Softener Installation and Operation Manual

For Service Call:

_____

Form No. 999400 – Ecodyne Industrial Softener Manual
Revised: 10/02/13

Table of Contents

Fill in the following data for future reference:

Model: _____

Type of Controls: _____

Softener ----------

Regeneration Time Settings:

Backwash	_____
Brine & Slow Rinse	_____
Fast Rinse	_____
Refill	_____

Salt Dosage (lbs per regeneration) _____

PRE-INSTALLATION DATA

Read the entire instruction manual before you begin installation. Failure to install and operate the system as required will void the warranty. The system will perform at maximum efficiency, when installed and operated as designed.

Obtain all the materials and tools needed for the installation before beginning. Always use the correct tools to install and maintain the system. The installation must conform to local plumbing and electrical codes. Code compliance is the responsibility of the installer or contractor.

OPERATING PARAMETERS

SOFTENERS:

Parameter	**Minimum**	**Maximum**
Hardness	-	100 Grains per gallon
Iron (Ferrous)	-	10 ppm
Iron (Ferric)	-	5 ppm
Flow Rate	0.5 gpm / ft^3	10 gpm / ft^3
Chlorine	-	0.1 ppm
Turbidity	-	5 NTU
Water Pressure	25 psi	100 psi *
Water Temperature	35^O F	100^O F ***
pH	6.8	-

* Maximum pressure dependent on components. High pressure designs are available.
*** High Temperature systems available on special order – consult factory.

- Protect the system from pressure extremes. Do not expose the system to surging pressures or water hammer. Water hammer will cause damage to the control valves, mineral tanks, and plumbing. If a condition of this type exists, a “Water Hammer Arrestor” must be installed to prevent damage.

- Protect the system against back-pressure caused by a pump or any type of water storage system. If pressure on outlet exceeds inlet pressure, resin can be flushed into the inlet water supply during the service cycle.

- When routing the outlet piping to an atmospheric storage tank, a valve or flow control must be installed in the outlet piping to prevent over running of the system. A back-pressure of 15 to 20 psi should be maintained on the system at all times.

- Protect the system from freezing weather conditions. Temperatures at and below freezing will cause damage to tanks, valving and plumbing. Water expands when it freezes and can cause the tanks and plumbing to burst.

PRE-INSTALLATION DATA

- Protect the system from high temperatures in excess of 100^{O} F. Some of the components used in the manufacture of the system will not withstand high temperatures. Do not connect the system down stream of a hot water system. Also protect the outlet of the system from backup of hot water from a water heater or boiler.

- The system operates on 24 Volts AC supplied from a step down transformer using 120 Volts on the primary side. The 120 volts operates from a normal 15 amp wall outlet receptacle which is properly grounded. The power reduction transformer supplied with the equipment is UL listed. Conformance to local and National Electrical Codes must be observed and are the responsibility of the installer.

- The system must be located within 10 feet of an open floor drain or sump. The drain from the system must contain a vent, in accordance with the local plumbing codes. The flow of drain water should be observable. Water softeners use an eduction system to draw the brine into the mineral tank. Back-pressure from overhead drain systems can affect the draw rate of the softener, therefore; it is not recommended to run the drains any higher that 8 feet above the control valve assembly. On overhead drains, an air gap must be installed in the highest point of the drain line, and local plumbing codes and regulations should be followed.

- It is recommended that inlet, outlet and by-pass valves be installed on the unit for future service ability. The inlet and outlet valves are utilized to turn off the water to the unit so that the valve and other components can be serviced. The by-pass valve allows water down stream to the process (by-passing the unit) so that water can still be supplied, even though it is raw water, should it be needed.

- Metal shavings, solder flux, threading compounds and other contaminating materials from the installation of the piping; must be flushed from the piping prior to allowing water to enter the system. These foreign materials can cause damage to the control valve.

- Be sure to turn “OFF” the water supply and depressurize system before starting work on valve(s). When re-pressurizing system, advance unit to backwash and “slowly” turn on water. Allow system to remain in backwash cycle until all air is purged. When air has been eliminated, advance system to service, watching for leaks.

COMPONENTS OF A WATER SOFTENER

The system, normally is not assembled at the factory. The following should be used as a reference for the correct parts against what was received. Different size units have different quantities of the media and style of internal distributors. All systems up to and including 30" diameter have a single-point lower distributor. Systems 36" and larger have hub radial lower distributor systems.

	COMPONENTS
Softener	Mineral Tank
	Control Valve & Controller*
	Controller*
	Flow Meter*
	Resin
	Gravel Underbedding
	Backwash Flow Control
	Standpipe & Distributor
	Brine Tank
	Brine Well & Air-check
	Brine Tubing Kit
	Transformer

* Systems with Standard Time Clock Fleck Controls come with the controls as part of the Control Valve Assembly. System-6 and Systems-7 Fleck Controls will have an extra package in the form of a flow meter. Systems using Ecodyne's ViP Controller have the Flow Meters and Controller shipped as separate items.

WATER SOFTENING PROCESS

A water softener removes the hardness from the water by a process known as ion exchange. Hardness in the water causes scale to form inside pipes, water heaters or boilers. This scale shortens the life of these products. The most common hardness ions in the water are calcium, magnesium and iron. The media, called resin, in the softener is charged with sodium ions from the brine (sodium chloride) contained in the brine tank, during the regeneration process. The calcium, magnesium and iron which come in contact with the resin beads, are exchanged for sodium on the resin.

The amount of hardness removed by a softener is determined by the level of salt (salt dosage) and amount of resin available. The amount of removal capability is referred to as the capacity of the resin. The volume of resin is measured in cubic feet. The salt dosage is normally 5, 10, or 15 pounds per cubic foot. The corresponding capacities are as follows:

5 lbs / cubic foot = 20,000 grains
10 lbs / cubic foot = 25,000 grains
15 lbs / cubic foot = 30,000 grains

A water softener with 2 cubic feet of resin and regenerated with 5 lbs / ft^3 of salt will be capable of removing up to 40,000 grains of hardness. Each grain of hardness is equal to 17.1 parts per million (ppm). If the hardness of the influent water is tested to be 20 grains (342 ppm), then the 2 cubic foot water softener with 40,000 grains removal capability can soften 2,000 gallons of water between regenerations.

Hardness leakage from a water softener is directly proportional the amount of TDS in the inlet supply and the salt dosage provided during regeneration. An example of this: If 500 ppm TDS as $CaCO_3$ is in the influent and a salt dosage of 10 lbs per cubic foot is being used – hardness leakage will be at least 1.5 ppm during the normal service run. The Water Quality Association (WQA) defines the degree of hard water as follows:

Term		Grains / Gallon	PPM
Soft	=	less than 1.0	less than 17.1
Slightly Hard	=	1.0 to 3.5	17.1 to 60
Moderately Hard	=	3.5 to 7.0	60 to 120
Hard	=	7.0 to 10.5	120 to 180
Very Hard	=	10.5 and above	180 and above

** Note: If water hardness leakage is critical for a particular application, then a custom system may need to be designed for that application.*

LOCATING THE EQUIPMENT

Locate the mineral tank on a firm, level foundation, preferably concrete (plastic shims are available under part # 3038). The system should be within 10 feet of an electrical outlet. A floor drain capable of handling the maximum backwash flow rate must be located near the system (refer to drain line flow control chart below). Trial fit the control valve to the tank, in order to properly align the control valve and mineral tank to the plumbing. Once loaded, the tank is not easily moved.

Locate and connect the brine tank as shown in the installation drawings. Brine hose and adapter fittings are shipped inside the brine tank. The brine draw hose supplied is 10 feet long. The brine tank must be located on a smooth, clean surface. Do not set on bricks or wooden blocks. The bottom of the brine tank can distort, if placed on an irregular surface, when filled with salt, which could cause damage to the brine tank.

ASSEMBLY OF EQUIPMENT

The system is not assembled prior to shipment. The components for the water softener system are in a list on page 5.

- The standpipe and distributor are shipped with the mineral tank. Tanks smaller than 30" have a single point distributor. Tanks 30" and larger utilize a hub radial distributor design. The laterals must be assembled to the hub in the vessel. Screw hub onto the standpipe first. These larger mineral tanks have a bottom opening, to ease assembly. The tank should be laid down when assembling the hub and laterals. Make sure closure is tight before standing up tank. The distributor and standpipe assembly must be centered in the tank and resting on the bottom of the tank. Verify that the length of the standpipe is correct (flush to 1/8" above top of tank). If needed, cut to proper length.

- Once the mineral tank is in the proper location, fill the mineral tank with approximately 12" of water. The water will help absorb the shock when the gravel is loaded into the tank. Plug the end of the standpipe to prevent resin or gravel from entering it during the filling process.

- A funnel is recommended for loading the resin and gravel into the mineral tank. A funnel kit part # 980015 is available.

Loading gravel and resin:

1. Load the gravel into the mineral tank.
2. Level the gravel. A ½" piece of copper pipe can be used for this purpose.
3. Load the resin into the mineral tank.
4. Fill the void in the top of the tank with water.
5. Wash all resin from the threads in the top of the tank.

Caution: Resin left in threads on top of the tank can cause the valve to cross thread damaging the sealing area and causing leaks.

See "Resin Loading Chart" for quantities of gravel and resin required.

- Thread the control valve onto the top of the mineral tank, being careful not to cross thread. Assemble the drain line flow control (DLFC) to the drain line connection on the control valve assembly. A missing flow control can result in resin being washed out of the mineral tank and down the drain. The 1", 1-1/2" and 2" valves have a flanged swivel adapter for the steel tanks. The valve can be rotated into proper position after the tank is in position. The 3" control valves are flange mounted to the steel tanks. Connect the drain line from the control valve to the nearest floor drain. If the drain line must be installed overhead, do not exceed 8 feet above the control valve, and provide a vacuum break, before returning to the floor drain. See the "Softener Drain Line Flow Rate Chart".

- Piping can now be connected to the inlet and outlet of the control valve. It is recommended that inlet, outlet and by-pass valves be installed on each system. Note the location of the flow meter in the attached drawing. The flow meter should be 10 pipe diameters down stream from the last fitting and there should be 5 pipe diameters after the flow meter. See the typical installation drawing.

- Connect hose provided from the brine tank to the brine valve located on the side of the control valve assembly. An air check assembly is provided inside the brine tank, which prevents air from being drawn into the softener during the slow rinse cycle of regeneration. It acts as a check valve when all the brine has been drawn out of the brine tank.

  Caution: To insure against damage, connect overflow drain from brine tank to an open floor drain. Do not connect to the multiport valve drain.

- Install the control in the position shown on the drawing. Connect transformer and Flow Meter to the control if required. *Note:* ***Time clock units do not have a transformer or flow meter*****.** Plug into 120 volt receptacle and cycle system through a regeneration cycle without water. Make sure everything is functioning properly.

- Turn on water ***slowly*** and check for leaks. Installation is complete. Program the control as required. See appropriate control section in this manual.

RESIN LOADING CHART

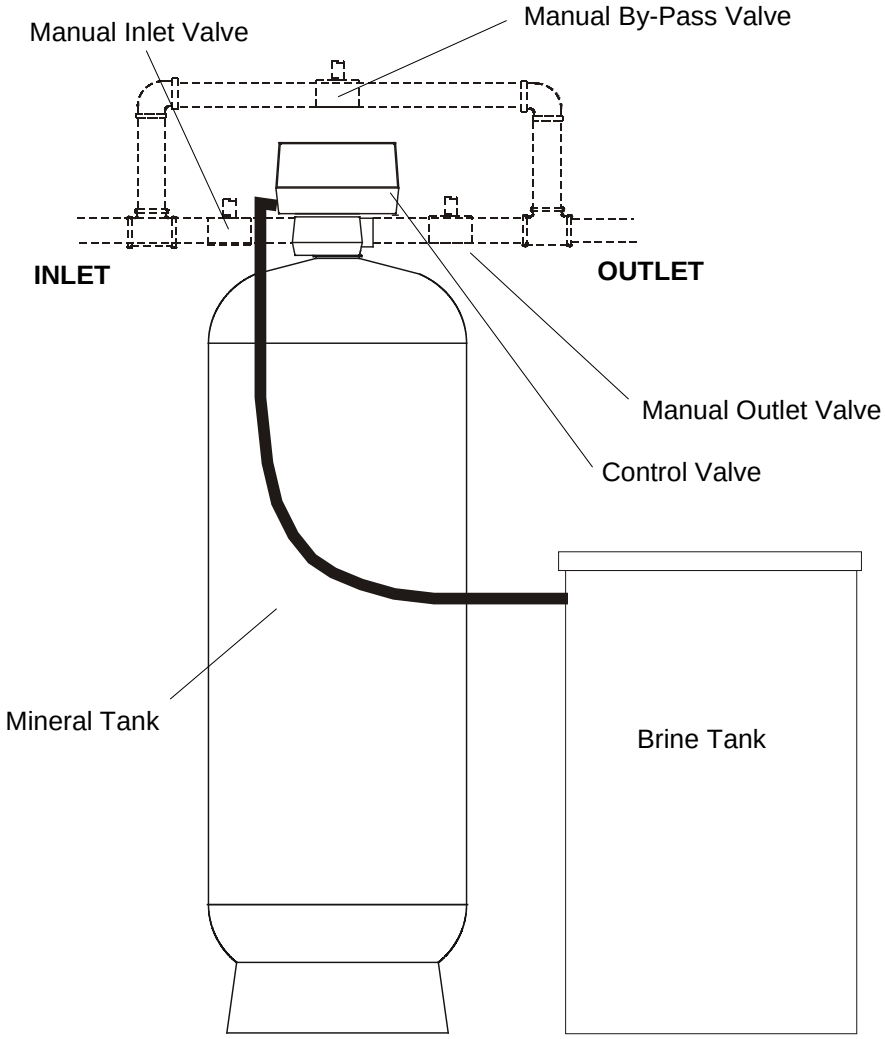
MODEL	GRAVEL QTY - LBS	RESIN QTY. – FT^3
S-30	12	1
S-60	25	2
S-90	50	3
S-120	100	4
S-150	100	5
S-180	100	6
S-210	150	7
S-240	150	8
S-270	150	9
S-300	150	10
S-450	250	15
S-600	300	20
S-900	400	30
S-1200	500	40

DRAIN LINE FLOW RATE and INJECTOR SIZE CHART

Valve Type	Softener Tank Diameter	Valve Size	Injector size	Injector Color	Drain Line Flow Rate
Multiport	9 or 10	1”	#1	White	2 gpm
	12	1”	#2	Blue	3 gpm
	14	1”	#2	Blue	5 gpm
	16	1-1/2” or 2”	#3	Yellow	7 gpm
	17	1-1/2” or 2”	#3	Yellow	7 gpm
Multiport	18	1-1/2” or 2”	#3	Yellow	7 gpm
	20	1-1/2” or 2”	#3	Yellow	12 gpm
	24	1-1/2” or 2”	#4C	Green	15 gpm
	30	1-1/2” or 2”	#5C	White	20 gpm
	36	1-1/2” or 2”	#5C	White	30 gpm
Multiport	30	3”	#5	Red	20 gpm
	36	3”	#5	Red	30 gpm
	42	3”	#6	White	40 gpm
	48	3”	#7	Blue	50 gpm
Side Mount Multiport	54	2” or 3”	#8	Yellow	70 gpm
	60	2” or 3”	#9	Violet	90 gpm
	72	2” or 3”	#10	Black	130 gpm

SINGLE SOFTENER INSTALLATION – TIME CLOCK MODELS

24" Time Clock Softener

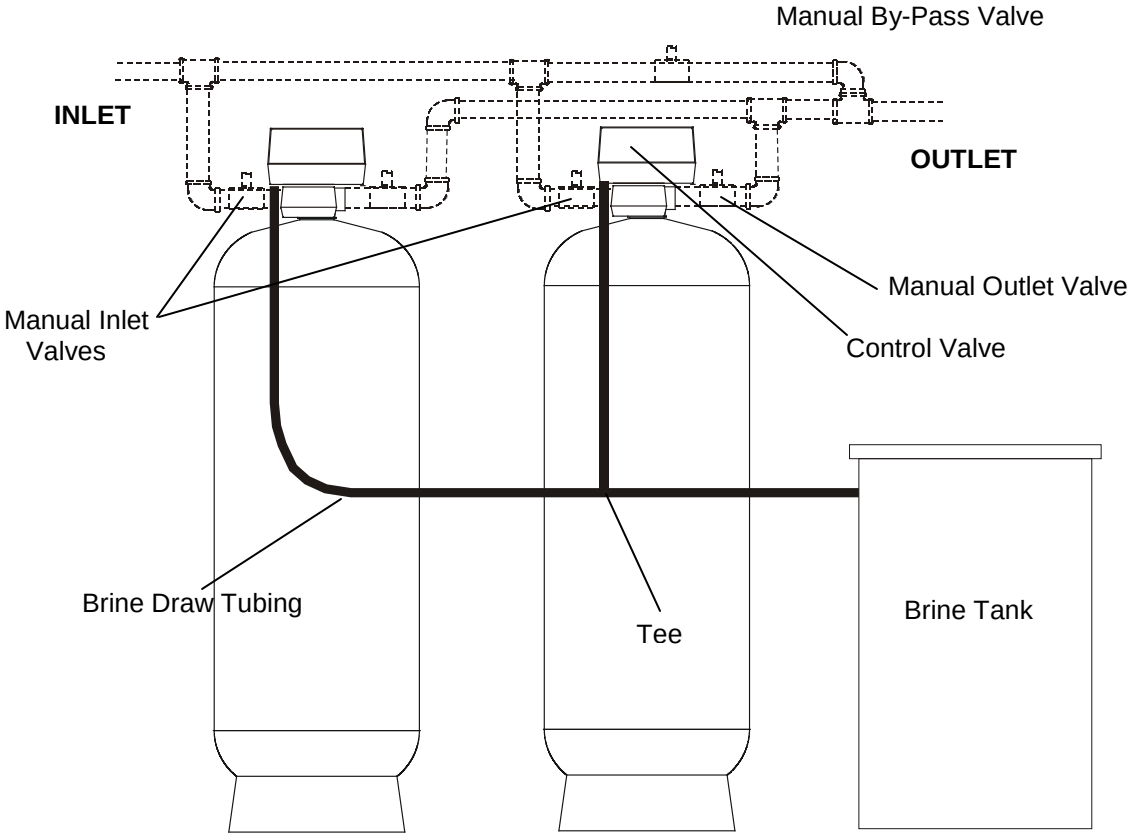


Installation Instructions:

- Install manual inlet, manual outlet and manual by-pass valves for each system to allow for servicing.
- See control section of the manual to obtain instructions for setting up and programming the timer control.
- Once installation is complete, turn on the water and check for leaks.
- **Important:** Install the drain line flow control. The flow rate is determined by the size of the mineral tank. Refer to the flow control chart on the page 9.
- Instructions for locating the softener and it's assembly, are detailed on pages 7 and 8.
- Turn off water and index control to backwash position (see control section). Slowly turn on water, to insure that the mineral tank is full of water and all air has been evacuated.
- Continue advancing the control valve through the regeneration cycles and back into service. See "Brine Tank Installation Instructions" for details on the brine tank.

DUPLEX SOFTENER INSTALLATION - TIME CLOCK MODELS

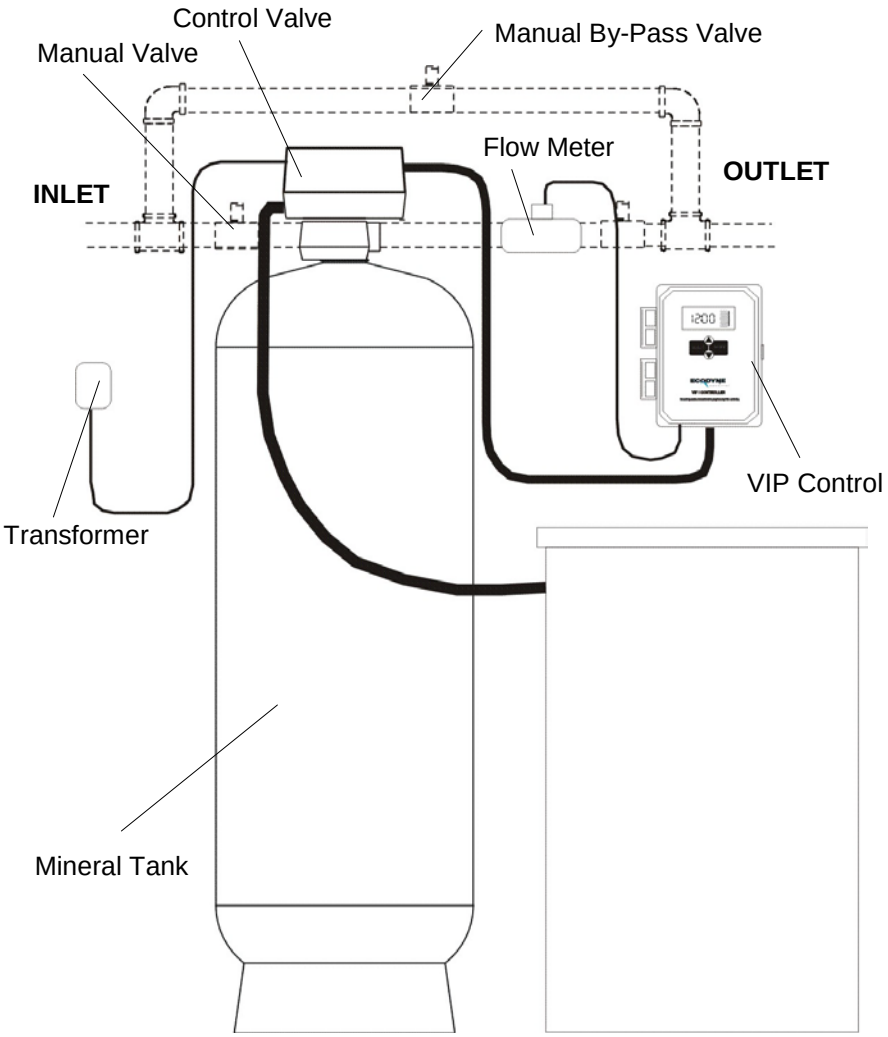
The diagram below shows two softeners, each with it's own top mount valve. Each tank should be installed with inlet and outlet isolation valves, which can be closed when service is required on the system. Each tank can be taken off line, repaired and brought back on line, while the other tank remains on line providing soft water.



24" Time Clock Softeners

The system should also be installed with a by-pass valve for use in the event of an emergency. The plumbing header shown is called a ***Reverse Return Header System***. This header system is also known as a balanced header system. Water enters from the left and exits to the right. This type of plumbing system insures that the flow of water through the first unit is equal to the flow of water from the second unit. Simply close the inlet valves and open the by-pass, depressurize the system and repairs can be made. See "Brine Tank Installation Instructions" for details on the brine tank.

SINGLE SOFTENER INSTALLATION – DEMAND MODELS



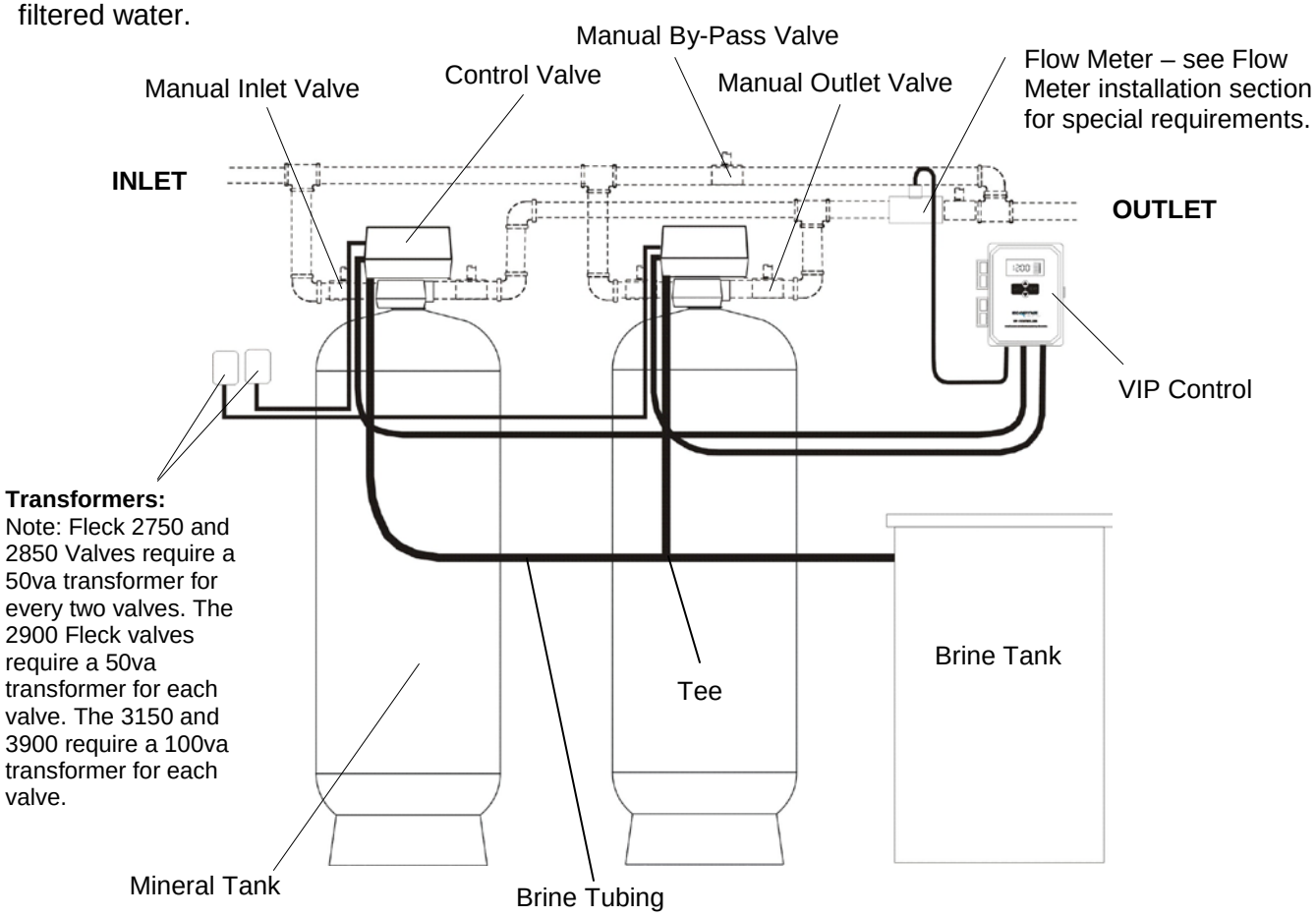
24" Demand Softener

Installation Instructions:

- Install manual inlet, manual outlet and manual by-pass valves for each system to allow for servicing.
- When installing the flow meter leave 10 pipe diameters up stream and 5 pipe diameters down stream to insure accuracy of the flow meter.
- Connect all wiring to the control before plugging in the transformer.
- See control section of the manual to obtain instructions for setting up and programming the control.
- **Important:** Install the drain line flow control. The flow rate is determined by the size of the mineral tank. Refer to the flow control chart on the page 9.
- Instructions for locating the filter and assembly of the filter, are detailed on pages 7 and 8.
- Once installation is complete, turn on the water and check for leaks.
- Turn off water and index control to backwash position (see control section). Slowly turn on water to fill the mineral tank with water. Continue advancing control valve to the service position. See "Brine Tank Installation Instructions" for details of the brine tank.

DUPLEX SOFTENER INSTALLATION – DEMAND MODELS

The diagram below shows two filters, each with it's own top mount valve. The installation of a flow meter for a demand system, is also shown. Each tank should be installed with inlet and outlet isolation valves, which can be closed when service is required on the system. Each tank can be taken off line, repaired and brought back on line, while the other tank remains on line providing filtered water.



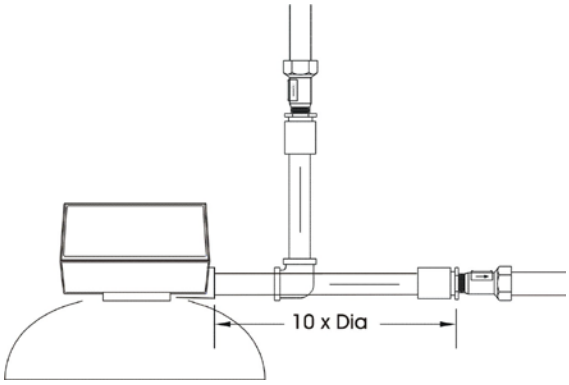
24" Duplex Demand Softener

The system should also be installed with a by-pass valve for use in the event of an emergency. The plumbing header shown is called a ***Reverse Return Header System***. This header system is also known as a balanced header system. Water enters from the left and exits to the right. This type of plumbing system insures that the flow of water through the first unit is equal to the flow of water from the second unit. Note that there is an additional valve after the flow meter, which will allow the it to be serviced when required. Simply close the inlet valves, close the one after the flow meter and open the by-pass, depressurize the system and repairs can be made on the flow meter. See "Brine Tank Installation Instructions" for details on the brine tank.

FLOW METER INSTALLATION

Flow meters must be installed in a horizontal or upward flow position only. Allow an appropriate straight length of pipe before and after the meter. These installations and appropriate straight lengths (specified in pipe diameters) are shown below.

Typical Single Installation

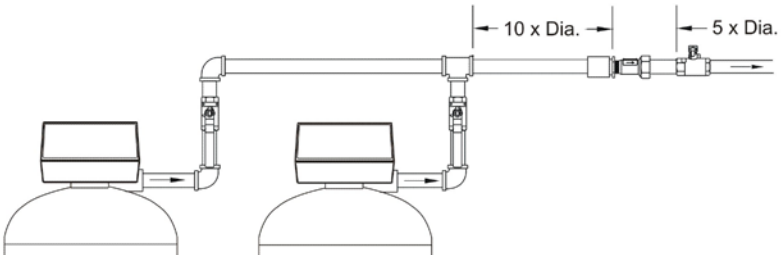


Two types of flow sensors are commonly provided:

1. A turbine type in a 1", 1-1/2" & 2"
   - plastic
   - PVC
   - or brass housing
2. An insertion type with a tee or saddle fitting is standard on 3" and larger plumbing

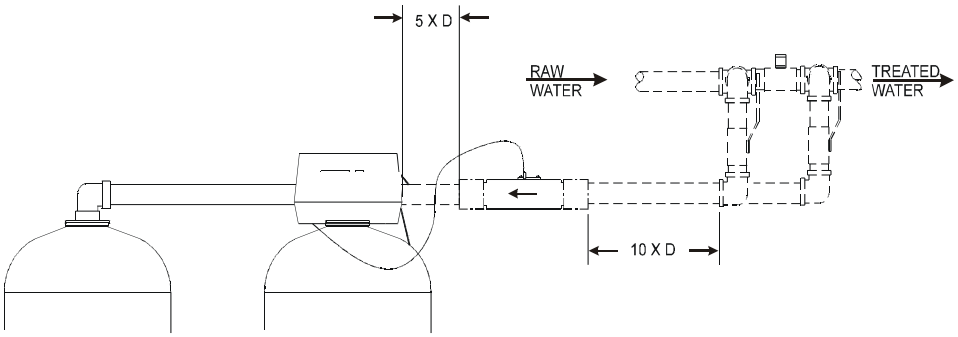
NOTE: Extension Cables in 5', 10', and 15' lengths are available for both the control and the flow meter cables.

Typical Duplex Installation



NOTE: *On Duplex Systems the meter is installed on the common* ***OUTLET*** *header.*

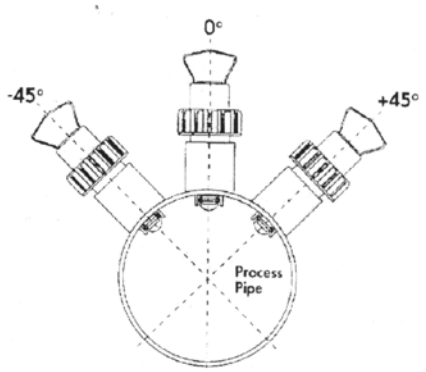
Typical Twin Installation



NOTE: *On Twin Systems the meter is installed on the common* ***INLET*** *header.*

3” and 4” FLOW SENSORS

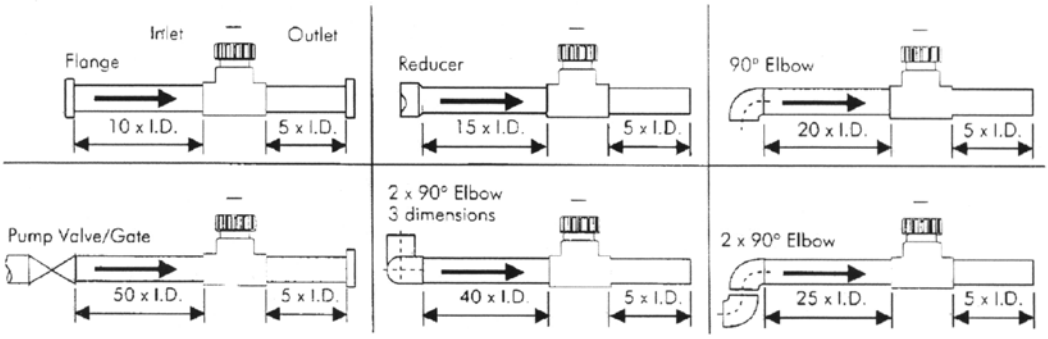
In horizontal pipe runs with no air pockets or sediment present, mount the sensory/fitting in the 12 o’clock position or 6 o’clock position. If sediment or air pockets are present, tilt the sensor/fitting at a maximum angle of 45° to overcome these obstacles. In vertical runs, upward flow is required. Full pipes are required.



Warning: Saddle clamps used with insertion type flow sensors must not be used on thin wall copper tubing. Use saddle clamps on Sch40 or Sch80 pipe only.

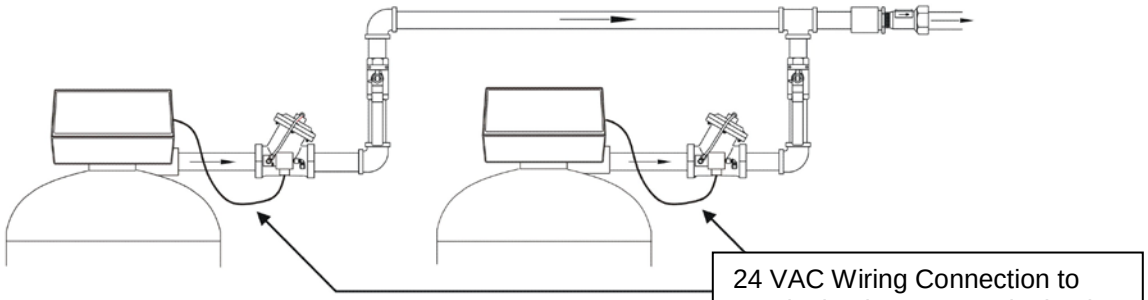
Installation - Dimensions

For maximum linearity and accuracy, the sensor must be located in a straight run of pipe upstream and downstream of the sensor. Major obstructions such as pumps or throttled valves will require longer straight runs.



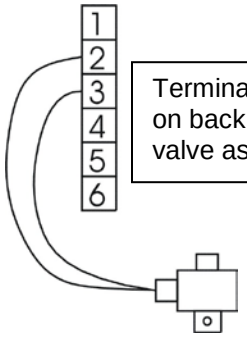
NO-HARD WATER BY-PASS

To eliminate hard water bypass on systems equipped with 1" (A), $1^1/_2$" (B), and 2" (C) control valves, a solenoid-operated outlet diaphragm valve is provided. Install the valve on the outlet line of the control valve, maintain appropriate straight lengths for turbines and wire as shown below.



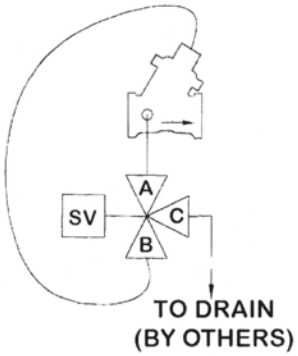
24 VAC Wiring Connection to terminal strip. See terminal strip wiring connections on next page.

3-way Solenoid Installation – No By-pass



Terminal strip located on back plate of control valve assembly.

3-way Solenoid Valve

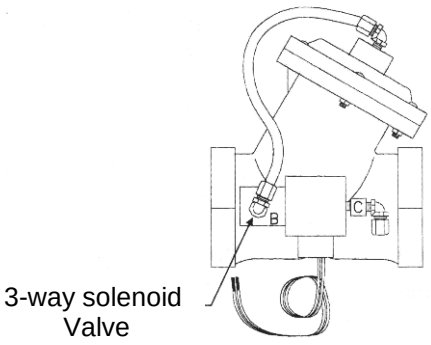


CONNECTIONS:

Port A – Pre-tubed to side of diaphragm valve.
Port B – connected to top of diaphragm valve.
Port C – connect to drain.

Valve Assembly No Bypass

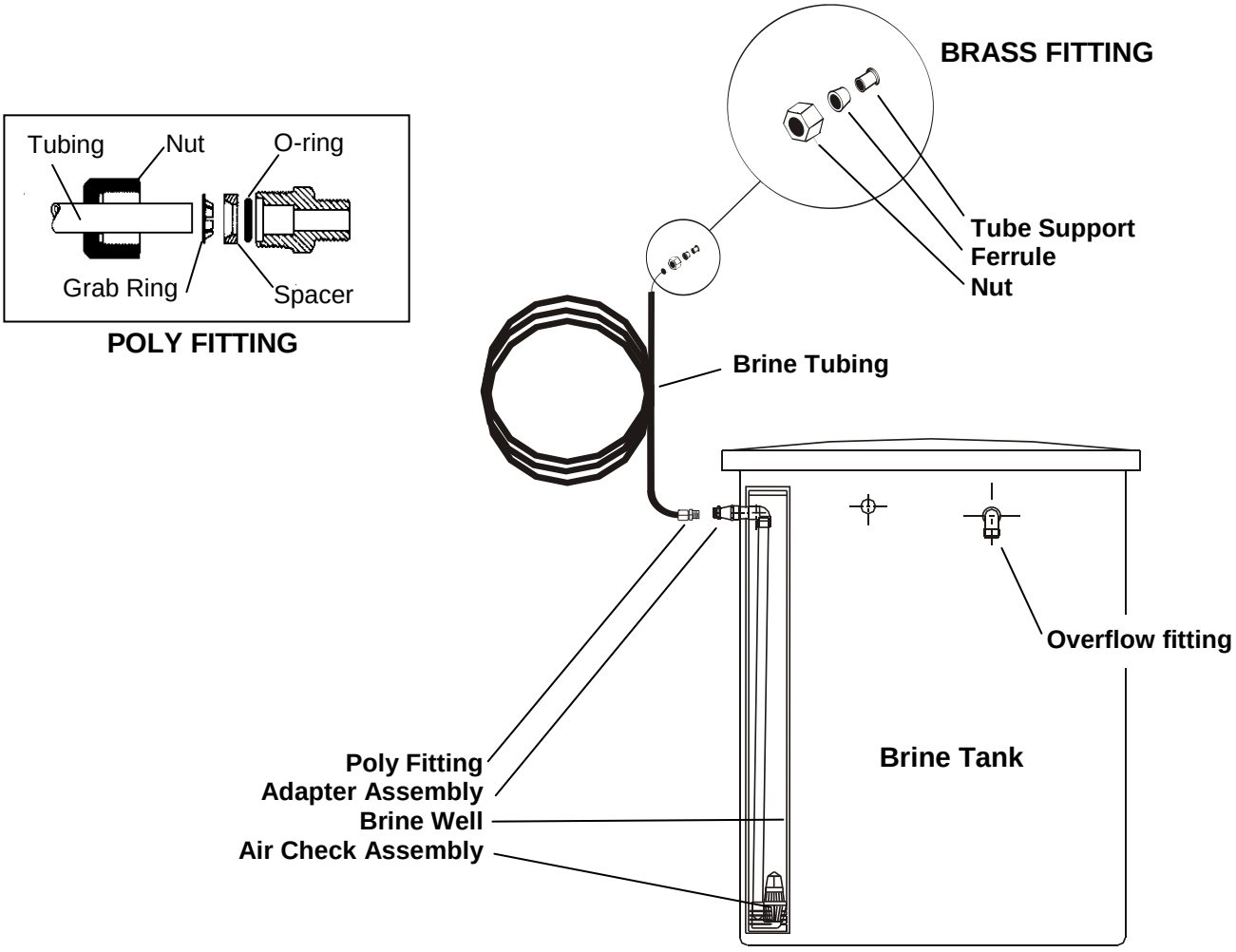
Fleck 2750, 2850 and 3150 valve assemblies are shipped with diaphragm valves for multiple unit installation. The diaphragm valves serve 2 functions; first, to prevent raw water from entering the service line and second, to hold units off line when operated in the duplex alternating mode. Fleck 2900 and 3900 valves have double pistons and the lower piston serves the same purpose as the diaphragm valve.



3-way solenoid Valve

BRINE TANK ASSEMBLY

The brine tank assembly consists of a plastic storage tank for salt and an air-check assembly. Some systems are installed with more than one brine tank and / or multiple air-check assemblies. Locate the brine tank on a firm foundation. Install the air-check by putting the top elbow through the side wall of the brine tank into one of the holes provided, and screw on the



adapter supplied. A black poly fitting is supplied with the black poly tubing which is used for the brine hose. Install the poly fitting into the adapter, loosen the nut and push the poly tubing into the fitting as far as it will go. Disassemble fitting to make sure that the metal grab ring is at least ¼" past the end of the tubing and that the o-ring and plastic spacer are in place. Put the fitting back together and tighten the plastic nut.

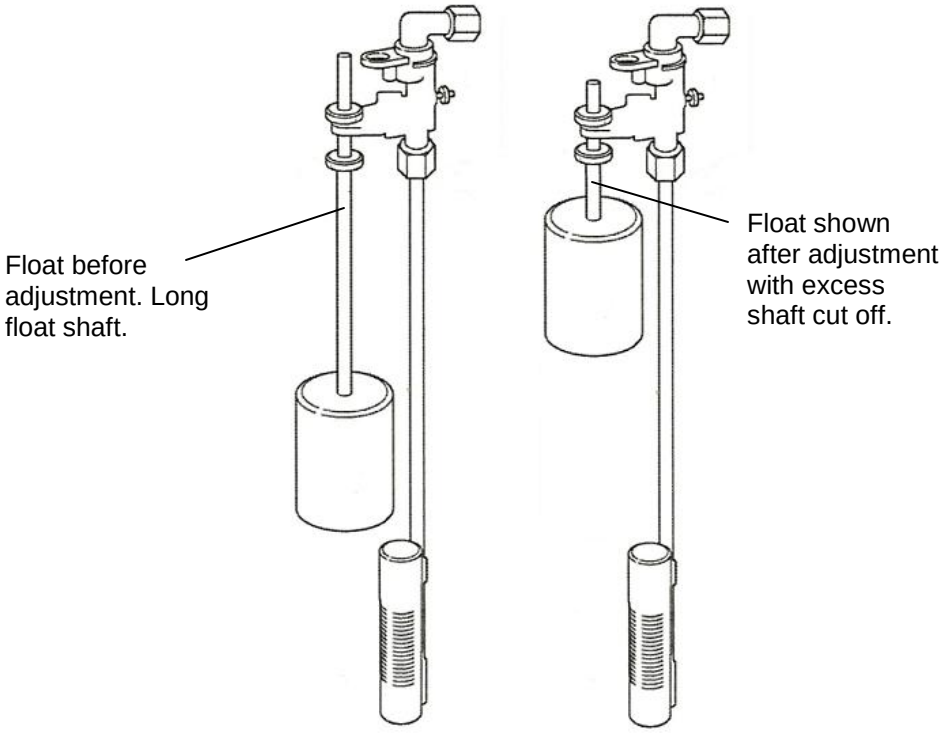
The other end of the tubing connects to the control valve. A brass nut, ferrule and tube support are provided with the control valve assembly. Slide the nut over the end of the tubing. Then slide on the ferrule over the tubing. The tube support is inserted into the tubing. Push the

assembly onto the fitting and tighten the nut. ***Caution: the tube support must be in place to prevent the hose from blowing off the brine valve.*** On duplex systems, a poly tee is provided and the two brine lines are simply connected together. On a triplex and quad systems, all can be connected together. It should be noted, that some quadraplex systems come with two brine tanks.

Load salt into the brine tank (at least half full). Fill the brine tank the rest of the way with water. Warm water will produce the required brine concentration much faster than cold water. The resin in the softener comes in regenerated form and does not require an initial regeneration, however; a manual regeneration should be initiated and the softener allowed to cycle through the various regeneration cycles to insure proper operation. The overflow drain fitting on the brine tank should be connected to the nearest floor drain. This drain is not under pressure, so pressure piping need not be utilized.

SAFETY FLOAT

Safety overflow floats come standard on all 400 lb and 700 lb brine tanks. The Safety overflow floats are optional on larger brine tanks and may be installed to prevent accidental overflow of the brine tank. When used the float should be adjusted up to the point that the safety valve is activated just before the water reaches the overflow drain connection. The safety float valve will shut off the brine line to prevent water from entering the brine tank through the brine line, should a malfunction occur in the control valve assembly. To adjust the float, simply slide the grommets and float up to the desired position. There are grommets above and below the float, adjust both. Cut off the excess float tube sticking above the safety valve. See illustration below.



CALIBRATION DATA for VIP SENSORS

Pipe Size	Pulses Per Gallon
3/4”	200
1”	100
1 1/2”	46
2”	46

Specifying the exact VIP meter on the “turbine select” screen will enable low flow correction routines which improve the accuracy at lower flow rates. Alternatively, selecting the “ADJ” selection allows the pulses per gallon to be calibrated exactly; however, low flow correction is no longer available.

CALIBRATION DATA for Model 2536 SENSORS

Iron Tees and Saddles

Pipe Size	Pulses Per Gallon Sch 40 Pipe	Pulses Per Gallon Sch 80 Pipe
1” Tee	287	---
1 1/2” Tee	91	---
2” Tee	54	---
2” Saddle	54	65
3” Saddle	23.2	26
4” Saddle	13.3	14.7

PVC Tees and Saddles

Pipe Size	Pulses Per Gallon Sch 40 Pipe	Pulses Per Gallon Sch 80 Pipe
1” Tee	---	352
1 1/2” Tee	---	117
2” Tee	---	67
2” Saddle	55	67
3” Saddle	23.7	27
4” Saddle	13.5	15.0

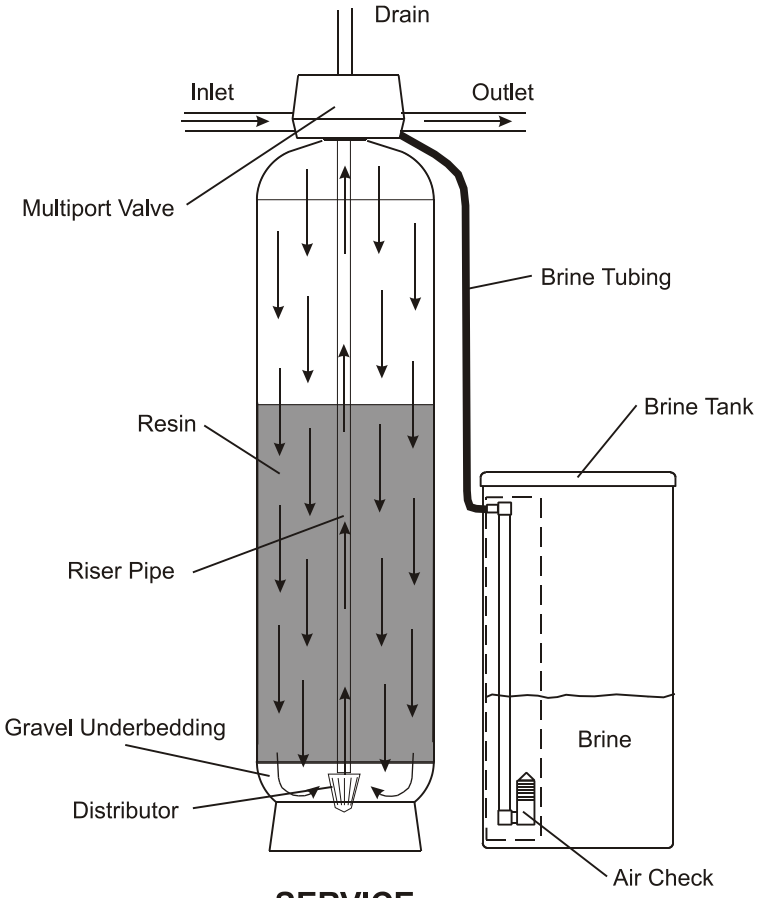
Copper Tube

Pipe Size Copper Tube	Pulses Per Gallon		
	K	L	M
3”	28	27	26
4”	15.8	15.2	14.9

SOFTENER REGENERATION

Softening is an ion exchange process. The hardness ions (calcium and magnesium) are exchanged for sodium ions on the resin. When the hardness starts to leak through the softener, the resin is considered exhausted, and must be regenerated. There are five regeneration cycles: Backwash, Brine Draw, Slow Rinse, Fast Rinse and Refill. When the softener is providing soft water it is in the Service cycle. See page 3 for the required parameters of a water softener. Page 6 contains a detailed explanation of the water softening process, or Service cycle. An explanation of each regeneration cycle, including the Service cycle follows.

SERVICE CYCLE:
The Service Cycle is the normal softening cycle. The raw water flows into the control valve and is directed into the top of the tank. The water then flows down through the resin, into the gravel underbed and into the lower distributor system. As the raw water passes through the resin, the hardness is removed. The soft water flows into the distributor and up the standpipe or riser into the control valve. The control valve directs the soft water to the outlet and on to point of use.

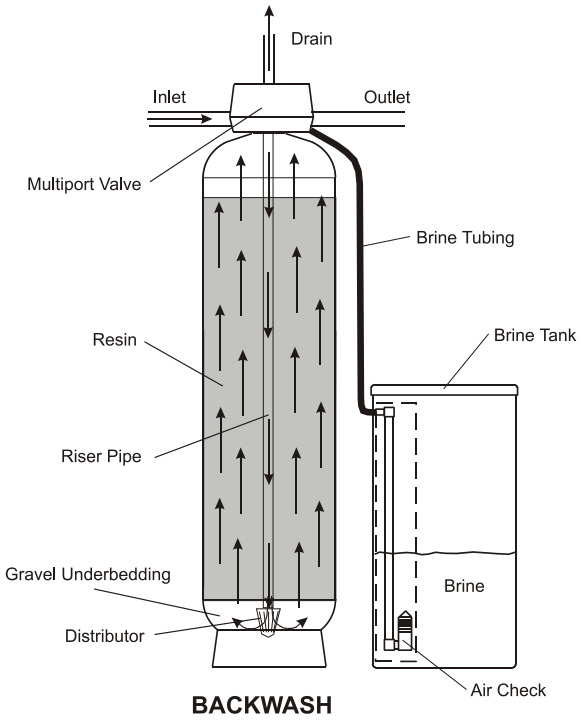


SERVICE

BACKWASH CYCLE:

The Backwash Cycle is the first cycle of regeneration. Raw water enters the control valve and is directed down the riser pipe and out the distributor at the bottom of the mineral tank. The water flows evenly up through the resin expanding it and washing the turbidity collected during the service cycle, down the drain; through the drain line flow control, (DLFC).

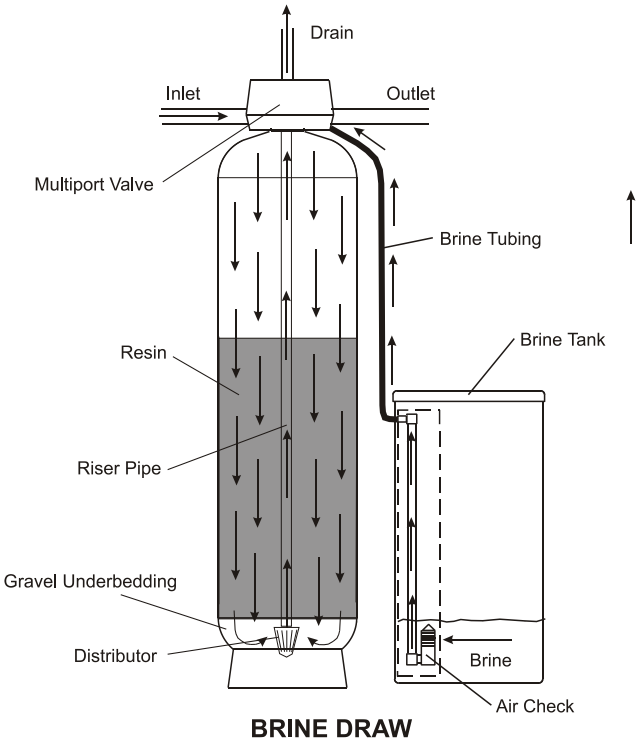
The expansion of the resin is normally 50% per the resin manufacturers specifications. The backwash flow rate is restricted by a self-adjusting flow control assembled on the drain connection of the control valve assembly. The backwash flow rate is between 4.0 to 4.5 gpm per square foot of bed area. The normal time setting is 10 minutes.



BACKWASH

BRINE DRAW CYCLE:

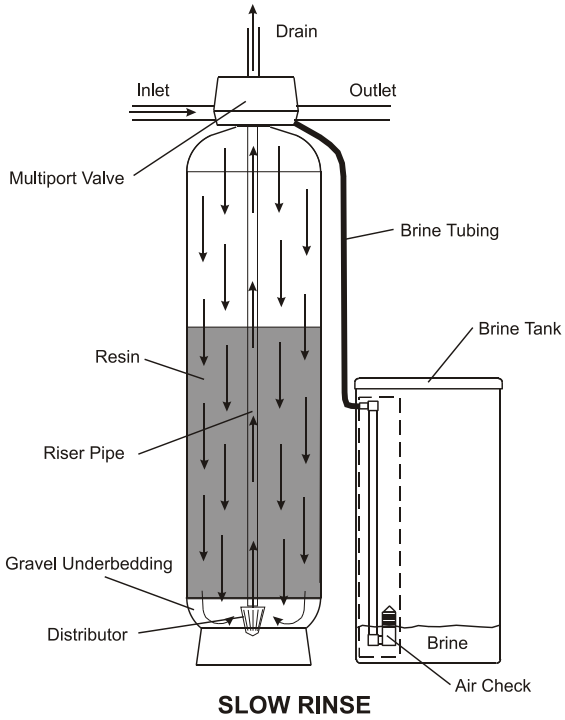
The control valve indexes into the Brine Draw Cycle after backwash is complete. The raw water is directed into the top of the tank through an eductor. A vacuum is generated as the water passes through the eductor, and is based on the water flow. This vacuum draws a concentrated sodium solution out of the brine tank and up into the top of the mineral tank. The sodium rich brine flows down through the resin exchanging its sodium for the calcium and magnesium on the resin. The water flows down into the distributor, up the riser tube, and out the drain.



BRINE DRAW

SLOW RINSE CYCLE:

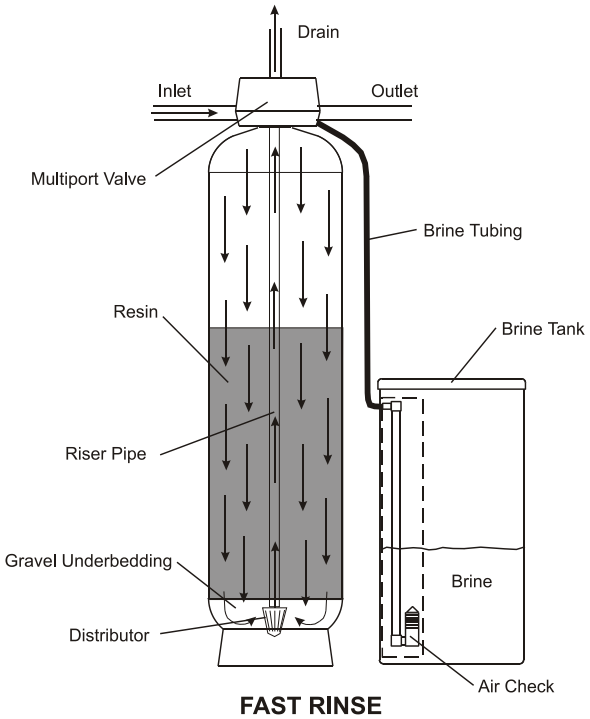
Brine draw continues until all the liquid brine has been drawn out of the brine tank. The ball in the aircheck seats, stopping the draw cycle and starting the Slow Rinse Cycle. Raw water flows down through the resin at the same rate as during the draw cycle. Excess brine and the remainder of the hardness is washed out to the drain. Another term for slow rinse is displacement. The flow rate is proportional to the amount of resin being regenerated.



SLOW RINSE

FAST RINSE CYCLE:

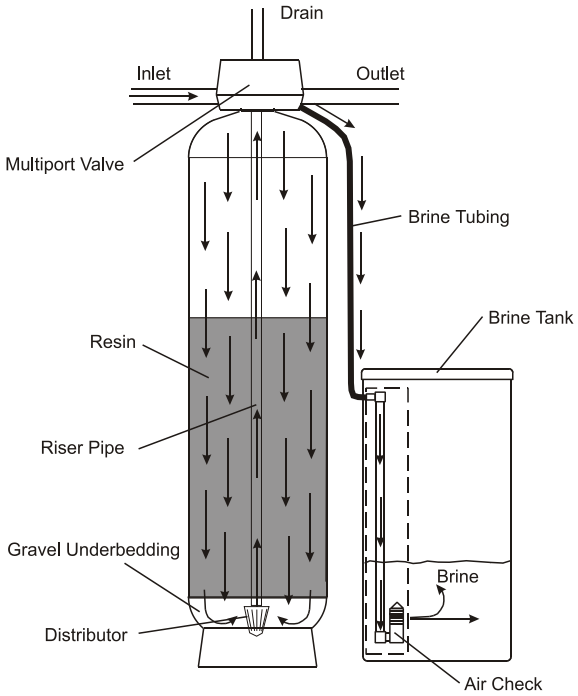
Raw water enters the top of the mineral tank the same as during the service cycle. The water flows down through the resin and gravel, and is collected in the distributor and directed up the riser pipe. The water flows through the control valve to drain through the drain line flow control. The fast rinse flow rate is the same as the backwash flow rate. The fast rinse compacts the resin bed preparing it for the removal of hardness during the service cycle.



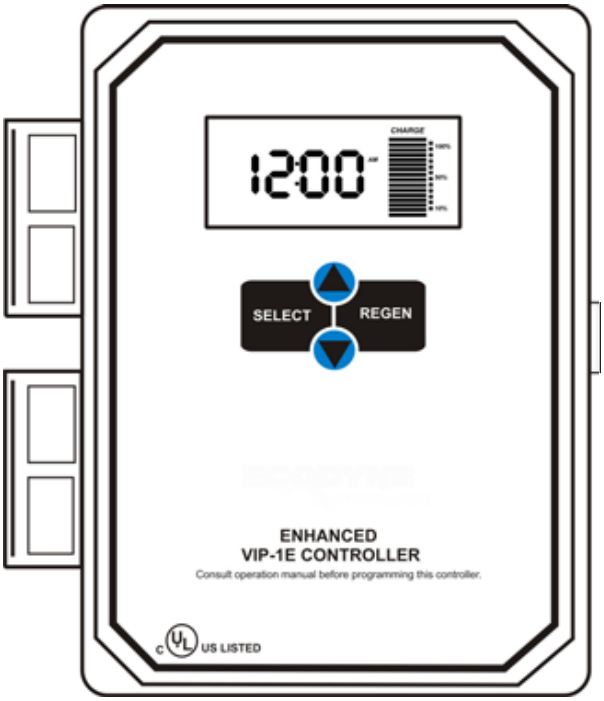
FAST RINSE

REFILL CYCLE:

The refill cycle is a timed cycle. A brine line flow control is utilized along with a time setting to return the water to the brine tank. The amount of water placed back in the brine tank is determined by the salt dosage of the resin and the amount of resin contained in the mineral tank. See page 6. An example of this: a 5 lb per cubic foot salt setting is used and each mineral tank has 5 cubic feet of resin, then 25 lbs of salt is required for regeneration. Since 3 lbs of salt can be dissolved by a gallon of water, a minimum of 8.33 gallons of water is required. If the refill rate is 2.0 gpm then, the refill time required is 5 minutes. When refill is complete, the system advances to stand-by or service.



BRINE REFILL



VIP-1E Controller Installation, Operation and Programming Guide

Form No. 999420
Revised 6-07-13

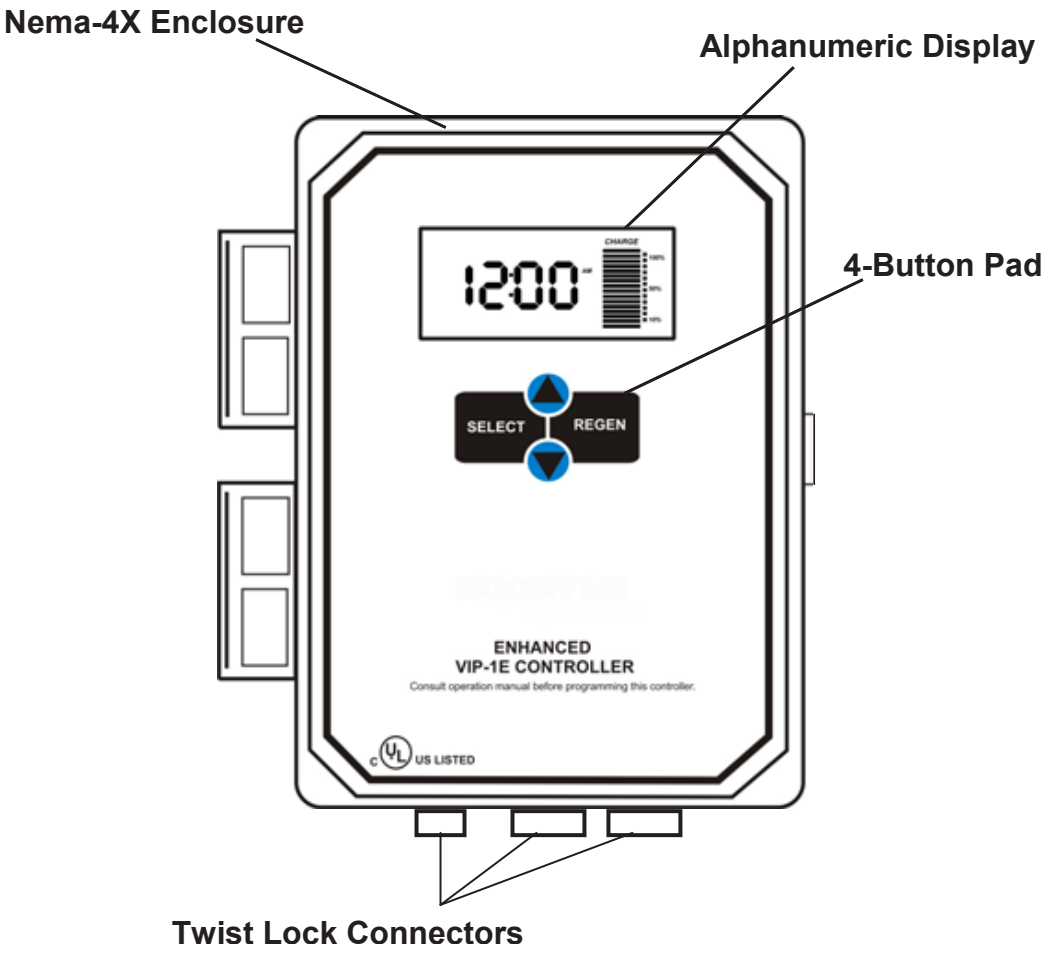
Table of Contents

INTRODUCTION

The control is a computer based, demand initiated controller for commercial and industrial filter, softener, and dealkalizer systems. The controller operates by sensing water flow and remembering water usage history to anticipate future water requirements and to optimally control system operation. Softeners, Dealkalizers or Filters can be operated as single tank systems, alternating two tank systems, or parallel two tank systems. Additionally, the controller provides powerful features, which allow precise monitoring of system performance and detailed assistance in diagnosing problems.

The VIP control works with a full line of 1", 1.5", 2" and 3" commercial and industrial softener, dealkalizer and filter multi-port valves. The VIP control also works in conjunction with stagers for operation of a complete line of valve nest systems. The control accepts flow signals from a number of Hall effect type flow sensors. When operated in conjunction with 1", 1.5", or 2" VIP flow sensors, the control will automatically make low flow rate corrections to improve accuracy. For larger system requirements, the controller operates with 3", 4" and larger insertion type paddlewheel flow meters.

VIP-1E Features



Four Button Pad -The Button pad is used for both operating and programming the system.

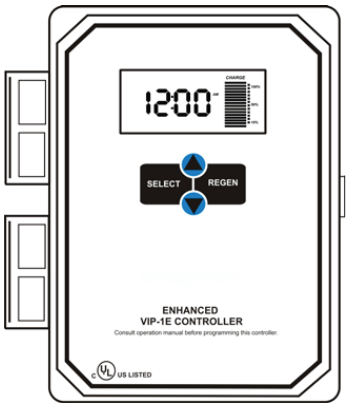
- **[SELECT]** is the navigation button. **[SELECT]** is used to advance display screens and to access higher level programming and diagnostics screens.
- **[▲]** (up) and **[▼]** (down) are the change buttons. Whenever a display value is flashing, the **[▲]** (up) and **[▼]** (down) buttons can be used to change that value.
- **[REGEN]** is used for manual control. The **[REGEN]** button can be used to schedule regeneration tonight by pushing the button once. Pushing and holding the **[REGEN]** button for 4 seconds will initiate an immediate regeneration. The **[REGEN]** button can also be used to manually index systems through the steps of regeneration after initiation.

Alphanumeric Display - The display is an illuminated, alphanumeric, liquid crystal display (LCD) which presents the information used to program, operate, and diagnose the systems and performance. The normal time of day is displayed along with the percent capacity remaining for the system. When programming for Softeners, Filters or Dealkalizers the critical parameters can be set and are displayed.

Twist Lock Connectors - All interconnections to the VIP I Controllers are plastic, water resistant, indexed, turn-to-lock, quick connectors. The control interconnecting cables are pre-installed on valves and turbines. No wiring is required.

- ***Flow Meter Connector*** - one flow meter is used in conjunction with single or duplex systems.
- ***Unit 1 Control Connector*** - contains all the wiring required to power and control a first unit.
- ***Unit 2 Control Connector*** - on single valve systems, its connections allow remote initiation and provide a 24 VAC alarm signal. On two valve systems, it is the second unit's power and control connection.

Nema-4X Enclosure - The enclosure is constructed of corrosion resistant plastic. It is a watertight enclosure measuring 6-1/2” wide x 8-1/2” high x 5” deep. The controller may be wall mounted or bracket mounted to a nearby pipe. The VIP is UL listed as an Enclosed Industrial Control Panel for US and Canada per UL508A.



c UL US LISTED

Optional Control Features

- ***Service and Regeneration Outputs***

The VIP control has two relay outputs available for adding Service and Regeneration indicator lights. Each relay is off when its respective unit is in the service position and activated when in the regeneration mode. The relays are Single Pole Double Throw relays with 10 amp contacts. A terminal strip is provided inside the control for connection to the indicator lights. The terminal strip has the common, normally open and the normally closed connections to the relays. Wiring diagrams are included at the end of this programming manual.

- ***Remote Alarm Output***

The VIP is equipped with an alarm relay output . When an Error has occurred the control will flash Error on the screen and both of the relays for the service and regeneration indicators are activated. A wiring diagram is included at the end of this programming manual.

- ***Brine / Caustic Pump Output***

The control has a relay built in that can operate a pump for brine or a chemical pump for caustic feed. The length of time it is activated during the brine draw cycle is controlled independently of the regeneration time. TDRA can be turned ***off*** or set for a specific time from 1 minute up to 120 minutes. The default time is 50 minutes.

- ***Salt Monitor***

The Salt Monitor feature indicates the amount of salt that is in the brine tank and will alert the user when the level is low. This option is only available on the VIP-1 single and duplex systems. The brine tank should be divided into 10 equal segments, which shows the level of dry salt it contains. The level can be adjusted between 1 and 10. Bars shown on the display of the control relate to the levels indicated in the brine tank. An alarm sounds when the level drops to a programmed level in the brine tank.

The current salt level is displayed on the control when the Salt Monitor is enabled and the type of unit selected is a softener. Start with the current time of day on the display. The Level of Salt can be displayed by pressing the Select button twice. There are 10 bars on the display of the control, corresponding to the 10 levels of salt in the brine tank. The current salt level can be adjusted by pressing the Up or Down arrows until the level of salt in the brine tank is matched. The level on the control is then automatically reduced based on the amount of salt dissolved by the water put into the brine tank during the refill cycle at the end of each regeneration.

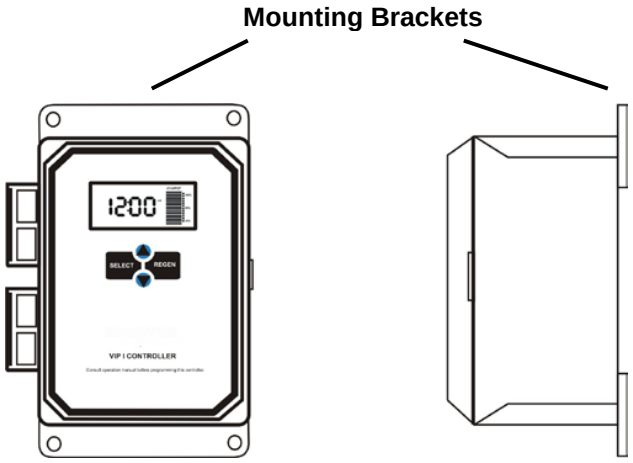
- ***Modbus 485 DCS Interface***

The VIP control is equipped with a two wire 485 Modbus connection and can be connected to a factory DCS system. The VIP must be ordered special with this option activated. Documentation containing the information stored in the holding registers is included as part of this option. Each register is described along with allowable data ranges for the contents of each register.

CONTROL INSTALLATION

Wall Mounting

Plastic Wall Mounting brackets are supplied with the VIP Control. The brackets should be bolted onto the back of the control with the screws provided. The mounting tabs are shown at the top and bottom of the control at the right.



Pipe Mounting

Attach the Wall Mount brackets (rotated 180^{O}) on the back of the control. Mount the section of Unistrut in the position indicated in the photographs below (screws and washers are provided). The photo on the left can be used as a guide if the support pipe runs horizontally. If the support pipe runs vertically then the photo on the right can be used as a guide. The Unistrut pipe clamp is then mounted to the Unistrut and positioned as desired and held in place with the nut and bolt provided.

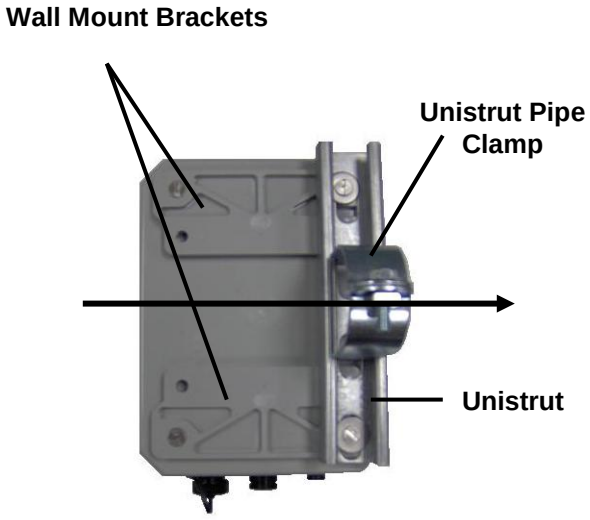


Photo showing position of Unistrut if support piping is running horizontally

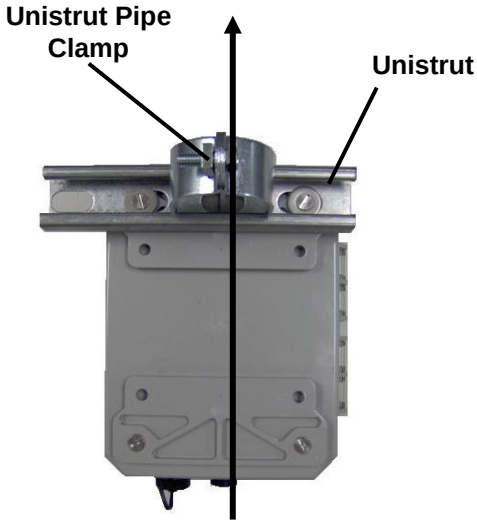
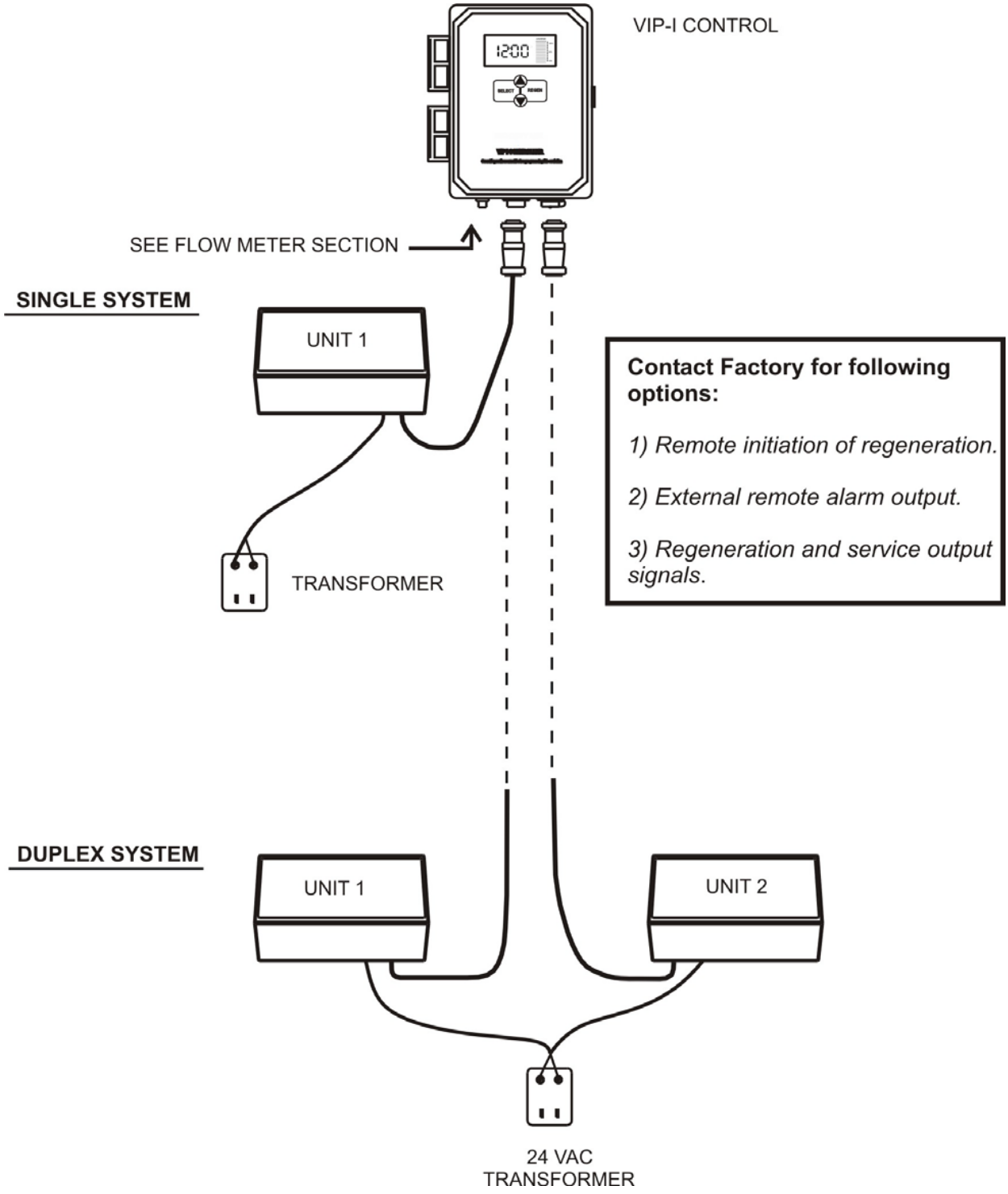


Photo showing position of Unistrut if support piping is running vertically

WIRING CONNECTIONS



Note:

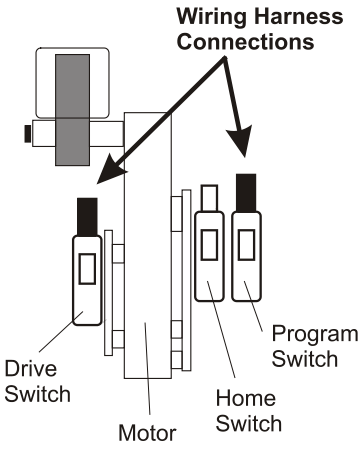
- All 2750 and 2850 valves use 1 – 50VA transformer per system.
- All 2900 valves use 1 – 50VA transformer per valve.
- All 3150 and 3900 valves use 1 – 100VA transformer per valve.

VIP VALVE WIRING HARNESS CONNECTIONS

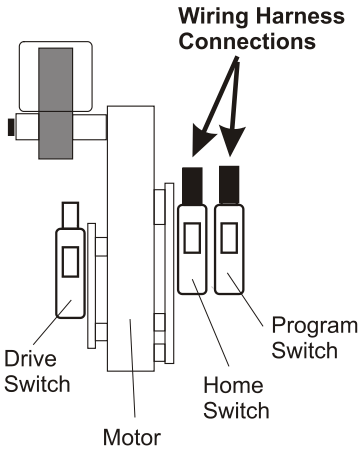
The small red and black wiring harness is connected to the ***Program Switch.*** This switch tells the VIP Control the position of the valve. The other wiring harness is connected to either the *Home Switch* or the *Drive Switch* dependant on the function of the valve. *Single and Parallel* operation requires the wiring harness to be on the ***Drive Switch***. *Alternating and Variable Flow* systems require the harness to be on the ***Home Switch***.

2750 – 2850 and 2900 Upper Drive Motor Assembly

SINGLE AND PARALLEL OPERATION

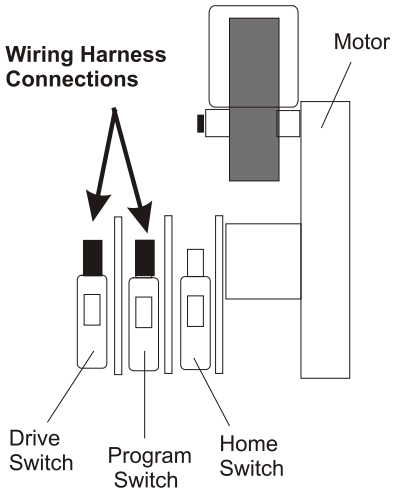


ALTERNATING AND VARIABLE OPERATION

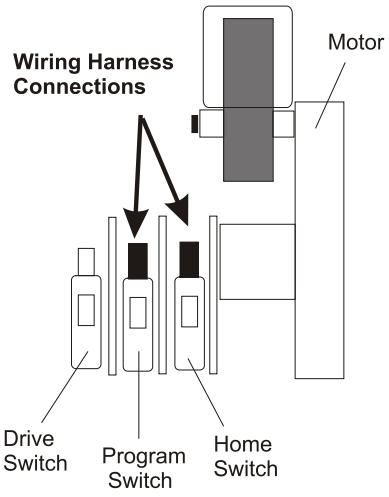


3150 and 3900 Upper Drive Motor Assembly

SINGLE AND PARALLEL OPERATION



ALTERNATING AND VARIABLE OPERATION



MAIN SCREEN

- The Main Screen - The time and charge bar screen is the default display screen for the controller. The Main Screen is the starting point from which system, status, settings, configuration, and diagnostics can be reached. Once the control has been initially programmed or after being left idle for four (4) minutes, the display will always revert back to the Main Screen from any other screen.

- Basic operating information is supplied by the Main Screen such as Time of Day, Charge Bar, and Recharge Tonight segments as explained in detail below.

Time of Day

- The Time of Day appears (non-flashing) in a four-character display. The display format can be 12 hour (with AM or PM) or 24 hour as designated during programming.

Charge Bar

- The Charge Bar indicates the percentage of unused operating capacity remaining. The figure above indicates that 50% of the operating capacity remains. As capacity is depleted, the charge bar segments are reduced. During reconditioning, the charge bar segments are added as the regeneration cycle takes place.

- On Alternating Systems, the charge bar indicates the capacity remaining in the service tank. On Parallel Systems, the charge bar shows the capacity of unit 1 for six (6) seconds, blanks for one (1) second, and then shows the capacity of unit 2 for two (2) seconds.

ReCharge Tonight – (Single and Alt2 Systems Only)

- The words ***Recharge Tonight*** flash in the display when the controller has determined that a regeneration is needed. At the next programmed recharge time, regeneration will occur. Time of regeneration can be changed in Level 2 Programming.

- When the word ***Recharge*** flashes in the display, regeneration is currently underway. The Recharge segment will continue to flash until the regeneration is complete.

SYSTEM STATUS – FIRST LEVEL PROGRAMMING ----------

The **[SELECT]** button is the navigational button. By pressing and releasing this button repeatedly, operation and status information screens can be accessed.

NOTE: BEEPER - A beeper sounds while pressing buttons for setup. One beep signals a change in the display. Several repeat beeps indicates the button pressed is invalid, telling you to try another button.

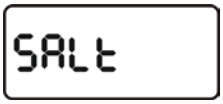
Change Time of Day

The Time of Day screen is entered by a press and release of the **[SELECT]** button. Should a power out*age occur, the* ***Time of Day*** *is maintained for a minimum of 96 hours. The* ***Time of Day*** is changed using the **[▲]** up and **[▼]** down buttons. Each push changes the display by one (1) minute. If the buttons are held, the time display changes at a faster rate.

The **[▲]** up and **[▼]** down buttons are used to change the selection. Press the **[SELECT]** button to advance the control to the next screen.

Brine Tank Salt Level

The brine tank salt level is indicated on the display using the bars on the right. ***Only if the salt monitor is activated in "Level Three Programming" of the control.*** When filling the brine tank, use the **[▲]** up to increase the number of bars displayed. This will correspond to the number on the sticker in the brine tank. The bars will be depleted as the unit regenerates. "Load" "Salt" will alternate on the main screen when the level drops below the predetermined alarm level. If the salt monitor is turned off, this display will not show. This screen is not available on filters. See **"Third Level Programming"** for more information.



Average Daily Gallons

The Average Daily Gallons screen displays the average daily gallons (liters) based upon the past 7 days of water usage. The figure adjusts daily at midnight. The display uses all 5 digits to show values from 0 to 1,040,000 gallons.

NOTE: For usage greater than 99,999, the display uses exponential notation. For example to display 100,000 the display would read "100E3" (100E3 = 100 x 10^3 = 100,000 just like many calculators show).

This is a display only screen and can not be changed. Press and release the **[SELECT]** button to advance to the next screen.

Flow Rate

The Flow Rate screen indicates the current flow rate in gallons (or liters) passing by the flow sensor. Flow rates can be displayed from 0 to 999 GPM (LPM) using up to three LCD digits. When the flow rate is under 100, the tenths indicator is used.

This is a display only screen and can not be changed. Press and release the **[SELECT]** button to advance to the next screen.

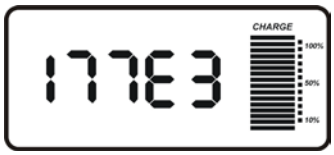
Gallons

The Gallons screen indicates the amount of treated water that has passed by the turbine. Bypass water is not included. Accumulated flow is shown in gallons (liters) up to 1,040,000 gallons. For display values greater than five (5) digits, scientific notation is used. When ***999E4*** (9,990,000) is reached the counter will roll over back to 0 and resume counting.

Press and release the **[▼]** down button to manually reset this value to zero. Press and release **[SELECT]** button to advance to the next screen.

Capacity (grains)

The Capacity screen indicates the total ***grains capacity*** of each unit. It is based on the cubic feet of resin, the hardness of the water, and the salt setting. Display values greater than five (5) digits are shown in scientific notation. 177E3 indicates that each unit has 177,000 grains capacity. The display will alternate between **CAP** and **177E3.**



Total Capacity (gallons)

The Total Capacity screen indicates the total ***gallons capacity*** of treated water for each unit, which can be obtained between the regeneration cycles. This capacity is based on the input hardness, amount of resin in the vessel and the salt dosage in pounds per cubic foot. Display values greater than five (5) digits will use scientific notation. The 11,800 in the display at the right, indicates that each unit will provide 11,800 gallons of treated water between regenerations. The display will alternate between ***tCAP*** and **11800.**

INITIATING EXTRA REGENERATIONS

Single Tank Systems -

- Press and release **[REGEN]** to schedule a regeneration. ***Recharge Tonight*** will flash in the display. Press and release **[REGEN]** a second time to deselect a scheduled regeneration.

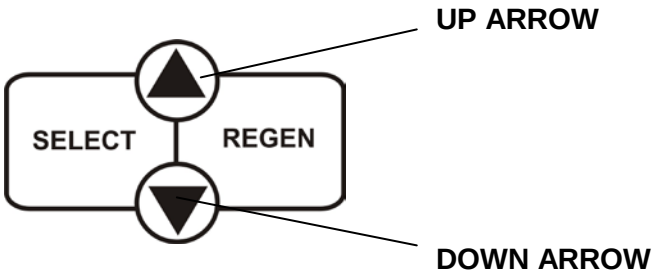
- Press and hold **[REGEN]** for three (3) seconds to initiate an immediate regeneration.

Duplex Alternating Systems -

- Press and hold **[REGEN]** for three (3) seconds to initiate an immediate regeneration of the service or primary tank.

Duplex Parallel Systems -

- Press and hold **[REGEN]** for three (3) seconds to initiate an immediate regeneration of the primary tank. If in the Time Clock mode, both tanks will regenerate in sequence.



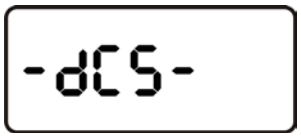
There are 4 - Buttons located on front of the VIP-1E control:

1 – Select
2 – Regen
3 – Up Arrow
4 – Down Arrow

START-UP

When the control is powered up, the programmed model designation is displayed for 4 seconds. Next, the software release version is displayed for 4 seconds. Finally, the time of day is displayed. Programming is started at ***Level 3***. If the Modbus RTU Communication Option was purchased and it has been activated, then **-dCS-** will be displayed first for 4 seconds when the control is powered up. The industry standard Modbus RTU Protocol over a 2-wire EIA-485 bus has been incorporated into the Control.

Push and hold the select button for *3 seconds* and the control will advance from ***Level 1*** to ***Level 2***. Push and hold for an additional 3 seconds and the control will advance from ***Level 2*** to ***Level 3***. ***Level 3*** is where programming is started. Push and hold for 3 seconds again and the control will advance from ***Level 3*** to the diagnostics mode, ***Level 4***.



THIRD LEVEL PROGRAMMING ----------

Model or Type Selection

The Model or Type Selection screen is used to designate the type of system the control will operate. Go to level 3 to change the type of equipment or to program the other parameters.

The three types of equipment are:

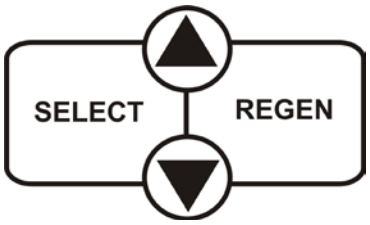
SOFTENER
FILTER
DEALKALIZER

In addition to the above selections, if a softener is to be chosen then the model of the softener may be entered. The model designations are *S-30* through *S-1200*. Fourteen (14) predefined models can be chosen. Selecting a pre-defined model option loads default values for most programming choices, simplifying start-up of the system.

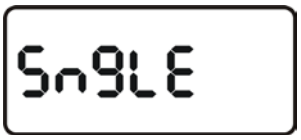
Screen Navigation

The [▲] up and [▼] down buttons are used to change the selection. Pressing the **[SELECT]** button confirms the choice and advances the control to the next screen. The **[REGEN]** button initiates regeneration and advances the control through a regeneration cycle.

NOTE: BEEPER - A beeper sounds while pressing buttons for setup. One beep signals a change in the display. Repeat beeps indicate the button pressed is invalid, telling you to try another button.

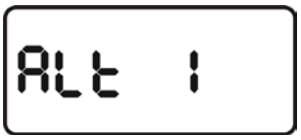


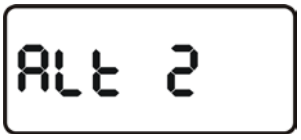
Mode Selection

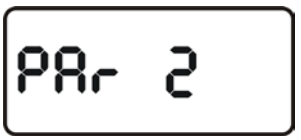


Different Softener valves can be operated in a variety of different modes. Five (5) choices are possible with the VIP I Control:

- **SNGL** — A single tank, single control valve system. (Motor driven)
- **ALT1** — A two tank, single valve twin system. (Motor driven)
- **ALT2** — A two tank, two control valve system that operates in a duplex alternating mode. (Motor driven) Choose immediate regeneration or delayed regeneration.
- **PAR2** — A two tank, two control valve system that operates in a duplex parallel mode. (Both tanks on line – motor driven)
- **ECO** — A Single tank, 5-cycle control valve system. (Solenoid operated)







Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

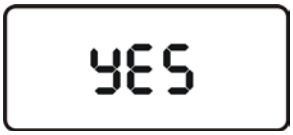
> ***NOTE: When an operating mode is first selected or whenever the mode is changed, the control will execute a routine designed to verify the presence and position of the control valve. The control will drive the valve motor(s) through approximately two revolutions and stop in the service or standby position as is appropriate for mode chosen.***

Regeneration Delay Selection – (Alt 2 only)

The Time of Regeneration can be delayed on Duplex Alternating Systems. When Alt 2 is selected, the Delay screen will appear next. The screen will alternate between ***Delay*** and ***No***. The ***No*** can be changed to ***YES*** by pressing one of the arrow keys. The time of regeneration can be immediate or delayed.

*If **No** is selected the regeneration will be immediate. When one unit runs out of capacity, the second unit comes on line and the exhausted unit will advance into regeneration.*

*If **YES** is selected then the time of regeneration will be delayed. When one unit runs out of capacity, the second unit comes on line and the exhausted unit waits until the recharge time is reached before regenerating.*



See ***Recharge Time*** in the Second Level Programming section.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

(Third Level Programming Continued)

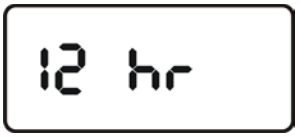
Gallons / Liters Selection

All water flow or usage displays can be shown in gallons (gallons per minute) or liters (liters per minute).

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

12 / 24 Hour Selection

Indications of time can be in either 12 or 24-hour format. When ***12-hour*** is selected, the time displays are shown in standard clock time (1am to12pm, 1pm to 12am). When the ***24-hour*** clock is selected, the time displays are shown in military time (1:00 to 24:00).



Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

(Third Level Programming Continued)

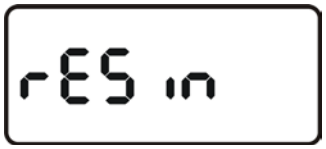
Error Beep Off / On Selection

If the controller should encounter an error condition and the beeper is ***ON*****,** the speaker will beep 5 times every second and the error code will be displayed. If this feature is turned ***OFF***, the error code will be displayed, but no beeping will occur.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and then press **[SELECT]**.

Resin Quantity Selection

The Resin Quantity select or display is used to let the controller know how much resin (per tank) is being used in a softener or dealkalizer. The controller allows a range of .5 - 150 ft^3 per tank. The display at the right shows 10.0 ft^3. This screen is not available when ***FILTER*** is selected.



Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and then press **[SELECT]**.

Refill Rate Selection

VALVE SIZE – RESIN QUANTITY – REFILL RATES																
Valve Size	**1**		**1 & 1.5**	**1.5" and 2"**				**2"**		**3"**				**3" and 4"**		
Resin (Ft^3)	**1**	**2**	**3**	**4**	**5**	**7**	**10**	**15**	**20**	**15**	**20**	**30**	**40**	**50**	**60**	**85**
Refill (GPM)	**0.5**					**2**				**4**				**10**		

The Refill Rate selection screen identifies the brine tank refill rate to the controller. This value is used to calculate the correct refill time for a given salt setting. The control valve brine system is stamped or labeled with this rate. Alternatively, look at the standard rates in the table above. This screen is not available when ***FILTER*** has been selected.

NOTE: Always check the refill rate setting versus the actual refill rate as measured. An accurate setting is essential for correct operation of your system.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and then press **[SELECT]**.

The brine refill step can be eliminated by selecting ***OFF***. The refill step can be turned off when pumped brine or an external brine maker is used.

LBS per Selection

The optional salt level monitor is turned ***on*** or ***off*** with this selection. The default value is OFF. The amount of salt per level is shown in the chart below. The brine tank is split into 10 levels by a optional black and yellow sticker for the brine tank, which is placed on the brine well.

Brine Tank Size	Length of Brine Label	Inches per Level	Lbs of SALT* per Level
400 lb. – 18" x 39"	30"	3"	32
700 lb. – 24" x 41"	30"	3"	58
1000 lb. – 24" x 50"	40"	4"	78
1500 lb. – 30" x 50"	40"	4"	122
2500 lb. – 39" x 48"	40"	4"	208
4500 lb. – 52" x 60"	50"	5"	375

** The weight of the salt is based on White Crystal Rock Salt from Morton Salt Company.*

(Third Level Programming Continued)

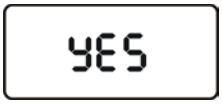
The lbs per level can be programmed from **OFF** up to **510**, in two lb increments. The control calculates the lbs of salt used per regeneration and sends an alarm signal when it has determined that the salt level is below the preset value. The amount of salt in the brine tank is programmed on the main menu, by activating the number of bars on the right of the screen equivalent to the level of salt in the brine tank. A prompt will appear in the Level 1 programming asking for the level of salt in the brine tank. Increase or decrease the number of bars showing on the right side of the screen by pushing the **[▲]** up or **[▼]** down buttons.

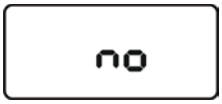
Brine / Caustic Pump Selection

The control has a relay built in which can operated a pump during the brine draw cycle of regeneration. This relay can also be used to operate a chemical feed pump for the caustic feed of a dealkalizer, 10 amps maximum. The timing starts when brine draw starts and ends as programmed. This timing is independent of the brine draw cycle. The time the relay is activated can be programmed from OFF up to 120 minutes in 1-minute increments. Default is 50 minutes.

Caustic Feed Pump Activation – (Dealkalizer only)

A caustic feed pump may be activated during brine draw, only if Dealkalizer is chosen under type of equipment. The caustic pump default is "**no"**, but can be turned on any time. The length of time that the pump is activated is equal to the time set in the ***tdrA*** screen. Answering "YES" to caustic also allows the control to calculate the capacity of the dealkalizer based on caustic addition. If the pump is off, the capacity calculated is based on sodium chloride only regenerations, which is approximately 30% less capacity than using salt and caustic. This screen will not appear if ***Filter*** or ***Softener*** is selected.





(Third Level Programming Continued)

Salt Alarm Level Selection

The level at which the alarm to Load Salt activates is programmable. Select the number of bars at which the alarm will activate. When the salt level drops below the chosen number of bars, the alarm will sound, and "Load" "Salt" will alternate being displayed on the main screen. The alarm beeper will sound until salt is added to the brine tank and the level on the main screen is increased above the alarm level setting. This display will only appear if a value is programmed in the ***LBS per*** screen. The display at the right shows 3 bars lit, which is approximately 1/3 of the brine tank.

Use the **[▲]** up or **[▼]** down buttons to increase or decrease the number of bars, and then press **[SELECT]**.

Turbine Selection

The Turbine selection screen displays the nominal size of the turbine being used by the unit. Five turbine size selections are available - .75", 1.0", 1.5", 2.0", "ADJ" or "none". "ADJ" allows the programming of the "K" factor for the flow meter being used. "None" converts the control to time clock operation.

Use the [▲] up or [▼] down buttons to identify the correct choice and then press **[SELECT]**.

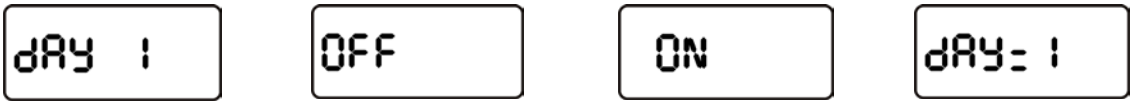
Turbine "Adjustable" Selection

If the "ADJ" setting was selected on the previous screen, the turbine pulses per gallon value must be programmed into the control. The tables on page 24 will be helpful in making the correct choice. Consult your supplier if you have any questions.

NOTE: If this is an initial programming sequence or if the model or system has been changed, programming will continue with the operating settings (second level select). If only configuration items (other than the model and system) have been changed; or, after a 4-minute idle period, the control will revert back to the Main Screen.

Turbine "nonE" Selection

If "nonE" is selected the control automatically converts to a time clock. The next prompt is for the days of regeneration. The display will flash between dAY 1 and OFF. Use the [▲] up or [▼] down buttons to change to ON. This will continue through all 7 days of the week. The system will regenerate on the days selected. "Today" is selected in the first level of programming. The display will show dAY= 1. Change the 1 using the [▲] up or [▼] down buttons, to the number corresponding to today.



SECOND LEVEL PROGRAMMING ----------

The Second Level select screens are accessed in two ways:

- **By Continuation** — After completing the third level programming screens on an initial start-up, the control continues with second level select screens.
- **Manual Entry** — Press and hold the **[SELECT]** button for 3 seconds to access the second level screens.

Hardness Selection – (Softener only)

Hardness is required when setting up a softener. Set the grains per gallon hardness of the water supply (determined by the water analysis or contact the local water department).

Use the **[▲]** up button to increase the number and the **[▼]** down button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 125, the display changes by 5. Press and hold the buttons for fast advance. This screen is not available when ***Filter*** or ***Dealkalizer*** is selected.

> ***NOTE: To compensate for iron in the water supply, add 4 to the hardness number for each 1-ppm of iron.***

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Total Exchangeable Anions – (Dealkalizer only)

Total Exchangeable Anions (TEA) is required when setting up a dealkalizer. Set the grains per gallon of the total exchangeable anions of the water supply (determined by the water analysis). Default is 20 grains.

Use the **[▲]** up button to increase the number and the **[▼]** down button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 125, the display changes by 5. Press and hold the buttons for fast advance. This screen is not available when ***Filter*** or ***Softener*** is selected.

Chlorides Selection – (Dealkalizer only)

The chloride content of the water being treated in conjunction with the total exchangeable anions is used to calculate the capacity of the dealkalizer. Chlorides are settable in increments of 1 from 0 to 25 grains and in increments of 5, between 25 and 100 grains. Default is 5 grains. This screen is not available when ***Filter*** or ***Softener*** is selected.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Backwash Time Setting

The Backwash Time screen is used to tell the controller how long to backwash a softener or filter during the first step of a reconditioning cycle. The recommended setting is 10 minutes for a clean, clear raw water supply. If the water condition is too poor, recommended pretreatment equipment should be installed. The backwash time is adjustable from 1-30 minutes.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Brine Draw Time Setting

The Brine Time screen is used to tell the controller how long to allow for brine eduction and slow rinse. As the programmed salt dose increases, the amount of time required by a softener to draw brine and slow rinse increases.

As a rule of thumb, the following settings are suggested, yet should be adjusted as experience and observation with a particular installation dictate. The first regeneration cycle should be observed and timed to verify this setting.

5 lb./ Ft^3 .....60 minutes
10 lb./ Ft^3 .....80 minutes
15 lb./ Ft^3 .....100 minutes

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**. This screen is not available when ***FILTER*** is selected. Set the salt dosage for Dealkalizers at minimum setting.

Fast Rinse Time Setting

The Fast Rinse Time screen is used to tell the controller how long to fast rinse a filter, softener or dealkalizer.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Salt Dosage Setting – (Softener only)

The salt dose screen is used to tell how much salt per ft^3 of resin should be used when regenerating the softener. The nominal capacity of a softener is achieved when 15 lbs./ ft^3 is used for regeneration. More efficient operation can be achieved with lower salt settings such as 10 lbs./ ft^3 or 5 lbs./ ft^3; however, the capacity of the system will be lower. The following table will be useful in selecting the appropriate settings. (Salt dose settings can be set in the range of 4 - 20 lbs./ ft^3.)

Dose (lbs./ Ft^3)	Capacity (grains/ Ft^3)
5	17,700
10	24,900
15	29,400
20	32,400

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Recharge Time – (Single Systems and ALT-2 with Delayed Regen)

The Recharge Time screen is used on Single, Alt-2 with Delayed Regen (VIP-1E) softener or filter systems to specify the time at which regeneration will begin. Time Clock mode of operation also uses this feature for time of regeneration. The recharge time can only be set to a whole hour increment in the 24-hour mode. The default time for Softeners and Dealkalizers is 2:00 am. The default for filters is 12:00 midnight.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Fixed Reserve – (Single Systems only)

The Fixed Reserve screen is used to choose whether or not the control will be allowed to determine the best choices of when to regenerate a single softener, dealkalizer or filter. In ***AUTO*** mode, the control uses sophisticated rules to examine water usage and history to make decisions about scheduling regenerations in anticipation of demand.

There are certain situations where the control's decision may not provide the best choice of when to regenerate. In these situations, the controller can be set to regenerate based upon a preset trip point rather than a variable. This trip point is adjustable from 0% (all capacity depleted) to 100% (schedule the next available regeneration).

The fixed reserve is indicated by the number of charge bar segments showing (each segment equals 10%). Press **[SELECT]** to advance to the next screen.

Maximum Days Between Regenerations

The Maximum Days Screen is used to force a regeneration if one has not occurred within a given number of days. The control default is ***AUTO***. This means that regeneration occurs only as called for by the control.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

97% Capacity Setting – (Single Systems only)

When the 97% screen is selected ***ON***, a single softener, filter and dealkalizer will regenerate ***immediately***, when 97% of the capacity is depleted. The default for this setting is ***OFF***. When the 97% screen is ***OFF***, and capacity is depleted, regeneration is scheduled for the preset ***Recharge Time***. The unit will remain on line and supply untreated water until regeneration is completed.

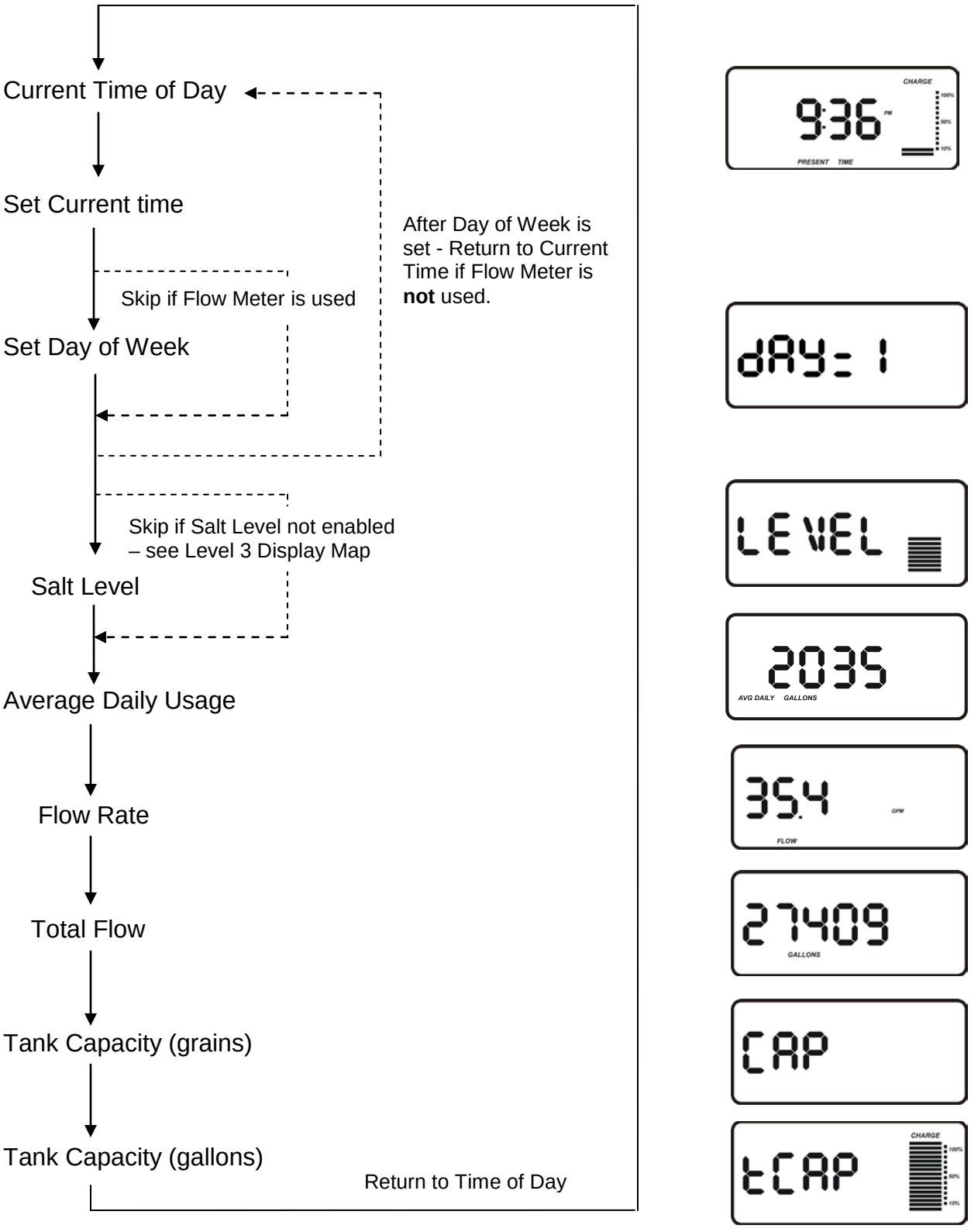
Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

Filter Gallons

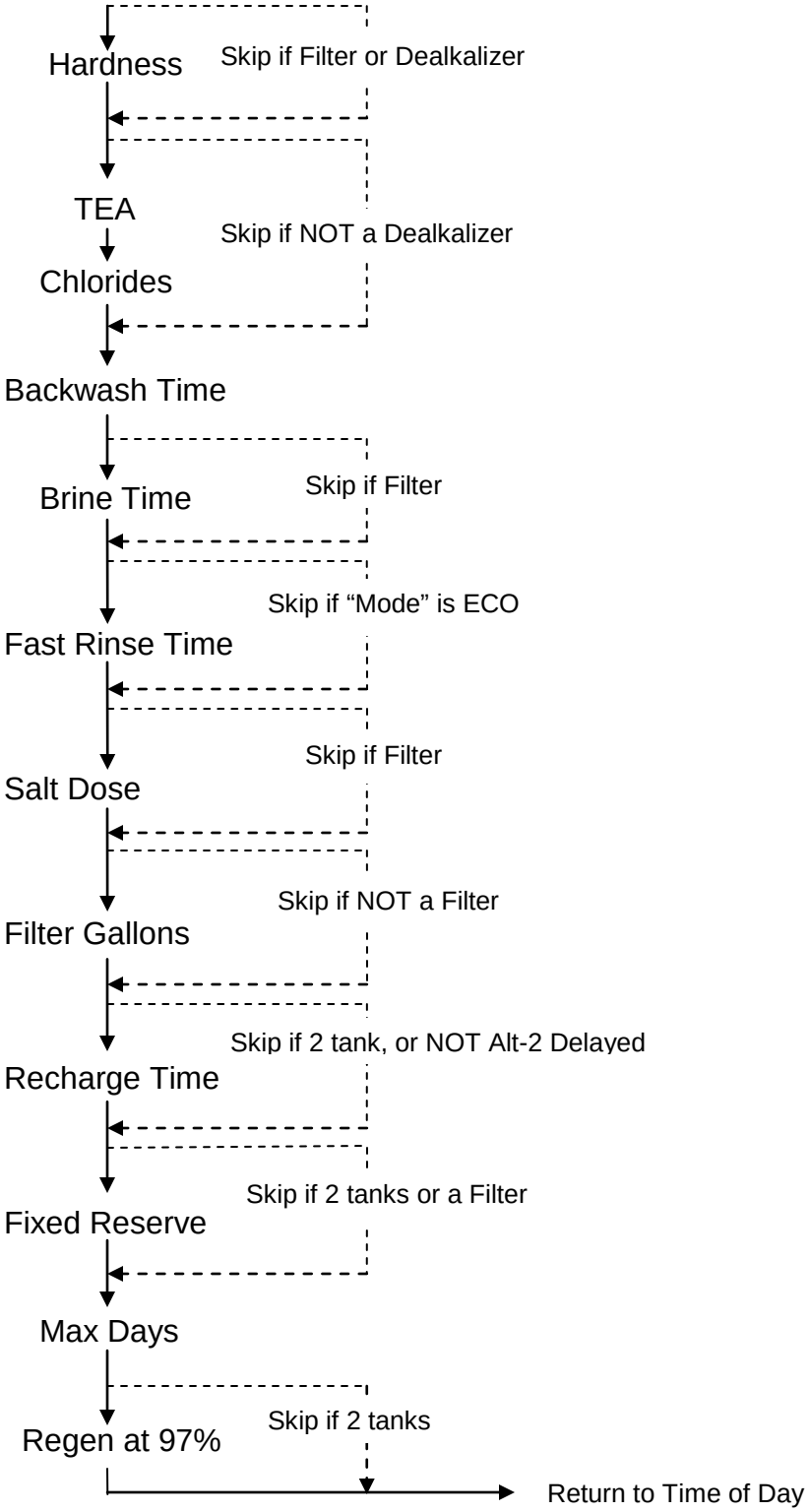
The Filter Gallons screen is used to set how many gallons (liters) is allowed to pass through a filter before backwashing is required. The filter gallons (liters) value has a range off 1000 to 999,000 gallons (378E4 liters) and is adjustable in 1000-gallon increments. If the value is adjusted to below 1000 gallons the display will read ***OFF*** indicating the gallons (liters) function is ***OFF*** and the unit will only regenerate manually or by an external signal. This screen is not available when *Softener or Dealkalizer* is selected. The display to the right shows 7000 gallons.

Use the **[▲]** up or **[▼]** down buttons to identify the correct choice and press **[SELECT]**.

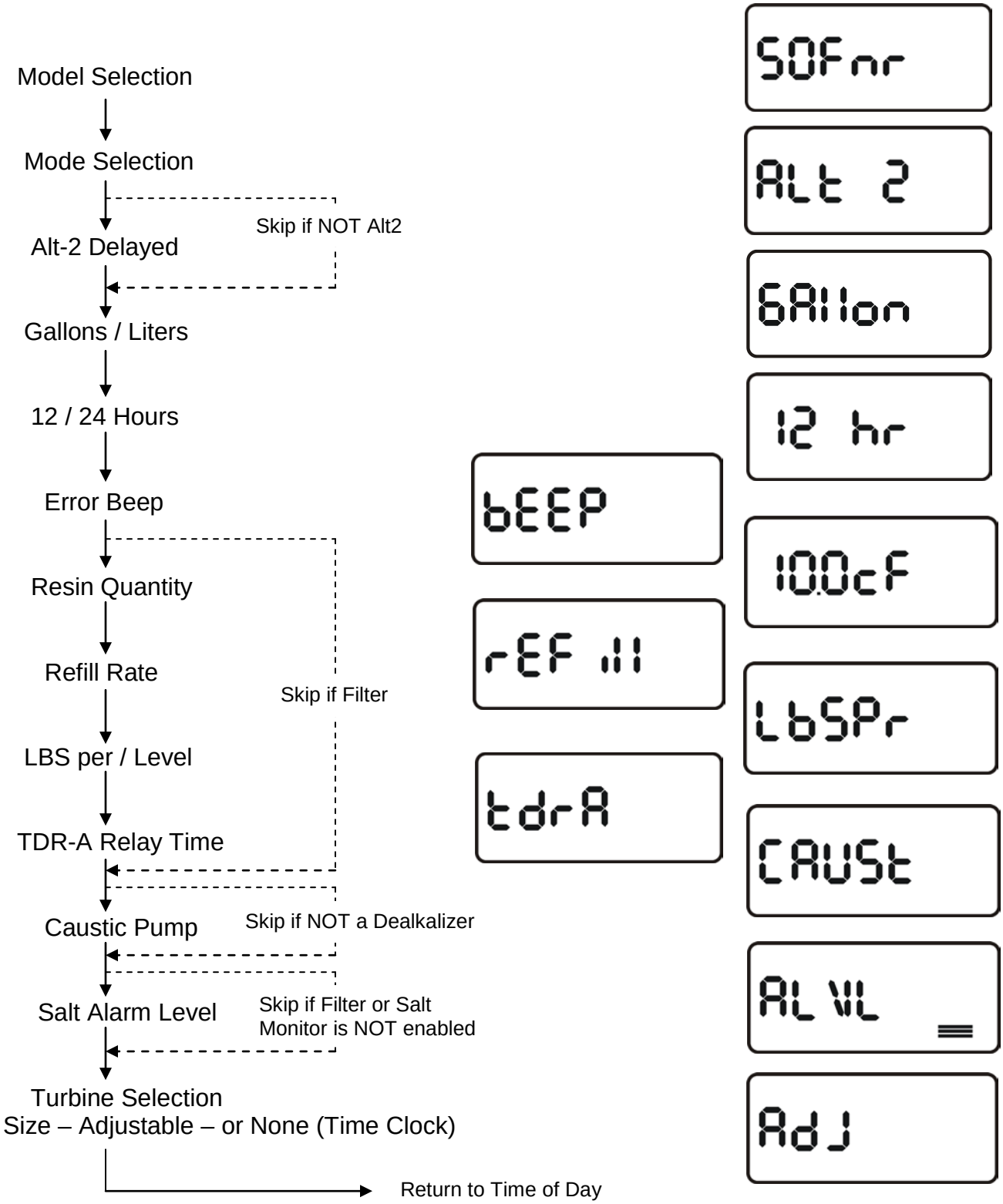
LEVEL 1 DISPLAY MAP



LEVEL 2 DISPLAY MAP



LEVEL 3 DISPLAY MAP



The VIP I Electronic Control offers an unprecedented amount of information and assistance for monitoring system performance and diagnosing system problems. The tools for accessing this information are reviewed in detail in the following sections - Automatic Diagnostics and Manual Diagnostics.

INITIAL CHECKOUT

Before moving to the more advanced tools, always perform the following initial checkout.

1. Is the display time correct?
   - If the display is blank, check power.
   - If the display time is flashing, there was a power failure for more than 4 days. The system will continue to operate correctly; however, reconditioning will occur at incorrect times. Reset the time of day to correct the problem.

   - If the ***Error*** code is showing, go to the ***Automatic Diagnostics*** section.
2. Are plumbing isolation valves fully open? Is the manual bypass valve fully closed?
3. Are power, control, and turbine cables installed correctly and securely?
4. Are inlet, outlet, and drain lines installed correctly (including brine well flow controls)?
5. Is there salt in the brine system? Is the brine tubing installed correctly? Has bridging occurred in the brine system? Does the valve draw and refill properly?
6. Is the hardness setting correct for your water supply? Has the hardness level changed since it was tested?

If you do not find the problem after making the initial check, go to the ***Manual Diagnostics*** section of this manual.

AUTOMATIC DIAGNOSTICS

The computer automatically performs a number of diagnostics checks during the normal operation of the system. If a condition is detected that would prevent the system from functioning properly, an error code is displayed and if the alarm feature is ***ON***, the speaker will begin beeping.

When an error code is being displayed and the **[SELECT]** button is held, the controller will enter the manual diagnostics display screen to aid in trouble shooting.

Error Code

Error — Indicates one of the following is occurring:

- The motor is not running and/or the position switch is bad.
- A timing or valve position error has occurred during regeneration.
- The valve is unable to find the home position.
- The valve is cycling continuously.

Problem	Solution
Faulty Motor.	Replace Motor
Faulty Position Switch	Replace Position Switch
Faulty Cable to Position Switches	Replace Cable to Position Switch
Bad Output Drive Circuit to Motor	Replace Electronics
Improperly Placed Position Switch	Reposition Switch
Bad Wiring or Connector to Motor	Replace Motor
Bad Position Input Circuits	Replace Face Plate

Clearing the Error Code

The Error Code can be cleared in two ways:

- ***Turn off and then restore power*** This will reset the error code and the system will return to normal operation. If the error code still exists, the controller will redisplay the error code the next time it checks for that condition.

- Pressing the **[REGEN]** button will direct the control to attempt to clear the error. If successful, normal operation will resume. If unsuccessful, the error code will reappear and operation will again be halted.

FOURTH LEVEL MANUAL DIAGNOSTICS

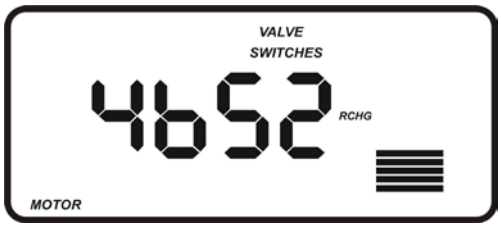
These functions are accessed through the Manual Diagnostics (fourth level select) screen. This screen is used to diagnose problems with the turbine, valve position, outputs, and inputs. The manual diagnostics screen can be accessed in two ways.

- Pressing the **[SELECT]** button when an error code is showing.
- Fourth Level Select Screens — Press and hold **[SELECT]** button for 3 seconds one time, repeat a second time, and then a third time.

Manual Diagnostics Display

46 - The first three places on the left side of the display are the Turbine pulses. This number will change as the turbine counts pulses.

5 – The valve position, matches number of bars lit.
- 0 – Service
- 1 – Backwash
- 2 – Brine/Rinse
- 3 – Fast Rinse
- 4 – Refill
- 5 – Standby
- H – Valve is Homing



2 – The unit being viewed (Unit #2 shown). Press the **[▲]** up button to alternate between unit 1 and unit 2.

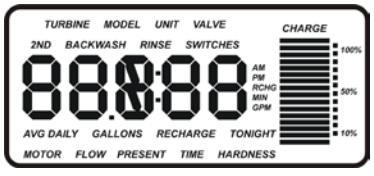
Valve Switches – Shows when micro-switch on valve is closed, and does not show if switch is open.

Motor - segment will be displayed any time a valve motor is running.

RCHG – segment will be displayed when external switch is activated.

Display All Digits

If both of the **[▲]** up or **[▼]** down buttons are depressed while in the Manual Diagnostics display, the controller turns on all display segments. This verifies the segments and that the **[▲]** up or **[▼]** down buttons are working.



Number of Regenerations

Pressing and holding the **[▼]** down button will temporarily display the ***UNIT*** and ***RECHARGE*** segments and the number of regenerations. Pressing and holding again will show the ***UNIT*** and ***TIME*** segments and the number of days in operation.

Manually Advancing through the Regeneration Cycles

The units can be manually advanced through the regeneration cycles utilizing the **[REGEN]** button. Place the control in the Fourth Level Diagnostics screen and depress the **[REGEN]** button. The unit will advance into the backwash cycle of regeneration.

(Note: If system is an ALT2 system, then both units will advance into the service position. There will be a 20 second delay and then one unit will advance into backwash cycle).

When the motor stops, depress the **[REGEN]** button again and the unit in regeneration will advance one step. This function can be used to manually advance a valve through the regeneration cycle to check valve operation.

The system can be manually advanced through a regeneration cycle without going to the Diagnostics level, but there is nothing to indicate the cycle the unit is in.

FIFTH LEVEL ADVANCED DIAGNOSTICS

The Fifth Level Diagnostics will display the history of the control and should only be accessed by a qualified Technical Service Representative. The display will provide the following information:

- Status of Tank #1
- Status of Tank #2
- Tank #1 Days since last regen
- Tank #2 Days since last regen
- Tank #1 capacity left in gallons
- Tank #2 capacity left in gallons
- Tank #1 filter gallons used
- Tank #2 filter gallons used
- Total gallons through system
- Today's water usage
- Average daily gallons
- Day counter
- Previous average daily gallons
- Number of regenerations
- Days in service
- Control state
- Error Code
- Digital input state
- Digital output state
- Regen Flags
- Regen phase timer
- Reason for last regeneration
- Current regen step
- Regen tank (1 or 2)
- Pounds of salt in brine tank
- Brine draw output time
- Daily gallons difference
- History of gallons
- Day counter
- Gallons capacity

CALIBRATION DATA for FLOW SENSORS

The proper size Flow Sensor must be specified in the Turbine Select screen of the VIP Control. The VIP Control has the “K” factors for the .75”, 1”, 1.5” and 2” built in to its algorithm. The “K” factor is the number of pulses per gallon If ADJ is selected then the VIP has the capability to accept the “K” factor from any Flow Meter with a square wave output. Signet model 2536 is one such meter. The tables below provide the “K” factor associated with the type of pipe for standard meters offered.

Type of Sensor	Pipe Size	Pulses per Gallon		
VIP PVC & Brass	.75”	200		
	1.0”	100		
	1.5”	46		
	2.0”	46		
Signet 2536 for Iron Pipe		***Sch 40 Pipe***	***Sch 80 Pipe***	
	1” Tee	287	-	
	1.5” Tee	91	-	
	2” Tee	54	-	
	2” Saddle	54	65	
	3” Saddle	23.2	26	
	4” Saddle	13.3	14.7	
Signet 2536 for PVC Pipe		***Sch 40 Pipe***	***Sch 80 Pipe***	
	1” Tee	-	352	
	1.5” Tee	-	117	
	2” Tee	-	67	
	2” Saddle	55	67	
	3” Saddle	23.7	27	
	4” Saddle	13.5	15.0	
Signet 2536		***Type K***	***Type L***	***Type M***
for	3”	28	27	26
Copper Pipe	4”	15.8	15.2	14.9

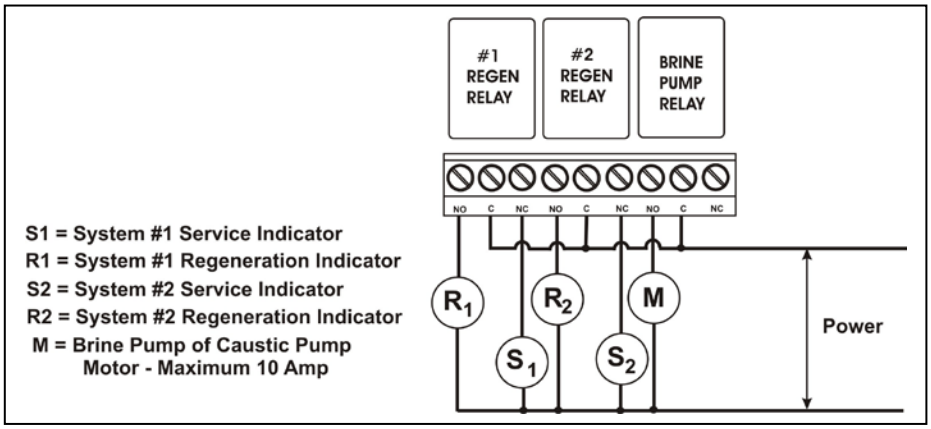
OPTIONAL RELAY OUTPUTS

The control is equipped with three - single pole double through relays. Relay #1 corresponds to Unit #1 and is “Off” during the Service cycle and “On” during the regeneration. Relay #2 is “Off” during the Service cycle and “On” during the regeneration. Relay #3 is only “On” during the brine draw cycle of Unit #1 or Unit #2 when the TDRA time in the control is programmed. See TDRA programming information.

Cycle	Relay #1	Relay #2	Relay #3
Unit #1 Service	Off	Off	Off
Unit #1 Regeneration	**On**	Off	*
Unit #2 Service	Off	Off	Off
Unit #2 Regeneration	Off	**On**	*
Error - Alarm	**On**	**On**	NA
* Unit #1 or #2 Brine Draw	NA	NA	**On**

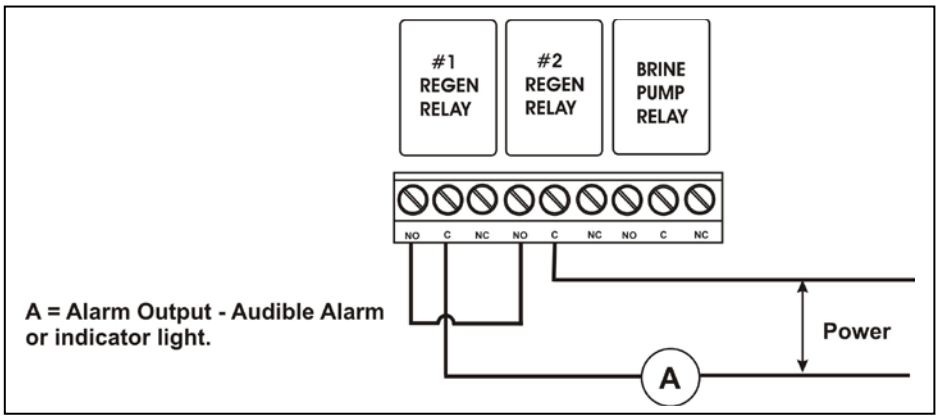
Regeneration and Service Signals

The wiring diagram shows how to connect the regeneration indicators for systems #1 and #2. The terminal strip shown in the diagram is located on the back of the PC board. The contacts on the relays are isolated contacts. The relays must have an external power source connected. The relay contacts are rated for 10 amps. The regeneration signal outputs are labeled “R_1” and “R_2” in the diagram below, while the service signal outputs are labeled “S_1” and “S_2”. The “M” indicates the Brine or Caustic Pump Motor connection.



Alarm Connection

Should an alarm output be desired, wire the terminal block as shown. In an alarm or error condition both Relay #1 and Relay #2 are activated. An external power source may be used for the alarm. The relay contacts are rated for 10 amps. The alarm will activate when an ***Error*** code is encountered.



Time Clock Softener Programming Guide

Form No. 999400 – Softener Time Clock Programming Guide
Revised: 07/16/13

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REGENERATION CYCLE TIMER SETUP

All control valves come from the factory configured with the default regeneration cycle program settings. Even if you do not intend to change the factory settings, they should be checked. Refer to the valves separate instruction manual for these settings:

- Backwash ……..... 10 minutes
- Brine and Slow Rinse …….…….. 60 minutes
- Rapid Rinse …… 10 minutes
- Brine Refill …… 10 minutes

Backwash time is based upon the clarity of the raw water. The minimum recommended time setting for softeners is 5 minutes for a clean, clear raw water supply. If the raw water contains small amounts of turbidity, backwashing longer and more frequently is recommended. If the raw water condition is too poor, pre-treatment equipment must be installed. Filters should be set to match the application, 20 minutes is not unusual.

Brine and Slow Rinse time must be adjusted according to the salt dosage selected for the softener. As Brine Refill settings rise, the amount of time required by a softener to draw brine and slow rinse increases. As a rule of thumb, use the following:

- 5 lb./ft^3 ……Use the default setting, 60 minutes.
- 10 lb./ft^3 ……Increase Brine and Slow Rinse to 80 minutes.
- 15 lb./ft^3 ... ……..Increase Brine and Slow Rinse to 100 minutes.

These three settings correspond to the beginning, middle, and end of the range of capacities specified in Table 3 and are only recommendations. They should be adjusted as experience and observation with a particular installation dictate. Filters are set to the minimum setting, 4 minutes (or 2 pins).

Rapid Rinse time is recommended at 10 minutes **minimum**. Experience with the equipment may indicate that longer rapid rinse period is required.

Brine Refill determines the capacity of the softener. More brine results in higher softener capacity. The amount of brine produced by the brine system is determined by the time set on the brine refill step. Consult Table 5 for the relationship between refill times and the capacity that will result. Filters should be set to the minimum setting, 4 minutes (or 2 pins).

HOW TO CHANGE 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 the 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 BRINE DRAW AND SLOW RINSE TIME

- The group of holes between the last pin in the backwash section and the second group of pins determine the length of time that your unit will brine and rinse (2 min. per hole).
- 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 FAST RINSE TIME

- 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).
- 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.

NOTE: Program wheels have 0 to 165 min. cycle times, use "2" min. per pin or hole to set regeneration times. The layout of pins and holes on the program wheel follow the same procedures as on this page.

HOW TO CHANGE THE REFILL TIME

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

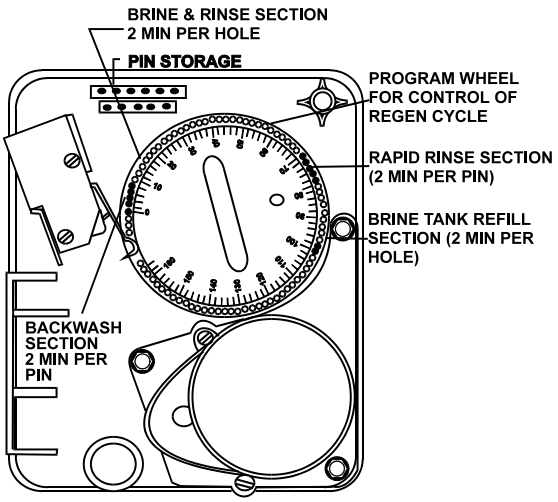


Table 5: Capacity Chart

Capacity	30K A (1")	60K A (1")	90K B (1 ½")	120K B (1 ½") C (2")	150K B (1 ½") C (2")	210K B (1 ½") C (2")	300K B (1 ½") C (2")	450K C (2")	450K E (3")	600K C (2")	600K E (3")	900K E (3")	1200K E (3")	1500K E (3") F (4")	900K E (3") F (4")	1200K E (3") F (4")
Resin (Ft^3):	1	2	3	4	5	7	10	15	15	20	20	30	40	50	60	85
Refill (GPM):	0.5	0.5	0.5	0.5	0.5	2	2	2	4	2	4	4	4	10	10	10
Refill Time:																
4 min.	19,600															
6	24,100	33,400				123,900			265,500							
8	26,900	39,200				149,800	177,000		307,500		354,000			885,000		
10	30,000	44,200	53,100			164,500	196,000		342,000		392,000			980,000	1,062,000	
12		48,200	58,800	66,800		177,800	214,000	265,500	367,500		428,000	531,000		1,070,000	1,176,000	
16		53,800	68,400	78,400	88,500	197,400	245,000	307,500	415,500	354,000	490,000	615,000	708,000	1,225,000	1,284,000	1,620,000
20		58,800	74,700	88,400	98,000	210,000	269,000	342,000	450,000	392,000	538,000	684,000	784,000	1,345,000	1,470,000	1,818,000
24		60,000	80,700	96,400	107,000		291,000	367,500		434,000	582,000	735,000	856,000	1,455,000	1,614,000	1,980,000
28			86,100	101,600	117,500		300,000	388,500		470,000	600,000	792,000	940,000	1,500,000	1,746,000	2,082,500
32			90,000	107,600	122,500			415,500		490,000		831,000	980,000		1,800,000	2,250,000
36				112,800	129,500			436,500		518,000		873,000	1,036,000			2,286,000
40				117,600	134,500			450,000		538,000		900,000	1,076,000			2,473,000
44				120,000	138,500					554,000			1,128,000			2,550,000
48					145,500					582,000			1,164,000			
52					148,500					600,000			1,200,000			
56					150,000											
60																

Capacities Shown Are Based Upon :

Influent Hardness ..... 500 PPM as $CaCO_3$

Minimum Salt Dosage ..... 5 lb./ft^3

Maximum Salt Dosage ..... 15 lb./ft^3

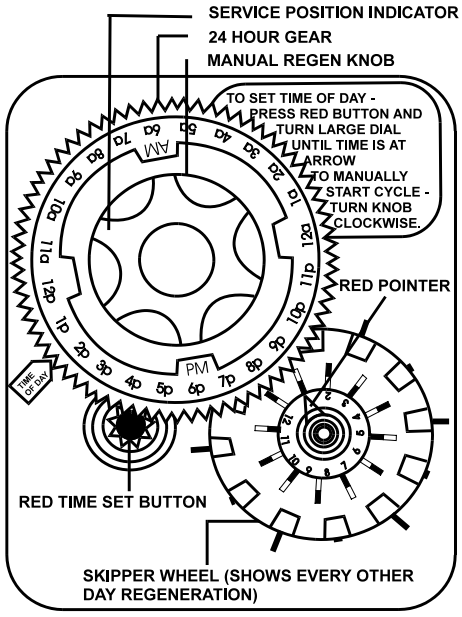
Refill Formula: Refill Time (Minutes) = $\frac{\text{Dose (\#/Ft}^3\text{) X Resin (Ft}^3\text{)}}{\text{3 X Refill Rate (gpm)}}$

SETTING TIME OF DAY

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

MANUAL REGENERATION

- Turn the manual regeneration knob clockwise.
- This slight movement of the manual regeneration knob engages the program wheel and starts the regeneration program.
- The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.
- 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.
- In any event, conditioned water may be drawn after rinse water stops flowing from the water conditioner drain line.

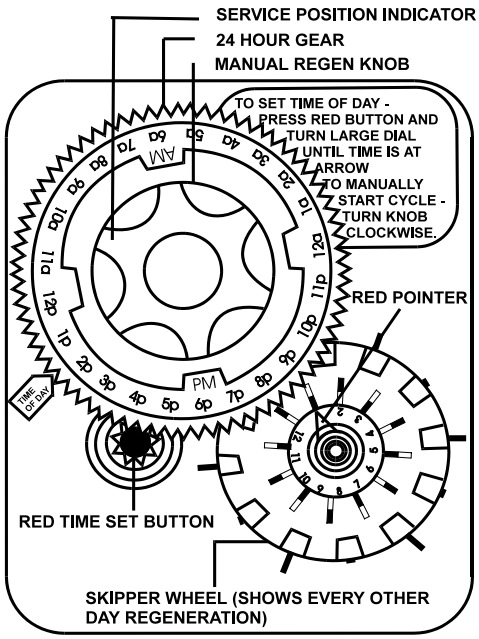


SETTING REGENERATION DAYS

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.

- A 7-day wheel is standard. The 12-day wheel is optional.
- Regeneration occurs at approximately 2 a.m.

** Immediate regeneration timers do not have 24-hour gear. No time of day can be set.*



VIP and Fleck Softener Repair Parts List

Form No. 999400 – Parts Section
Revised 06/01/13

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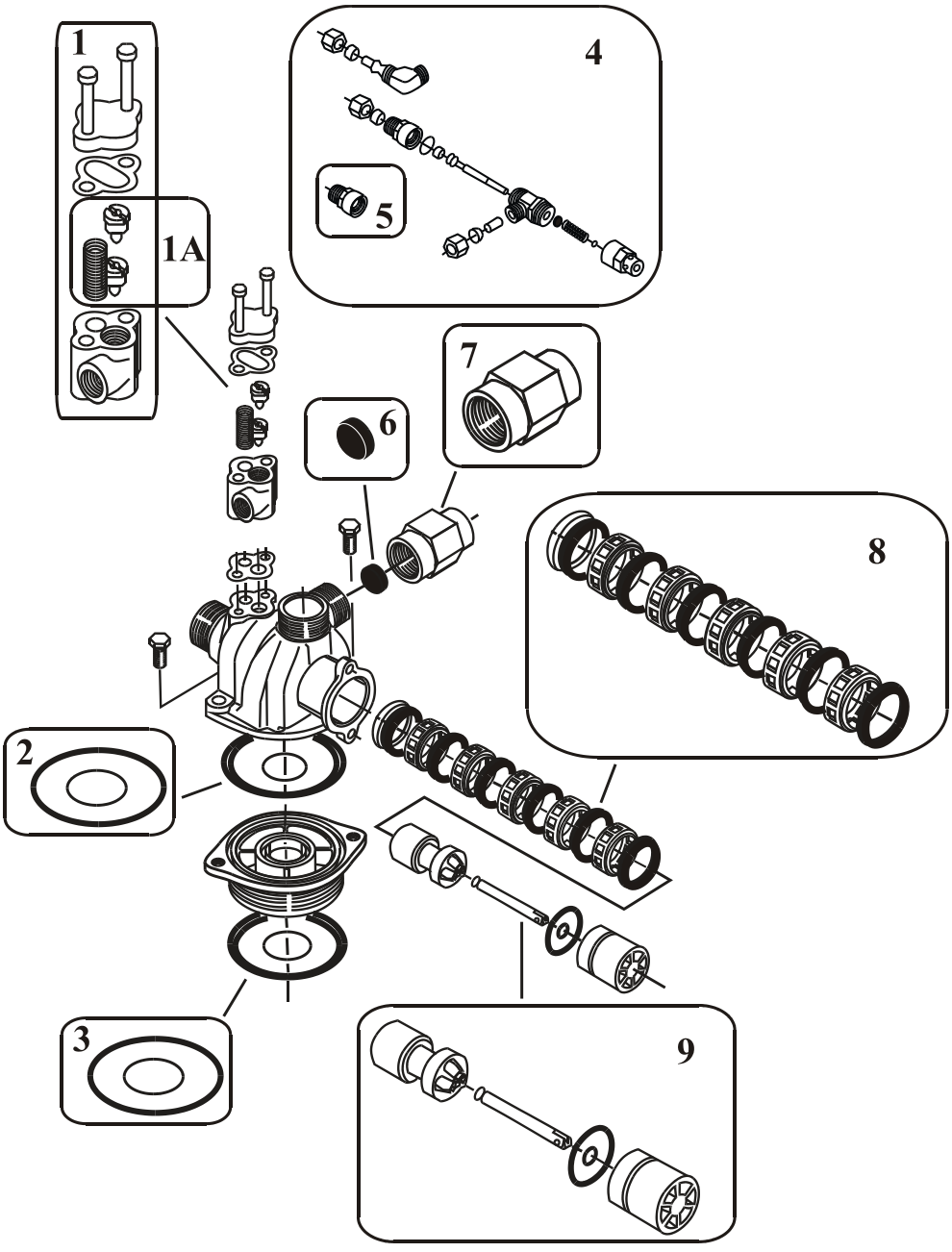
COMPLETE FLECK SOFTENER VALVE ASSEMBLIES

Softener Model Capacity	*System Control Type*			
	Single (VIP I) SNGL	Duplex (VIP I) and Multi-tank (VIP II/III)	Twin Alternating (VIP I)[2]	Time Clock (TC)
30,000-A (1”)	312233	312233[1]	312254[2]	312013[3]
60,000-A (1”)	312234	312234[1]	312255[2]	312013
90,000-A (1”)	312235	312235[1]	312256[2]	312013[3]
90,000-B (1 ½“)	312237	312237[1]	312257[2]	312012
120 to 180,000-B (1 ½”)	312238	312238[1]	312258[2]	312012[3]
210 to 300,000-B (1 ½“)	312239	312239[1]	312259[2]	312011
120 to 180,000-C (2”)	312240	312241	---	312008
210 to 300,000-C (2”)	312242	312243	---	312007
450 to 600,000-C (2”)	312244	312245	---	312007[3]
750,000-C (2”)	312246	312247	---	---
450 to 600,000-E (3”)	312248	312249	---	312038[3]
750 to 900,000-E (3”)	312250	312251	---	312038[3]
1,200,000-E (3”)	312252	312253	---	312038
1,500,000-E (3”)	312272	312272	---	---
1,800,000-E (3”)	312273	312273	---	---
1,500,000-F (4”) SM	312268	312268	---	---
1,800,000-F (4”) SM	312269	312269	---	---
2,550,000-F (4”) SM	312270	312270	---	---

(1) Diaphragm Valves are used as stop valves on all Multi-tank systems. Control valve is hard water by-pass type.
(2) 1” Fleck 9000 and 1-1/2” Fleck 9500 Valves
(3) When ordering Time Clock Valves specify unit capacity or unit size, so that proper size injector and refill flow control can be included.

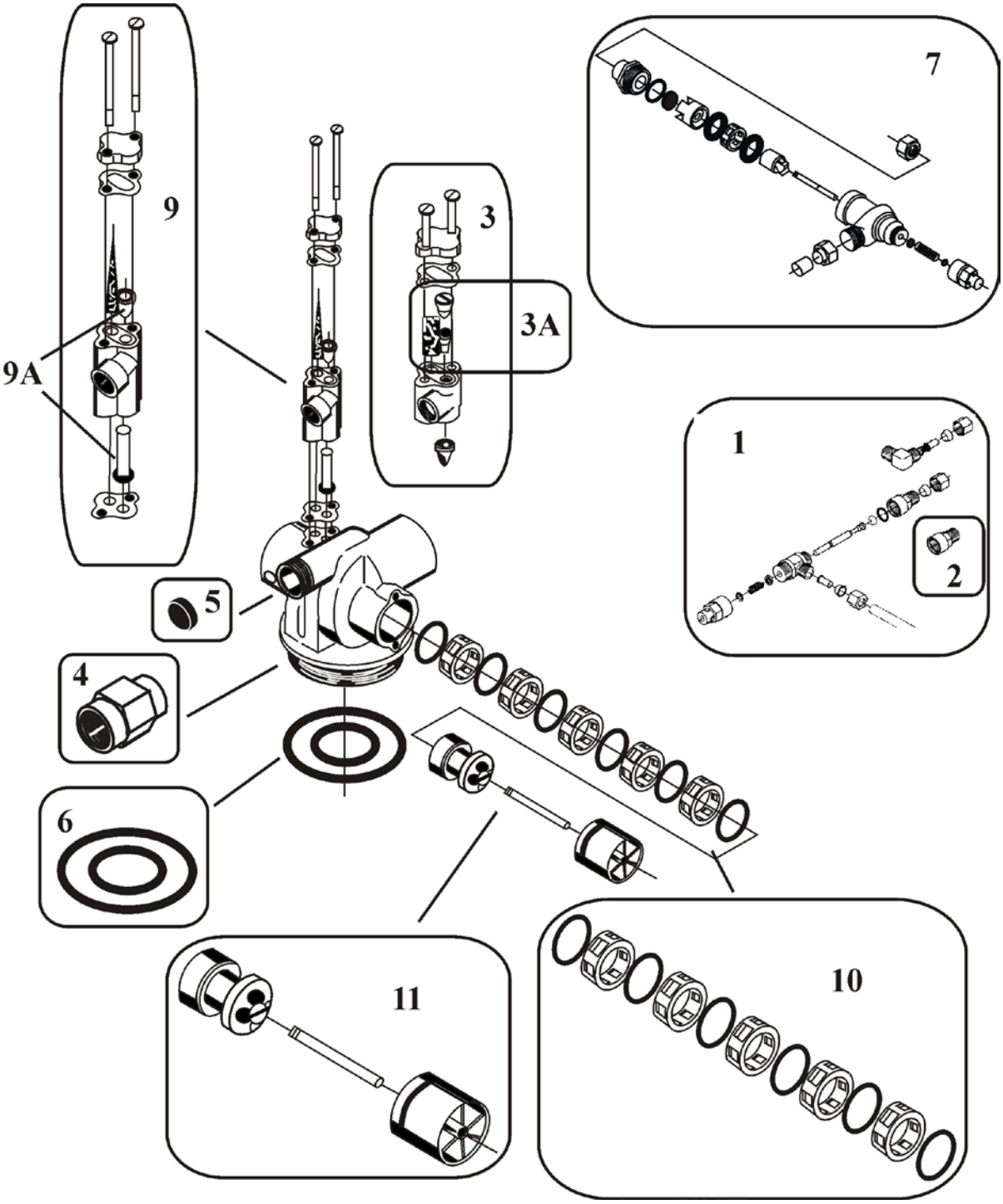
MODEL 2750 FLECK 1” VALVE



MODEL 2750 FLECK 1" VALVE (CONT'D)

Item No.	Part Number	Description	Used On Models
1	FLK 60480-01	1600 Brine Injector Assy. Complete w/ White #1 injector	30
	FLK 60480-02	1600 Brine Injector Assy. Complete w/ Blue #2 injector	60-90
1A	312186	Throat, Nozzle, Screen Kit - #1 White	30
	312201	Throat, Nozzle, Screen Kit - #2 Blue	60-90
2	312202	O-Ring Kit, Valve Body	30-90
3	312203	O-Ring Kit, Tank and Riser	30-90
4	FLK 60029-020	1600 Brine Valve Assy. (3/8" Ln - Short Stem)	30-90
5	FLK 60361-50	Brine Line Flow Control (0.5 gpm)	30-90
6 & 7	312144	Drain Flow Control Housing w/2 GPM Insert	30
	FLK 60699-30	Drain Flow Control Housing w/3 GPM Insert	60
	FLK 60699-50	Drain Flow Control Housing w/5 GPM Insert	90
8	FLK 60121	2750 Seal, Spacer Kit	30-90
9	FLK 60090-HF	Piston Assy. – Hard Water By-pass	30-90
	FLK 60101-01	Piston Assy – No Hard Water By-pass	30-90
10 (Not shown)	**702150**	**Rebuild Kit – HWBYP (includes Items 3, 8 and 9)**	**ALL**
	702211	**Rebuild Kit – NHWBYP (includes Items 3, 8 and 9)**	**ALL**

MODEL 2850 FLECK 1-1/2" VALVE

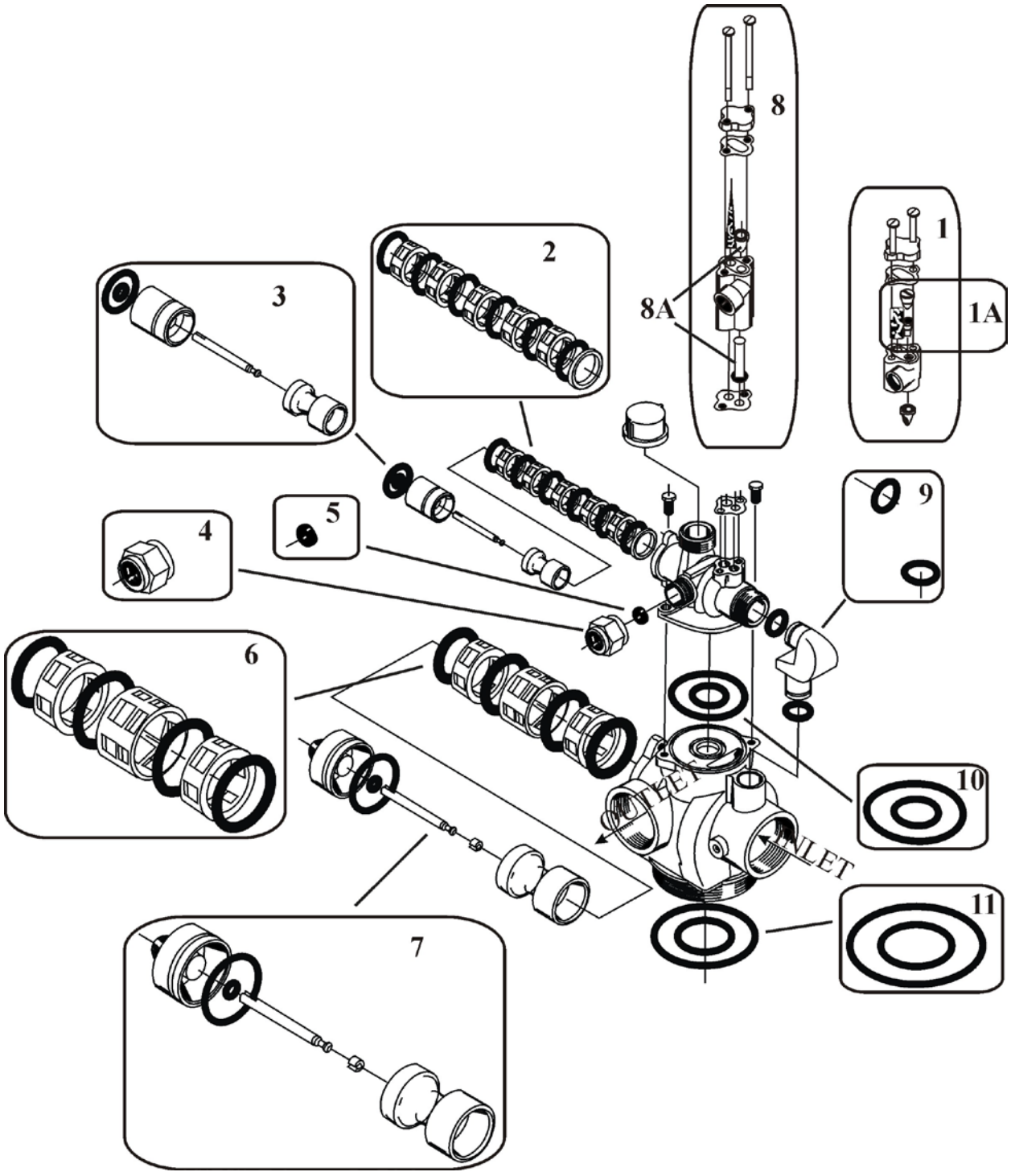


MODEL 2850 FLECK 1-1/2" VALVE (CONT'D)

Item No.	Part Number	Description	Used On Models
1	FLK 60029-020	1600 Brine Valve Assy. (3/8" Ln - Short Stem)	90-180
2	FLK 60020-50	Brine Line Flow Control (0.5 gpm)	90-180
3	FLK 60480-02	1600 Brine Injector Assy. #2 - Blue	90
	FLK 60480-03	1600 Brine Injector Assy. #3 - Yellow	120-180
3A	312201	Throat, Nozzle, Screen Kit #2 - Blue	90
	312204	Throat, Nozzle, Screen Kit #3 - Yellow	120-180
4 & 5	312142	Drain Flow Control Housing w/5 GPM Insert	90
	312143	Drain Flow Control Housing w/7 GPM Insert	120-180
	312019	Drain Flow Control Housing w/15 GPM Insert	210-300
6	312329	O-Ring Kit, Tank and Riser	90-180
7	FLK 60034-20	1700 Brine Valve Assy. Complete Less Injector (1/2" Ln)	210-300
8	Not Available		
9	FLK 60381-04	1700 Injector Assy. Complete w/ 4C injector (green)	210-300
9A	312022	Throat, Nozzle #4C – Green	210-300
10	FLK 60129-20	2850 Seal & Spacer Kit	90-300
11	FLK 60105	Piston Assy. – Hard Water By-Pass	90-300
	FLK-60114-01	Piston Assy. – No Hard Water By-Pass	90-300
12 (Not shown)	**702151**	**Rebuild Kit – HWBYP (includes Items 6, 10 and 11)**	**ALL**
	702208	**Rebuild Kit – NHWBYP (includes Items 6, 10 and 11)**	**ALL**

.

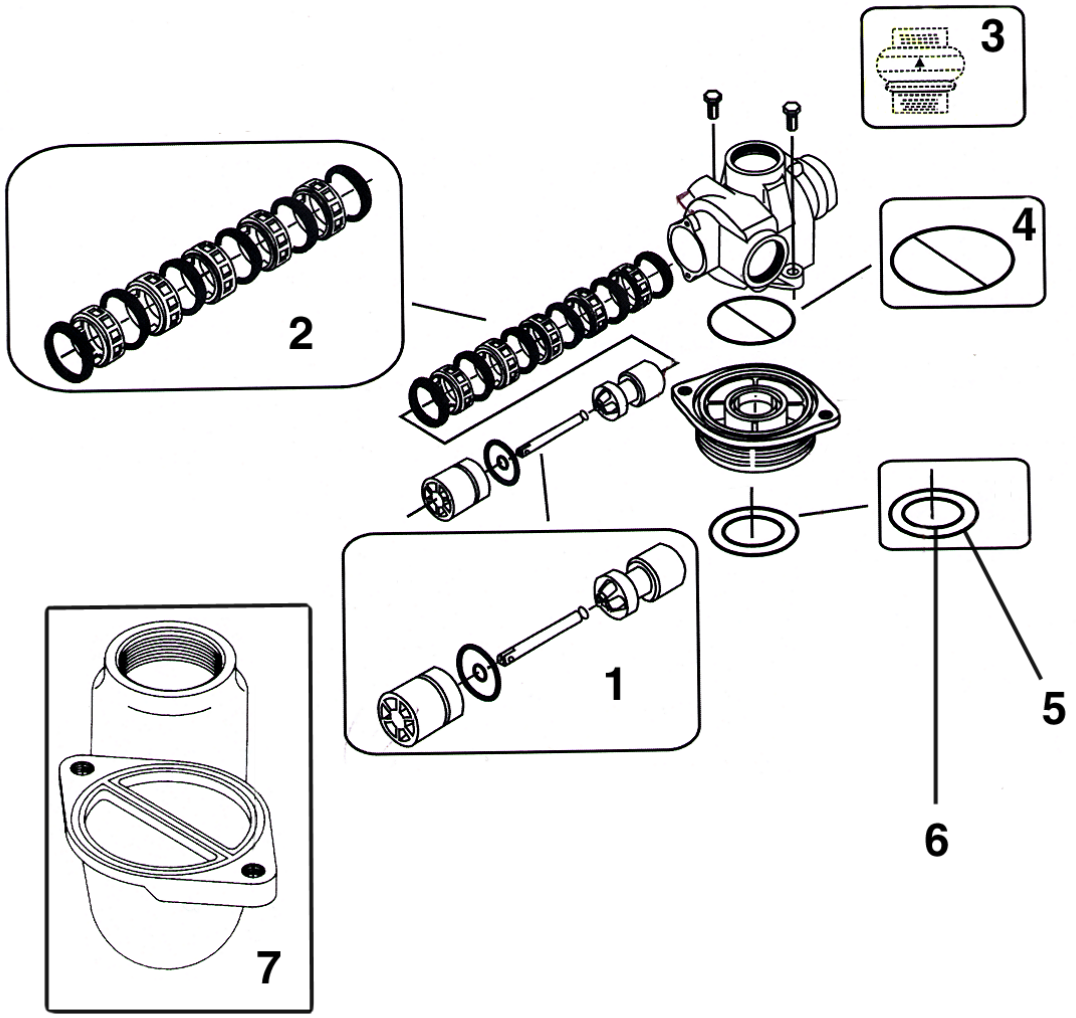
MODEL 2900 FLECK 2” VALVE



MODEL 2900 FLECK 2" VALVE (CONT'D)

Item No.	Part Number		Description		Used On Models
	One piece casting *-After March '05* **2900-S**	*Two piece casting -Before March '05* **2900**			
1	FLK60480-03	FLK60480-03	1600 Brine Injector Complete #3 Assembly		120-180
1A	312204	312204	Throat, Nozzle, Screen Kit with #3 Yellow Injector		120-180
2	FLK61530	FLK60121	2900 Upper Seal & Spacer Kit		120-600
3	FLK61540	FLK60090-HF	2900 Upper Piston Assy.		120-600
4 & 5	312143	312143	Drain Line Flow Control Housing w/7 GPM Insert		120-180
	312019	312019	Drain Line Flow Control Housing w/15 GPM Insert		210-300
	312018	312018	Drain Line Flow Control Housing w/20 GPM Insert		450
	4948	4948	Drain Line Flow Control Housing w/30 GPM Insert		600
6	FLK60128	FLK60128	2900 Lower Seal & Spacer Kit		120-600
7	FLK61550	FLK60103	2900 Lower Piston Assy. (Hard Water Bypass) White		120-600
	FLK61555	312026	2900 Lower Piston Assy. (No Hard Water Bypass) Black		120-600
8	FLK60381-04	FLK60381-04	1700 Brine Injector Assy. Complete w/ Green 4C Injector		210-300
	FLK60381-05	FLK60381-05	1700 Brine Injector Assy. Complete w/ White 5C Injector		450-600
8A	312022	312022	Throat and Nozzle Kit #4C		210-300
	312015	312015	Throat and Nozzle Kit #5C		450-600
9	NA	312208	O-Ring Kit, Regen Water Adapter		120-600
10	NA	312209	O-Ring, Valve Body		120-600
11	312205	312205	O-Ring Kit, Tank and Riser		120-600
12 (Not shown)	**702171**	**702152**	**HWBP Rebuild Kit**	**INCLUDES ITEMS 2, 3, 6, 7 & 11**	**ALL**
	702172	**702153**	**NHWBP Rebuild Kit**		

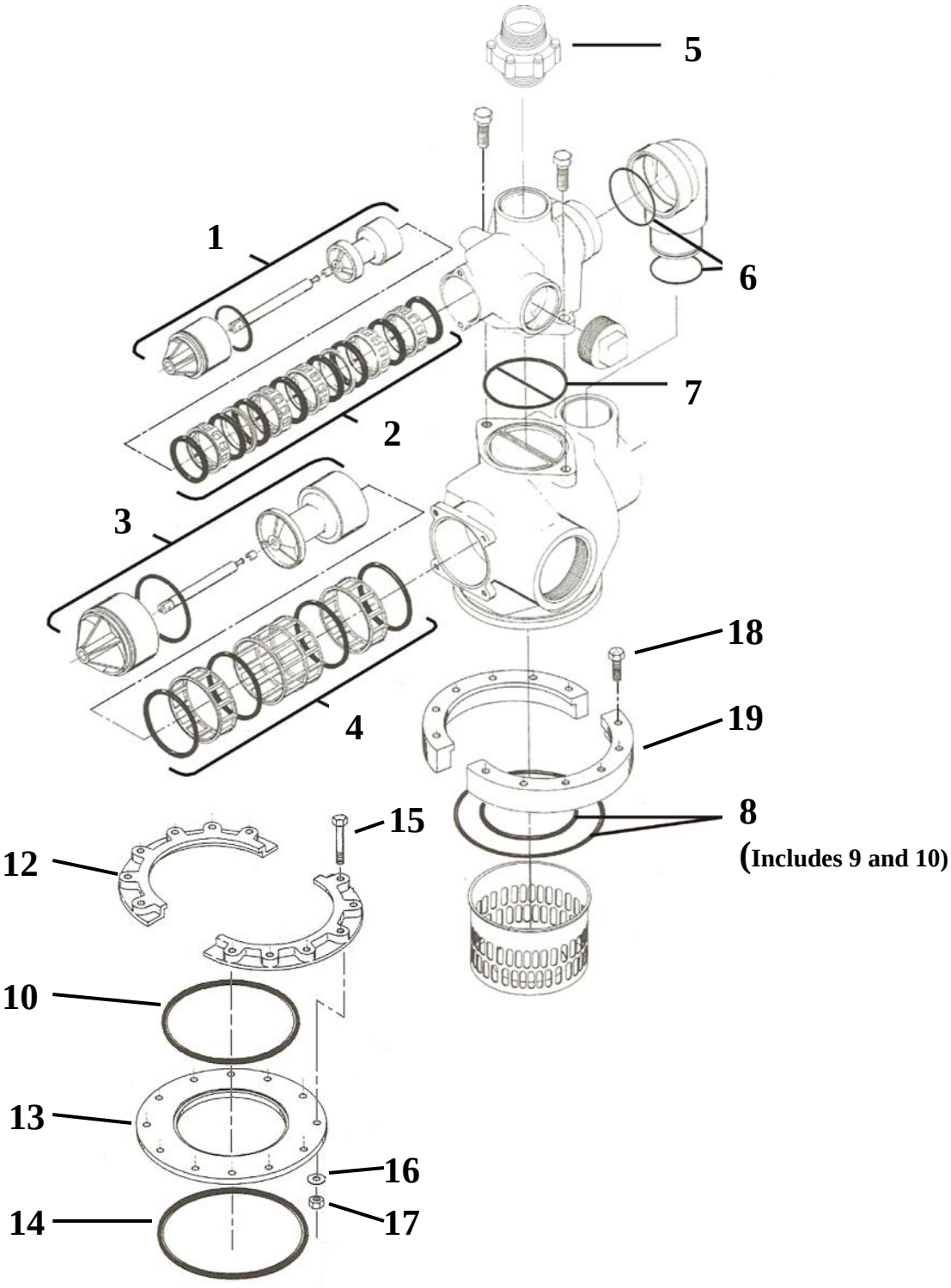
MODEL 3150 SIDE MOUNT FLECK 2” VALVE



MODEL 3150 SIDE MOUNT FLECK 2” VALVE (CONT’D)

Item No.	Part Number	Description		Used On Models
1	FLK60106-00	3150 Piston Assembly - HWBP		1500 - 2550
	312131	3150 Piston Assembly - NHWBP		
2	FLK60131	3150 Seal and Spacer Kit		1500 - 2550
3	312054	2” Brass Drain Line Flow Control - 70 GPM		1500
	312167	2” Brass Drain Line Flow Control - 85 GPM		1800
	312070	2” Brass Drain Line Flow Control - 100 GPM		2550
4	FLK15112	Seal Adapter Base		1500 - 2550
5	FLK15210	O-Ring Top of Park Tank		NA
6	FLK15247	O-Ring-299		NA
7	FLK17407	Side Mount Adapter		1500 - 2550
8 (Not shown)	**702154**	**HWBP Rebuild Kit**	**Includes items 1, 2, 5 & 6**	**ALL**
	702155	**NHWBP Rebuild Kit**		

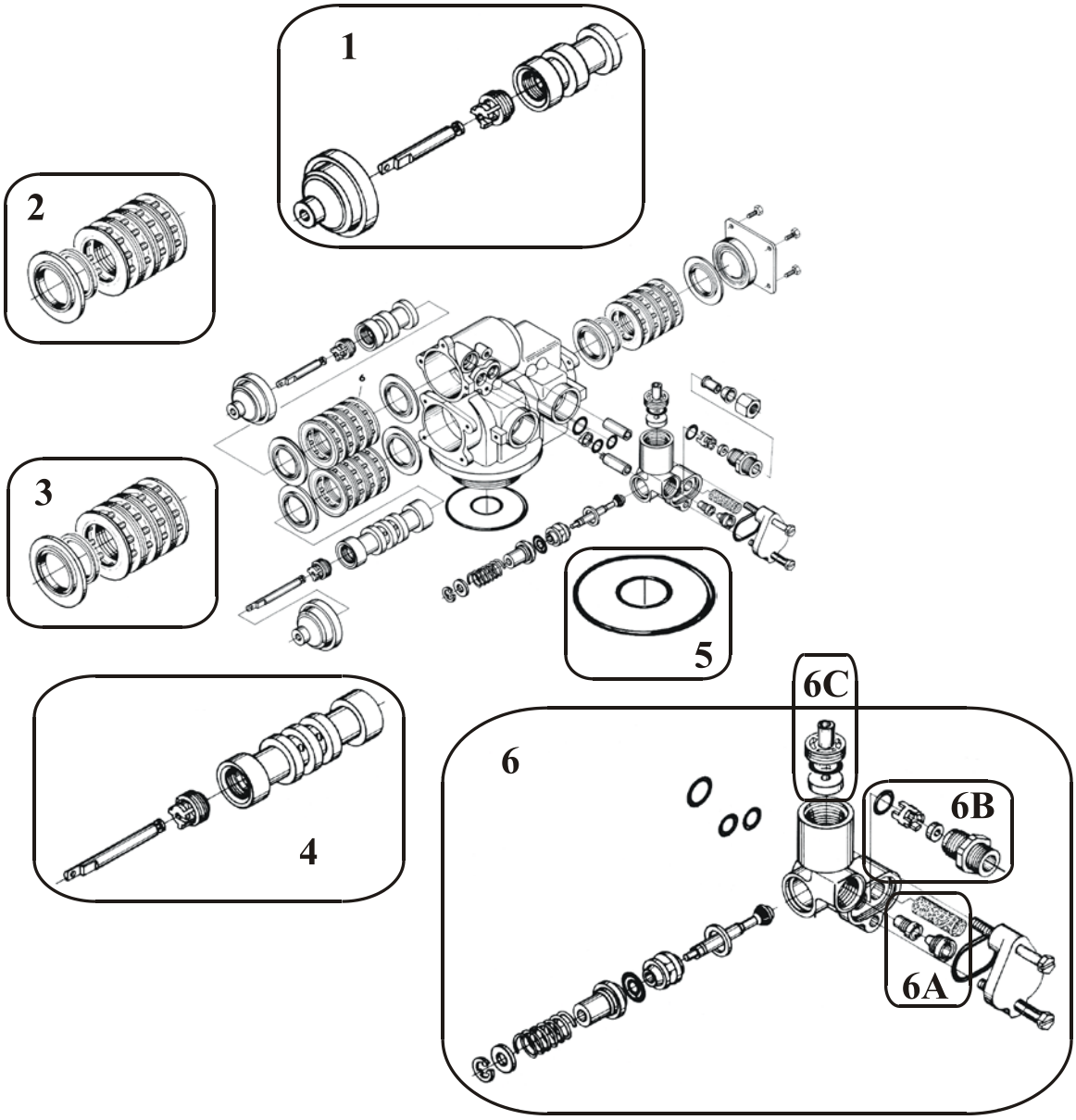
MODEL 3900 FLECK 3” VALVE



MODEL 3900 FLECK 3" VALVE (CONT'D)

Item No.	Part Number	Description		Used On Models
1	FLK60106-00	3900 Upper Piston Assy.		450
2	FLK60131	3900 Upper Seal and Spacer Kit		450-1800
3	312152	3900 Lower Piston Assy. (Hard Water Bypass) (White Cap)		450-1800
	312053	3900 Lower Piston Assy. (Not Hard Water Bypass) (Black Cap)		450-1800
4	FLK60132	3900 Lower Seal and Spacer Kit		450-1800
5	FLK60711-25	2" Brass Drain Line Flow Control - 25 GPM		450
	312043	2" Brass Drain Line Flow Control - 30 GPM		600
	312044	2" Brass Drain Line Flow Control - 40 GPM		900
	312045	2" Brass Drain Line Flow Control - 50 GPM		1200
	312054	2" Brass Drain Line Flow Control - 70 GPM		1500
	312167	2" Brass Drain Line Flow Control - 85 GPM		1800
6	312210	O-Ring Regen. Water Adapter Kit		450-1800
7	FLK15112	Seal, Valve Body		450-1800
8	**312211**	**O-Ring Kit, Tank and Riser (Includes 9 & 10)**		450-1800
9	FLK16800	Riser Tube O-Ring -238		450-1800
10	312181	O-Ring – 362 (FLK16345)		450-1800
11	**312182**	**Kit – 3900 Flange Mount (includes items 12, 13, 14, 15, 16 and 17)**		450-1800
12	312175	Flange Segment (FLK16482) (2 required)		450-1800
13	312176	Flange Ring (FLK16483)		450-1800
14	312177	O-Ring -422 (FLK16484)		450-1800
15	312178	Screw (12 required)		450-1800
16	312179	Washer SS 5/16" x .60 OD (12 required)		450-1800
17	312180	Nut SS 5/16"-18 (12 required)		450-1800
18	FLK11238	Screw for Steel Tank (12 required)		450-1800
19	312199	Flange Segment for Steel Tanks (2 required)		450-1800
20 (not shown)	**702156**	**HWBP Rebuild Kit**	**Includes items 1, 2, 3, 4 & 8**	**ALL**
	702157	**NHWBP Rebuild Kit**		

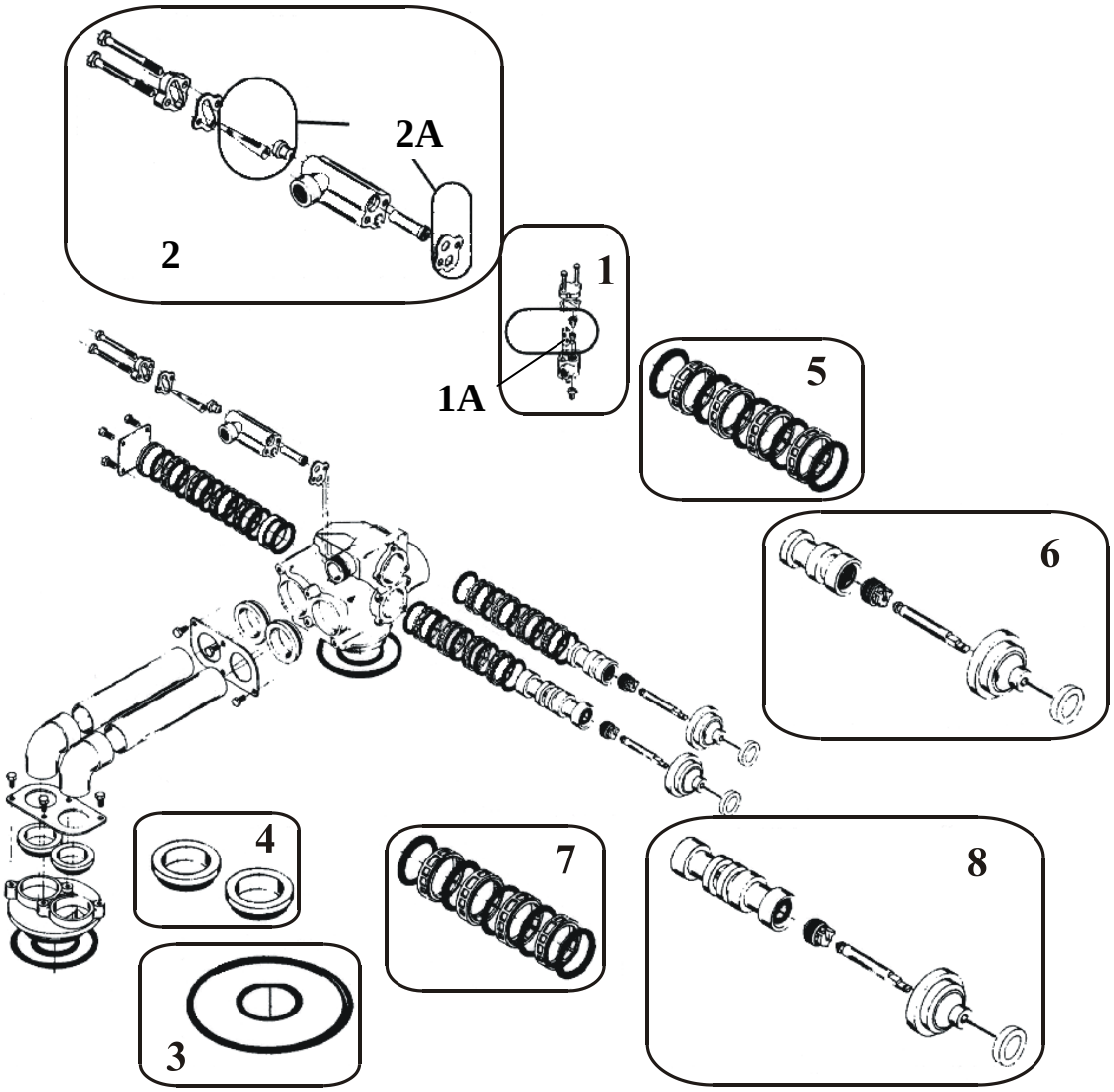
MODEL 9000 TWIN ALTERNATING FLECK 1” VALVE



MODEL 9000 TWIN ALTERNATING FLECK 1" VALVE

Item No.	Part Number	Description	Used On Models
1	FLK60400	Upper Piston Assy.	30-90
2	FLK60125	Upper Seal, Spacer Kit	30-90
3	FLK60421	Lower Seal, Spacer Kit	30-90
4	FLK60401	Lower Piston Assy.	30-90
5	312202	O-Ring, Valve and Riser	30-90
6	FLK60385-0131	9000 Injector Assy. .25 gpm BLFC, #1 injector and 2.0 gpm Drain Line Flow Control	30
	FLK60385-0252	9000 Injector Assy. .50 gpm BLFC, #2 Injector and 3.0 gpm Drain Line Flow Control	60
	FLK60385-0282	9000 Injector Assy. .50 gpm BLFC, #2 injector and 5.0 gpm Drain Line Flow Control	90
6A	312186	9000 Nozzle, Throat, Screen Kit #1 White	30
	312201	9000 Nozzle, Throat, Screen Kit #2 Blue	60-90
6B	312125	Flow Control Insert - 2 GPM (DLFC)	30
	FLK12089	Flow Control Insert - 3 GPM (DLFC)	60
	312021	Flow Control Insert - 5 GPM (DLFC)	90
6C	FLK60022-50	Brine Line Flow Control - 0.5 gpm (BLFC)	60-90
7 (Not shown)	312216	O-ring – couplings (4 req'd)	30 - 90
8 (Not shown)	**702158**	**Valve Rebuild Kit (includes items – 1, 2, 3, 4, 5, & 7)**	**ALL**

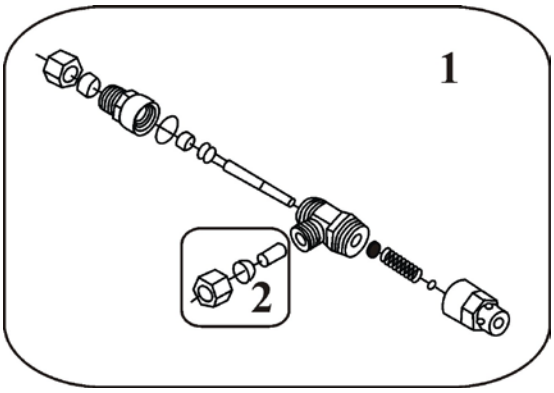
MODEL 9500 TWIN ALTERNATING FLECK 1-1/2” VALVE



MODEL 9500 TWIN ALTERNATING FLECK 1-1/2" VALVE

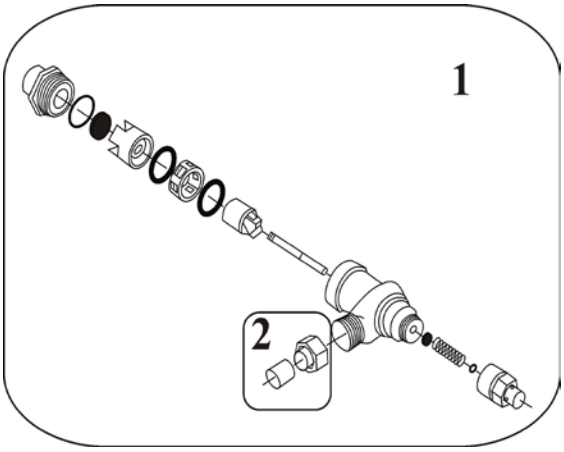
Item No.	Part Number	Description	Used On Models
1	FLK60480-02	1600 Injector Assy. #2 Comp	90
	FLK60480-03	1600 Injector Assy. #3 Comp	120-180
1A	312186	Throat, Nozzle, Screen Kit #1	90
	312204	Throat, Nozzle, Screen Kit #3	120-180
2	FLK60381-04	1700 Injector Assy. with #4C injector Complete	210-300
2A	312206	Throat, Nozzle, Screen Assy. #4C Green	210-300
3	312329	O-Ring, Tank & Riser	90-300
4	312217	O-Ring, Tank Adapter (4 req'd)	90-300
5	FLK60134-20	Upper Seal and Spacer Kit	90-300
6	FLK60108	Upper Piston Kit	90-300
7	FLK60133-20	Lower Seal and Spacer Kit	90-300
8	FLK60109	Lower Piston Kit	90-300
9 (Not shown)	**702159**	**Valve Rebuild Kit – Includes items 3, 4, 5, 6, 7 & 8**	**ALL**

1600 BRINE VALVE ASSEMBLY for MODEL 2750, 2850, 2900 and 9500 FLECK VALVES



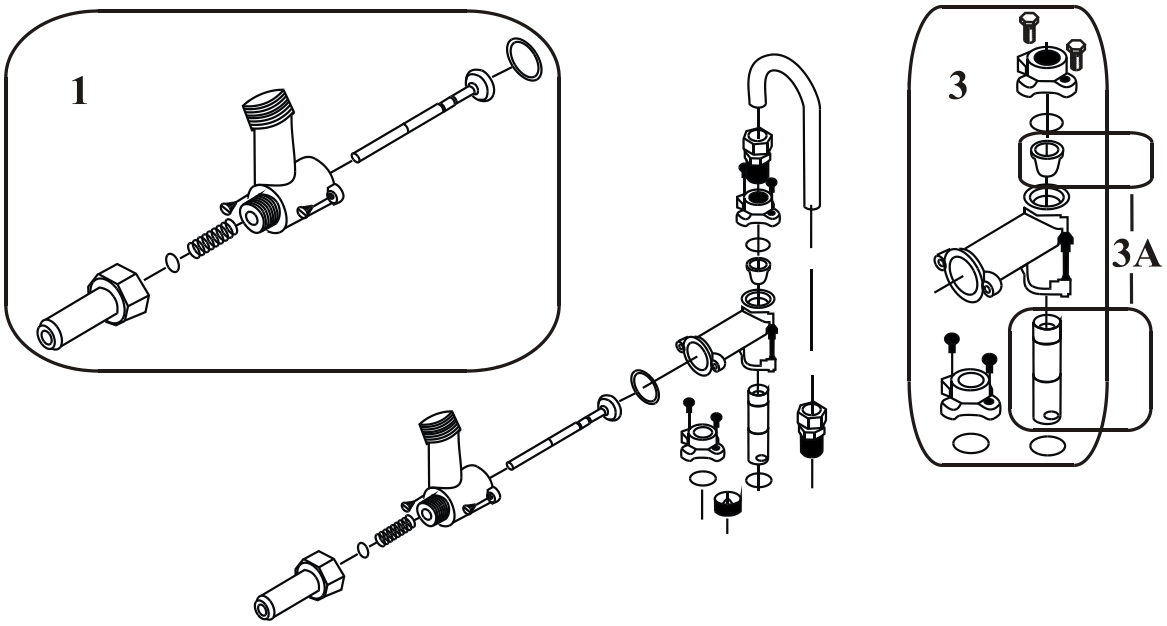
Item No.	Part Number	Description	Used On Models
1	FLK60029-020	2750 Brine Valve	30-90
	FLK60029-020	2850 Brine Valve	90-180
	FLK60029-020	2900 Brine Valve	120-180
	FLK60037-620	9500 Brine Valve	90-180
2	FLK60900-38	3/8” Nut, Sleeve, and Insert Kit	ALL

1700 BRINE VALVE ASSEMBLY for MODEL 2850, 2900 and 9500 FLECK VALVE



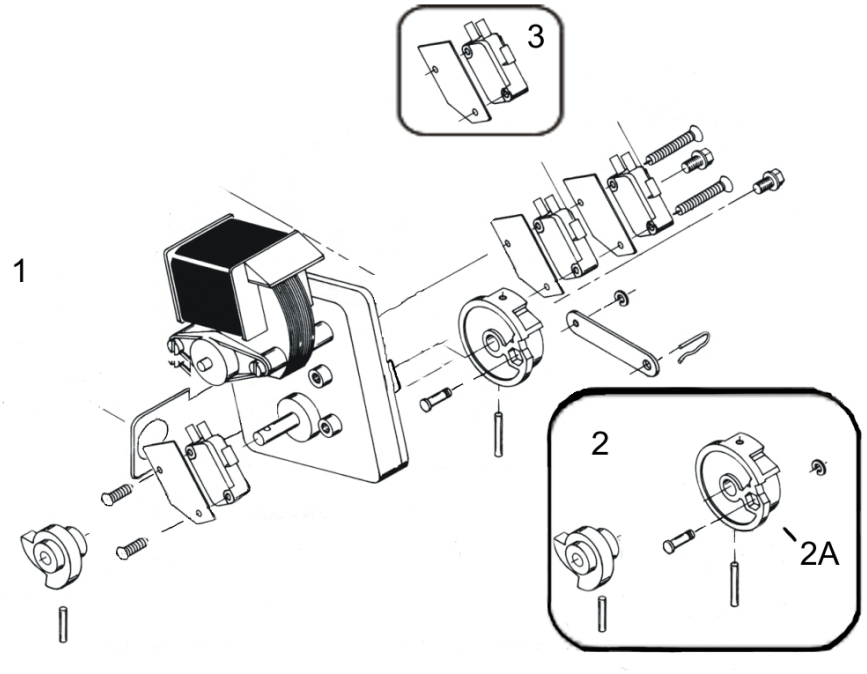
Item No.	Part Number	Description	Used On Models
1	FLK60034-20	2850 Brine Valve	210-300
	FLK60034-20	2900 Brine Valve	210-600
	FLK60039-20	9500 Brine Valve	210-300
2	FLK 60900-39	1/2” Nut, Sleeve, and Insert Kit	ALL

1800 BRINE VALVE ASSEMBLY for 3150 AND 3900 FLECK VALVES



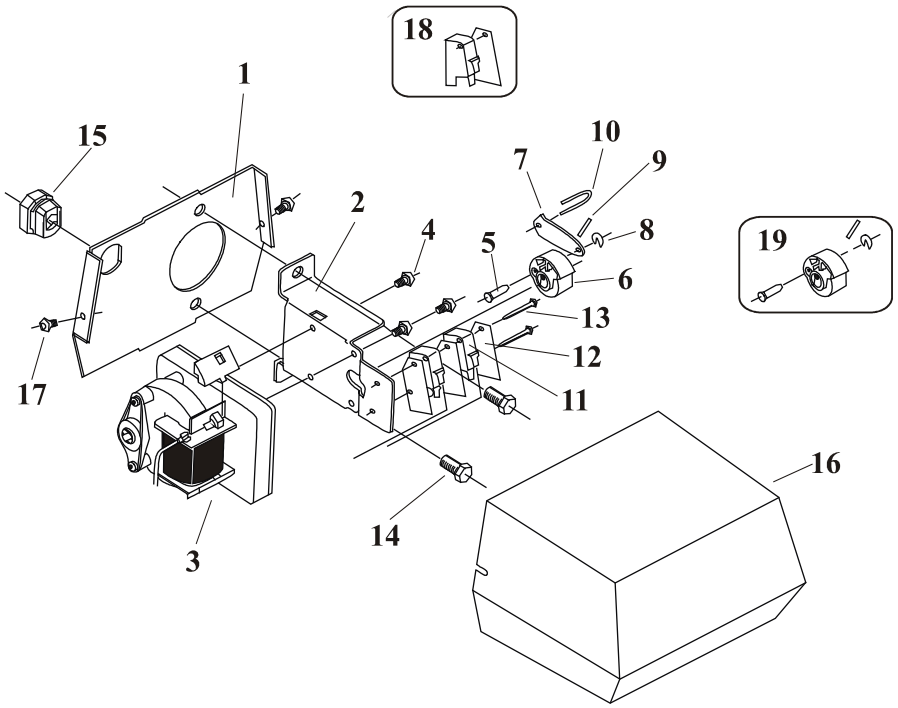
Item No.	Part Number	Description	Used On Models
1	FLK 60036-02	1800 Brine Valve Assy.	450-1200
2	FLK 60710-4.0	Brine Line Refill Flow Control - 4.0 gpm (Not Shown)	450-1200
	FLK 60710-10	Brine Line Refill Flow Control - 10.0 gpm (Not Shown)	1500 - 2550
3	FLK 60277-05	1800 Brine Injector Assy.	450
3A	312146	Throat, Nozzle Assembly #5 Red	450 - 600
	312046	Throat, Nozzle Assembly.#6 White	900
	312047	Throat, Nozzle Assembly #7 Blue	1200
	312148	Throat, Nozzle Assembly #8 Yellow	1500
	312166	Throat, Nozzle Assembly #9 Violet	1800
	312169	Throat, Nozzle Assembly #10 Black	2550

MODEL 2750, 2850 AND 2900 DRIVE MOTOR ASSEMBLY



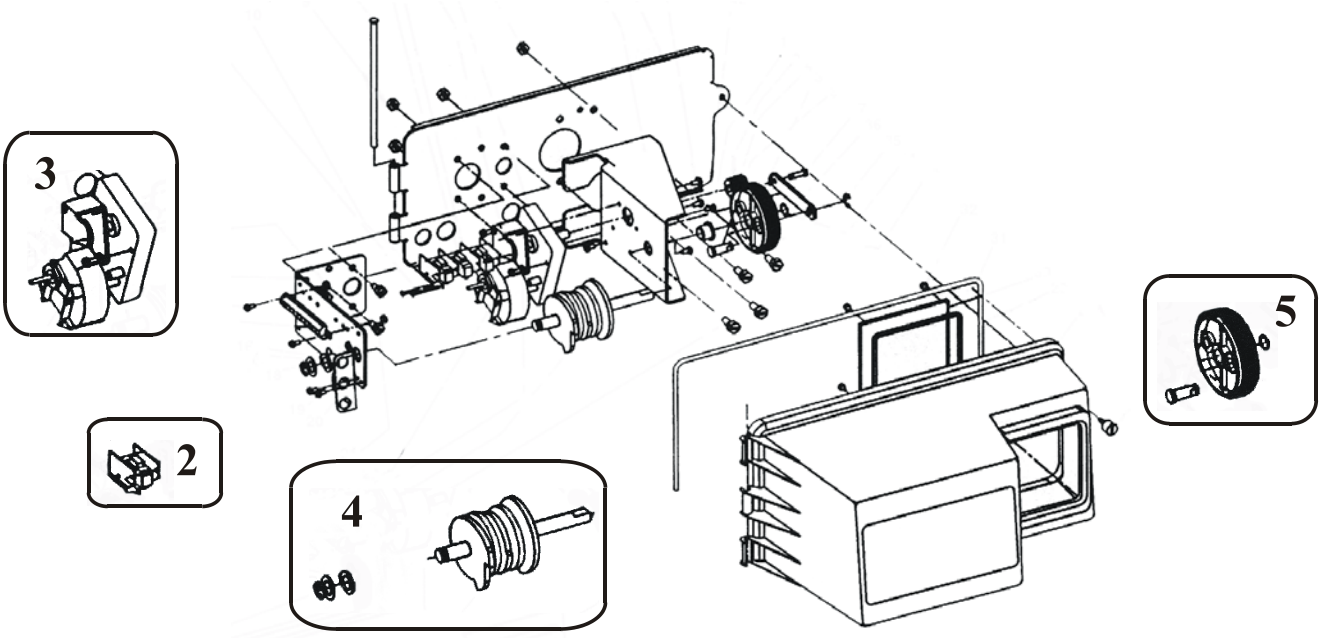
Item No.	Part Number	Description	Used On Models
1	FLK 60050-23	Drive Motor, 24Volt 50/60 cycle (NXT) – includes brackets, switches, and cam	30-600
	FLK 60050-24	Drive Motor, 24Volt 50/60 cycle (VIP) – includes brackets, switches, and cam	30-600
	FLK 60050-21	Drive Motor, 120Volt 50/60 cycle (TC) – includes brackets, switches and cam	30-600
2	312218	Drive Cam Kit STF (Black)	30-600
	312218-01	Drive Cam Kit for VIP (Black)	30-600
2A	FLK12576	Cam Only STF - *Separate Timed Fill* (TC)	30-600
	FLK12576-01	Cam Only STF (Modified for VIP only)	30-600
3	312219	Micro-Switch, Insulator Kit (10)	30-1200

LOWER DRIVE ASSEMBLY for 2900 FLECK VALVE



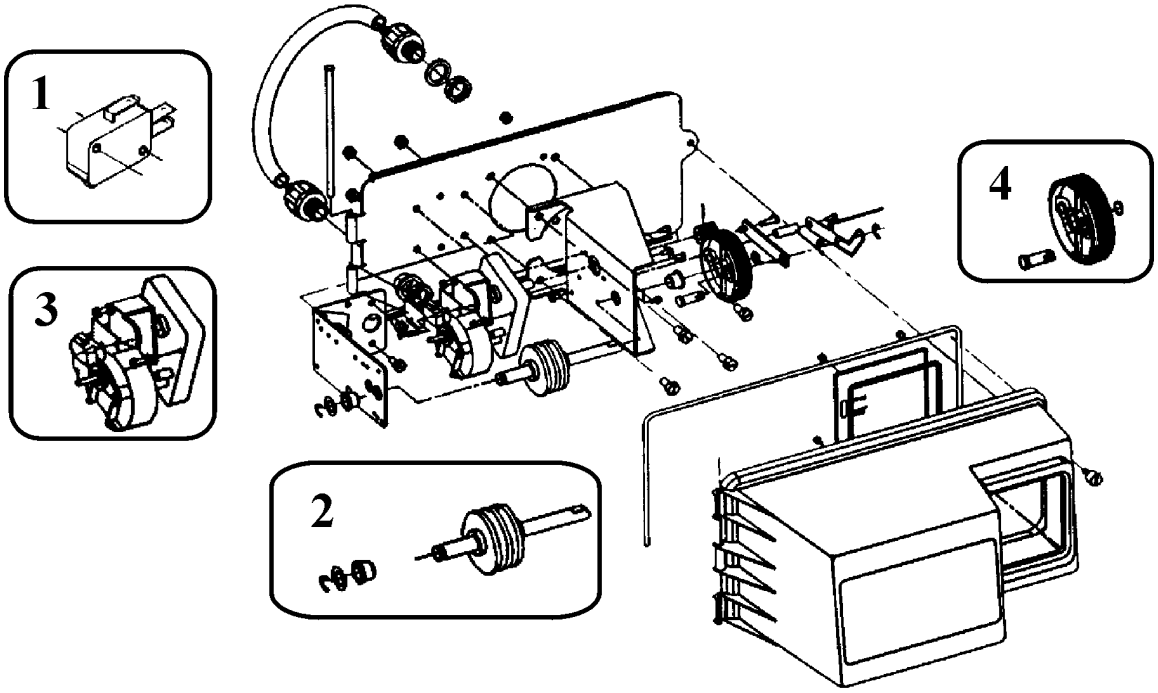
ITEM #	PART NUMBER	DESCRIPTION
1	FLK 14770	Designer Back Plate
2	FLK 14769	Motor Bracket
3	FLK 60055-53 FLK 60055-51 FLK 60055-52	24volt 50/60Hz ***Motor Assembly*** 120v/60Hz Includes: brackets, switches, 220v/50Hz and cam.
4	FLK 10872	Screw
5	FLK 14784	Connecting Rod Bearing
6	FLK 14775	Drive Cam
7	FLK 14759	Piston Drive Link
8	FLK 10250	Retaining Ring
9	FLK 11381	Pin – Drive Cam
10	FLK 14813	Spring Clip
11	FLK 10218	Micro Switch
12	FLK 11805	Insulator
13	FLK 14923	Micro Switch Screw
14	FLK 11224	Drive Mounting Screw
15	FLK 14924	Strain Relief
16	FLK 14800-02	Designer Lower Cover
17	FLK 15236	Cover Screw
18	312219	Micro Switch Kit w/ insulator
19	312220	Lower Drive Cam Kit

DRIVE ASSEMBLY for MODEL 3150 AND UPPER 3900 FLECK VALVES



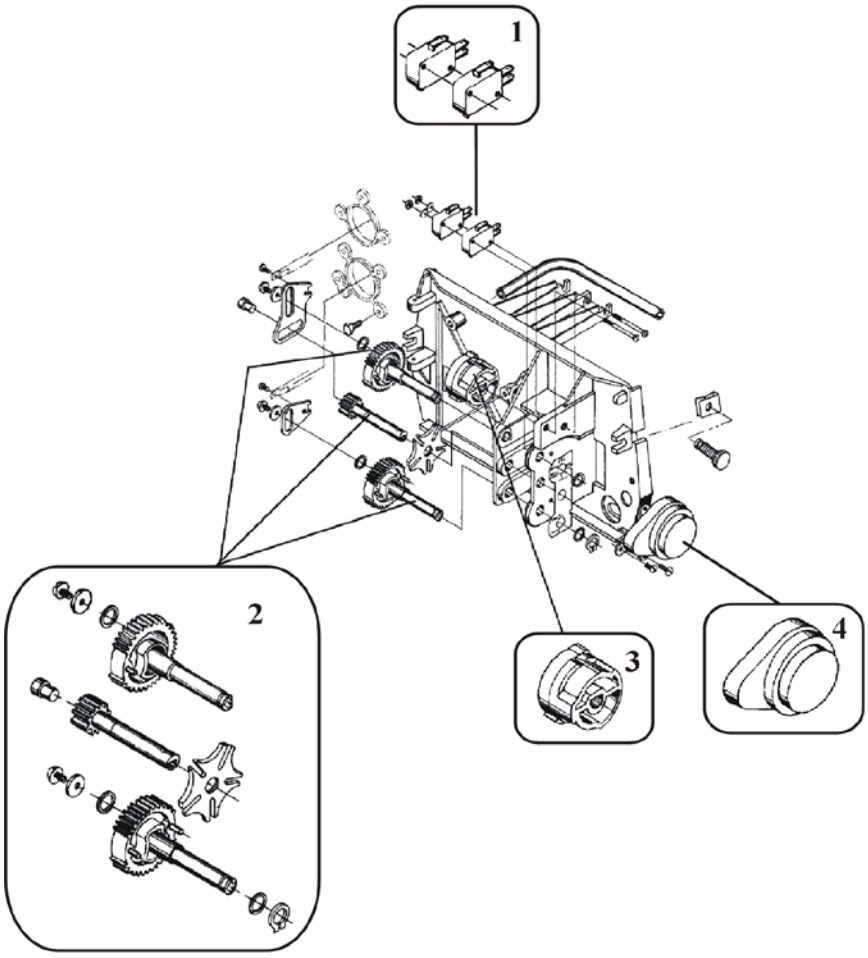
Item No.	Part Number	Description	Used On Models
1	FLK17749-00	Relay (not shown)	450-1200
2	312219	Micro-Switch, Insulator Kit (10)	450-1200
3	FLK 60057-03	Upper Drive Motor, 24Volt 50/60 (VIP I, VIP II/III)	450-1200
	FLK 60057-01	Upper Drive Motor, 120V 50/60 (TC Time Clock Only)	450-1200
	FLK 60057-01	Upper Drive Motor, 220V 50 cycle (TC Time Clock Only)	450-1200
4	312221	Upper Cam Kit (Modified for VIP only)	450-1200
5	312222	Upper Drive Gear	450-1200

LOWER DRIVE ASSEMBLY for 3900 FLECK VALVE



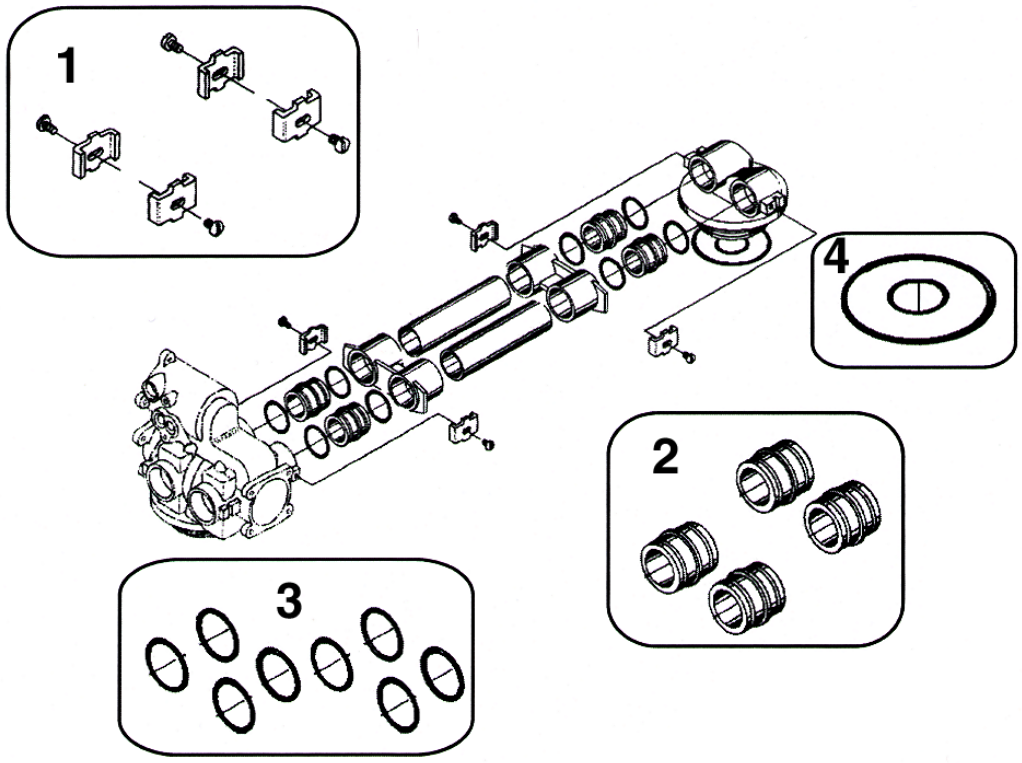
Item No.	Part Number	Description	Used On Models
1	312219	Micro-Switch, Insulator Kit (10)	450-1200
2	312223	Lower Cam Kit	450-1200
3	FLK 60058-03	Lower Drive Motor, 24Volt 50/60 Hz	450-1200
	FLK 60058-01	Lower Drive Motor, 120Volt 50/60 Hz	450-1200
	FLK 60058-02	Lower Drive Motor, 220Volt 50 Hz	450-1200
4	FLK 312224	Lower Drive Gear Kit	450-1200

MODEL 9000 AND 9500 DRIVE ASSEMBLY



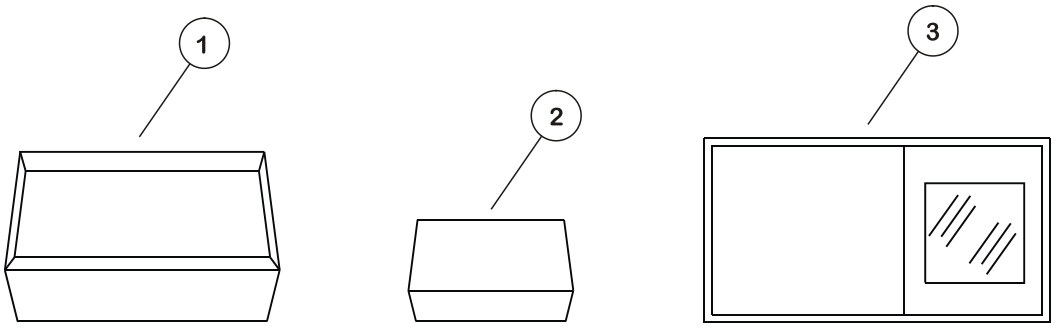
Item No.	Part Number	Description	Used On Models
1	312219	Micro-Switch, Insulator Kit (10)	30-300
2	312225	Drive Gear Kit (9000/9500)	30-300
3	FLK15132	Control Cam (Triple 9000)	30-300
4	FLK61633-00	Drive Motor 24Volt 50/60 (1 RPM)	30-90 (1”)
			90-300 (1.5”)

MODEL 9000 TANK CONNECTOR PARTS



Item No.	Part Number	Description	Used On Models
1	FLK18600	Clamp Screw Kit (4)	30-90
2	312213	Tank Adapter, Coupling w/O-Ring (4)	30-90
3	312216	O-Ring, Coupling	30-90
4	312202	Ring, Tank Adapter and Riser	30-90

VALVE COVERS



VALVE COVERS

Item No.	Part Number	Description
1	FLK 60232-110	Black Designer Cover f/ 2750, 2850 & '2900 upper'
2	FLK 14800-02	Black Designer Lower Drive Motor Cover for 2900
(not shown)	FLK 60217-02	Black Environmental Lower Drive Motor Cover for 2900
3	FLK 60219-02	Black Environmental Cover w/Clear Window 2750, 2850 & '2900 upper'
	FLK 60219-12	Black Environmental Cover w/Black Window 2750, 2850 & '2900 upper'
	FLK 60240-02	Black Env Cover w/Clear Window for 3150 & 3900
	FLK 60240-22	Lower Black Environmental Cover for 3900
	FLK 60240-32	Black Env Cover w/Black Window for 3150 & 3900
Note: Exchanging designer cover to environmental cover? – Requires complete back-plate *(Powerhead)* conversion.		

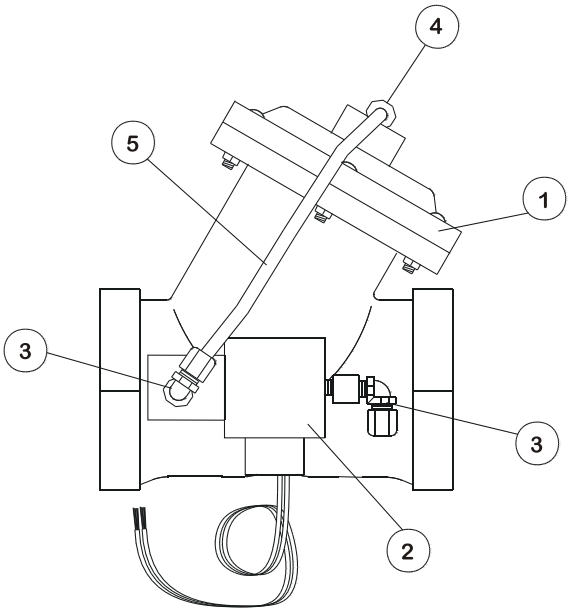
POWER HEADS – VIP CONFIGURATION (24V)

Part Number	Description
312311	Power-Head, Fleck 2750 & 2850 (complete)
312313	Power-Head, Fleck 2900 upper & lower (complete)
312314	Power-Head, Fleck 3150 (complete)
312315	Power-Head, Fleck 3900 upper & lower (complete)
312317	Power-Head, Fleck 9000 (complete)
312317	Power-Head, Fleck 9500 (complete)
Note: Power heads consist of a complete Fleck valve back-plate; Including, all associated electronic components - complete wire harnesses, motors, switches, etc. Not included are brass valves and all associated valve components. **In addition, the power heads '*Environmental*' covers are sold separately.**	

MISCELLANEOUS ACCESSORIES & TOOLS

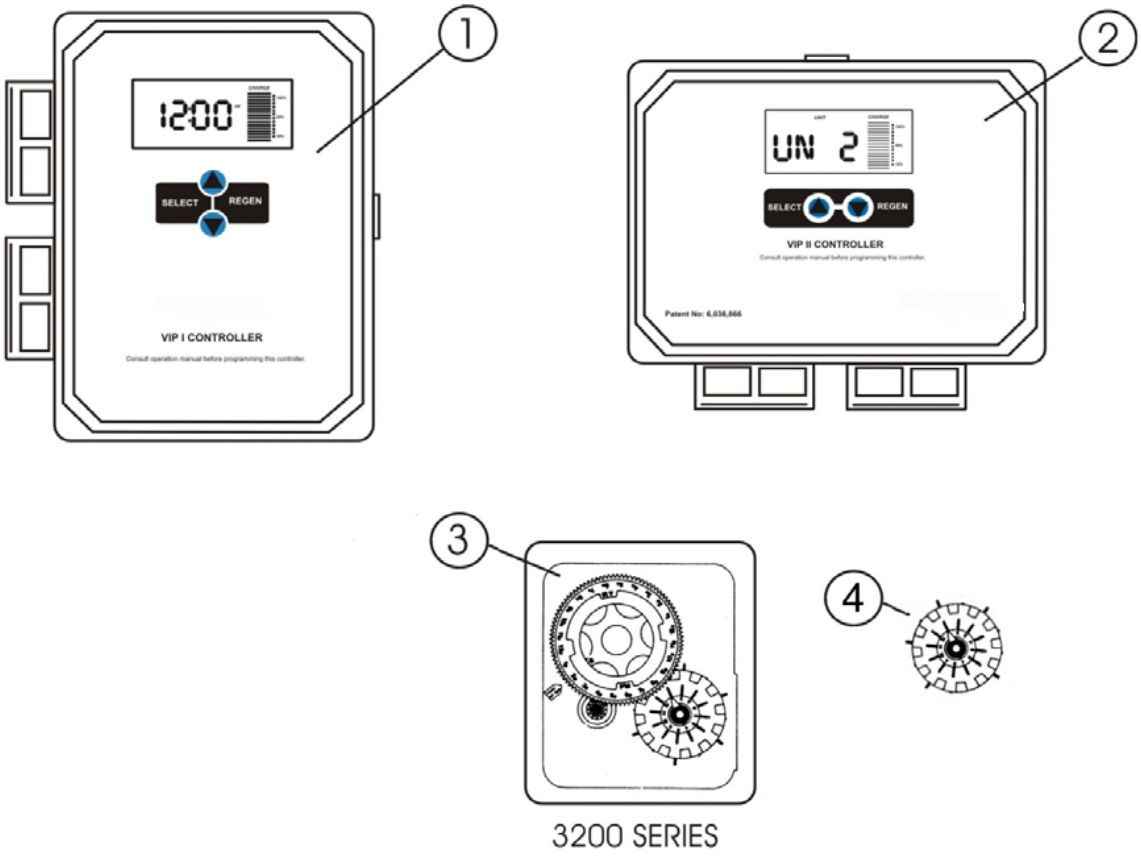
Part Number	Description
980015	3” Funnel Kit for Media Loading
FLK 12763	Stuffer Tool for 9000 - 1” Valves
FLK 11098	Stuffer Tool for 2750 - 1” Valves
FLK 16516	Stuffer Tool for 2850 and 9500 - 1 $^{1}/_{2}$” Valves
FLK 12683	Stuffer Tool for 2900 or 3150 - 2” Valves
FLK 13061	Puller Tool for 2750 and 9000 - 1” Valves
FLK 17623	Puller Tool for 2850 and 9500 - 1 $^{1}/_{2}$” Valves
FLK 12682	Puller Tool for 2900 or 3150 - 2” Valves
700078	Silicon O-Ring Lube (2oz tube)
312024	Service Switch Kit for 1” and 1-1/2” Valves
312025	Service Switch Kit for 2” Valves
703006	Resin Transfer System

NO RAW WATER BY-PASS DIAPHRAGM VALVE ASSEMBLIES



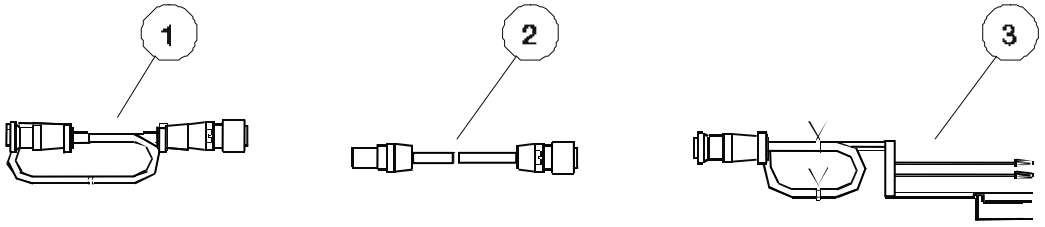
Item No.	Part Number	Description
Complete Valve Assembly – 24Volt 50/60 Hz		
1	910003 910004 910005	1” Steel Valve 1.5” Steel Valve 2” Steel Valve
2	206004	Solenoid Valve, 24Volt 50/60 Hz
3	6144	Elbow, Tube PP (1/8” NPT x ¼” Tube)
4	6145	Elbow, Tube PP (1/4” NPT x ¼” Tube)
5	4887	Tubing Black Polypro (1/4” OD)
Diaphragm Valve Rebuild Kits		
Not Shown	702021 702047 702022 702048 702023 702049	1” Diaphragm and Seal Kit 1” Internal Parts Kit N.O. 1 1/2” Diaphragm and Seal Kit 1 1/2” Internal Parts Kit N.O. 2” Diaphragm and Seal Kit 2” Internal Parts Kit N.O.

CONTROLLERS, CABLES AND TRANSFORMERS

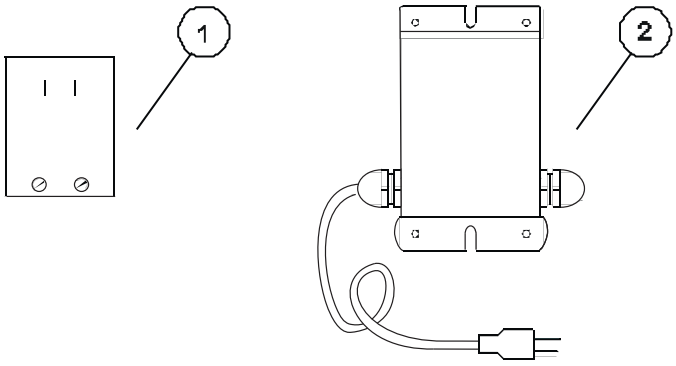


Item No.	Part Number		Description	
VIP Controllers				
1	920182	VIP-1E Controller	920182-DCS	VIP-1E Control w/DCS
2	920183	VIP-2E Controller	920183-DCS	VIP-2E Control w/DCS
	920184	VIP-3E Controller	920183-DCS	VIP-3E Control w/DCS
7-Day Timers				
3	FLK 60303-13		3200 7-Day Timer 120/60	
	FLK 60303-14		3200 7-Day Timer 220/50	
****12-Day Timer***				
4	FLK 14860		Skipper wheel (12-day Timer)	
***NOTE:** For 12 day timer option, both item#3 & #4 are required. Swap skipper wheels.				

CONTROL CABLES / EXTENSIONS AND TRANSFORMERS…(cont.)

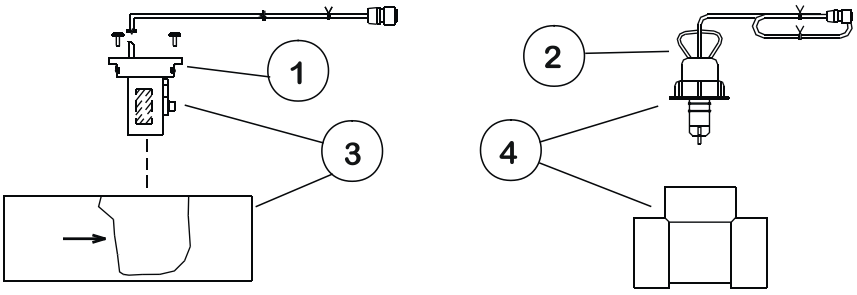


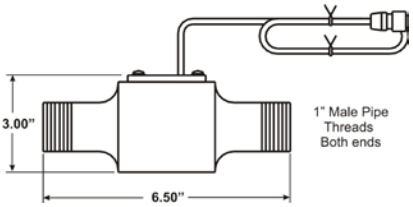
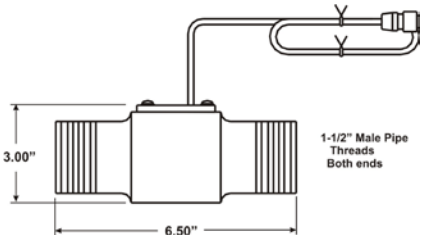
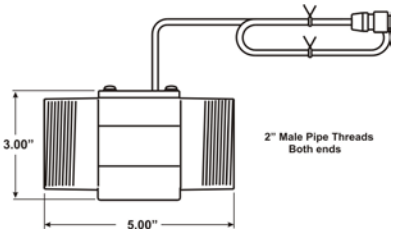
Item No.	Part Number	Description
Extension Cable, Valve to VIP Controller		
1	119068-10	10 ft. long
Extension Cable, Turbine (Flow meter) to VIP Controller		
2	119075-10	10 ft. long
Replacement Fleck Valve Control Cable		
3	119067	10 ft long

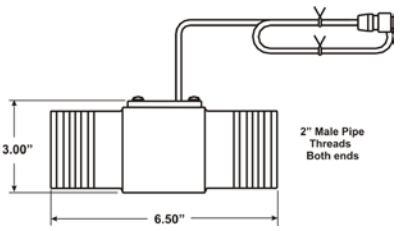
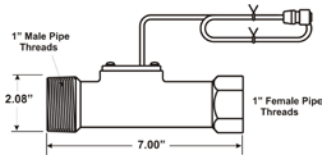
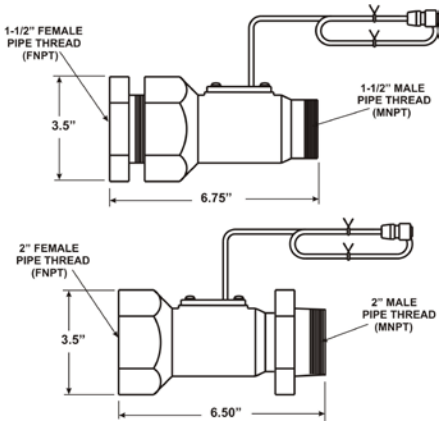


Item No.	Part Number	Description
1	7022207	120V x 50/60 Hz - 24V / 50VA
2	980019-24	120V x 50/60 Hz – 24V / 50VA
	FLK41034	120V x 50/60 Hz – 24V / 108 VA
	980059-24	220V x 50/60 Hz – 24V / 100 VA

FLOW METERS AND CABLES



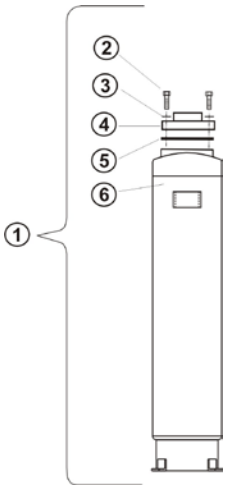
Item No.	Part Number	Description
1	930017	Replacement Turbine Assembly
2	930022	Replacement Paddle Wheel for 3” and 4” Sensors
Complete Plastic Flow Meter Assemblies		
3	930047	1” Machined PVC Meter 
	930046	1-1/2” Machined PVC Meter 
	7161679	2” Molded Plastic Meter 

3	930062	2” Machined PVC Meter 
Complete Brass Flow meter Assemblies		
Not Shown	930015	1” Brass Meter 
	930016	1-1/2 x 2” Brass Meter 
Complete Paddlewheel Flow Meters		
4	930049	3” Flow Meter – Plastic Paddle Wheel w/ Copper Tee
	930050	4” Flow Meter – Plastic Paddle Wheel w/ Copper Tee
Not Shown	930027	3” Flow Meter – Plastic Paddle Wheel w/ PVC Saddle
	930028	4” Flow Meter – Plastic Paddle Wheel w/ PVC Saddle

STEEL TANKS AND INTERNALS

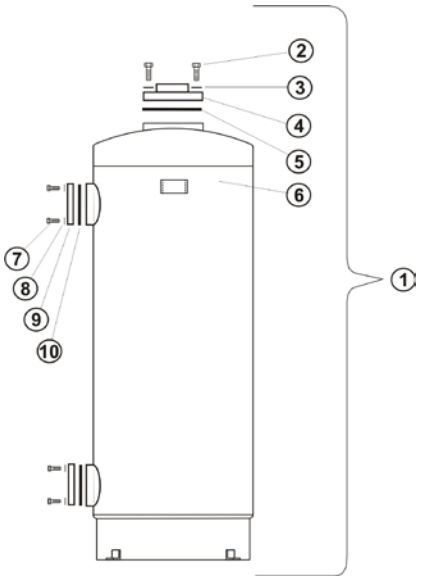
10", 12", and 14" Tanks for Fleck 2750 and 9000 Valves

Item No.	Part Number	Description
1	410045 410047 410049	10" Spray Lined Steel Tank Kit 12" Spray Lined Steel Tank Kit 14" Spray Lined Steel Tank Kit
2	506079	5/8"-11 SS Bolt x 1.75" long
3	507027	5/8" SS Flat Washer
4	406047	Adapter 3" Flange x 2.5" NPT
	406049*	Adapter 4" Flange x 4"–8 UN
4A*	406025*	Adapter 4"-8 UN x 2.5" NPT
5	205001	3" Flange Gasket - EPDM
	205003*	4" Flange Gasket - EPDM
6	407057 407058 407059	10" Steel Tank Only 12" Steel Tank Only 14" Steel Tank Only



**** Item 4A - 406025 used on 14" tank only – used with 406049.***

14", 18", and 24" Tanks for Fleck 2850, 9500, 2900 and 3150 Valves

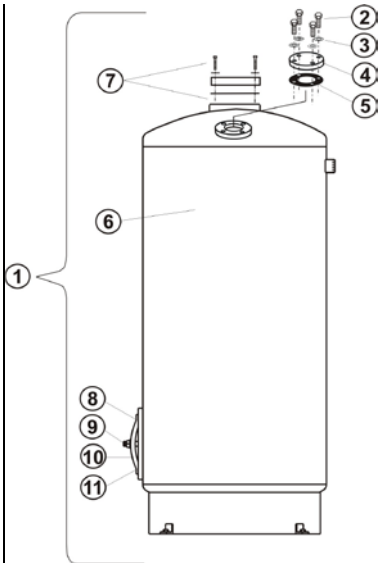


Item No.	Part Number	Description
1	410050 410052 410054	14" Spray Lined Steel Tank Kit 18" Spray Lined Steel Tank Kit 24" Spray Lined Steel Tank Kit
2	506079	5/8"-11 SS Bolt x 1.75" long
3	507027	5/8" SS Flat Washer
4	406049	Adapter 4" Flange x 4"– 8UN
5	205003	4" Flange Gasket - EPDM
6	407059 407060 407061	14" Steel Tank Only 18" Steel Tank Only 24" Steel Tank Only
7	506079	5/8"-11 SS Bolt x 1.75" long
8	507027	5/8" SS Flat Washer
9	218005	2" Blind Flange - PVC
10	205002	2" Flange Gasket - EPDM

STEEL TANKS AND INTERNALS (cont'd)

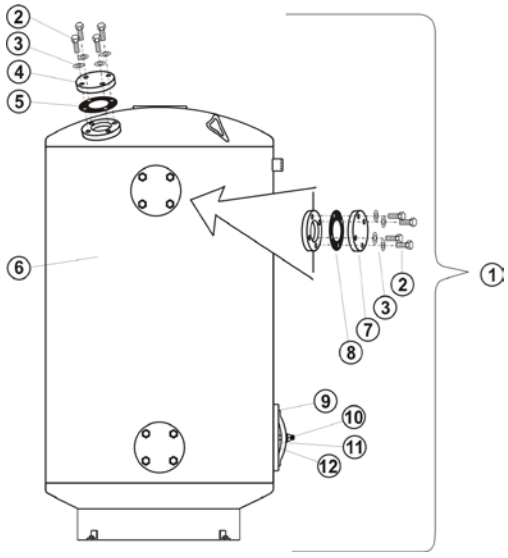
30" and 36" Tanks for Fleck 2850, 2900, 3150 and 3900 Valves

Item No.	Part Number	Description
1	410056 410057 410059 410060	30" Lined Steel Tank Kit – 4" Top 30" Lined Steel Tank Kit – Flg Top 36" Lined Steel Tank Kit --4" Top 36" Lined Steel Tank Kit – Flg Top
2	506079	5/8"-11 304SS Bolt x 1.75" Long
3	507027	5/8" SS Flat Washer
4	218005	2" Blind Flange - PVC
5	205002	2" Flange Gasket - EPDM
6	407062 407063	30" Tank Only – 3900 Flanged Top 36" Tank Only – 3900 Flanged Top
7	299049	3900 to 4"-8 UN Adapter Kit
Replacement 12" x 16" Manway Parts		
8	700087	12" x 16" Gasket
9	700081	Nut and Bolt
10	700082	Yoke
11	700080	Manway Cover



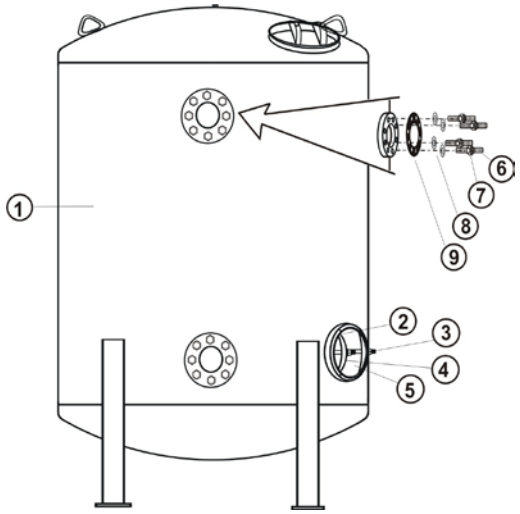
42" and 48" Tanks for Fleck 3900 Valves

Item No.	Part Number	Description
1	410061 410062	42" Lined Steel Tank Kit 48" Lined Steel Tank Kit
2	506079	5/8"-11 304SS Bolt x 1.75" Long
3	507027	5/8" SS Flat Washer
4	218005	2" Blind Flange - PVC
5	205002	2" Flange Gasket - EPDM
6	407064 407065	42" Tank Only – 3900 Flanged Top 48" Tank Only – 3900 Flanged Top
7	218020	3" Blind Flange - PVC
8	205001	3" Flange Gasket
Replacement 12" x 16" Manway Parts		
9	700087	12" x 16" Gasket
10	700081	Nut and Bolt
11	700082	Yoke
12	700080	Manway Cover



STEEL TANKS AND INTERNALS (cont'd)

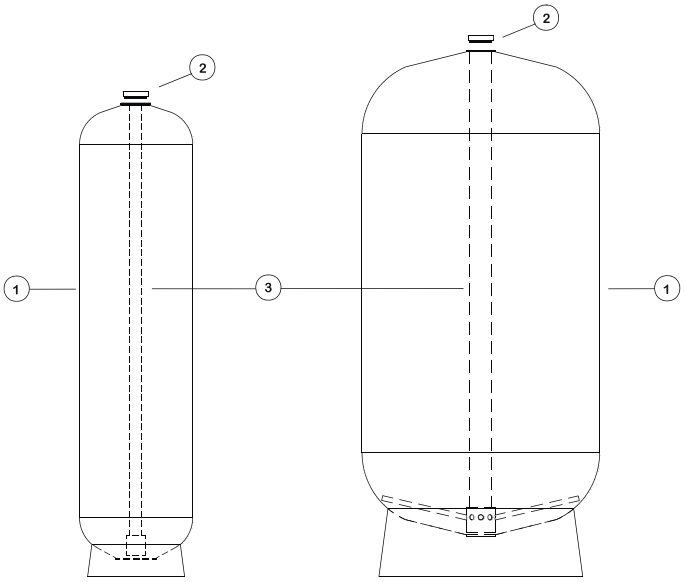
54", 60" & 72" Tanks for Fleck Side Mount Valves



Item No.	Part Number	Description
1	402043 402044 402045	54" Spray Lined Steel Tank 60" Spray Lined Steel Tank 72" Spray Lined Steel Tank
Replacement 12" x 16" Manway Parts		
2	700087	12" x 16" Gasket
3	700081	Nut and Bolt
4	700082	Yoke
5	700080	Manway Cover
Replacement 4" Flange Gaskets and Studs		
6	506068	Studs 5/8"-11 x3.5" long
7	505001	Hex Nuts 18-8 SS
8	507027	5/8" SS Flat Washer
9	205003	4" Flange Gasket

STEEL TANK DISTRIBUTORS and INTERNALS						
Tank Diameter	**2750 & 9000**	**2850 & 9500**	**2900**	**3150**	**3900**	**3150 & 3900 Side Mount**
10"	296071					
12"	50612-25					
14"	50612-25	296075				
18"		296076	296076			
24"		296076	296076	7175610		
30"			296076	7175610	296099	
36"			296076	7175610	296066	
42"					296067	
48"					296068	
54"						296095
60"						296096
72"						296097

FIBERGLASS TANKS AND INTERNALS



9” thru 24” **30” thru 48”**

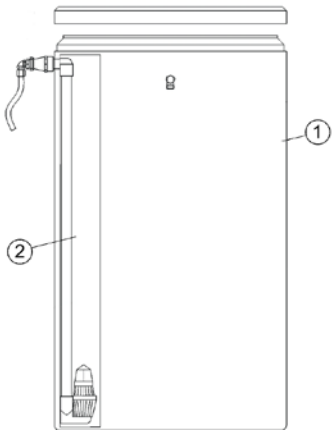
Item No.	New Number	Old Number	Description
1	403110	403022	9” x 48” FRP Tank with 2.5 “ Top Opening (1” sys)
	403111	403043	10” x 54” FRP Tank with 2.5” Top Opening (1” sys)
	403112	403011	12” x 52” FRP Tank with 2.5 “ Top Opening (1” sys)
	C2023-2.5	n/a	14” x 65” FRP Tank with 2.5“ Top Opening (1” sys)
	403010	403010	14” x 65” FRP Tank with 4“ Top Opening (1.5” sys)
	403009	403009	16” x 65” FRP Tank with 4“ Top Opening (1.5”, 2” sys)
	403091	403091	18” x 65” FRP Tank with 4” Top Opening (1.5”, 2” sys)
	403013	403013	21” x 62” FRP Tank with 4” Top Opening (1.5”, 2” sys)
	403143	403139	21” x 62” FRP Tank with 4” – 8 UN Top & Bottom
	Obsolete	403090	22” x 60” FRP Tank with 4” – 8 UN Top Opening
	7139062	7298777	24” x 72” FRP Tank with 4” – 8UN Top Opening
	403148	403007	30” x 72” FRP Tank with 4“-8UN T/B Opening
	403149	403006	36” x 72” FRP Tank with 4“-8UN T/B Opening
	C1037A	n/a	30” x 72” FRP Tank with 6“ FLG T/B Opening
	C1038A	n/a	36” x 72” FRP Tank with 6“ FLG T/B Opening
	C1039	403087	42” x 72” FRP Tank with 6” FLG T/B Opening
	C1040	n/a	48” x 72” FRP Tank with 6” FLG T/B Opening
2	Obsolete	406025	Tank Adapter 4-8 UN to 2-1/2”-8 UN
	Obsolete	406018	Tank Adapter 6-8 UN to 4-8 UN
3	*INTERNALS: 9” thru 24” - Single point standpipe & distributor (see following table)*		
	INTERNALS: 30” thru 48” - Single point standpipe & lower hub & lateral kits (see following table)		

FIBERGLASS TANK INTERNALS

FIBERGLASS TANK INTERNAL KITS					
Tank Diameter	**2750 & 9000**	**2850 & 9500**	**2900**	**3150**	**3900**
9” Single Point	296071	-	-	-	-
12“ Single Point	296071	-	-	-	-
14“ Single Point	296071	296075	-	-	-
16“ Single Point	-	296075	296075	-	-
17“ Single Point	-	296075	296075	-	-
18“ Single Point	-	296076	296076	-	-
20” Single Point	-	296076	296076	-	-
21” Single Point	-	296076	296076	-	-
22” Single Point	-	296076	296076	-	-
24“ Single Point	-	296076	296076	7175610	-
30” Hub Radial	-	-	296182 296184	296158	296156
36” Hub Radial	-	-	296183 296184	296157	296080
42” Hub & Radial	-	-	-	-	296081
48” Hub & Radial	-	-	-	-	296082

FIBERGLASS TANK CLOSURES & PARTS	
Part Number	**Description**
D4431	Bolt Kit for 6” Flanged Tank Closures – 12 Nuts, Bolts, & Washers
222035	4” Threaded Bottom Plug
Q7010	6” Flanged Closure

BRINE TANK ASSEMBLIES & SAFETY FLOATS



Softener Model# / Mineral Tank Dia.		Brine tank Size	ITEM No.1	ITEM No.2
			Brine Tank P/N	Safety brine valve float assembly
S-31	9”x48”	400#, 18x40	**940052**	**2310 Assy. - 3” Dia x 40” Brine Well** *Note: Comes standard with Brine Tank Assy.* **For replacement use p/n:* 980100
S-61	12”x52”	400#, 18x40	**940052**	
S-91	14”x65”	400#, 18x40	**940052**	
S-121	16”x65”	700#, 24x40	**940053**	
S-151	18”x65”	700#, 24x40	**940053**	
S-301	24”x72”	1000#, 24x50	**940025**	***2350 assy. – 5x48 well** *Note: Optional - Does not come with Brine Tank Assy.* FLK60038 - Safety Brine Valve FLK60026-30 - Float assy. 980057 - Air Check VLV complete 980093 - Brine well 5” Dia. X 48” high
S-451	30”x72”	1500#, 30x50	**940026**	
S-601 & S-901	36”x72”	2500#, 39x48	**940027**	
S-1201	48”x72”	4500#, 52x60	**940007**	***2350 assy. – 5x60 well** *Note: Optional - Does not come standard with Item#1 Brine Tank p/n.* FLK60038 - Safety Brine Valve FLK60026-30 - Float assy. 980057 - Air Check VLV complete 980095 - Brine well 5” Dia. X 60” high
***Note:** All Safety Brine Valve replacement parts come without fastening hardware.				