

Installation, Operation and Maintenance

2" Commercial Water Softeners

Series: PWS20, PWS20-2 & PWS20-P



PWS20 Simplex Systems



PWS20-2 Duplex Alternating Systems



PWS20-P Duplex, Triplex and Quadplex Progressive Systems



Congratulations on your purchase of this Watts® commercial water softening solution.

You have made a great choice to protect your plumbing system against the damaging effects of hard water. This system has been engineered for trouble free operation and produced using top quality components. Simple programming, corrosion resistant mineral tank(s) and an easy to service design ensures this system will be durable and easy to maintain.

Thank You!

The Watts Team

Softened water provides a wide variety of benefits such as reducing the potential of lime scale formation in boilers, water heaters and heat exchangers to protecting the remainder of the plumbing system from costly maintenance and down time associated with the negative effects of hard water.

⚠ WARNING

Please read carefully before proceeding with installation. Your failure to follow any attached instructions or operating parameters may lead to the product's failure. Keep this Manual for future reference.

**⚠ WARNING**

If you are unsure about installing your Watts water softener contact a Watts representative or consult a professional water treatment dealer or plumber.

You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product. **FAILURE TO COMPLY WITH PROPER INSTALLATION AND MAINTENANCE INSTRUCTIONS COULD RESULT IN PRODUCT FAILURE WHICH CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.** Watts is not responsible for damages resulting from improper installation and/or maintenance. Local building or plumbing codes may require modifications to the information provided. You are required to consult the local building and plumbing codes prior to installation. If this information is not consistent with local building or plumbing codes, the local codes should be followed.

Save manual for future reference.

Refer to the enclosed for operating parameters to ensure proper use with your water supply.

- As with all plumbing projects, it is recommended that a trained professional water treatment dealer or contractor install the water conditioning system. Please follow all local plumbing codes for installing this water conditioning system.
- Inspect the water conditioning system for carrier shortage or shipping damage before beginning installation. Replace any damaged component immediately, before beginning installation.
- Use caution when installing soldered metal piping near the water conditioning system. Heat can adversely affect the system's components.
- Use only lead-free solder and flux for sweat-solder connections, as required by state, province and federal codes.
- Handle all components of the system with care. Do not drop, drag or turn components upside down.
- Be sure the floor under the system is clean, level and strong enough to support the system while in operation.
- Install the system in a protected area.
- Do not attempt to treat water over 110°F (43°C) or under 34°F (1°C) with the system.
- Always connect the system to the main water supply pipe before the water heater.
- Do not install in direct sunlight as overheating of electronics may occur and ultraviolet rays from the sun may cause damage.
- Do not use on water that is microbiologically unsafe or of unknown quality. This system will not make microbiologically unsafe water safe. Water that is unsafe must be treated separately from this conditioner.
- Operating ambient temperature: 34° to 100°F (1° to 43°C).
- Operating water pressure range : 25 to 125psi (171 kPa to 8.6 bar).
- All plumbing connections to the system should be made using industry accepted best practices. Plumbing tape or paste may be used on metal inlet and outlet plumbing connections. Do not use paste type pipe thread sealants on the system's plastic plumbing connections.

- Do not use petroleum-based lubricants such as Vaseline, oils or hydrocarbon-based lubricants on O-rings or valve seals. Use only 100% silicone lubricants.
- Use only the power transformer supplied with this water conditioning system.
- All electrical connections must be completed according to local codes.
- The power outlet must be grounded.
- For installations where plastic plumbing is used, install an appropriate grounding strap across the inlet and outlet piping of the building's metal plumbing to ensure that a proper ground is maintained.
- To disconnect power, unplug the AC adapter from its power source.
- Observe drain line requirements.
- Support the full weight of the plumbing system with pipe hangers or other means.
- Do not allow this water conditioning system to freeze. Damage from freezing will void this water conditioning system's warranty.
- It is established that when daytime water pressure exceeds 80psi (5.5 bar), the maximum pressure rating of 125psi (8.6 bar) can be exceeded. A pressure regulator must be installed on this system or warranty is voided.
- Periodic cleaning and maintenance is required for system to function properly.
- Observe all warnings that appear in this manual.
- Keep the media tank in the upright position. Do not turn upside down or drop. Turning the tank upside down or laying the tank on its side can cause media to enter the valve.
- Use only regenerants designed for water conditioning. Do not use ice melting salt, block salt or rock salt.

How To Use This Manual

This installation manual is designed to guide the installer through the process of installing and starting up this commercial water conditioning systems.

This manual is a reference and will not include every system installation situation. The person installing this equipment should have:

- Training on the control valve.
- Knowledge of water conditioning and how to determine proper control settings.
- Adequate plumbing skills.

⚠ WARNING

Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

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Introduction

Principals of Softening- Ion Exchange

In nature, water acts as a solvent that dissolves substances it comes in contact with such as solid rock. When water dissolves limestone rock, which is composed of calcium and magnesium, the solid calcium and magnesium become ions. This means they have been dissolved into the water and are now a liquid. An ion with a positive electrical charge is called a cation. Calcium and magnesium hardness ions in water are positively charged cations. When water dissolves enough calcium and magnesium hardness cations it is classified as hard water, which can cause lime scale build up in plumbing systems, water spots, and an increase in soap and cleaning product usage.

Ion exchange water softening is a process where an ion exchange resin is used to effectively exchange calcium and magnesium hardness cations for sodium cations in the water.

New, or freshly regenerated, ion exchange resin is saturated with sodium cations. As calcium and magnesium hardness cations come in contact with the ion exchange resin, they attach to the resin and sodium cations are released into the water. This is possible because the hardness cation are more attracted to the ion exchange resin than the sodium cations. Therefore, scale forming calcium and magnesium cations have been exchanged for non-scale forming sodium cations as the water is treated. If the calcium and magnesium content of the water is reduced to less than 17.1 mg/L, that water is classified as soft water.

Eventually the ion exchange resin will become exhausted, depleted of sodium, and will need to be regenerated with a sodium brine solution to restore its capacity to soften water. This system includes a flow meter to track treated water volume and initiate the regeneration process before resin exhaustion occurs.

Regeneration occurs automatically and consists of 5 steps:

Step 1- Backwash

Approximate Duration 10 Minutes- Fresh water flow is directed upward through the resin bed, to remove solid particles the resin bed has captured, sending them to drain.

Step 2- Brine Draw

Approximate Duration 15-20 Minutes- Brine water is drawn from the brine tank, rinsed over the ion exchange resin, driving away the calcium and magnesium cations and restoring sodium cations within the resin. Calcium and magnesium is sent to drain.

Step 3- Slow Rinse

Approximate Duration 40-45 Minutes- Once the brine tank is emptied of brine water, fresh water will continue to rinse over the resin and rinse calcium and magnesium cations to drain.

Step 4- Rapid Rinse

Approximate Duration 10 Minutes- After the conclusion of slow rinse, fresh water will rinse over the resin to ensure any residual sodium brine has been cleaned from the resin before it returns to service.

At the conclusion of Rapid Rinse:

Simplex single tank systems return to the "In Service" position. Multi tank systems remain in the "Stand By" position.

Step 5- Brine Tank Refill

Approximate Duration User Adjustable- In this final step of regeneration, water is added back into the brine tank so that a brine solution can be prepared for the next regeneration.

Project Data Sheet

Job Details

Job Number: _____

Model Number: _____

Water Hardness: _____ ppm or gpg

Capacity Per Unit: _____

Mineral Tank Size: _____ Diameter: _____ Height: _____

Salt Setting per Regeneration: _____

Regenerant Flow: _____ Upflow _____ Downflow _____

1. Meter Size:

A. ¾" Paddle Wheel

B. ¾" Turbine

C. 1" Paddle Wheel

D. 1" Turbine

E. 1½" Electronic Inline Plastic Turbine

F. 1½" Paddle Wheel

G. 2" Paddle Wheel: Stainless Steel _____ Brass _____ Plastic _____

H. Generic _____ Pulse Count _____ Meter Size _____

2. System Type:

A. System #4: 1 Mineral Tank, 1 Meter, Immediate, or Delayed Regeneration

B. System #7: 2 Mineral Tanks, 1 Meter, Immediate Regeneration

C. System #14: 2-8 Mineral Tanks, 2-8 Meters, Immediate Regeneration,

Progressive Flow Tank Staging- GPM Threshold for Progressive

Feature _____

D. _____ Other: System # Description _____

3. Controller Program Settings:

A. Backwash: _____ Minutes

B. Brine and Slow Rinse: _____ Minutes

C. Rapid Rinse: _____ Minutes

D. Brine Tank Refill: _____ Minutes

E. Pause Time: _____ Minutes

4. Drain Line Flow Control: _____ gpm

5. Brine Line Flow Control: _____ gpm

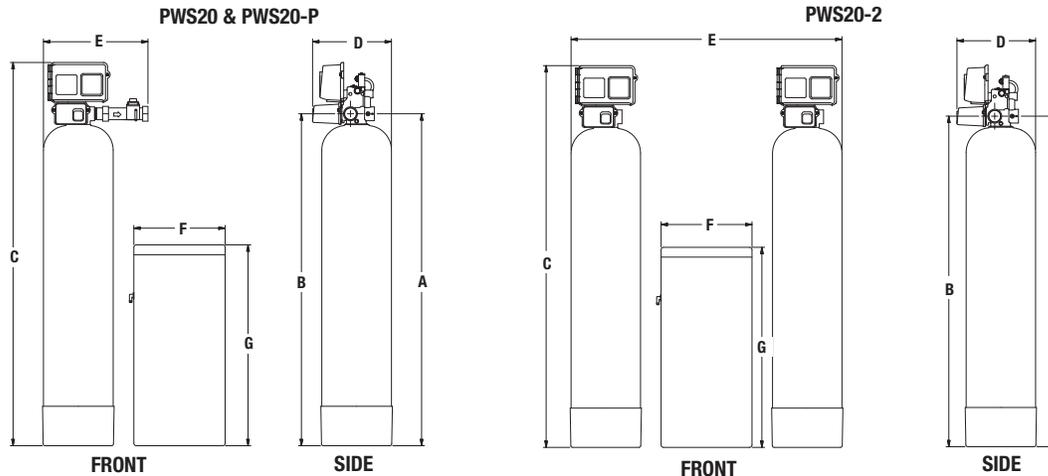
6. Injector Size#: _____

7. Water Pressure: _____

8. Water Temperature: _____

System Specifications

Dimensions - Weights



NOTICE

Dimensional data is for a single mineral tank system ONLY. PWS20-P models are composed of multiple PWS20 systems. See Space Required in table below.

Series PWS20 & PWS20-P

MODEL NO.	DIMENSIONS								WEIGHTS							
	A		B		C		D		E		F		G		lbs.	kgs.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
PWS20131D11	67 ³ / ₈	1711	67 ³ / ₈	1711	77 ⁷ / ₈	1978	16	406	21 ¹ / ₄	538	18	457	40	1016	265	120
PWS20131E11	67 ³ / ₄	1721	67 ³ / ₄	1721	77 ¹ / ₈	1959	17	432	22 ¹ / ₄	564	18	457	40	1016	350	159
PWS20131F11	68 ¹ / ₂	1740	68 ¹ / ₂	1740	78 ¹⁵ / ₁₆	2004	18 ¹ / ₈	460	23 ¹ / ₄	589	24	607	41	1041	400	182
PWS20131G11	70 ¹ / ₂	1791	70 ¹ / ₂	1791	80 ¹⁵ / ₁₆	2055	21 ¹ / ₈	536	24 ¹¹ / ₁₆	627	24	607	50	1270	600	273
PWS20131H11	76 ³ / ₄	1949	76 ³ / ₄	1949	87 ¹ / ₈	2213	24 ¹ / ₈	613	26 ¹ / ₄	665	30	762	50	1270	710	323
PWS20131I11	80 ¹ / ₄	2038	80 ¹ / ₄	2038	93 ¹ / ₈	2302	30 ¹ / ₈	765	30 ¹ / ₈	764	39	991	48	1219	1160	527
PWS20131J11	86	2184	86	2184	97 ⁷ / ₁₆	2449	36 ¹ / ₈	917	36 ¹ / ₈	917	39	991	60	1524	1560	709

Series PWS20-2

MODEL NO.	DIMENSIONS								WEIGHTS							
	A		B		C		D		E		F		G		lbs.	kgs.
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
PWS20131D21	67 ³ / ₈	1711	67 ³ / ₈	1711	77 ⁷ / ₈	1978	16	406	60	1524	18	457	40	1016	450	205
PWS20131E21	67 ³ / ₄	1721	67 ³ / ₄	1721	77 ¹ / ₈	1959	17	432	60	1524	18	457	40	1016	500	227
PWS20131F21	68 ¹ / ₂	1740	68 ¹ / ₂	1740	78 ¹⁵ / ₁₆	2004	18 ¹ / ₈	460	70	1778	24	610	41	1041	800	364
PWS20131G21	70 ¹ / ₂	1791	70 ¹ / ₂	1791	80 ¹⁵ / ₁₆	2055	21 ¹ / ₈	536	75	1905	24	610	50	1270	1200	545
PWS20131H21	76 ³ / ₄	1949	76 ³ / ₄	1949	87 ¹ / ₈	2213	24 ¹ / ₈	613	87	2210	30	762	50	1270	1400	636
PWS20131I21	80 ¹ / ₄	2038	80 ¹ / ₄	2038	93 ¹ / ₈	2302	30 ¹ / ₈	765	104	2642	39	991	48	1219	2200	1000
PWS20131J21	86	2184	86	2184	97 ⁷ / ₁₆	2449	36 ¹ / ₈	917	115	2921	39	991	60	1524	3000	1364

NOTICE

Service gpm is for a single mineral tank system ONLY. For PWS20-P Series systems, you will need to multiply the Service gpm by (x2) for Duplex, (x3) for Triplex and (x4) for Quadplex systems.

Specifications

MODEL NO.	MINERAL TANK			BRINE TANK		SOFTENING CAPACITY		LBS. SALT PER REGENERATION		FLOW RATE & PRESSURE		
	TANK SIZE	RESIN Ft ³	GRAVEL	TANK SIZE	SALT FILL	MAX	MIN	MAX	MIN	SERV GPM	DROP PSI	BKW GPM
PWS20131D11	14" x 65"	3	60 lbs.	18" x 40"	400	90 K	60 K	45	18	25/40	15/25	5
PWS20131E11	16" x 65"	4	80 lbs.	18" x 40"	400	120 K	80 K	60	24	35/55	15/25	7
PWS20131F11	18" x 65"	5	100 lbs.	24" x 41"	600	150 K	100 K	75	30	57/65	15/25	10
PWS20131G11	21" x 62"	7	100 lbs.	24" x 50"	600	210 K	140 K	105	42	60/77	15/25	12
PWS20131H11	24" x 72"	10	200 lbs.	30" x 50"	1200	300 K	200 K	150	60	74/97	15/25	15
PWS20131I11	30" x 72"	15	400 lbs.	39" x 48"	2200	450 K	300 K	225	90	80/100	15/25	25
PWS20131J11	36" x 72"	20	500 lbs.	39" x 60"	2200	600 K	400 K	300	120	84/105	15/25	35

System Specifications

Ordering Information for 2" Simplex and Duplex Alternating Softeners

MODEL NO.	ORDERING CODES	DESCRIPTION	SPACE REQUIRED D X W X H	WEIGHT LBS
PWS20131D11	7100031	3 Cubic Foot 2" Simplex Softener with Flow Meter	18" x 39" x 87"	265
PWS20131E11	7100032	4 Cubic Foot 2" Simplex Softener with Flow Meter	18" x 39" x 87"	350
PWS20131F11	7100033	5 Cubic Foot 2" Simplex Softener with Flow Meter	24" x 48" x 89"	400
PWS20131G11	7100034	7 Cubic Foot 2" Simplex Softener with Flow Meter	24" x 52" x 89"	600
PWS20131H11	7100035	10 Cubic Foot 2" Simplex Softener with Flow Meter	30" x 60" x 96"	710
PWS20131I11	7100036	15 Cubic Foot 2" Simplex Softener with Flow Meter	39" x 75" x 106"	1160
PWS20131J11	7100037	20 Cubic Foot 2" Simplex Softener with Flow Meter	39" x 81" x 107"	1560
PWS20131D21	7100038	3 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	18" x 60" x 87"	450
PWS20131E21	7100039	4 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	18" x 64" x 87"	500
PWS20131F21	7100040	5 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	24" x 72" x 89"	800
PWS20131G21	7100041	7 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	24" x 80" x 89"	1200
PWS20131H21	7100042	10 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	30" x 90" x 96"	1400
PWS20131I21	7100043	15 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	39" x 111" x 106"	2200
PWS20131J21	7100044	20 Cubic Foot 2" Duplex Alternating Softener with Flow Meter	39" x 123" x 107"	3000

Ordering Information for 2" Duplex Progressive Softeners

MODEL NO.	ORDERING CODE	DESCRIPTION	SPACE REQUIRED D X W X H	WEIGHT LBS
PWS20131D22	7100726	3 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	38" x 55" x 87"	530
PWS20131E22	7100727	4 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	39" x 57" x 87"	700
PWS20131F22	7100728	5 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	46" x 59" x 89"	800
PWS20131G22	7100729	7 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	49" x 62" x 91"	1200
PWS20131H22	7100645	10 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	59" x 65" x 98"	1420
PWS20131I22	7100646	15 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	74" x 73" x 104"	2320
PWS20131J22	7100647	20 Cubic Foot 2" Progressive Duplex Softener with Flow Meters	80" x 85" x 108"	3120

Ordering Information for 2" Triplex Progressive Softeners

MODEL NO.	ORDERING CODE	DESCRIPTION	SPACE REQUIRED D X W X H	WEIGHT LBS
PWS20131D33	7100730	3 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	38" x 82" x 87"	795
PWS20131E33	7100731	4 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	39" x 85" x 87"	1050
PWS20131F33	7100732	5 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	46" x 88" x 89"	1200
PWS20131G33	7100733	7 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	49" x 92" x 91"	1800
PWS20131H33	7100648	10 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	59" x 97" x 98"	2130
PWS20131I33	7100649	15 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	74" x 109" x 104"	3480
PWS20131J33	7100650	20 Cubic Foot 2" Progressive Triplex Softener with Flow Meters	80" x 127" x 108"	4680

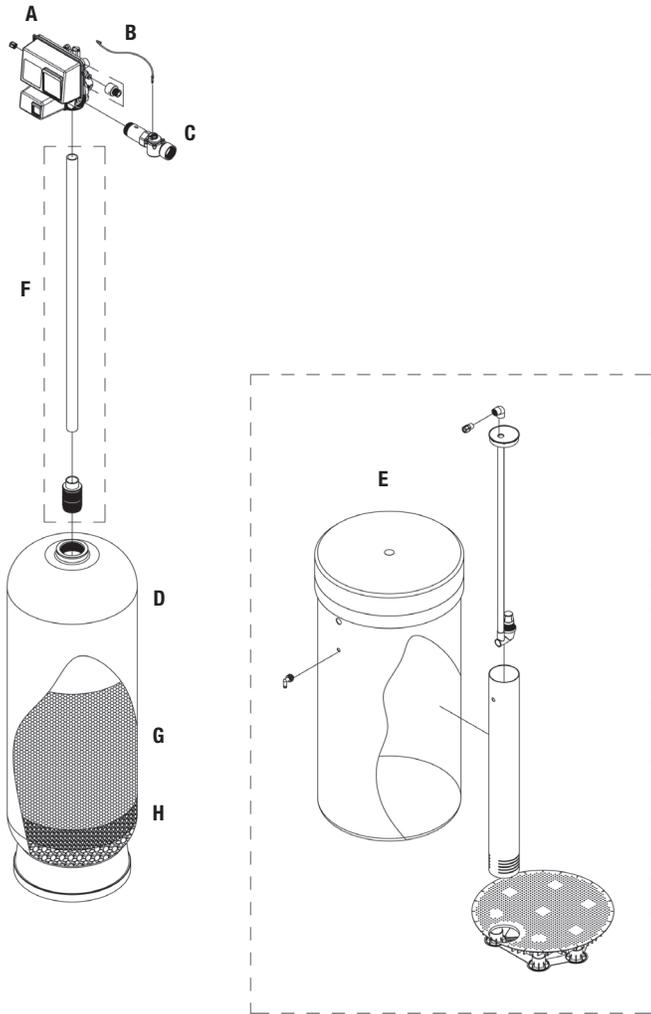
Ordering Information for 2" Quadplex Progressive Softeners

MODEL NO.	ORDERING CODE	DESCRIPTION	SPACE REQUIRED D X W X H	WEIGHT LBS
PWS20131D44	7100734	3 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	38" x 109" x 87"	1060
PWS20131E44	7100735	4 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	39" x 113" x 87"	1400
PWS20131F44	7100736	5 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	46" x 117" x 89"	1600
PWS20131G44	7100737	7 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	46" x 123" x 91"	2400
PWS20131H44	7100738	10 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	59" x 129" x 98"	2840
PWS20131I44	7100739	15 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	74" x 145" x 104"	4640
PWS20131J44	7100740	20 Cubic Foot 2" Progressive Quadplex Softener with Flow Meters	80" x 169" x 108"	6240

Notes: Capacities are based on resin manufacturer's data and are dependent upon influent water TDS, temperature, bed depth, and flow rates. Feed water must be free of oil and color. Pipe size, tank size, and space requirements are in inches. Capacities and flow rates expressed above are per tank. Flow rates listed at 25psi drops are for intermittent peak flow rates and are not to be used as continuous flows.

Set Up

Unpack system and make sure all components are accounted for according to the diagram below according to your specific series number. If any components are missing or damaged contact your Watts representative. If they can not be reached contact Watts customer service at 1-800-224-1299.



Operating Parameters

pH	6 to 10
Hardness (maximum)	Depends on customer's acceptable hardness leakage level
Water Pressure	25psi to 125psi (171 kPa to 8.6 bar)
Temperature	34 - 110°F (1 - 43°C)
Free Chlorine (maximum)	1mg/L
Iron (maximum)	1mg/L
Oil and H2S	None Allowed
Turbidity	Less than 5.0 NTU
Total Dissolved Solids	Must be below 750mg/L for the softener to produce less than 1 grain per gallon soft water
Minimum Ambient Temperature	34°F/1°C
Maximum Ambient Temperature	120°F/52°C
Maximum Humidity	75%
Power Supply Input Voltage	100-240 VAC
Power Supply Input Frequency	50/60 Hz
Power Supply Output Voltage	24 VDC
Power Supply Output Current	2.7 amps (per control valve)
Maximum Altitude	2,000 meters above sea level
Water known to have heavy loads of dirt and debris may require pre-filtration prior to the water softening system.	
For all other guideline information please contact your Watts representative.	

QUANTITY OF MAJOR COMPONENTS BY SERIES

COMPONENT LABEL	COMPONENT	PWS20 SIMPLEX	PWS20-2 DUPLEX ALTERNATING	PWS20-P DUPLEX PROGRESSIVE	PWS20-P TRIPLEX PROGRESSIVE	PWS20-P QUADPLEX PROGRESSIVE
A	Number of Control Valves	1	2	2	3	4
B	Number of Drain Line Flow Controllers*	1	2	2	3	4
C	Number of Flow Meters	1	1	2	3	4
D	Number of Mineral Tanks	1	2	2	3	4
E	Number of Brine Tanks	1	1	2	3	4
F	Number of Distributor Tubes*	1	2	2	3	4
G	Resin**	Quantity Varies Depending On System Size				
H	Gravel**	Quantity Varies Depending On System Size				

*Drain line flow controllers may come factory assembled on control valve's drain port depending on size. Distributor tubes ship inside mineral tanks.

**Resin and gravel are supplied in bulk on pallets. The proper amount is supplied for the system.

Divide resin and gravel equally between the number of mineral tanks. See page 6 Specifications table for media quantity by tank size.

System Installation

Pre-Installation Considerations

- A minimum of 25psi of water pressure is required for regeneration valve to operate effectively.
- A continuous 115 volt, 60 Hertz current supply is required. Make certain the current supply is always hot and cannot be turned off with another switch.
- Condition of existing plumbing should be free from lime and iron buildup. Piping that is built up heavily with lime and/or iron should be replaced. If piping is clogged with iron, a separate iron filter unit should be installed ahead of the water softener.
- The softener should be located close to a drain.
- Always provide for the installation of a bypass valve.
- The full weight of the plumbing system must be supported by pipe hangers or other means.
- Do not install the system where it would block access to the water heater, main water shutoff, water meter, or electrical panels.
- Install the system in a place where water damage is least likely to occur if a leak develops.
- If applicable, use di-electric unions where dissimilar metals are present.

NOTICE

The main control valve and all plumbing connections have right-hand threads. Turn clockwise to install.

NOTICE

If O-ring lubricant is required, only use a silicone based compound formulated for potable water O-ring applications. Watts recommends Ordering Code #7300948 Silicone Lubricant. The use of other types of lubricants may attack the control's plastic or rubber components. Petroleum-based lubricants can cause swelling in rubber parts, including O-rings and seals.

⚠ WARNING

Do not exceed water pressure of 125psi (8.6 bar). Do not exceed 110°F (43°C). Do not subject unit to freezing conditions.

General Installation Instructions

1. Turn off water heater(s).
2. Turn off the main water supply to the building and open a treated water faucet (cold and hot) to relieve any pressure within the plumbing system.
3. Place the mineral tank(s) in the desired installation location. Make sure that the location is level and sturdy enough to support the weight of the system once it is in operation.
4. After the mineral tank(s) have been placed into their final position, and will not need to be moved again, load the mineral tanks with resin and gravel media following the instructions below:
 - 4a. Inspect the distributor screens for damage, and make sure all screens are present before loading the mineral tank with media. Before proceeding with installation, replace any damaged components immediately.
 - 4b. Cap the top open end of the distributor tube with tape and plastic sheeting to keep all media and foreign debris from entering the distributor tube. This cap must be secure and not come off during media loading.
 - 4c. Place the distributor tube, screen end down, into the mineral tank and center it in the bottom. The top of the distributor tube should be flush with the top of the tank. Test the tape cap to make sure it can not come off during the media loading process.
 - 4d. For systems 24" in diameter and larger, fill the mineral tank $\frac{1}{3}$ full with water to prevent breakage of the distributor tube screens during the media loading process. This step is not required for tanks smaller than 24" in diameter.
 - 4e. Make sure the plastic and tape cap is secure to the top of the distributor tube, place a funnel on the top of the tank and load first the gravel (if different sizes of gravel are used load the largest gravel first, then the smaller gravel) then the softening resin into the tank. The cap must not come off of the distributor tube during the loading of the media.
 - 4f. Remove the funnel from the top of the tank and plastic cap and tape from the top of the distributor tube. **DO NOT PULL UP ON THE DISTRIBUTOR TUBE** when removing the cap. The distributor tube top must remain flush with the top of the tank.
 - 4g. Clean any media from the threads and top of the mineral tank. Media in the threads and on the O-ring sealing surface of the tank can cause tank thread damage and prevent the control valve's O-ring seal from sealing properly.
 - 4h. Lubricate the O-rings on the bottom of the control valve (distributor tube port O-ring and top of tank O-ring). Use nonpetroleum based silicone lubricant only.
 - 4i. Press the factory supplied black upper diffuser into the base of the control valve.
 - 4j. Place the control valve on top of the tank. When performing this step, seat the top of the distributor tube inside the distributor port located on the bottom of the control valve first, then press the control valve down until the control valve threads come in contact with the tank threads. This ensures that the distributor tube is properly seated into the bottom of the control valve.
 - 4k. Tighten the control valve onto the tank with a clockwise rotation. Be careful not to cross thread the control valve to tank connection or over tighten it. A hand tight fit is appropriate for the control valve torque. **DO NOT** use a wrench. Tank or control valve damage could result. **DO NOT** apply thread sealant or plumbing tape on the control valve to tank threaded connection.
- 5*. Install flow meter(s). For PWS20 Simplex and PWS20-P Progressive Series systems, apply a suitable thread sealant to the male threads of the meter(s) and with the meter's direction of flow arrow pointing in the direction of water flow, install the meter(s) directly into the outlet port(s) of the system control valve(s). For PWS20-2 Series Duplex Alternating systems, apply a suitable thread sealant and install the meter in the common outlet water line of the two control valves within 30" of the nearest control valve's controller. The meter's direction of flow arrow must point in the direction of water flow.
- 6*. Rotate meter(s) clockwise to tighten, by gripping the meter(s) on the hexagonal surface with a wrench, and continue to tighten the water meter(s) until the meter dome(s) is pointing straight up.

System Installation

- 7*. Connect the cold water supply to the inlet port of the water softening system's control valve(s). When constructing the supply line, install an inlet water isolation valve and plumbing union fitting (user supplied) in the supply line of each control valve and close the isolation valve. The union fitting(s) should be located between the isolation valve and the systems inlet port.
- 8*. Install an inlet water sample port in the supply line and close it.
- 9*. If risk of vacuum exists, install Watts # 0556031 vacuum relief valve in the supply line to protect the system against vacuum damage.
- 10*. Connect the outlet water connection of the water meter(s) for PWS20 and PWS20-P systems, and the control valve outlet water ports for PWS20-2 systems, to the water line requiring softened water. When constructing this outlet water line, install an outlet water isolation valve and plumbing union fitting (user supplied) in the outlet line of each control valve and close the isolation valve. The union fitting(s) should be located between the outlet of the control valve(s) and the outlet isolation valve(s).
- 11*. Install an outlet water sample port on the outlet water line of the system and close it.
- 12*. Install a bypass valve between the inlet and outlet plumbing water lines and close it.
- 13*. If not already factory installed on the control valve, attach the drain line flow controller directly to the control valve's drain port. See page 11 for connection detail. The flow arrow on the drain line flow controller must point towards the drain receptacle. Only plumbing tape is allowed on the drain line flow controller fitting threads.

⚠ WARNING

Operating a system without a drain line flow controller will cause all media to flow out of the system through the drain line.

- 14*. Construct the drain line routing it to an appropriate drain receptacle abiding by all local building and plumbing codes. DO NOT construct drain line to elevations that exceed 4 feet above the drain port of the control valve, or reduce the drain line diameter to smaller than that of the drain line flow controller. Install a plumbing union fitting in the drain line close to the drain line flow controller. The drain line must be anchored to the floor.
- 15*. Connect the brine tank to the water softener's control valve brine port using the factory supplied fittings and tubing. See page 11 for connection detail. The brine tank should set on a common elevation as the mineral tank and within distance so that it can be reached by the length of factory supplied brine tubing. Add enough water (6") to the brine tank so that water covers the top of the air check. DO NOT add salt to the brine tank at this time.
16. Connect meter cable(s) into meter dome(s) according to Figure 1. NXT2 & SXT controller meter cable(s) must use side port on meter dome(s). Connect the other end of the meter cable(s) to the control valve's P5 port located on the control valve's controller of the control valve the meter is plumbed into. For PWS20-2 series systems, connect the meter cable to a single control valve controller. See pages 14 & 15 for P5 location.
17. Connect the 24V transformer power supply wire(s) to the P14 port(s) of the control valve controller(s). See pages 14 & 15 for P14 location.
18. If applicable, install a metal bonding strap across metal inlet and outlet plumbing lines to maintain electrical continuity.

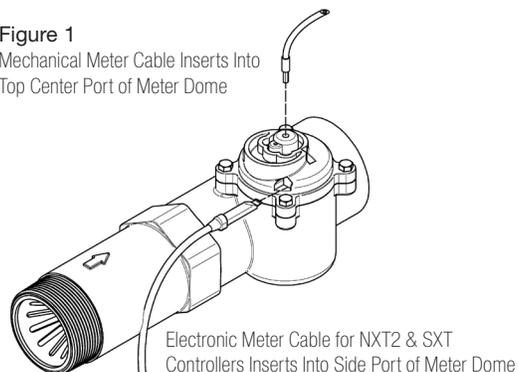
The system is now ready for Start Up.

*See Installation Diagrams pages 11–13 of this manual for additional information.

Start Up Instructions

1. Ensure all inlet and outlet isolation valves and the bypass valves are in the closed position and the treated water faucet hot and cold side are in the open position.
 2. Open the main water supply valve to the building.
 3. Check for leaks and repair as needed.
 4. Plug the power cord of the control valve into an electrical outlet to energize system.
 5. Locate "Manually Initiating a Regeneration" on page 18 of this manual and follow the steps to place the system into the backwash position. Once the system cycles into the backwash position, unplug the control valve from the power outlet to keep the system in the backwash position.
 6. Open the inlet isolation valve slightly until water can be heard flowing through the isolation valve and allow the mineral tank to fill with water. Air will come out of the drain line until the mineral tank is full of water. Once water flow at the drain line is observed, fully open the inlet valve and allow water flow to drain for 10 minutes to flush the resin bed of any color. If water at the drain shows any discoloration, continue to flush the resin bed until water at the drain is clear.
 7. After resin bed flushing is complete, plug the system back in to the power outlet so that it will return to the service position. Repeat steps 4, 5, 6 and 7 on the other tank(s) if this is a Series PWS20-2 Duplex Alternating or PWS20-P Progressive system.
 8. For PWS20-2 or PWS20-P series systems, connect the factory supplied inner-connecting communication cable(s) between the P1 and P3 ports of the control valve's controllers shown on pages 14 & 15.
 9. Program the system according to the System Type (see page 20) following the Control Valve Programming section beginning on page 21.
 10. Put the appropriate amount of water in the brine tank(s). This is accomplished by manually cycling the control valve(s) to cycle step 4 "Brine Tank Refill" and allowing a complete brine tank refill cycle to conclude. This step must be done for each brine tank in the system only after the proper brine tank refill time has been programmed into each controller.
 11. Put the appropriate amount of salt in each brine tank. Do Not fill the salt level past the brine well lid.
 12. Fully open the outlet isolation valve(s).
 13. Ensure the bypass valve is in the closed position.
 14. Check for leaks and repair as needed.
 15. Allow water to flow from the hot and cold side treated faucet until all air has been purged from the plumbing system. Then close both the hot and cold side treated water faucet.
 16. Turn on water heaters.
- Start up is now complete and the system is ready for operation.

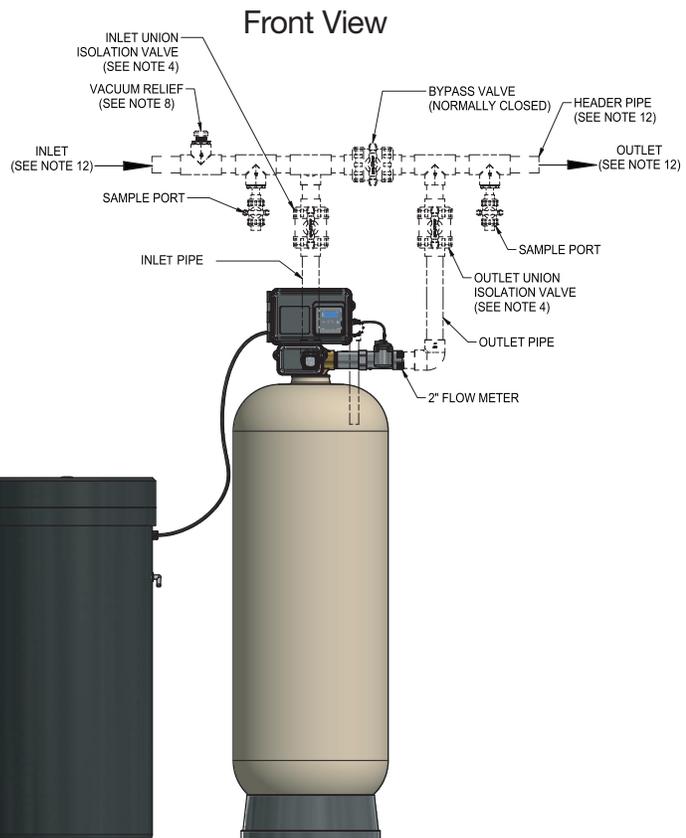
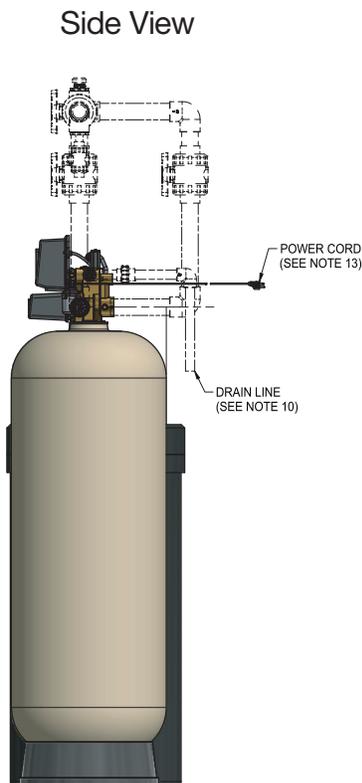
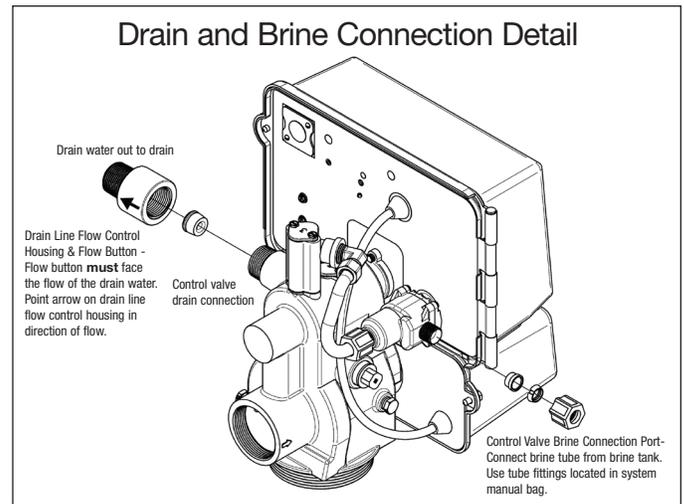
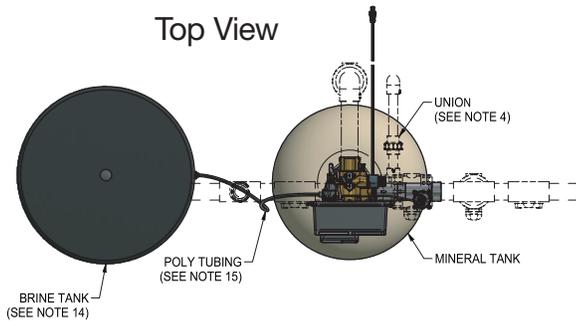
Figure 1
Mechanical Meter Cable Inserts Into
Top Center Port of Meter Dome



Installation Diagrams - Series PWS20 Simplex Systems

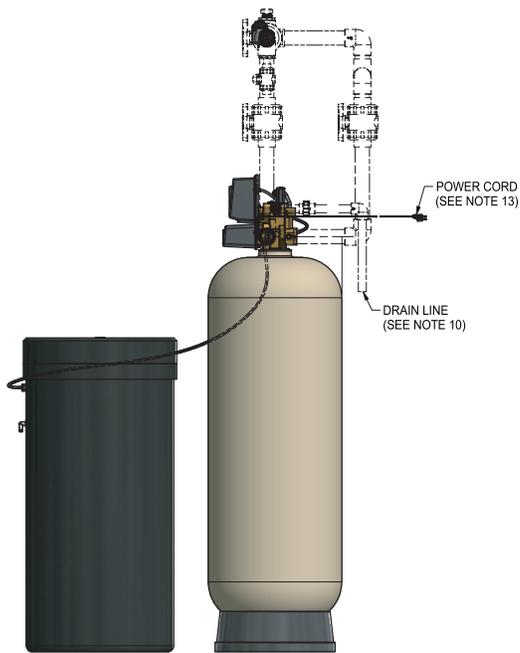
Installation Reference Notes For All System Installation Drawings:

1. All dimensions are on page 6 of this manual & unless otherwise noted are ± 1 inch (25mm).
2. All items shown in phantom line are to be provided by others.
3. All dimensions are subject to change without any notice.
4. Install unions fittings on inlet, outlet & drain plumbing connections.
5. Provide a 2 feet minimum clearance above mineral tank for filling media.
6. A GFCI equipt electrical outlet should be provided within 5 feet of equipment location.
7. Use dielectric unions on plumbing connections of control valve when dissimilar metals are present.
8. Provided system shall not be subject to any vacuum. If risk of vacuum is present, install siphon break on drain line & install vacuum relief valve Watts ordering code # 0556031 on inlet line.
9. Brine tank dimensions shown on table are factory selected for use with the specified system size.
10. Do not install drain line directly to a drain. For proper drain connection follow all national, state and local codes. Do not construct drain line to elevations that exceed 4 feet above the control valve's drain port.
11. The full weight of the piping and valves must be supported by pipe hangers or other means.
12. Inlet and outlet headers need to be sized according to flow rate requirements by others.
13. Power requirements: 115V/60Hz 2.7 amps per control valve unless otherwise specified.
14. Brine tank must be located within 10 feet of system control valve and on a common floor elevation with mineral tank to ensure proper brine draw operation.
15. Use factory supplied brine tubing. Do not use smaller diameter tubing than what is supplied.
16. Limit inlet pressure to not exceed maximum published operating pressure.

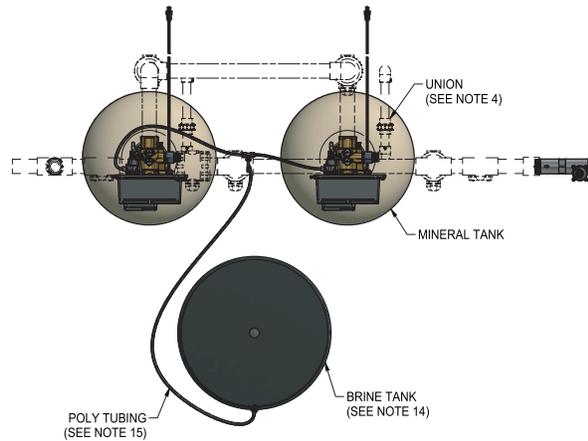


Installation Diagrams - Series PWS20-2 Duplex Alternating Systems

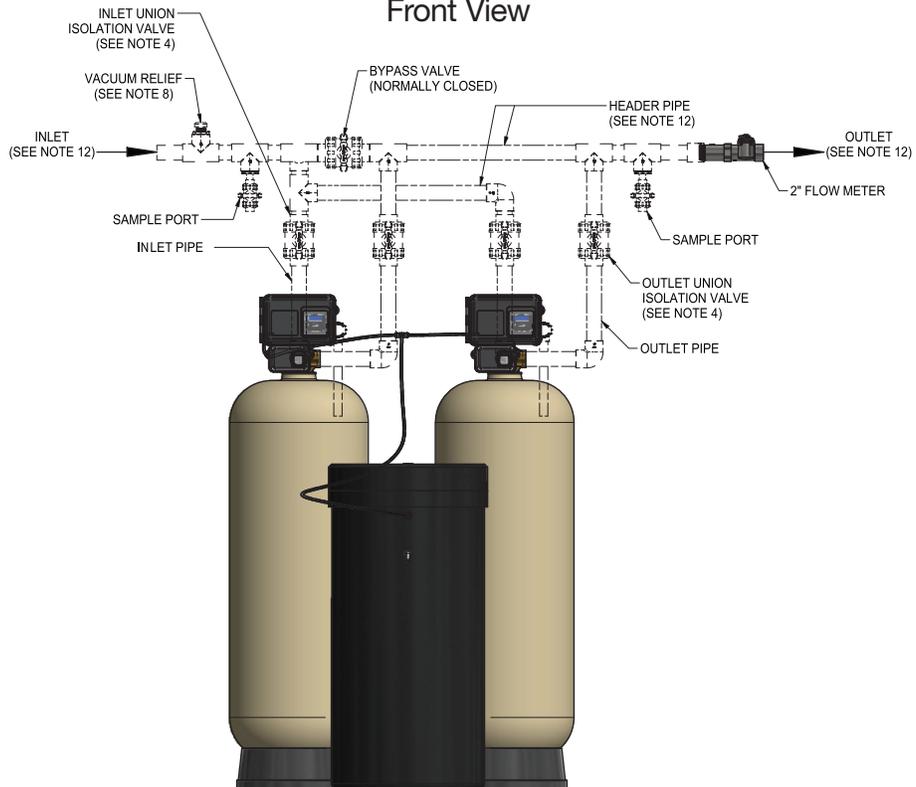
Side View



Top View

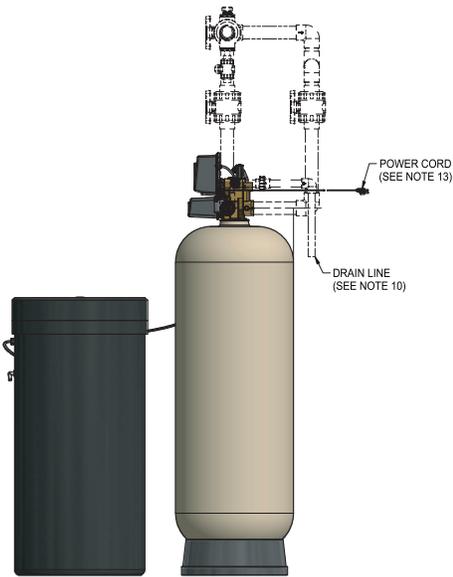


Front View

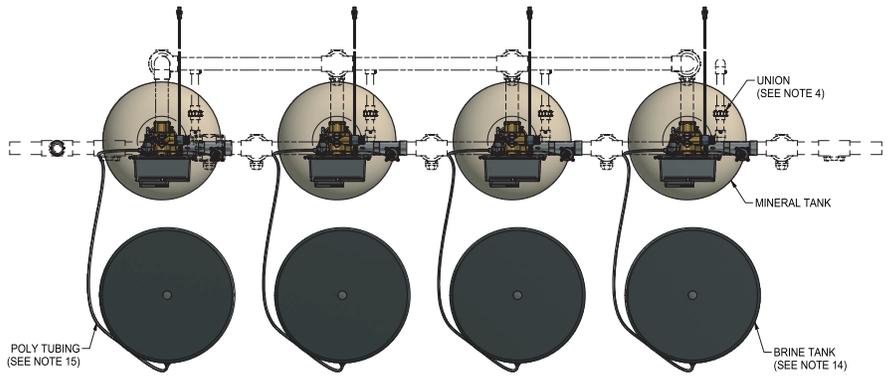


Installation Diagrams - Series PWS20-P Progressive 2-4 Tank Systems

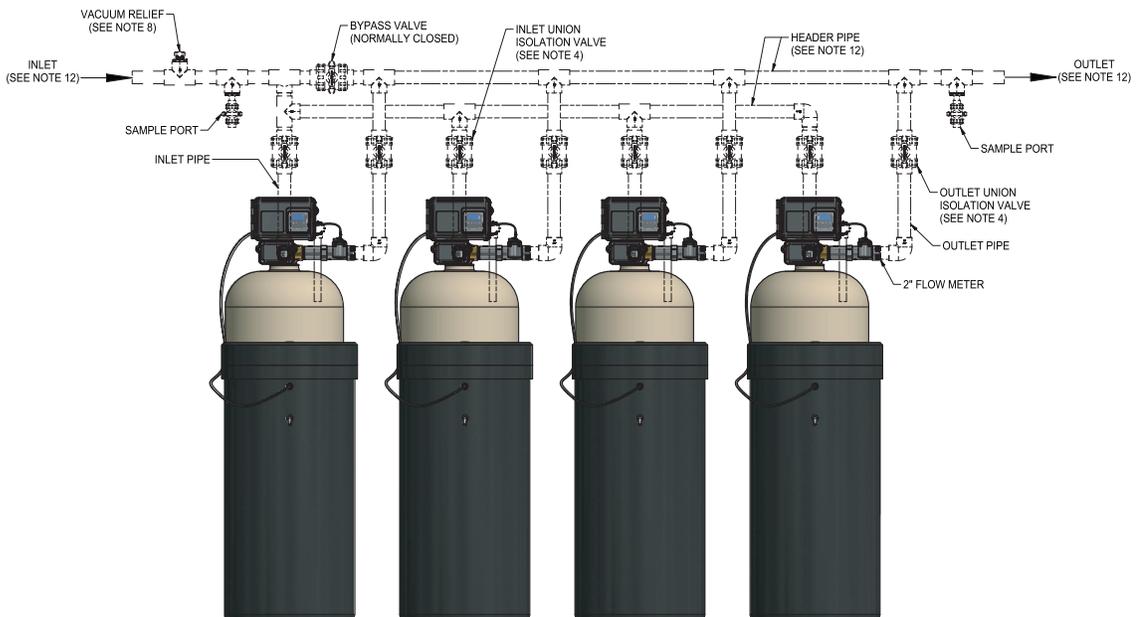
Side View



Top View



Front View



Controller Electrical Connections

Power Supply Connections

Installing the Power Supply:

Note: Power Supply includes a harness with 2 black wires that connect to circuit board, see page 15.

1. Insert black and black transformer wires into 24VDC input of control.

Network / Communication Cables and Connections

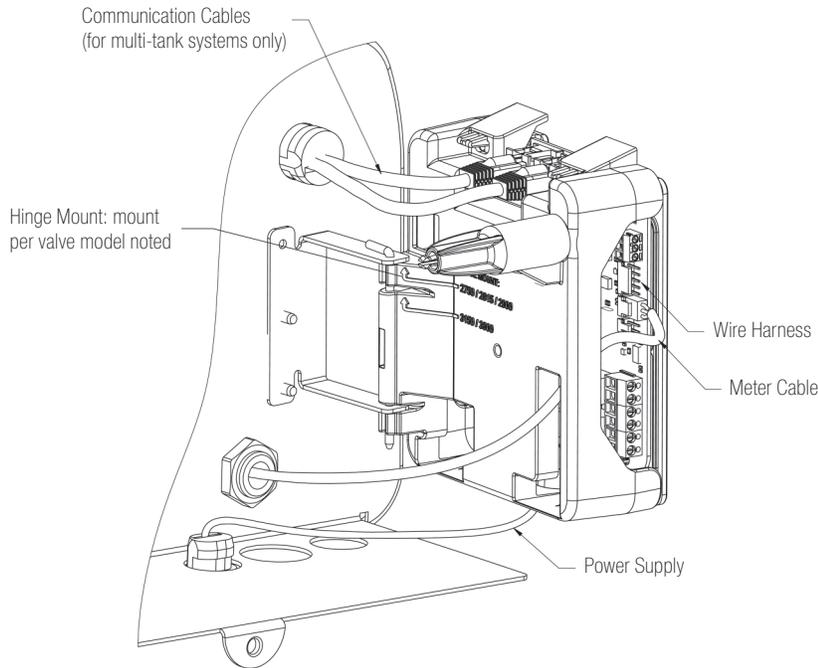
Use a shielded CAT5 Network/Communication cable.

Connect the network/communication cable first before programming.

Cable length between timers/units should not exceed 25 feet.

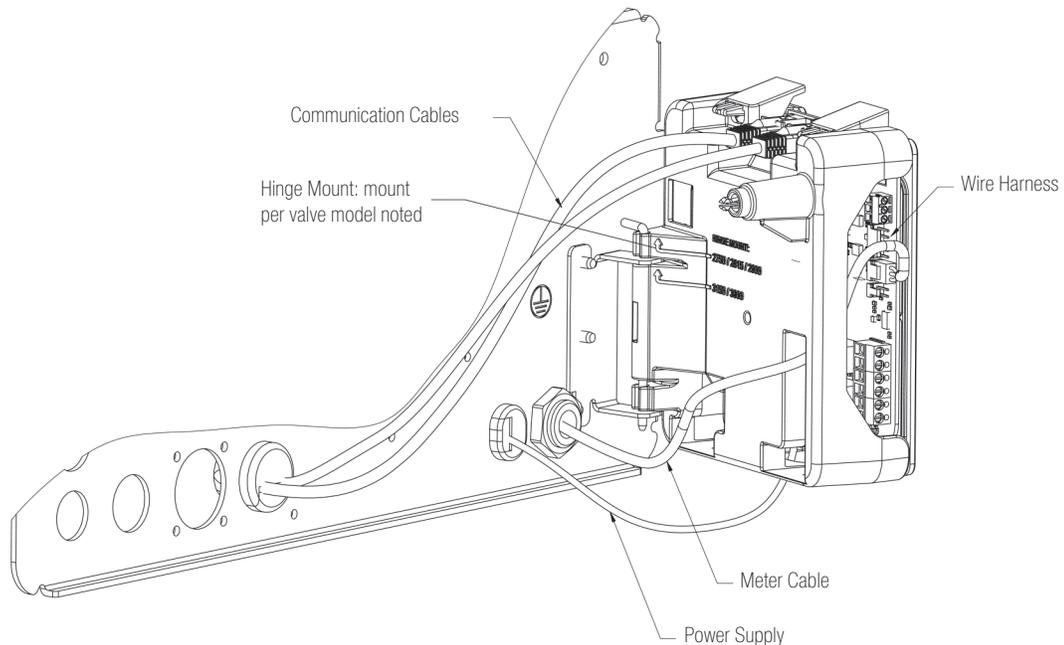
Connect each unit in series (do not form a loop) together from one communication port to the next communication port. It does not matter which one goes to the next one.

2510/2750/2815/2850/2900 Valves*:



44404 Rev A

3150/3900 Valves:

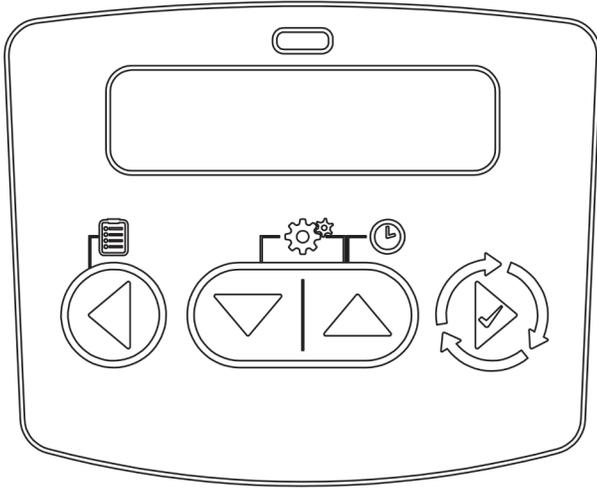


44403 Rev A

*PWS20, PWS20-2 & PWS20-P Systems use 2900/2900S Type Control Valves.

NXT2 Controller Programming and Operation

This system uses the NXT2 controller which is capable of operating single or multi-tank systems.



Modes of Operation

System Type	4 - Single Unit 5 - Parallel Interlock (2-8 Unit) 6 - Parallel Series Regeneration (2-8 Units) 7 - Alternating Interlock (2 Units) 8 - Alternating Delayed (2 Units) 9 - Alternating with Standby Units (2-8 Units) 14 - Progressive Demand Recall (2-8 Units)
Valve Type*	2510 2750 2815 2850 2900S 2910 (Europe only) 3150 3900
Regeneration Type	Softener/Filter Meter Delayed Softener/Filter Meter Immediate Time Clock Day of the Week Remote Regeneration
Regeneration Flow	Downflow Upflow Filter

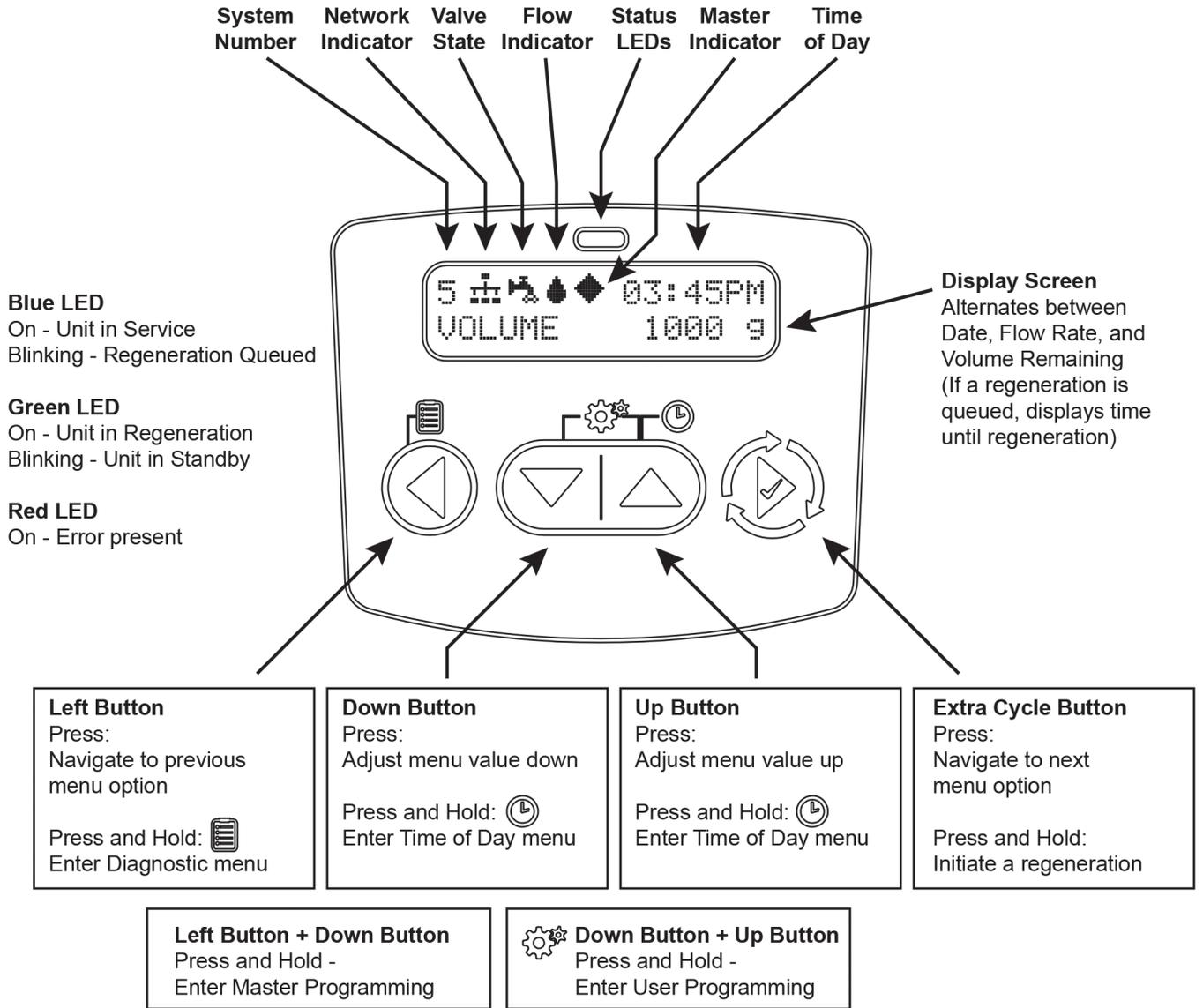
Features

On-screen multilingual support: English, Francais, Deutsch, Italiano, Espanol, Nederlands, Portugues

- Time of day super capacitor backup for 12-hour power loss
- 2 to 4 line scrolling text OLED display, high contrast easy to read in low light conditions and at a distance
- Full functional user interface with easy programming allowing forward and backwards menu navigation
- Network two to eight valves via shielded CAT5 cables
- LED Status Indicator
 - Blue: In Service
 - Flashing Blue: Regeneration Queued
 - Green: Regeneration
 - Flashing Green: Standby
 - Red: Error condition present
- Two Programmable Auxiliary relay outputs
 - Time-based
 - Volume based (Chemical pump)
 - Alarm-based
 - Cycle-based
 - Standby
- Remote input
 - Remote Lockout
 - Remote Regeneration
- Easy installation with plug-in wiring harnesses
- Assistance Name and Phone Number contact fields
- Error Log History
- Water Usage Daily (up to 13 weeks)
- Push Settings
- Capacitive Touch buttons
- Two Regeneration Lockout Windows
- Reset to factory default settings or from saveable custom settings
- Full calendar display
- Master Programming Lockout
 - Code-based
 - Time-based
 - Delayed
- Icons for easy system status identification
- Dynamic network addressing
- Diagnostics
 - Real-time Flow Rate
 - Peak Flow Rate (can be reset)
 - Totalizer (can be reset)
 - Reserve Capacity
 - Use Since Last Regeneration
 - Last Regeneration
 - Identifiable Software Version
 - Total Number of Regenerations
 - Regeneration Interval
 - Last Settings Change
 - Error Log History
 - Average Daily Usage (per weekday, 3 month history)

*PWS20, PWS20-2 & PWS20-P Systems use 2900/2900S Type Control Valves.

Controller Display



Display Icons

- | | | | |
|--|----------------------------------|--|-------------------------|
| | Valve State: Service | | Lock Window |
| | Valve State: Standby | | Initializing |
| | Flow Indicator (flashing) | | Upper Drive Movement |
| | Regeneration | | Lower Drive Movement |
| | Master Unit (auto-assigned) | | Remote Regeneration |
| | Network Indicator - Connected | | Master Programming |
| | Network Indicator - Disconnected | | User Programming |
| | Network Indicator - Unit Missing | | Diagnostics |
| | USB Connected (Field Programmer) | | Time of Day Programming |
| | Error Condition Present | | |
| | Remote Lock | | |

Controller Operation

Setting the Time of Day

Note: Set Time of Day on any unit and the rest of the units in the system will update the Time of Day automatically.

1. Press and hold the Up button for 2 seconds. The “Time” value is displayed. Press the Up or Down buttons to adjust as desired.
2. Press the Extra Cycle button to advance to the “Year” field. Press the Up or Down buttons to adjust as desired.
3. Press the Extra Cycle button to advance to the “Month” field. Press the Up or Down buttons to adjust as desired.
4. Press the Extra Cycle button to advance to the “Calendar Day” field. Press the Up or Down buttons to adjust as desired.
5. Press the Extra Cycle button to return to the normal display screen.

NOTE: Press and hold the Left button to exit without saving.

Manually Initiating a Regeneration

1. When controller is In Service or Standby, press and hold the Extra Cycle button on the main screen.
2. The controller advances to Regeneration Cycle Step #1, and begins programmed time count down.
3. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #2 (if active).
4. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #3 (if active).
5. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #4 (if active).
6. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #5 (if active).
7. Press the Extra Cycle button once more to advance the valve back to In Service.

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

Controller Operation During Regeneration

In the Regeneration Cycle step display, the controller shows the current regeneration cycle name the valve is in, or has reached, and the time remaining in that step. Once all regeneration steps are complete, the controller returns to In Service and resumes normal operation.

CYCLE 1/5	
BACKWASH	00:10:00

CYCLE 2/5	
DRAW	00:60:00

CYCLE 3/5	
RAPID RINSE	00:10:00

CYCLE 4/5	
TANK REFILL	00:12:00

CYCLE 5/5	
PAUSE	00:00:00



Press the Extra Cycle button during a system queued Regeneration Cycle to immediately advance the valve to the next cycle step position and resume normal step timing.

Controller Operation During Programming

The controller enters the Program Mode in Standby or Service Mode as long as it is not in regeneration. While in the Program Mode, the controller continues to operate normally monitoring water usage. Controller programming is stored in memory permanently.

Controller Operation During A Power Failure

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

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

Flow Meter Equipped Controller

As treated water is used, the Volume Remaining display counts down from the calculated system capacity to zero. When zero is reached, a Regeneration Cycle begins if no other units are in regeneration.

Controller Features

Remote Lock

The controller does not allow the unit/system to go into Regeneration until the Regeneration Lockout Input signal to the unit is cleared. This requires a contact closure to activate the unit. The recommended gauge wire is 16 AWG with a maximum wire length run of 50 feet.

Regeneration Day Override Feature

If the Day Override option is turned on and the valve reaches the set Regeneration Day Override value, the Regeneration Cycle starts if no other unit is in Regeneration. If other units are in regeneration, it is added to a regeneration queue. This occurs regardless of the remaining volume available.

Lock Settings (access to Master Programming)

Lock Settings prevents the user from accessing Master Programming. In Master Programming, select the desired Lock Settings option (Off, Time Based, Delayed, or Enter Code).

Time Based - User must set clock to 12:01 pm to unlock

Delayed - User must press and hold the Left and Down buttons for 60 continuous seconds to unlock

Enter Code - User must input code "1201" to unlock

Capacitive Buttons

Capacitive button entry warrant different consideration than tactile button entry. Do not wear gloves. Be sure to keep your hands and the capacitive buttons free of debris, grease, or water. Buttons may become temporarily unresponsive if environmental conditions change such as sudden humidity or temperature changes. If buttons become unresponsive, wait 5 to 10 minutes for the buttons to recalibrate.

LED Status indicator

Blue - Unit in Service

Flashing Blue - Regeneration Queued

Green - Unit in Regeneration

Flashing Green - Unit in Standby

Red - Error with codes

Power Loss Backup

Time of day super capacitor backup for power loss; rated to last minimum 12 hours

Continuous Flow Detect

Alert appears when specified continuous flow rate is detected during service over a specified duration. Continuous flow rate is adjustable from 0.1 to 99999.9 GPM/LPM (accuracy of flow rate detected will vary based on capability of meter). Duration range is adjustable from 1 to 255 hours.

Remote Regeneration

Ability to trigger a regeneration via a remote input.

Regeneration Types

Softener/Filter Meter Delayed - When volume remaining reaches zero and the scheduled regeneration time is reached (default 2 a.m. softener; 12 a.m. filter), the unit will regenerate.

Softener/Filter Meter Immediate - When volume remaining reaches zero, the unit will regenerate.

Time Clock - Once volume remaining reached zero and the selected regeneration time is reached (default 2 a.m. softener; 12 a.m. filter), the unit will regenerate.

Day of the Week - Once volume remaining reaches zero and the selected Day of the Week is reached, the unit will regenerate.

Remote Regeneration - Remote Regeneration is accomplished by a 3rd party device completing a contact closure connected to the remote regeneration input connector. The 3rd party device must complete the signal duration time that was set in the duration signal time in programming to start a regeneration. You can set the remote regeneration for immediate regeneration or delayed regeneration at the set time that was programmed for regeneration time in programming.

Reset to Factory Defaults

While powering up the unit, when the Pentair Diamond logo® logo appears, press and hold the Extra Cycle button to access the Reset menu then select Reset to Factory Defaults. Press the Extra Cycle Button to confirm your selection and to advance to the service screen. Furthermore, you may select Reset to Non-Factory Defaults to save a set of unique control parameters.



Power on the unit. When Pentair logo appears, press and hold the Extra Cycle button. The Reset menu appears.



Use the up/down buttons to select.



Press the Extra Cycle button to set the desired option and return to the Service screen.



END

Lock Window

Lock Window prevents the unit from regenerating during a specified time frame. Two lock windows are available (Lock Window #1 and Lock Window #2). In Master Programming, enable a Lock Window then select the desired Lock Start time and Lock End time.

Settings Review

To prevent unintentional changes to Master Programming, enable Settings Review to view and navigate through Master Programming settings without the ability to edit.

The Pentair Diamond logo® is a trademark owned by Pentair plc or its affiliates.

Controller Features

Push Settings

The ability to transmit user settings from one unit to all other connected units. Select the desired Master Programming settings on one unit then push the same settings to all other connected units. After the push settings have completed, you may still make unique changes to individual units.

Auxiliary Relays

The NXT2 has two auxiliary relays that may be activated based on cycle, time, or volume.

AUX. 1: CYCLE BASED  

SP	BW	BD	RR	RF	SB
X	X	✓	X	X	X

Activates during selected cycle step

AUX. 1: TIME BASED-START TIME #1  

1 M

Activates upon selected start time
(Range: 0-91 minutes)

AUX. 1: TIME BASED-END TIME #1  

5 M

Deactivates upon selected end time
(Range: Start Time plus 1 minute)

AUX. 1: VOLUME BASED - VOLUME-G  

00100

Activates when selected volume (gallon) is reached (Range: 0-99999)

AUX. 1: VOLUME BASED - DURATION-S  

0010

Selected duration in seconds
(Range: 0-9999 seconds)

System 4 - Single Unit

Single Tank configuration Time Clock: No Meter Immediate:
One Meter Delayed: One Meter Remote Signal Start

System 5 (2-8 Units) Parallel Interlock

All tanks in parallel supplying treated water. Each unit in the system will have its own flow meter/sensor input. The control will delay the start of Regeneration if another unit is already in Regeneration. Once that unit has completed a Regeneration cycle, and has returned to Service, the unit with the longest regeneration queue time will begin Regeneration. No more than one unit will be in Regeneration at a time.

System 6 (2-8 Units) Parallel Series Regeneration

All tanks in parallel supplying treated water. Only #1 control will monitor flow meter/sensor input. When a regeneration is required for the system, it will regenerate valve address #1 first, immediately followed by #2, then #3, then #4 if installed. No more than one unit will be in Regeneration at a time.

System 7 (2 Units) Alternating Immediate

One tank online supplying treated water, one tank in Standby. Only #1 control will monitor its flow meter/sensor input. Regeneration of a unit will begin after the other control has left Standby and returned to Service. When the Regeneration cycle is complete, the regenerated unit will enter Standby. Standby on each tank is controlled by the relay on the NXT2 circuit board.

System 8 (2 Units) Alternating Delayed

Immediate Transfer Delayed Regeneration One tank online supplying treated water, one tank in Standby. Only #1 control will monitor its flow meter/sensor input. Online unit depletes its volume. Once this occurs the offline unit comes online. The previously online unit goes offline and delays its regeneration until the programmed regeneration time has been reached.

System 9 (2-8 Units) Alternating with Standby Units

Up to 7 tanks online supplying treated water, one tank in Standby. Meter/sensor input is required on each tank. Regeneration of a unit will begin after the other control has left Standby and returned to Service. When the Regeneration cycle is complete, the regenerated unit will enter Standby. Standby on each tank is controlled by the relay on the NXT2 circuit board.

System 14 (2-8 Units) Progressive Demand Recall

Meter input is required on each tank. Unit #1 will begin In Service with #2, #3, and #4 (if installed) will begin in Standby. At least one unit is In Service at all times. When flow rate to the Primary Service Unit increases to a user specified rate, the next unit in sequence will move from Standby to Service. As the flow rate falls below the user specified rate, subsequent tanks will return to Standby. When the Primary Service Unit regenerates, the next unit in sequence will become the new Primary Service Unit. As each units capacity is reached, the controller will initiate a Regeneration of that unit. Depending on the number of units in the system and flow rate demand, the regenerated unit will then be placed either into Standby or Service. Only one unit will be in Regeneration at a time.

Master Programming Mode Flow Chart

CAUTION

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

NOTICE

To identify your model softener, locate the diameter and height dimensions from the mineral tank label and check the specification charts within this manual to identify which model uses that size mineral tank.

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

Master Programming Mode

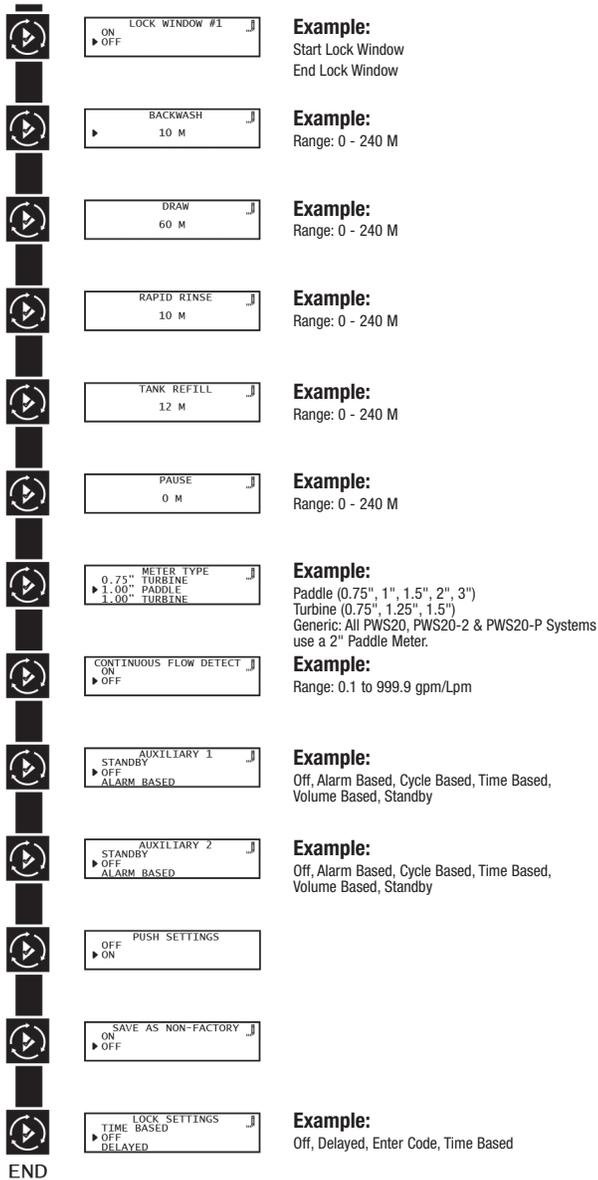
1. Press and hold the Left and Down buttons simultaneously for 3 seconds to enter Master Programming mode.
2. To navigate, press the Extra Cycle button to advance to the next value. Press the Left button to retreat to the previous value.
3. Where applicable, use the Down and Up buttons to adjust a value as desired. When entering data into text fields (such as Assistance Name) or numerical fields (such as Hardness), press the Extra Cycle button to advance to the next character/digit and press the Left button to retreat to the previous character/digit. Proceed through all available characters/digits to advance to the next value.
4. To reset/clear a value (such as Assistance Name), while on the value, press and hold the Down and Up buttons simultaneously for 5 seconds.
5. To exit Master Programming Mode, progress through all available values or after 5 minutes of inactivity the controller will exit automatically. To exit master programming without saving changes, press the Left button until you return to the service screen.
6. Depending on the current controller programming, certain values may not be able to be viewed or set.
7. The controller will display local information, not system information.
8. In the event of a regeneration occurring while displaying master programming, the regeneration step and time remaining will be displayed. When regeneration has been completed, the display will return to the main screen.

	SETTINGS REVIEW ON OFF	Example: On: View settings without the ability to alter settings. Off: User has ability to alter settings.
	LANGUAGE PORTUGUESE ENGLISH FRANCAIS	Example: English, Francais, Duetsch, Italiano, Espanol, Nederlandse, Portugues
	ASSISTANCE NAME 1	Example: 12 characters maximum.
	ASSISTANCE NAME 2	Example: 12 characters maximum.
	ASSISTANCE PHONE	Example: 14 characters maximum.
	SYSTEM SYSTEM 4 SYSTEM 5 SYSTEM 6	Example: 4, 5, 6, 7, 8, 9, 14
	NUMBER OF TANKS	Example: 2, 3, 4, 5, 6, 7, 8
	TRIP POINT #1 - GPM	Example: Trip Points only available/visible when System Type 14 is selected.
	TRIP POINT #1 - SERVICE DURATION	Example: Range: 1-90 seconds
	TRIP POINT #1 - STANDBY DURATION	Example: Range: 60-300 seconds
	VALVE 2815 2850 2900	Example: 2510, 2750, 2815, 2900, 3150, 3900: PWS20, PWS20-2 & PWS20-P Systems use 2900/2900S Type Control Valves.
	REGEN. FLOW UPFLOW DOWNFLOW FILTER	Example: Upflow Downflow Filter
	REGEN. TYPE SOFTENER METER DEL SOFTENER METER IMM TIME CLOCK	Example: Softener Meter Delayed Softener Meter Immediate Time Clock Day of the Week
	UNITS METRIC US	Example: Metric US
	CAPACITY - GRAINS 0023828	Example: Range: 0-9,999,999 grains
	HARDNESS - GPG 025	Example: Range: 0-199 GPG
	RESERVE FIXED VOLUME WEEKLY RESERVE VARIABLE RESERVE	Example: Fixed Volume Weekly Reserve Variable Reserve Fixed %
	REMOTE REGENERATION DELAYED OFF IMMEDIATE	Example: OFF Off, Immediate, Delayed
	REMOTE SIGNAL DURATION 1 S	Example: Range: 1-9999 seconds
	DAY OVERRIDE/TIME-DRIVEN 10 D	Example: Range: Off - 99 Days
	REGEN. TIME 02:00HR	Example: Range: 0 - 23 Hours 59 Minutes

Master Programming Mode Flow Chart - Cont'd

Example:

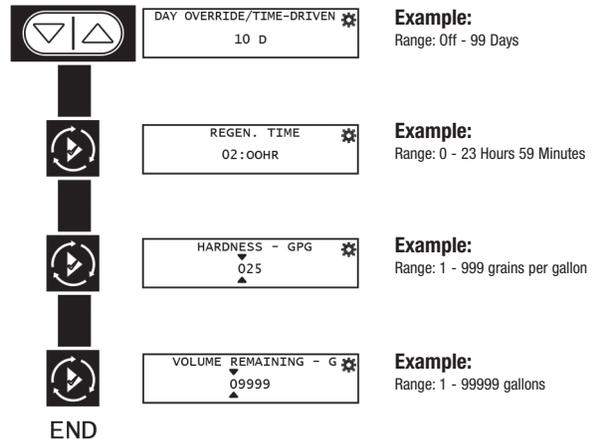
Range: 0 - 23 Hours 59 Minutes



User Programming Mode Flow Chart

User Programming Mode

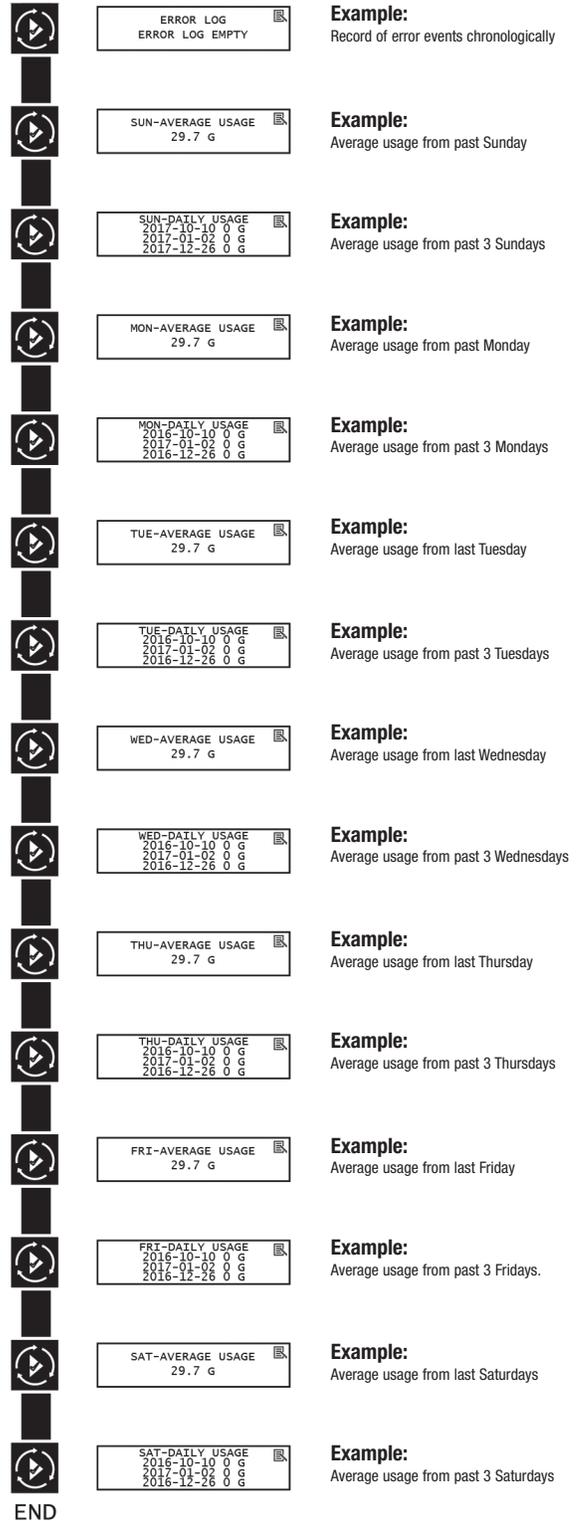
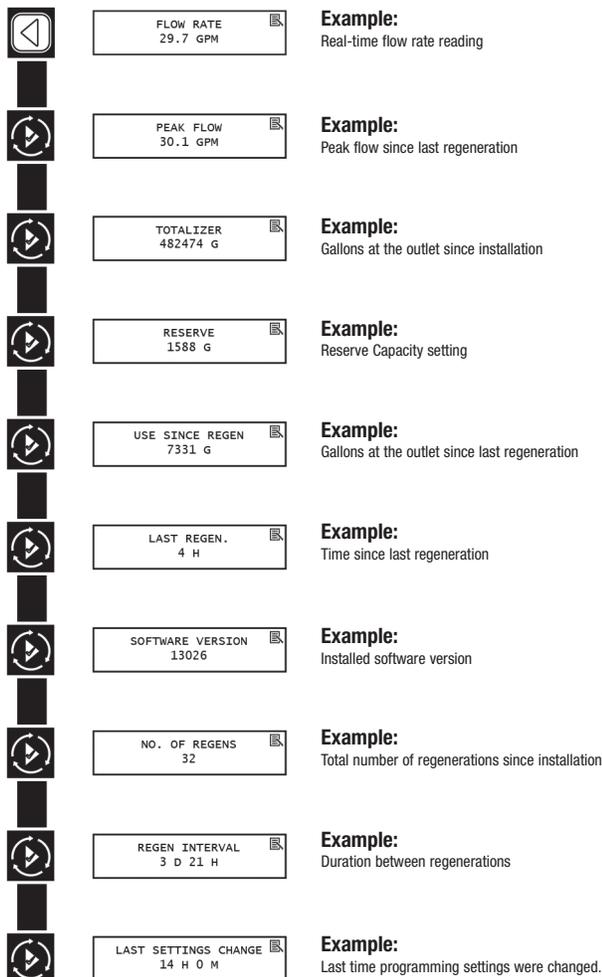
1. Press and hold the Down and Up buttons simultaneously for 3 seconds to enter the User Programming mode.
2. To navigate the menu, press the Extra Cycle button to advance to the next value. Press the Left button to retreat to the previous value.
3. Where applicable, use the Up and Down buttons to adjust a value as desired.
4. After progressing through all available values, the controller will return to Normal operation.
5. To exit diagnostic mode, progress through all cycles, or press & hold Left button at any time, or simply wait 5 minutes and controller will automatically return to normal operation.
- 6 Depending on the current controller settings, certain values may not be able to be viewed or set.
7. The controller will display local information, not system information.
8. In the event of a regeneration occurring while displaying user programming, the regeneration step and time remaining will be displayed. When regeneration has been completed, the display will return to the main screen.



Diagnostic Programming Mode Flow Chart

Diagnostic Programming Mode

1. Press and hold the Left button to enter Diagnostic Programming mode.
2. To navigate, press the Extra Cycle button to advance to the next value. Press the Left button to retreat to the previous value.
3. Where applicable, use the Up and Down buttons to adjust a value as desired.
4. To reset/clear a value (such as Totalizer or Error Log), while on the value, press and hold the Up and Down buttons simultaneously.
5. After progressing through all available values, the controller will return to normal operation.
6. To exit diagnostic mode, press and hold the Left button at anytime or after 5 minutes of inactivity the controller will return to normal operation automatically.
7. Depending on the current controller programming, certain values may not be able to be viewed or modified.
8. The controller will display local information, not system information.
9. In the event of a regeneration occurring while displaying diagnostics, the regeneration step and time remaining will be displayed. When regeneration has been completed, the display will return to the main screen.



END

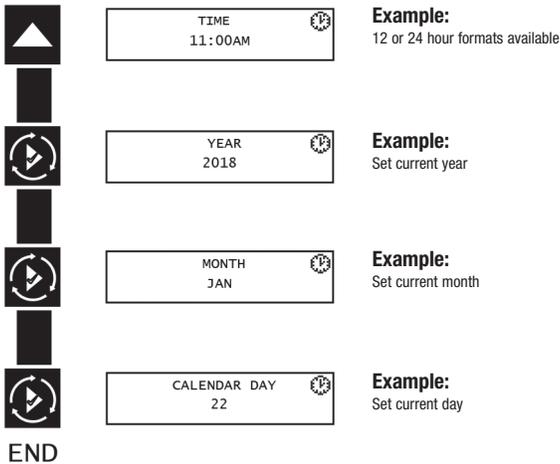
Time of Day Programming Mode Flow Chart

Setting the Time of Day

NOTE: Set Time of Day on any unit and the rest of the units in the system will update the Time of Day automatically.

1. Press and hold the Up button for 2 seconds. The “Time” value is displayed. Press the Up or Down buttons to adjust as desired.
2. Press the Extra Cycle button to advance to the “Year” field. Press the Up or Down buttons to adjust as desired.
3. Press the Extra Cycle button to advance to the “Month” field. Press the Up or Down buttons to adjust as desired.
4. Press the Extra Cycle button to advance to the “Calendar Day” field. Press the Up or Down buttons to adjust as desired.
5. Press the Extra Cycle button to return to the normal display screen.

NOTE: Press and hold the Left button to exit without saving.



NXT2 Programming Parameters and Ranges

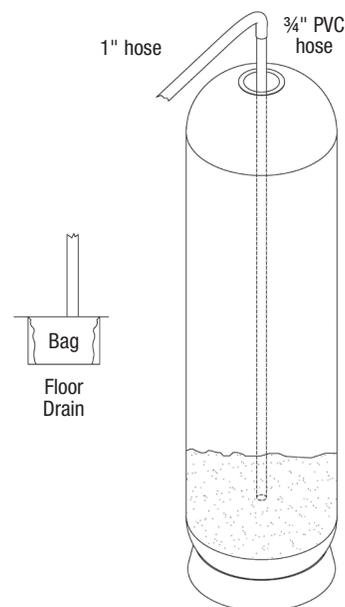
SYSTEM TYPE	4				5	6	7	8	9	14	PROGRAMMING PARAMETER RANGES	
REGEN TYPE	TIME CLOCK	DAY OF THE WEEK	SOFTENER/FILTER METERED IMMEDIATE	SOFTENER/FILTER METERED DELAYED	INTERLOCK	SERIES	ALTERNATING	ALTERNATING	ALTERNATING	PROGRESSIVE DEMAND RECALL	US	METRIC
Settings Review	X	X	X	X	X	X	X	X	X	X	On, Off	
Language	X	X	X	X	X	X	X	X	X	X	English Francais Deutsch Italiano Espanol Nederlands Portugues	
Assistance Name 1, 2	X	X	X	X	X	X	X	X	X	X	Custom	
Assistance Phone	X	X	X	X	X	X	X	X	X	X	Custom	
Regen Type	X	X	X	X	X	X	X	X	X	X	Time Clock Day of the Week Softener/Filter Metered Immediate Softener/Filter Metered Delayed	
Valve	X	X	X	X	X	X	X	X	X	X	2510 2750 2815 2850 2900 3150 3900	
Regen Flow	X	X	X	X	X	X	X	X	X	X	Uplow, Downflow, Filter	
Units	X	X	X	X	X	X	X	X	X	X	US, Metric	
Remote Regeneration	X	X	X	X	X	X	X	X	X	X	Off, Immediate, Delayed	
Auxiliary 1, 2	X	X	X	X	X	X	X	X	X	X	Off, Alarm Based, Cycle Based, Time Based,	
Lock Window 1, 2	X	X	X	X	X	X	X	X	X	X	On, Off	
Meter Type			X	X	X	X	X	X	X	X	Paddle (0.75", 1", 1.5", 2", 3") Turbine (0.75", 1.25", 1.5") Generic	
Continuous Flow Detect			X	X	X	X	X	X	X	X	On, Off	
Save as Non Factory	X	X	X	X	X	X	X	X	X	X	On, Off	
Lock Settings	X	X	X	X	X	X	X	X	X	X	Off, Delayed, Enter Code, Time Based	
Day Override / Time Drive	X		X	X	X	X	X	X	X	X	Off-99 Days	
Regen Time	X	X		X		X		X			Any	
Day of the Week		X				X					SU, MO, TU, WE, TH, FR, SA	
Capacity			X	X	X	X	X	X	X	X	0-9,999,999 Grains	0-9,999,999 Grams, 0-560,287 Lx°DH, 0-1,000,000 Lx°FTH, 0-701,557 Lx°EH
Hardness			X	X	X	X	X	X	X	X	0-199 GPG	0-19,999 mg/L, 0-1,402 °EH, 0-199.9 °FTH, 0-112 °DH
International Hardness Units			X	X	X	X	X	X	X	X	mg/L, °EH, °FTH, °DH	
Reserve				X		X					Weekly Reserve, Variable Reserve, Fixed %, Fixed Volume	
Number of Tanks (Max)	1	1	1	1	8	8	2	2	8	8	2, 3, 4, 5, 6, 7, 8	
Push Settings					X	X	X	X	X	X	On, Off	
Trip Point #1-7 GPM										X	0-1,999 GPM	0-7,569 LPM
Trip Point #1-7 SD										X	1-90s	
Trip Point #1-7 STBD										X	60-300s	

Replacing the Media

NOTICE

Ion exchange resin may need to be replaced periodically due to physical breakdown caused by chlorine/chloramine disinfectants, or fouling caused by certain metals such as iron and manganese.

1. Mark the location of the mineral tanks on the floor in case they need to be moved once all water, resin and gravel has been removed. This will help with realignment of the plumbing after media replacement. DO NOT attempt to move a mineral tank that contains media and or water.
 2. Open the bypass valve.
 3. Close the inlet and outlet isolation valves for the mineral tank needing media replacement
 4. Locate "Manually Initiating a Regeneration" on page 18 of this manual and follow the steps to place the system in the backwash position. This relieves any pressure inside the mineral tank. Once the system cycles into the backwash position, unplug the control valve from the power outlet to keep the system in the backwash position.
 5. Disconnect the inlet, outlet, and drain union plumbing fittings. Then, if necessary for the removal of the control valve from the mineral tank, remove the remaining plumbing from the inlet, outlet and drain ports of the control valve.
 6. Disconnect the meter cable from the from the from the meter dome and from the P5 port located on the back of the control valve controller. Store the meter cable in a safe location.
 7. Disconnect the brine tubing from the control valve's brine connection port.
 8. Disconnect the power supply cable from P14 port located on the back of the control valve controller.
 9. If this is a PWS20-2 or PWS20-P series system disconnect any interconnecting communication cables from the P1 and P3 ports located on the back of the control valve controllers.
 10. Remove the control valve from the mineral tank by turning the control valve counter-clockwise when viewed from above. Keeping a firm grip on the control valve, continue to rotate until it can be lifted off of the top of the mineral tank. Store the control valve in a safe location.
 11. Note the top of the distributor tube. It must be flush with the top of the tank. If it is above the top of the tank by more than $\frac{1}{2}$ " the distributor tube may have become disconnected from the distributor screen in the bottom of the mineral and must be reconnected.
 12. Obtain a length of $\frac{3}{4}$ " sch. 40 PVC that is the same height as the mineral tank and a length of 1" clear braided poly-vinyl hose. The hose must be long enough to reach the nearest floor drain. (Both of these can be acquired at a local hardware store).
 13. Insert one end of the pipe inside the hose and the other end of the pipe into the top of the mineral tank and down into the resin media. Put the other end of the hose inside a water permeable bag and locate the bag over the floor drain.
 14. Insert a garden hose into the bag side of the poly-vinyl hose to fill the hose and PVC pipe with water. Air will bubble out of the tank. Once all the air is out of the hose and pipe, remove the garden hose from the polyvinyl hose to establish a siphon. The resin can then be siphoned into the bag. Use the garden hose to maintain a full water level in the mineral tank to. The bag end of the poly-vinyl hose must remain lower in elevation than the end of the PVC pipe in the mineral tank to maintain the siphon. The bag will retain the resin while the water flows down the drain. Use caution not to allow resin to enter the floor drain.
 15. Continue to siphon resin until it is completely evacuated from the mineral tank. Gravel will clogged the siphon hose and, if it must be removed due to fouling, or to repair or replace a damaged distributor tube and screen, must be evacuated by other means.
 16. If replacing gravel, inspect lower distributor screens for damage and replace if necessary.
 17. To add new media and reconnect control valve to mineral tank follow General Installation steps 3-4K located on page 9 of this manual.
 18. Reconnect inlet, outlet, and drain plumbing to the control valve and tighten the plumbing union fittings on each of these plumbing lines.
 19. Reconnect brine tubing to brine connection port of control valve.
 20. Reconnect meter cable to meter dome. Then reconnect the other end of the meter cable to the P5 port located on the back of the control valve controller.
 21. If this is a PWS20-2 or PWS20-P series system reconnect any interconnecting communication cables to the P1 and P3 ports located on the back of the control valve controllers.
 22. Open the inlet isolation valve slightly, until water can be heard flowing through the isolation valve and allow the mineral tank to fill with water. Air will come out of the drain line until the mineral tank is full of water. Once water flow at the drain line is observed, fully open the inlet valve and allow water flow to drain for 10 minutes to flush the resin bed of any color. If water at the drain shows any discoloration, continue to flush the resin bed until water at the drain is clear.
 23. After resin bed flushing is complete, reconnect the power supply cable to the P14 port located on the back of the control valve controller. Plug the system back in to the power outlet so that it will return to the service position.
 24. Fully open inlet and outlet isolation valves and close bypass valve.
 25. Check for leaks and repair as required.
 26. Open hot and cold side of a treated water faucet to flush any air from the plumbing system.
- If this is a PWS20-2 or PWS20-P series system replace media in each mineral tank according to this media replacement procedure.

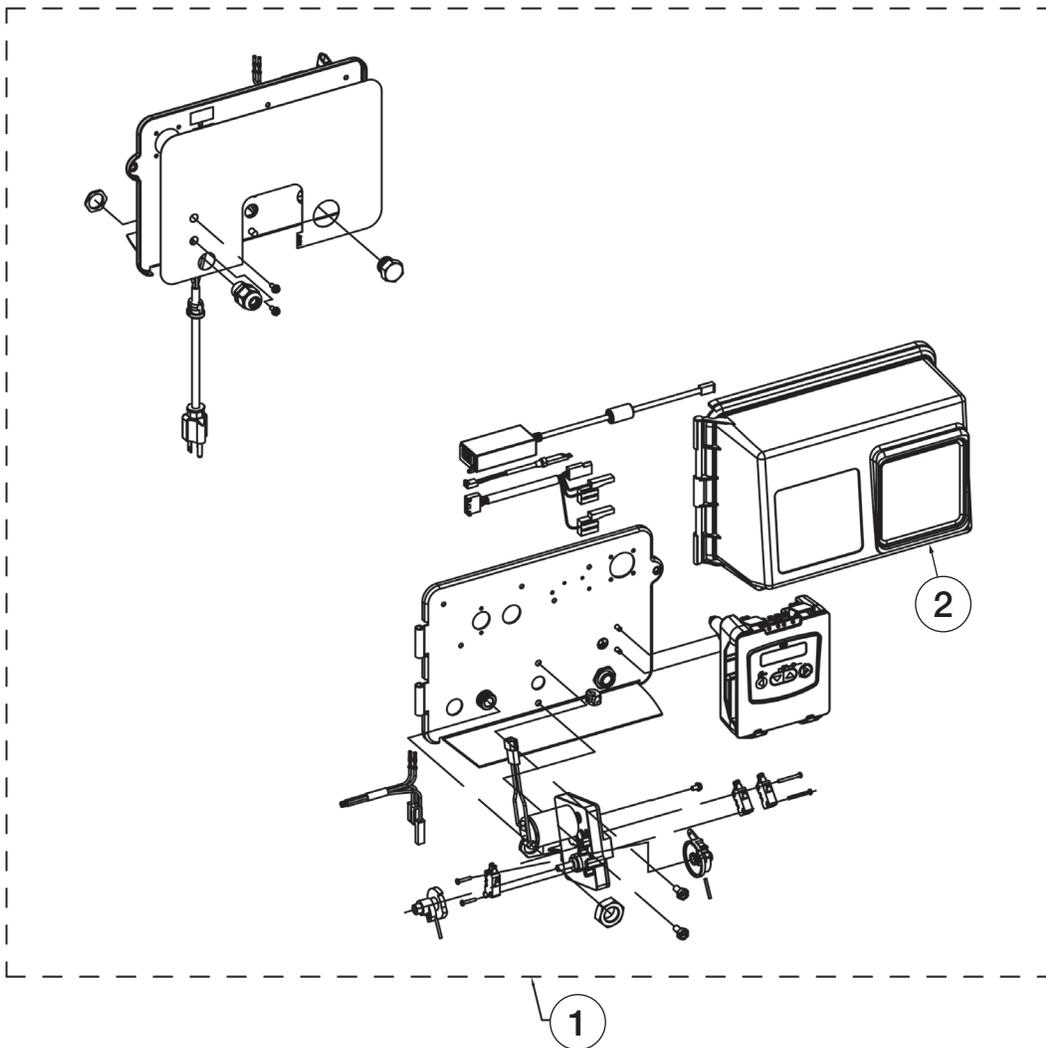
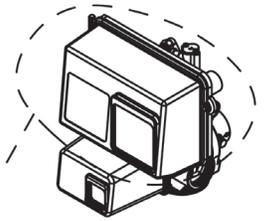


Replacement Parts

Continued from previous page

MAJOR SYSTEM COMPONENTS			
ITEM NO.	QTY	ORDERING CODES	DESCRIPTION
7	1	68106677	Q9058 TANK ADAPT BUSHING 6" FLANGE X 4" #8 THREAD PVC W/ORING FOR 30" & 36" SOFTENERS
8	1	68101188	D3341 BOLT SET FOR Q9058 TANK ADAPTOR INCLUDES 12 BOLTS
9	1	68100997	C9098 FIBERGLASS MINERAL TANK 14X65 ALMOND W/ 4" #8 TOP
9	1	68101000	C9099-4 FIBERGLASS MINERAL TANK 16X65 ALMOND W/ 4" #8 TOP
9	1	68100691	C1029 FIBERGLASS MINERAL TANK 18X65 ALMOND W/ 4" #8 TOP
9	1	68100694	C1030 FIBERGLASS MINERAL TANK 21X62 ALMOND W/ 4" #8 TOP
9	1	68100698	C1031 FIBERGLASS MINERAL TANK 24X72 ALMOND W/ 4" #8 TOP
9	1	68100703	C1037 FIBERGLASS MINERAL TANK 30X72 ALMOND W/ 6" FLANGE TOP
9	1	68100706	C1038 FIBERGLASS MINERAL TANK 36X72 ALMOND W/ 6" FLANGE TOP
10	*	7300100	A4000 SOFTENING RESIN MEDIA WATTS BRAND HIGH CAPACITY SAC NA FORM 1 CUBIC FOOT PER BAG
11	*	68100354	A7005A MEDIA GRAVEL #20 FLINT 0.625"X.125" 50 LBS PER BAG
12	*	7300102	A7006A MEDIA GRAVEL .25"X.125" 50 LBS PER BAG
13	1	68102491	G2002BS BRINE TANK ASSY 18X40 BLK W/ GRID, SAFETY FLOAT & AIR CHECK FOR 3/8" BRINE HOSE
13	1	68110284	G2003E BRINE TANK ASSY 24X41 BLK W/ GRID & AIR CHECK FOR 1/2" BRINE HOSE
13	1	68102503	G2004B BRINE TANK ASSY 24X50 BLK W/ GRID & AIR CHECK FOR 1/2" BRINE HOSE
13	1	68102512	G2009A BRINE TANK ASSY 30X50 BLK W AIR CHECK FOR 1/2" BRINE HOSE
13	1	68102509	G2008C BRINE TANK ASSY 39X48 BLK W AIR CHECK FOR 1/2" BRINE HOSE
13	1	68102554	G3015-1 BRINE TANK ASSY 39X60 BLK W AIR CHECK FOR 1/2" BRINE HOSE
14	1	68102593	H1018 BRINE OVERFLOW SET
15	1	68102491	G2002B BRINE TANK 18X40 BLK EMPTY
15	1	68102494	G2003 BRINE TANK 24X41 BLK EMPTY
15	1	68102500	G2004 BRINE TANK 24X50 BLK EMPTY
15	1	68102511	G2009 BRINE TANK 30X50 BLK EMPTY
15	1	68102507	G2008 BRINE TANK 39X48 BLK EMPTY
15	1	68102553	G3015 BRINE TANK 39X60 BLK EMPTY
16	1	68102591	H1016 BRINE WELL CAP 4"
16	1	68102592	H1017 BRINE WELL CAP 5"
17	1	68102634	H7007 BRINE SAFETY FLOAT BRINE VALVE AND AIR CHECK ASSY 2310 FOR 3/8" BRINE HOSE
17	1	68110335	K4560009-KIT AIR CHECK 900 & FITTING FOR 1/2" BRINE HOSE
18	1	68102598	H1030-36S BRINE WELL 4"X36" SLOTTED
18	1	68102606	H1071 BRINE WELL 5"X60" SLOTTED
19	1	68102607	H1072 BRINE GRID FOR 18" DIAMETER BRINE TANKS
19	1	68102608	H1075 BRINE GRID SET FOR 24" DIAMETER BRINE TANKS INCLUDES 5" PVC LEGS

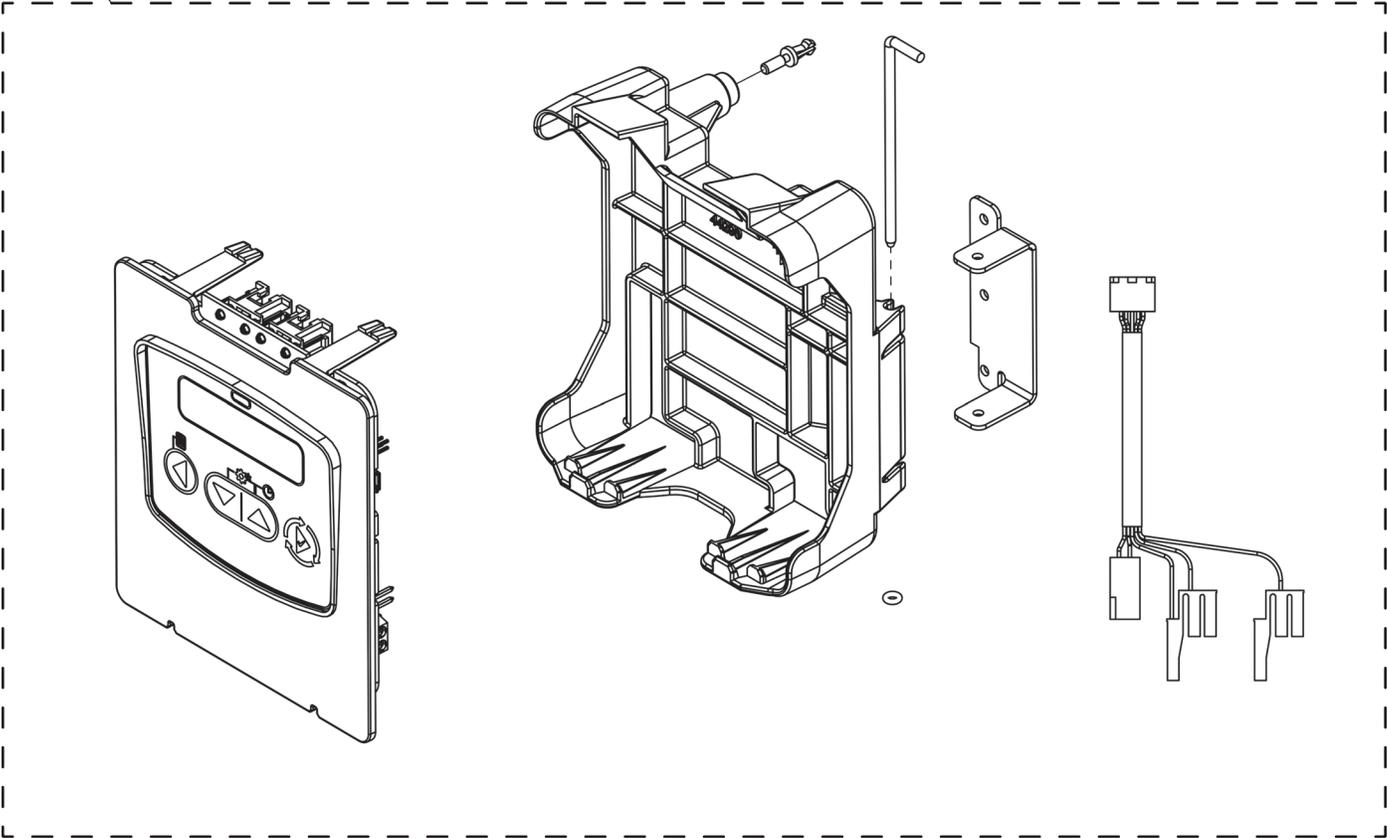
Replacement Parts - 2900 Upper Powerhead



2900 UPPER POWERHEAD				
ITEM NO.	QTY	PART NUMBER	DESCRIPTION	
1	1	68104633	K4560410-NT UPPER POWERHEAD F/2900S 24V NXT2 W/ POWER SUPPLY, NO TIMER	
2	1	68104575	K4560219-02 COVER FOR 2750 & 2900 UPPER POWER HEAD	

NXT2 Controller Assembly

1

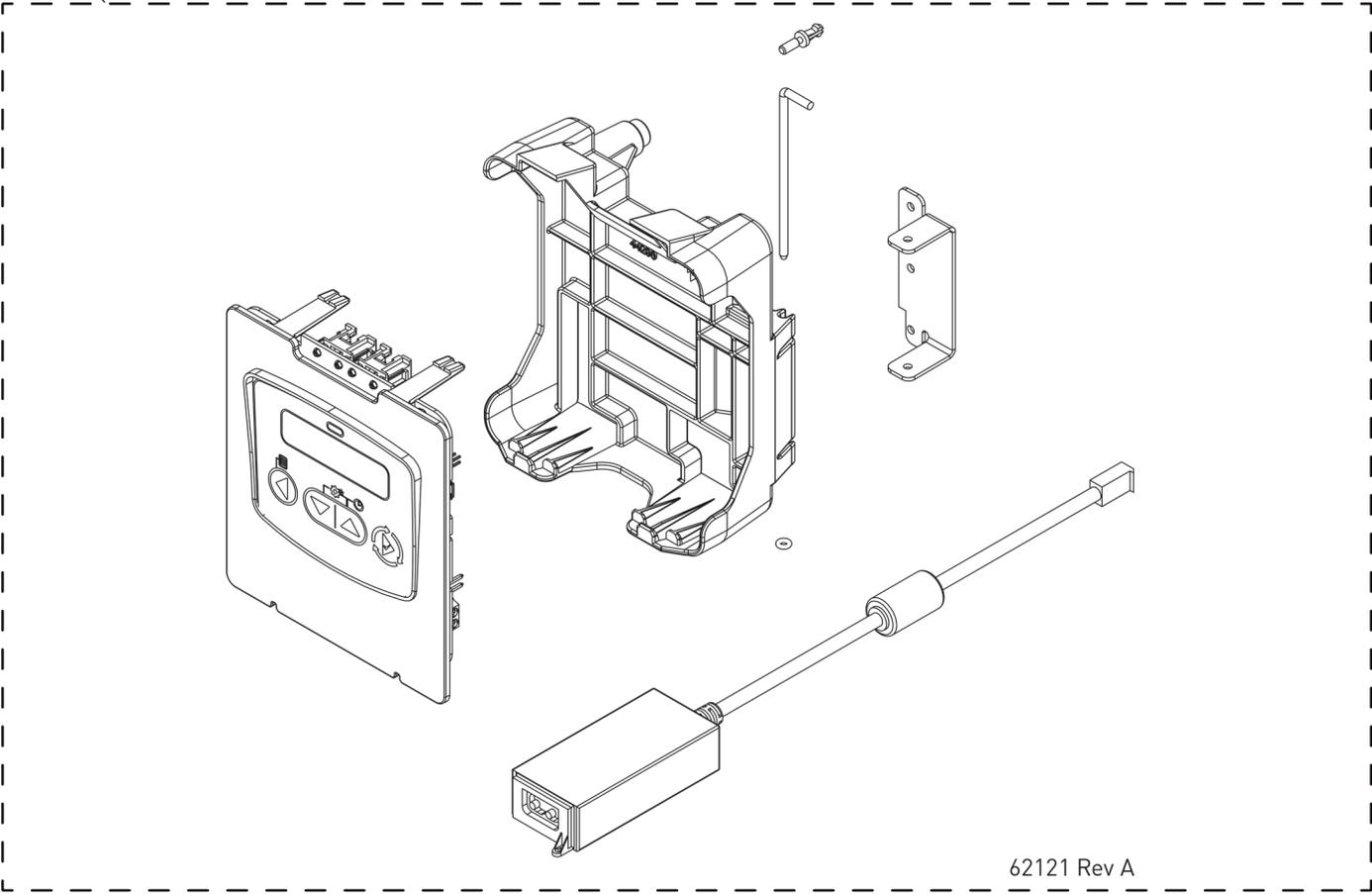


62115 Rev A

NXT2 CONTROLLER ASSEMBLY			
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104777	K4562115 CONTROLLER ASSEMBLY NXT2

NXT to NXT2 Conversion Kit

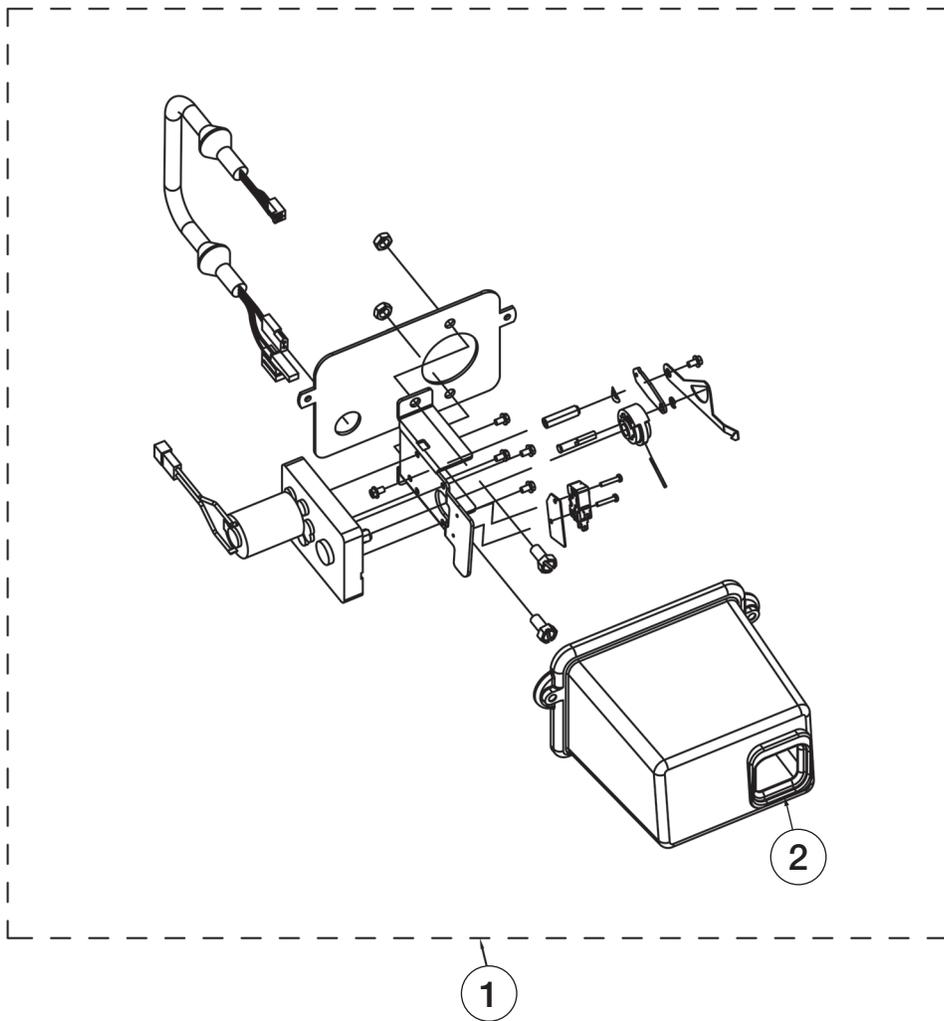
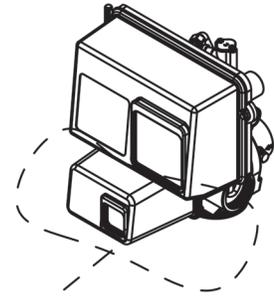
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62121 Rev A

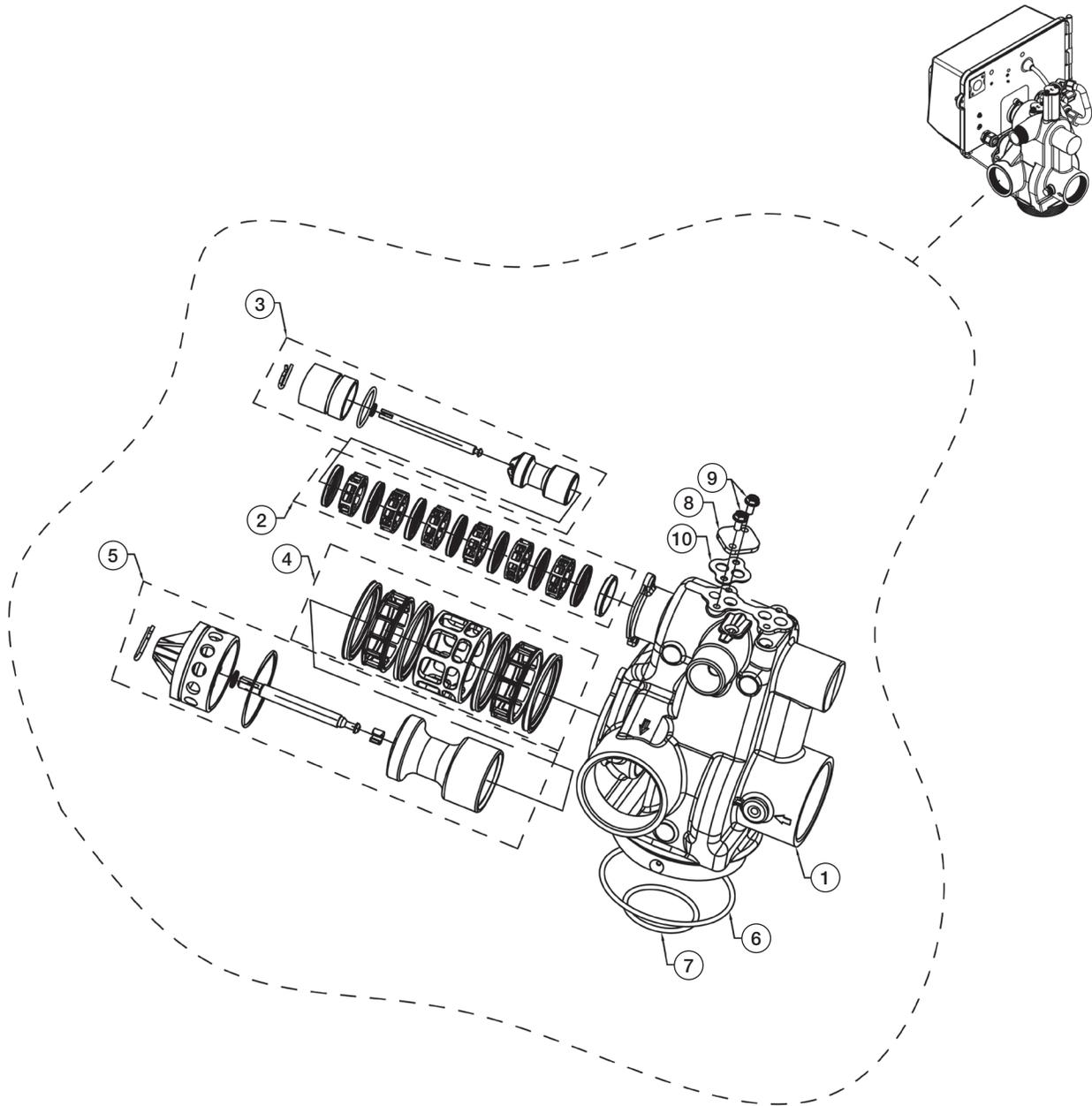
NXT TO NXT2 CONVERSION KIT			
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104778	K4562121-01 CONTROLLER ASSY CONV KIT NXT TO NXT2 W/ 24V US POWER SUPPLY

Replacement Parts - 2900 Lower Powerhead



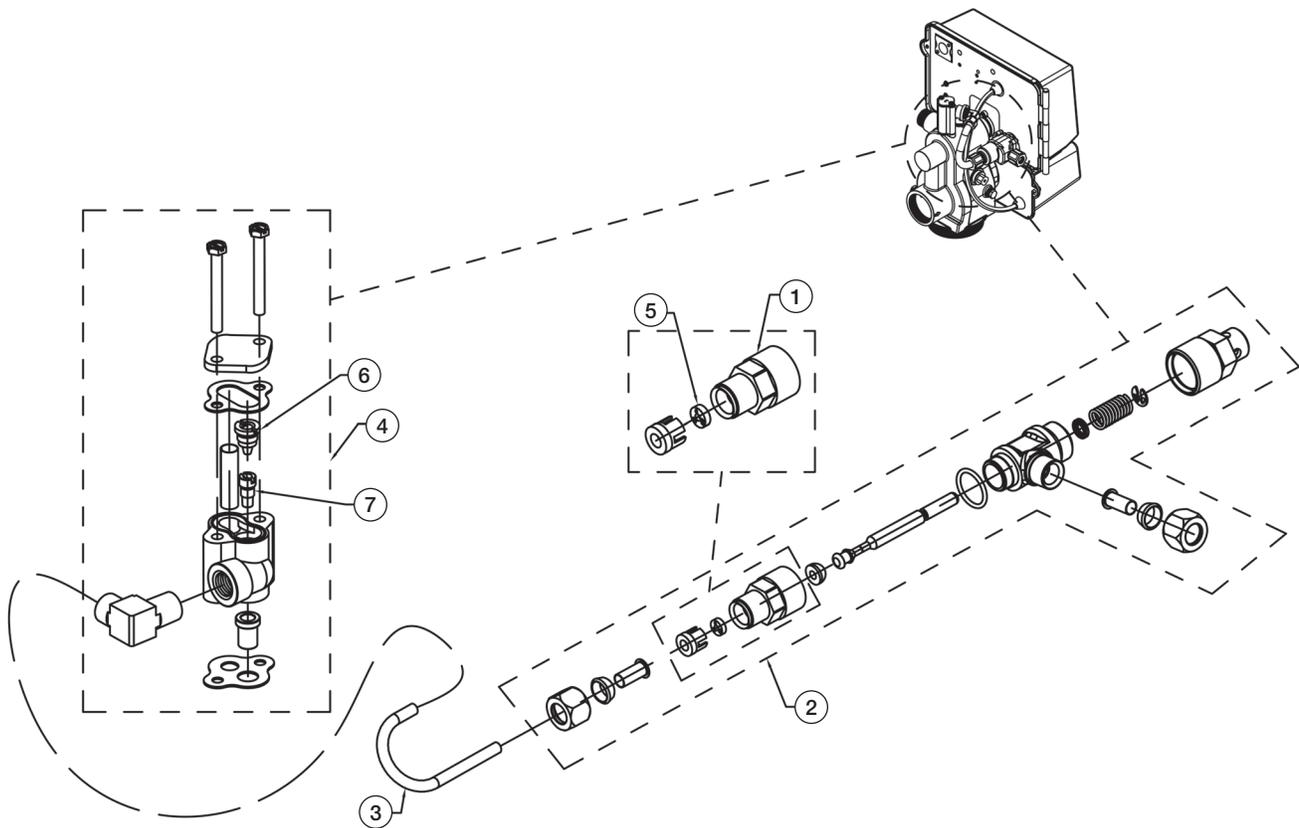
2900 LOWER POWERHEAD			
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104635	K4560411-NT LOWER POWERHEAD F/ 2900S 24V NTXT2, NO COVER
2	1	68104574	K4560217-02 COVER FOR 2900 LOWER POWER HEAD ENVIRO

Replacement Parts - 2900S Control Valve Body



2900S DOWNFLOW CONTROL VALVE BODY ASSEMBLY			
ITEM NO.	QTY	ORDERING CODES	DESCRIPTION
1	1	-	VALVE BODY 2900S MACHINED, NPT U.S. TAP
2	1	7300795	K4561530 SEAL & SPACER KIT F/ 2900S UPPER
3	1	7300794	K4561540 PISTON ASSEMBLY DOWNFLOW F/ 2900S UPPER
4	1	7300798	K4560128 SEAL & SPACER KIT F/ 2900S LOWER
5	1	7300796	K4561550 PISTON ASSEMBLY DOWNFLOW HWBP F/ 2900S LOWER
5	1	7300797	K4561555 PISTON ASSEMBLY DOWNFLOW NHWP F/ 2900S LOWER
6	1	68104171	K4513575 ORING #240 TANK TO VALVE F/2900S/2930/3150
7	1	68104172	K4513577 ORING #226 F/2900S, 9500 DISTRIBUTOR PILOT
8	1	68104103	K4511893 PART INJECTOR COVER STAINLESS STEEL
9	2	68104255	K4515137 SCREW HEX WASHER HEAD
10	1	68104400	K4519925 INJECTOR COVER GASKET

Replacement Parts - 1600 Brine System

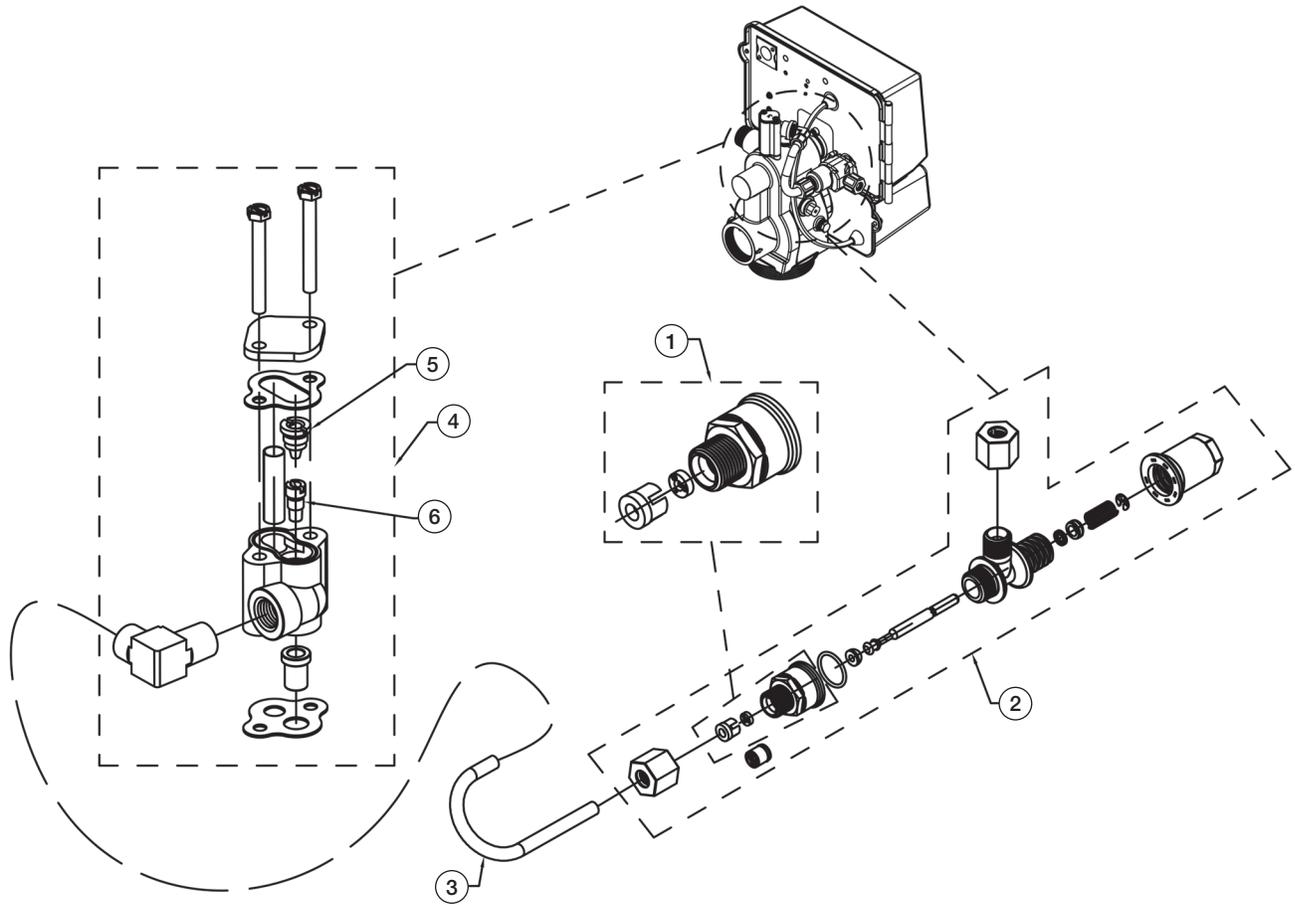


1600 INJECTOR & BRINE VALVE ASSEMBLY

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104482	K4560020-25 BRINE FLOW CONTROL ASSEMBLY .25 GPM F/1600/3600
1	1	68104483	K4560020-50 BRINE FLOW CONTROL ASSEMBLY .50 GPM F/1600/3600
1	1	68104484	K4560022-100 BRINE FLOW CONTROL ASSEMBLY 1.0 GPM F/5600/9000
2	1	68104490	K4560029 BRINE VALVE SHORT STEM 1600/ NO FLOW CONTROLLER
2	1	68104493	K4560029-100 BRINE VALVE SHORT STEM 1600 W/ 1.0 GPM FLOW CONTROLLER
2	1	68104494	K4560029-50 BRINE VALVE SHORT STEM 1600 W/ .50 GPM FLOW CONTROLLER
3	1	68104321	K4516508 BRINE TUBE 1600 F/2850 2900S
*4	1	68104654	K4560480-03 INJ ASSY 1600 COMPLETE W/ #3 YELLOW INJ
5	1	68104117	K4512094 BRINE FLOW WASHER .25 GPM
5	1	68104118	K4512095 BRINE FLOW WASHER .50 GPM
5	1	68104119	K4512097 BRINE FLOW WASHER 1.0 GPM
6	1	68104079	K4510913-00 INJECTOR NOZZLE #00 VIOLET
6	1	68104080	K4510913-000 INJECTOR NOZZLE #000 BROWN
6	1	68104081	K4510913-BL INJECTOR NOZZLE #2 BLUE
6	1	68104083	K4510913-R INJECTOR NOZZLE #0 RED
6	1	68104084	K4510913-W INJECTOR NOZZLE #1 WHITE
6	1	68104085	K4510913-Y INJECTOR NOZZLE #3 YELLOW
7	1	68104086	K4510914-00 INJECTOR THROAT #00 VIOLET
7	1	68104087	K4510914-000 INJECTOR THROAT #000 BROWN
7	1	68104088	K4510914-BL INJECTOR THROAT #2 BLUE
7	1	68104089	K4510914-G INJECTOR THROAT #4 GREEN
7	1	68104090	K4510914-R INJECTOR THROAT #0 RED
7	1	68104091	K4510914-W INJECTOR THROAT #1 WHITE
7	1	68104092	K4510914-Y INJECTOR THROAT #3 YELLOW

* 68104654 INJECTOR ASSEMBLY COMES WITH YELLOW INJECTOR NOZZLE & THROAT. PLEASE SPECIFY TO ONE OF OUR SPECIALISTS IF YOU REQUIRE A DIFFERENT NOZZLE & THROAT.

Replacement Parts - 1650 Brine System

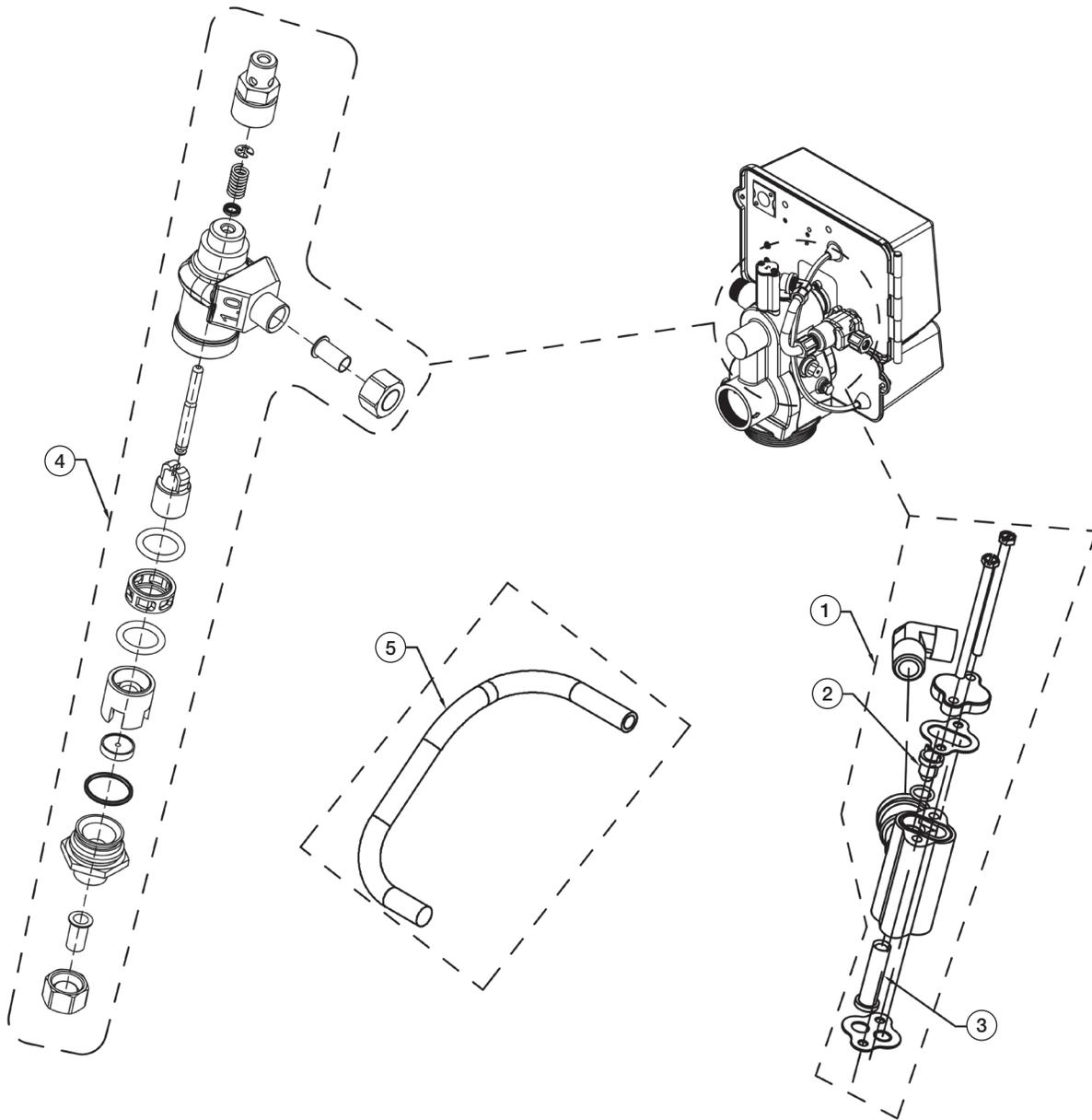


1650 INJECTOR & BRINE VALVE ASSEMBLY

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104474	K4560010-100 BRINE FLOW CONTROL ASSEMBLY 1.0 GPM F/1650
1	1	68104475	K4560010-50 BRINE FLOW CONTROL ASSEMBLY .50 GPM F/1650
2	1	68104476	K4560011 BRINE VALVE PLASTIC 1650 / NO FLOW CONTROLLER
2	1	68104477	K4560011-020 BRINE VALVE 1650 SHORT STEM W/ .50 GPM FLOW CONTROLLER
2	1	68104478	K4560011-030 BRINE VALVE 1650 SHORT STEM W/ 1.0 GPM FLOW CONTROLLER
3	1	68104321	K4516508 BRINE TUBE 1600 F/2900S 2850
*4	1	68104654	K4560480-03 INJ ASSY 1600 COMPLETE #3 PLSTC
5	1	68104079	K4510913-00 INJECTOR NOZZLE #00 VIOLET
5	1	68104080	K4510913-000 INJECTOR NOZZLE #000 BROWN
5	1	68104081	K4510913-BL INJECTOR NOZZLE #2 BLUE
5	1	68104082	K4510913-G INJECTOR NOZZLE #4 GREEN
5	1	68104083	K4510913-R INJECTOR NOZZLE #0 RED
5	1	68104084	K4510913-W INJECTOR NOZZLE #1 WHITE
5	1	68104085	K4510913-Y INJECTOR NOZZLE #3 YELLOW
6	1	68104086	K4510914-00 INJECTOR THROAT #00 VIOLET
6	1	68104087	K4510914-000 INJECTOR THROAT #000 BROWN
6	1	68104088	K4510914-BL INJECTOR THROAT #2 BLUE
6	1	68104089	K4510914-G INJECTOR THROAT #4 GREEN
6	1	68104090	K4510914-R INJECTOR THROAT #0 RED
6	1	68104091	K4510914-W INJECTOR THROAT #1 WHITE
6	1	68104092	K4510914-Y INJECTOR THROAT #3 YELLOW

* 68104654 INJECTOR ASSEMBLY COMES WITH YELLOW INJECTOR NOZZLE & THROAT. PLEASE SPECIFY TO ONE OF OUR SPECIALISTS IF YOU REQUIRE A DIFFERENT NOZZLE & THROAT.

Replacement Parts - 1700 Brine System

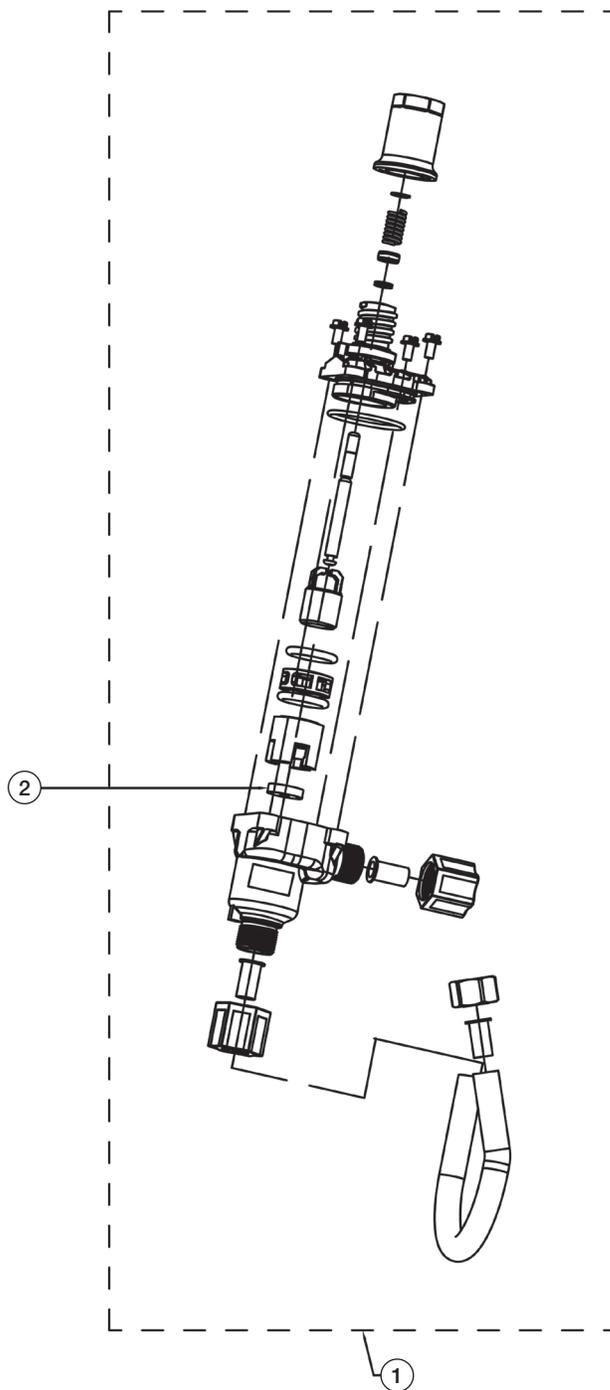


1700 INJECTOR & BRINE VALVE ASSEMBLY

ITEM NO.	QTY	PART NUMBER	DESCRIPTION
*1	1	68104614	K4560381 PART 1700 INJECTOR ASSY .5 SPEC INJECTOR
2	1	68104209	K4514801-3CY INJECTOR NOZZLE #3C YELLOW
2	1	68104210	K4514801-4CG INJECTOR NOZZLE #4C GREEN
2	1	68104211	K4514801-5CW INJECTOR NOZZLE #5C WHITE
2	1	68104212	K4514801-6R INJECTOR NOZZLE #6C RED
2	1	68104213	K4514801-7CB INJECTOR NOZZLE #7C BLACK
3	1	68104214	K4514802-3Y INJECTOR THROAT #3C YELLOW
3	1	68104215	K4514802-4G INJECTOR THROAT #4C GREEN
3	1	68104216	K4514802-5W INJECTOR THROAT #5C WHITE
3	1	68104217	K4514802-6R INJECTOR THROAT #6C RED
3	1	68104218	K4514802-7C INJECTOR THROAT #7C BLACK
4	1	68104499	K4560034 BRINE VALVE 1700 W/ 2.0 GPM FLOW CONTROLLER
5	1	68104272	K4515416 BRINE TUBE 1700 F/ 2850 2900S
5	1	68104317	K4516460 BRINE TUBE ANNEALED 1700 F/ 2850 2900S

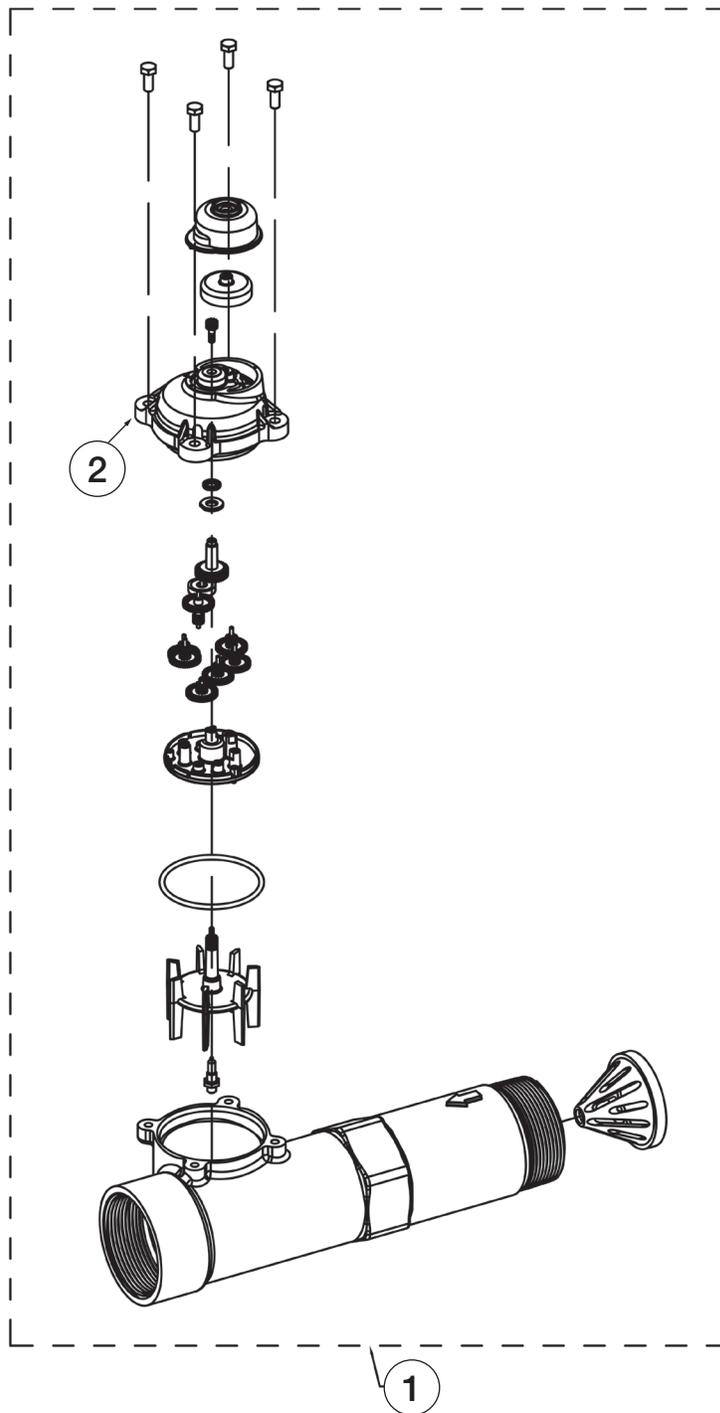
* 68104614 INJECTOR ASSEMBLY COMES WITH GREEN INJECTOR NOZZLE & THROAT. PLEASE SPECIFY TO ONE OF OUR SPECIALISTS IF YOU REQUIRE A DIFFERENT NOZZLE & THROAT.

Replacement Parts - 1710 Brine System



1710 BRINE VALVE ASSEMBLY			
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	68104658	K4560605-20 BRINE VALVE 1710 F/2750 2900S VALVES W/ 2.0 GPM FLOW CONTROLLER
2	1	68104109	K4512085 FLOW CONTROL WASHER 1.2 GPM
2	1	68104110	K4512086 FLOW CONTROL WASHER 1.5 GPM
2	1	68104111	K4512087 FLOW CONTROL WASHER 2.0 GPM
2	1	68104112	K4512088 FLOW CONTROL WASHER 2.4 GPM
2	1	68104113	K4512089 FLOW CONTROL WASHER 3.0 GPM
2	1	68104114	K4512090 FLOW CONTROL WASHER 3.5 GPM
2	1	68104115	K4512091 FLOW CONTROL WASHER 4.0 GPM
2	1	68104116	K4512092 FLOW CONTROL WASHER 5.0 GPM

Replacement Parts - 2" Stainless Steel Mech/Electronic Meter



2 INCH STAINLESS STEEL METER ASSY			
ITEM NO.	QTY	PART NUMBER	DESCRIPTION
1	1	7300855	K4561934-10 METER ASSEMBLY COMPLETE 2" STAINLESS STEEL MECH/ELEC
2	1	68104199	K4514716 METER DOME PLASTIC FOR 2" METER W/ O-RING MECH/ELEC

Troubleshooting

Problem	Cause	Correction
Water conditioner fails to regenerate	Electrical service to unit has been interrupted	Assure permanent electrical service (check circuit breaker, GFCI, fuse, plug, pull chain, or switch)
	Controller is defective	Replace controller
	Power failure	Reset time of day
Softener delivers hard water	By-pass valve is open	Close by-pass valve
	No salt is in brine tank	Add salt to brine tank and maintain salt level above water level
	Injector screen plugged	Clean injector screen
	Insufficient water flowing into brine tank	Check brine tank fill time and clean brine line flow control if plugged
	Hot water tank hardness	Repeated flushings of the hot water tank is required
	Leak at distributor tube	Make sure distributor tube is not cracked. Check O-ring and tube pilot
	Internal valve leak	Replace seals and spacers and/or piston
	Reserve capacity has been exceeded	Check salt dosage requirements and adjust program to provide additional reserve
Unit used too much salt	Meter is not measuring flow	Clean meter of foreign debris. Replace meter dome
	Improper salt setting	Check salt usage and salt setting
Loss of water pressure	Excessive water in brine tank	See- Problem "Excessive water in brine tank"
	Iron buildup in line to water conditioner	Clean line to water conditioner
	Iron buildup in water conditioner	Clean control and add mineral cleaner to mineral bed. Increase frequency of regeneration
Loss of mineral through drain line	Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system	Remove piston and clean control valve
	Air in water system	Assure that well system has proper air eliminator control. Check for dry well condition
Iron in conditioned water	Improperly sized drain line flow control	Check for proper drain rate
	Fouled mineral bed	Check backwash, brine draw, and brine tank fill. Increase frequency of regeneration. Increase backwash time.
Excessive water in brine tank	Plugged drain line flow control	Clean flow control
	Plugged injector system	Clean injector and screen
	Controller not cycling	Replace controller
	Foreign material in brine valve	Replace brine valve seat and clean valve
	Foreign material in brine line flow control	Clean brine line flow control
Softener fails to draw brine	Drain line flow control is plugged	Clean drain line flow control
	Injector is plugged	Clean injector
	Injector screen plugged	Clean screen
	Line pressure is too low	Increase line pressure to 20psi
	Internal control leak	Change seals, spacers, and piston assembly
	Service adapter did not cycle	Check drive motor and switches
Control cycles continuously	Misadjusted, broken, or shorted switch	Determine if switch or controller is faulty and replace it, or replace complete power head
Resin and gravel in outlet water	Damaged lower distributor screen	Replace distributor screen
High service flow rate pressure drop	Resin damaged by chlorine/chloramine	Replace resin
	Foreign material in distributor screen	Replace all media and distributor screens

Troubleshooting

Error Codes and Troubleshooting

Detected Errors

If a communication error is detected, an Error Screen will appear.

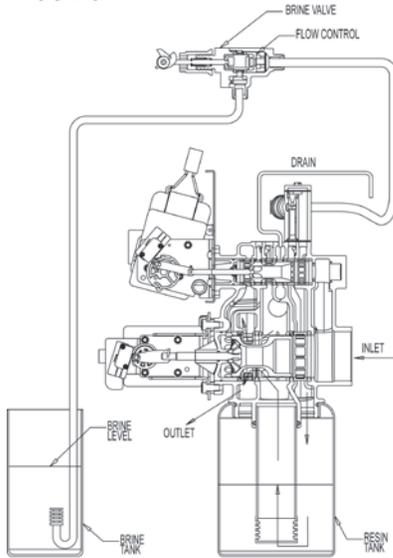
- All units In Service remain in the In Service position.
- All units in Standby go to In Service.
- Any unit in Regeneration when the error occurs completes Regeneration and goes to In Service.
- No units are allowed to start a Regeneration Cycle while the error condition exists, unless they are manually forced into Regeneration.
- When an error is corrected and the error no longer displays (it may take several seconds for all of the units in a system to stop displaying the error message), the system returns to normal operation.

NOTE: During the error condition, the control continues to monitor the flow meter and update the volume remaining. Once the error condition is corrected, all units return to the operating status they were in prior to the error. Regeneration queue is rebuilt according to the normal system operation. Or, if more than one unit has been queued for regeneration, then the queue is rebuilt according to which one communicates first.

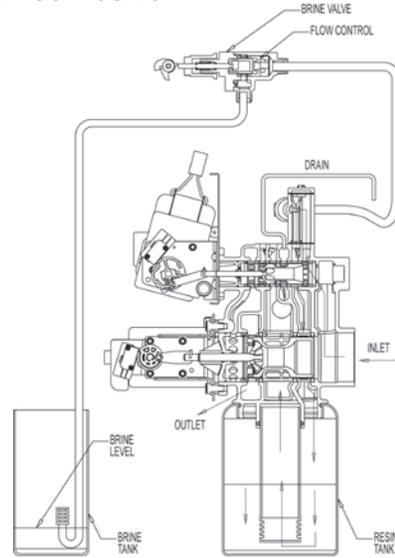
Message Displayed	Causes for Error	Correction
Error Valve Count Mismatch	Number of NXT2 detected does not match selected system type in Master Programming	Push correct valve settings in Master Settings
Motor Stall No Changes Detected in the Optical Sensor for 6 Seconds	The motor is on but no encoder pulses are detected within a given duration while homing	Check the P11 connection and trigger a manual regeneration
Motor Run-On No CAM Switch Change Detected	The motor is on but no encoder pulses are detected or CAM Switches change state within a given duration	Verify correct valve type is chosen. Trigger a manual regeneration
Optical Sensor Undesired change detected by the Optical Sensor	The motor is off but additional encoder pulses are detected	Trigger a manual regeneration
Over-Current Motor Over-Current is Detected	Motor current exceeds thresholds	Trigger a manual regeneration
Flow Meter Error Continuous Flow Detected	Flow exceeded specified threshold for a specific duration	Trigger a manual regeneration
Error Send/Receive Failure	During a setting push, a packet was missing	Reconnect communication cables and push setting in Master Settings
Error System Type Mismatch on Network	The system type among connected units does not match	Push correct system settings in Master Settings
Microcontroller Error	Calibration or manufacturing test was not performed	Contact your Watts representative
100 Days Without Regen	100 Days have expired without a regeneration	Trigger a manual regeneration

Water Softener Flow Diagrams - Down Flow Brining

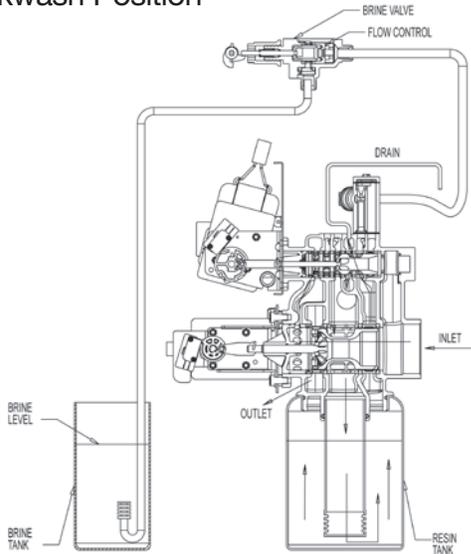
1 Service Position



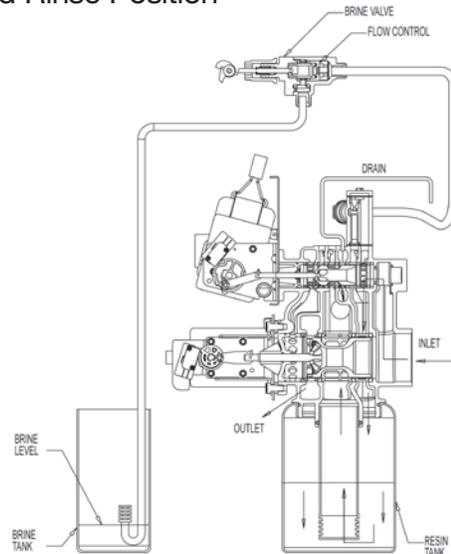
4 Slow Rinse Position



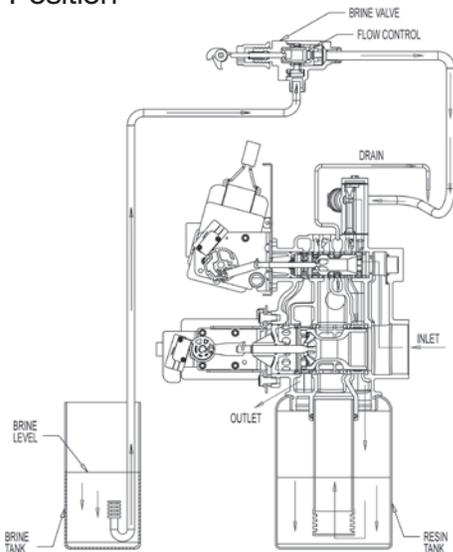
2 Backwash Position



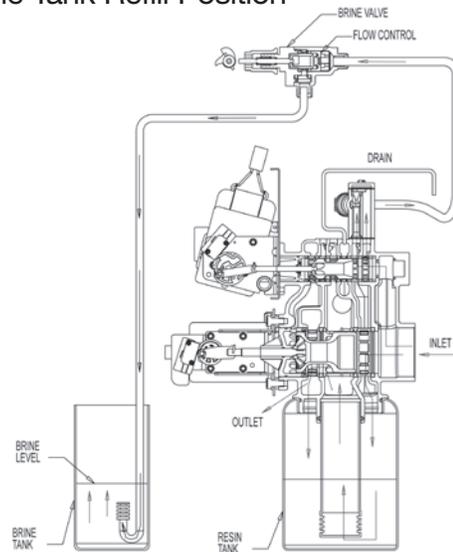
5 Rapid Rinse Position



3 Brine Position

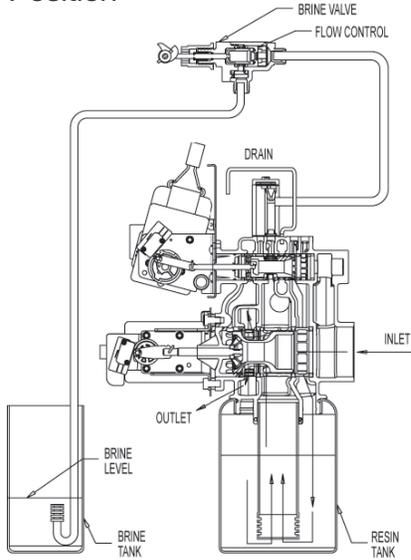


6 Brine Tank Refill Position

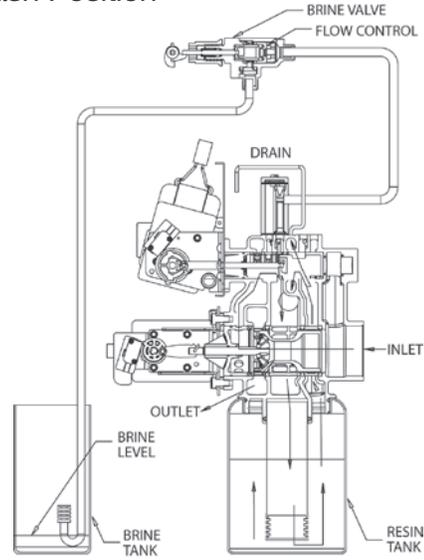


Water Softener Flow Diagrams - Up Flow Brining

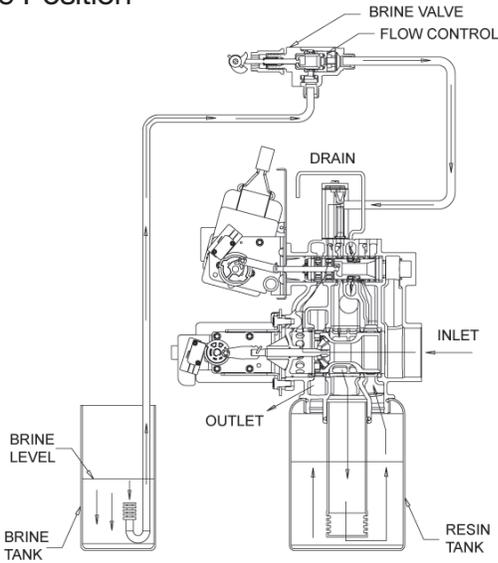
1 Service Position



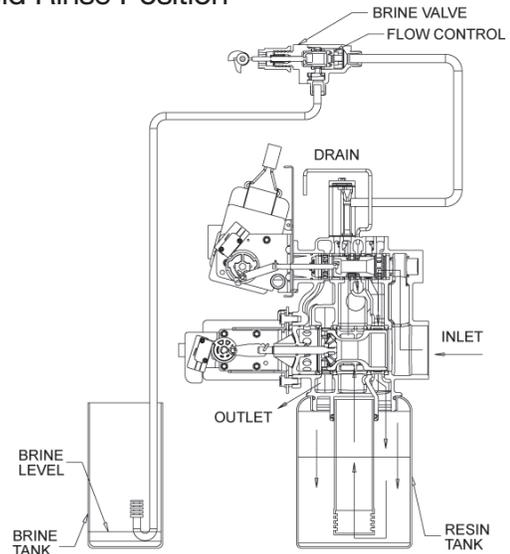
4 Backwash Position



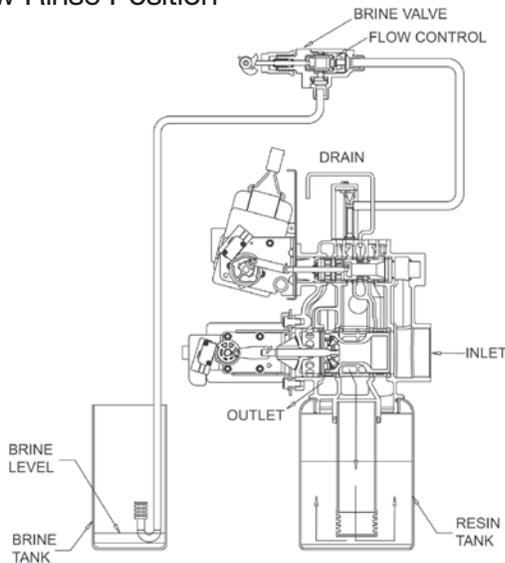
2 Brine Position



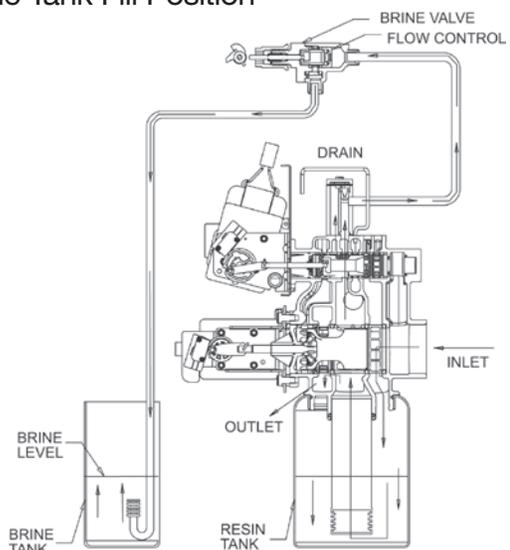
5 Rapid Rinse Position



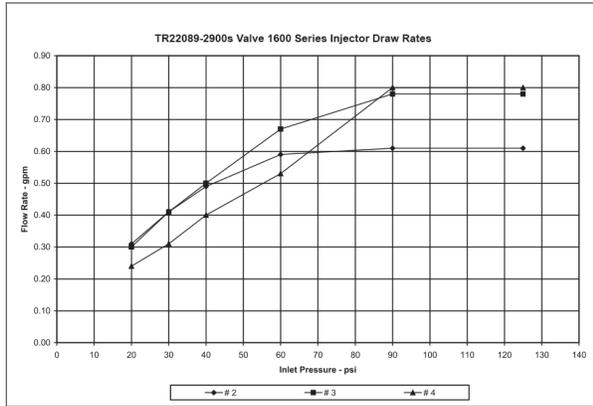
3 Slow Rinse Position



6 Brine Tank Fill Position

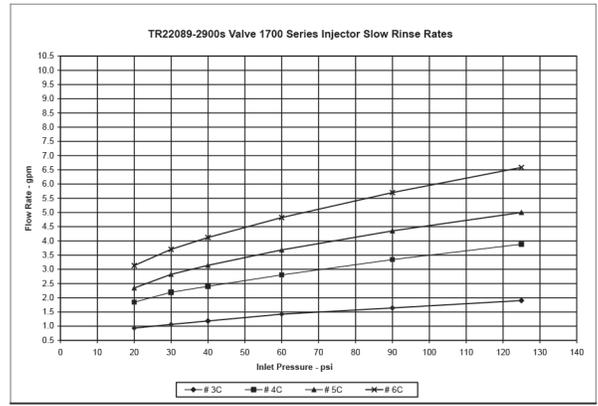


Flow Data and Injector Draw Rates - Down Flow



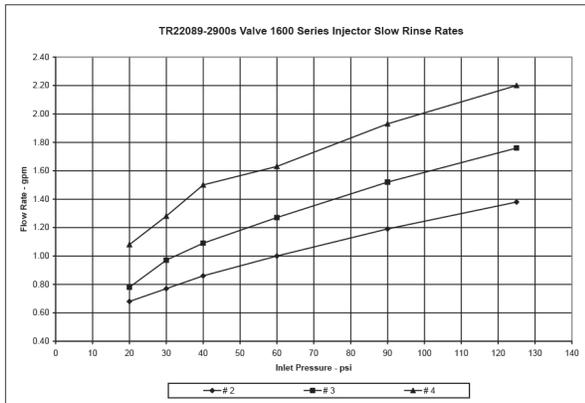
1600 series injectors		Draw Rate - gpm		
pressure	# 2	# 3	# 4	
20	0.31	0.30	0.24	
30	0.41	0.41	0.31	
40	0.49	0.50	0.40	
60	0.59	0.67	0.53	
90	0.61	0.78	0.80	
125	0.61	0.78	0.80	

all injectors used the steel cap and an air disperser



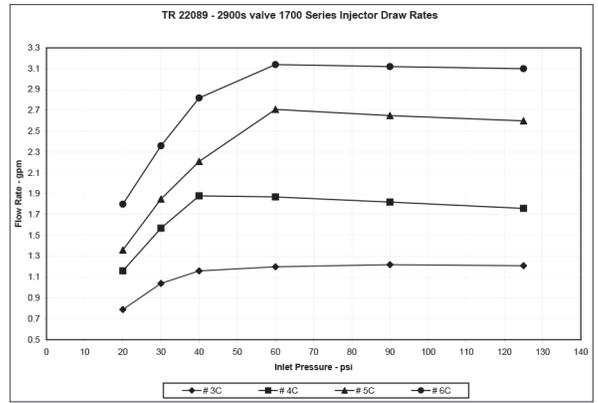
1700 series injectors		Slow Rinse - gpm			
pressure	# 3C	# 4C	# 5C	# 6C	
20	0.93	1.84	2.34	3.13	
30	1.06	2.19	2.82	3.70	
40	1.18	2.40	3.14	4.12	
60	1.42	2.80	3.68	4.82	
90	1.64	3.34	4.35	5.70	
125	1.90	3.88	5.00	6.58	

3C - steel cap, no o-ring, air disperser
 # 4C & 5C - steel cap, o-ring, air disperser
 # 6C & 7C - brass cap, o-ring, no air disperser



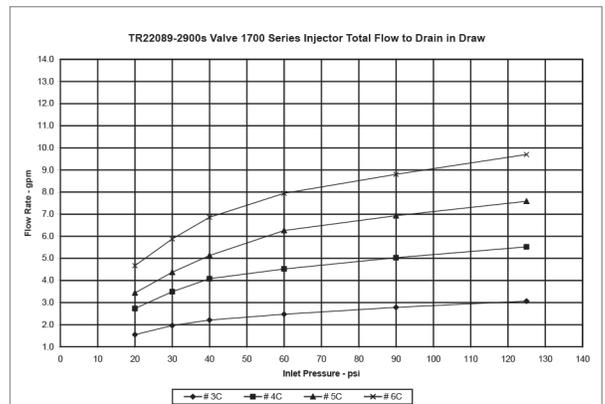
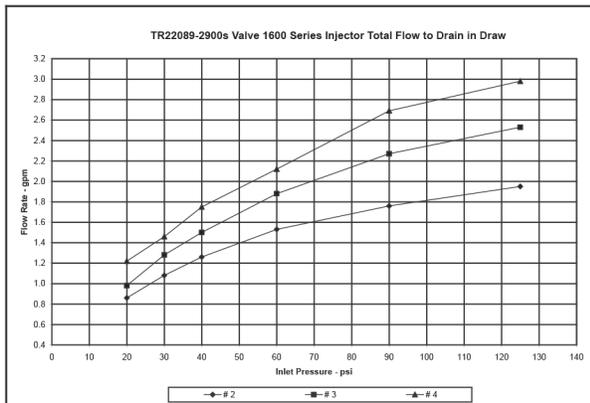
1600 series injectors		Slow Rinse Rates - gpm		
pressure	# 2	# 3	# 4	
20	0.68	0.78	1.08	
30	0.77	0.97	1.28	
40	0.86	1.09	1.50	
60	1.00	1.27	1.63	
90	1.19	1.52	1.93	
125	1.38	1.76	2.20	

all injectors used the steel cap and an air disperser



1700 series injectors		Draw Rate - gpm			
pressure	# 3C	# 4C	# 5C	# 6C	
20	0.79	1.16	1.36	1.80	
30	1.04	1.57	1.85	2.36	
40	1.16	1.88	2.21	2.82	
60	1.20	1.87	2.71	3.14	
90	1.22	1.82	2.65	3.12	
125	1.21	1.76	2.60	3.10	

3C - steel cap, no o-ring, air disperser
 # 4C & 5C - steel cap, o-ring, air disperser
 # 6C - brass cap, o-ring, no air disperser



Injector Nozzle and Throat Chart for 1600/1700 Brine Systems

1600 Brine System

Standard

Size	Color
#0	Red
#1	White
#2	Blue
#3	Yellow
#4	Green

1700 Brine System

Standard

Size	Color
#3C	Yellow
#4C	Green
#5C	White
#6C	Red

WATER SOFTENERS/FILTERS Limited Warranty:

The Company warrants each fiberglass tank 13 inches in diameter and smaller to be free from defects in material and workmanship under normal usage for a period of ten years from the date of original shipment.

The Company warrants each fiberglass tank 14 inches in diameter and larger to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.

The Company warrants any size Salt Tank (Brine Tank) to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.

The Company warrants each Control valve to be free from defects in material and workmanship under normal usage for a period of five years from the date of original shipment.

The Company warrants diaphragm valve nests and related controls to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment.

The Company warrants all other components to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment.

Water softener resins subjected to iron, manganese and chlorine levels greater than 1ppm are expressly not covered by this warranty. Manganese greensand media and expendable media such as activated carbon, Filox[®], Micro-Z[®] and neutralizing media are also not covered by this warranty. In the event of a covered defect within the warranty period, the Company will, at its option, replace or recondition the product without charge.

Disclaimer of Warranty. THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Liability. The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product

Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**



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