Operation & Maintenance Manual

3900 NXT2 Systems

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Foreword

The operating instructions contained herein are intended to serve as a guide for the operation of the water softener equipment.

Since it is impossible to cover all operating contingencies and emergencies in a normal operating manual, the operator should read the manual and become familiar with it contents. They should also review the flow diagrams and vendor literature. This also should include all physical details, and full knowledge of the location and function of the equipment.

The use of an operating logbook is recommended in order to provide a proper record of performance. In the event of operational problems, such a record will prove invaluable when "trouble shooting" the system. This log should include all pertinent flow rates, temperatures and water characteristics. Equipment requiring maintenance or repair should be noted so that it can be scheduled for service or repair.

Frequently, water softener equipment like other processes, develop their own distinct characteristics. Design criteria outlined in this manual is based on many years of experience. However, they do not preclude modifications due to "personality" of the system. Operators should guide themselves accordingly and make any minor adjustments necessary for proper operation of the system.

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Section 1: Introduction

Long term, successful operation of any softening system depends upon the care and attention it receives. Ordinarily, water treatment systems will provide uniform performance after the initial start-up period. Total gallons between regenerations and treated water purity usually do not vary appreciably over the life of the resin as long as the incoming water does not change.

This manual in intended to be a practical reference guide for operators. In view of the fact that system performance can change very dramatically throughout the year, a discussion of “ion exchange” theory is included in addition to basic information relative to equipment operation and regeneration procedures. Thorough understanding of the simple chemical reactions will help to determine if some equipment malfunction has occurred, or if the system is simply responding to changing water conditions. For this reason, the operator and supervising personnel should review Section 2, which defines terminology and simple chemistry associated with this system.

Ion exchange (softening process) is a reversible reaction. Ion exchange softening resins have only a limited capacity for removing hardness (calcium & magnesium). If the volume of water through the resin bed exceeds its capacity, hardness leakage will be detected in the effluent water. Therefore, service runs must be terminated before hardness leakage occurs. When the service run is completed, the resin is treated with sodium chloride (NaCl) to displace the hardness and restore its capacity. This process is termed “regeneration”.

How completely softening can be accomplished depends upon several factors. The primary influences are the incoming water, type of resin, and amount of salt. Equally important, secondary influences are the concentrations and flow rates at which NaCl is introduced.

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Section 2: Principles Of Ion Exchange

2.1 Ion Exchange Softening Process

In order to understand the softening process of ion exchange, it is first necessary to understand the meaning of the terms which are used in the explanation. Hard Water, Cation Exchanger, and Brine are defined below and used to show how the ion exchange process works.

Hard Water – All natural water contains dissolved impurities, but in widely varying amounts. There is always a balance of cations (+) and anions(-), but in the softening process anions have no effect. Water will be hard if it contains large amounts of calcium (Ca++) and/or magnesium (Mg++) ions.

Brine – Salt which has dissolved in water. Completed brine (100%) saturation contains as much salt as possible in water solution (26% to 27%). Salt – Sodium chloride (NaCl), when dissolved in water splits up (ionizes) into sodium (Na+) ions and chloride (Cl-) ions.

Saturated Brine – Contains a large amount of Na+ and Cl- ions (concentration is over 200,000 ppm). When used to regenerate a cation exchanger, only the sodium (Na+) ions are used. The chloride (Cl-) ions are washed to drain.

Cation Exchanger – A high-capacity bead form polystyrene sulfonate cation resin. These beads have negative (-) electric charge, which attracts and holds the cations, which are positively (+) charged (works like a magnet).

Softening Process – When the bead reaches the exchange capacity of Ca++ or Mg++ hardness break through the resin bed will increase. The increase in effluent hardness will indicate that the effective capacity of the cation resin has been reached. The cation exchanger must be regenerated to restore it to its original capacity.

Regeneration – Brine is used to regenerate the cation exchanger to its original capacity. Sodium (Na) ions attach to the resin beads forcing the calcium and magnesium ions to release from the resin beads. Once the exchange has taken place the sodium ions are rinsed to drain. The softener in now ready to remove hardness from the water.

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2.2 Quality Of Effluent

If the hard water contains less than 500 ppm (about 30 grains) of calcium, magnesium and sodium salts, all expressed as $CaCO_3$, it will be found that the effluent from a softener will contain an average of not more that 2 ppm actual total hardness (zero hardness by the soap test). However, as the total cation concentration in the hard water increases above 500 ppm, the average hardness in the effluent will also increase proportionately

The reason for this is that when the sodium salt - those present in the raw water plus those formed by the exchange reactions - are present in high enough concentrations, they cause a "back-regeneration" effect at the same time as the softening process is taking place. This effect prevents as complete a removal of calcium and magnesium as would otherwise be possible.

It is often possible to reduce the average hardness in the effluent below normally expected concentrations, by using a greater amount of salt than usual for regeneration. Normal Softening Cycle - At the start of a normal softening cycle, the hardness in the effluent drops rapidly as the residue of hardness ions left in the bed at the end of the rinse are forced out. The effluent hardness reaches a certain minimum value and remains at approximately this concentration for the major part of the softening run.

2.3 Capacity Of Ion Exchanger

The capacity for the removal of calcium and magnesium depends mainly upon the type of ion exchanger which is used. It is further influenced by the amounts of hardness and sodium ions in the raw water, and by the amount of salt used for regeneration.

Raw Water - The effect of the amounts of hardness and sodium ions in the raw water, is expressed in terms of compensated hardness. The hardness of the raw water is considered to be greater than it actually is for capacity determinations, whenever: (a) the total hardness is greater than 400 ppm (as $CaCO_3$), or (b) the sodium salts are over 100 ppm as ($CaCO_3$). This "greater-than-actual" hardness is referred to as compensated hardness.

Salt Dosage - The capacity, which will be obtained from a cation exchanger, is also determined by the amount of salt used during regeneration. The grains of hardness, which can be removed by each cubic foot of ion exchange, resin increases as more salt is used for regeneration.

At the same time, the efficiency of salt usage decreases with the higher regenerant dosages. That is, a greater number of grains of hardness are removed for each pound of salt used at the lower salt dosages, (and consequently, at the lower capacities). Thus, greater economy may be obtained at the expense of the number of gallons of water softened between regenerations.

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Calculation Of Capacity - To determine the capacity of any cation exchanger, follow the procedure outlined below:

From the analysis of the raw water, determine the actual total hardness as the sum of the calcium and magnesium concentrations expressed as $CaCO_3$. If necessary, calculate the compensated hardness in accordance with the formula given above.

Express parts per million (ppm) of total hardness as grains per gallon by means of the following conversion formula:

PPM / 17.1= grains per gallon (gpg)

2.4 Regeneration Steps

Regeneration is a process by which ions are stripped from the exhausted resin bed and its ion removal ability is restored. All exchangers, ranging from a simple water softener to a complex mixed bed deionizer go through four basic regeneration steps. There may be variations in flow rates; types of regenerating chemicals and regenerant concentrations but these general steps are as follows:

Backwash - Water flow is reversed so that it passes upward through the resin bed. Flow rates are sufficiently high to expand (fluidize) and to agitate the bed without washing large resin particles out of the tank. This action relieves any compaction that may have occurred during the service run. In addition, very fine resin fragments that can form during normal service are washed to drain. Proper backwash is essential to good exchanger performance. A compacted bed can develop high-pressure losses during service, which, in turn, can lead to flow channeling problems.

Brine In - A brine solution is passed slowly through the resin, displacing the exchanged ions and discharging them to drain. Proper control of flow rate and brine concentration is important to insure high regeneration efficiency. The amount of salt that is used depends upon the allowable hardness leakage for any given water supply and the desired resin operating capacity.

Displacement Rinse (Slow Rinse) - After all of the brine has been introduced into the resin bed, water continues to flow at approximately the same low flow rate. This slowly displaces the salt from the free space above the bed and from the void volume between resin particles, insuring that it is utilized to maximum efficiency.

Final Rinse - The final step in regenerating is important in that it will displace any salt left in the exchanger vessel prior to returning to service.

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Section 3: Installation, Loading & Start Up Procedures

3.1 Installation of Equipment

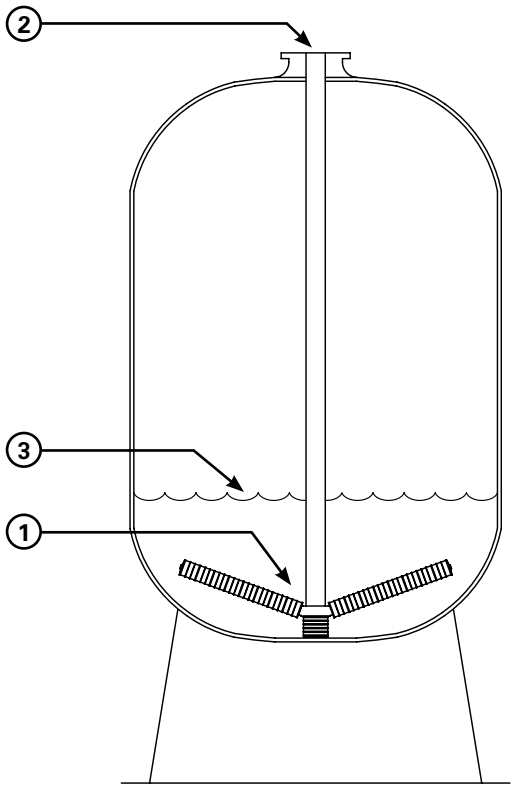
1. Before beginning installation, review the following instructions to familiarize yourself with the general placement of the equipment.
2. The operating pressure is between 30 to 100 psi. If pressure is higher than 100 psi, then a pressure regulator must be installed.
3. The operating temperature is between 35 to 100 degrees F.
4. Locate the equipment in the specified location. When setting the equipment, install on level concrete pad if possible. Level equipment as required.
5. Equipment should be located near a floor drain. The floor drain should be adequate in size to handle the softener backwash flow rate.
6. Interconnecting piping and shut off valves of equipment should be installed per local plumbing codes by a certified plumber.
7. Unions to be installed in the drain line for cleaning of the backwash flow control. Do NOT reduce the drain line pipe size, or install a manual shut off valve. Provide an air gap in the drain line in accordance with local plumbing codes.
8. Before installing any flow meters, read the instruction manual on proper installation of the sensor. Many flow meters must be installed in a certain way to operate properly.
9. Once installed close all manual shut off valves.
10. Brine tank should be located near the softeners, installed on a smooth flat surface. If not the brine tank should be placed on a smooth piece of exterior plywood and level.
11. Once the brine tank has been set in place, remove the lid and check that the brine well is in a vertical position. If the brine tank is equipped with a brine valve/float assembly, remove and check to make sure the brine float setting is correct (See Section 7 – Brine Float Setting). The float will have a certain setting depending on the amount of salt used per regeneration. If incorrect adjust float to proper setting.
12. Place brine valve into brine well and set all the way to the bottom of the brine tank.
13. Fill brine tank with approximately 13-19 inches of water. The water level should be approximately half to the height of float setting.

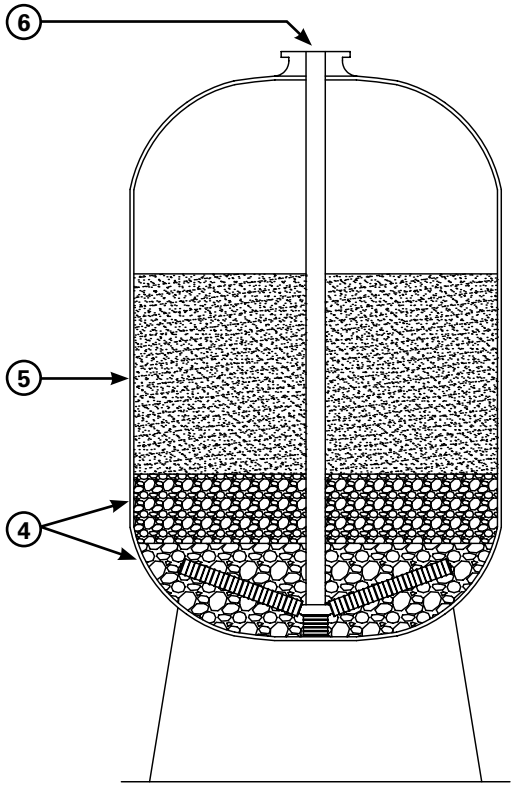
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3.2 Loading Gravel & Resin

1. Before loading the gravel, check the lower distributor for possible damage from shipping. Making sure all laterals are in proper location. Do NOT proceed with loading if any damage is evident.
2. Once the distributor is checked out ok, plug the end of the distributor tube with a PVC cap/plug, clean rag or tape to keep the gravel and resin out of the center of the riser.
3. Fill the tank approximately 1/4 -1/3 full of water. The water will act as a buffer when loading the gravel and prevent any damage to the lower distributor.
4. Determine the amount of gravel and resin required for each tank. ***When coarse, medium and fine gravels are specified, add in that order.*** Slowly pour the gravel into the tank. Try to keep it as level as possible.

   (Not all systems have multiple sizes of gravel)
5. Once the gravel has been loaded. Slowly pour the determined amount of resin into the tank. Try to keep it as level as possible.
6. Flush the tank opening with water to clean resin beads from the top of the tank. Then, remove the cap, plug, rag or tape from the distributor pipe. Apply a light coat of approved lubricating silicone to the top edge of the pipe. **(DO NOT USE PETROLIUM LUBRICANTS, ie. Vaseline)**
7. Finish filling the tank with water, up to the top. This will eliminate air space and prevent excessive air – head pressure when the water conditioner is pressurized.
8. Once completed, lubricate the o-ring and carefully install control valve, then secure the top flange.
9. Keep power off until final checkout procedure is completed.





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3.3 Start-Up Procedures

1. Once the piping and installation completed, and with the mineral in the tank, proceed with the following.
2. Open the manual by-pass valve. The manual inlet and outlet valves are to remain closed.
3. Plug electrical power of the main controller to a wall outlet (120v)
4. The main controller is a Fleck NXT2. The controller is now ready to be programmed. See Section 8. Familiarize yourself with the proper manual, on proper wiring and programming procedure for your specific controller.
5. Once the programming is completed, manually set the valve unit into backwash. Slowly open the manual inlet valve. **DO NOT OPEN INLET VALVE COMPLETELY**. (Full flow of water could cause loss of resin) Water will enter in the bottom of the mineral tank, causing any air to expel from top to the drain. Continue to slowly fill until all the air has expelled from the tank and only water flows to drain.
6. When only water flows to drain, open manual inlet valve completely and continue backwashing until water is clear from any color.
7. Manually set the unit through regeneration one step at a time. When doing this make sure the piston completely comes to a stop before proceeding to the next step.
8. Fill brine tank with proper amount and type of salt recommended.
9. Close the manual by-pass valve and open manual outlet valves. The system is ready for service.

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Section 4: Operating & Regeneration Procedures

4.1 Normal System Operation

The system is designed for fully automatic operation. Service runs will automatically terminate when an exhaustion end-point is reached.

Although it should not be absolutely necessary to observe every regeneration, Operators should periodically witness a complete cycle to make sure that critical flow rates and steps have not gotten out of adjustment.

Daily

- Date and Time
- Meter Reading
- Outlet Hardness
- Inlet Hardness
- Inlet and outlet pressure gauge readings; calculated pressure drop
- Record Salt Usage

Miscellaneous

All of this information can be invaluable in detecting if something is going wrong, or when trouble shooting. High-pressure drop during the run can be symptomatic of buildup of suspended solids on the bed or excess breakage of resin beads. Short runs or higher than normal effluent hardness could be caused by resin fouling. This could be caused by malfunction during regeneration or even a contaminated batch of salt.

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4.2 Multi-Port Valve Operation (See Section 8 – Fleck 3900 Control Manual)

Multi-port valve consist of Fleck 3900 multi-port double piston operated valve. The valve operates with upper and lower piston that moves on a seals and spacer assembly. The upper piston is for regeneration and the lower piston is for service. The piston moves to a certain location, which determines the operation position of the unit.

SERVICE

During service flow, raw water passes through the valve and downflow through the softener up through the distributor tube to service. Service flow continues until the water meter/counter has signaled an end of run and will automatically switch service flow to the other unit and go into regeneration.

REGENERATION

Based on 10 grains/gallon of hardness as $CaCO_3$, approximately 3000 gallons of water per cubic foot of resin in the softener can flow before exhaustion of resin.

BACKWASH

Raw water flow is diverted to pass down through the distributor tube and up-flow through the softener. The water expands the bed scrubbing the resin beads and washing any entrapped dirt out to drain. Backwash sequence lasts approximately 15 minutes.

BRINE AND SLOW RINSE

Raw water is directed through the ejector located at the multi-port valve creating a venturi action in the ejector to draw the required amount of brine into the softener. The brine float air check valve shuts off the brine flow when the preset draw down is reached. Raw water continues to the drain slow rinsing the resin for the remainder of the cycle. Brine and slow rinse sequence generally lasts 60 minutes.

FAST RINSE

Raw water passes through the multi-port valve down flow through the softener and out to drain. This sequence removes all remaining brine from the resin and lasts 10 minutes. When the regeneration cycle is completed and the softener goes back into service, raw water will backflow through the ejector refilling the brine tank to its normal level. The brine valve float will control water makeup level.

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Section 5: Operator Responsibilities

Operator Maintenance

Long term, reliable system performance depends upon how conscientiously the equipment is operated and maintained. Operator responsibilities should include the following recommended practices:

1. Maintain Operating Logs - Operators should maintain close control of the process by monitoring system performance daily. Effluent hardness, service run lengths and pressure drop should be recorded. Since resins are subject to fouling, decrease in product quality or run length could be the result of fouling. In addition to operating data, log notations should include equipment design changes, or modifications in programmed times. This information can be invaluable if trouble shooting is ever required.
2. Check Regeneration Flow rates - Check and adjust flows during regeneration on a regular basis.
3. Institute, a Program of Preventative Maintenance - Setup a definite schedule for routine maintenance. Typical recommended practices are: annual resin sampling and analysis; and annual inspection, lubrication and/or replacement of diaphragms on all diaphragm valves.

5.2 Salt Specification - Use Salt As Specified.

a. *Type* - Rock salt or evaporated salt
b. *Color* - White to grayish white
c. *Composition* - Not less than 98% sodium chloride, with a minimum of calcium and magnesium salts; zero phenolphthalein alkalinity (Alkalinity P); no grease, fat, or oil content
d. *Fineness* - Softeners using polyethylene brine tanks, with no gravel in the bottom, must use an extra coarse grade of rock salt.
e. *Solubility* - The salt should dissolve rapidly without packing, to form a clear solution.

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Section 6: Trouble Shooting

6.1 General

The most common system failures are either “poor water quality’ or “short service run. lf the change in performance occurs suddenly – i.e., within a couple of operating cycles, 9 times out of 10 these problems result from:

a Insufficient regenerating chemical quantity,

b Poor control of chemical concentrations and/or flow rates,

c Over-running (over exhausted) resin beds during a service run

d Flow channeling because of a plugged or failed internal flow distributor.

If however, the change occurs gradually over a period of weeks or months, the problem is more likely due either to a change in feed water mineral content or from fouling of the resins. Under any circumstance, the importance of maintaining Operating Logs cannot be stressed too strongly. Study of the Log will often reveal any trend that might be developing. In the case of fouling, periodic resin analyses are the only way to identify such problems.

General guidelines that wilt assist in determining common operating difficulties are given below. Often poor performance results because of one or more contributing factors. The recommended approach is to go systematically through the list to see what symptoms apply and then to take corrective action.

6.2 Reduced Capacity Or Poor Effluent Quality

SOURCE OF TROUBLE	POSSIBLE CAUSE	CORRECTIVE ACTION
Change In Chemical Composition Of Raw Water	Higher hardness in raw water	Check hardness by chemical test. lf it has changed, compute new capacity and use new meter setting
Softener Being Overrun Consistently	Raw water has more hardness	Check raw water hardness and meter setting. Give unit a “double regeneration
	Meter setting is incorrect	Reset meter per manual
Incorrect Chemical Test Results	Test procedure in error	Follow instructions carefully
	Chemicals for test causing error	Replace weak or contaminated test solutions
Meter Slippage	Worn or damaged meter	Replace or repair as necessary

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Inadequate Regeneration	Using a weak (less than 22 Be) brine solution	Recharge at required times Use salt which meets specification
		Use correct amount of dilution water
	Not using enough salt	Check text for specified amount. Use correct saturated brine draw (or pumpage)
Loss Of Ion Resin	Surges during backwash	Install pressure regulator
		Replace lost ion exchanger resin
***Fouling Of Ion Resin**	Oxidized iron (Fe) or manganese (Mn) coating resin	If iron & manganese are in oxidized form at source, provide filter to remove. If water supply is clear when first drawn (Fe & Mn are in soluble form) eliminate any air leaks from suction piping. Do NOT feed chlorine or other oxidizing chemicals before softening the water
	Organic matter (slime) coating resin	Provide treatment to destroy organic matter
Damage To Ion Resin	High concentrations of chlorine (or other oxidizing agents) in water.	Add reducing agent (such as Sodium Sulfite) or otherwise remove
Channeling - caused by:		
1. Dirty or packed bed	Backwash rate too low	Adjust controller to correct rate
	Dirty inlet water or backwash water	May require pretreatment
2. Gravel hills, tipped bed or potholes	Careless placement of supporting bed	Inspect and probe bed
	Surges during backwash	Install pressure regulator
	Air in backwash water.	Eliminate air leaks and cause of surges

*NOTE: It is sometimes possible to restore a fouled bed to its original condition, or very nearly so.

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6.3 Increase Pressure Lose Or Decrease In Flow Rate

Dirty Or Packed Bed - See above for possible causes and corrective actions.

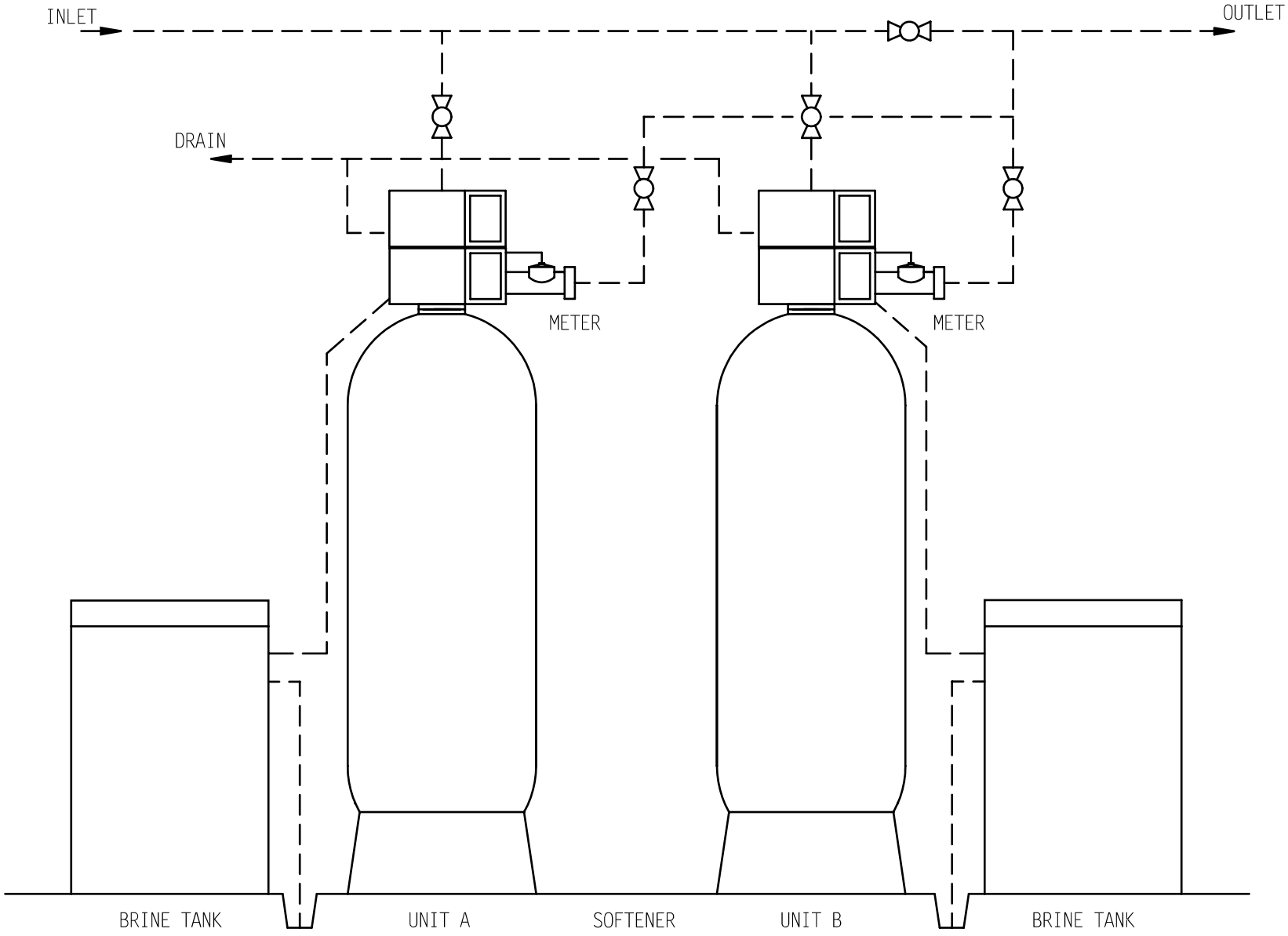
Restricted Flow – Obstruction in meter, piping or valves. Inspect and clean as required.

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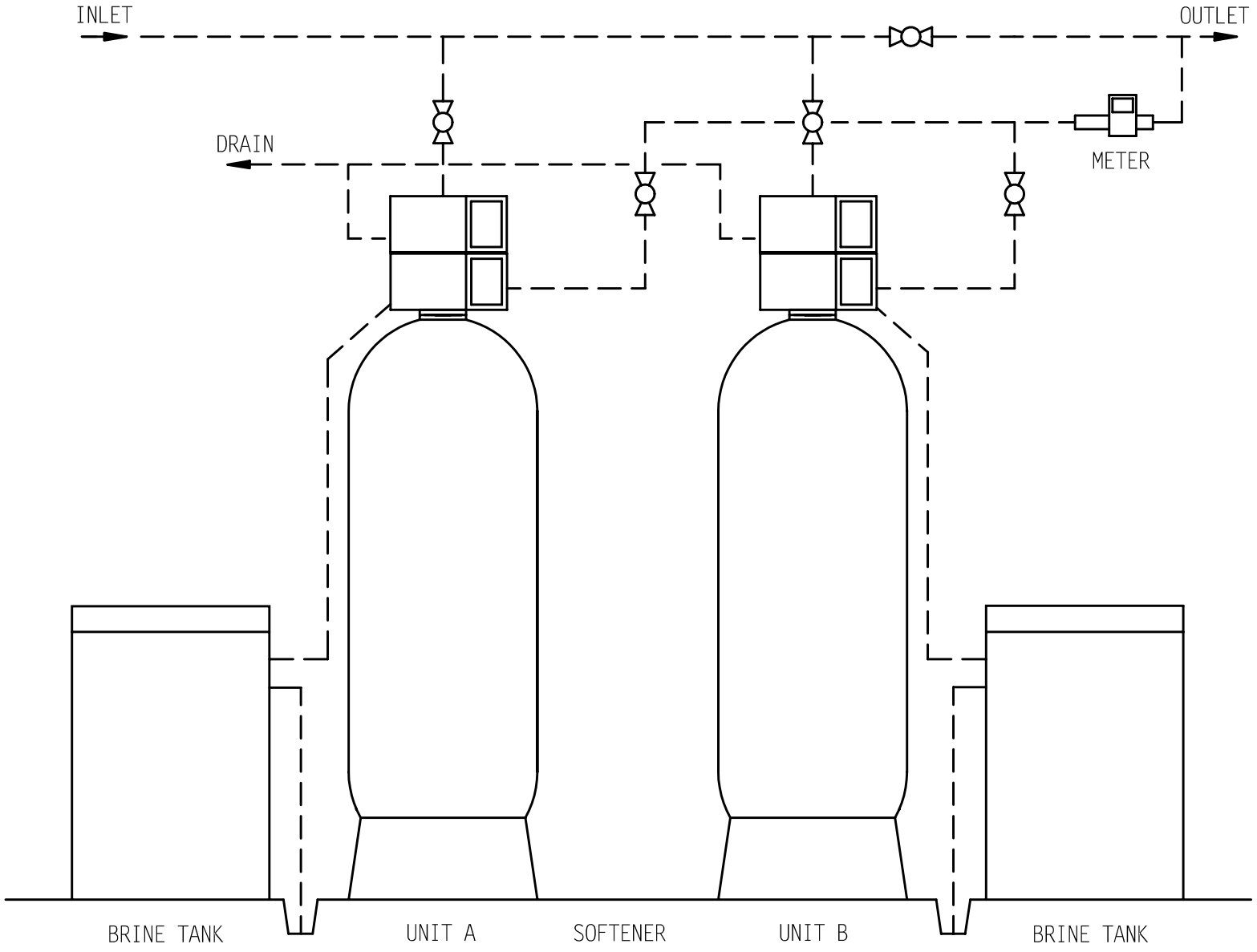
Section 7: Softener System Drawings & Specifications

7.1 Typical System 5 Duplex Interlock Unit Installation



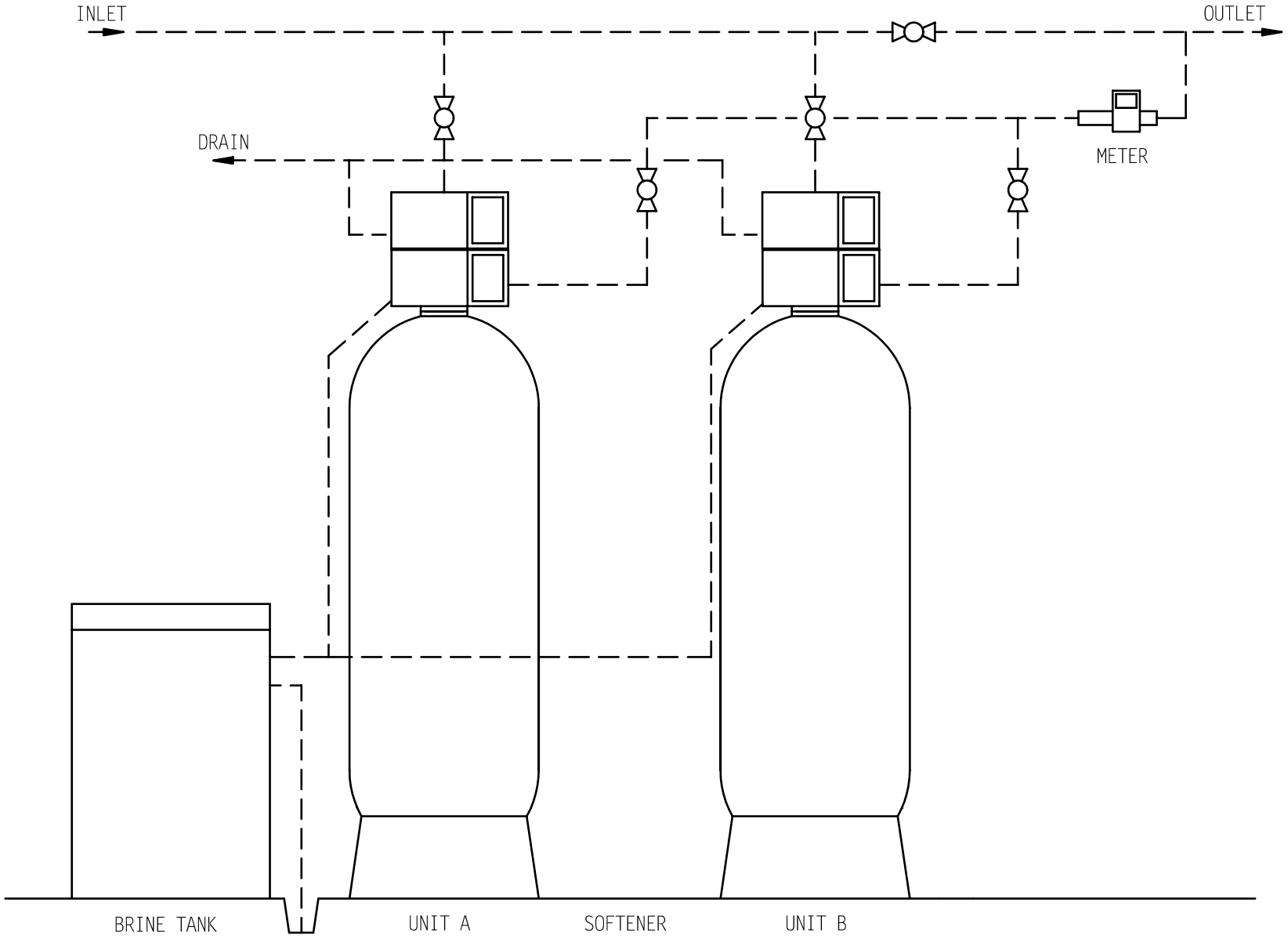
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7.2 Typical System 6 Duplex Parallel Unit Installation



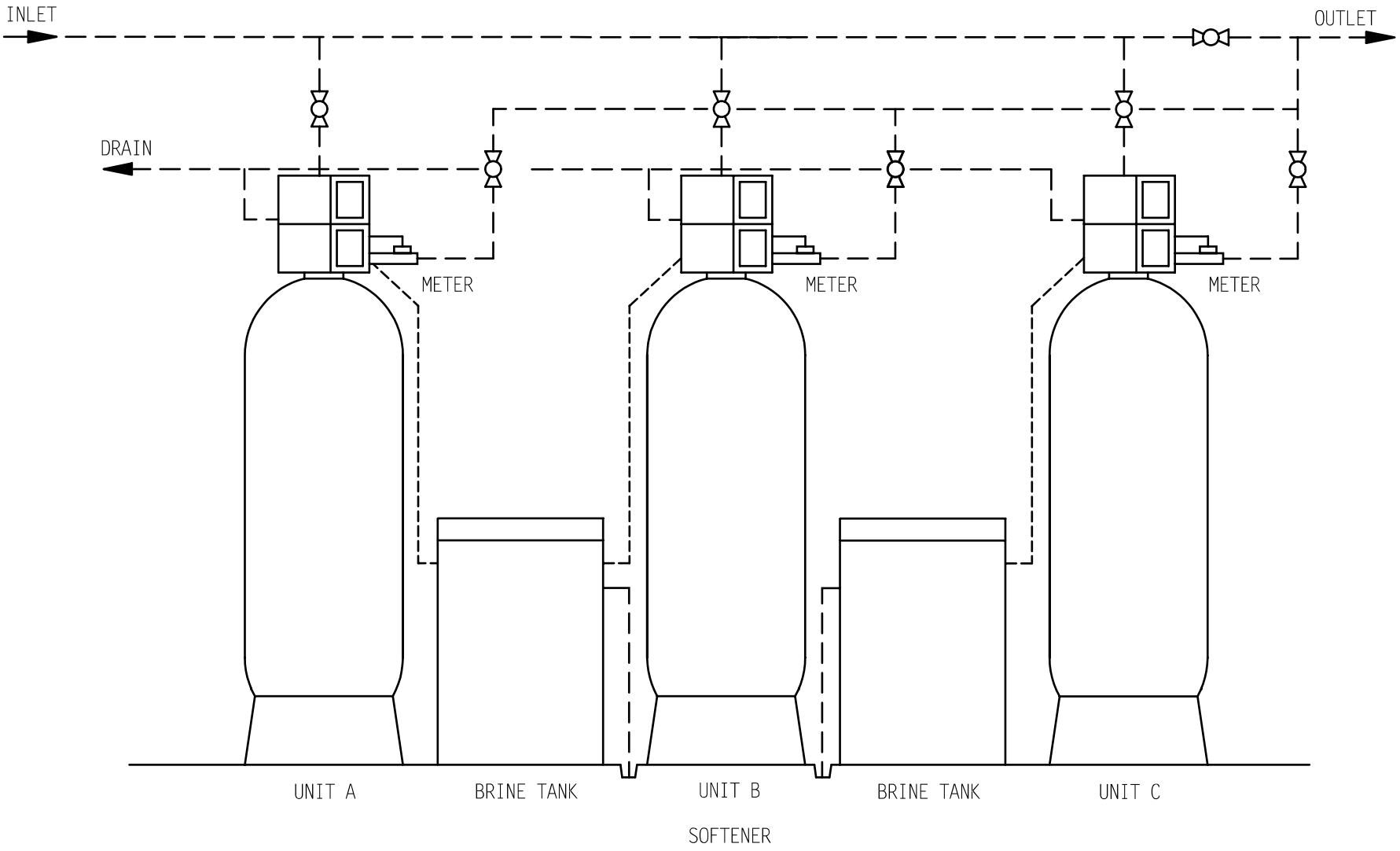
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7.3 Typical System 7 Duplex Alternating Unit Installation



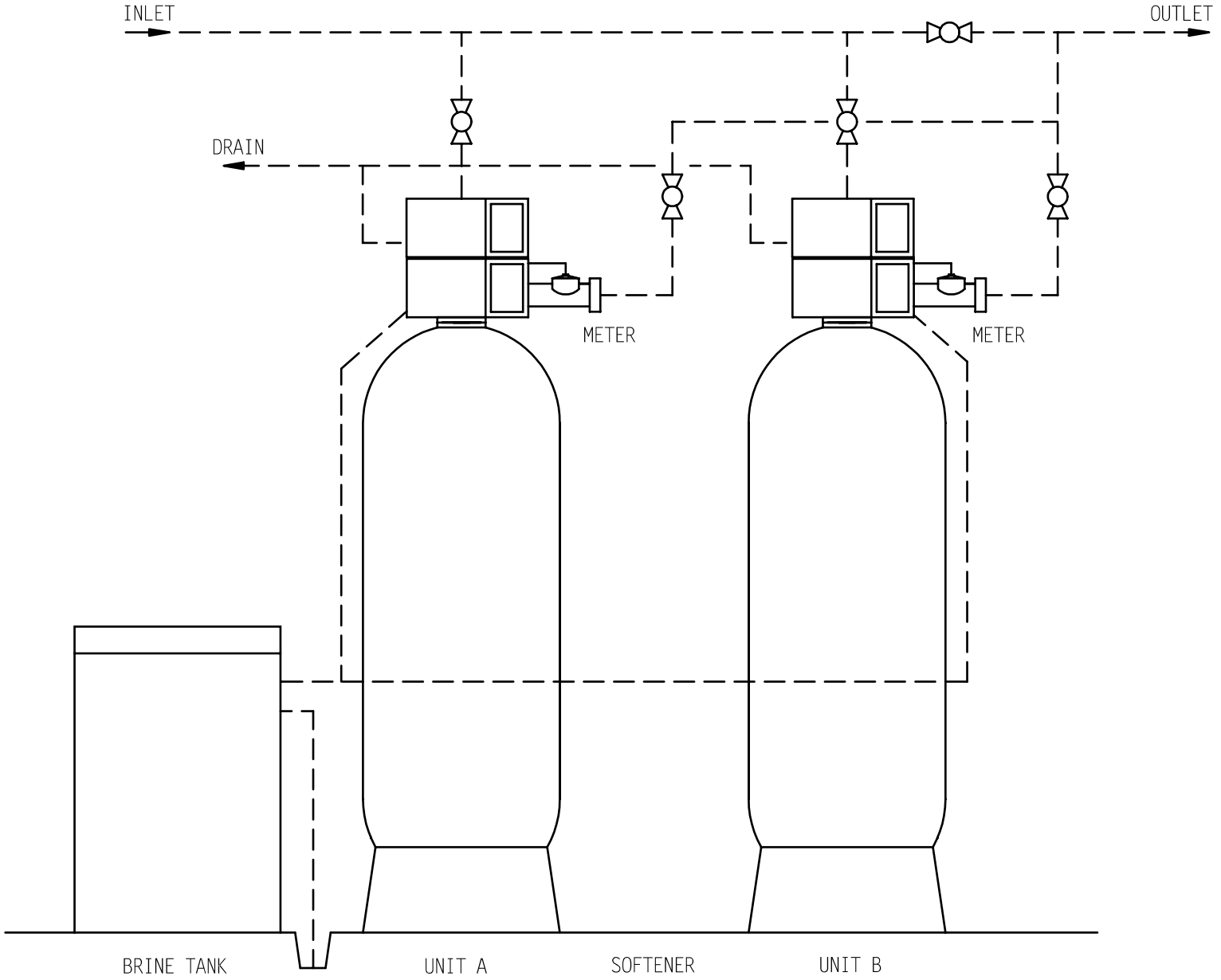
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7.4 Typical System 9 Triplex Alternating Unit Installation 2 Units in Service, 1 Unit is Standby



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7.5 Typical System 14 Twin Progressive Unit Installation



7.6 Specifications

3900 Specifications					
Model	**300,000**	**450,000**	**600,000**	**900,000**	**1,200,000**
Capacity (1)	300,000	450,000	600,000	900,000	1,200,000
Capacity (2)	240,000	360,000	480,000	720,000	960,000
Media Tank Size	24" x 72"	30" x 72"	36" x 72"	42" x 72"	48" x 72"
Resin, Cubic Feet	10	15	20	30	40
Resin, Pounds	500 #	750 #	1000 #	1500 #	2000 #
Gravel Underbed, 1/4" x 1/8"	100 #	100 #	150 #	250 #	300 #
Gravel Underbed, 1/2" x 1/4"	150 #	250 #	350 #	450 #	600 #
Max Service Flow Rate, GPM (3)	170	210	250	270	280
Min Service Flow Rate, GPM	120	155	185	200	205
Backwash Flow Rate, GPM	15	25	35	50	65
Backwash, Minutes	10	10	10	10	10
Backwash, Pins	5	5	5	5	5
Brine Draw and Rinse, Minutes	60	60	60	60	60
Brine Draw and Rinse, Holes	30	30	30	30	30
Rapid Rinse, Minutes	10	10	10	10	10
Rapid Rinse, Pins	5	5	5	5	5
Salt Required (1)	150 #	225 #	300 #	450 #	600 #
Salt Required (2)	90 #	135 #	180 #	270 #	360 #
Refill Time, Minutes (1)	26	16	20	16	14
Refill Time, Holes (1)	13	8	9	9	9
Refill Time, Minutes (2)	16	10	12	10	8
Refill Time, Holes (2)	8	5	6	5	4
Return To Service, Minutes	4	4	4	4	4
Return To Service, Pins	2	2	2	2	2
Brine Line Flow Control, GPM	2	5	5	10	15
Injector Size	# 4	# 5	# 6	# 7	# 8
Injector Color	Green	n/a	n/a	Blue	Yellow

Notes:
(1) - At 15 Pounds Per Cubic Foot yields 30,000 Grains Capacity Per Cubic Foot.
(2) - At 9 Pounds Per Cubic Foot yields 24,000 Grains Capacity Per Cubic Foot.
(3) - At 15 PSI Pressure Drop.

3" Meter Range
Standard Range, 3" - 63,750 Gallons
Extended Range, 3" - 318,750 Gallons

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7.7 Brine Float Settings

Tank Size	Cu. Ft.	Brine Tank	Brine Valve[1]	Salt Deck[2]		Brine valve set at[3]	
				Yes	NO	9lb/cf.	15lb/cf.
30 x 72	15	30 x 48	494	9"		26"	44"
					X	38"	—
		39 x 48	494	9"		14"	25"
					X	23"	34"
36 x 72	20	39 x 48	494	12"		18"	39"
					X	30"	—
		42 x 60	494	9"		17"	30"
					X	26"	39"
42 x 72	30	42 x 60	494	12"		27"	—
					X	39"	—
		50 x 60	494	12"		16"	29"
					X	28"	41"
48 x 72	40	50 x 60	494	12"		29"	—
					X	37"	—
		60 x 60	494	12"		—	26"
					X	26"	38"

Notes:

1 - Brine Valve Clack 494 – 1" connection

2 - Salt deck height as noted.

3 - Float setting from bottom of brine tank.

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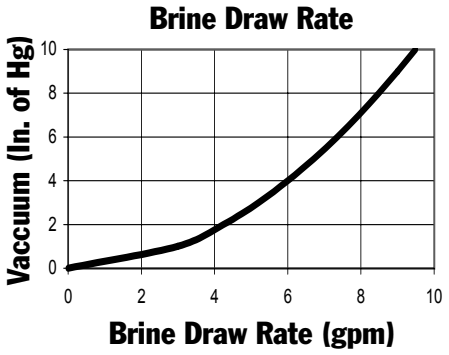
454 3/4" High Flow Brine Valve

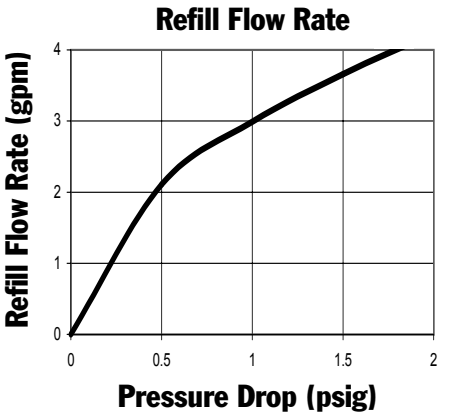
454 ¾" HIGH FLOW BRINE VALVE — Today's larger commercial brine valves demand higher brine draw and refill rates. Building upon the original 454's design, the 454 ¾" High Flow has improved flow characteristics allowing brine draw up to 10 gallons per minute and refill rates up to four gallons per minute. A flow diffuser and heavier float reduces the potential of premature checking. 36" and 54" Float Rods are available.

Please specify length as listed below:

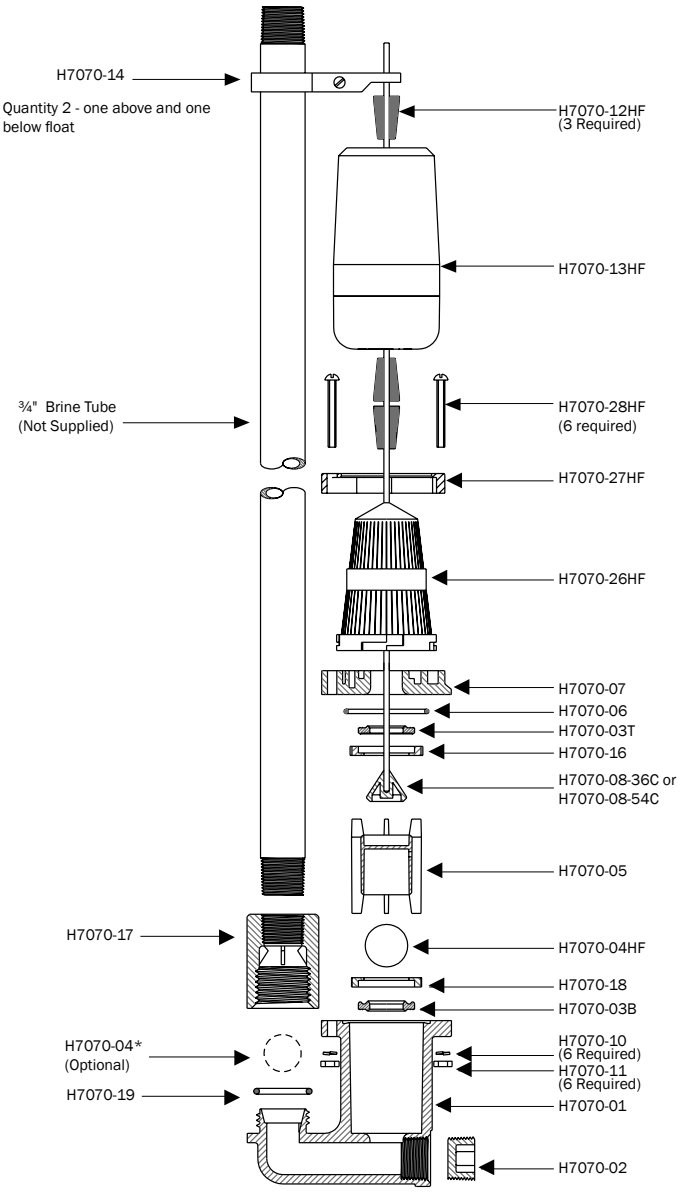
H7070-36HF - 454 ¾" High Flow Brine Valve (36" Rod)

H7070-54HF - 454 ¾" High Flow Brine Valve (54" Rod)





NOTE: The 454 ¾" High Flow Brine Valve is designed for salt brine only. It will also fit inside a brine well that is 5" or larger.



ORDER NUMBERS:

H7070-01	Body	H7070-10	SS Lock Washer
H7070-02	Plastic Plug-¾"	H7070-11	SS Nut
H7070-03T	Seat Washer Top (Orange)	H7070-12HF	High Flow Float Grommet
		H7070-13HF	High Flow Float
H7070-03B	Seat Washer Bottom (Clear)	H7070-14	Float Rod Guide Asy
		H7070-16	Upper Seat Retainer
H7070-04HF	High Flow Air Check Ball	H7070-17	Refill Chamber
		H7070-18	Lower Seat Retainer
H7070-04*	Refill Check Ball	H7070-19	O-ring Refill Chamber Seal
H7070-05	Ball Cage		
H7070-06	O-ring Cover Seal	H7070-26HF	Basket Diffuser
H7070-07	Body Cover	H7070-27HF	Retainer Ring
H7070-08-36C	Float Rod and Seat Cone Asy - 36"	H7070-28HF	SS HF Screw
H7070-08-54C	Float Rod and Seat Cone Asy - 54"		

* Optional for control valves without timed refill.
See note on back of page for further information.

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454 High Flow Brine Valve Installation Guide

1. Use Teflon tape only on threaded plastic pipe connections. Many liquid or paste pipe sealing products contain compounds that may cause plastics to crack with time.
2. PVC brine pipe is recommended for use with these valves as it is non-corrosive and threads easily.
3. After the proper float setting has been determined and the height set, place the float rod guides close to the float (but not as to hinder float operation), adjust to position the float directly above the brine valve and tighten securely.
4. Position the assembly securely in the brine well and check to see that there is no interference with the float operation.

NOTE: This brine valve is intended to be used as a safety float only for timed brine systems at refill rates up to 4 gpm. High refill flow rates can cause the brine valve to close prematurely. Repeated float closures at high refill rates can cause "water hammer," which may damage the plumbing. A refill check ball is available for use with non-timed refill systems. To install the refill check ball, unscrew the refill chamber (H7070-17), insert ball, and thread refill chamber back onto the body of the valve.

Order No: H7070-34
Description: 454 Brine Valve Seal Replacement Kit

	Description
H7070-03T	Seat Washer Top (Orange)
H7070-03B	Seat Washer Bottom (Clear)
H7070-06	O-ring Cover Seal
H7070-16	Upper Seat Retainer
H7070-18	Lower Seat Retainer
H7070-19	O-ring Refill Chamber Seal

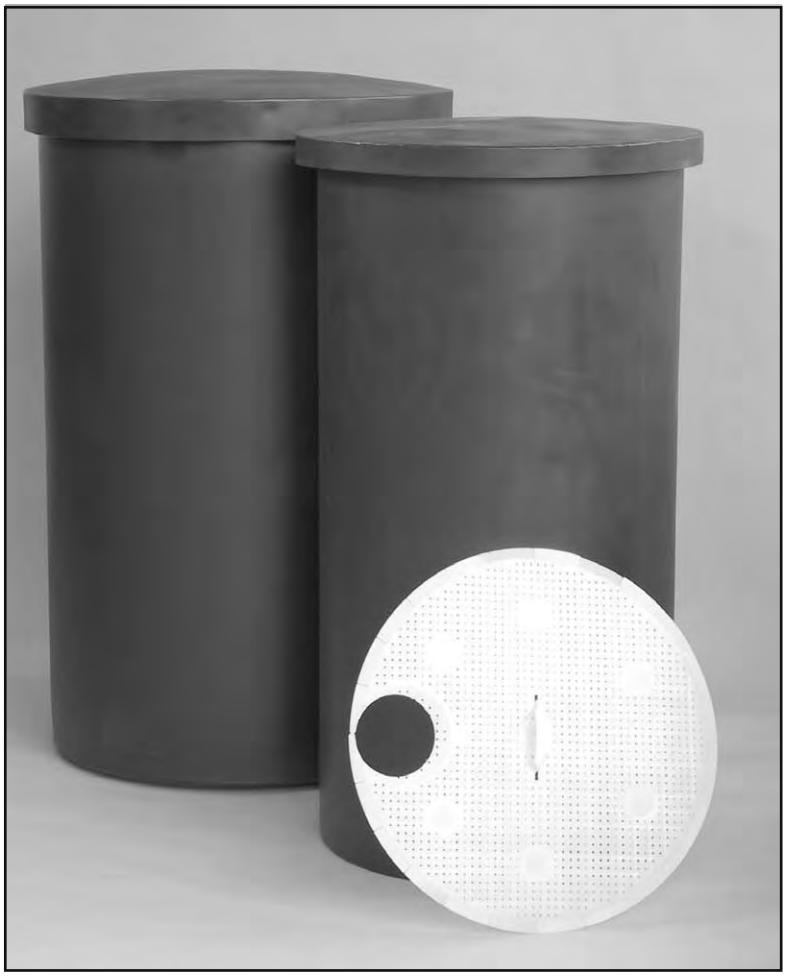
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7.8 Commercial/Industrial Rotationally Molded Brine Tanks

Commercial and industrial water softeners require a large volume of brine during each regeneration. From a capacity of 95 gallons to 500 gallons, our Rotationally Molded Brine Tanks are built to last. Molded out of durable, chemically resistant high density polyethylene, their 1/4" seamless walls won't bulge. All tanks and covers are black. Rotationally Molded Brine Tanks are strong enough to handle your toughest brine requirements.

Also available:

24" Plastic Grids
30" Plastic Grids



TANK SIZE	ORDER NUMBER	DIAMETER	HEIGHT	SALT CAPACITY	VOLUME	WEIGHT
24 x 48	G22448CB1P00	24"	48"	800 lbs.	95 gal.	30 lbs.
24 x 60	G22460CB1P00	24"	60"	1000 lbs.	115 gal.	32 lbs.
30 x 48	G23048CB1P00	30"	48"	1200 lbs.	145 gal.	48 lbs.
30 x 60	G23060CB1P00	30"	60"	1600 lbs.	180 gal.	56 lbs.
39 x 48	G23948CB1P00	39"	48"	2200 lbs.	250 gal.	67 lbs.
39 x 60	G23960CB1P00	39"	60"	2700 lbs.	300 gal.	80 lbs.
42 x 60	G24260CB1P00	42"	60"	3100 lbs.	350 gal.	84 lbs.
50 x 60	G25060CB1P00	50"	60"	4500 lbs.	500 gal.	107 lbs.

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Section 8: 3900 Control Manual NXT2 Manual

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PENTAIR

FLECK 3900

SERVICE MANUAL



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CALIFORNIA PROPOSITION 65 WARNING

⚠ WARNING: This product contains chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

JOB SPECIFICATION SHEET

Job Number: _____

Model Number: _____

Water Hardness: _____ ppm or gpg

Capacity Per Unit: _____

Mineral Tank Size: _____ Diameter: _____ Height: _____

Salt Setting per Regeneration: _____

1. **Type of Timer:**
   - A. 7 Day or 12 Day
   - B. Meter Initiated
2. **Downflow: Upflow Upflow Variable**
3. **Meter Size:**
   - A. 3/4-inch Std Range (125 - 2,100 gallon setting)
   - B. 3/4-inch Ext Range (625 - 10,625 gallon setting)
   - C. 1-inch Std Range (310 - 5,270 gallon setting)
   - D. 1-inch Ext Range (1,150 - 26,350 gallon setting)
   - E. 1-1/2 inch Std Range (625 - 10,625 gallon setting)
   - F. 1-1/2 inch Ext Range (3,125 - 53,125 gallon setting)
   - G. 2-inch Std Range (1,250 - 21,250 gallon setting)
   - H. 2-inch Ext Range (6,250 - 106,250 gallon setting)
   - I. 3-inch Std Range (3,750 - 63,750 gallon setting)
   - J. 3-inch Ext Range (18,750 - 318,750 gallon setting)
   - K. Electronic ____ Pulse Count ___ Meter Size _____
4. **System Type:**
   - A. System #4: 1 Tank, 1 Meter, Immediate, or Delayed Regeneration
   - B. System #4: Time Clock
   - C. System #4: Twin Tank
   - D. System #5: 2-5 Tanks, Interlock Mechanical
     2-4 Tanks, Interlock Electronic
     Meter per unit for Mechanical and Electronic
   - E. System #6: 2-5 Tanks, 1 Meter, Series Regeneration, Mechanical
     2-4 Tanks, 1 Meter, Series Regeneration, Electronic
   - F. System #7: 2-5 Tanks, 1 Meter, Alternating Regeneration, Mechanical
     2 Tanks only, 1 Meter, Alternating Regeneration, Electronic
   - G. System #9: Electronic Only, 2-4 Tanks, Meter per Valve, Alternating
   - H. System #14: Electronic Only, 2-4 Tanks, Meter per Valve. Brings units on and offline based on flow.
5. **Timer Program Settings:**
   - A. Backwash: _____ Minutes
   - B. Brine and Slow Rinse: _____ Minutes
   - C. Rapid Rinse: _____ Minutes
   - D. Brine Tank Refill: _____ Minutes
   - E. Pause Time: _____ Minutes
   - F. Second Backwash: _____ Minutes
6. **Drain Line Flow Control: gpm**
7. **Brine Line Flow Controller: gpm**
8. **Injector Size#:**
9. **Piston Type:**
   - A. Hard Water Bypass
   - B. No Hard Water Bypass

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INSTALLATION

Water Pressure

A minimum of 20 pounds (1.4 bar) of water pressure is required for regeneration valve to operate effectively.

Electrical Facilities

An uninterrupted alternating current (A/C) supply is required.

NOTE: Other voltages are available. Please make sure your voltage supply is compatible with your unit before installation.

Existing Plumbing

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.

Location Of Softener And Drain

The softener should be located close to a drain to prevent air breaks and back flow.

By-Pass Valves

Always provide for the installation of a by-pass valve if unit is not equipped with one.

CAUTION Water pressure is not to exceed 125 psi (8.6 bar), water temperature is not to exceed 110°F (43°C), and the unit cannot be subjected to freezing conditions.

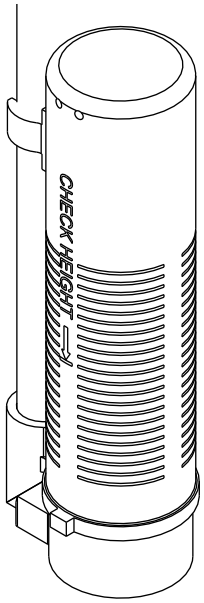
Installation Instructions

1. Place the softener tank where you want to install the unit making sure the unit is level and on a firm base.
2. During cold weather, the installer should warm the valve to room temperature before operating.
3. All plumbing should be done in accordance with local plumbing codes. The pipe size for residential drain line should be a minimum of 1/2 inch (13 mm). Backwash flow rates in excess of 7 gpm (26.5 Lpm) or length in excess of 20 feet (6 m) require 3/4 -inch (19 mm) drain line. Commercial drain lines should be the same size as the drain line flow control.
4. Refer to the dimensional drawing for cutting height of the distributor tube. If there is no dimensional drawing, cut the distributor tube flush with the top of the tank.
5. Lubricate the distributor o-ring seal and tank o-ring seal. Place the main control valve on tank.

NOTE: Only use silicone lubricant.

6. Solder joints near the drain must be done prior to connecting the Drain Line Flow Control fitting (DLFC). Leave at least 6 inches (15 cm) between the DLFC and solder joints when soldering pipes that are connected on the DLFC. Failure to do this could cause interior damage to the DLFC.
7. Plumber tape is the only sealant to be used on the drain fitting. The drain from twin tank units may be run through a common line.
8. Make sure that the floor is clean beneath the salt storage tank and that it is level.
9. Place approximately 1 inch (25 mm) of water above the grid plate. If a grid is not utilized, fill to the top of the air check (Figure 1) in the salt tank. Do not add salt to the brine tank at this time.
10. On units with a by-pass, place in by-pass position. Turn on the main water supply. Open a cold soft water tap nearby and let run a few minutes or until the system is free from foreign material (usually solder) that may have resulted from the installation. Once clean, close the water tap.
11. Slowly place the by-pass in service position and let water flow into the mineral tank. When water flow stops, slowly open a cold water tap nearby and let run until the air is purged from the unit.
12. Plug unit into an electrical outlet.

NOTE: All electrical connections must be connected according to local codes. Be certain the outlet is uninterrupted.



60002 Rev E

Figure 1 Residential Air Check Valve

START-UP INSTRUCTIONS

The water softener should be installed with the inlet, outlet, and drain connections made in accordance with the manufacturer's recommendations, and to meet applicable plumbing codes.

1. Turn the manual regeneraton knob slowly in a clockwise direction until the program micro switch lifts on top of the first set of pins. Allow the drive motor to move the piston to the first regeneration step and stop. Each time the program switch position changes, the valve will advance to the next regeneration step. Always allow the motor to stop before moving to the next set of pins or spaces.

NOTE: For electronic valves, please refer to the manual regeneration part of the timer operation section. If the valve came with a separate electronic timer service manual, refer to the timer operation section of the electronic timer service manual.

2. Position the valve to backwash. Ensure the drain line flow remains steady for 10 minutes or until the water runs clear (see above).
3. Position the valve to the brine / slow rinse position. Ensure the unit is drawing water from the brine tank (this step may need to be repeated).
4. Position the valve to the rapid rinse position. Check the drain line flow, and run for 5 minutes or until the water runs clear.

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STARTUP INSTRUCTIONS *CONTINUED*

5. Position the valve to the start of the brine tank fill cycle. Ensure water goes into the brine tank at the desired rate. The brine valve drive cam will hold the valve in this position to fill the brine tank for the first regeneration.
6. Replace control box cover.
7. Put salt in the brine tank.

NOTE: Do not use granulated or rock salt.

3200 TIMER SETTING PROCEDURE

How To Set Days On Which Water Conditioner Is To Regenerate (Figure 2)

Rotate the skipper wheel until the number "1" is at the red pointer. Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers. Each tab is one day. Finger at red pointer is tonight. Moving clockwise from the red pointer, extend or retract fingers to obtain the desired regeneration schedule.

How To Set The Time Of Day

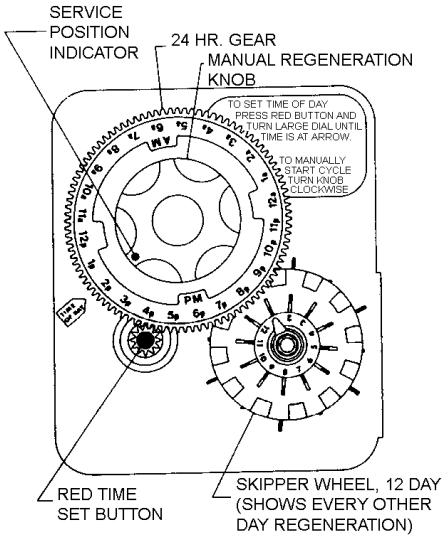
1. Press and hold the red button in to disengage the drive gear.
2. Turn the large gear until the actual time of day is at the time of day pointer.
3. Release the red button to again engage the drive gear.

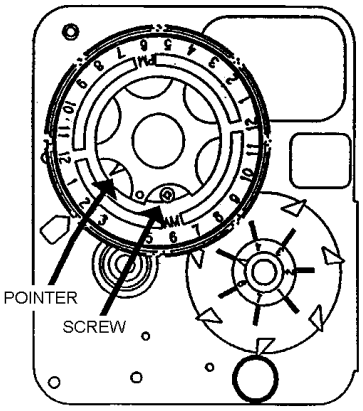
How To Manually Regenerate Your Water Conditioner At Any Time

1. Turn the manual regeneration knob clockwise.
2. This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
3. The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
4. Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only one half of this time.
5. In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

How to Adjust Regeneration Time

1. Disconnect the power source.
2. Locate the three screws behind the manual regeneration knob by pushing the red button in and rotating the 24 hour dial until each screw appears in the cut out portion of the manual regeneration knob.
3. Loosen each screw slightly to release the pressure on the time plate from the 24-hour gear.
4. Locate the regeneration time pointer on the inside of the 24-hour dial in the cut out.
5. Turn the time plate so the desired regeneration time aligns next to the raised arrow.
6. Push the red button in and rotate the 24-hour dial. Tighten each of the three screws.
7. Push the red button and locate the pointer one more time to ensure the desired regeneration time is correct.
8. Reset the time of day and restore power to the unit.





3200 ADJUSTABLE REGENERATION TIMER

IMPORTANT!
SALT LEVEL MUST ALWAYS BE ABOVE WATER LEVEL IN BRINE TANK

61502-3200 Rev A

Figure 2

3210 & 3220 TIMER SETTING PROCEDURE

Typical Programming Procedure

Calculate the gallon capacity of the system, subtract the necessary reserve requirement and set the gallons available opposite the small white dot on the program wheel gear (Figure 3).

NOTE: Drawing shows 8,750 gallon setting. The capacity (gallons) arrow (15) shows zero gallons remaining. The unit will regenerate tonight at the set regeneration time.

How To Set The Time Of Day

1. Press and hold the red button in to disengage the drive gear.
2. Turn the large gear until the actual time of day is opposite the time of day pointer.
3. Release the red button to again engage the drive gear.

How To Manually Regenerate Your Water Conditioner At Any Time

1. Turn the manual regeneration knob clockwise.

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3210 & 3220 TIMER SETTING PROCEDURE *CONTINUED*

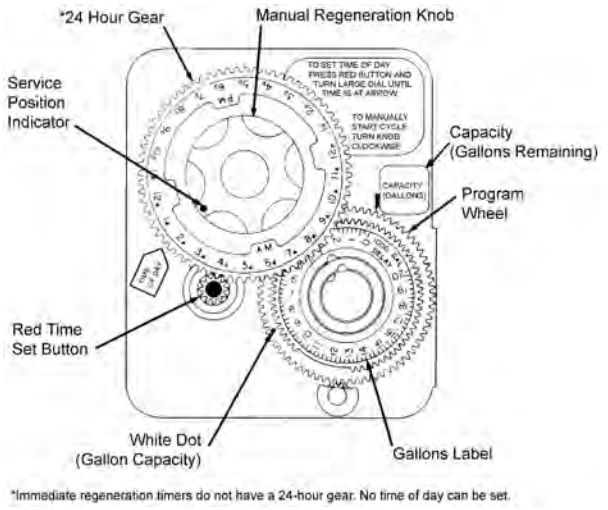
2. This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
3. The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
4. Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only one half of this time.
5. In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

Immediate Regeneration Timers

These timers do not have a 24-hour gear. Setting the gallons on the program wheel and manual regeneration procedure are the same as previous instructions. The timer will regenerate as soon as the capacity gallons reaches zero.

NOTE: The program wheel to the left may be different than the program wheel on the product.

NOTE: To set meter capacity rotate manual knob one - 360° revolution to set gallonage.



61502-3200 Rev A

Figure 3

3200, 3210, 3220, 3230 REGENERATION CYCLE SETTING PROCEDURE

How To Set The Regeneration Cycle Program

The regeneration cycle program on your water conditioner has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

3200 Series Timers (Figure 4)

1. To expose cycle program wheel, grasp timer in upper left-hand corner and pull, releasing snap retainer and swinging timer to the right.
2. To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs toward center, lift program wheel off timer. Switch arms may require movement to facilitate removal.
3. Return timer to closed position engaging snap retainer in back plate. Make certain all electrical wires locate above snap retainer post.

Timer Setting Procedure

How To Change The Length Of The Backwash Time

The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting at zero determines the length of time your unit will backwash.

For example, if there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). To change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes.

How To Change The Length Of Brine And Rinse Time

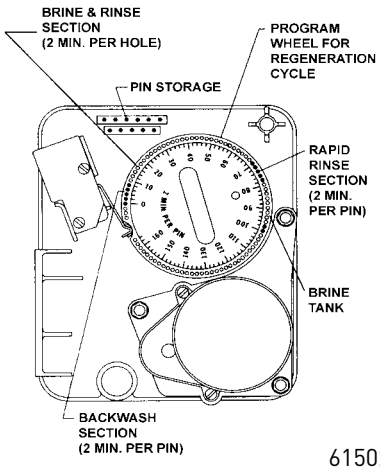
1. The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse (2 min. per hole).
2. To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.

How To Change The Length Of Rapid Rinse

1. The second group of pins on the program wheel determines the length of time that your water conditioner will rapid rinse (2 min. per pin).
2. To change the length of rapid rinse time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse time in minutes.

How To Change The Length Of Brine Tank Refill Time

1. The second group of holes in the program wheel determines the length of time that your water conditioner will refill the brine tank (2 min. per hole).
2. To change the length of refill time, move the two pins at the end of the second group of holes as required.
3. The regeneration cycle is complete when the outer microswitch is tripped by the two pin set at end of the brine tank refill section.
4. The program wheel, however, will continue to rotate until the inner micro switch drops into the notch on the program wheel.

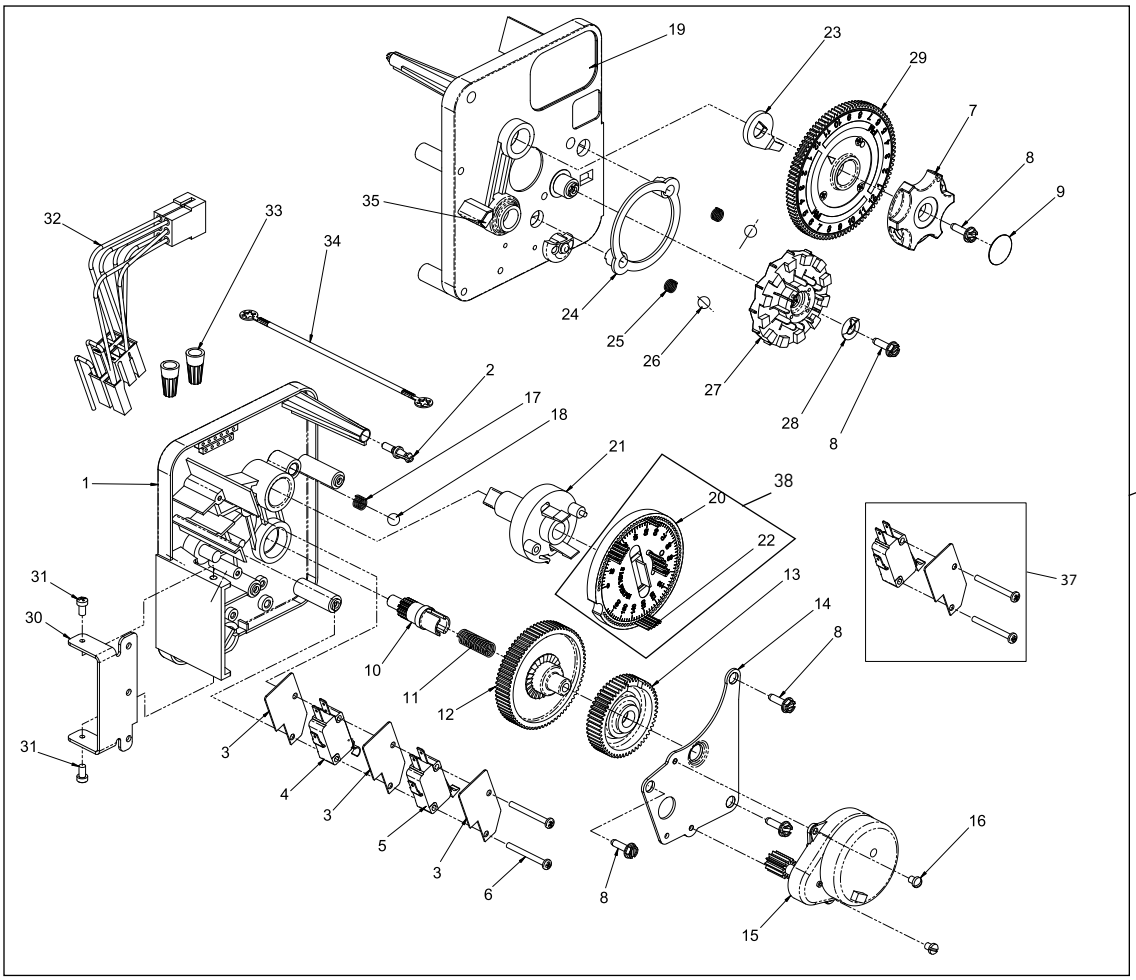


61502-3210 Rev A

Figure 4

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3200 TIME CLOCK TIMER ASSEMBLY



615023200 Rev A

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3200 TIME CLOCK TIMER ASSEMBLY

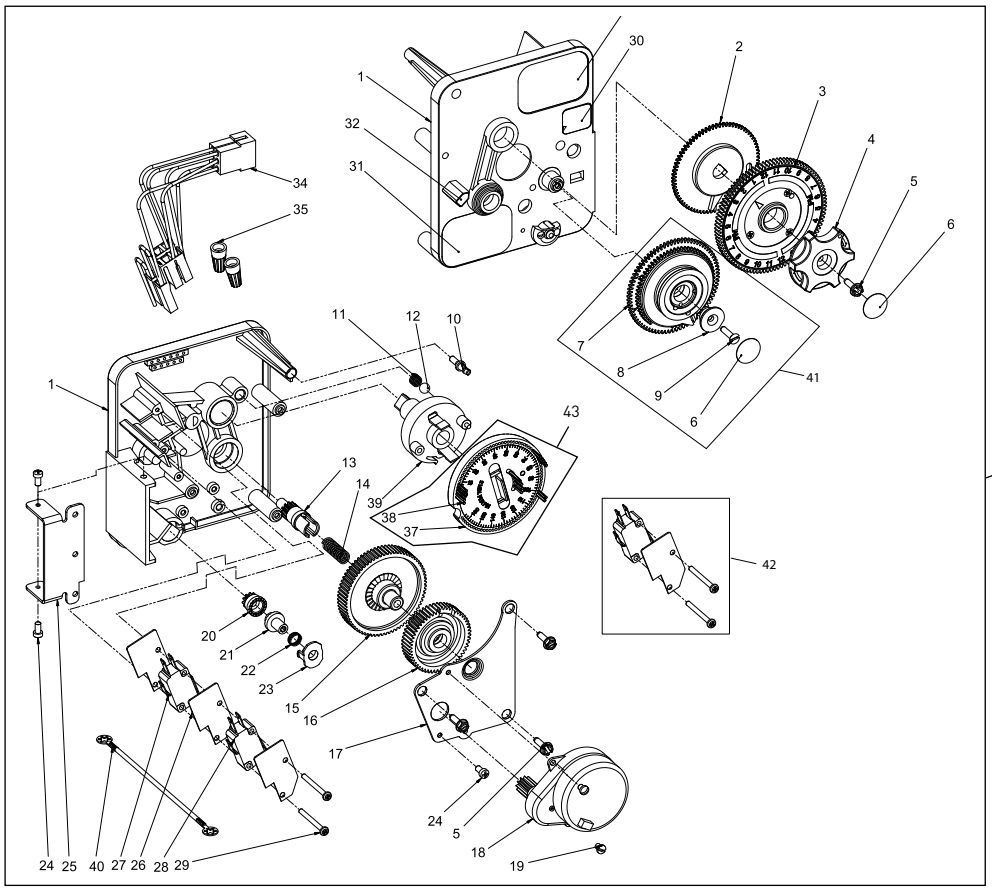
CONTINUED

Item No.	QTY	Part No.	Description
1	1	13870	Housing, Timer, 3200
2	1	14265	Clip, Sping
3	3	14087	Insulator
4	1	10896	Switch, Micro
5	1	15320	Switch, Micro, Timer
6	2	11413	Screw, Pan Hd Mach, 4-40 x 1-1/8
7	1	13886	Knob, 3200
8	5	13296	Screw, Hex Wsh, 6-20 x 1/2
9	1	11999	Label, Button
10	1	13018	Pinion, Idler
11	1	13312	Spring, Idler Shaft
12	1	13017	Gear, Idler
13	1	13164	Gear, Drive
14	1	13887	Plate, Motor Mounting
15	1	18743-1	Motor, 120V, 60Hz, 1/30 RPM
		18752-1	Motor, 100V, 50Hz, 1/30 RPM
		18824-1	Motor, 230V, 50Hz, 1/30 RPM
		18826-1	Motor, 24V, 50Hz, 1/30 RPM
		19659-1	Motor, 24V, 60Hz, 1/30 RPM
		19660-1	Motor, 230V, 60Hz, 1/30 RPM
16	2	13278	Screw, Sltd Fillister Hd 6-32 x .156
17	1	15424	Spring, Detent, Timer
18	1	15066	Ball, 1/4-inch, Delrin
19	1	15465	Label, Caution
20	1	19210	Program Wheel Assy
21	1	13911	Gear, Main Drive, Timer
22	17	41754	Pin, Spring, 1/16 x 5/8 SS, Timer
23	1	13011	Arm, Cycle Actuator
24	1	13864	Ring, Skipper Wheel
25	2	13311	Spring, Detent, Timer
26	2	13300	Ball, 1/4-inch, SS
27	1	14381	Skipper Wheel Assy, 12 Day
		14860	Skipper Wheel Assy, 7 Day
28	1	13014	Pointer, Regeneration
29	1	40096-24	Dial, 12 AM Regen Assy, Black
		40096-02	Dial, 2 AM Regen Assy, Black
30	1	13881	Bracket, Hinger Timer
31	2	11384	Screw, Phil, 6-32 x 1/4 Zinc
32	1	13902	Harness, 3200
33	2	40422	Nut, Wire, Tan
34	1	15354-01	Wire, Ground, 4 inches
35	1	14007	Label, Time of Day
36	1	*	Complete 3200 Time Clock Timer Assembly
37		60320-02	Switch Kit, 3200/9000 Timer Auxiliary, Optional
38		61420-03	Program Wheel, Gear Assy, Filter 2 Min Per Pin
		61420-04	Program Wheel, Gear Assy, Softener, 2 Min Per Pin

*Call your distributor for Part Number

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3210 METER DELAYED TIMER ASSEMBLY



61502-3210 Rev A

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3210 METER DELAYED TIMER ASSEMBLY

CONTINUED

Item No.	QTY	Part No.	Description
1	1	13870	Housing, Timer, 3200
2	1	13802	Gear, Cycle Actuator
3	1	40096-02	Dial 2 AM Regen Assy, Black
4	1	13886	Knob, 3200
5	4	13296	Screw, Hex Wsh, 6-20 x 1/2
6	2	11999	Label, Button
7	1	13803	Gear, Program Drive Wheel
8	1	13806	Retainer, Program Wheel
9	1	13748	Screw, Flat Head St, 6-20 x 1/2
10	1	14265	Clip, Spring
11	1	15424	Spring, Detent, Timer
12	1	15066	Ball, 1/4-inch Delrin
13	1	13018	Pinion, Idler
14	1	13312	Spring, Idler Shaft
15	1	13017	Gear, Idler
16	1	13164	Gear, Drive
17	1	13887	Plate, Motor Mounting
18	1	18743-1	Motor, 120V, 60Hz 1/30 RPM
		18752-1	Motor, 100V, 50Hz, 1/30 RPM
		18824-1	Motor, 230V, 50Hz, 1/30 RPM
		18826-1	Motor, 24V, 50Hz, 1/30 RPM
		19659-1	Motor, 24V, 60Hz, 1/30 RPM
		19660-1	Motor, 230V, 60Hz, 1/30 RPM
19	1	13278	Screw, Fillister Hd, 6-32 x .156
20	1	13830	Pinion, Program Wheel Drive
21	1	13831	Clutch, Drive Pinion
22	1	14276	Spring, Meter, Clutch
23	1	14253	Retainer, Clutch Spring
24	3	11384	Screw, Phil, 6-32 x 1/4
25	1	13881	Bracket, Hinge Timer
26	3	14087	Insulator
27	1	10896	Switch, Micro
28	1	15320	Switch, Micro, Timer
29	2	11413	Screw, Pan Hd Mach, 4-40 x 1 1/8
30	1	14198	Label, Indicator
31	1	15465	Label, Caution
32	1	14007	Label, Time of Day
33	1	14045	Label, Instruction
34	1	13902	Harness, 3200
35	2	40422	Nut, Wire, Tan
36	1	15354-01	Wire, Ground, 4 inches
37	1	19210	Program Wheel Assy
38	17	41754	Pin, Spring, 1/16 x 5/8 SS, Timer
39	1	13911	Gear, Main Drive, Timer
40	1	*	Complete 3210 Meter Delayed Timer Assembly
41		60405-80	Program Wheel, w/3-inch STD Label 63,750 gal
		60405-90	Program Wheel, w/3-inch EXT Label 320,000 gal
42		60320-02	Switch Kit, 3200/9000 Timer Auxiliary, Optional
43		61420-03	Program Wheel, Gear Assy, Filter 2 Min Per Pin
		61420-04	Program Wheel, Gear Assy, Softener, 2 Min Per Pin

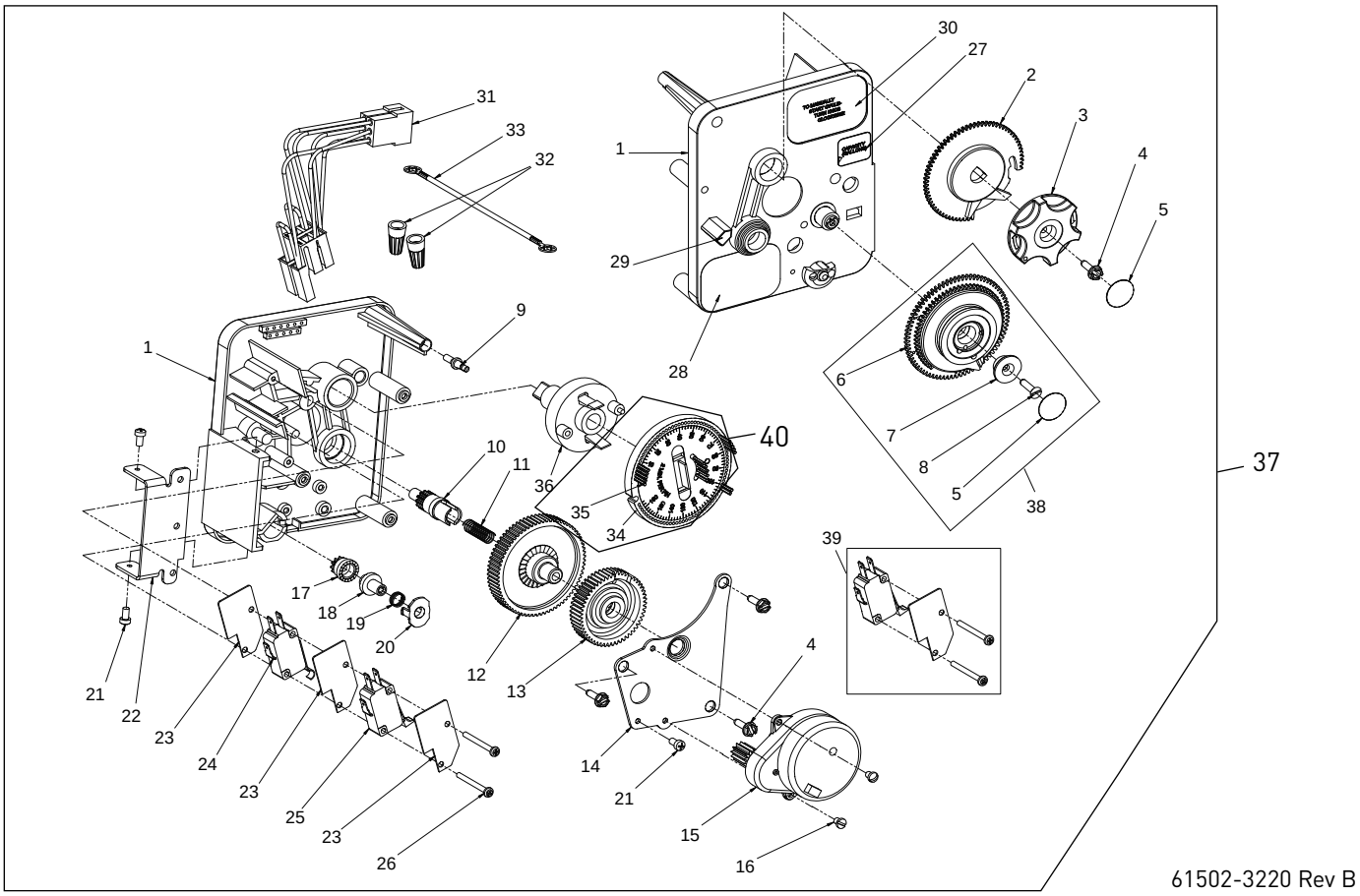
Not Shown:

	25141	Label, STD M^3, Gallon 240, 3-inch
	25142	Label, EXT M^3, Gallon 1200, 3-inch

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3220 METER IMMEDIATE TIMER ASSEMBLY



61502-3220 Rev B

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3220 METER IMMEDIATE TIMER

ASSEMBLY *CONTINUED*

Item No.	QTY	Part No.	Description
1	1	13870	Housing, Timer
2	1	15431	Gear, Cycle Actuator, System #5
3	1	13886	Knob, 3200
4	4	13296	Screw, Hex Wsh, 6-20 x 1/2
5	2	11999	Label, Button
6	1	13807	Gear, Program Drive Wheel
7	1	13806	Retainer, Program Wheel
8	1	13748	Screw, Flt Hd St, 6-20 x 1/2
9	1	14265	Spring Clip
10	1	13018	Pinion, Idler
11	1	18563	Idler Shaft Spring
12	1	13017	Gear, Idler
13	1	13164	Drive Gear
14	1	13887	Plate, Motor Mounting
15	1	18743-1	Motor, 120V, 60 Hz, 1/30 RPM
		18752-1	Motor, 100V, 50Hz, 1/30 RPM
		18824-1	Motor, 230V, 50Hz, 1/30 RPM
		18826-1	Motor, 24V, 50Hz, 1/30 RPM
		19659-1	Motor, 24V, 60Hz, 1/30 RPM
		19660-1	Motor, 230V, 60Hz, 1/30 RPM
16	2	13278	Screw, Sltd Fillister Hd
17	1	14502	Pinion, Program Wheel
18	1	14501	Clutch, Drive Pinion
19	1	14276	Meter Clutch Spring
20	1	14253	Retainer, Clutch Spring
21	3	11384	Screw, Phil, 6-32 x 1/4 Zinc
22	1	13881	Bracket, Hinge Timer
23	3	14087	Insulator
24	1	15414-00	Micro Switch
25	1	15320	Switch, Micro, Timer
26	2	11413	Screw, Pan Hd Mach, 4-40 x 1-1/8
27	1	14198	Label, Indicator
28	1	15465	Label, Caution
29	1	14007	Label, Time of Day
30	1	15148	Label, Instruction
31	1	40617	Harness, 3220
32	2	40422	Nut, Wire, Tan
33	1	15354-01	Wire, Ground, 4 inches
34	1	19210-05	Program Wheel Assembly, 9000/3230
35	17	41754	Pin, Spring, 1/16 x 5/8 Stainless Steel, Timer
36	1	15055	Gear, Main Drive
37	1	*	Complete 3220 Meter Immediate Timer Assembly
38		60405-80	Program Wheel, w/3-inch STD Label 63,750 gal
		60405-90	Program Wheel, w/3-inch EXT Label 320,000 gal
39		60320-02	Switch Kit, 3200/9000 Timer Auxiliary, Optional
40		61420-06	Program Wheel, Gear Assy, Softener Immediate 2 Min Per Pin
		61420-42	Program Wheel, Gear Assy, Filter Immediate 2 Min Per Pin

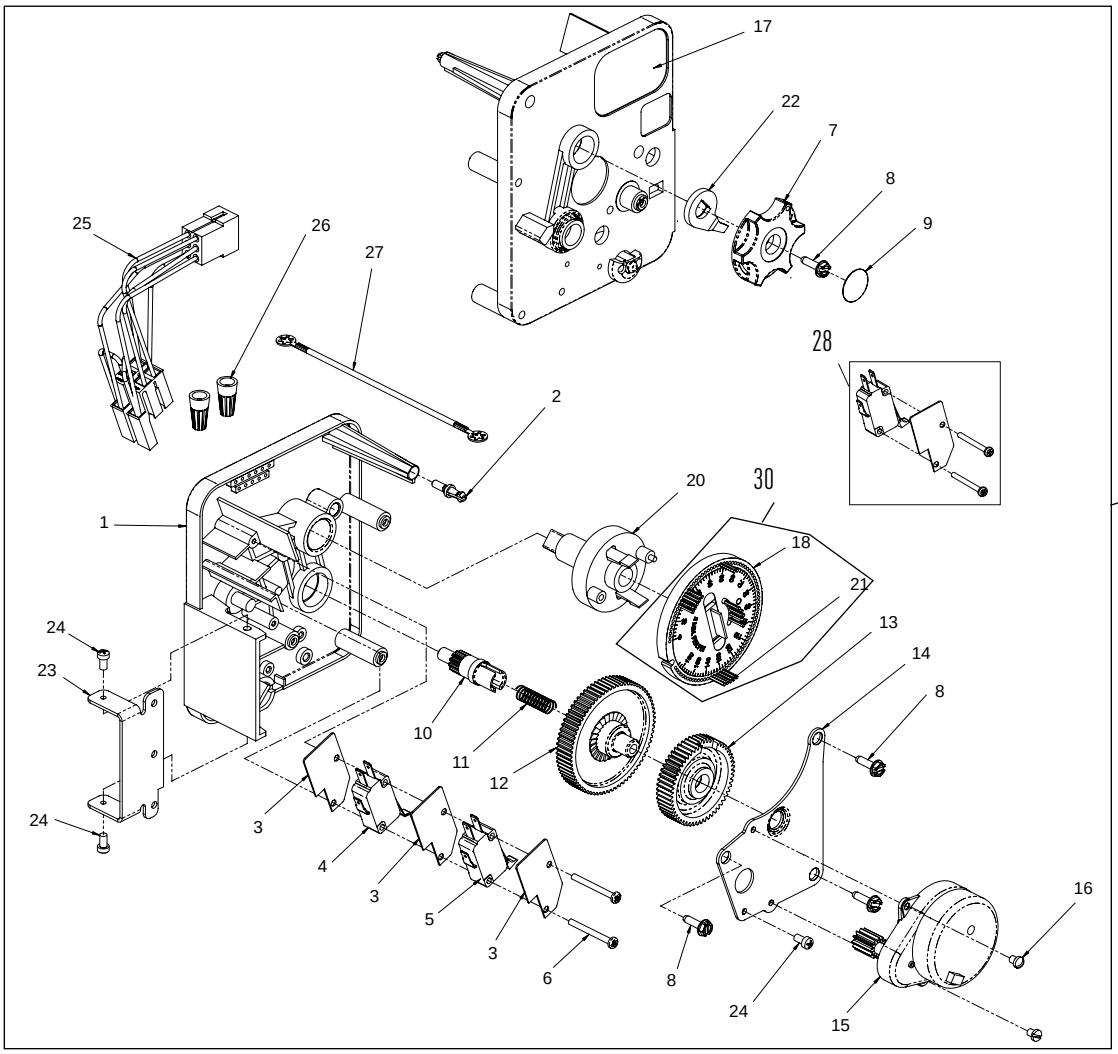
Not Shown:

		25141	Label, STD M^3, Gallon 240, 3-inch
		25142	Label, EXT M^3, Gallon 1200, 3-inch

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3230 REMOTE START TIMER ASSEMBLY



61502-3230R REV A

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3230 REMOTE START TIMER ASSEMBLY

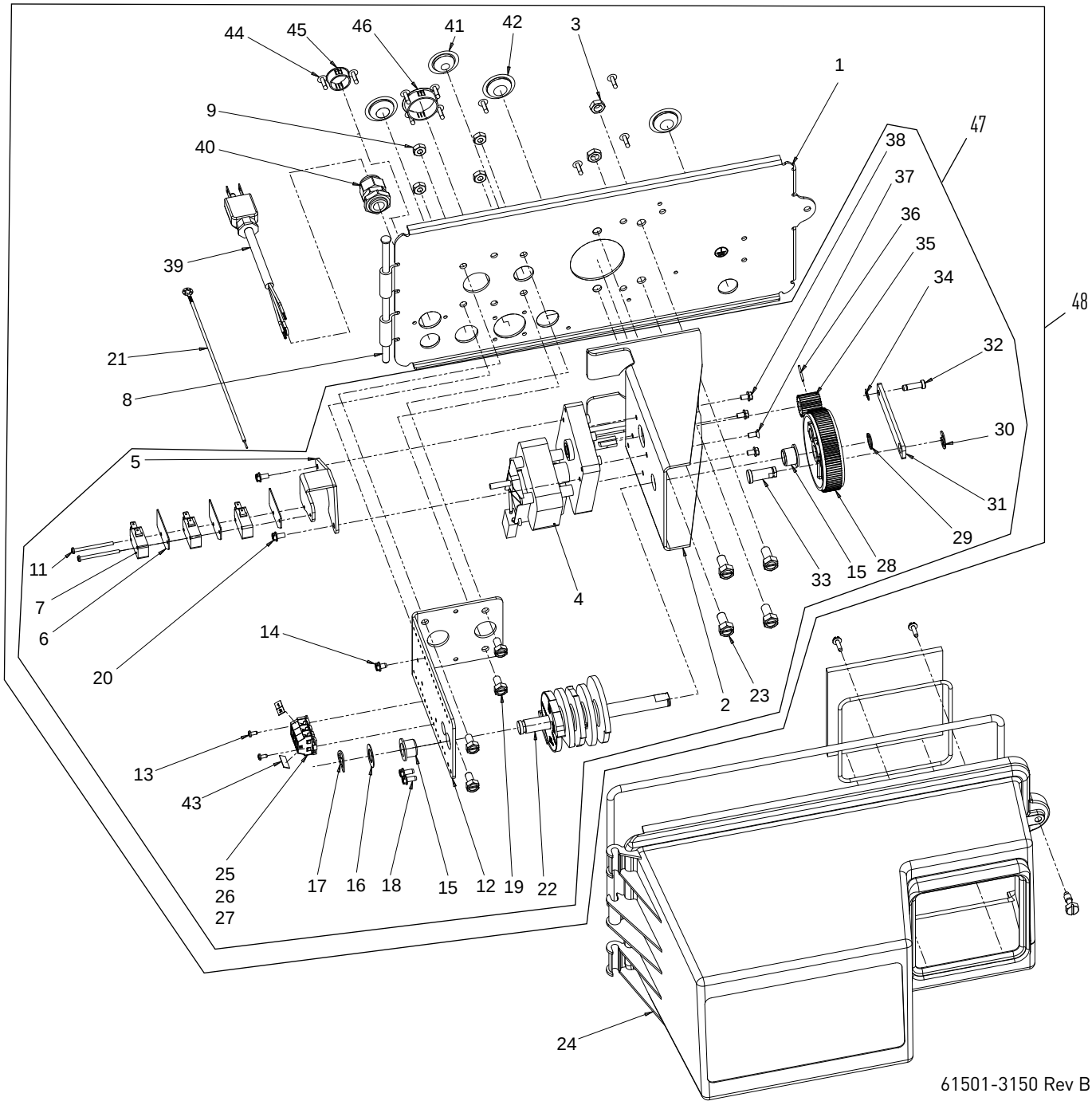
CONTINUED

Item No.	QTY	Part No.	Description
1	1	13870	Housing, Timer
2	1	14265	Spring Clip
3	3	14087	Insulator
4	1	15314	Micro Switch
5	1	15320	Switch, Micro, Timer
6	2	11413	Screw, Pan Hd Mach, 4-40 x 1-1/8
7	1	13886	Knob, 3200
8	4	13296	Screw, Hex Wsh, 6-20 x 1/2
9	1	11999	Label, Button
10	1	13018	Pinion, Idler
11	1	18563	Idler Shaft Spring
12	1	13017	Gear, Idler
13	1	15055	Drive Gear
14	1	13887	Plate, Motor Mounting
15	1	18743-1	Motor, 120V, 60 Hz, 1/30 RPM
		18752-1	Motor, 100V, 50Hz, 1/30 RPM
		18824-1	Motor, 23V, 50Hz, 1/30 RPM
		18826-1	Motor, 24V, 50Hz, 1/30 RPM
		19659-1	Motor, 24V, 60Hz, 1/30 RPM
		19660-1	Motor, 230V, 60Hz, 1/30 RPM
16	2	13278	Screw, Sltd Fillister Hd
17	1	15313	Label, Caution
18	1	19210-05	Program Wheel Assembly, 3200
20	1	15055	Main Drive Gear
21	17	41754	Pin, Spring, 1/16 x 5/8 Stainless Steel, Timer
22	1	13011	Cycle Actuator Arm
23	1	13881	Bracket, Hinge Timer
24	3	11384	Screw, Phil, 6-32 x 1/4 Zinc
25	1	16336	Harness, 3230R
26	2	40422	Nut, Wire, Tan
27	1	15354-01	Wire, Ground, 4 inches
28		60320-02	Switch Kit, 3200/9000 Timer Auxiliary, Optional
29		*	3230 Timer Assy
30		61420-06	Program Wheel, Gear Assy, Softener Immediate 2 Min Per Pin
		61420-42	Program Wheel, Gear Assy, Filter Immediate 2 Min Per Pin

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CONTROL DRIVE ASSEMBLY



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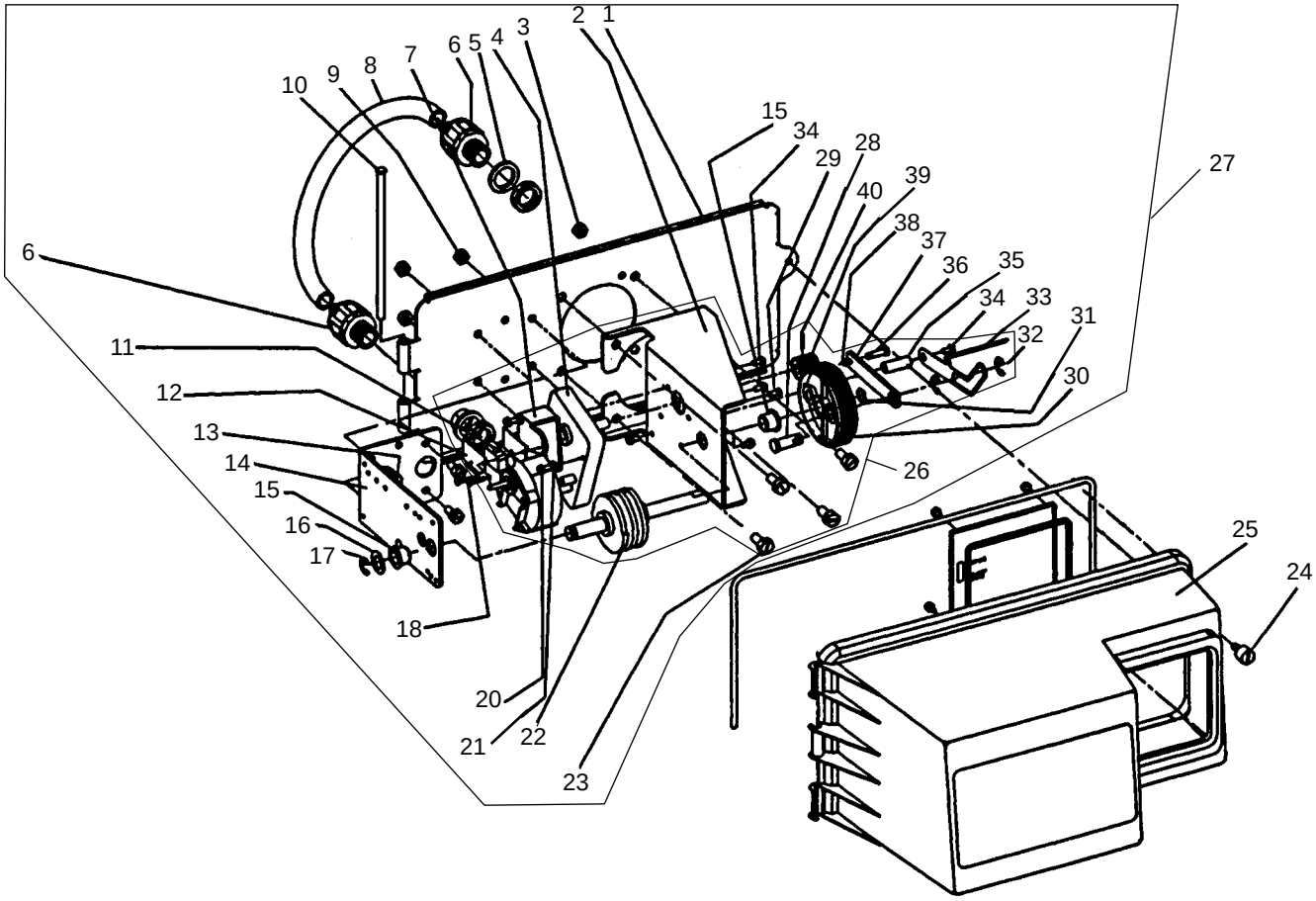
CONTROL DRIVE ASSEMBLY *CONTINUED*

Item No.	QTY	Part No.	Description
1	1	19304-04	Backplate, 3150/3900, Upper, NEMA 3R
2	1	15120-01	Bracket, Motor Mtg, 3150/3900 Environmental
3	2	16346	Nut, Hex, Jam, 5/16 - 18
4	1	40392	Motor, Drive, 115V, 50/60 Hz, Sp
		40390	Motor, Drive, 220V, 50 Hz, Sp, Fam 3
		42581	Motor, Drive, 24VAC/DC, 50-60 Hz, Fam 3
5	1	17797	Bracket, Switch Mounting, 3150/3900
6	4	10302	Insulator, Limit Switch
7	3	10218	Switch, Micro
8	1	17845-03	Pin, Hinge, 3150/3900, Env
9	4	11235	Nut, Hex, 1/4 -20, Mach Screw, Zinc
10	2	13365	Washer, Lock, #4, External
11	2	40080	Screw, Rd Hd, 4-40 x 1-1/2 inch
12	1	16053	Bracket, Brine Side
13	2	40133	Screw, Pan Hd, 4-40 x 1/4-inch
14	2	40133	Screw Pan HD, 4-40 x 1/4-inch
15	2	16052	Bushing, 3150/3900
16	1	16059	Washer, SS, .88, 3150/3900
17	1	16051	Ring, Retaining, Bowed
18	2	10300	Screw, Slot Hex Wsh, 18-8 x 3/8
19	4	10231	Screw, Slot Hex, 1/4 - 20 x 1/2
20	2	14202-01	Screw, Hex Wsh Hd, 8 x 5/16
21	1	10475-01	Wire, Ground
22	1	16494-03	Cam Assy, 3150/3900 Signal After Brine Fill
		16494-05	Cam Assy, 3150/3900 Upper Signal After Rapid Rinse
		16494-06	Cam Assy, 3150/3900, Upper, Upflow, Signal After Rapid Rinse
23	4	11224	Screw, Hex Hd, 5/16 - 18 x 5/8
24	1	60240-02	Cover Assy, 3150/3900 Env, Black, NEMA 3R
25	5	41084	Terminal Block, Segment, Gray
26	1	41085	Endplate, Terminal Bloack, Gray
27	1	40174	Terminal Block, Green/ Yellow
28	1	16046	Gear, Drive
29	1	16050	Ring, Retaining
30	1	11774	Ring, Retaining
31	1	16047	Link, Drive
32	1	11709	Pin, Drive Link
33	1	16048	Bearing, Drive Link
34	1	11898	Clip, 3150/3900
35	1	16045	Pinion, Drive
36	1	11381	Pin, Roll, 2900/3900
37	1	11080	Screw, Flt Hd Mach, 8-32 x 3/8
38	3	10872	Screw, Hex Wsh, 8-32 x 17/64
39	1	40084-12	Power Cord, 12 feet US, Round, 120V
		40085-12	Power Cord, 12 feet US, Round, 240V
		11545	Power Cord, 4 feet European, Black
		19303	Power Cord, 8 feet, Australian
		19885	Power Cord, Japanese, 110V/120V
40	1	17967	Fitting Assy, Liquid Tight, Blk
41	1	19691	Plug, .750 Dia, Recessed, Black
42	3	19591	Plug, .8750 Hole, Recessed, Black
43	2	15250	Label, Terminal Strip
44	10	19800	Plug, .140 Dia, White
45	1	15806	Plug, Hole, Heyco #2693
46	1	17421	Plug, 1.20 Hole
47		60057-01	Drive Assy, 3150, 120V, SYS 5 & 7, Signal After Brine Tank Fill
		60057-03	Drive Assy, 3150, 24V, 3900 Upper, SYS #5 or SYS #7
		60057-11	Drive Assy, 3150, 120V, 3900 Upper, SYS #4 or SYS #6
		60057-21	Drive Assy, 3150, 120V, Upflow, 3900 Upper, SYS 5 or SYS 7, Brine Draw First
48		*	3150 Powerhead Assembly
Not Shown			
	1	17470	Cable Guide Assy, 2850/3150
	1	19856	Ring, Retaining (Used on Cover)
	1		Timer (See Timer Section)
	1	16427-04	Wire, Lead, 12 inches, White
	1	40396	Harness, Drive, Environmental
	1	14924	Strain Relief Heyco #1247
	1	15513	Meter Cable, 17.5 inches, 2 inches
	1	15216	Meter Cable, 15.25 inches, 1.5 inches
	1	18585	Harness, 3900, Aux Switch

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ADAPTER CONTROL DRIVE LOWER POWERHEAD



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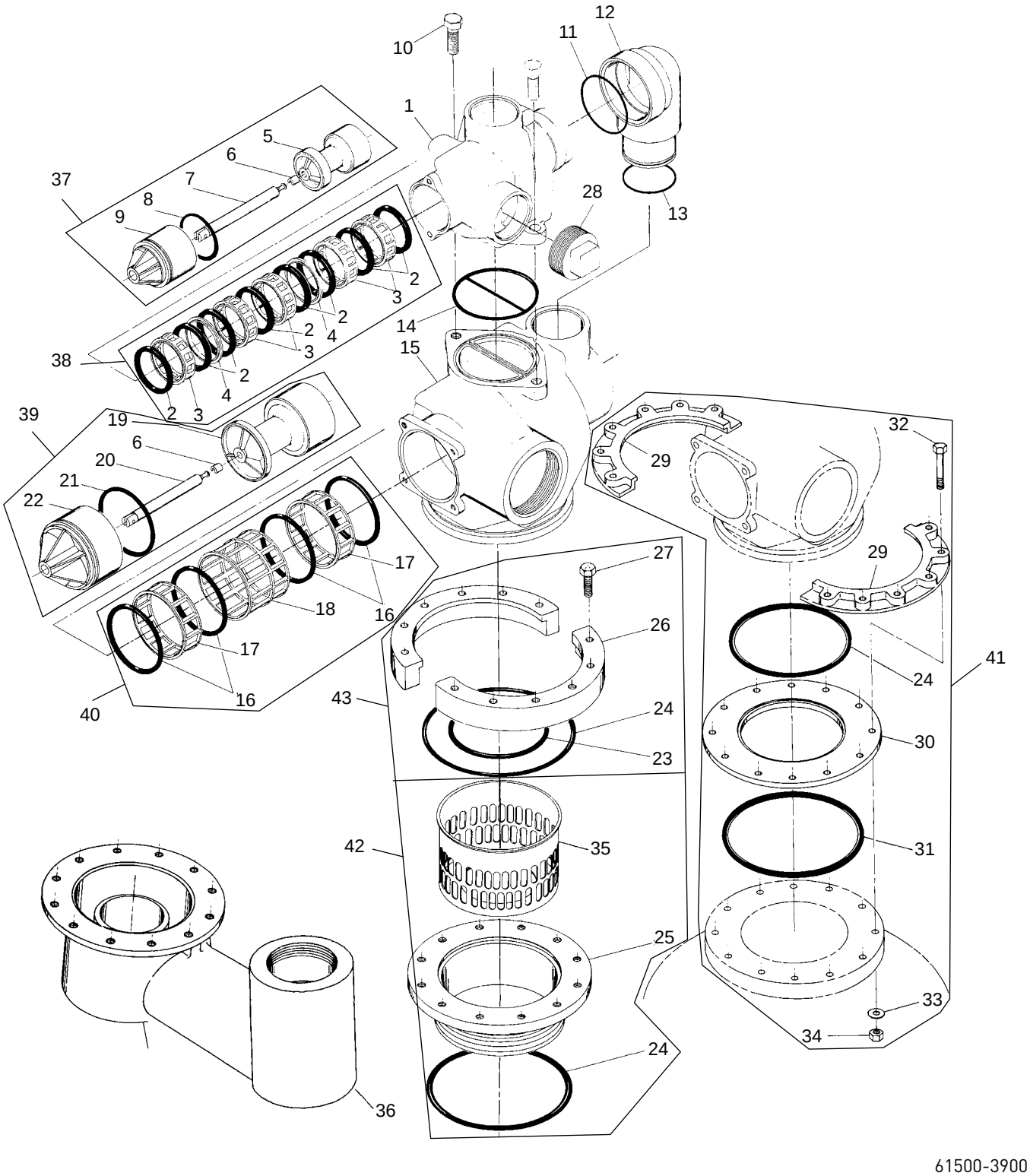
ADAPTER CONTROL DRIVE LOWER POWERHEAD *CONTINUED*

Item No.	QTY	Part No.	Description
1	1	19305	Back Plate, 3900 Lower, Enviromental
2	1	16086	Bracket - Motor Mounting
3	2	16346	Nut
4	1	40392	Drive Motor - 115 V. 50/60 Hz.
		40390	Drive Motor - 220 V. 50/60 Hz.
		42581	Drive Motor - 24 VAC/DC 50/60 Hz.
5	2	18692	Washer, Sealing
6	2	18691	Connector, Conduit
7	1	17797	Bracket - Switch Mounting
8	1	18693	Conduit, Interdrive
9	4	11235	Nut, 1/4-20
10	1	17845-03	Pin, Hinge
11	1	10218	Switch
12	2	10302	Insulator - Switch
13	4	10231	Screw - Hex Head, 1/4-20 x 1/2, 18-8 S.S.
14	1	16053	Bracket - Brine Side
15	2	16052	Bushing
16	1	16059	Washer
17	1	16051	Retaining Ring - Bowed "E"
18	2	11805	Screw, RD HD, 4-40 x 5/8-inch, Type 1, Steel/Zinc
20	2	17567	Screw - Hex Head, WSH, 8 x 1/2, Type B, 18-8, S.S.
21	2	12288	Washer, Lock, Internal #8
22	1	16495	Cam Assembly
23	4	11224	Screw - Hex Head, 5/16-18 x 5/8, S.S.
24	1	19813/41536	Screw O-ring, Cover
25	1	60240-22	Cover, Black, Lower, Environmental
26			Includes Item No: 2, 4, 7, 11, 12, 15, 18, 20, 21, 22, 23, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40
		60058-01	Lower Drive Assy, 3900, 120V
		60058-03	Lower Drive Mtr Assy, 3900, 24V
27		*	3900 Lower Powerhead Assy
28	1	16048-01	Bearing - Drive Link
29	2	11080	Screw - Flt HD Mach, 8-32 x 3/8, Steel Zinc
30	1	16046	Drive Gear
31	1	16050	Retaining Ring
32	2	11774	Retaining Ring - "E"
33	1	19315	Indicator
34	4	10872	Screw - Hex Head, 8-32 x 17/64, Steel/Trivalent Zinc
35	1	18726	Space, Indicator
36	1	11709	Pin - Drive Link
37	1	16047	Drive Link
38	1	11898	Clip
39	1	16045	Drive Pinion
40	1	11381	Roll Pin
Not Shown			
	1	40405	Wire Harness, Environmental, System 4, Lower

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CONTROL VALVE



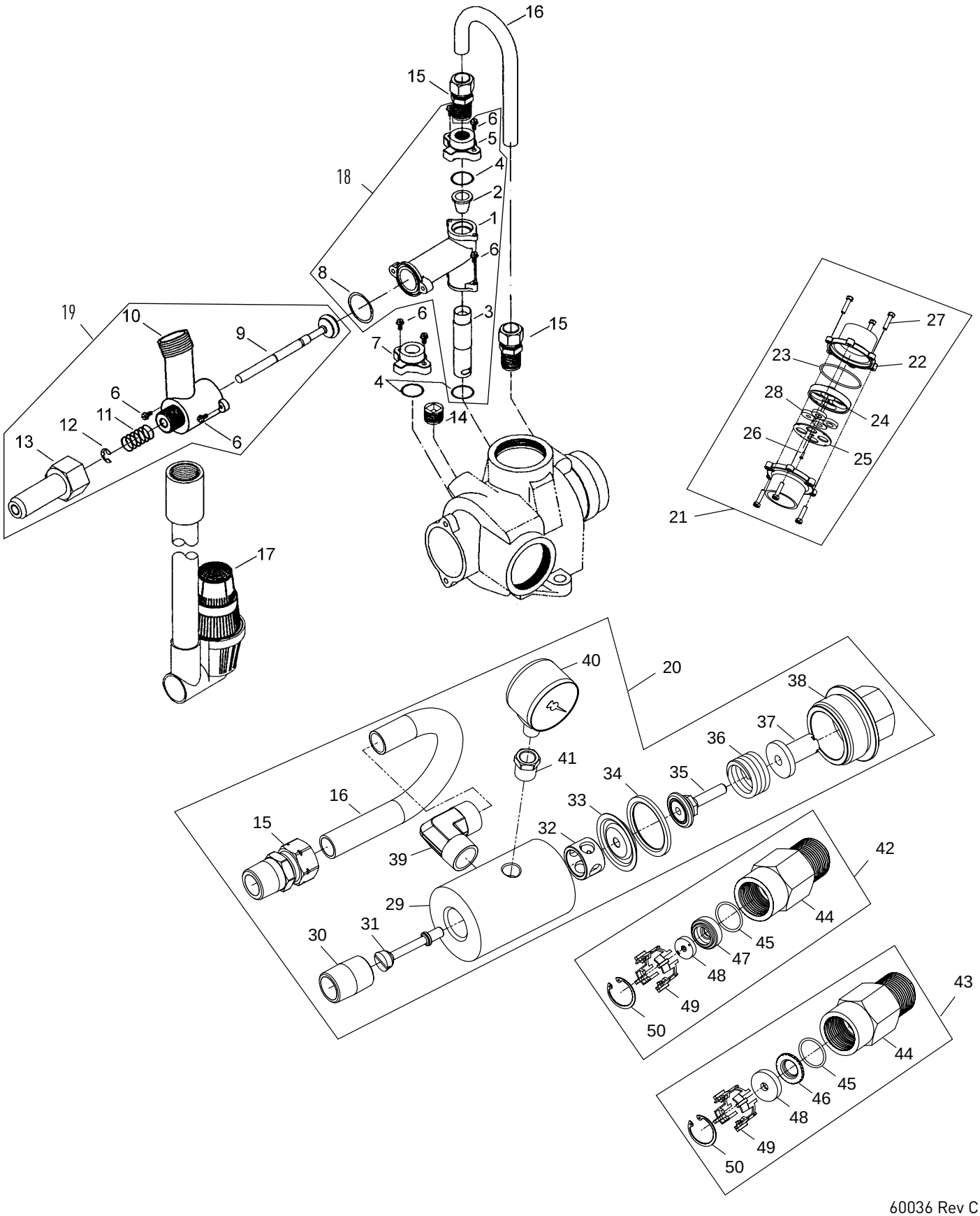
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CONTROL VALVE *CONTINUED*

Item No.	QTY	Part No.	Description
1	1	15114	Valve Body
2	8	11720	Seal
		11720-02	Seal, Silicone
3	5	10369	Spacer - Port
4	2	10368	Spacer
5	1	16130	Piston
6	2	14818	Clip - Piston Rod
7	1	15125	Piston Rod
8	1	14922	O-ring -035
9	1	16398-01	End Plug Assembly
10	2	40118	Screw - Hex Head
11	1	16078	O-ring - 149
12	1	16074	Coupling
13	1	16077	O-ring - 140
14	1	15112	Seal
15	1	16067-02	3-inch Adapter Body
16	4	16068	Seal
		41534	Seal, 3900, 558 BP
17	2	16069	Spacer - Narrow
18	1	16070	Spacer - Wide
19	1	16071	Piston
		16082	Piston - No Hard Water Bypass
20	1	16072	Piston Rod
21	1	16076	O-ring - 042
22	1	16399-01	End Plug Assy - White
		16399-11	End Plug Assy - Black, NHWB-P
23	1	16800	O-ring - 238
24	2	16345	O-ring - 362
25	1	16255	Tank Adapter - 6-inch -8
26	2	16257	Flange Segment
27	12	11238	Screw - Hex Head
28	1	16088	Pipe Plug - 2-inch NPT
35	1	16258	Flow Disperser
37		60106-00	Piston Assy, 3900/3150 STD
		60106-10	Piston Assy, 3150, Upflow
38		60131	Seal & Spacer Kit, 3900 Upper, 3150
		60131-10	Seal & Spacer Kit, Silicone, Chemical Resistent, 3900 Upper, 3150
39		60107-00	Piston Assy, 3900, HWBP, Lower
		60107-10	Piston Assy, 3900, NHWBP, Lower
40		60132	Seal & Spacer Kit, 3900, Lower
		60132-10	Seal & Spacer Kit, 3900, 558BP Chemical Resistent, Lower
41		60190	Flange Kit, Park & Structural, 09/05 and After
		60191	Flange Kit, Park, 08/05 and Prior
42		60193	Flange Kit, 6-inch Thread
43		60192	Flange Kit, Welded
Options			
29	2	16482	Flange Segment
30	1	16483	Flange Ring
31	1	16484	O-Ring -442
32	12	16517	Screw, Park Tank
		19592	Screw, Structural Tank
33	12	18619	Washer
34	12	16346	Nut
36	1	18584	Adapter, Side Mount

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1800 SERIES BRINE SYSTEM AND DRAIN
LINE FLOW CONTROL ASSEMBLY



60036 Rev C

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1800 SERIES BRINE SYSTEM AND DRAIN LINE FLOW CONTROL ASSEMBLY *CONTINUED*

Item No.	QTY	Part No.	Description
1	1	16340	Body, Injector, 1800 D/F
		16340-20	Body, Injector, 1800, Downflow, Metric
		16340-01	Body, Injector, 1800 Upflow
		16340-21	Body, Injector, 1800, Upflow, Metric
2	1	15128-xx	Injector Nozzle
		15128-04	#4 Green
		15128-05	#5 Red
		15128-06	#6 White
		15128-07	#7 Blue
		15128-08	#8 Yellow
		15128-09	#9 Violet
		15128-10	#10 Black
3	1	15127-xx	Injector Throat
		15127-04	#4 Green
		15127-05	#5 Red
		15127-06	#6 White
		15127-07	#7 Blue
		15127-08	#8 Yellow
		15127-09	#9 Violet
		15127-10	#10 Black
4	3	15246	O-ring, -116
5	1	16341-01	Cap, Injector, 1800
6	8	12473	Screw, Hex Wsh, 10-24 x 5/8
7	1	16341-02	Plug, Injector, 1800
8	1	19054	O-ring, -021, 560CD
9	1	16497-01	Stem Assy, 1800, Brine Valve
10	1	18713	Brine Valve Body, 1800
11	1	11772	Spring, 3150 Brine Valve
12	1	11774	Ring, Retaining
13	1	16498-01	Stem Guide Assy, Brine
14	1	16387	Plug, Pipe, 1/2-inch NPT
15	2	18702	Fitting, Tube, 1/2 NPT 5/8
16	1	18703	Tube, Brine, 5/8 OD Annealed
		18703-01	Tube, Brine, 5/8 OD, Short, Upflow
17	1	60009-00	Air Check, #900, Commercial Less Fittings
		60009-01	Air Check, #900, Commercial, HW Less Fittings
18		60277-04	Injector Assy, 1800, #4, Downflow
		60272-04	Injectory Assy, 1800, #4, Upflow
		60277-05	Injectory Assy, 1800 #5, Downflow
		60272-05	Injector Assy, 1800, #5, Upflow
		60277-06	Injector Assy, 1800, #6, Downflow
		60277-07	Injector Assy, 1800, #7, Downflow

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1800 SERIES BRINE SYSTEM AND DRAIN LINE FLOW CONTROL ASSEMBLY *CONTINUED*

Item No.	QTY	Part No.	Description
		60272-07	Injector Assy, 1800, #7, Upflow
		60277-08	Injector Assy, 1800, #8, Downflow
		60277-09	Injectory Assy, 1800 #9, Downflow
		60277-10	Injectory Assy, 1800 #10, Downflow
19		60036-02	Brine Valve, 1800, Design 3
		60276-01	Brine Valve, 1800, Retrofit Kit, Downflow 1800 Injector and Brine Valve, Update to Design 3
20		60734	Regulator, 3150/3900, Pressure, Upflow
21		60711-000	DLFC, 2-inch NPT, Less BTTNS, w/4 HLS
		60711-00	DLFC, 2-inch NPT, Less BTTNS, W/2 HLS
		60711-01	DLFC, 2-inch NPT, Less BTTNS, W/1 HLS
		60711-20	DLFC, 2-inch NPT, 20 gpm
		60711-25	DLFC, 2-inch NPT, 25 gpm
		60711-30	DLFC, 2-inch NPT, 30 gpm
		60711-35	DLFC, 2-inch NPT, 35 gpm
		60711-40	DLFC, 2-inch NPT, 40 gpm
		60711-45	DLFC, 2-inch NPT, 45 gpm
		60711-50	DLFC, 2-inch NPT, 50 gpm
		60711-55	DLFC, 2-inch NPT, 55 gpm
		60711-60	DLFC, 2-inch NPT, 60 gpm
		60711-65	DLFC, 2-inch NPT, 65 gpm
		60711-70	DLFC, 2-inch NPT, 70 gpm
		60711-75	DLFC, 2-inch NPT, 75 gpm
		60711-80	DLFC, 2-inch NPT, 80 gpm
		60711-85	DLFC, 2-inch NPT, 85 gpm
		60711-90	DLFC, 2-inch NPT, 90 gpm
		60711-95	DLFC, 2-inch NPT, 95 gpm
		60711-100	DLFC, 2-inch NPT, 100 gpm
		60812-30	DLFC, 2-inch BSP/Metric, 30 gpm
		60812-35	DLFC, 2-inch BSP/Metric, 35 gpm
		60812-45	DLFC, 2-inch BSP/Metric, 45 gpm
		60812-50	DLFC, 2-inch BSP/Metric, 50 gpm
		60812-55	DLFC, 2-inch BSP/Metric, 55 gpm
		60812-70	DLFC, 2-inch BSP/Metric, 70 gpm
		60812-75	DLFC, 2-inch BSP/Metric, 75 gpm
		60812-80	DLFC, 2-inch BSP/Metric, 80 gpm
		60812-90	DLFC, 2-inch BSP/Metric, 90 gpm
		60812-95	DLFC, 2-inch BSP/Metric, 95 gpm
		60812-100	DLFC, 2-inch BSP/Metric, 100 gpm
22	2	27913-21	Housing, Flow Control, 2-inch BSP
23		16804	O-ring, -150
24	1	16649	Holder, DLFC Button
25	1	16650	Cover Plate DLFC
26	1	13898	Screw, Flat HD, Phil, Steel
27	6	13386	Screw, Hex HD MACH, 1/4-20 x 1 OR Slot Hex Cap Screw 18-8 S.S.
		17976	Screw, Hex HD, M6 x 25 mm
28		16529	Washer, Flow, 10.0 gpm
		16736	Washer, Flow, 15.0 gpm
		16528	Washer, Flow, 20.0 gpm
		16737	Washer, Flow, 25.0 gpm
29	1	19089	Body Regulator 3150
30	1	10242	Fitting, Nipple, 1/2-inch, Close
31	1	19091	Pin, Regulator 3150
32	1	19093	Stand-Off Regulator 3150
33	1	19095	Diaphragm, Regulator 3150
34	1	19094	Washer, Regulator 3150
35	1	19092	Retainer, Regulator 3150
36	1	19101	Spring, Regulator 3150
37	1	19399	Washer, Calibration 3150
38	1	19090	Cap, Regulator 3150
39	1	19278	Fitting, Tube, 90 Deg
40	1	19693	Pressure Gauge
41	1	41232	Bushing Reducer 1/4 x 1/8
42		60710-1.2	BLFC, 1-inch F x 1-inch M, NPT, 1.2 gpm
		60710-2.0	BLFC, 1-inch F x 1-inch M, NPT, 2.0 gpm
		60710-2.4	BLFC, 1-inch F x 1-inch M, NPT, 2.4 gpm
		60710-3.0	BLFC, 1-inch F x 1-inch M, NPT, 3.0 gpm
		60710-3.5	BLFC, 1-inch F x 1-inch M,

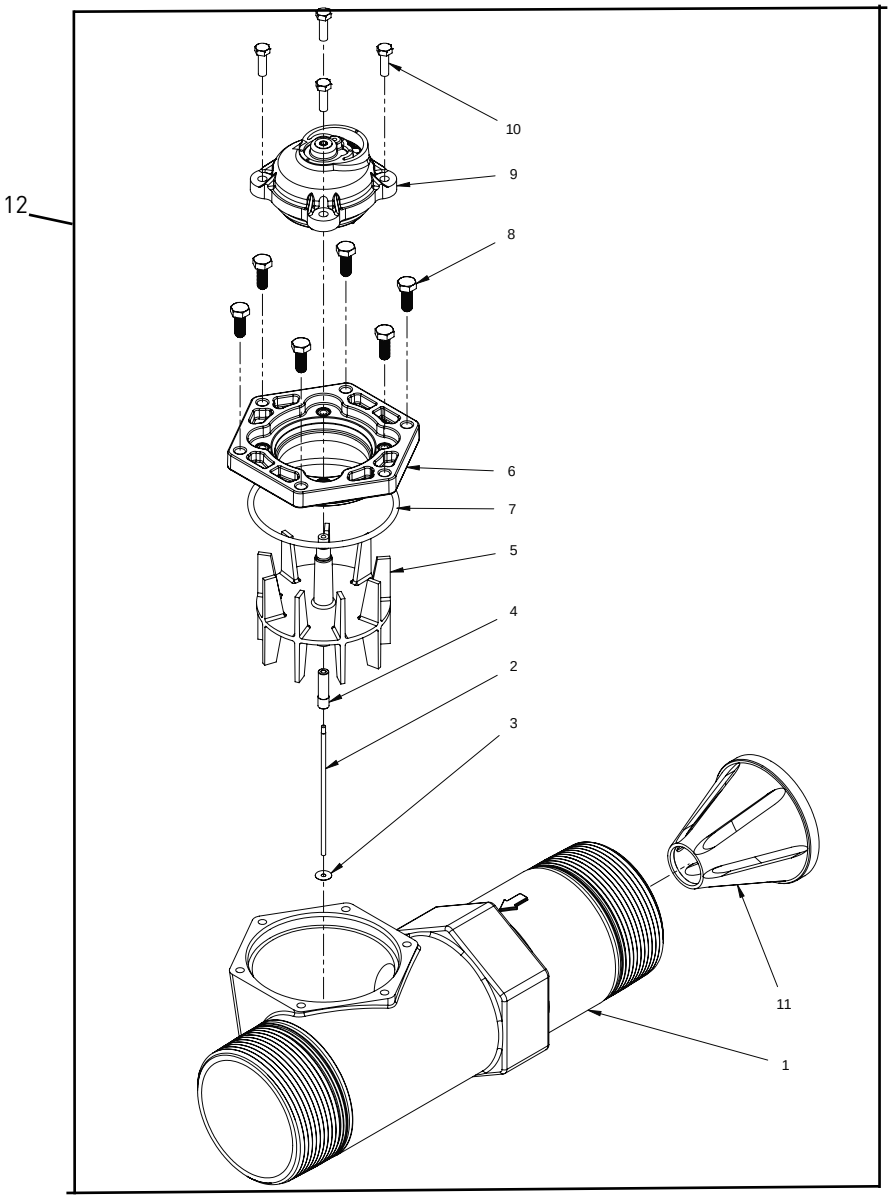
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1800 SERIES BRINE SYSTEM AND DRAIN LINE FLOW CONTROL ASSEMBLY *CONTINUED*

Item No.	QTY	Part No.	Description
			NPT, 3.5 gpm
	.....	60710-4.0.....	BLFC, 1-inch F x 1-inch M, NPT, 4.0 gpm
	.....	60710-5.0.....	BLFC, 1-inch F x 1-inch M, NPT, 5.0 gpm
	.....	60710-7.0.....	BLFC, 1-inch F x 1-inch M, NPT, 7.0 gpm
43	.....	60710-9.0.....	BLFC, 1-inch F x 1-inch M, NPT, 9.0 gpm
	.....	60710-10.....	BLFC, 1-inch F x 1-inch M, NPT, 10 gpm
	.....	60710-12.....	BLFC, 1-inch F x 1-inch M, NPT, 12 gpm
	.....	60710-15.....	BLFC, 1-inch F x 1-inch M, NPT, 15 gpm
	.....	60710-20.....	BLFC, 1-inch F x 1-inch M, NPT, 20 gpm
	.....	60710-25.....	BLFC, 1-inch F x 1-inch M, NPT, 25 gpm
44	.....	16530.....	Housing, BLFC, 1"M x 1"F
45	.....	19292.....	O-ring, -020
46	.....	19279.....	Retainer, Flow Control, Flow 9.0 - 25 gpm
47	.....	19053.....	Retainer, Flow Control, Flow 2.0 - 7.0 gpm
48	.....	12085.....	Washer, Flow, 1.2 gpm
	.....	12087.....	Washer, Flow, 2.0 gpm
	.....	12088.....	Washer, Flow, 2.4 gpm
	.....	12089.....	Washer, Flow, 3.0 gpm
	.....	12090.....	Washer, Flow, 3.5 gpm
	.....	12091.....	Washer, Flow, 4.0 gpm
	.....	12092.....	Washer, Flow, 5.0 gpm
	.....	12408.....	Washer, Fow, 7.0 gpm
	.....	17944.....	Washer, Flow, 9.0 gpm
	.....	16529.....	Washer, Flow, 10.0 gpm
	.....	16735.....	Washer, Flow, 12.0 gpm
	.....	16736.....	Washer, Flow, 15.0 gpm
	.....	16528.....	Washer, Flow, 20.0 gpm
	.....	16737.....	Washer, Flow, 25.0 gpm
49	.....	16738.....	Retainer,Flow Control
50	.....	16805.....	Ring, Retaining
Not Shown - Option Without Brine Valve			
	1	16605.....	Retainer Plate
	1	19860.....	Fitting, Brine Valve, 1800

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3-INCH METER ASSEMBLY

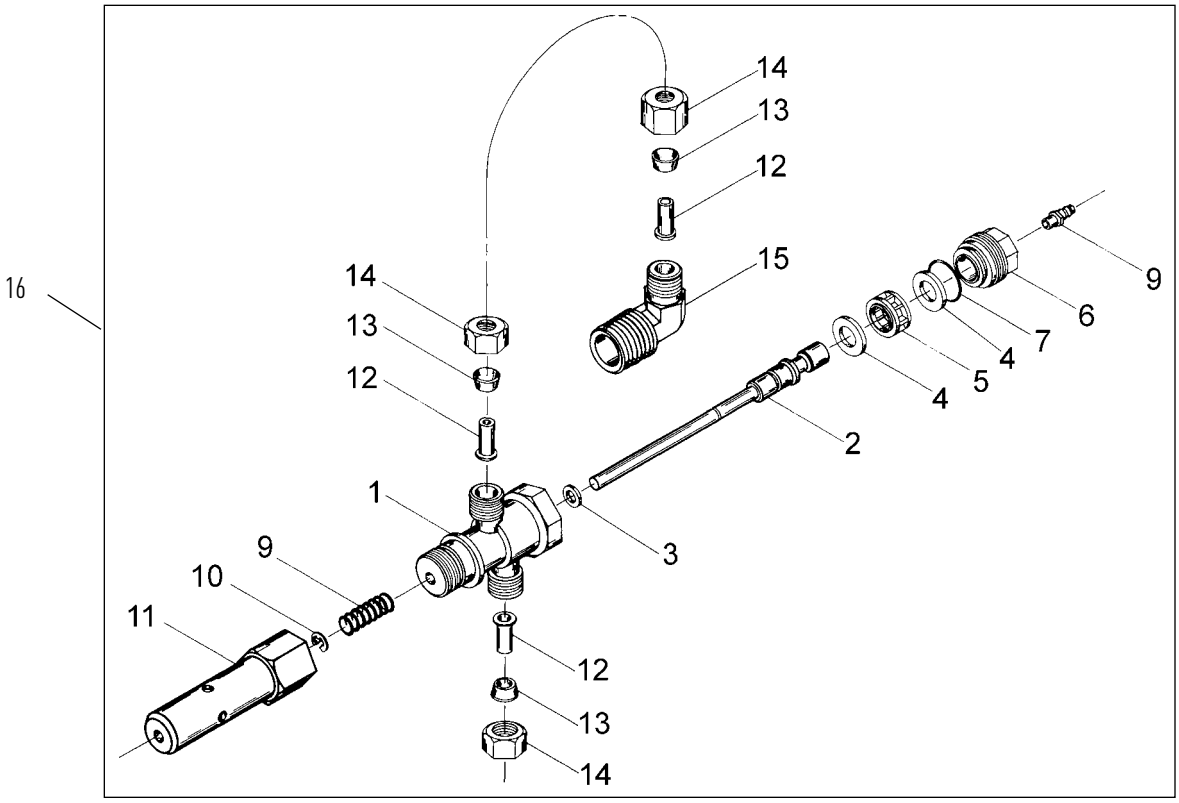


61935 Rev B

Item No.	QTY	Part No.	Description
1	1	43787-10	Body, Meter, 3", SS, NPT
	1	43787-20	Body, Meter, 3", SS, BSP
2	1	16279	Shaft, Impeller
3	1	16574	Washer, Plain, SS
4	1	15381	Plug, Impeller
5	1	16252-01	Impeller, 3900, PP
6	1	43982	Meter Plate, 3"
7	1	15707	O-Ring, -236
8	6	44074	Screw - Hex HD, M6X16MM, SS
9	1	61936	Meter Cap ASSY
		61936-01	Meter Cap ASSY, EXT Range
10	4	21716	Screw, Hex Head, MS X 16
11	1	16280	Flow Straightener, 3"
12		61935-10	Meter Assy, 3" INLN, SS, NPT STD
		61935-11	Meter Assy, 3" INLN, SS, NPT EXT
		61935-20	Meter Assy, 3" INLN, SS, BSP STD
		61935-21	Meter Assy, 3" INLN, SS, BSP STD

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SERVICE VALVE OPERATOR ASSEMBLY



BR60150-3150REVA

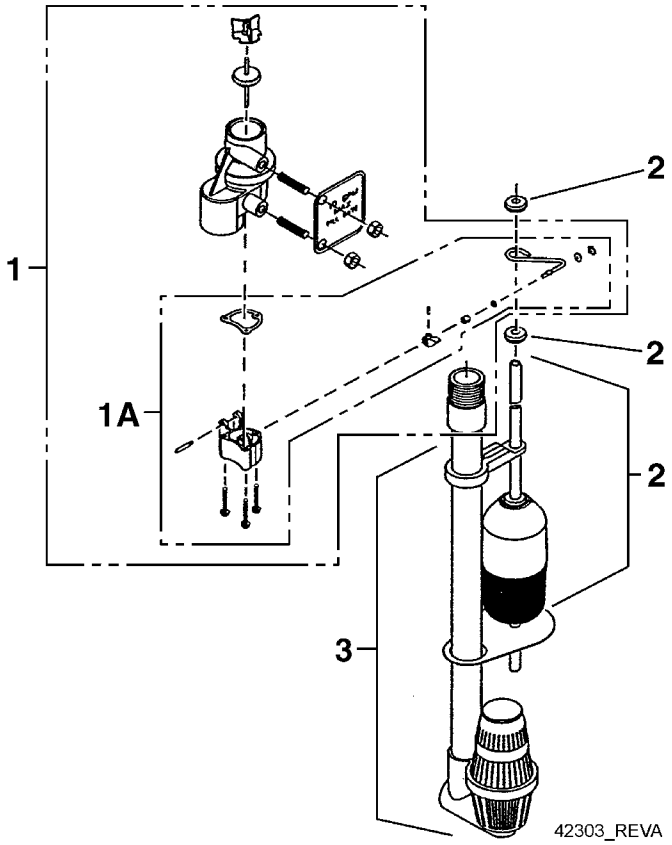
Item No.	QTY	Part No.	Description
1	1	15074	Body, SVO
2	1	16065	Piston & Stem, SVO
3	1	10141	O-ring, -010
4	2	14835	Seal, 3150
5	1	14834	Spacer, Softwater Fill
6	1	16509	Plug, End, SVO
7	1	12977	O-ring, -015
8	1	15965	Fitting, Bias
9	1	10249	Spring, Brine Valve
10	1	10250	Ring, Retaining
11	1	16498-02	Stem Guide Assy, SVO
12	3	10332	Fitting, Insert, 3/8
13	3	10330	Fitting, Sleeve, 3/8 Celcon
14	3	10329	Fitting, Tube, 3/8 Nut, Brass
15	1	16503	Fitting, Elbow, 90 Deg.
16	1	60150-3150	SVO Assy, 3150/3900 (Includes Items 1-15)

Not Shown

	1	16511	Tube, 3150, PVC, SVO

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2350 SAFETY BRINE VALVE



Item No.	QTY	Part No.	Description
1	1	60038	Safety Brine Valve, 2350
1A	1	61024	Actuator Assy, 2350 Brine
2	1	60028-30	Float Assy, 2350, 30-inch Wht
		60026-30SAN	Float Assy, 2350, 30-inch Hot Water
3	1	60009-00	Air Check, #900, Commercial Less Fittings
		60009-01	Air Check, #900, Commercial, Hot Water Less Fittings
Not Shown			
	1	18603	Fitting Assy, 900 Air Check 2350
	1	18602	Fitting Assy, 900 Air Check

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TROUBLESHOOTING

Problem	Cause	Correction
Water conditioner fails to regenerate.	Electrical service to unit has been interrupted	Assure permanent electrical service (check fuse, plug, pull chain, or switch)
	Timer is defective.	Replace timer.
	Power failure.	Reset time of day.
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.
Unit used too much salt.	Improper salt setting.	Check salt usage and salt setting.
	Excessive water in brine tank.	See "Excessive water in brine tank".
Loss of water pressure.	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.
	Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system.	Remove piston and clean control.
Loss of mineral through drain line.	Air in water system.	Assure that well system has proper air eliminator control. Check for dry well condition.
	Improperly sized drain line flow control.	Check for proper drain rate.
Iron in conditioned water.	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.
	Timer not cycling.	Replace timer.
	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 20 psi
	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 timer is faulty and replace it, or replace complete power head.
Drain flows continuously.	Valve is not programming correctly.	Check timer program and positioning of control. Replace power head assembly if not positioning properly.
	Foreign material in control.	Remove power head assembly and inspect bore. Remove foreign material and check control in various regeneration positions.
	Internal control leak.	Replace seals and piston assembly.

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GENERAL SERVICE HINTS FOR METER CONTROL

Problem: Softener delivers hard water

Reason: Reserve capacity has been exceeded.

Correction: Check salt dosage requirements and reset program wheel to provide additional reserve.

Reason: Program wheel is not rotating with meter output.

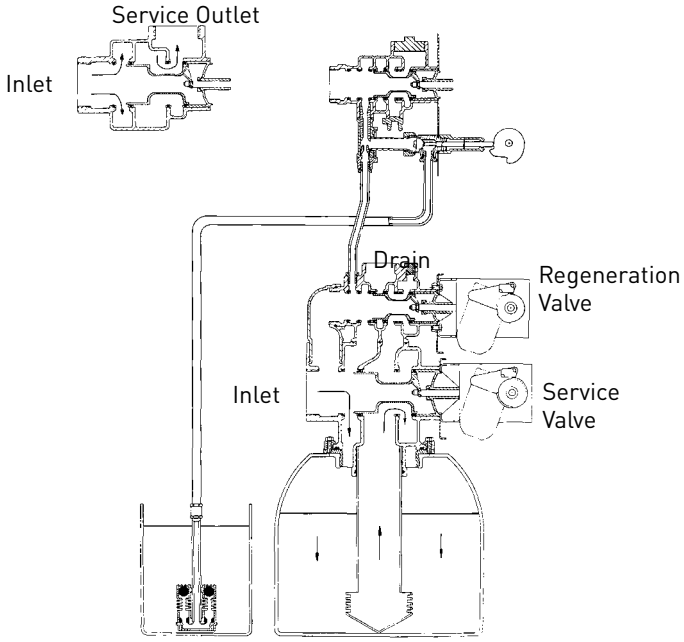
Correction: Pull cable out of meter cover and rotate manually. Program wheel must move without binding and clutch must give positive clicks when program wheel strikes regeneration stop. If it does not, replace timer.

Reason: Meter is not measuring flow.

Correction: Check meter with meter checker.

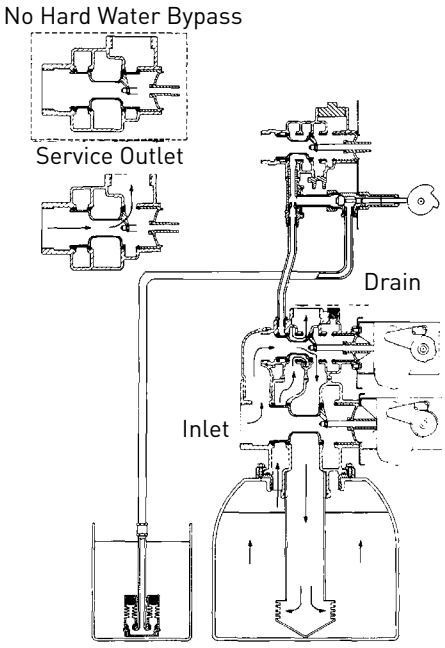
WATER CONDITIONER FLOW DIAGRAMS

1 Service Position



Hard water enters at valve inlet and flows down thru mineral to the bottom distributor. Conditioned water flows up thru the distributor tube, around the piston and out the outlet.

2 Backwash Position



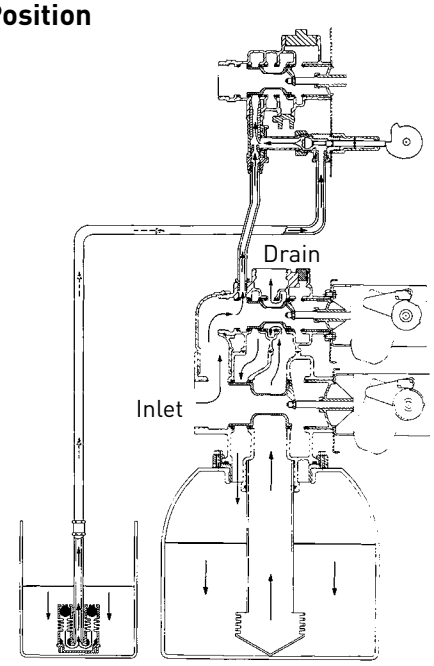
Hard water enters at valve inlet – flows thru service adapter piston for by-pass, and up thru coupling to regeneration valve inlet. Flow continues thru the regeneration valve piston – down the distributor tube – thru the bottom distributor and up thru the mineral – around the piston and out the drain. If optional no hard water by-pass piston is used, water flow to service outlet is prevented by an extension on the service outlet until the end of the rapid rinse cycle or brine tank refill cycle, depending on options chosen.

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WATER CONDITIONER FLOW DIAGRAMS

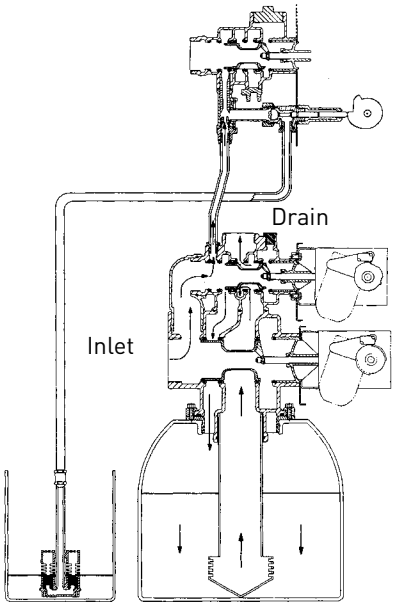
CONTINUED

3 Brine Position



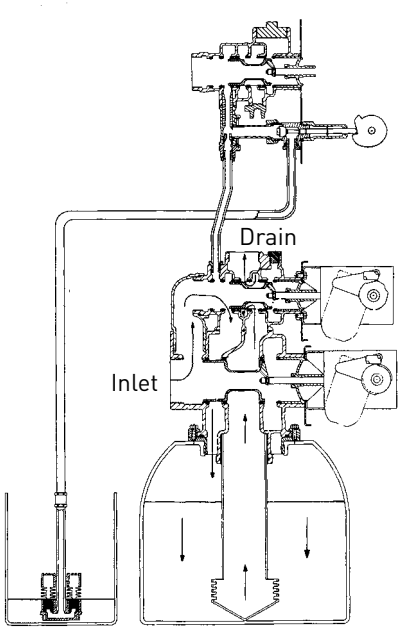
Hard water enters at valve inlet – flows thru injector nozzle and throat to draw brine from the brine tank. Brine flows down thru the mineral – into the bottom distributor – up the distributor tube – around the piston and out the drain.

4 Slow Rinse Position



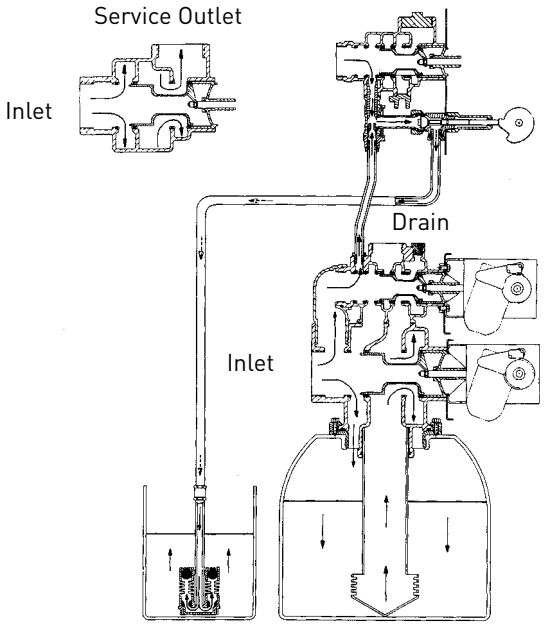
Hard water enters at valve inlet – flows thru injector nozzle and throat – down thru the mineral – into the bottom distributor – up the distributor tube – around the piston and out the drain.

5 Rapid Rinse Position



Hard water enters at valve inlet – flows thru the regeneration valve directly down thru the mineral – into the bottom distributor – up the distributor tube – around the piston and out the drain.

6 Brine Tank Refill Position

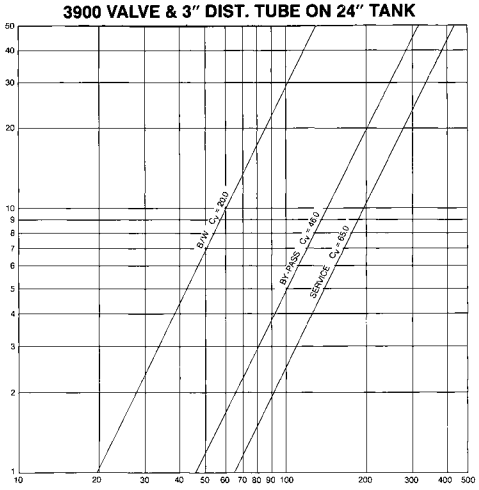


Hard water enters at valve inlet – flows thru nozzle and thru throat to brine valve to refill the brine tank. Inlet flow also continues down thru mineral to the bottom distributor. Conditioned water flows up thru the distributor tube, around the piston and out the outlet. Note: An option is available to keep service valve in by-pass position until the end of brine tank refill cycle.

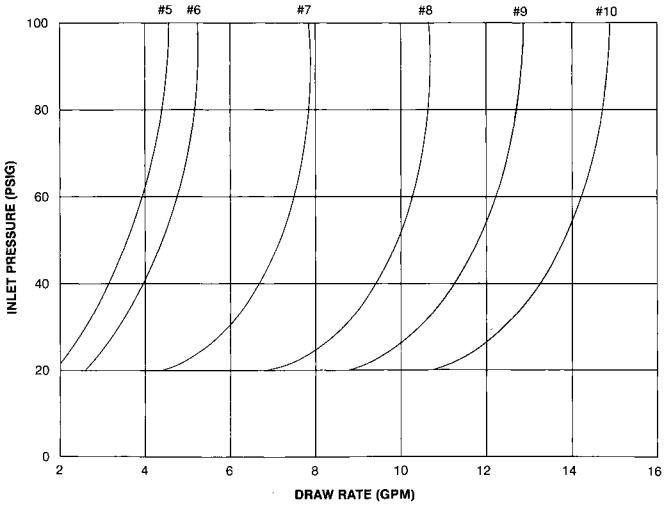
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FLOW DATA & INJECTOR DRAW RATES

3900 VALVE & 3" DIST. TUBE ON 24" TANK

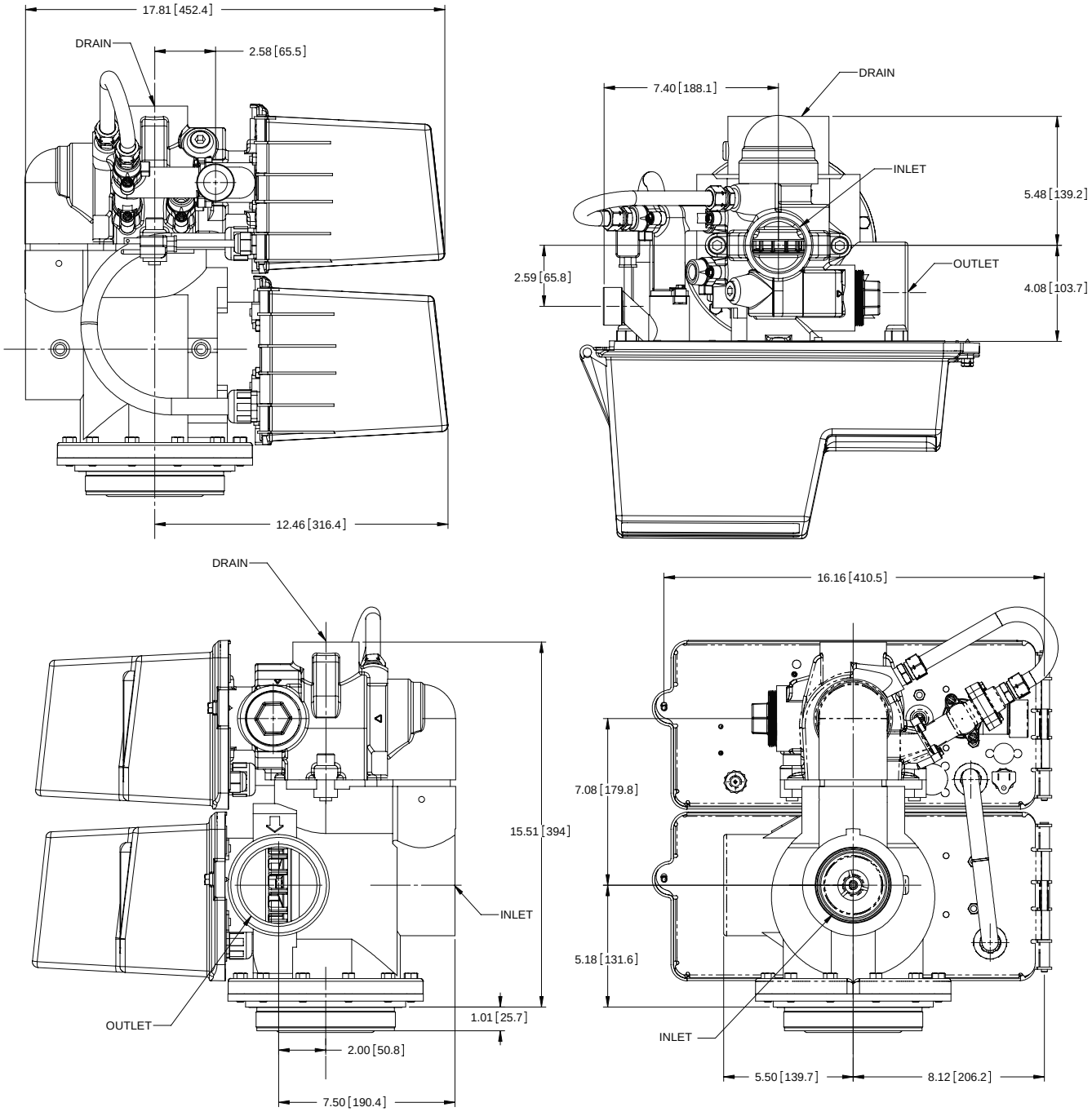


3900 ON EMPTY TANK



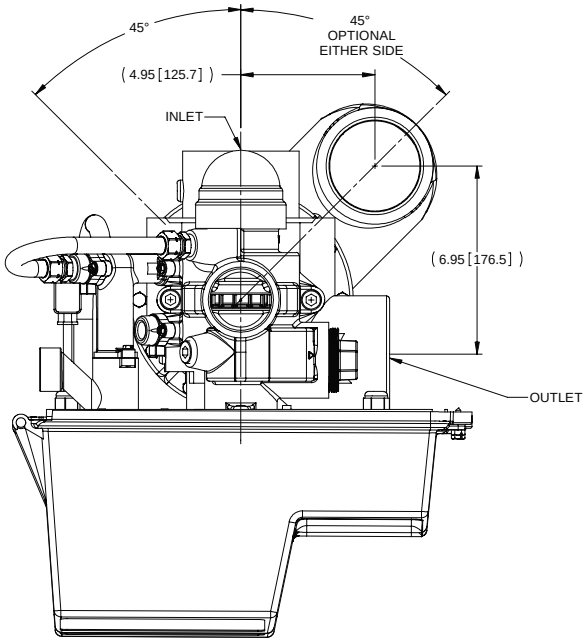
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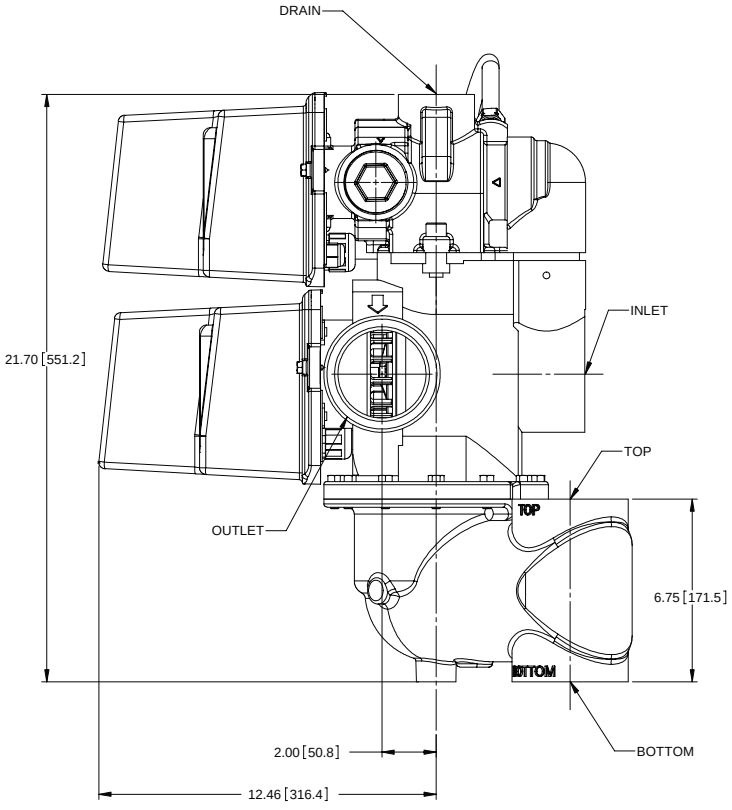
DIMENSIONAL DRAWING 3900 TOP MOUNT

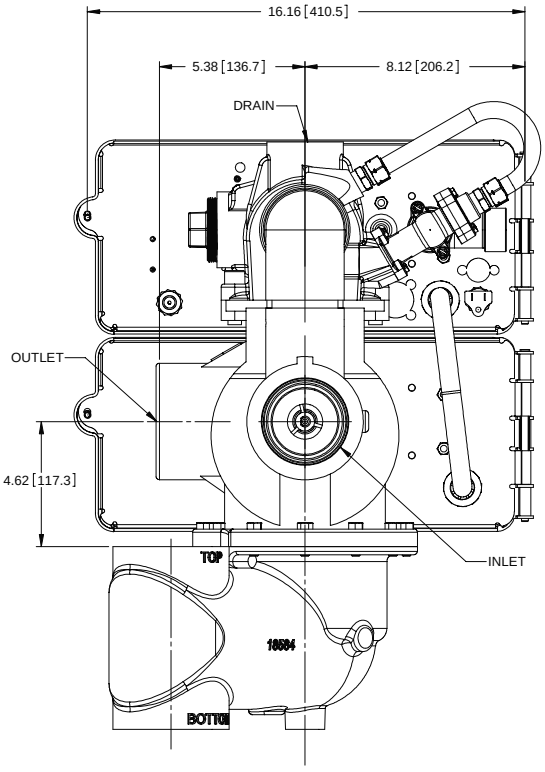


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DIMENSIONAL DRAWING 3900 SIDE MOUNT



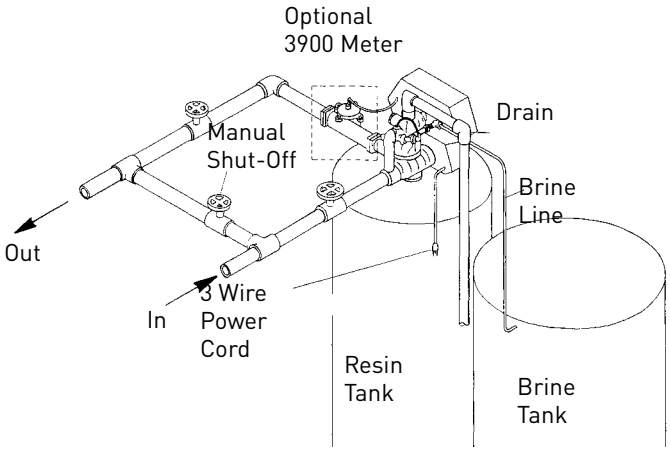




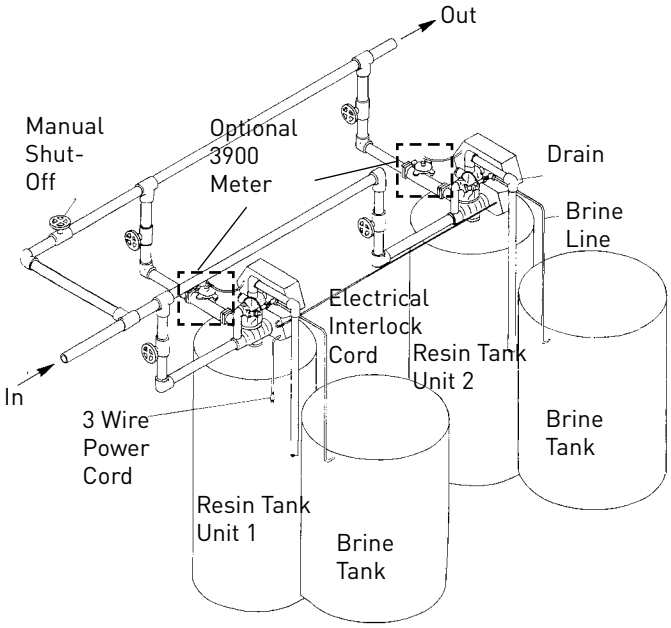
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TYPICAL INSTALLATIONS

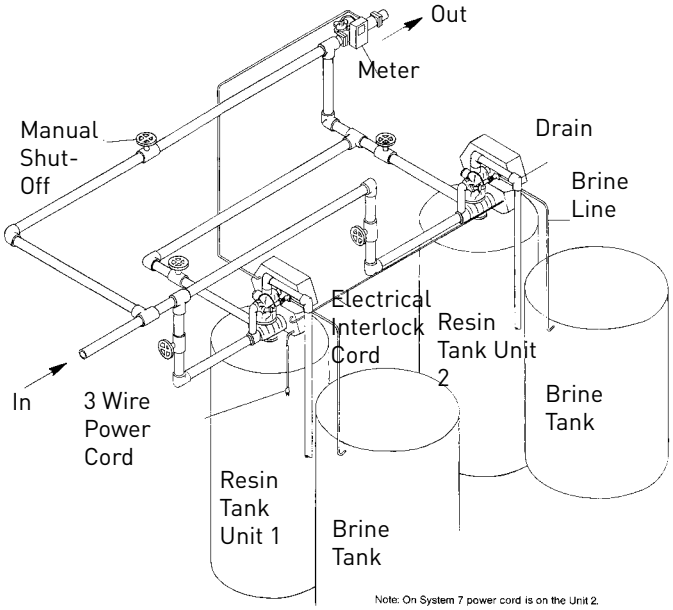
System #4 - Typical Single Tank Installation with Optional Meter



System #5 Interlock - Typical Twin Tank Installation with Optional Meter Interlock and No Hard Water Bypass



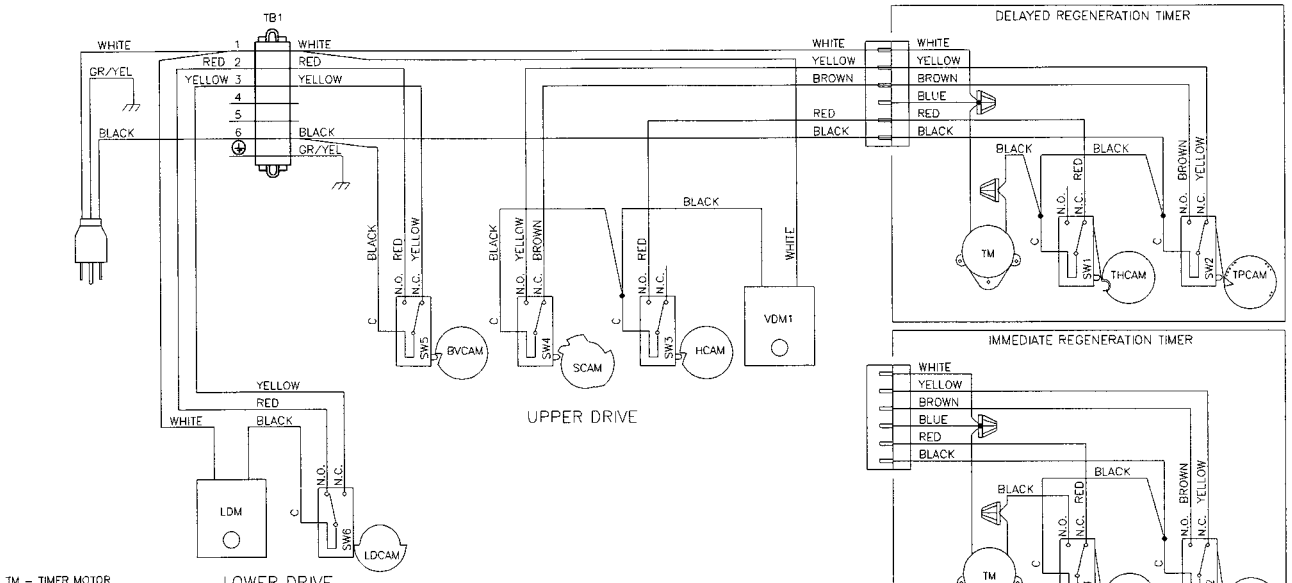
System #6 Interlock - Typical Twin Tank Installation with Optional Meter Interlock and No Hard Water Bypass



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VALVE WIRING

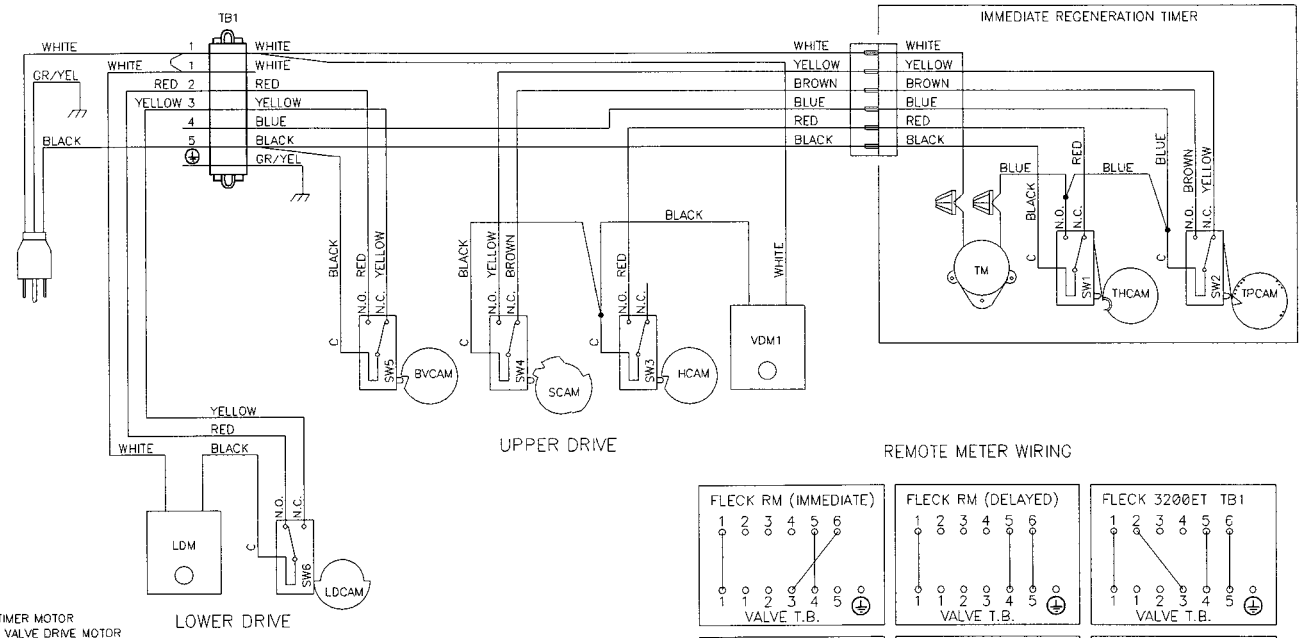
System #4



TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
LDM – LOWER DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – LOWER DRIVE SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM
LDCAM – LOWER DRIVE CAM

NOTE:
SINGLE TANK TIMECLOCK, METER DELAYED, OR METER IMMEDIATE REGENERATION

System #4 with Remote Meter



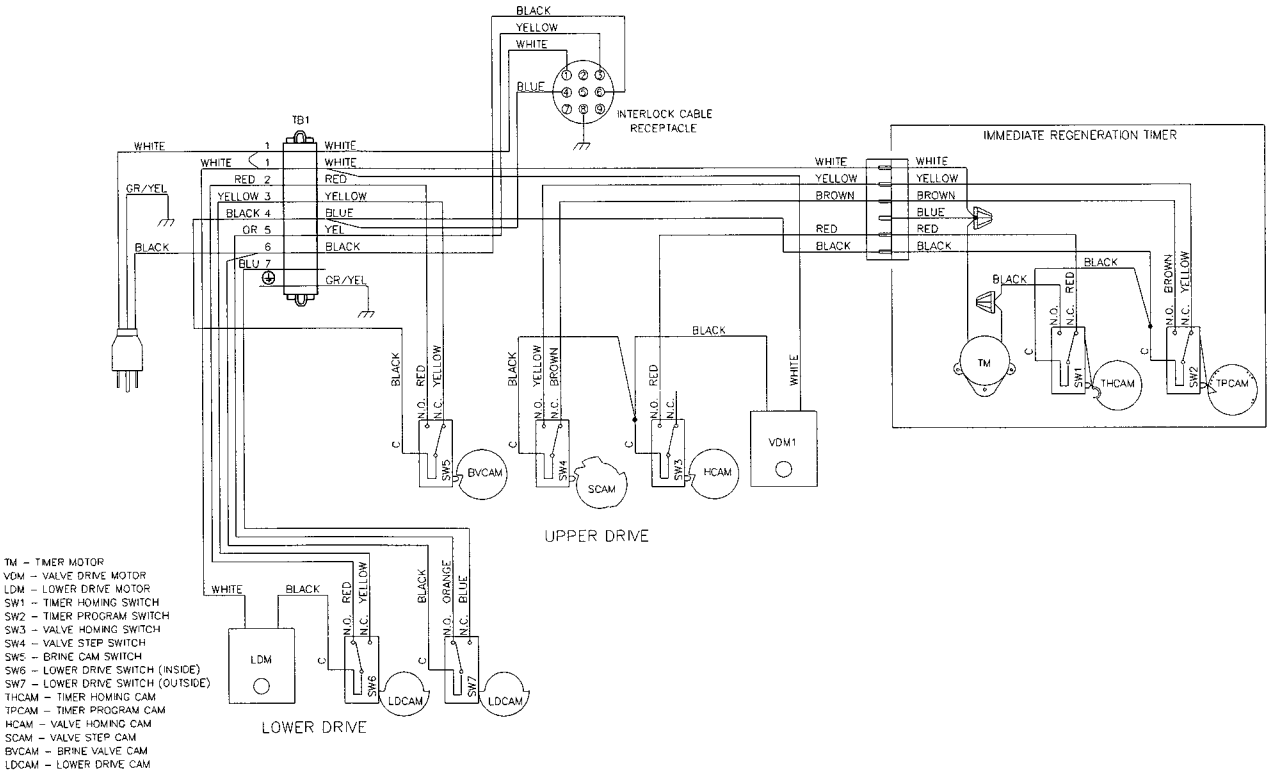
REMOTE METER WIRING

TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
LDM – LOWER DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – LOWER DRIVE SWITCH
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM
LDCAM – LOWER DRIVE CAM

NOTE:
SINGLE TANK REMOTE METER DELAYED, OR IMMEDIATE REGENERATION

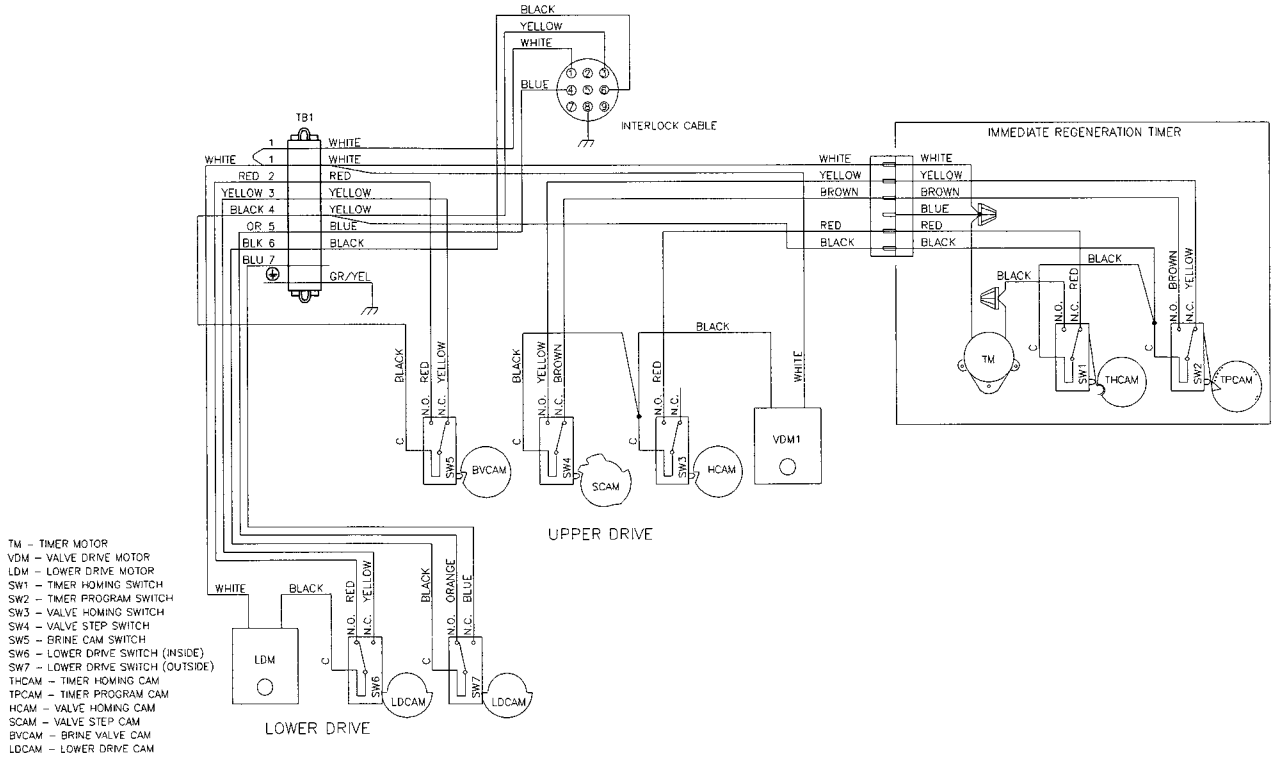
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System #5



TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
LDM – LOWER DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – LOWER DRIVE SWITCH (INSIDE)
SW7 – LOWER DRIVE SWITCH (OUTSIDE)
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM
LDCAM – LOWER DRIVE CAM

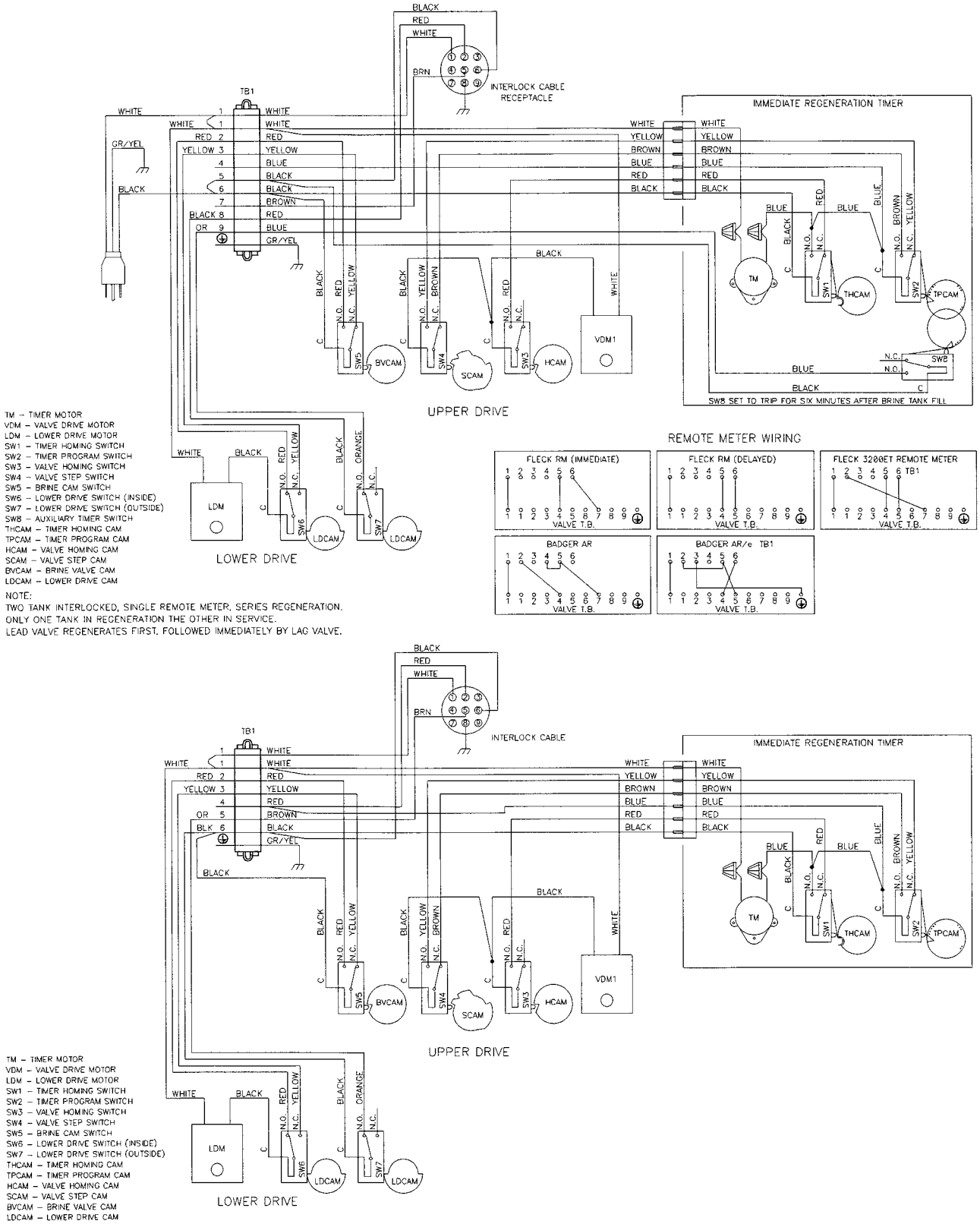
NOTE:
TWO TANK INTERLOCKED, INDIVIDUAL METER, IMMEDIATE REGENERATION.
ONLY ONE TANK IN REGENERATION THE OTHER IN SERVICE.



TM – TIMER MOTOR
VDM – VALVE DRIVE MOTOR
LDM – LOWER DRIVE MOTOR
SW1 – TIMER HOMING SWITCH
SW2 – TIMER PROGRAM SWITCH
SW3 – VALVE HOMING SWITCH
SW4 – VALVE STEP SWITCH
SW5 – BRINE CAM SWITCH
SW6 – LOWER DRIVE SWITCH (INSIDE)
SW7 – LOWER DRIVE SWITCH (OUTSIDE)
THCAM – TIMER HOMING CAM
TPCAM – TIMER PROGRAM CAM
HCAM – VALVE HOMING CAM
SCAM – VALVE STEP CAM
BVCAM – BRINE VALVE CAM
LDCAM – LOWER DRIVE CAM

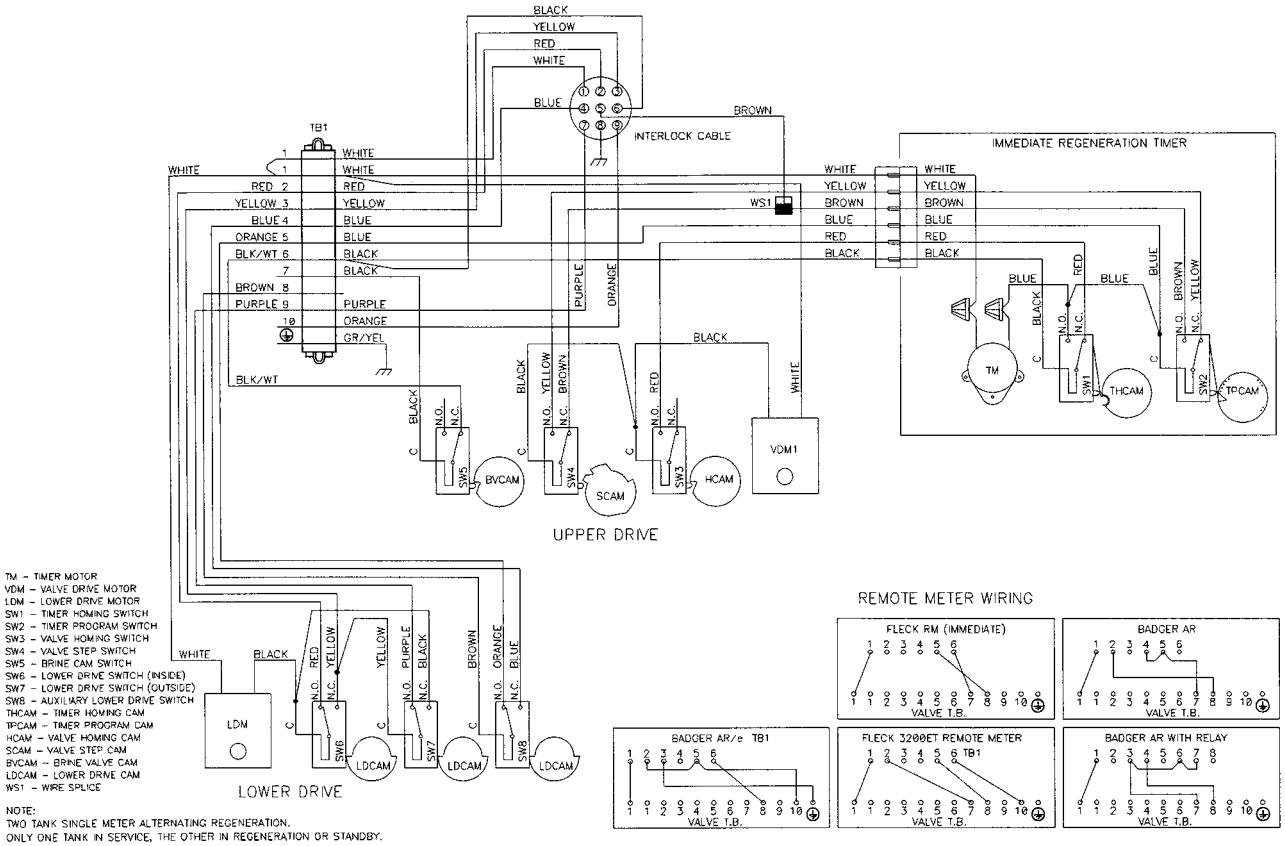
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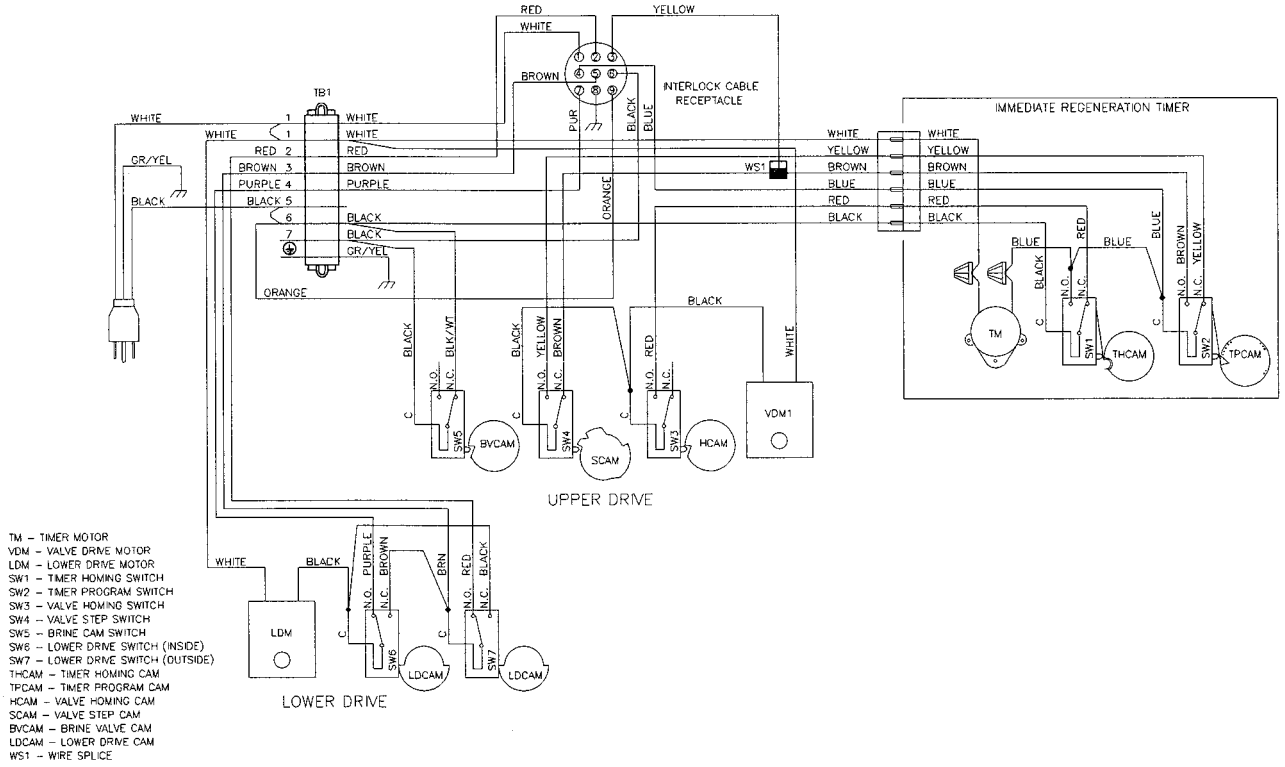
System #6



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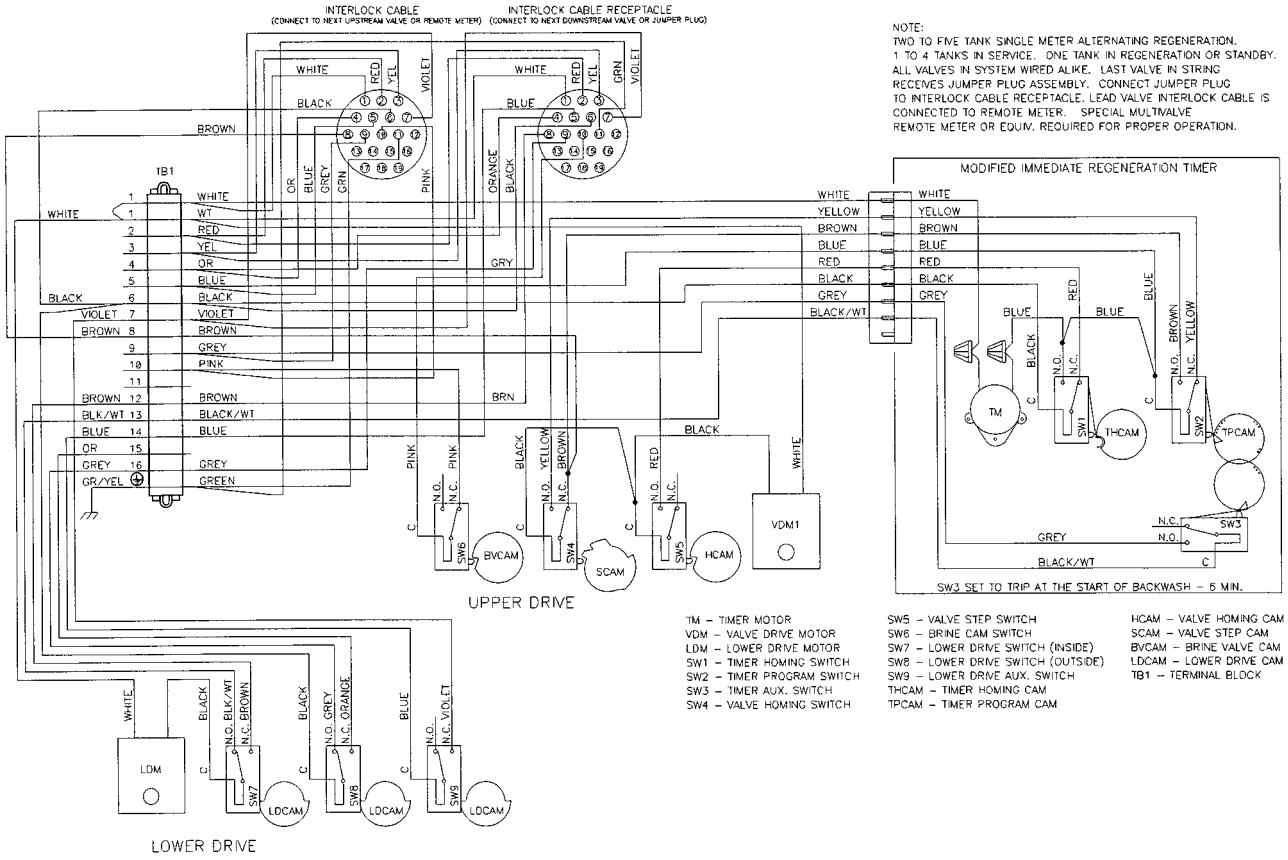
System #7





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System #7 Multivalve



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SERVICE ASSEMBLIES

60036-02 1800 Brine Valve:
11772 ..... Spring
11774 ..... Retaining Ring
18713 ..... Brine Valve Body
16497-01 ..... Brine Stem Assembly
16498-01 ..... Stem Guide Assembly

60277-xx 1800 Injector Assembly:
12473 ..... Screw - Hex Head
15127-xx ..... Injector Throat
15128-xx ..... Injector Nozzle
15246 ..... O-ring -116
16340 ..... Injector Body
16341-01 ..... Injector Cover
-xx Specify Size

60106-00 3900 Upper Piston Assembly:
14818 ..... Clip Piston Rod
14922 ..... O-ring -035
15125 ..... Piston Rod
16130 ..... Piston
16389-0 ..... End Plug Assembly

60107-00 3900 Lower Piston - Hard Water Bypass:
14818 ..... Clip Piston Rod
16071 ..... Piston
16072 ..... Piston Rod
16076 ..... O-ring -042
16399-01 ..... End Plug Assembly - White

60107-10 3900 Lower Piston - No Hard Water Bypass:
14818 ..... Clip Piston Rod
16082 ..... Piston - No Hard Water Bypass
16072 ..... Piston Rod
16076 ..... O-ring -042
16399-11 ..... End Plug Assembly - Black

60131 3900 Upper Seal Kit:
10368 ..... Spacer
10369 ..... Spacer - Port
11720 ..... Seal

60132 3900 Lower Seal Kit:
16068 ..... Seal
16069 ..... Spacer - Narrow
16070 ..... Spacer - Wide

60057-01 3900 Upper Drive Motor Assembly - 115 V:
10302 ..... Insulator - Switch
10872 ..... Screw - Hex Head
11080 ..... Screw - Flat Head
10218 ..... Switch
10300 ..... Screw - Hex Head
15120 ..... Bracket - Motor Mounting
40392 ..... Drive Motor - 115 V. 50/60 Hz
16052 ..... Blushing
17797 ..... Bracket - Switch Mounting
12624 ..... Screw - Pan Head

60058-01 3900 Lower Drive Motor Assembly - 115 V System #4:
10302 ..... Insulator - Switch
10872 ..... Screw - Hex Head
11080 ..... Screw - Flat Head
10218 ..... Switch
10300 ..... Screw - Hex Head
11805 ..... Screw - Pan Head
40392 ..... Drive Motor - 115V. 50/60 Hz
17797 ..... Bracket - Switch Mounting
16086 ..... Bracket - Motor Mounting

60131-10 3900 Upper Seal Kit:
10368 ..... Spacer
10369 ..... Spacer
11720-02 ..... Seal, 1-1/2-inch, Silicone

60132-10 3900 Lower Seal Kit:
41534 ..... Seal, 3900, 558 Bypass
16069 ..... Spacer, 3900
16070 ..... Spacer, 3900

60038 Safety Brine Valve, 2350:
60028-30 ..... Float Assembly, White
60009-00 ..... #900 Air Check, Less Fittings
18602 ..... Kit, Fitting, 1700 Brine, 900 Air Check
18603 ..... Kit, Fitting, 1700 Brine, 2350 Safety

61417 Adapter Assy, Side Mount, 3900:
18584-02 ..... Adapter, 3900 Side Mount
16257 ..... Segment, Flange
11238 ..... Screw, Hex, 5/16-18 x 1, 18-8 Stainless Steel
16345 ..... O-ring, 362
16800 ..... O-ring, 238
11533 ..... Plug, Pipe 1/4-inch

60150-3150 SVO, Assembly, 3150/3900
Drain Line Flow Controls (DLFC):
60711-00 ..... 2-inch NPT, Less BTTNS, w/2 Holes
60711-000 ..... 2-inch NPT, Less BTTNS, w/3 Holes
60711-01 ..... 2-inch NPT, Less BTTNS, w/1 Hole
60711-20 ..... 2-inch NPT, 20 gpm
60711-25 ..... 2-inch NPT, 25 gpm, Brass
60711-30 ..... 2-inch NPT, 30 gpm
60711-35 ..... 2-inch NPT, 35 gpm
60711-40 ..... 2-inch NPT, 40 gpm
60711-45 ..... 2-inch NPT, 45 gpm
60711-50 ..... 2-inch NPT, 50 gpm
60711-55 ..... 2-inch NPT, 55 gpm
60711-60 ..... 2-inch NPT, 60 gpm
60711-65 ..... 2-inch NPT, 65 gpm
60711-70 ..... 2-inch NPT, 70 gpm
60711-75 ..... 2-inch NPT, 75 gpm
60711-80 ..... 2-inch NPT, 80 gpm
60711-85 ..... 2-inch NPT, 85 gpm
60711-90 ..... 2-inch NPT, 90 gpm
60711-95 ..... 2-inch NPT, 95 gpm
60711-100 ..... 2-inch NPT, 100 gpm
60812-30 ..... 2-inch BSP/ Metric, 30 gpm
60812-35 ..... 2-inch BSP/ Metric, 35 gpm
60812-45 ..... 2-inch BSP/ Metric, 45 gpm
60812-50 ..... 2-inch BSP/ Metric, 50 gpm
60812-55 ..... 2-inch BSP/ Metric, 55 gpm
60812-70 ..... 2-inch BSP/ Metric, 70 gpm
60812-75 ..... 2-inch BSP/ Metric, 75 gpm
60812-80 ..... 2-inch BSP/ Metric, 80 gpm
60812-90 ..... 2-inch BSP/ Metric, 90 gpm
60812-95 ..... 2-inch BSP/ Metric, 95 gpm
60812-100 ..... 2-inch BSP/ Metric, 100 gpm

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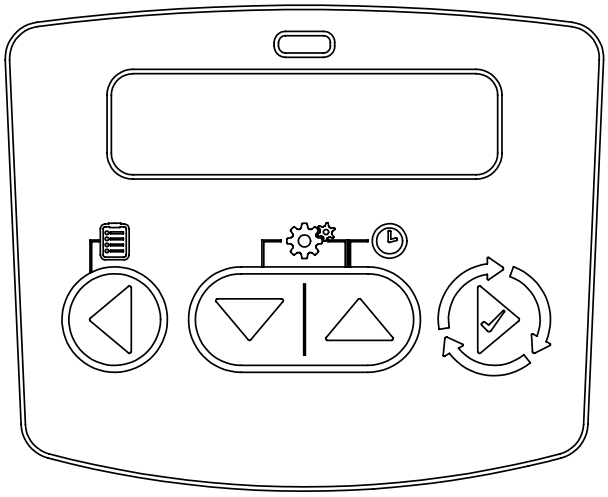
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PENTAIR

FLECK NXT2 TIMER
SERVICE MANUAL



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IMPORTANT PLEASE READ:

- The information, specifications and illustrations in this manual are based on the latest information available at the time of release. The manufacturer reserves the right to make changes at any time without notice.
- This manual is intended as a guide for service of the valve only. System installation requires information from a number of suppliers not known at the time of manufacture. This product should be installed by a plumbing professional.
- This unit is designed to be installed on potable water systems only.
- This product must be installed in compliance with all state and municipal plumbing and electrical codes. Permits may be required at the time of installation.
- It is established that when daytime water pressure exceeds 80 psi (5.5 bar), the maximum pressure rating of 125 psi (8.6 bar) can be exceeded. A pressure regulator must be installed on this system or warranty is voided.
- Do not install the unit where temperatures may drop below 32°F (0°C) or above 120°F (52°C).
- Do not place the unit in direct sunlight. Black units will absorb radiant heat, increasing internal temperatures.
- Do not strike the valve or any of the components.
- Warranty of this product extends to manufacturing defects. Misapplication of this product may result in failure to properly condition water, damage to product, or personal injury.
- A prefilter should be used on installations in which free solids are present.
- In some applications local municipalities treat water with Chloramines. High Chloramine levels may damage valve components.
- Correct and constant voltage must be supplied to the controller to maintain proper function.
- The system is intended to treat only potable quality water. It is not intended as the permanent primary treatment of water from a source that is contaminated, such as from radon, pesticides, insecticides, sewage or wastewater.
- This system is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children shall not play with the system.
- Cleaning shall not be made by children without supervision.
- Periodic cleaning and maintenance may be required to function properly.
- All plumbing and electrical should be done in accordance with local codes.
- An uninterrupted power supply is required. The control uses a transformer to supply 24 VDC. Please make sure your voltage supply is compatible with your unit before installation.

CALIFORNIA PROPOSITION 65 WARNING

⚠ WARNING: This product contains chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

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OPERATING PARAMETERS

Minimum Pressure	20 psi/1.4 bar/138 kPa
Maximum Pressure	125 psi/8.61 bar/861 kPa
Minimum Water Temperature	34°F/1°C
Maximum Water Temperature	110°F/43°C
Minimum Ambient Temperature	34°F/1°C
Maximum Ambient Temperature	120°F/52°C
Maximum Humidity	75%
Input Voltage	100-240 VAC
Input Frequency	50/60 Hz
Output Voltage	24 VDC
Output Current	2.7 amps
Maximum Altitude	2,000 meters

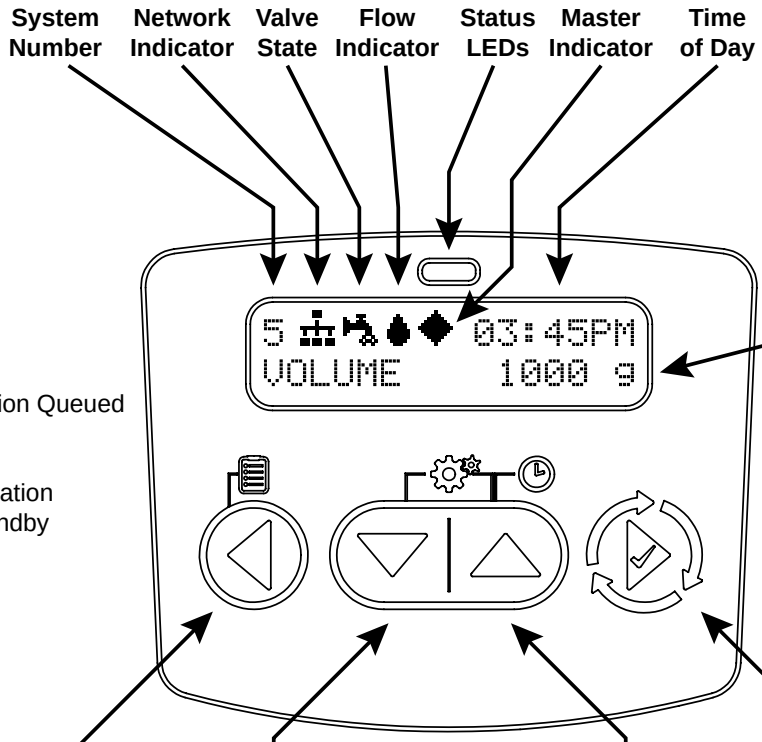
System Type	4 - Single Unit 5 - Parallel Interlock (2-8 Unit) 6 - Parallel Series Regeneration (2-8 Units) 7 - Alternating Interlock (2 Units) 8 - Alternating Delayed (2 Units) 9 - Alternating with Standby Units (2-8 Units) 14 - Demand Recall (2-8 Units)
Valve Type	2510 2750 2815 2850 2900 3150 3900
Regeneration Type	Softener/Filter Meter Delayed Softener/Filter Meter Immediate Time Clock Day of the Week Remote Regeneration
Regeneration Flow	Downflow Upflow Filter
Electrical Rating	24V DC

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 CAT5 or better 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)

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TIMER DISPLAY



Blue LED
On - Unit in Service
Blinking - Regeneration Queued

Green LED
On - Unit in Regeneration
Blinking - Unit in Standby

Red LED
On - Error present

Display Screen
Alternates between Date, Flow Rate, and Volume Remaining (If a regeneration is queued, displays time until regeneration)

Left Button
Press:
Navigate to previous menu option

Press and Hold:
Enter Diagnostic menu

Down Button
Press:
Adjust menu value down

Press and Hold:
Enter Time of Day menu

Up Button
Press:
Adjust menu value up

Press and Hold:
Enter Time of Day menu

Extra Cycle Button
Press:
Navigate to next menu option

Press and Hold:
Initiate a regeneration

Left Button + Down Button
Press and Hold -
Enter Master Programming

Down Button + Up Button
Press and Hold -
Enter User Programming

Display Icons

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

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TIMER 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.

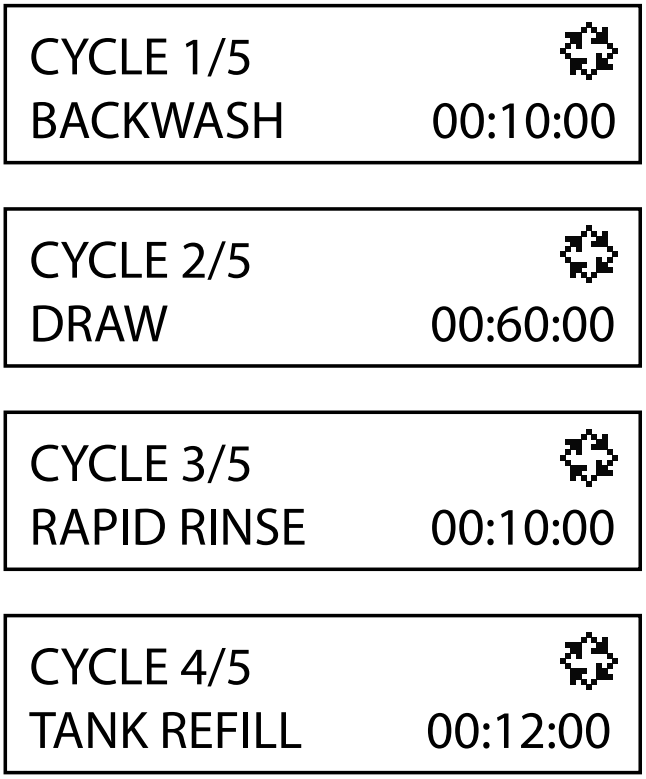
Manually Initiating a Regeneration

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

NOTE: A manually initiated or queued regeneration can be cleared by pressing 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.

Timer Operation During Regeneration

In the Regeneration Cycle step display, the timer 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 timer returns to In Service and resumes normal operation.



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.

Timer Operation During Programming

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

Timer Operation During A Power Failure

All program settings are stored in permanent memory. Current valve position, cycle step time elapsed, and time of day are 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 Timer

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.

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TIMER FEATURES

Remote Lock

The timer 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 - Regeneration

Flashing Green - 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 999.9 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.

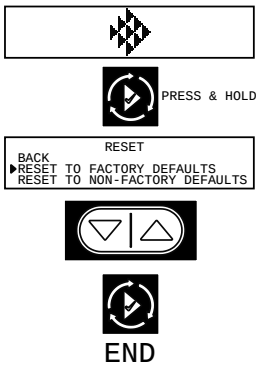
Time Clock - Once volume remaining reached zero and the selected regeneration time is reached (default 2 a.m. softener; 12 a.m. filter), the unit will regenerate.

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

Remote Regeneration - Regeneration begins or is queued after a contact closure meets or exceeds for the length of time specified in the Remote Signal Duration (Range 1-30 seconds Service; 60-300 seconds Standby). Unit regenerates will occur based on the Remote Regeneration specified method (Immediate or Delayed). Immediate Regeneration will immediately initiate a regeneration. Delayed Regeneration will initiate a regeneration based on the programmed regeneration time selected.

Reset to Factory Defaults

While powering up the unit, when the Pentair 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.

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.

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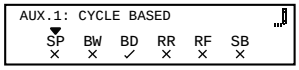
TIMER FEATURES *continued...*

Push Settings

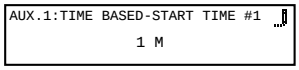
The ability to transmit settings from one unit to all other connected units. Select the desired Master Programming settings on one unit then push the same settings to all other connected units. After push settings are complete, you may still make unique changes to individual units.

Auxiliary Relays

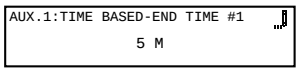
The NXT2 has two auxiliary relays available based on cycle, time, or volume.



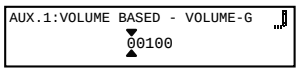
Activates during selected cycle step



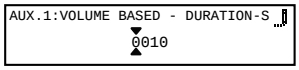
Activates upon selected start time (Range: 0-91 minutes)



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



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



Selected Duration in Seconds (Range: 0-9999 seconds)

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SYSTEM DEFINITIONS

System 4 - Single Unit

Single Tank configurationTime Clock: No MeterImmediate: One MeterDelayed: One MeterRemote 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 at 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 RegenerationOne 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) 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 becomethe 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.

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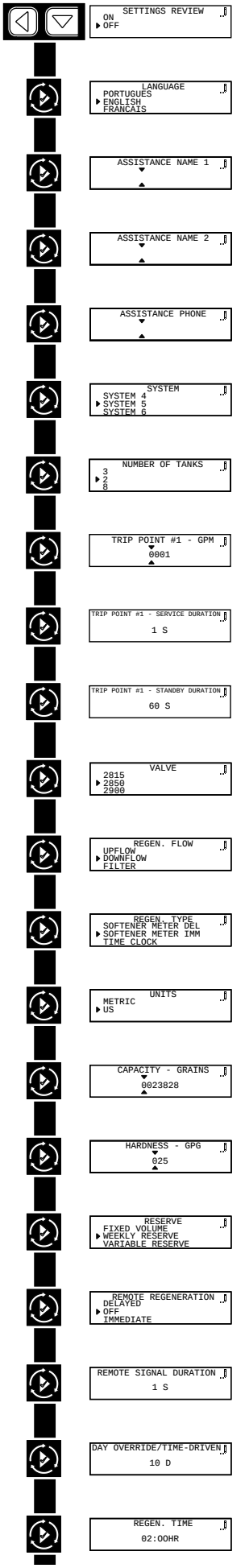
MASTER PROGRAMMING MODE FLOW CHART

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

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 timer 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 timer 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.



Example:
On: View settings without the ability to alter settings.
Off: User has ability to alter settings.

Example:
English, Francais, Duetsch, Italiano, Espanol, Nederlandse, Portugues

Example:
12 characters maximum.

Example:
12 characters maximum.

Example:
14 characters maximum.

Example:
4, 5, 6, 7, 8, 9, 14

Example:
2, 3, 4, 5, 6, 7, 8

Example:
Trip Points only available/visible when System Type 14 is selected.

Example:
Range: 1-90 seconds

Example:
Range: 60-300 seconds

Example:
2510, 2750, 2815, 2900, 3150, 3900

Example:
Upflow
Downflow
Filter

Example:
Softener Meter Delayed
Softener Meter Immediate
Time Clock
Day of the Week.

Example:
Metric
US

Example:
Range: 0-9,999,999 grains

Example:
Range: 0-199 GPG

Example:
Fixed Volume
Weekly Reserve
Variable Reserve
Fixed %

Example:
Off, Immediate, Delayed

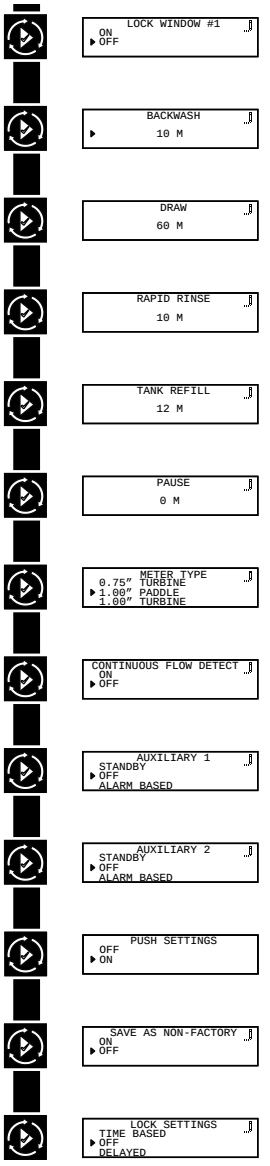
Example:
Range:
1-90 seconds (Service)
60-300 seconds (Standby)

Example:
Range: Off - 99 Days

Example:
Range: 0 - 23 Hours 59 Minutes.

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MASTER PROGRAMMING MODE
FLOW CHART *continued...*



Example:
Start Lock Window
End Lock Window

Example:
Range: 0 - 240 M

Example:
Range: 0 - 240 M

Example:
Range: 0 - 240 M

Example:
Range: 0 - 240 M

Example:
Range: 0 - 240 M

Example:
Paddle (0.75”, 1”, 1.5”, 2”, 3”)
Turbine (0.75”, 1.25”, 1.5”)
Generic

Example:
Range: 0.1 to 999.9 gpm/Lpm

Example:
Off, Alarm Based, Cycle Based, Time Based, Volume Based, Standby

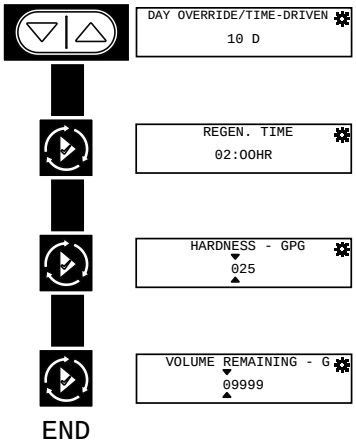
Example:
Off, Alarm Based, Cycle Based, Time Based, Volume Based, Standby

Example:
Off, Delayed, Enter Code, Time Based

USER PROGRAMMING MODE
FLOW CHART

User Programming Mode

1. Press and hold the Down and Up buttons simultaneously for 3 seconds to enter User 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. After progressing through all available values, the timer will return to Normal operation.
5. To exit diagnostic mode, progress through all available values, press and hold the Left button at anytime, or after 5 minutes of inactivity the timer will return to normal operation automatically.
6. Depending on the current controller programming, certain values may not be able to be viewed or set.
7. The timer 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.



Example:
Range: Off - 99 Days

Example:
Range: 0 - 23 Hours 59 Minutes.

Example:
Range: 1 - 999 grains per gallon

Example:
Range: 1 - 99999 gallons

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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 timer 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 timer will return to normal operation automatically.
7. Depending on the current controller programming, certain values may not be able to be viewed or set.
8. The timer 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.



FLOW RATE
29.7 GPM

Example:
Real-time flow rate reading.

PEAK FLOW
30.1 GPM

Example:
Peak flow since last regeneration.

TOTALIZER
482474 G

Example:
Gallons at the outlet since installation.

RESERVE
1588 G

Example:
Reserve Capacity setting.

USE SINCE REGEN
7331 G

Example:
Gallons at the outlet since last regeneration.

LAST REGEN.
4 H

Example:
Time since last regeneration.

SOFTWARE VERSION
13026

Example:
Installed software version.

NO. OF REGENS
32

Example:
Total number of regenerations since installation.

REGEN INTERVAL
3 D 21 H

Example:
Duration between regenerations.

LAST SETTINGS CHANGE
14 H 0 M

Example:
Last time programming settings were changed.



ERROR LOG
ERROR LOG EMPTY

Example:
Record of error events chronologically.

SUN-AVERAGE USAGE
29.7 G

Example:
Average usage from past Sunday.

SUN-DAILY USAGE
2017-10-10 0 G
2017-01-02 0 G
2017-12-26 0 G

Example:
Average usage from past 3 Sundays.

MON-AVERAGE USAGE
29.7 G

Example:
Average usage from past Monday.

MON-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Mondays.

TUE-AVERAGE USAGE
29.7 G

Example:
Average usage from last Tuesday.

TUE-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Tuesdays.

WED-AVERAGE USAGE
29.7 G

Example:
Average usage from last Wednesday.

WED-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Wednesdays.

THU-AVERAGE USAGE
29.7 G

Example:
Average usage from last Thursday.

THU-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Thursdays.

FRI-AVERAGE USAGE
29.7 G

Example:
Average usage from last Friday.

FRI-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Fridays.

SAT-AVERAGE USAGE
29.7 G

Example:
Average usage from last Saturdays

SAT-DAILY USAGE
2016-10-10 0 G
2017-01-02 0 G
2016-12-26 0 G

Example:
Average usage from past 3 Saturdays.

END

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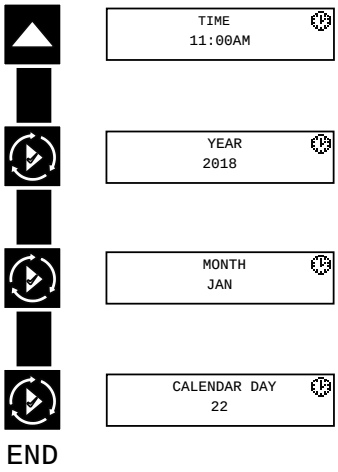
TIME OF DAY PROGRAMMING MODE FLOW CHART

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.



Example:
12 or 24 hour formats available

Example:
Set current year

Example:
Set current month

Example:
Set current day

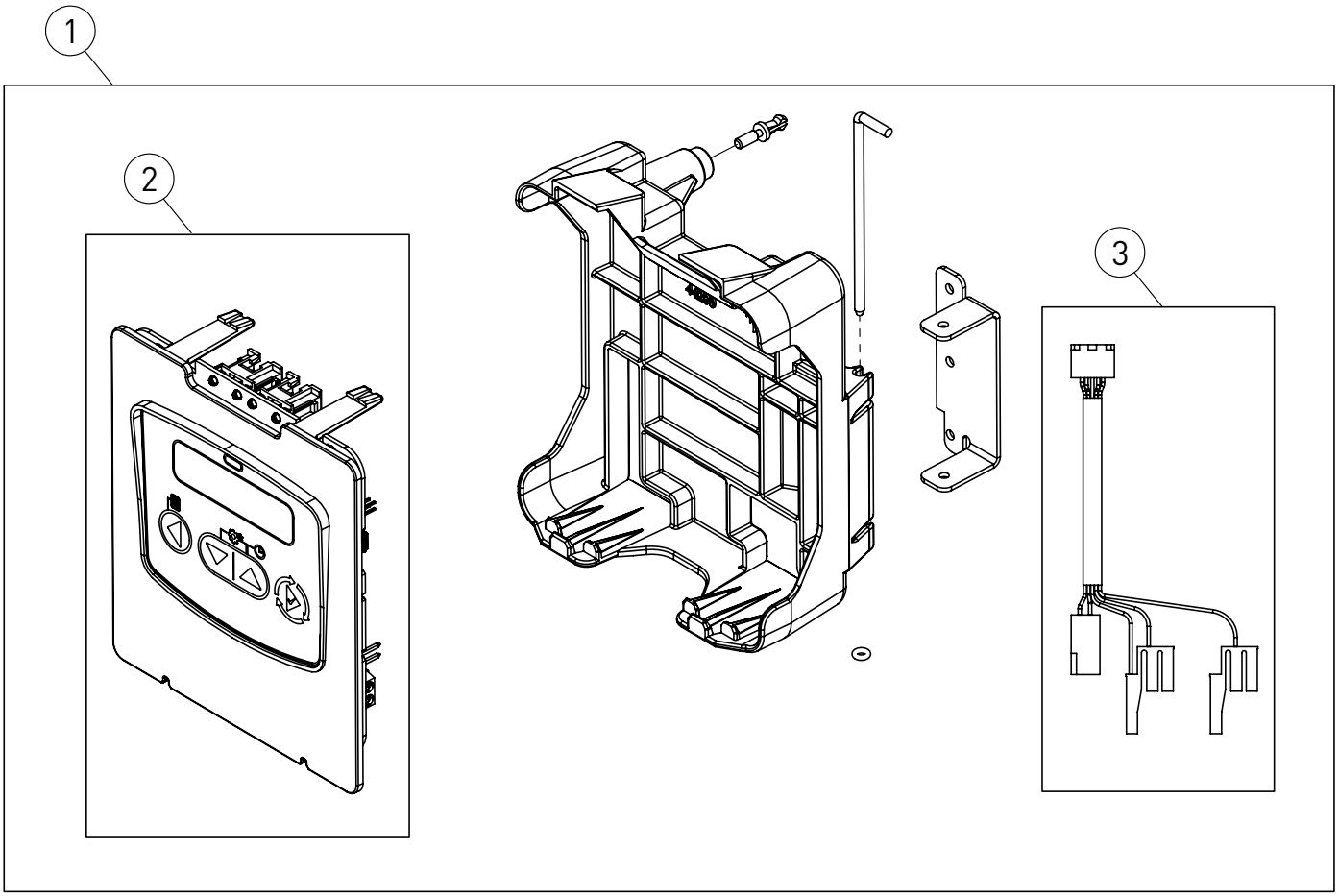
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NXT2 Programming Parameters and Ranges

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	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	Upflow, 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	
Auxilliary 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 Driven	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	

NXT2 TIMER ASSEMBLY
(2510, 2750, 2850, 2900, 3150, 3900 VALVES)



62115 Rev A

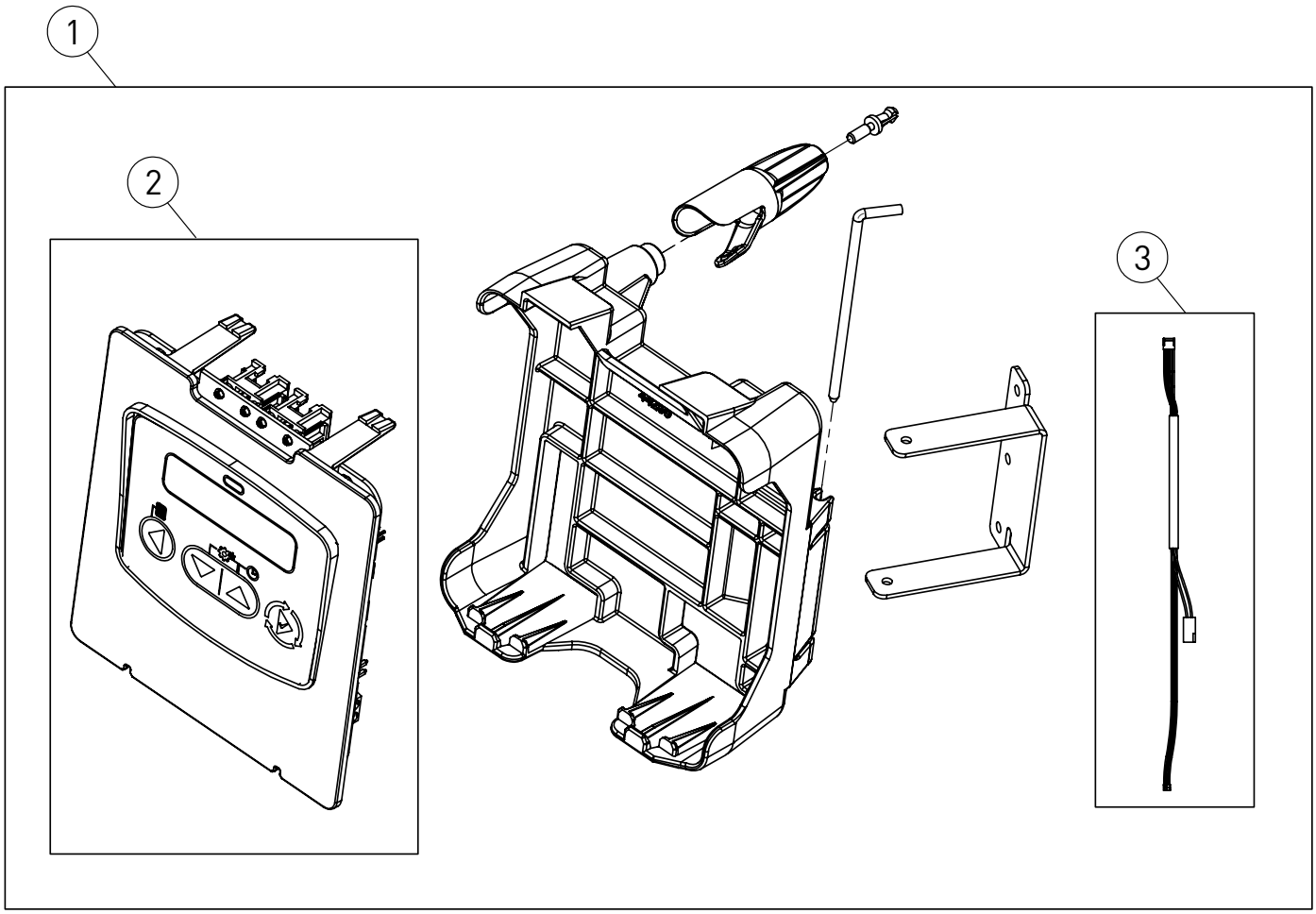
Item No.	QTY	Part No.	Description
1	1	62115	Timer Assy, NXT2

Service Assemblies

2	1	62120	Control Panel Assy, NXT2, Programmed
3	1	40941	Wire Harness, Upper Drive

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NXT2 TIMER ASSEMBLY
(2815 VALVE)



62115-01 Rev A

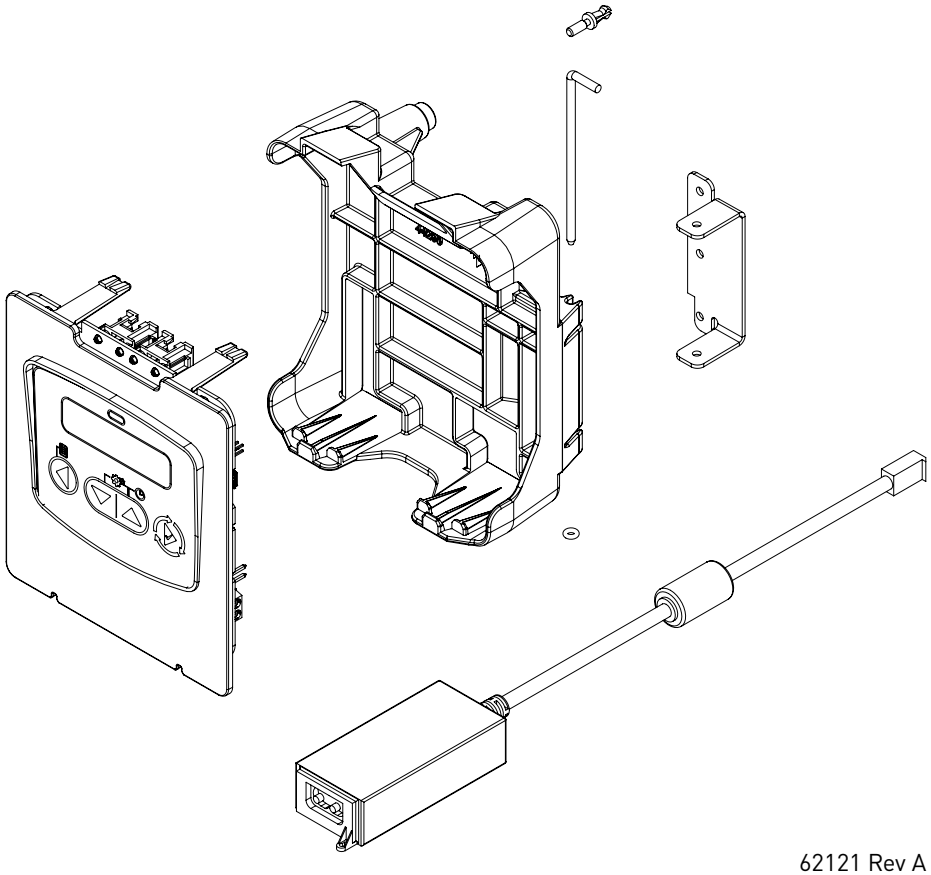
Item No.	QTY	Part No.	Description
1	1	62115-01	Timer Assy, NXT2, 2815

Service Assemblies

2	1	62120	Control Panel Assy, NXT2, Programmed
3	1	44076	Wire Harness, Upper Drive

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NXT TO NXT2 CONVERSION KITS



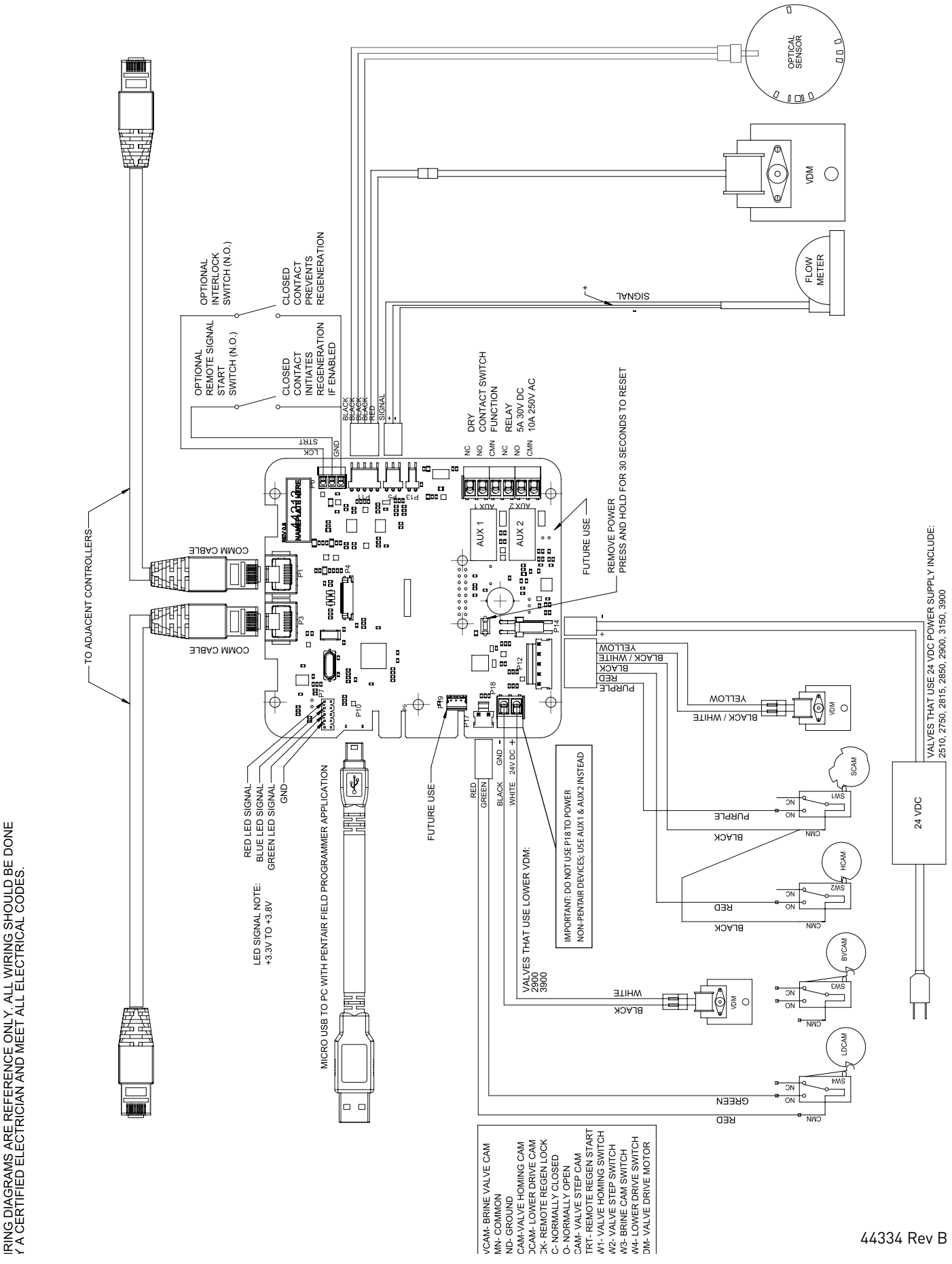
62121 Rev A

Item No.	QTY	Part No.	Description
	1	62121-01	Conversion Kit, NXT2, US
	1	62121-02	Conversion Kit, NXT2, Euro
	1	62121-03	Conversion Kit, NXT2, Aust
	1	62121-04	Conversion Kit, NXT2, Japan

NOTE: Conversion Kits do not include wiring harness; save and reuse existing NXT wiring harness. Region-specific power supply is included.

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NXT2 WIRING DIAGRAM



IRING DIAGRAMS ARE REFERENCE ONLY. ALL WIRING SHOULD BE DONE
Y A CERTIFIED ELECTRICIAN AND MEET ALL ELECTRICAL CODES.

44334 Rev B

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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

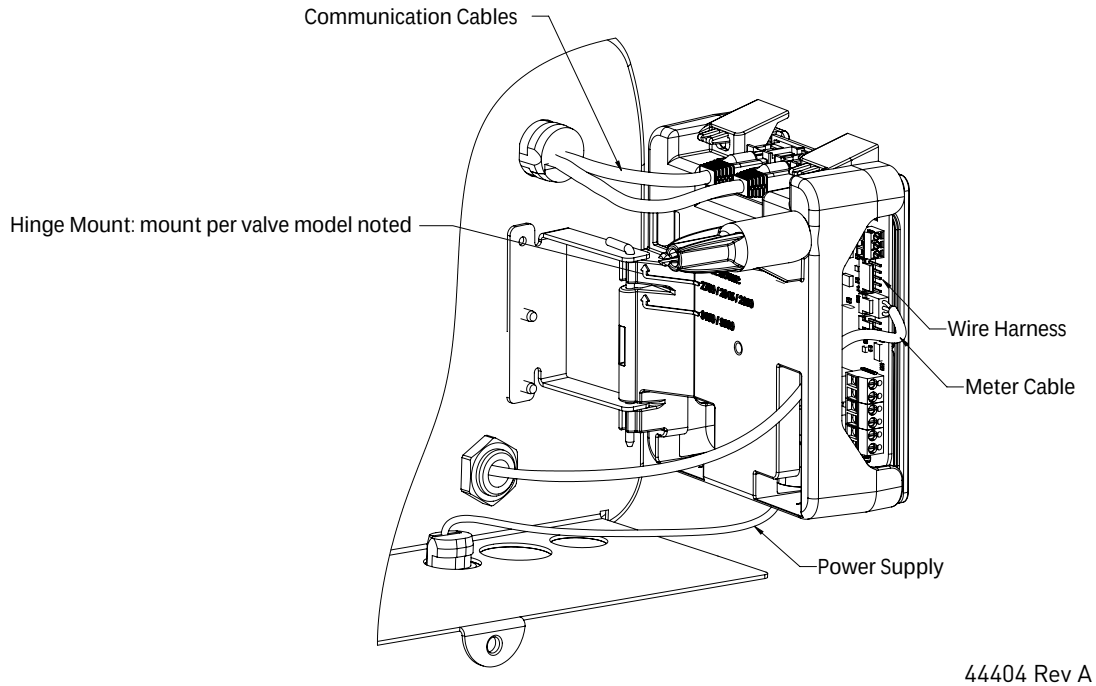
Use a CAT5 or better Network/Communication cable.

Connect the network/communication cable first before programming.

The maximum cable length between timers is 100 feet.

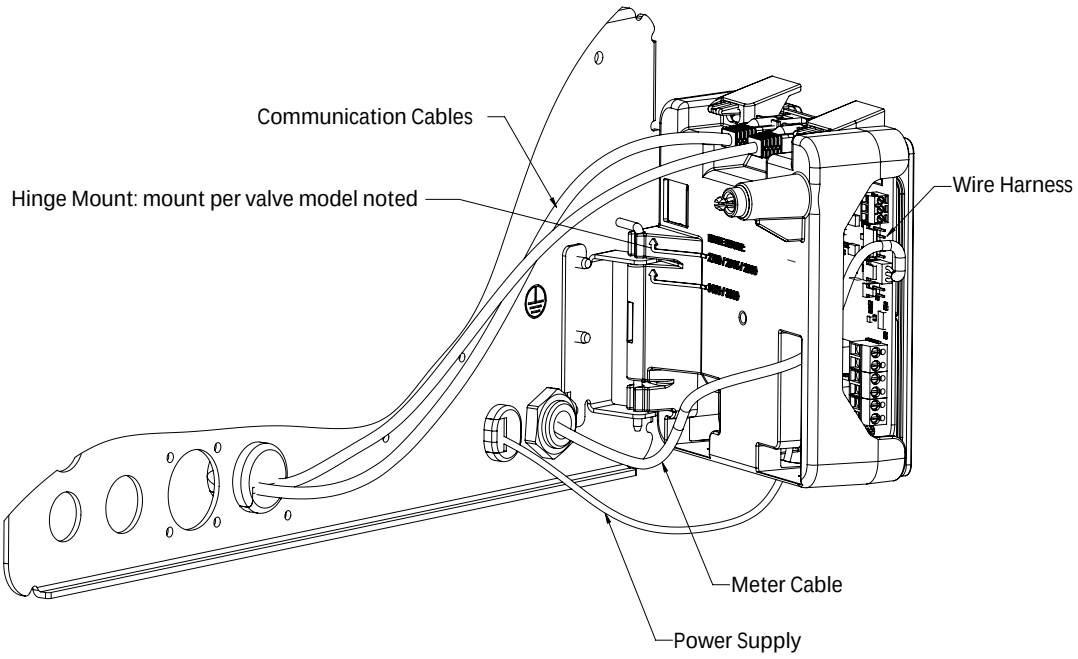
Connect each unit in series (do not form a loop) together from one communication port to the next communication port. It does not matter which one goes to the next one.

2510/2750/2815/2850/2900 Valves:



44404 Rev A

3150/3900 Valves:



44403 Rev A

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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	Cause 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 encloder 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 Pentair representative.
100 Days Without Regen	100 Days have expired without a regeneration	Trigger a manual regeneration

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44381 REV A JL18

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Section 9: Softener Addendum
Softener Log Sheet

SOFTENER LOG SOFTENER LOG SHEET NO.

Date	Time	Meter Reading	Gallons Delivered	Inlet Pressure	Outlet Pressure	Salt Used

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