



# Culligan®

## Culligan® Heavy Duty Commercial Softener

*food service*  
*assisted living facilities*  
*cafeterias*  
*casinos*  
*educational facilities*  
*grocery*  
*hotel/hospitality*  
*institutions*  
*laundry*  
*corporate campuses*  
*theme parks*  
*vehicle wash*



## Hi-Flo® 2e Heavy Duty Commercial Softener

### Culligan® Hi-Flo® 2e Electronic Water Softener Standard Features

- Culligan® Tripl-Hull™ Tanks—Durable carbon steel with the corrosion resistance of plastic. A 20 mil inner liner hermetically sealed within the steel tank.
- Culligan® Power Valve—Constructed of durable, corrosion-resistant plastic.
- 1 1/2" Flo-Paks—Corrosion resistant hard anodized, polymer coated aluminum alloy Flo-Paks allow system flows up to 54 gpm per tank.
- 24 Volt Operation—Standard operation requires only 24 volts of power. Uses a UL listed 120/24 volt transformer.
- Accusoft® Microprocessor—Easily accessible electronic controller includes EEPROM chip for up to 30 year storage capability of base program and a “Super-Cap” capacitor for prolonged protection during power outages.
- Single or Duplex Configurations



# The Culligan® Hi-Flo® 2e Electronic Water Softener

## Applications and Benefits

- Restaurants—For dishwashing, cleaning material savings, scale reduction.
- RO/DI Pretreatment
- Car washes—Quality results, detergent and water heating savings, scale reduction.
- Apartment buildings, assisted living facilities and hotels—Quality water for laundry, dishwashers, boilers.
- Light industry—For process and make-up water, boiler and cooling system pretreatment, general housekeeping.
- Office buildings—For heating plant pretreatment, tenant convenience, general housekeeping.

## Options

- Patented Aqua-Sensor® Control - Solid State control initiates regeneration only when needed based upon water hardness. Automatically adjust to changes in raw water hardness and water consumption. Ideal for applications with fluctuating water hardness levels. Needless regenerations are eliminated, which conserves salt and water, thereby reducing your operating costs.

In addition, the Aqua-Sensor® rinse out feature ensures left-over salt from regeneration is

completely removed before the system is returned to service, which saves water.

- 1 1/2" Softminder® Turbine Flow Meter\*—Detects flow rates ranging from 1 to 60 gpm. Initiates regeneration based upon volume of hard water treated. Accurate measurement of the treated water is maintained, maximizing the capacity of the system between regeneration. Lower operating costs can be expected when compared to time clock based operation.

## Warranty

Culligan® Hi-Flo® 2e water softeners are backed by a limited 1-year warranty against defects in material, workmanship and corrosion\*\*. In addition, the control valve body (excluding internal parts), the salt storage container, the brine valve and all of its component parts, are warranted for a period of 5 years. Tripl-Hull™ tanks carry a limited 12-year warranty against internal corrosion.

\* Suitable for use with 1 1/2" pipe size models only.

\*\* See printed warranty for details. Culligan will provide a copy of the warranty upon request.

## System Specifications

Pressure:	30–100 psig 210–690 kPa
Power:	24 Volts/60hz <sup>1</sup>
Power Consumption:	3/42 Watts Min/Max
Enclosure Rating:	NEMA 1
Temperature:	40–120°F 4 - 49°C
Turbidity:	5 NTU, max. <sup>2</sup>
Chlorine:	1 mg/L, max. <sup>2</sup>
Iron:	5 mg/L, max.

<sup>1</sup>120 Volt/24 Volt Transformer Included.

<sup>2</sup>See media specification for details.

The contaminants or other substances removed or reduced by this water treatment device are not necessarily in your water.

Model	Resin Qty. (Ft <sup>3</sup> )	Pipe Size	Flow Rate Gallons Per Minute		Tank Size***	
			Continuous*	Peak**	Softener	Brine
PVE-45A	1.5	1"	8	11	12" x 38"	18" x 38"
PVE-60A	2	1"	10	14	16" x 37"	18" x 38"
PVE-90A	3	1"	10	14	16" x 48"	24" x 42"
PVE-120A	4	1"	10	14	16" x 60"	24" x 42"
PVE-45B	1.5	1.5"	26	35	12" x 38"	18" x 38"
PVE-60B	2	1.5"	35	48	16" x 37"	18" x 38"
PVE-90B	3	1.5"	33	45	16" x 48"	24" x 42"
PVE-120B	4	1.5"	31	42	16" x 60"	24" x 42"
PVE-135B <sup>1</sup>	5	1.5"	34	54	16" x 60"	24" x 42"

<sup>1</sup>PVE-135 Models contain Cullix-Hi-Velocity media. Influent iron is limited to 0.5 mg/L.

\*Flow rate at a 15 psi pressure loss.

\*\*Flow rate at a 25 psi pressure loss.

\*\*\*Dimensions are diameter by tank height.

## “Hey Culligan Man!”®

**Culligan**

Culligan Commercial @ Work™

[www.culligan.com](http://www.culligan.com)

1-800-CULLIGAN

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# Hi-Flo<sup>®</sup> 2/2e

## AUTOMATIC WATER SOFTENERS

### SPECIFICATIONS AND OPERATING DATA

Single Tank  Model	Exchange Capacity <sup>1</sup> @ Salt Dosage		Service Flow Rates				Pipe Size	Resin Qty.	Softener Tank Size	Brine Tank Size	Approx. Ship. Weight
	Minimum	Maximum	Peak <sup>2</sup>		Continuous						
			Flow	Press. Drop	Flow	Press. Drop					
	gr @ lb g @ kg	gr @ lb g @ kg	gpm m <sup>3</sup> /hr	psi kPa	gpm m <sup>3</sup> /hr	psi kPa					
PV-45A	30,000/9	45,000/23	11	25	8	15	1	1.5	12 x 38	18 x 38	235
	1,940/4.1	2,920/10.4	2.5	172	1.8	103	1	42.5	300 x 960	460 x 970	107
PV-45B	30,000/9	45,000/23	35	25	26	15	1.5	1.5	12 x 38	18 x 38	245
PV-45BM	1,940/4.1	2,920/10.4	7.9	172	5.9	103	1.5	42.5	300 x 960	460 x 970	111
PV-60A	40,000/12	60,000/30	14	25	10	15	1	2	16 x 37	18 x 38	375
	2,590/5.4	3,890/13.6	3.2	172	2.39	103	1	56.6	410 x 940	460 x 970	170
PV-60B	40,000/12	60,000/30	48	25	35	15	1.5	2	16 x 37	18 x 38	385
PV-60BM	2,590/5.4	3,890/13.6	10.9	172	7.9	103	1.5	56.6	410 x 1,020	460 x 970	175
PV-90A	60,000/18	90,000/45	14	25	10	15	1	3	16 x 48	24 x 42	435
	3,890/8.2	5,830/20.4	3.2	172	2.3	103	1	85.0	410 x 1,220	610 x 1,070	197
PV-90B	60,000/18	90,000/45	45	25	33	15	1.5	3	16 x 48	24 x 42	445
PV-90BM	3,890/8.2	5,830/20.4	10.2	172	7.5	103	1.5	85.0	410 x 1,220	610 x 1,070	202
PV-120A	80,000/24	120,000/60	14	25	10	15	1	4	16 x 60	24 x 42	500
	5,180/10.9	7,780/27.2	3.2	172	2.3	103	1	113	410 x 1,520	610 x 1,070	227
PV-120B	80,000/24	120,000/60	42	25	31	15	1.5	4	16 x 60	24 x 42	515
PV-120BM	5,180/10.9	7,780/27.2	9.5	172	7.0	103	1.5	113	410 x 1,520	610 x 1,070	234
PV-135B <sup>3</sup>	90,000/30	135,000/75	54	25	34	15	1.5	5-HV	16 x 60	24 x 42	565
PV-135BM	5,830/13.6	8,750/34.0	12.3	172	7.7	103	1.5	142	410 x 1,520	610 x 1,070	256

1 Exchange capacities based on treating water containing 10 grains per gallon (171 mg/L) of hardness (expressed as calcium carbonate), free of color, oil, turbidity and at a service flow rates not exceeding 20 gpm per square foot (24.5 m<sup>3</sup>/m<sup>2</sup>/min) of bed area. These are nominal capacities based on resin manufacturers' data and will vary with influent water characteristics, temperature, pressure and other factors.

2 Operation of a softener at peak flow rate for extended periods of time may result in a slight reduction of softening capacity. This is due to premature hardness breakthrough.

3 PV-135 models contain Culler<sup>®</sup> Hi-Velocity<sup>™</sup> media. Influent iron limited to 0.5 ppm.

NOTE: Operational, maintenance and replacement requirements are essential for this product to perform as advertised. Also available in duplex configuration with twice the capacity and flow rate. Duplex units have two resin tanks and a single brine system.

*Culligan*

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# LIMITED WARRANTY

## CULLIGAN® HI-FLO® 2 and 2e AUTOMATIC WATER CONDITIONERS

You have purchased one of the finest water conditioners made. As an expression of our confidence in Culligan products, your water conditioner is warranted to the original end-user, when installed in accordance with Culligan International Company specifications, against defects in material and workmanship from the date of original installation, as follows:

<b>For a period of ONE YEAR</b>	<b>The entire conditioner The circuit board and meter</b>	
<b>For a period of FIVE YEARS</b>	<b>The control valve body, but excluding its internal parts</b>	} <b>On models so equipped</b>
	<b>The salt storage container and The brine valve and all its components parts</b>	
<b>For a period of TWELVE YEARS</b>	<b>The conditioner tank, if it contains a plastic inner liner</b>	

If a part described above becomes defective, within the specified period, you should notify your independently operated Culligan dealer and arrange a time during normal business hours for the dealer to inspect the water conditioner on your premises. Any part found defective within the terms of this warranty will be repaired or replaced by the dealer. You pay only freight from our factory and local dealer charges.

Of course, damage caused by accident, fire, flood, freezing, Act of God, misuse, misapplication, neglect, alteration, installation or operation contrary to our printed instructions, or by the use of accessories or components which do not meet Culligan specifications, is not covered by this warranty.

Our product performance specifications are furnished with each water conditioning unit. TO THE EXTENT PERMITTED BY LAW, CULLIGAN DISCLAIMS ALL IMPLIED WARRANTIES INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE; TO THE EXTENT REQUIRED BY LAW, ANY SUCH IMPLIED WARRANTIES ARE LIMITED IN DURATION TO THE ONE-YEAR PERIOD SPECIFIED ABOVE FOR THE PARTS DESCRIBED IN THIS LIMITED WARRANTY. As manufacturer, we do not know the characteristics of your water supply or the purpose for which you are purchasing a water conditioner. Please understand that the quality of water supplies may vary seasonally or over a period of time, and that your water usage rate may vary as well. Water characteristics can also change considerably if your water conditioner is moved to a new location. For these reasons, we assume no liability for the determination of the proper equipment necessary to meet your requirements, and we do not authorize others to assume such obligations for us. Further, we assume no liability and extend no warranties, express or implied, for the use of this product on a non-potable water source. OUR OBLIGATIONS UNDER THIS WARRANTY ARE LIMITED TO THE REPAIR OR REPLACEMENT OF THE FAILED PARTS OF THE WATER CONDITIONER, AND WE ASSUME NO LIABILITY WHATSOEVER FOR DIRECT, INCIDENTAL, CONSEQUENTIAL, SPECIAL, GENERAL, OR OTHER DAMAGES, WHETHER FROM CORROSION OR OTHER CAUSES.

### CONSUMERS:

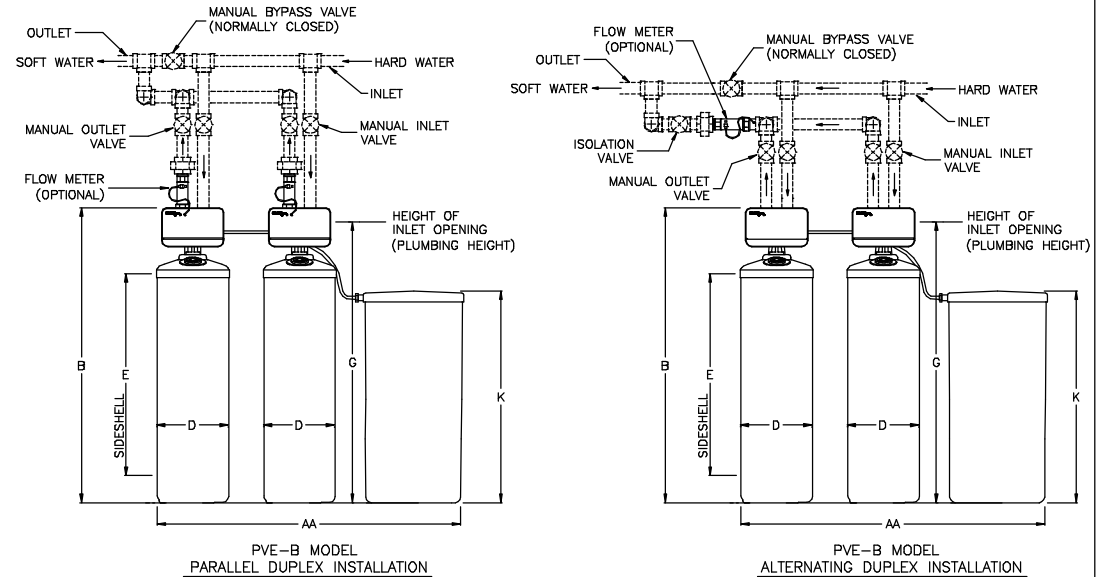
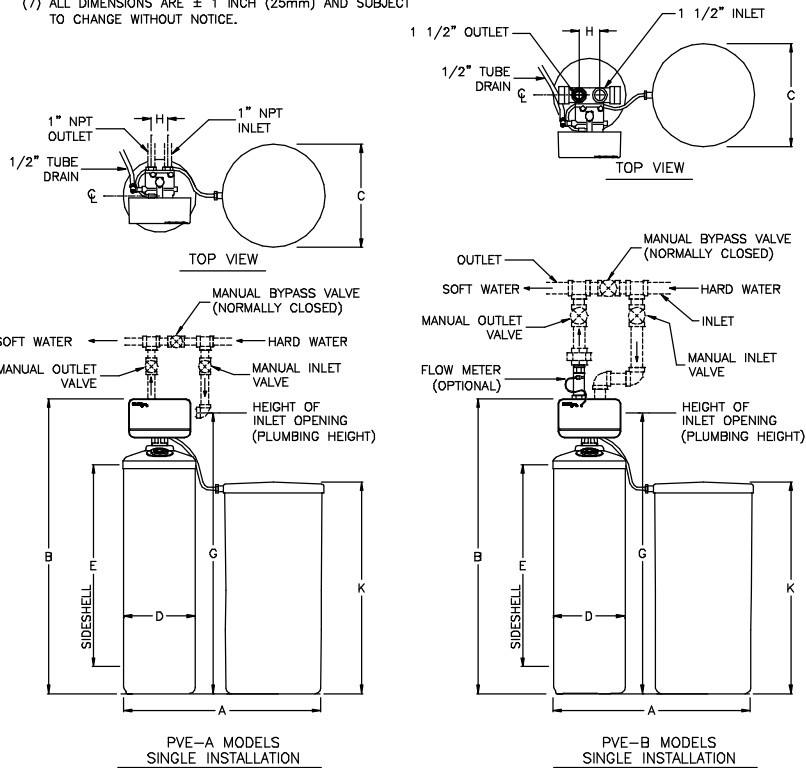
Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Similarly, some states do not allow the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Consult your telephone directory for your local independently-operated Culligan dealer, or write Culligan International Company, for warranty and service information.

**CULLIGAN INTERNATIONAL COMPANY  
One Culligan Parkway  
Northbrook, Illinois 60062**

**NOTES:**

- (1) ITEMS SHOWN IN BROKEN LINES TO BE FURNISHED BY OTHERS.
- (2) AN ELECTRICAL OUTLET SHOULD BE PROVIDED WITHIN 5 FEET OF THE EQUIPMENT.
- (3) UNIONS SHOULD BE LOCATED ON INLET AND OUTLET CONNECTIONS OF CONTROL VALVE TO FACILITATE SERVICING.
- (4) DO NOT MAKE A DIRECT CONNECTION TO THE DRAIN. PROVIDE AN AIR GAP OF AT LEAST FOUR TIMES THE DIAMETER OF THE DRAIN PIPE TO CONFORM TO SANITATION CODES AND TO PERMIT THE OBSERVATION OF THE DRAIN FLOW.
- (5) ALLOW 24 INCHES ABOVE SOFTENER FOR FILLING.
- (6) INSIDE DIAMETER - ALLOW A MINIMUM OF 1-INCH FOR OUTSIDE CLEARANCE.
- (7) ALL DIMENSIONS ARE ± 1 INCH (25mm) AND SUBJECT TO CHANGE WITHOUT NOTICE.

MODEL	DIMENSIONS (INCHES)									MINIMUM DRAIN PIPE SIZE	DRAIN FLOW	SIMPLEX OPER. WT.
	A	AA	B(5)	C	D(6)	E	G	H	K			
PVE-45A	36	54	53	18	12	38	50	3	38	1/2"	3.5gpm	880 lb
PVE-45B								3 3/4				890 lb
PVE-60A	40	62	54	18	16	37	51	3	38	1/2"	5.5gpm	1610 lb
PVE-60B								3 3/4				1620 lb
PVE-90A	46	68	66	24	16	48	63	3	42	1/2"	5.5gpm	1730 lb
PVE-90B								3 3/4				1740 lb
PVE-120A	46	68	77	24	16	60	74	3	42	1/2"	5.5gpm	1850 lb
PVE-120B								3 3/4				1860 lb
PVE-135B												



				<b>Culligan®</b> NORTHBROOK, ILLINOIS			
SCALE	00.00	DETAILED BY	KMR	CHECKED BY		APPROVED	
REF. NO.	DATE	DATE	DATE	DATE	DATE	DATE	DATE
LET	CHANGE	BY	APP	DATE	DATE	DATE	DATE
PRINT & BILL OF MATERIALS ARE NOT TO BE USED WITHOUT THE WRITTEN CONSENT OF CULLIGAN USA DO NOT SCALE FROM DRAWING						NAME HI-FLO 2/2e AUTOMATIC SOFTENERS TECHNICAL DATA SHEET	
						PART NO. S2 SHEET 1 OF 1	



# ENGINEER'S SPECIFICATION

<b>AUTOMATIC WATER SOFTENER HI-FLO® 2 and 2e</b>	<b>CUSTOMER:</b>
	<b>DATE:</b>

## 1.0 SCOPE

1.1 Provide as indicated a vertical pressure type water softener system complete with pressure vessel, softening resin, control valve, brine maker and controller. The system will be of an approved design as fabricated by a manufacturer regularly engaged in the production of water treatment equipment. All equipment and material will be supplied in compliance with the specifications as intended for a complete and operational system.

*(Open Bidding Arrangement)*

1.2 Qualified manufacturers of water treatment equipment of the type specified are Culligan International Company or the Engineer's approved equal.

*(Closed Bidding Arrangement)*

1.2 Qualified manufacturers of water softener equipment must be engaged in the manufacture of this equipment for a period of not less than fifteen (15) years. Acceptable manufacturers are Culligan International Company or the Engineer's approved equal.

## 2.0 GENERAL DESCRIPTION

*(Selection for statement of specific model)*

2.1 The system specifications are based on Culligan International model \_\_\_\_\_.

The purpose of the Culligan International Series Hi-Flo® 2 or Hi-Flo® 2e automatic water softener will be to remove mineral hardness from a known water supply to a level not to exceed \_\_\_\_\_ mg/l, as determined by an accepted ASTM or EDTA test method, when the system is operated at \_\_\_\_\_ gpm and in accordance with the operating instructions. The system will be capable of supplying \_\_\_\_\_ gallons of softened water between regenerations based on the influent water analysis listed in Section 3.1 of this equipment specification.

The systems performance is rated at a design flow rate of \_\_\_\_\_ gpm with a rated pressure drop of \_\_\_\_\_ psi, and will be capable of a peak flow rate of \_\_\_\_\_ gpm for sustained periods of 90 minutes with a pressure drop of \_\_\_\_\_ psi.

There shall be a quantity of \_\_\_\_\_ of the above described systems.

*(Selection for general statement)*

2.1 The system, in compliance with the equipment specification, is described as an automatic \_\_\_\_\_ water softener system meeting the performance and design data requirements as hereinafter specified.

## 3.0 PERFORMANCE AND DESIGN DATA

### 3.1 INFLUENT WATER ANALYSIS

Calcium, Ca: \_\_\_\_\_

Magnesium, Mg: \_\_\_\_\_

Total Hardness: \_\_\_\_\_

(Constituents above are expressed in ppm or mg/l as CaCO<sub>3</sub> or as otherwise specified.)

Iron, Fe: \_\_\_\_\_

Manganese, Mn: \_\_\_\_\_

Total Dissolved Solids, TDS: \_\_\_\_\_

(Constituents above are expressed in ppm or mg/l.)

Turbidity, NTU: \_\_\_\_\_

Color: \_\_\_\_\_

pH: \_\_\_\_\_

### 3.2 DESIGN PARAMETERS

Normal System Flow & Pressure Drop: \_\_\_\_\_ gpm @ 15 PSI  
Maximum System Flow & Pressure Drop: \_\_\_\_\_ gpm @ 25 PSI  
Backwash/Rinse Flow: \_\_\_\_\_ gpm  
Backwash Volume: \_\_\_\_\_ gallons nominal  
Daily Water Usage: \_\_\_\_\_ gallons per day (gpd)  
Daily Hours of Water Demand: \_\_\_\_\_  
Operating Temperature Range: 40°–120°F  
Operating Pressure Range (System): 30–100 PSI  
Electrical Requirements: 120 Volt, 60 Hz, 1 phase (receptacle required)  
System Dimension (L x W x H): \_\_\_\_\_"L x \_\_\_\_\_"W x \_\_\_\_\_"H

(*ASTM soap test method*)

3.3 EFFLUENT WATER QUALITY ZERO GPG HARDNESS

(*Hardness EDTA test method*)

3.3 EFFLUENT WATER QUALITY \_\_\_\_\_ MG/L HARDNESS

### 4.0 EQUIPMENT SPECIFICATIONS

#### 4.1 SOFTENER TANK(S)

Each system shall include \_\_\_\_\_ tank(s). Each softener tank shall be \_\_\_\_\_ inches in diameter. The sideshell height shall be \_\_\_\_\_ inches, sufficient to allow for proper freeboard space above the resin bed for adequate expansion of the resin during backwashing.

##### 4.1.0 Tank Construction

Tank(s) shall be electrical welded pressure vessel quality low carbon steel construction rated for 100 psig working pressure. Tank(s) will be of the Culligan Tripl-Hull™ construction.

##### 4.1.1 Access Openings

Each tank will be equipped with openings for mineral filling and periodic inspection.

##### 4.1.2 Tank Finish – Exterior

The tank exterior will be protected by a molded plastic jacket for corrosion resistance. The jacket will also act as an insulator to minimize condensation on the surface of the tank.

##### 4.1.3 Tank Finish – Interior

The tank interior will consist of a 20 mil thick vinyl bag liner, hermetically sealed within the steel tank to protect against internal corrosion.

#### 4.2 INTERNAL DISTRIBUTION

4.2.1 The upper distribution system shall be of the single point distributor type, constructed of a fine slotted strainer to dispense water laterally to avoid channeling within the resin bed.

4.2.2 The lower distribution system shall be of the single point distributor type, constructed of PVC pipe and a fine slotted strainer to provide even flow distribution through the resin bed. The distribution system shall be embedded in a subfill of washed inorganic material to support the resin bed.

#### 4.3 MAIN OPERATING VALVE

The main operating valve shall be of a top mount design constructed of phenylene oxide thermoplastic to resist attack by substances found in natural water supplies.

The main operating valve will be of the four (4) position, motor driven, piston type to positively locate the internal valve piston to route the flow of water through the softener during service, backwash, brine draw/rinse and fast rinse/brine refill. The internal piston and seal assembly will be of a modular cartridge design for ease of replacement and service.

The main operating valve shall incorporate self adjusting flow regulators to control the rate of flow and prevent resin loss during backwash, brine/rinse and fast rinse/refill steps of regeneration, regardless of system pressure fluctuations between 30 and 100 psi.

*(PV-A Models)*

The main operating valve will be fitted with 1 inch NPT inlet and outlet water pipe connections.

*(PV-B Models)*

The main operating valve will provide water to service through 1-1/2 inch inlet and outlet Flo-Pak™ cartridge design, diaphragm valves. The Flo-Pak diaphragm valves shall be slow opening and closing, free of water hammer and will control the flow of water through the softener during the service cycle to permit high flow rates with minimum pressure drop. The main operating valve will control water flow through the softener during the regeneration process.

The main operating valve shall be designed and manufactured by the same manufacturer as the water softener system and will be fully tested prior to shipment.

*(Single units only – hard water bypass)*

The unit shall be supplied so that the valve will allow automatic bypass of untreated water during regeneration. The bypass shall be integral to the main operating valve body and be capable of being easily modified to prevent hard water bypass.

*(Single units only – NO hard water bypass)*

The unit shall be supplied so that the valve will not allow automatic bypass of untreated water during regeneration. The bypass shall be integral to the main operating valve body and be capable of being easily modified to allow hard water bypass.

#### 4.4 CONTROLS

*(Hi-Flo 2 Models)*

The main operating valve will be controlled by an integral clock timer. The timer will permit adjustment of the backwash and fast rinse/refill times. An extra recharge lever will be provided to permit manual regeneration initiation at any time. The timer control will be UL listed.

*(Hi-Flo 2e Models)*

A fully integrated programmable micro-processor driven electronic controller shall be provided to automatically cycle the main operating valve through the regeneration sequence.

The electronic controller shall be designed and manufactured by the same manufacturer as the water treatment equipment.

The controller shall sequence all steps of an automatic regeneration and automatically return the softener to a service or stand-by mode. The initiating time and/or volume setpoints shall automatically reset upon initiation of the regeneration sequence.

The controller shall allow for a manual initiation of the automatic regeneration sequence by utilizing a regeneration button on the face of the controller.

The controller shall be housed in an enclosure constructed to NEMA 1 enclosure standards. The controller shall include a keypad, capable of programming all controller functions, located inside the enclosure. Also included with the keypad shall be a fluorescent alpha-numeric display capable of showing all information necessary for programming the controller and operating the softener.

##### 4.4.1 System control options

*(Hi-Flo 2, Time Clock Systems)*

An integral time clock control will be provided to initiate and control the regeneration process of the water softener. The clock timer will be capable of regenerating the softener at any time of day or night and on any or every day of the week.



*(Hi-Flo 2, Aqua Sensor® Systems)*

An Aqua-Sensor® control will be included for each softener to provide immediate or delayed hardness initiated regeneration. A probe will be inserted into the resin bed and will sense the need for regeneration based on the differential water hardness reading and will signal the circuit board to initiate regeneration. The system will compensate for variations in water hardness and temperature and will require no field adjustments when operated within the normal temperature range of the softener. Simultaneous regenerations shall not be possible.

*(Hi-Flo 2, Meter Initiated, Single Unit)*

A volumetric meter, electrically connected to the timer control, shall set the timer for regeneration at a preset time of day or night after the preset volume of water has passed through the water softener. The timer will activate a motor drive that will perform the regeneration functions on the exhausted tank and return it to the service position.

*(Hi-Flo 2, Meter Initiated, Parallel Twin Unit)*

Each unit shall include a volumetric meter, electrically connected to the timer control. Upon exhaustion of either tank, its control shall activate a motor drive that will immediately, or at a preset time of day or night, perform the regeneration functions on the exhausted tank and return it to the service position. The controls shall include an electrical interlock to prevent simultaneous regeneration of both softeners in the event the second tank exhausts while the first tank is in regeneration.

*(Hi-Flo 2, Meter Initiated, Alternating Twin Unit)*

A single volumetric meter shall signal the softeners to regenerate on an alternating basis after the preset volume of water has passed through the water softener. One unit remains in a fully regenerated stand-by condition while the other unit is in service. Upon exhaustion of the service unit, the stand-by unit shall immediately be placed into service and the exhausted unit shall be removed from service and the regeneration initiated. The timer will activate a motor drive that will perform the regeneration functions on the exhausted tank and return it to the stand-by position. No external alternating devices will be acceptable. Simultaneous regenerations shall not be possible.

*(Hi-Flo 2 Duplex Alternating Time Clock or Aqua-Sensor® Models)*

A duplex alternator will be included in the system. It will permit only one unit of a duplex system to be in the service mode at any given time, while keeping the other unit in regeneration, or in stand-by after regeneration. The Duplex Alternator will be adaptable to Time Clock or Aqua-Sensor® regeneration and will be fitted with lights to indicate which unit is in the service cycle.

*(Hi-Flo 2e, Time Clock, Single Unit)*

An operator selected program of a time-initiated regeneration for single units shall be available. The controller shall be capable of being entirely programmed in the field without additional interface devices. The operator shall be able to select regeneration to occur after a specified number of days. The electronic controller shall indicate various functions that include time of day, time of regeneration, number of regenerations in the last fourteen (14) days, number of days since the last regeneration and unit in regeneration.

*(Hi-Flo 2e, Meter Initiated, Single Unit)*

An operator selected program of immediate or delayed volume initiated regeneration for single units shall be available. The controller shall be capable of being entirely programmed in the field without additional interface devices. The electronic controller shall indicate various functions that include time of day, time of delayed regeneration, instantaneous flow rate, volume remaining before next regeneration, number of regenerations in the last fourteen (14) days, number of days since the last regeneration and unit in regeneration.

*(Hi-Flo 2e, Aqua-Sensor® Initiated, Single Unit)*

An operator selected program of immediate or delayed hardness initiated regeneration for single units shall be available. An Aqua-Sensor® control probe will be inserted into the resin bed and will sense the need for regeneration based on the differential water hardness reading and will signal the circuit board to initiate regeneration. The system will compensate for variations in water hardness and temperature and will require no field adjustments when operated within the normal temperature range of the softener. The controller shall be capable of being entirely programmed in the field without additional interface devices. The electronic controller shall indicate various functions that include time of day, time of delayed regeneration, number of regenerations in the last fourteen (14) days, number of days since the last regeneration and unit in regeneration.

*(Hi-Flo 2e, Time Clock, Parallel Twin Unit)*

An operator selected program of a time initiated regeneration for parallel twin configurations shall be available. The controller shall be capable of being programmed in the field without additional interface devices. The electronic controller shall indicate various functions that include time of day, time of regeneration, number of regenerations in the last fourteen (14) days, number of days since the last regeneration and unit in regeneration. The controller must communicate via a single pre-wired cable assembly, simultaneous regenerations shall not be possible.

*(Hi-Flo 2e, Meter Initiated, Parallel Twin Unit)*

An operator selected program of immediate or delayed volume initiated regeneration for parallel twin configurations shall be available. The controller shall be capable of being programmed in the field without additional interface devices. The controller shall indicate various functions that include time of day, time of delayed regeneration, instantaneous flow rate display, volume remaining before next regeneration, number of regenerations in the last fourteen (14) days, the days since the last regeneration and indication if the softener is in regeneration. The controller must communicate via a single pre-wired cable assembly, simultaneous regenerations shall not be possible.

*(Hi-Flo 2e, Meter Initiated, Alternating Twin Unit)*

An operator selected program of immediate volume initiated regeneration for alternating twin configurations shall be available. The controller shall be capable of being programmed in the field without additional interface devices. The controller shall indicate various functions that include time of day, instantaneous flow rate display, volume remaining before next regeneration, number of regenerations in the last fourteen (14) days, the days since the last regeneration and indication if the softener is in stand-by or regeneration. No external alternating devices will be acceptable. The alternating function must be contained in the sequencing controller and each controller must communicate via a single pre-wired cable assembly, simultaneous regenerations shall not be possible.

*(Hi-Flo 2e, Aqua-Sensor® Initiated, Parallel Twin Unit)*

An operator selected program of immediate or delayed hardness initiated regeneration for parallel twin configurations shall be available. An Aqua-Sensor® control probe will be inserted into the resin bed and will sense the need for regeneration based on the differential water hardness reading and will signal the circuit board to initiate regeneration. The system will compensate for variations in water hardness and temperature and will require no field adjustments when operated within the normal temperature range of the softener. The controller shall be capable of being programmed in the field without additional interface devices. The controller shall indicate various functions that include time of day, time of delayed regeneration, number of regenerations in the last fourteen (14) days, the days since the last regeneration and indication if the softener is in regeneration. The controller must communicate via a single pre-wired cable assembly, simultaneous regenerations shall not be possible.

*(Hi-Flo 2e, Aqua-Sensor® Initiated, Alternating Twin Unit)*

An operator selected program of immediate hardness initiated regeneration for alternating twin configurations shall be available. An Aqua-Sensor® control probe will be inserted into the resin bed and will sense the need for regeneration based on the differential water hardness reading and will signal the circuit board to initiate regeneration. The system will compensate for variations in water hardness and temperature and will require no field adjustments when operated within the normal temperature range of the softener. The controller shall be capable of being programmed in the field without additional interface devices. The controller shall indicate various functions that include time of day, number of regenerations in the last fourteen (14) days, the days since the last regeneration and indication if the softener is in stand-by or regeneration. No external alternating devices will be acceptable. The alternating function must be contained in the sequencing controller and each controller must communicate via a single pre-wired cable assembly, simultaneous regenerations shall not be possible.

*(Hi-Flo 2e models ONLY)*

4.4.2 In addition the following functions shall be provided as part of the system controller:

Memory back-up protection: The controller shall have memory back-up protection via at least two methods, each capable of retaining the selected operating program and its default settings indefinitely.

Regeneration sequence timers: The controller shall allow control of up to three individual regeneration cycles, each programmable from 0 - 99 minutes.

Lockout function: The controller shall include a lockout to prevent unauthorized personnel from altering program data.

Regeneration override: The controller shall include a function to direct pre-programmed regeneration after 3 days without input signal (European requirement).

*(Included with metered unit and flow sensor selection – following two options)*

Flow rate indication: The controller shall include a flow rate indicator. The flow rate shall be displayed through the controller display.

Totalizer: The controller shall include a totalizer function. The totalizer value shall be displayed through the controller display.

#### 4.4.3 Flow Sensor(s)

*(Meter Initiated, Hi-Flo 2 models using DDS controller)*

A flow meter package shall be provided consisting of a turbine-type Hall effect meter; the package shall include one (1) controller and \_\_\_\_\_ flow sensors with fittings.

The fitting(s) provided shall be **<1.0/2.0>** inch, compatible with existing piping.

The flow sensor provided shall be functional within the flow range of **<1.0”: 0.25-50 gpm/2.0”: 2-250 gpm>**.

The operating temperature/pressure range of the flow sensor fittings shall be 34°-120°F at 120 psi max.

The flow sensor shall have an accuracy of +/-3%.

*(Meter Initiated, Hi-Flo 2e models)*

A flow sensor package shall be provided consisting of an turbine-type Hall Effect; the package shall include a total of \_\_\_\_\_ flow sensors with fittings.

The fitting provided shall be a 1-1/2 inch threaded Noryl housing. A 4-foot length of cable shall be provided for direct connection to the system controller.

The flow sensor package provided shall be functional within the flow range of 1 to 60 gpm.

The operating temperature/pressure range of flow sensor fittings shall be 34°F - 100°F at 140 psi max.

The wetted surfaces of the flow sensor shall be constructed of non-corroding materials.

The flow sensor shall have an accuracy to 2% over full range.

#### 4.5 EXCHANGE RESIN

*(All models EXCEPT PV-135B)*

The ion exchange resin shall be virgin high capacity “standard mesh” of sulfonated polystyrene type stable over the entire pH range with good resistance to bead fracture from attrition or osmotic shock. Each cubic foot of resin will be capable of removing 30,000 grains of hardness as calcium carbonate when regenerated with 15 lbs. of salt. The resin shall be solid, of the proper particle size of 20-50 mesh, U.S. standard screen and will contain no agglomerates, shells, plates or other shapes that might interfere with the normal function of the water softener. The resin shall be manufactured to comply with the food additive regulation 21 CFR 173.25 as set forth by the USFDA.

The system shall include \_\_\_\_\_ cubic feet of exchange resin per vessel and a total of \_\_\_\_\_ cubic feet of resin for the system.

*(PV-135B models)*

The ion exchange resin shall be virgin high velocity of sulfonated polystyrene type stable over the entire pH range with good resistance to bead fracture from attrition or osmotic shock. Each cubic foot of resin will be capable of removing 27,000 grains of hardness as calcium carbonate when regenerated with 15 lbs. of salt. The resin shall be solid, of the proper particle size of 16-30 mesh, U.S. standard screen and will contain no

agglomerates, shells, plates or other shapes that might interfere with the normal function of the water softener. The resin shall be manufactured to comply with the food additive regulation 21 CFR 173.25 as set forth by the USFDA.

The system shall include \_\_\_\_\_ cubic feet of exchange resin per vessel and a total of \_\_\_\_\_ cubic feet of resin for the system.

#### 4.6 BRINE SYSTEM

Provide a complete brine system consisting of a plastic tank, salt platform, brine well, an automatic brine valve and all necessary fittings for operation with the water softening system. The system shall consist of a combined brine measuring and salt storage tank with salt platform. The tank will be sized \_\_\_\_\_ inches x \_\_\_\_\_ inches; the system will include a total of \_\_\_\_\_ brine tank(s).

The brine tank will be equipped with a float operated non-corrosive field serviceable brine float valve for automatic control of brine withdrawal and fresh water refill.

The brine valve will automatically open to admit brine to the resin tank during eduction and close automatically providing positive shut-off to prevent air from entering the system. The brine valve will also regulate the flow of soft water into the brine tank during refill. The brine valve works with the timed fill feature of the main operating valve controls to admit the correct volume of fresh water to the brine tank in accordance with the salt dosage setting on the controls. The brine valve will include a float operated safety shut-off valve as a back up to the timed refill from the main operating valve control to prevent brine tank overflow.

#### 4.7 ACCESSORIES

*(All Optional selections)*

- 4.7.1  Water test kits for hardness tests will be supplied.
- 4.7.2  Pressure Gauges for hard water inlet and soft water outlet.
- 4.7.3  Sampling Cocks for hard water inlet.

#### 5.0 INSTRUCTIONS

\_\_\_\_\_ complete sets of installation, operating and maintenance manuals shall be provided.

#### 6.0 FIELD SERVICE

The services of a factory authorized service representative can be made available to supervise, inspect and provide operator training as required for initial start-up and system operation. Contact your local Culligan dealer for service rates and scheduling.

#### 7.0 WARRANTY

A single written warranty must be provided from the manufacturer of the water softener system covering workmanship and materials.