a power cable to connect between the power supply 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 hang on the valve with the included bracket.

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 7.

PLANNING FOR LOCATION & INSTALLATION OF SYSTEM

MATERIALS YOU MAY NEED

Use the illustration below (Fig. 5) 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 P/N 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 conditioner valve drain (see page 11). The drain fitting has standard garden hose threads. Adaptors are available from most hardware stores to convert the fitting to accept rigid pipe. On softeners, a length of 5/8" I.D. garden hose is also needed for the drain overflow on brine tanks.

- For inlet and outlet pipes to the conditioner, use copper, CPVC plastic, or threaded pipe and fittings. Avoid joining copper and galvanized together as corrosion will occur rapidly. The valve inlet and outlet connections are 1" male pipe thread. Optional fittings available are shown in Figure 6.

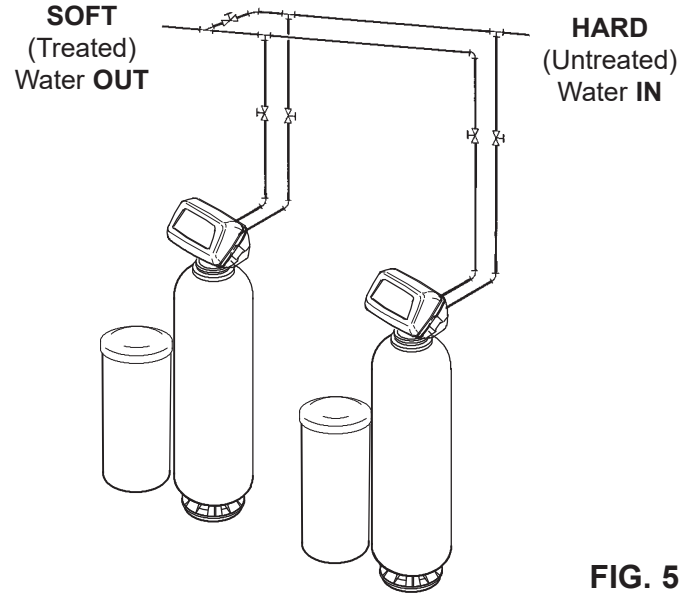


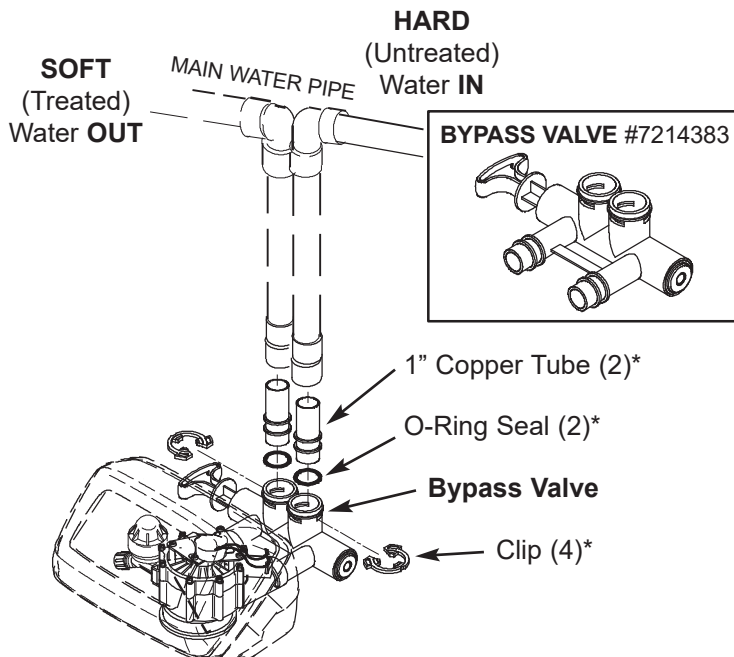
FIG. 5

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.

INSTALLATION STEPS

TYPICAL INLET/OUTLET PLUMBING CONNECTIONS



*Included with conditioner

OPTIONAL INLET/OUTLET FITTINGS

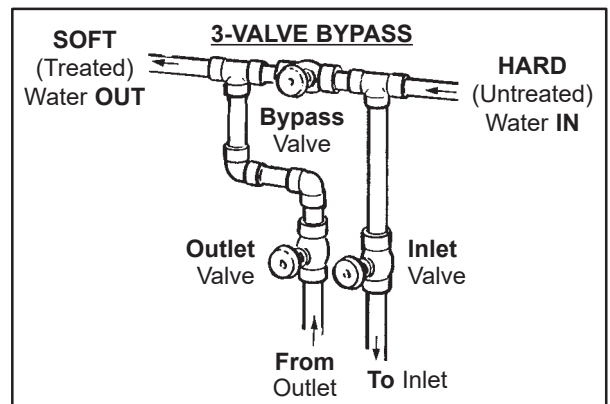
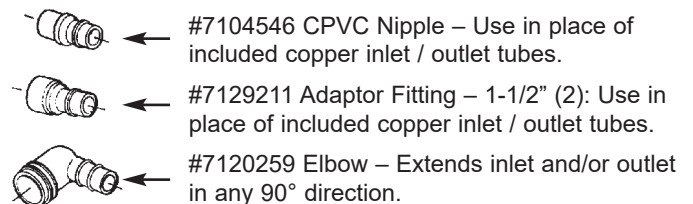


FIG. 6

INSTALLATION STEPS

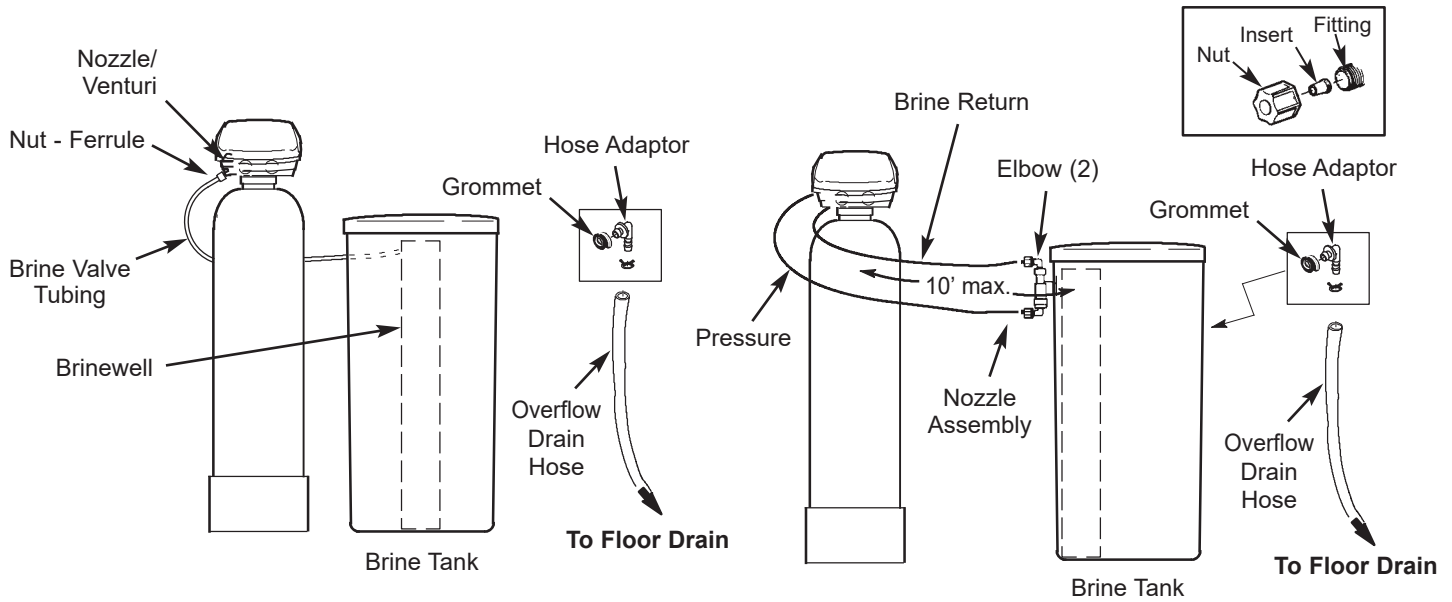


FIG. 7

PIPING ASSEMBLY NOTES AND CAUTIONS:

- Be sure to close the main water supply valve before beginning.
- Be sure to plumb so that hard (untreated) water flows to the valve inlet fitting.
- **CAUTION:** When soldering, make subassemblies 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 thread sealing tape or pipe joint compound on external pipe threads.
- Lubricate o-ring seals with high quality silicone grease.

INSTALLATION STEPS:

1. Referring to the typical installation illustrations (Figures 5 & 6), 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. **Softener Models: Move the brine tank assembly into position** nearby the resin tank. Enough tubing is included to allow locating the tank up to 10 feet away from the resin tank (Figure 7).

3a. Softener Models 071 & 071-1 - Connect Tubing:

- Route the tubing attached to the brine valve assembly out of the brine tank through the hole in the brine tank sidewall (Figure 7). Use the slot in the brinewell to hold tubing in place.

- Make sure end of brine tube is cut square and smooth. Within about 5/8" (16 mm) of the end, make sure outside of tube is not nicked, scratched, kinked or stretched out. Cut if necessary.

- Connect brine tube by inserting end into push-to-connect fitting on the valve's nozzle & venturi assembly (Figure 8). Push it until at least 5/8" (16 mm) of tube is inserted (Figure 10).

NOTE: A common mistake is to stop pushing the tube when it hits the internal metal collar or o-ring (Fig. 9). Make sure to push past these, until at least 5/8" (16 mm) of tube is inserted.

- Pull on the tube to make sure it is secure.

3b. All Other Softener Models - Connect Tubing:

- Verify that the proper nozzle & venturi are installed in nozzle assembly. If not, replace with correct pair.

MODEL	Venturi	Nozzle
101, 101-1, 131 & 131-1	Natural	White
191, 191-1, 251, 251-1, 321 & 321-1	Gray	Gray

- Install two elbows (in separate parts bag with the brine tank) into the top and bottom of the nozzle assembly (Figure 7).

- Using tubing inserts and compression nuts, fasten lengths of tubing to the two elbows.

- 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.

- 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.

INSTALLATION STEPS

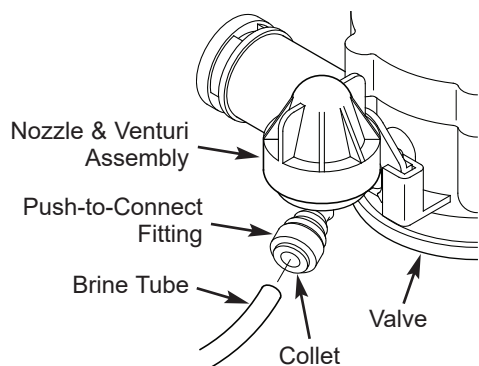


FIG. 8

INCORRECT - Not fully inserted

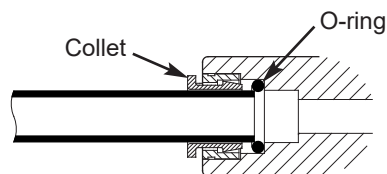


FIG. 9

CORRECT - Tube fully inserted

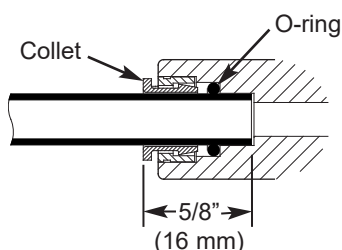


FIG. 10

4. Softener Models: Push the elbow fitting into the grommet in the sidewall of a round brine tank. Attach a length of drain hose to the fitting as follows:

- Softener Models 071 & 071-1: Attach a length of 5/8" I.D. tubing to the elbow and run to the floor drain.
- Other Softener Models: Attach a length of 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 garden hose connection (Figure 11). Attach the drain hose to the drain 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 back up.

continued on the next page

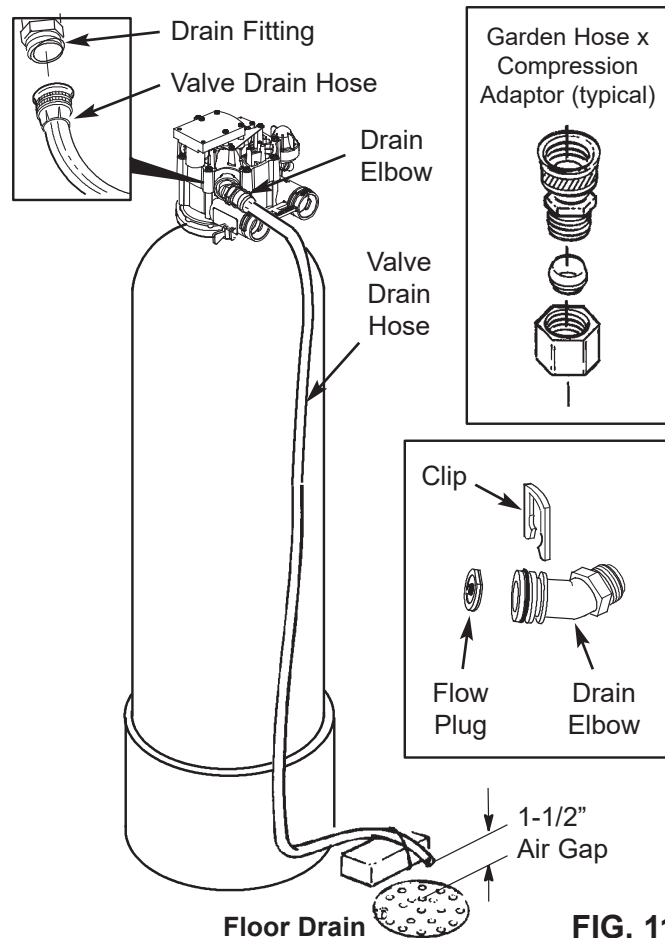
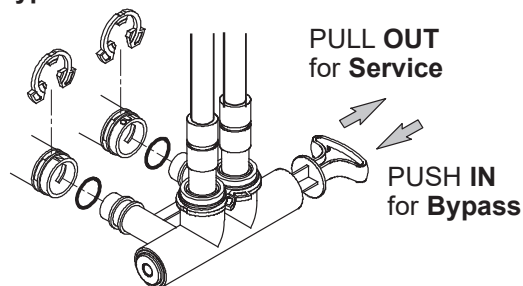
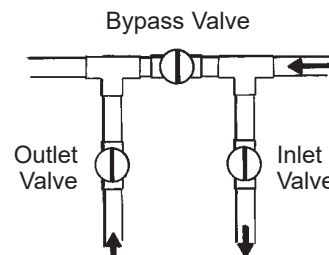


FIG. 11

Single Bypass Valve



3-Valve Bypass



For **SERVICE:**

- Open the Inlet and Outlet Valves
- Close the Bypass Valve

For **BYPASS:**

- Close the Inlet and Outlet Valves
- Open the Bypass Valve

FIG. 12

INSTALLATION STEPS

continued from the previous page

- For longer or raised drain hose runs, a 3/4" dia. hose (minimum) is recommended to reduce backpressure. Backpressure 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.

- Open two or more soft/filtered water faucets, both hot and cold.
- Referring to Figure 12, place the bypass valve(s) in "service".
- 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.
- Check the installation for leaks. If any rework is needed, observe the cautions on page 12.

7. Softener Models - Add Water and Salt to the Brine Tank: Using a pail or hose, add about 3 gallons of water into the brine tank. Add 7 gallons into a 24" diameter tank.

Salt storage capacities are shown in the specifications. Fill the tank with clean water softener salt. The recommended nugget, pellet and coarse solar salts have less than 1% impurities. See page 28 for additional information on salt.

8. Connect the Controller Cable(s): Referring to the diagram on the next page, connect electrical leadwires as follows.

NOTE: The power supply must be unplugged from line power before connecting or disconnecting controller cables. If not, it may result in damage to controller circuits.

- Line power cord to power supply ①
- Power cable from power supply to electronic box ②
- Controller cable to electronic box ③

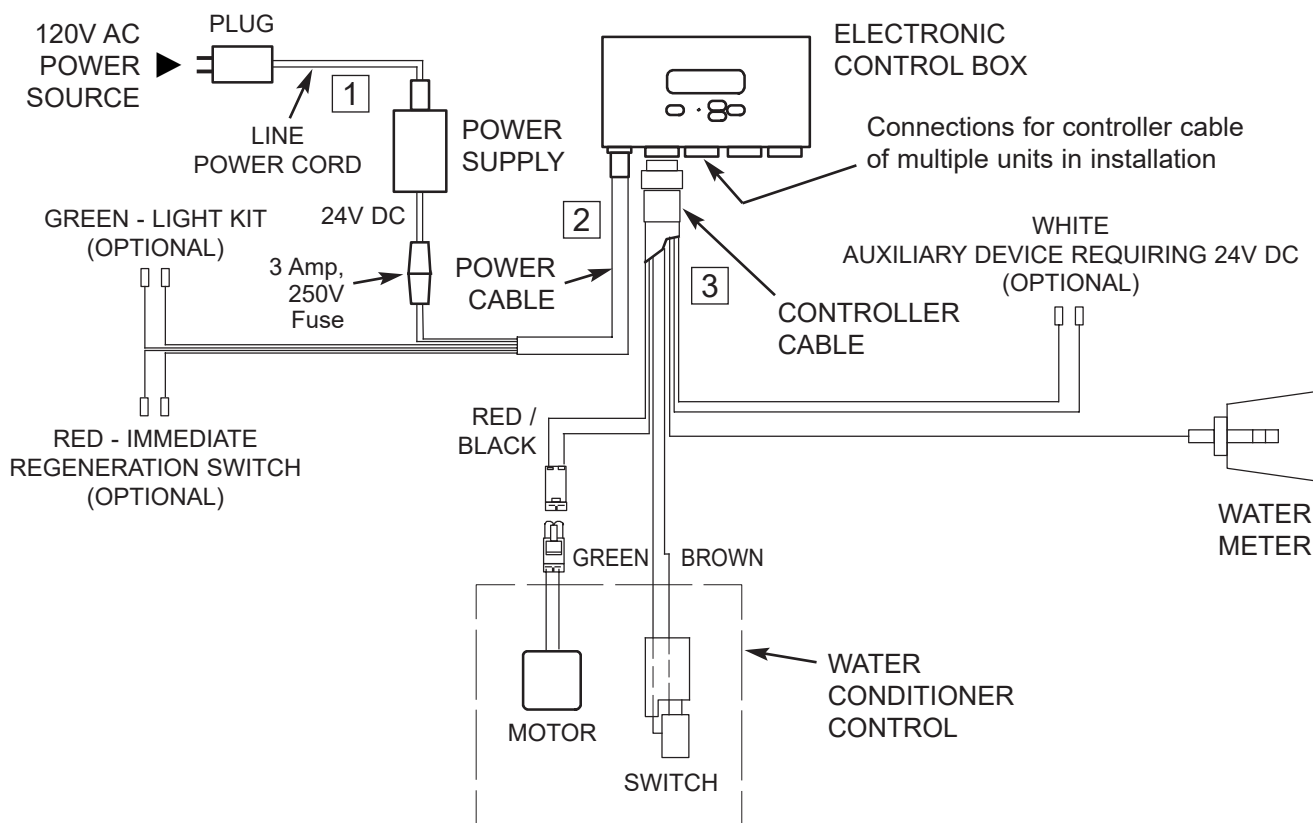
NOTE: For multiple tank installation, only one power supply is required for up to four tanks.

9. Plug Power Supply into a 120V, 60 Hz Electrical Outlet.

10. Do the Startup Programming: Upon installation, all controller settings are required. Follow procedures on pages 15 through 18.

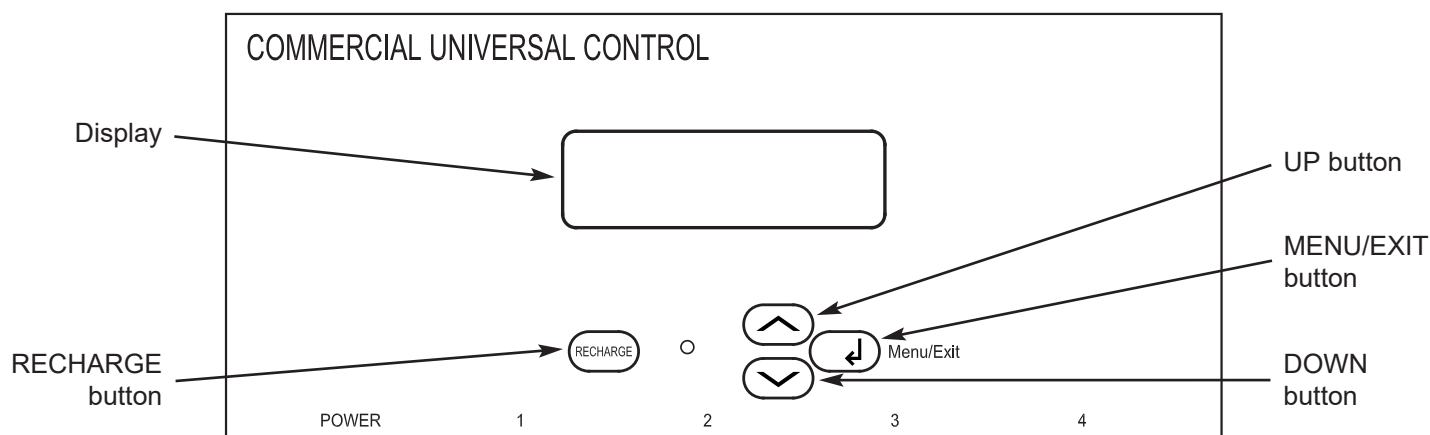
NOTE: Multiple units require only one power supply

WIRING CONNECTION DIAGRAM



PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP

(Once programmed, see page 19 to reset time / recharge, see pages 21-24 for other settings)



The CUC2 is a menu-driven electronic controller 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.

A “beeper” sounds when controller buttons are pressed. One beep signals a change in the faceplate display. Repeated beeping means the controller will not accept a change from the button you have pressed, telling you to use another button.

```

-----
Version : C5.0
    
```

When the power supply 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.

```

> English
  Español
  Français
↑↓ Change    ← Exit
    
```

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 the next setting.

```

Set English/Metric:

English
↑↓ Change    ← Exit
    
```

2. SET ENGLISH/METRIC: Using the UP (▲) or DOWN (▼) buttons, set the controller to measure in either English or Metric units. Press the MENU/EXIT (←) button to select and advance to the next setting.

```

Set 12/24 Hour
Clock:
12 Hour
↑↓ Change    ← Exit
    
```

3. 12/24 HOUR CLOCK: Using the UP (▲) or DOWN (▼) buttons, set the time format to either a 12 or 24 hour clock. Press the MENU/EXIT (←) button to select and advance to the next setting.

```

Set Valve
Type:
One Inch Single Disk
↑↓ Change    ← Next
    
```

4. SET VALVE TYPE: Use the UP (▲) or DOWN (▼) buttons to display the 1 inch single disc valve. When the correct valve type for the application is shown, press the MENU/EXIT (←) button to select and advance to the next setting.

```

Set Number of
Valves:
Quadplex
↑↓ Change    ← Next
    
```

5. SET NUMBER OF VALVES: If one softener or filter is installed, set Simplex in the display using the UP (▲) or DOWN (▼) buttons, then press the MENU/EXIT (←) button to select and advance to the next setting. If multiple units are installed, set Duplex, Triplex or Quadplex, as appropriate for the installation.

PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP

```
Set Recharge
Method:
Parallel Delayed
↑↓ Change      ␣ Next
```

6. SET RECHARGE METHOD (for multiple tank applications only): There are four choices for recharge method:

- When **Peak Flow** (see step 17) 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 into 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 (▼) buttons, select recharge method and press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set System
Type:
Softener
↑↓ Change      ␣ Next
```

7. SET SYSTEM TYPE: Using the UP (▲) or DOWN (▼) buttons, select either softener or filter system type, then press the MENU/EXIT (␣) button to select and advance to the next setting.

SOFTENERS ONLY (go to Page 18 for filters)

```
Set Resin
Qty:
1.5 Cubic Feet
↑↓ Change      ␣ Next
```

8. SET RESIN QUANTITY: Using the UP (▲) or DOWN (▼) buttons, select the 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 the next setting.

```
Set Refill
Rate:
0.3 gpm
↑↓ Change      ␣ Next
```

9. SET REFILL RATE: Using the UP (▲) or DOWN (▼) buttons, select the refill rate to the suggested gallons per minute flow rate table in your manual. Press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set Efficiency Mode:
Auto Adjusting
↑↓ Change      ␣ Next
```

10. SET EFFICIENCY MODE: Using the UP (▲) or DOWN (▼) buttons, select the salt efficiency mode:

- **Salt Efficient** will provide a salt efficiency of 4,000 grains or higher.
- **Boiler Option** will have 1 ppm soft water bleed or less.
- **Auto Adjusting** adjusts itself among 5 operating capacities, based on frequency of regenerations.
- **Actual Dose** allows the user to set actual salt dose in lbs/cu. ft. If Actual Dose is selected, the controller will continue to a Set Salt Dose screen.

```
Set Salt
Dose:
12 lb per ft3
↑↓ Change      ␣ Next
```

Press the MENU/EXIT (␣) button to select and advance to the next setting.

NOTE: If Auto Adjusting is chosen, brine times will still need to be selected in Step 12.

```
Set Fixed Reserve:
Automatic
↑↓ Change      ␣ Next
```

11. SET FIXED RESERVE (Simplex or Parallel Delayed Systems only; only if Actual Dose is selected in Step 10): If a minimum capacity must be available on any given day, use the UP (▲) or DOWN (▼) buttons to select the percentage of operating capacity required. See the table in your manual to determine actual capacity available. If **Automatic** is selected, the fixed reserve percentage will vary, based on a weekly average of capacity used. Press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set Brine
Time:
180 Minutes
↑↓ Change      ␣ Next
```

12. SET BRINE TIME: Using the UP (▲) or DOWN (▼) buttons, select the brine time to the suggested minutes from the table on page 20. Press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set Backwash
Time:
15 Minutes
↑↓ Change      ␣ Next
```

13. SET BACKWASH TIME: Using the UP (▲) or DOWN (▼) buttons, select the backwash time to the suggested minutes from the table on page 20. Press the MENU/EXIT (␣) button to select and advance to the next setting.

PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP

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

14. SET FAST RINSE TIME: Using the UP (▲) or DOWN (▼) buttons, select the fast rinse time to the suggested minutes from the table on page 20. Press the MENU/EXIT (↵) button to select and advance to the next setting.

```
Set Salt
Monitor Feature:
Off
↑↓ Change      ↵ Next
```

15. SET SALT MONITOR FEATURE: Using the UP (▲) or DOWN (▼) buttons, 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 the next setting.

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

16. SET MINIMUM TANKS IN SERVICE (Triplex and Quadplex units only): Using the UP (▲) or DOWN (▼) buttons, 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 the next setting.

```
Peak Flow
Trippoint:
  0.0 gpm
↑↓ Change      ↵ Next
```

17. SET PEAK FLOW TRIP POINT: If Peak Flow was selected as the method of recharge in Step 6, this option is activated. Using the UP (▲) or DOWN (▼) buttons, select the flow rate (1.0 gallons per minute minimum to 750 gpm maximum) at which you will **temporarily** require another unit to come into service. The unit will come online when the flow rate reaches this trip point. The unit will return to standby when a minimum of 30 minutes has elapsed **and** the flow rate falls below the trip point. Press the MENU/EXIT (↵) button to select and advance to the next screen.

```
Softener
1SD Quadplex
-----
Version : C5.0
```

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

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

18. SET CLOCK: Using the UP (▲) or DOWN (▼) buttons, set the present time, making sure that AM or PM is correct. 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 the next setting.

NOTE: The clock will need to be reset only if power is out for a long time.

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

19. SET HARDNESS: Using the UP (▲) or DOWN (▼) buttons, set the water hardness level, from 1 to 160 grains per gallon 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 the next setting.

```
Set Recharge
Time:
12:00AM
↑↓ Change      ↵ Exit
```

20. SET RECHARGE TIME: This screen is shown only for a single valve system or if Parallel Delayed recharge setting has been selected. Using the UP (▲) or DOWN (▼) buttons, set the desired time for regenerations to start. Press the MENU/EXIT (↵) button to select and advance to the next screen.

```
Recharge          3:45PM
Tonight At:
12:00AM
                               ↵ Menu
```

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

The initial programming steps for softeners are complete. Do the sanitizing procedure on page 19.

PROGRAMMING THE ELECTRONIC CONTROLLER AT STARTUP - FILTERS

FILTERS ONLY

```
Set Filter
Capacity:
Off
↑↓ Change      ␣ Next
```

21. SET FILTER CAPACITY: Using the UP (▲) or DOWN (▼) buttons, select the 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 the next setting.

```
Set Fixed
Reserve:
Automatic
↑↓ Change      ␣ Next
```

22. SET FIXED RESERVE (Simplex or Parallel Delayed systems only): If a minimum capacity must be available on any given day, use the UP (▲) or DOWN (▼) buttons to select the percentage of filter operating capacity required. 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 the next setting.

```
Set Backwash
Time:
15 Minutes
↑↓ Change      ␣ Next
```

23. SET BACKWASH TIME: Using the UP (▲) or DOWN (▼) buttons, select backwash time from 1 minute minimum to 30 minutes maximum. The minimum recommended time for filters is about 15 minutes. Increase the time as needed to thoroughly clean the filter bed. Press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set Fast Rinse
Time:
5 Minutes
↑↓ Change      ␣ Next
```

24. SET FAST RINSE TIME: Using the UP (▲) or DOWN (▼) buttons, select fast rinse time from 1 minute minimum to 30 minutes maximum. The factory setting of 5 minutes is usually adequate. Press the MENU/EXIT (␣) button to select and advance to the next setting.

```
Set Minimum Tanks
In Service:
3 Tanks
↑↓ Change      ␣ Next
```

25. SET MINIMUM TANKS IN SERVICE (Triplex and Quadplex units only): Using the UP (▲) or DOWN (▼) buttons, 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 the next setting.

```
Peak Flow
Trippoint:
0.0 gpm
↑↓ Change      ␣ Next
```

26. SET PEAK FLOW TRIP POINT: If Peak Flow was selected as the method of recharge in Step 6, this option is activated. Using the UP (▲) or DOWN (▼) buttons, select the flow rate (1.0 gallons per minute minimum to 750 gpm maximum) at which you will **temporarily** require another unit to come into service. The unit will come online when the flow rate reaches this trip point. The unit will return to standby when a minimum of 30 minutes has elapsed **and** the flow rate falls below the trip point. Press the MENU/EXIT (␣) button to select and advance to the next screen.

```
Filter
1SD Quadplex
-----
Version : C5.0
```

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

```
Set Clock:
12:00PM
↑↓ Change      ␣ Exit
```

27. SET CLOCK: Using the UP (▲) or DOWN (▼) buttons, set the present time, making sure that AM or PM is correct. 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 the next setting.

NOTE: The clock will need to be reset only if power is out for a long time.

```
Set Recharge
Time:
12:00AM
↑↓ Change      ␣ Exit
```

28. SET RECHARGE TIME (Simplex or Parallel Delayed systems only): Using the UP (▲) or DOWN (▼) buttons, set the desired time for regenerations to start. Press the MENU/EXIT (␣) button to select and advance to the next screen.

```
Water                      3:45PM
Flow Rate:
2.0 gpm
                               ␣ Menu
```

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

The initial programming steps for filters are complete.

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 into the brinewell (Figure 7, Page 12).
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.

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

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 complete, 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.

ELECTRONIC CONTROLLER - RESETTIME / RECHARGE

RESETTIME

To set the time if incorrect, or if the display is flashing after a long power outage (when power is lost, all other settings are maintained by the computer and do not require setting):

1. Press the MENU/EXIT (↵) button to enter the Primary Menu. Using the DOWN (▼) button, move the cursor (>) to **Set Clock** and press (↵) to enter this menu.

```
EXIT
Set Salt Level
>Set Clock
Set Hardness
```

2. Using the UP (▲) or DOWN (▼) buttons, set the present time, making sure that AM or PM is correct. By pressing and holding either the UP (▲) or DOWN (▼) button, the display will scroll at faster increments.

```
Set Clock

3:45 PM
↑↓ Change      ↵ Exit
```

3. When the correct time shows, press the MENU/EXIT (↵) button to select and return to the primary menu. Using the UP (▲) button, move the cursor (>) to **EXIT** and press the MENU/EXIT (↵) button to return to the normal operating screen.

```
Water              3:45 PM
Flow Rate:
2.0 gpm
                  ↵ Menu
```

RECHARGE

By pressing the RECHARGE 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 the MENU/EXIT (↵) button.

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

The **Online/Offline** menu allows a specific tank to be put online or taken offline. Move the cursor (>) next to the specific tank and press the MENU/EXIT (↵) button. This will toggle between "Online" and "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" and "Tonight".

WATER SOFTENER CONTROLLER SETUP INFORMATION

MODEL	Resin Quantity (cu. ft.)	Fill Rate (gpm)	Salt Dosage (lbs./cu. ft. of resin)	Grains Capacity	Brining Minutes	Backwash Minutes	Fast Rinse Minutes
071	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		
101, 101-1	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		
131, 131-1	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		
191, 191-1	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		
251, 251-1	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		
321, 321-1	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		

ELECTRONIC CONTROLLER - FEATURES & OPTIONS

PRIMARY MENU

The following is a description of the features and options in the Primary Menu. To enter the Primary Menu, press the MENU/EXIT (↵) button.

```
>EXIT
Set Salt Level
Set Clock
Set Hardness
```

Using the UP (▲) or DOWN (▼) buttons, 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 the MENU/EXIT (↵) button.

```
Set Salt Level:
    5
■■■■■□□□□□
↑↓ Change    ↵ Exit
```

SET SALT LEVEL (Softeners only): This screen only appears if the "Salt Monitor" feature is set to ON (Step 15). Using the UP (▲) or DOWN (▼) buttons, 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 numbers on the brinewell that the salt level is closest to. Press the MENU/EXIT (↵) button to select and return to the Primary Menu.

```
Set Clock:

3:45 PM
↑↓ Change    ↵ Exit
```

SET CLOCK: Use the UP (▲) or DOWN (▼) buttons to set the present time, making sure that AM or PM is correct. 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 return to the Primary Menu.

```
Set Hardness:

25 Grains
↑↓ Change    ↵ Exit
```

SET HARDNESS (Softeners only): Using the UP (▲) or DOWN (▼) buttons, set the water hardness level, from 1 to 160 grains per gallon 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 return to the Primary Menu.

```
Set Recharge
Time:
12:00 AM
↑↓ Change    ↵ Exit
```

SET RECHARGE TIME (Simplex or Parallel Delayed systems only): Using the UP (▲) or DOWN (▼) buttons, set the desired time for regenerations to start. Press the MENU/EXIT (↵) button to select and return to the Primary Menu.

NOTE: If a softener and filter are both being used, no more than one unit should backwash at a time.

```
T1: 2.5 gpm
T2: 3.1 gpm
T3: 1.6 gpm
T4: 2.8 gpm    ↵ Exit
```

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.

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

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.

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

AVERAGE 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.

continued on the next page

ELECTRONIC CONTROLLER - FEATURES & OPTIONS

PRIMARY MENU (continued)

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

```
Filtering      3:45 PM
Water
                ↵ Menu
```

NOTE: "Capacity Remaining" is not available for filters that have "Filter Capacity" set to OFF (Step 21). Screen will show "Filtering Water".

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

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 the MENU/EXIT (↵) button. Move the cursor (>) to EXIT and press the MENU/EXIT (↵) button to return to the Primary Menu.

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

SET 12/24 HOUR CLOCK: Using the UP (▲) or DOWN (▼) buttons, set the time format to either a 12 or 24 hour clock. Press the MENU/EXIT (↵) button to return to the Primary Menu.

```
Set English/Metric:
English
↑↓ Change    ↵ Exit
```

SET ENGLISH/METRIC: Using the UP (▲) or DOWN (▼) buttons, set the controller to measure in either English or Metric units. Press the MENU/EXIT (↵) button to return to the Primary Menu.

```
Set Rolling Display
Screens:
On
↑↓ Change    ↵ Exit
```

SET ROLLING SCREEN: Using the UP (▲) or DOWN (▼) buttons, set this feature 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 return to the Primary Menu.

ELECTRONIC CONTROLLER - FEATURES & OPTIONS

ADVANCED / SERVICE MENU

By entering these menus, a warning screen will first be displayed. Only technicians or knowledgeable users should access these menus.

The following is a description of the features and options in the Advanced / Service Menu. To enter the Advanced / Service Menu, press the MENU/EXIT (↵) button. Using the UP (▲) or DOWN (▼) buttons, move the cursor to **Advanced / Service** and press the MENU/EXIT (↵) button.

```
Set English / Metric
Set Rolling Screen
> Advanced / Service
EXIT
```

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

The warning screen will show, press the UP (▲) button to continue. To return to the Primary Menu, move the cursor (>) to EXIT and press the MENU/EXIT (↵) button.

```
> English
Español
Français
↑↓ Change  ↵ Exit
```

SET LANGUAGE: Using the UP (▲) or DOWN (▼) buttons, move the cursor (>) next to the preferred language. The choices are: English, Spanish, French, German, Italian and Dutch. Press the MENU/EXIT (↵) button to select and return to the Advanced / Service Menu.

TO SET THE SYSTEM TO YOUR NATIVE LANGUAGE IF ANOTHER LANGUAGE IS DISPLAYED:

From the run status (time of day) screen, press the MENU/EXIT (↵) button. Scroll to the bottom line of the menu. Press UP (▲) once, then press MENU/EXIT (↵). Press UP (▲) once. Press DOWN (▼) once, then press MENU/EXIT (↵). Scroll to your native language, then press MENU/EXIT (↵).

```
EXIT
> Tank 1: Online
Tank 2: Online
Tank 3: Online
```

DIAGNOSTICS: This screen is for viewing only and will show any error codes plus information on each individual tank, depending on the configuration (simplex, duplex, etc.). Move the cursor (>) next to the specific tank and press the MENU/EXIT (↵) button.

```
12:34:56PM Error0 ↑
Pos: Service 0:00
Req Pos: Service
Motor:Off Sw:Open ↓
```

Press the RECHARGE button and the valve will step through each cycle of the valve. Use the UP (▲) or DOWN (▼) buttons to view all lines of the screen. Press the MENU/EXIT (↵) button to return to the diagnostics screen, then press the MENU/EXIT (↵) button again to return to the Advanced / Service Menu.

```
Set Low Salt
Alert Level:
2
↑↓ Change  ↵ Exit
```

SET LOW SALT ALERT (Softeners only): Use the UP (▲) or DOWN (▼) buttons to change the Alert Level on a scale of 0 to 4, corresponding to the numbers on the brinewell. When the salt level falls below this level, the controller will signal that salt needs to be added to the brine tank. Press the MENU/EXIT (↵) button to select and return to the Advanced / Service Menu.

```
Set Max Days Between
Recharges:
Automatic
↑↓ Change  ↵ Exit
```

SET MAX DAYS BETWEEN RECHARGES: Use the UP (▲) or DOWN (▼) buttons to change Max Days Between Recharges. If Automatic is selected, the electronic controller will determine when to recharge, based on water usage. If 1 to 99 is selected, the unit will never go past that number of days set for a recharge, but could recharge before. Press the MENU/EXIT (↵) button to select and return to the Advanced / Service Menu.

continued on the next page

ELECTRONIC CONTROLLER - FEATURES & OPTIONS

ADVANCED / SERVICE MENU (continued)

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

SET 97% FEATURE (Simplex or Parallel Delayed systems only): Use the UP (▲) or DOWN (▼) buttons to set either OFF or ON. If ON is selected, the unit will automatically recharge when 97% of capacity has been used, at any time of the day. Press the MENU/EXIT (↵) button to select and return to the Advanced / Service Menu.

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

SET CHLORINE/BYPASS: This feature can be used to operate external equipment, such as a chlorine genera-

tor, with a 24V DC signal from the auxiliary output. Use the UP (▲) or DOWN (▼) buttons to set to Bypass (on during the entire recharge cycle) or Chlorine (on during Brining only). Press the MENU/EXIT (↵) button to select and return to the Advanced / Service Menu.

```
Set Valve
Type:
One Inch Single Disk
↑↓ Change      ↵ Next
```

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.

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

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.

```
Set English/Metric
Set Rolling Screen
>Advanced/Service
EXIT
```

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

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

The warning screen will show. Press the RECHARGE button to toggle the padlock icon. Press the MENU/EXIT (↵) button to select and return to the Primary Menu.

```
EXIT
Set Clock
Set Hardness
Set Recharge Time
```

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/Service menus.

To turn off the lockout feature:

Repeat the procedure just described. Pressing the RECHARGE button while in the warning screen will toggle on/off the lockout feature.

OPERATION

ELECTRONIC CONTROLLER AND WATER METER

As the controller computer 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 controller) 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 13). 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

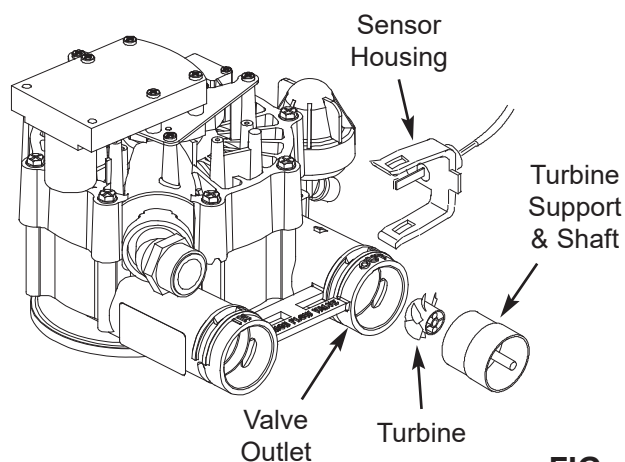


FIG. 13

and forth. This switching sends an electrical pulse through the sensor leads, to the 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.

WATER FLOW THROUGH THE SYSTEM

The water softener's media tank is filled with a synthetic 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 14): 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.

REGENERATION, or RECHARGE: The programmed controller starts regenerations at 12:00 AM, or other preset time. Regeneration consists of 5 steps, or cycles. These are fill, brining, brine rinse, backwash and fast rinse.

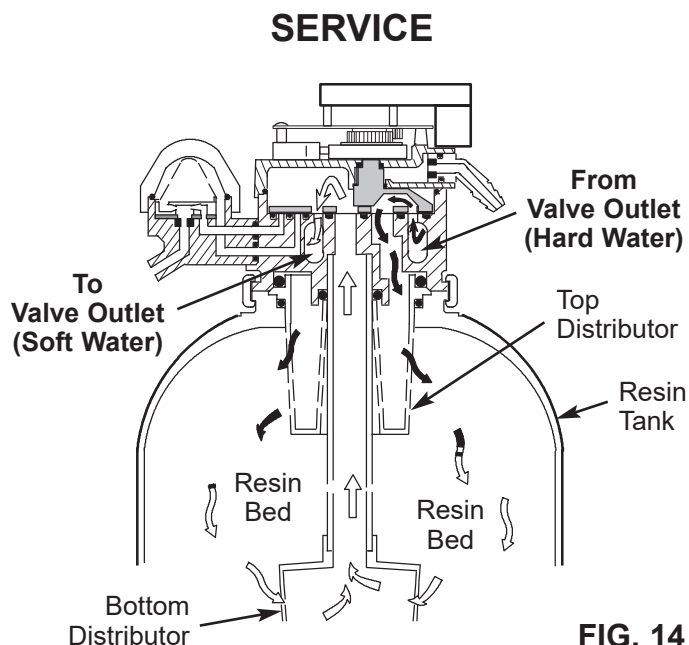


FIG. 14

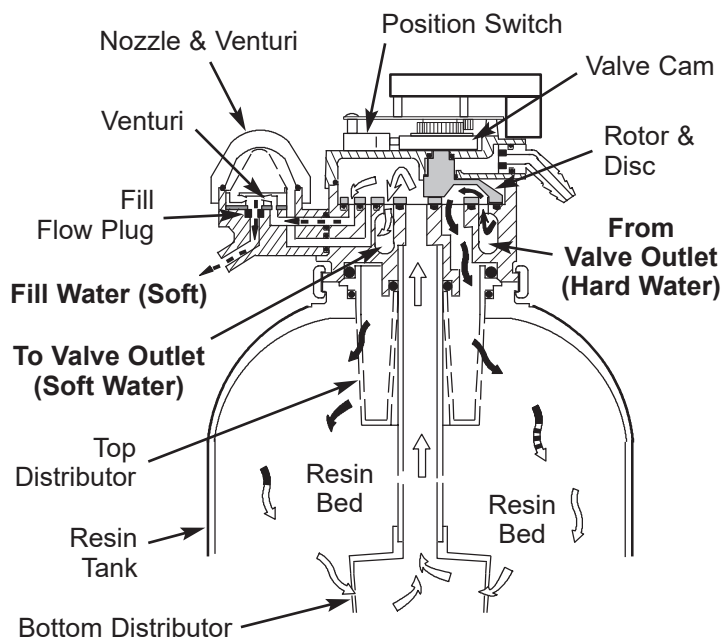
continued on page 27

OPERATION

WATER FLOW THROUGH THE SYSTEM (Continued)

FILL (Softeners Only)

Models 071 & 071-1



All Other Models

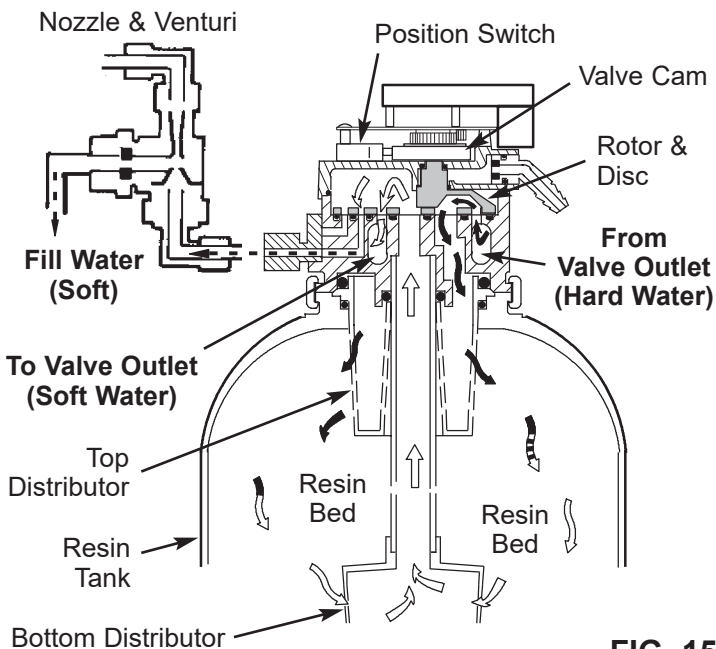
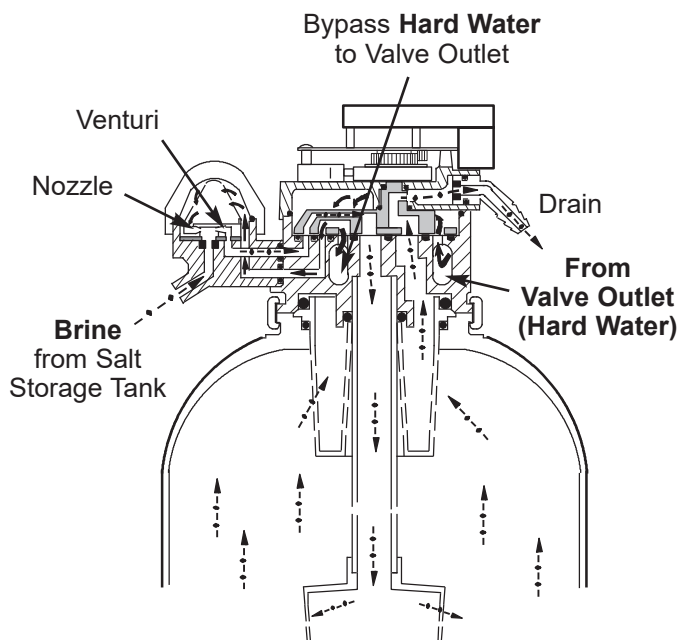


FIG. 15

BRINING and BRINE RINSE (Softeners Only)

Models 071 & 071-1



All Other Models

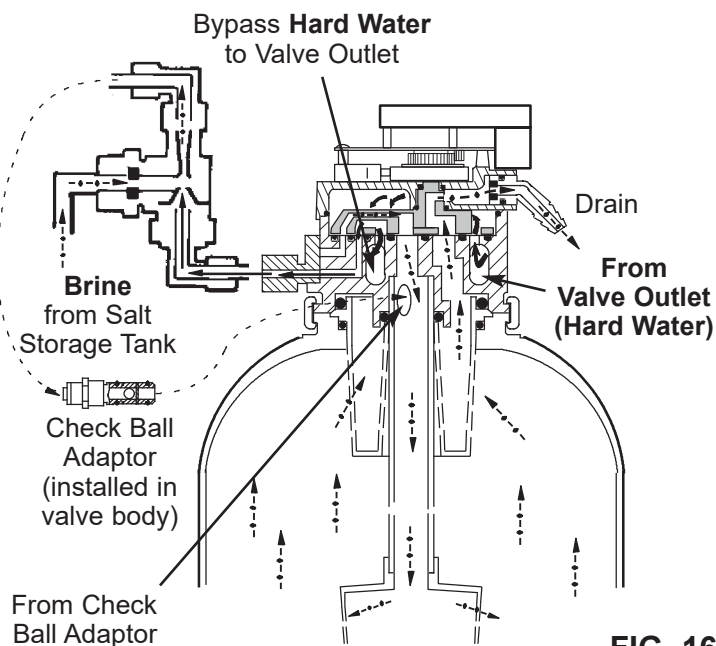


FIG. 16

OPERATION

WATER FLOW THROUGH THE SYSTEM (Continued)

FILL (Figure 15): 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 into 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 16): The controller 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 5.

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.

BACKWASH (Figure 17): 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 18): 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.

* See Repair Parts List, page 39, for more information on hard water bypass.

BACKWASH

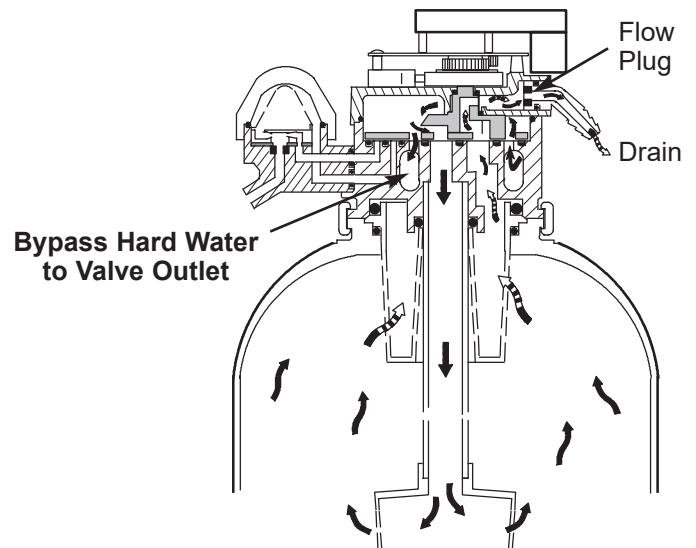


FIG. 17

FAST RINSE

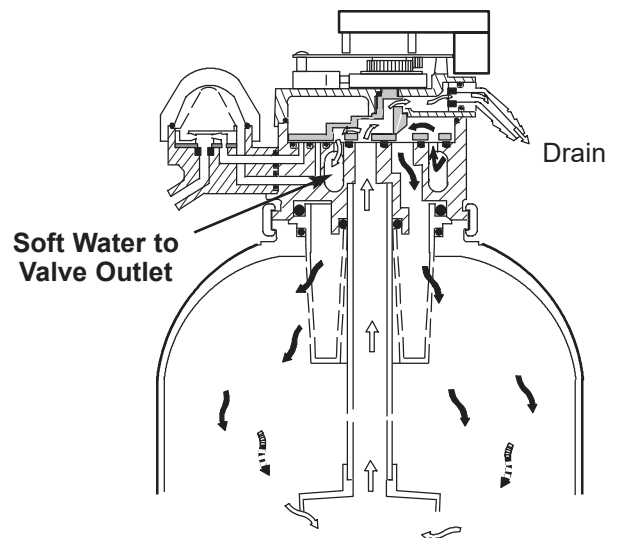


FIG. 18

SERVICE INFORMATION

REFILLING WITH SALT

Remove the brine tank cover and check the salt storage level frequently. Refill if less than half full. In humid areas, it is best to keep the salt storage level lower, and to refill more often. Make sure the brinewell cover is on.

RECOMMENDED SALT: Nugget, pellet, button, coarse solar, etc., water conditioner salt is recommended. This type of salt is from high purity evaporated crystals, sometimes formed, or compressed, into briquets. 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 REMOVING ADDITIVES: Some salts have an additive to help a water conditioner handle iron in a water supply. Although this additive may help keep the resin bed clean, it may also release corrosive fumes.

BREAKING A SALT BRIDGE

Sometimes, a hard layer or salt bridge forms in the brine tank. This is usually caused by high humidity. If such a layer occurs, 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. Do not pound on the tank walls.

SERVICE INFORMATION

CLEANING THE NOZZLE & VENTURI

A clean nozzle and venturi is a must for the softener to work properly. The nozzle and venturi creates the suction to transfer brine solution from the brine tank, into the resin tank. If either should become plugged with iron, sand, silt, dirt, etc., the brine will not get to the resin bed to regenerate it, and you will have hard water.

1" valve models use two different nozzle assembly designs. Figure 19 shows the assembly used on Models 071 and 071-1. All other models use the nozzle assembly in Figure 20.

NOZZLE ASSEMBLY - MODELS 071 & 071-1

To get to the nozzle venturi, remove the unit's 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 LOSE 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 o-ring seal with silicone grease and place in position. Install and tighten the cap. **DO NOT OVERTIGHTEN** and break the cap or housing.

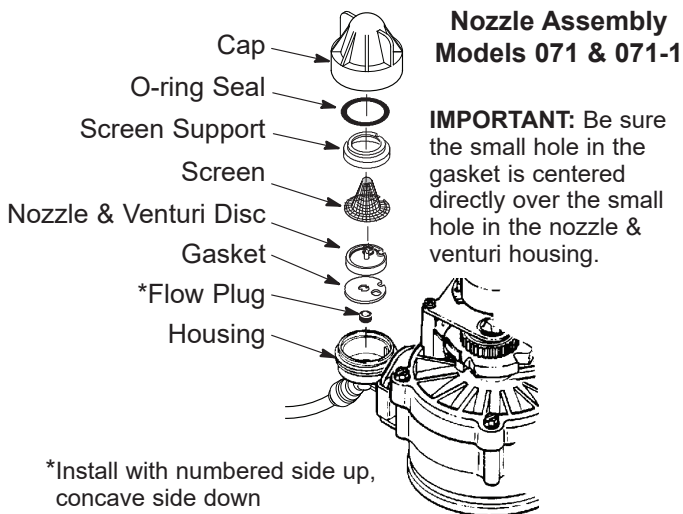


FIG. 19

NOZZLE ASSEMBLY - ALL MODELS EXCEPT 071 & 071-1

NOTE: Be sure the softener is in SERVICE position (no water pressure at nozzle assembly).

1. Disconnect bottom tubing at the nozzle assembly and unscrew nozzle housing from nozzle and venturi housing.
2. Unscrew nozzle from nozzle housing. Remove venturi with a long, needle-nose pliers, if needed (center hole of venturi can be cleaned 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 MISSHAPE 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. **DO NOT OMIT THE O-RING SEAL ON THE NOZZLE.**
5. Reinstall the nozzle housing and reconnect the tubing.

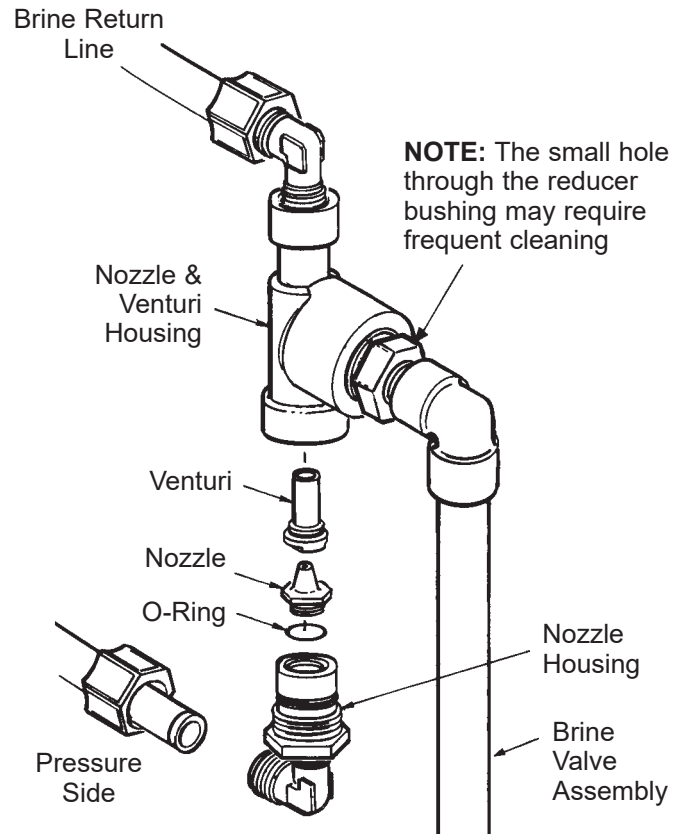


FIG. 20

SERVICE INFORMATION

TROUBLESHOOTING

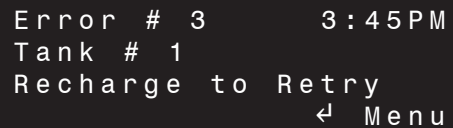
ALWAYS MAKE THE INITIAL CHECKS FIRST:

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 table on page 31.
2. Plumbing bypass valve(s) must be in service position (all the way open or closed, as applies. See page 13).
3. Inlet, outlet and drain must connect to the conditioner as shown on pages 10 and 11.
4. Is the power supply plugged into a "live" 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 28).
6. Is the brine tubing connected? See step 3, page 12.
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, perform MANUAL ELECTRONIC DIAGNOSTICS, and the MANUAL ADVANCE REGENERATION CHECK, page 32.

AUTOMATIC ELECTRONIC DIAGNOSTICS

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



```
Error # 3      3:45 PM
Tank # 1
Recharge to Retry
               ↵ Menu
```

The chart on the next page 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 the MENU/EXIT (↵) button can be used. MENU/EXIT (↵) remains operational so the service technician can perform the Manual Electronic Diagnostics to further isolate the problem, 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 controller. There would be no need to go into the online/offline screen to put the unit back online.

Procedure for removing error code from the controller:

Press the RECHARGE button, or:

1. Unplug the power supply.
2. Correct problem.
3. Plug the power supply back in.
4. Wait 6 minutes.

The error code will return if the problem was not corrected.

**If you have questions when installing, programming, operating or maintaining this system
CALL TOLL FREE: 1-800-627-3497**

SERVICE INFORMATION

PROBLEM	POSSIBLE CAUSE	POSSIBLE CORRECTION
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 power supply fuse blown.	Plug the power supply into an outlet and measure output voltage with a multi-meter. Should be between 24 and 30 volts DC.
Fuse keeps blowing.	Wiring harness shorted or not connected properly.	Check connections at controller box and valve. Connect all other wires before plugging power supply into outlet.
Cannot set some control parameters and display shows a padlock icon: 	Lockout feature is on.	Turn off lockout feature (see page 24).
Error code 1, 3 or 4 displayed.	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 that proper valve configuration is selected on 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; lubricate piston.
Error code 6 displayed.	Optional immediate regeneration switch is stuck in the on position.	Check red wires from power cable for possible shorts. Check immediate regeneration switch.

MANUAL ELECTRONIC DIAGNOSTICS

1. Make the preceding (page 30) INITIAL CHECKS first.
2. Enter the diagnostics screen on the controller (page 23) and using the DOWN (▼) button, view the turbine information.

```

Pos: Service 0:00 ↑
Req Pos: Service
Motor:Off 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.

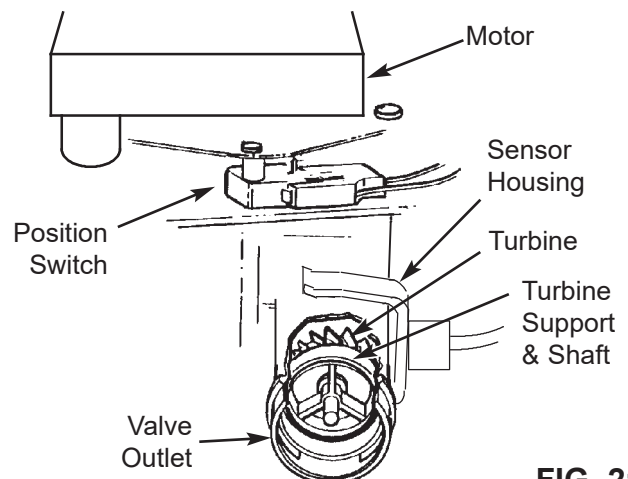


FIG. 21

SERVICE INFORMATION

MANUAL ADVANCE REGENERATION CHECK

This check verifies proper operation of the gear-motor, 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.

In this procedure you will use the RECHARGE button to manually advance the valve into each position and check the various valve cycles.

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

```
EXIT
Recharge All Now
> Tank 1: Fill
Tank 2: Service
```

1. Press the RECHARGE button to enter the recharge menu, move the cursor (>) to Recharge Now and press the MENU/EXIT (←) button.
2. Move the cursor (>) to the tank you wish to check.
3. Press the RECHARGE button to advance the valve through each position in the recharge sequence.

FILL: Remove the brinewell cover and, using a flashlight, observe fill water entering the tank. 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 28).

If the unit does not draw brine, check for:

- Dirty or defective nozzle and venturi (see page 29)
- Restriction in valve drain, causing 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. If flow is slow, check for a plugged internal riser pipe, backwash flow controls, drain piping, fouled filter 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.

4. To return the valve to service position, press the RECHARGE button once again.

NOTE: On multiple tank systems, if you use the “Recharge All Now” option, the first tank advances to the service position before the second tank begins the regeneration cycle.

OTHER SERVICE

HARD WATER BYPASS (raw water “bleeds” into filtered water supply).

- Defective disc, seal or wave washer (see key nos. 117, 112 and 139, page 38).
- Missing or defective o-ring(s) at resin tank to valve connection (see key no. 81 or 83, page 36).

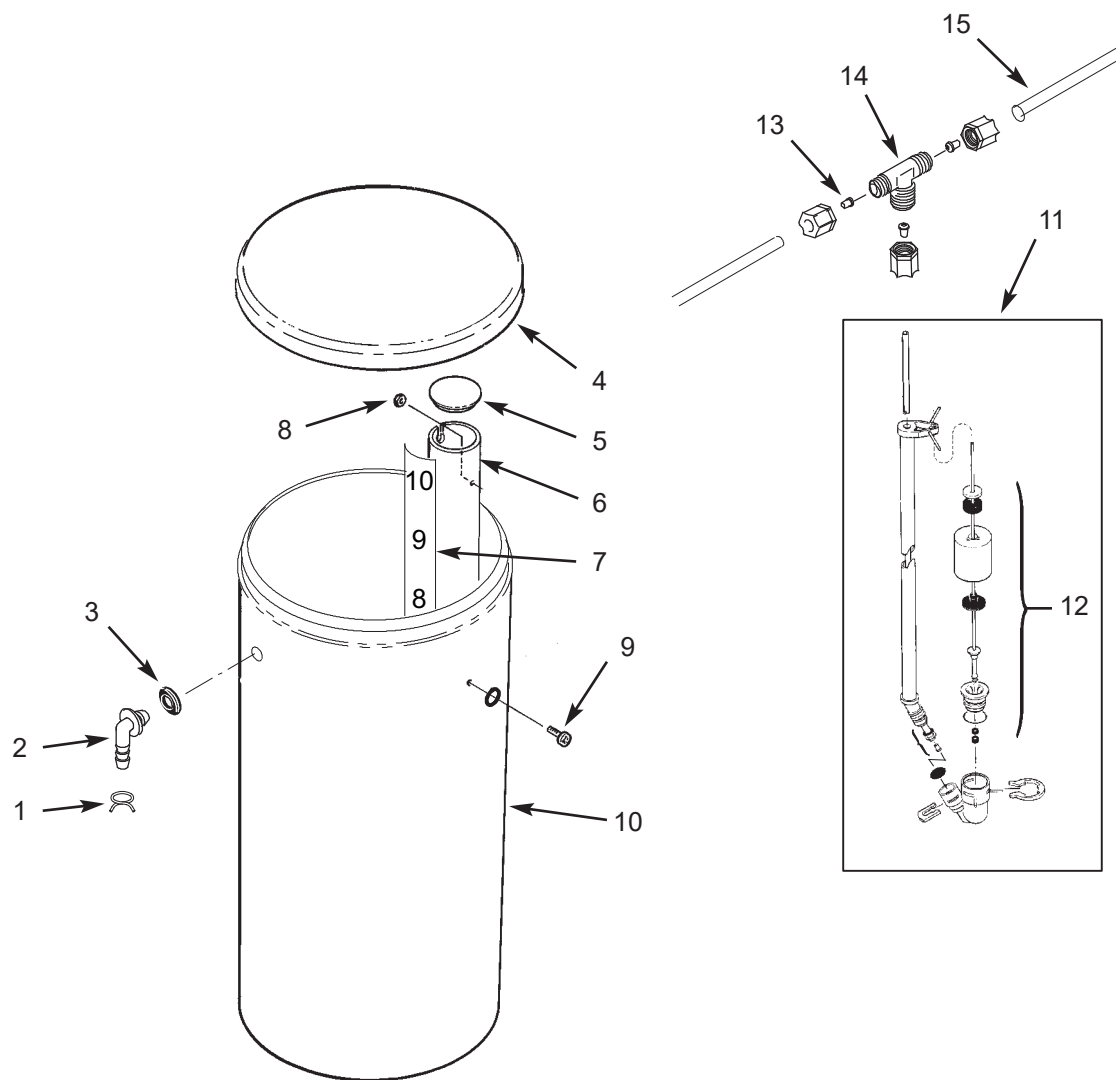
WATER LEAKS FROM DRAIN HOSE (valve in Service position)

- Defective disc, seal or wave washer.

WATER HAS SALTY TASTE

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

REPAIR PARTS - BRINE TANK (Models 071 & 071-1)



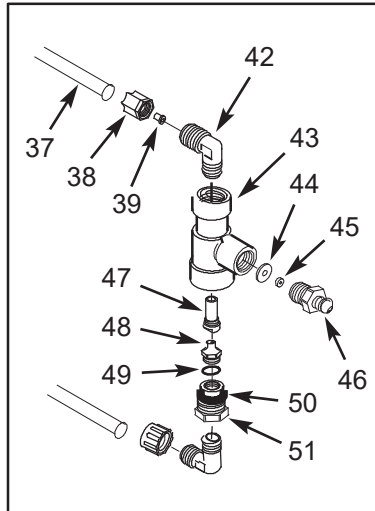
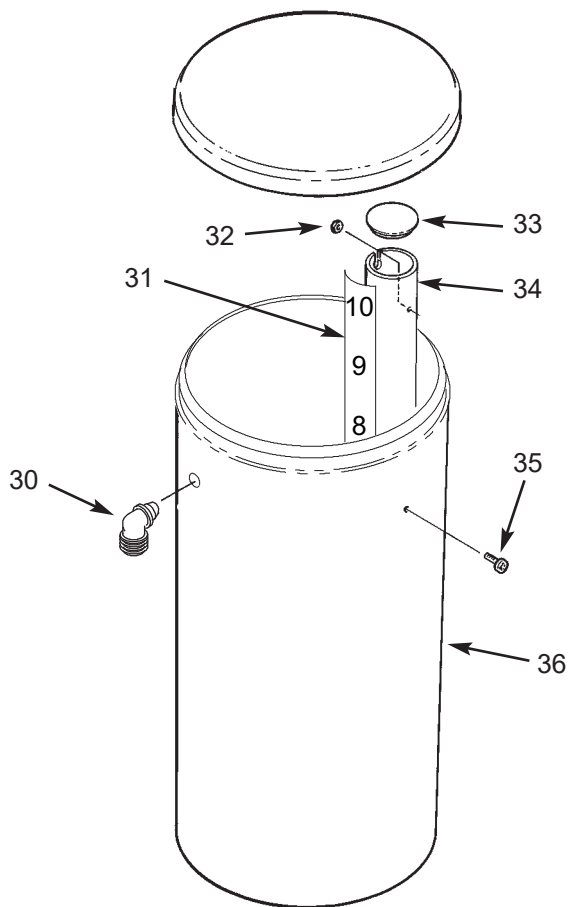
Key No.	Part No.	Description
—	7331258	Overflow Hose Adaptor Kit (includes Key Nos. 1-3)
1	↑	Hose Clamp *
2	↑	Tubing Adaptor
3	↑	Grommet
4	7180437	Brine Tank Cover
5	7219888	Cover, Brinewell
6	7109871	Brinewell
7	7243853	Decal, Brinewell
—	7331648	Brinewell Mounting Hardware Kit (includes Key Nos. 8 & 9)
8	↑	Nut, 1/4-20
9	↑	Screw, 1/4-20 x 5/8"

Key No.	Part No.	Description
10	7112612	Brine Tank (includes Key Nos. 6, 8 & 9)
11	7310210	Brine Valve Assembly
12	7327568	Float, Stem & Guide Assembly

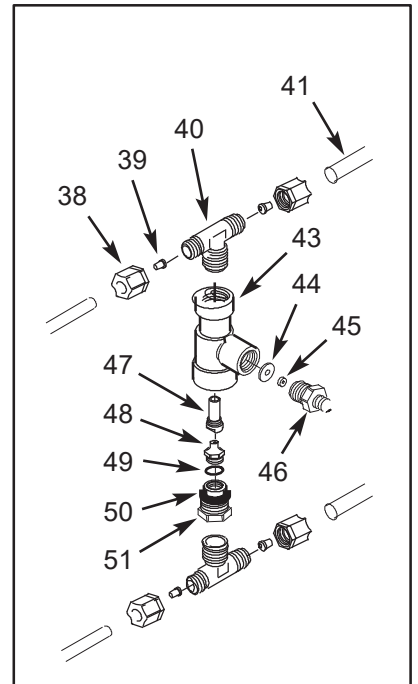
MULTIPLE TANK SYSTEMS		
13	7094979	Insert, Tubing (3 req.)
14	7056612	Tee, Tubing (5/16")
15	7161807	Tubing, 5/16" O.D. x 20 ft. *
	7161768	Tubing, 5/16" O.D. x 100 ft. *

* Not included with softener / filter

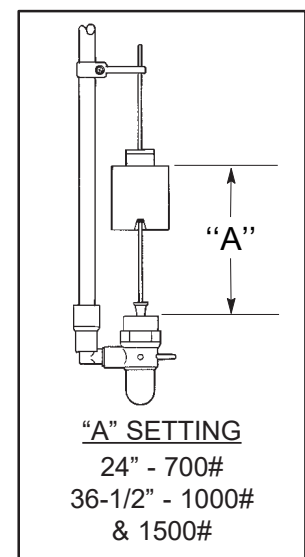
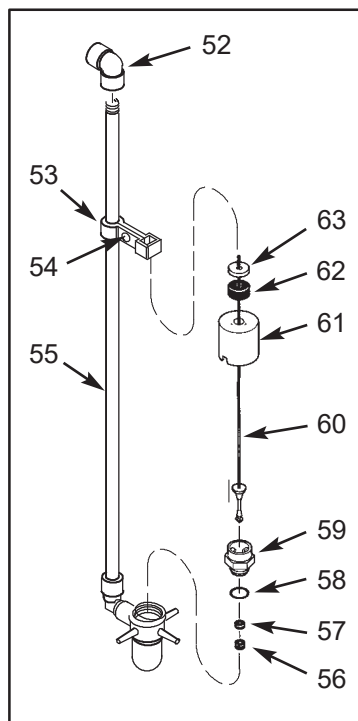
REPAIR PARTS - BRINE TANKS (All Other Softener Models)



SINGLE SYSTEMS



MULTIPLE SYSTEMS



REPAIR PARTS - BRINE TANKS (All Other Softener Models)

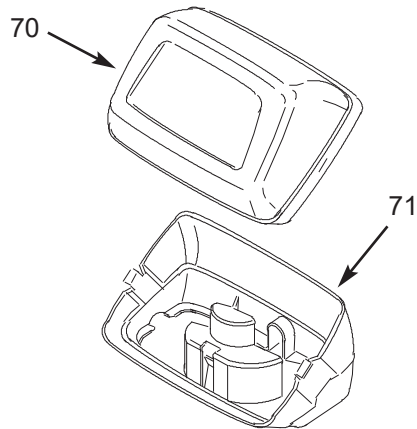
Key No.	Part No.	Description
30	0523819	Drain Elbow
31	7243853	Decal, Brinewell
32	7082150	Wing Nut
33	7222051	Cover, Brinewell
34	0980067	Brinewell
35	7178634	Screw, 1/4-20 x 5/8"
36	7227027	Brine Tank, w/Cover, Models 101 & 131
	7227035	Brine Tank, w/Cover, Models 191, 251 & 321
37	7168435	Tubing, 3/8" x 5-1/2 ft. (2 req.)
38	9003203	Nut, 3/8" (2 req.)
39	7131349	Insert, Tubing (2 req.)
40	7226966	Tee, 3/8" NPT x 3/8" Tube (2 req.)
41	7092781	Tubing, 3/8" x 10 ft. (4 req.)
42	9004503	Elbow (2 req.)
43	1109600	Housing, Nozzle & Venturi
44	1135200	Seal Disc
45	7128396	Flow Plug, 0.5 gpm
46	7128401	Bushing, 1/2" NPT (includes Key Nos. 44 & 45)
47	7126645	Venturi, Almond, Models 101 & 131
	7127772	Venturi, Gray, Mod's 191, 251 & 321

Key No.	Part No.	Description
48	7126637	Nozzle, White, Models 101 & 131
	7127764	Nozzle, Gray, Mod's 191, 251 & 321
49	0900060	O-Ring, 3/8" x 1/2"
50	7170327	O-Ring, 5/8" x 13/16"
51	1109700	Housing, Nozzle
52	9007700	Elbow, 1/2" NPT
53	1112200	Float Rod Guide
54	9006071	Screw, #6-20 x 7/8"
55	7234595	Repl. Riser Pipe & Elbow Assembly
56	0516924	Retainer, Bottom Seal
57	0516211	Bottom Seal
58	9000804	O-Ring, 7/8" x 1"
59	0517030	Nut, Brine Valve
60	2174500	Float Rod & Stem
61	2220300	Float Assembly
62	0513860	Float Stop
63	7168647	Ceramic Washer
■	7231262	Brine Valve Assembly (includes Key Nos. 43-46, 49-63 & Nozzle/Venturi 47 & 48 for Models 191, 251 & 321)
■	7157280	Tubing, 3/8" O.D. x 20 ft. ★

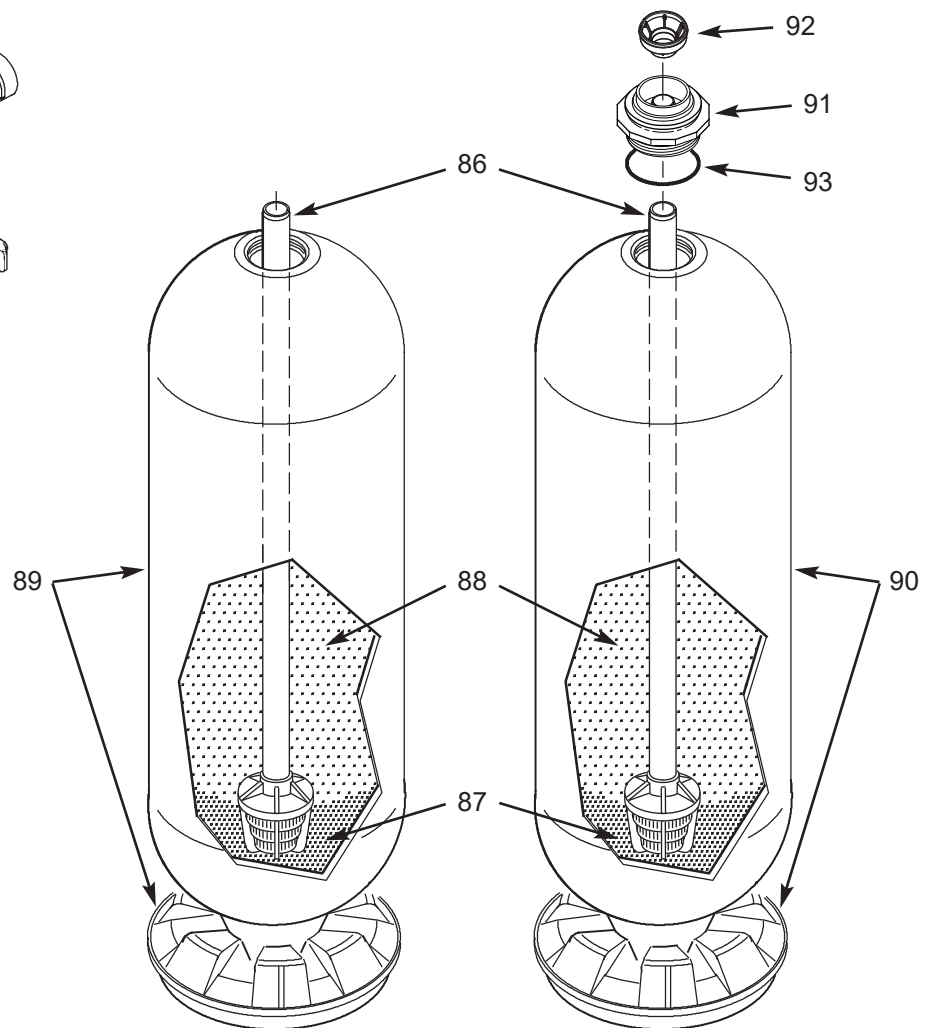
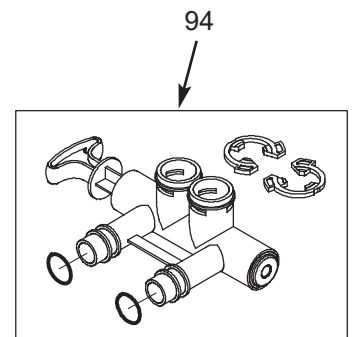
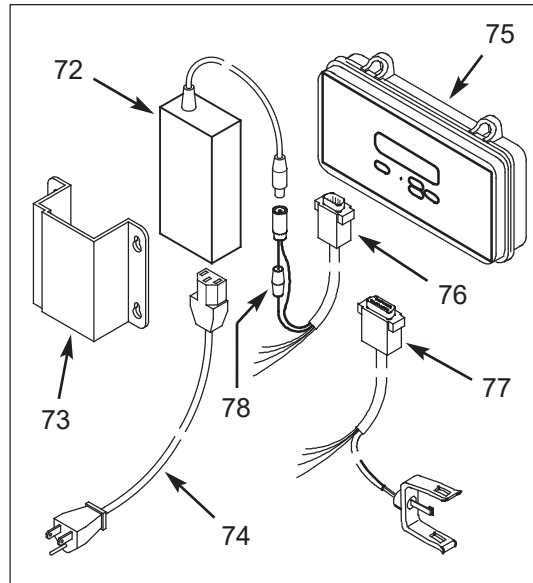
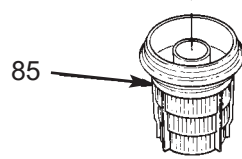
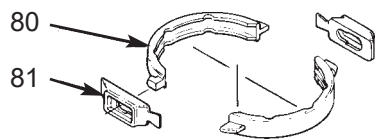
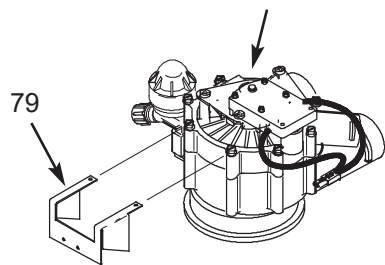
■ Not illustrated.

★ Not included with softener/filter

REPAIR PARTS - RESIN / MINERAL TANK ASSEMBLIES



Valve Assembly
See Pages 38-39
for parts



REPAIR PARTS - RESIN / MINERAL TANK ASSEMBLIES

Key No.	Part No.	Description
70	7174868	Cover
–	7370105	Decal, Cover
71	7189449	Cover, Bottom, Filters & Softener Model 071
	7222750	Cover, Bottom, All Other Softener Models
72	7362673	Power Supply, 24V DC, 65W
73	7377987	Bracket, Power Supply
74	7362720	Line Power Cord
75	7362974	Control Box, CUC2, Generic
	7362958	Control Box, CUC2, North Star
76	7362607	Power Cable, CUC2
77	7322372	Controller Cable & Sensor Asm.
78		Fuse, AGC 3A 250V, Purchase locally, replace with same type and value only.
79	7288219	Bracket, Control Box
–	7331177	Tank Neck Kit (includes 2 ea. of Key Nos. 80 & 81)
80	↑	Clamp Section (2 req)
81	↑	Retainer Clip (2 req.)
–	7112963	Distributor O-Ring Kit (includes Key Nos. 82-84)
82	↑	O-Ring, 2-7/8" x 3-1/4"
83	↑	O-Ring, 13-16" x 1-1/16"
84	↑	O-Ring, 2-3/4" x 3"
85	7077870	Top Distributor, Softener Models
	7088855	Top Distributor, Filter Models
86	7127895	Repl. Bottom Distributor

Key No.	Part No.	Description
87	7124415	Gravel - Fine, 17 lbs. ❶
	7124423	Gravel - Fine, 50 lbs. ❶
	7127073	Gravel - Medium, 50 lbs. ❶
	4104600	Gravel - Coarse, 17 lbs. ❶
88	0502272	Resin, 1 cu. ft. ❶
	0993080	Filter Sand, 50 lb. bag ❶
	7336834	Activated Carbon, 1 cu. ft. ❶
	7331101	Manganese Greensand, 1/2 cu. ft. ❶
	0993070	Anthracite, 50 lbs./cu.ft. ❶
	0993090	Garnet, 50 lb. bag ❶
89	7169457	Resin Tank w/base, 12" dia. x 54", ★ Models 071 & 121
	7169465	Resin Tank w/base, 17" dia. x 58", ★ Models 101, 131 & 171
	7141409	Resin Tank w/base, 24" dia. x 72", ★ Models 191, 251 & 321
90	7391787	Resin Tank w/base, 16" dia. x 65", Models 101-1, 131-1 & 171-1
	7391800	Resin Tank w/base, 24" dia. x 72", Models 191-1, 251-1 & 321-1
–	7395642	Neck Adapter Kit (includes 2 ea. of Key Nos. 80 & 81, 1 ea. of Key Nos. 82, 83 & 91-93)
91	↑	Neck Adapter
92	7265025	Filter Screen
93	9001100	O-Ring, 4-1/8" x 4-1/2"

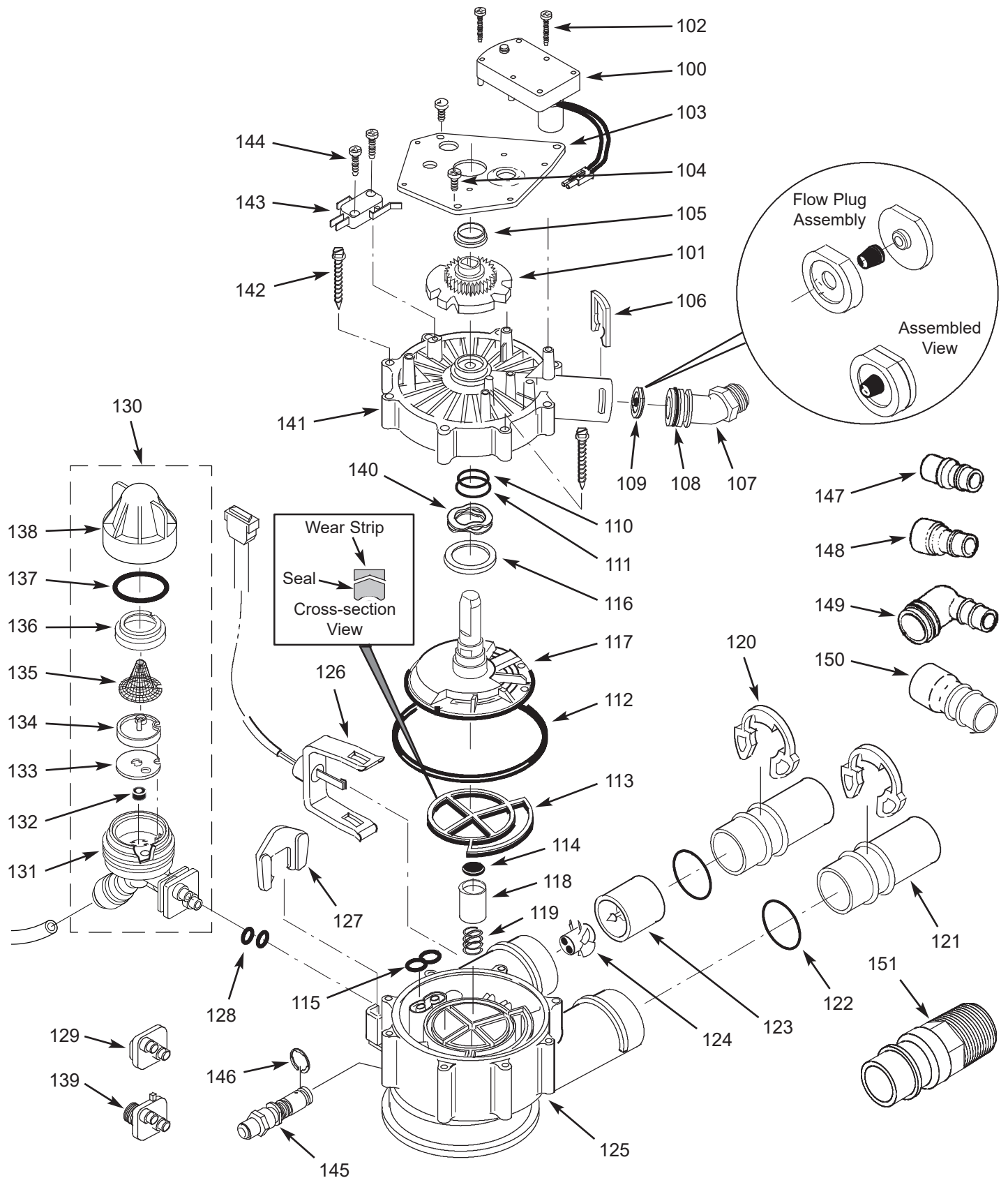
ACCESSORIES		
94	7214383	Bypass Valve
■	7286005	Controller Extension Cable, 20 ft.

■ Not illustrated.

❶ See page 3 for amounts required.

★ Includes Key Nos. 80-84, 85 (softener type) & 86.

REPAIR PARTS - VALVE ASSEMBLY



REPAIR PARTS - VALVE ASSEMBLY

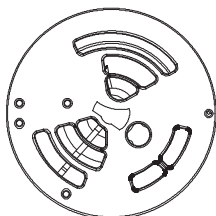
Key No.	Part No.	Description
—	7384714	Motor, Cam & Gear Kit, 1" (includes Key Nos. 100-102)
100	↑	Motor
101	↑	Cam & Gear
102	7224087	Screw, #8-32 x 1" (2 req.)
103	7231393	Motor Plate
104	0900857	Screw, #6-20 x 3/8" (3 req.)
105	7171250	Bearing
106	7169180	Clip, Drain
107	7172793	Drain Hose Adaptor
108	7170288	O-Ring, 15/16" x 1-3/16", single
	7336402	O-Ring, 15/16" x 1-3/16", pack of 20
109	7197808	Flow Plug, 3 gpm, Model 071
	7178202	Flow Plug, 7 gpm, Models 121XS, 121CS, 101 & 131
	7178210	Flow Plug, 10 gpm, Models 121GS, 121MS, 191, 251 & 231
	7178228	Flow Plug, 15 gpm, 171XS & 171CS
—	7185487	Seal Kit (Incl. Key Nos. 110-115)
110	↑	O-Ring, 5/8" x 13/16"
111	↑	O-Ring, 1-1/8" x 1-1/2"
112	↑	O-Ring, 4-1/2" x 4-7/8"
113	↑	Rotor Seal
114	↑	Seal
115	↑	Seal, Nozzle & Venturi
116	7174313	Bearing, Wave Washer
117	7185500	Rotor & Disc, Single Tank, Filters & Softener Model 071
	7229590	Rotor & Disc, Multiple Tank, Filters & Softener Model 071 +
	7229582	Rotor & Disc, Single Tank, All Other Softener Models
	7229605	Rotor & Disc, Multiple Tank, All Other Softener Models +
118	7171187	Plug, Drain Seal
119	7129889	Spring
120	7089306	Clip, 1", single (2 req.)
	7336428	Clip, 1", pack of 20
121	7077642	Copper Tube, 1", single (2 req.)
	7344138	Copper Tube, 1", pack of 10 (includes 10 ea. of Key No. 122)
122	7311127	O-Ring, 1-1/16" x 1-5/16", single (2 req.)
	7336410	O-Ring, 1-1/16" x 1-5/16", pack of 20

Key No.	Part No.	Description
—	7331703	Turbine & Support Assembly (incl. 1 ea. of Key Nos. 123, 124 & 2 ea. of Key No. 122)
123	↑	Turbine Support & Shaft
124	↑	Turbine
125	7171145	Valve Body, Filters & Soft. Model 071
	7222988	Valve Body, All Other Soft. Models
126	7322372	Controller Cable & Sensor Asm.
127	7081201	Retainer, Nozzle & Venturi
128	7170319	O-Ring, 1/4" x 3/8" (2 req.)
129	7100940	Plug, Filter Models
130	7398721	Nozzle & Venturi Assembly, Model 071 (incl. Key Nos. 127, 128 & 131-138)
131	↑	Housing, Nozzle & Venturi, Mod. 071
132	↑	Flow Plug, 0.3 gpm, Model 071
133	↑	Gasket, Model 071
134	↑	Nozzle & Venturi Disc, Blue, Model 071
135	↑	Screen, Model 071
136	↑	Screen Support, Model 071
137	↑	O-Ring, 1-1/8" x 1-3/8", Model 071
138	↑	Cap, Model 071
■	7298913	Repl. Nozzle, Venturi & Gasket Kit Model 071 (includes Key Nos. 128, 133, 134 & 137)
139	7128760	Adaptor, All Other Softener Models
140	7175199	Wave Washer
141	7171161	Valve Cover
142	7172997	Screw, #10-14 x 2-5/8" (8 req.)
143	7305150	Switch
144	7140738	Screw, #4-24 x 3/4" (2 req.)
145	7222938	Insert, Check Ball
146	7222954	E-Ring

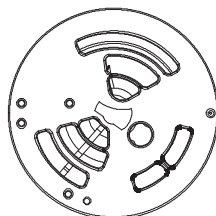
OPTIONAL INLET / OUTLET FITTINGS

147	7104546	CPVC Nipple
148	7129211	1-1/2" Adaptor Fittings
149	7120259	Elbow, Extends inlet and/or outlet in any 90° direction
150	7234553	1-1/4" Copper Tube
151	7271204	1" Plastic Installation Adaptor, single
	7336614	1" Plastic Install. Adaptor, pack of 10 (includes 10 ea. of Key No. 122)

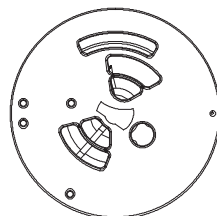
+ Multiple Tank Systems use special rotor & discs to prevent the use of hard water during regeneration. See illustrations below.



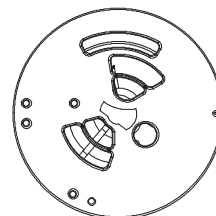
Rotor & Disc, Single Tank, Filters & Softener Model 071



Rotor & Disc, Single Tank, All Other Softener Models



Rotor & Disc, Multiple Tank, Filters & Softener Model 071



Rotor & Disc, Multiple Tank, All Other Softener Models

LIMITED WARRANTY

Warrantor: Water Channel Partners, 1890 Woodlane Drive, Woodbury, MN 55125

Warrantor guarantees to the original purchaser when the product is purchased from an authorized dealer, and when installed and maintained in accordance with the instructions, that:

for a period of TEN (10) YEARS from the date the product is delivered, the FIBERGLASS RESIN / MINERAL TANK will not rust, corrode, leak, burst, or in any other manner, fail to perform in accordance with its written specifications (moisture barrier is not guaranteed) and that,

for a period of THREE (3) YEARS from the date the product is delivered, the SALT TANK will not rust, corrode, leak, burst, or in any other manner, fail to perform in accordance with its written specifications and that,

for a period of THREE (3) YEARS from the date the product is delivered, the ELECTRONIC FACEPLATE will be free of defects in materials and workmanship and will perform in accordance with its written specifications, and that,

for a period of ONE (1) YEAR from the date the product is delivered, ALL OTHER PARTS will be free of defects in materials and workmanship and will perform in accordance with their written specifications.

If, during such respective period, a part proves, after inspection by Warrantor, to be defective, Warrantor will, at its sole option repair or replace that part at no charge, other than normal shipping, installation or service charges. If a repair or replacement part is unavailable, Warrantor may refund the original purchase price.

General Provisions

The above warranties are effective provided the water softener is operated at water pressures not exceeding 125 psi (8.8 kg/cm²), and at water temperatures not exceeding 100°F (38°C); provided further that the water softener is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the water softener is not damaged as the result of any force of nature such as, but not limited to, flood, hurricane, tornado or earthquake.

The limited warranty does not cover damage due to: (a) transportation, (b) storage, (c) improper use, (d) failure to follow the product instructions or to perform any preventive maintenance, (e) modifications, (f) unauthorized repair, (g) normal wear and tear, or (h) external causes such as accidents, abuse, or other actions or events beyond Warrantor's reasonable control. Use of aftermarket, used, or non-manufacturer provided parts will void all warranties. Warranty does not cover failures due to improper product installation. Warrantor is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages, or other circumstances beyond its control.

THERE ARE NO WARRANTIES ON THE WATER SOFTENER BEYOND THOSE SPECIFICALLY DESCRIBED ABOVE. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED TO THE EXTENT THEY MIGHT EXTEND BEYOND THE ABOVE PERIODS. THE SOLE OBLIGATION OF WARRANTOR UNDER THESE WARRANTIES IS TO REPLACE OR REPAIR THE COMPONENT OR PART WHICH PROVES TO BE DEFECTIVE WITHIN THE SPECIFIED TIME PERIOD, AND WARRANTOR IS NOT LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. NO DEALER, AGENT, REPRESENTATIVE, OR OTHER PERSON IS AUTHORIZED TO EXTEND OR EXPAND THE WARRANTIES EXPRESSLY DESCRIBED ABOVE.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which vary from state to state. This warranty applies to consumer-owned installations only.