Operation & Maintenance Manual

2900 Single Tank Time Clock and Metered Systems





Part# 2900 OPERATION MANUAL

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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.

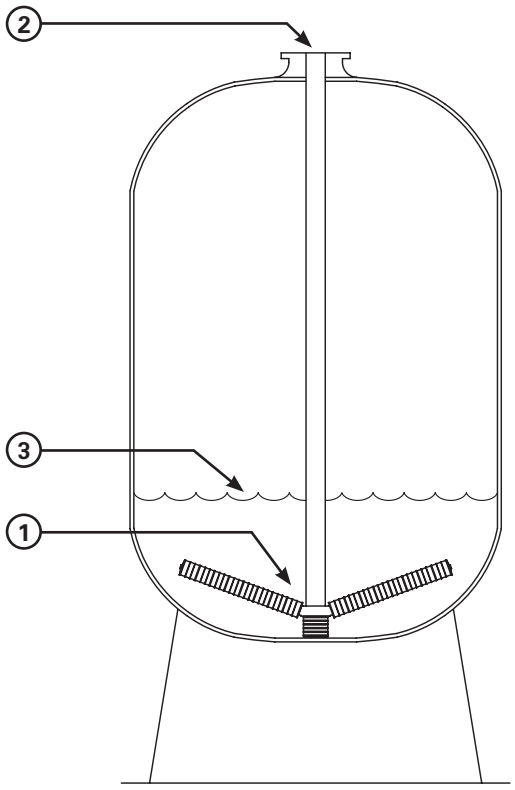
Additionally, assume that the facility uses 2,500 gallons of water per day. The program wheel on the control valve would be set at 7,500 gallons.

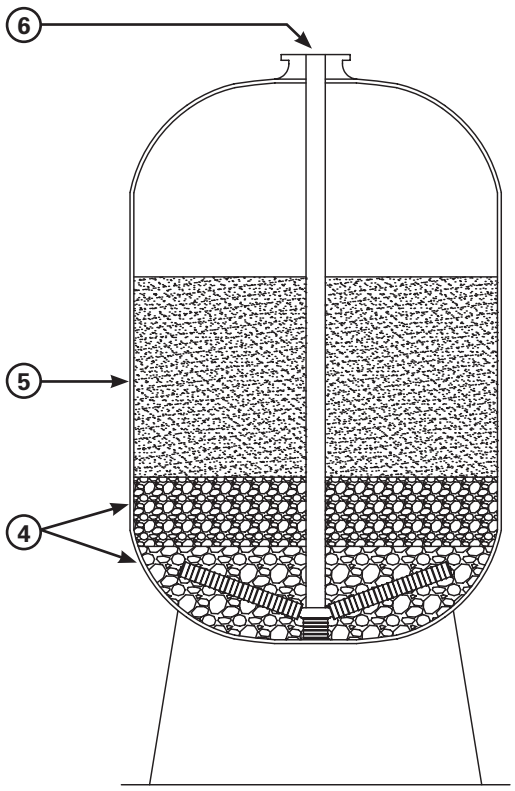
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3.2 Loading Gravel & Resin

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 with 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, lubircate the o-ring and carefully install the control valve being careful not to cross thread the valve into the tank, do not overtighten.
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 Model 2900. The control is either configured for "Meter Initiated Regeneration" or "Timed Regeneration". The controller now is ready to be programmed.

   How to calculate a softeners capacity and setting for a "Meter Initiated" system.

   Calculate the "Gallon Capacity Of The System". This is a function of the system size and the hardness of the water.

   For example, assume the system capacity is 300,000 Grains and the hardness of the water is 30 Grains Per Gallon. The "Gallon Capacity Of The System" is 10,000 Gallons (300,000 divided by 30).

   Additionally, assume that the facility uses 2,500 gallons of water per day. The program wheel on the control valve would be set at 7,500 gallons.

   For more details on setting the timer on a "Meter Initiated" System, see page 7 of Section 8 titled "Model 2900s 3210 Timer Settings".

   Note: The Fleck "Standard Range" Meter has can meter up to 21,250 gallons. In some cases, it may be necessary to install an "Extended Range" Meter which can meter up to 106,250 Gallons.

   Note: The presence of iron and other contaminants in the water may affect the above calculation.

   How to calculate a softeners capacity and setting for a "Timer Initiated" system.

   Calculate the "Gallon Capacity Of The System". This is a function of the system size and the hardness of the water.

   For example, assume the system capacity is 300,000 Grains and the hardness of the water is 30 Grains Per Gallon. The "Gallon Capacity Of The System" is 10,000 Gallons (300,000 divided by 30).

   Additionally, assume that the facility uses 2,500 gallons of water per day.

   The timer on the control valve would have to be set to initiate regeneration every four days (10,000 divided by 2,500 = 4).

   For more details on setting the timer on a "Timer Initiated" System, see page 6 of Section VIII titled "Model 2900s 3200 Timer Settings".

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Note: The presence of iron and other contaminants in the water may affect the above calculation.

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.

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 2900s Control Manual)

Multi-port valve consist of Fleck 2900s 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

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Meter Slippage Inadequate Regeneration	Worn or damaged meter Using a weak (less than 22 Be) brine solution	Replace or repair as necessary 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

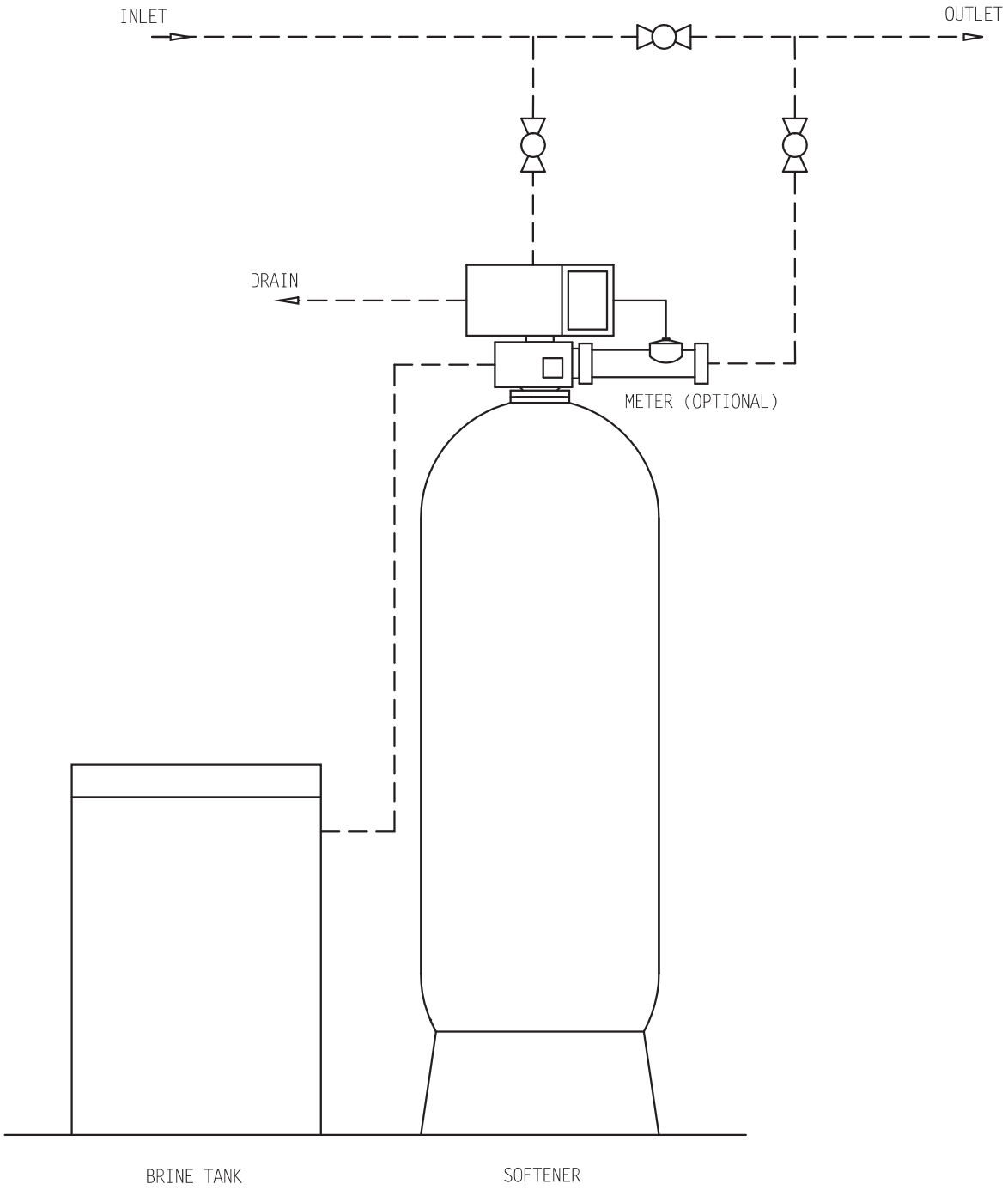
Dirty Or Packed Bed - See above for possible causes and corrective actions.

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 single Unit Installation



SEE SECTION 8 - 2900 MANUAL - FOR GENERAL ARRANGEMENT PIPING

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7.2 Specifications

Specifications						
Model	**120,000**	**150,000**	**210,000**	**300,000**	**450,000**	**600,000**
Capacity (1)	120,000	150,000	210,000	300,000	450,000	600,000
Capacity (2)	96,000	120,000	168,000	240,000	360,000	480,000
Media Tank Size	16" x 65"	18" x 65"	21" x 62"	24" x 72"	30" x 72"	36" x 72"
Resin, Cubic Feet	4	5	7	10	15	20
Resin, Pounds	200 #	250 #	350 #	500 #	750 #	1000 #
Gravel Underbed, 1/4" x 1/8"	75 #	100 #	50 #	100 #	100 #	150 #
Gravel Underbed, 1/2" x 1/4"	n/a	n/a	100 #	150 #	250 #	350 #
Max Service Flow Rate, GPM (3)	57	62	77	95	140	140
Min Service Flow Rate, GPM	40	50	55	60	75	100
Backwash Flow Rate, GPM	7	9	12	15	25	35
Backwash, Minutes	10	10	10	10	10	10
Backwash, Pins	5	5	5	5	5	5
Brine Draw and Rinse, Minutes	60	60	60	60	60	60
Brine Draw and Rinse, Holes	30	30	30	30	30	30
Rapid Rinse, Minutes	10	10	10	10	10	10
Rapid Rinse, Pins	5	5	5	5	5	5
Salt Required (1)	60 #	75 #	105 #	150 #	225 #	300 #
Salt Required (2)	40 #	50 #	70 #	90 #	135 #	180 #
Refill Time, Minutes (1)	16	18	18	26	16	18
Refill Time, Holes (1)	8	9	9	13	8	9
Refill Time, Minutes (2)	12	12	12	16	10	14
Refill Time, Holes (2)	6	6	6	8	5	7
Return To Service, Minutes	4	4	4	4	4	4
Return To Service, Pins	2	2	2	2	2	2
Brine Line Flow Control, GPM	1.2	1.5	2	2	5	5
Injector Size	# 3	# 3	# 4	# 4	# 5	# 6
Injector Color	Yellow	Yellow	Green	Green	n/a	n/a

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.

2" Meter Range
Standard Range, 2" - 21,250 Gallons
Extended Range, 2" - 106,250 Gallons

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7.3 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.
16 x 65	4	24 x 41	454-HF	6"		10"	18"
					X	16"	24"
18 x 65	5	24 x 41	454-HF	6"		14"	24"
					X	20"	30"
21 x 62	7	24 x 41 24 x 50	454-HF	9"		19"	33"
					X	28"	—
24 x 72	10	30 x 48	454-HF	9"		17"	29"
					X	25"	38"
30 x 72	15	30 x 48	454-HF	9"		26"	44"
					X	38"	—
		39 x 48	454-HF	9"		14"	25"
					X	23"	34"
36 x 72	20	39 x 48	454-HF	12"		18"	39"
					X	30"	—
		42 x 60	454-HF	9"		17"	30"
					X	26"	39"
48 x 72	40	50 x 60	454-HF	12"		29"	—
					X	37"	—
		60 x 60	454-HF	12"		—	26"
					X	26"	38"

Notes:
1 - Brine Valve Clack 454 Hi-Flow – 3/4" connection
2 - Salt deck height as noted.
3 - Float setting from bottom of brine tank.

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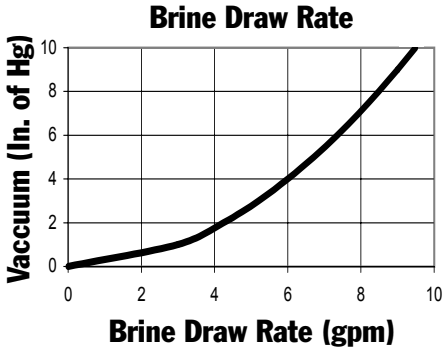
454 3/4" High Flow Brine Valve

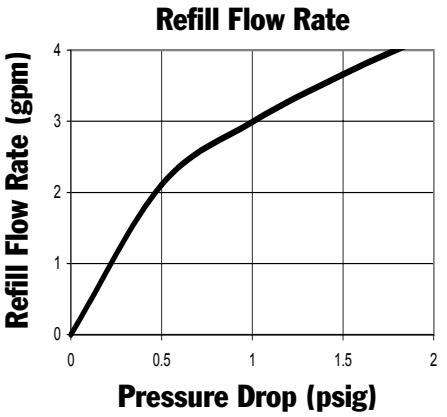
454 ¾" HIGH FLOW BRINE VALVE — Today's larger commercial brine valves demand higher brine draw and refill rates. Building upon the original 454's design, the 454 ¾" High Flow has improved flow characteristics allowing brine draw up to 10 gallons per minute and refill rates up to four gallons per minute. 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:

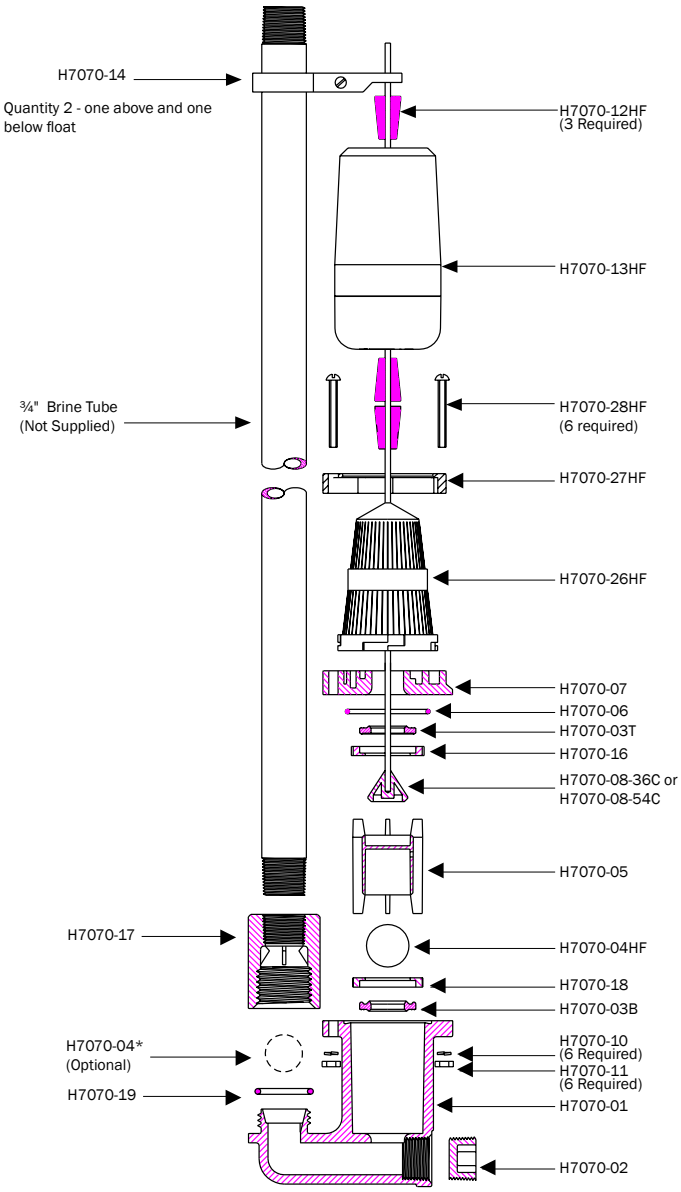
H7070-36HF - 454 ¾" High Flow Brine Valve (36" Rod)

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.

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

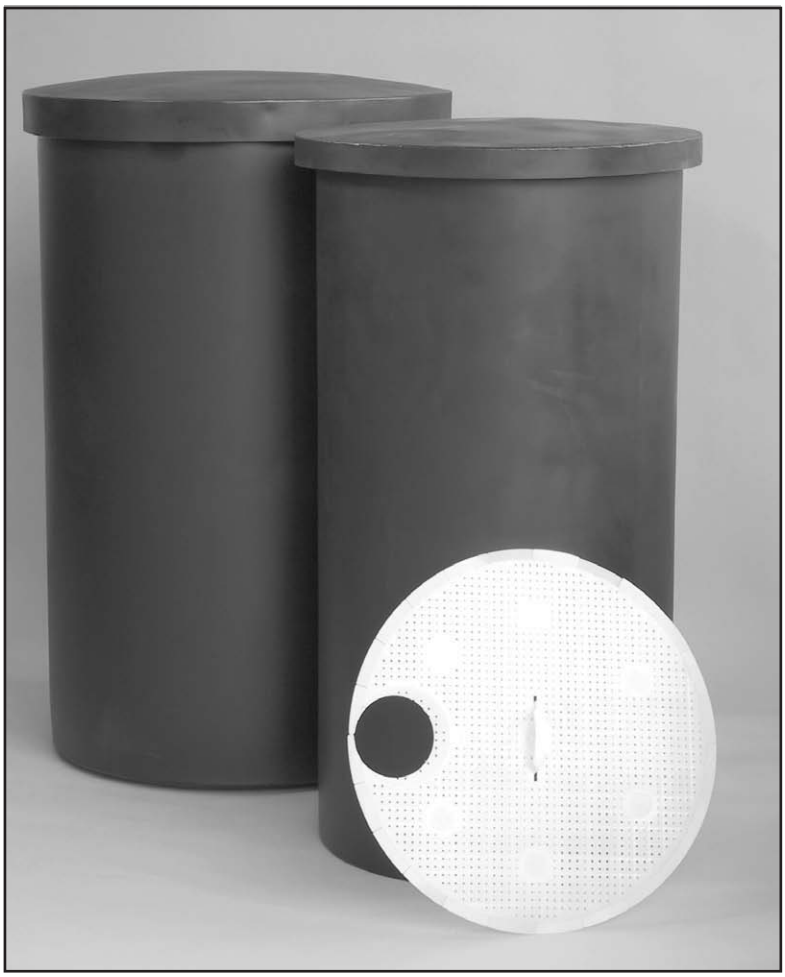
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7.3 Commercial/Industrial Rotationally Molded Brine Tanks

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: 2900 Control Manual

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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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