

Culligan®

THE CULLIGAN® HI-FLO® 52 AUTOMATIC WATER SOFTENER



Advanced technology for commercial applications.



EFFICIENT. VERSATILE. DEPENDABLE. AND ONLY FROM CULLIGAN.

Soft water saves your company money. It helps decrease energy costs. It improves equipment performance and reduces maintenance costs. Soft water even cuts detergent and chemical usage. That's why it's critical to choose a water softener you can depend on.

The Culligan® Hi-Flo® 52 is engineered to ensure a reliable supply of soft water for your business. It features a revolutionary new design that eliminates potential problems and improves overall flow rates. Simply, it's a new level in water softeners from Culligan, The World's Source for Better Water™.

HIGH FLOW RATE
2 INCH VALVE

ENGINEERED FOR EFFICIENT, TROUBLE-FREE PERFORMANCE.

ONE-PIECE VALVE BODY

The unique, alloy control valve body is cast in one piece, eliminating the need for extra seals and the potential for leaks.

FULL-FLOW PORTS

The Hi-Flo 52 valve uses large, internal ports to deliver consistently high flow and the lowest pressure drops in the industry. This ensures more water to the top floors or remote points of buildings.

TOP-MOUNT CONTROL VALVE

This keeps plumbing connections simple and adaptable; flow can easily be converted from left-to-right or right-to-left, streamlining the number of connections and eliminating pressure drops.

SELF-ADJUSTING FLOW CONTROLS

The Hi-Flo 52 valve uses technologically advanced flow controls that adjust automatically to deliver consistent and accurate flow during regeneration.

DESIGNED FOR MAXIMUM VERSATILITY.

THREE OPERATING CONFIGURATIONS

Single unit. For operations with medium capacity applications.

Two units in parallel. For operations with large capacity applications.

Two alternating units. For large capacity operations requiring a continuous flow of soft water.

Your Culligan Man will help you select the configuration that's right for your operation.

THREE REGENERATION OPTIONS

Timer. Dependable, electro-mechanical timer initiates regeneration at a pre-selected time any or every day of the week.

Soft-Minder® meter. Highly efficient meter monitors quantity of water softened and initiates regeneration only when a specified amount of water has been used.

Exclusive Aqua-Sensor® control. Advanced meter automatically monitors changing hardness levels and initiates regeneration cycles only when needed, saving salt and water.

Your Culligan Man will help you select the option that's right for your business.



SOFT-MINDER METER
CIRCUIT BOARD

THREE TYPES OF TANK CONSTRUCTION

Rugged steel. The baked phenolic epoxy-lined interior and durable gloss epoxy exterior ensures long life.

ASME steel. Built and certified at the Culligan factory to work at 125 psi, per ASME code.

Reinforced plastic. Corrosion-proof for use in extremely humid environments.



TOP-MOUNT CONTROL VALVE AND METER ASSEMBLY

OTHER CULLIGAN FEATURES.

EXCLUSIVE CULLEX® RESIN

The finest softening media available. It's designed by Culligan for maximum flow rates, chemical stability and long life.

EXCLUSIVE TWIN PISTON REGENERATION

Two pistons, operated by a powerful motor and stainless steel links, provide reliable operation through all regeneration cycles.

UNIQUE SEAL-PAK™ DESIGN

Both pistons glide effortlessly through special Teflon® seals, that, over time, actually coat the pistons and improve reliability with age.

DUBL-SAFE™ BRINE SYSTEM

Virtually eliminates the possibility of overflow by using two shut-offs.

REGULATORY COMPLIANCE

Every component that contacts water is specified to comply with FDA requirements under 21 CFR. The softener tank features bolt-down legs designed to comply with earthquake requirements of Seismic Zone 4 (UBC Importance Factor 1.0). Where required by local code or government specifications, standard 125 psi ASME code tanks are available from stock.



THE CULLIGAN® NATIONAL ACCOUNTS PROGRAM. THE SINGLE SOURCE SOLUTION.

If you own multiple operations across the country, Culligan is uniquely positioned to handle all your water needs. Our 750-plus dealer network can be coordinated through our headquarters to provide each of your locations with consistent, efficient service. This network also gives us a singular expertise on the varying water conditions of every region across the country. The Culligan National Accounts Program can save you time, money and hassles. For more information call 1-800-CULLIGAN.



LIMITED WARRANTY.

Culligan® Hi-Flo® 52 water softeners are backed by a limited 1-year warranty against defects in material, workmanship and corrosion. In addition, tanks carry a limited 5-year warranty against internal corrosion. See the printed warranty for details.

SPACE REQUIREMENTS

MODEL		LENGTH	DEPTH	HEIGHT	DUPLEX LENGTH
HSS-180	in	50	28	74	76
	m	1.27	0.71	1.88	1.93
HSS-300	in	60	34	75	90
	m	1.52	0.86	1.90	2.29
HSS-450	in	66	34	76	102
	m	1.68	0.86	1.93	2.59
HSS-600	in	78	40	80	120
	m	1.98	1.02	2.03	3.05
HSS-750	in	84	46	86	126
	m	2.13 ¹	1.17	2.18	3.20
HSF-180	in	53	28	78	78
	m	1.35	0.71	1.98	1.98
HSF-300	in	62	34	89	89
	m	1.57	0.86	2.26	2.26
HSF-450	in	68	34	93	102
	m	1.73	0.86	2.36	2.59
HSF-600	in	78	40	93	120
	m	1.98	1.02	2.36	3.05

NOTE: Operational, maintenance and replacement requirements are essential for this product to perform as advertised.

OPERATING LIMITS

Pressure	40-100 psi 207-690 kPa
Temperature	40°-120°F 4°-49°C
Electrical Requirements ¹	120VAC/60Hz/ 1Phase
Turbidity	5.0 NTU, max.
Chlorine	1.0 mg/L, max.
Iron ²	5 mg/L, max.

¹220VAC/50Hz/1Phase available.
Consult Culligan International Co.
²Up to 20 ppm when equipped with
Cullex® Iron Control feed system.

Culligan
The world's source for better water™

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CAT. NO. #01-8198-51

HI-FLO[®] 52

AUTOMATIC WATER SOFTENERS

SPECIFICATIONS AND OPERATING DATA

MODELS		Model 180	Model 300	Model 450	Model 600	Model 750	Model 900
Capacity ¹ , Maximum @ Salt Dosage	grains @	180,000	300,000	450,000	600,000	750,000	900,000
	pounds	90	150	225	300	375	450
	grams @	11,664	19,440	29,160	38,879	48,599	58,320
	kilograms	41	68	102	136	170	204
Capacity ¹ , Minimum @ Salt Dosage	grains @	120,000	200,000	300,000	400,000	500,000	600,000
	pounds	36	60	90	120	150	180
	grams @	7,776	12,960	19,440	25,920	32,400	38,880
	kilograms	16	27	41	54	68	82
Service Flow, ² Continuous	gpm	67	78	90	97	95	104
	m ³ /hr	15	18	20	22	22	24
Service Flow, Peak ³⁴	gpm	95	108	120	125	123	125
	m ³ /hr	22	25	27	28	28	28
Pipe Size, NPTI	in	2	2	2	2	2	2
Resin Volume	cu. ft.	6	10	15	20	25	30
	liters	170	283	425	566	708	850
Media Tank, dia. x ht. Steel	in	20 x 54	24 x 54	30 x 54	36 x 60	36 x 60	42 x 60
	cm	51 x 137	61 x 137	76 x 137	91 x 152	91 x 152	107 x 152
Fiberglass	in	21 x 69	24 x 72	30 x 72	36 x 72	NA	NA
	cm	53 x 175	61 x 183	76 x 183	91 x 183	NA	NA
Brine Tank, dia. x ht.	in	24 x 48	30 x 48	30 x 48	36 x 48	42 x 48	42 x 48
	cm	61 x 122	76 x 122	76 x 122	91 x 122	107 x 122	107 x 122
Ship. Wt., approx. Steel Fiberglass	pounds	730	1050	1580	2050	2400	2750
	kilograms	330	480	720	940	1090	1195
	pounds	570	860	1250	1600	NA	NA
	kilograms	260	390	570	730	NA	NA

1 Exchange capacities based on treating water containing 10 grains per gallon of hardness (expressed as calcium carbonate), free of color, oil, turbidity and at a continuous flow rate of approximately 50 percent of the peak flow rate. These are nominal capacities and will vary with influent water characteristics, water temperature, and other factors.

2 Continuous flow at 15 psi (103 kPa) pressure drop.

3 Peak flow at 25 psi (172 kPa) pressure drop.

4 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.

NOTE: Operational, maintenance and replacement requirements are essential for this product as advertised.

Culligan

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 www.culligan.com
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 SL-0075





LIMITED

WARRANTY

HI-FLO® 52 / 42 WATER SOFTENERS

You have just 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:

For a period of ONE YEAR	The entire conditioner
For a period of TWO YEARS	The control valve internal parts
For a period of FIVE YEARS	The control valve body, but excluding its internal parts
For a period of FIVE YEARS	The fiberglass wound conditioner tank(s), if so equipped*
For a period of FIVE YEARS	The epoxy-lined steel conditioner tank(s), if so equipped

*The tank must be protected by a vacuum breaker device as described in the unit's operating manual. Damage to the tank caused by vacuum is not covered by this warranty. The unit must be used in operating conditions that conform to Culligan's recommended design guidelines.

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.

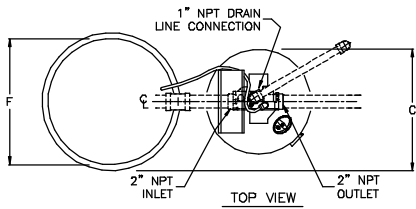
Of course, damage caused by accident, fire, flood, freezing, Act of God, misuse, misapplication, neglect, alteration, installation or operation contrary to our printed instructions, or by the use of accessories or components which do not meet Culligan specifications, is not covered by this warranty.

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.

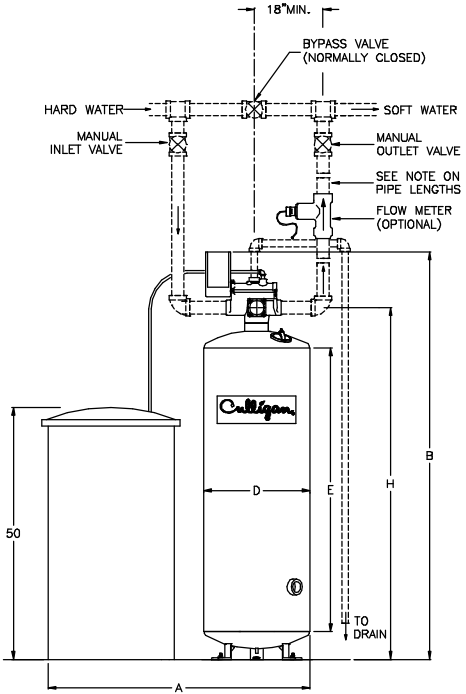
CULLIGAN INTERNATIONAL COMPANY
One Culligan Parkway
Northbrook, Illinois 60062



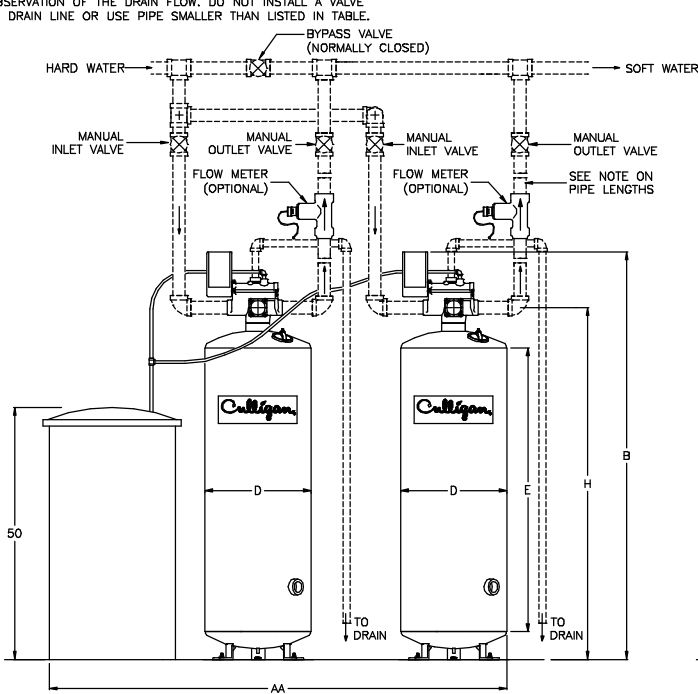
NOTES:

- (1) ALLOW 24 INCHES ABOVE SOFTENER FOR FILLING. TANKS BUILT TO 125 PSI ASME CODE ARE TALLER. ADD THE FOLLOWING TO DIMENSIONS B AND H:
 MODEL 180-3.25 INCHES MODEL 600-6.50 INCHES
 MODEL 300-3.63 INCHES MODEL 750-6.50 INCHES
 MODEL 450-7.50 INCHES MODEL 900-7.13 INCHES
 - (2) INSIDE DIAMETER-ALLOW A MINIMUM OF 1 INCH FOR OUTSIDE CLEARANCE.
 - (3) INSIDE DIAMETER-ALLOW A MINIMUM OF 4 INCHES FOR OUTSIDE CLEARANCE DUE TO TANK COVER.
 - (4) PIPE AND FITTINGS SHOWN DASHED TO BE FURNISHED BY OTHERS.
 - (5) AN ELECTRICAL OUTLET SHOULD BE PROVIDED WITHIN FIVE FEET OF THE EQUIPMENT LOCATION.
 - (6) ALL DIMENSIONS ARE ±1 INCH AND SUBJECT TO CHANGE WITHOUT NOTICE.
 - (7) METER HOUSINGS (OPTIONAL) ARE SHOWN FOR LOCATION ONLY. REFER TO INSTALLATION INSTRUCTIONS.
 - (8) STRAIGHT PIPE OF AT LEAST TEN TIMES THE INSIDE DIAMETER UPSTREAM OF THE METER AND FIVE TIMES THE INSIDE DIAMETER DOWNSTREAM ARE STRONGLY RECOMMENDED OR SIGNIFICANT INACCURACY MAY RESULT.
- * 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. DO NOT INSTALL A VALVE IN DRAIN LINE OR USE PIPE SMALLER THAN LISTED IN TABLE.

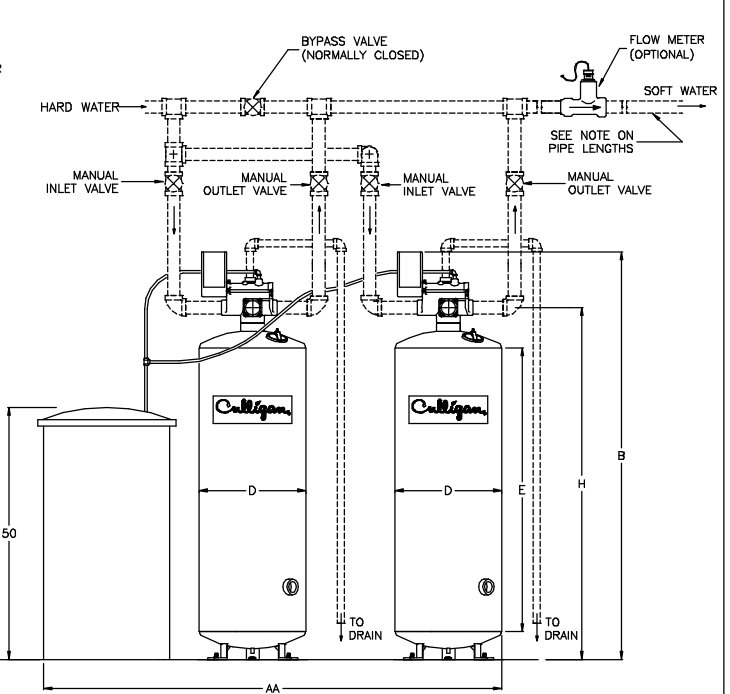
MODEL	DIMENSIONS (INCHES)										DRAIN FLOW	SIMPLEX OPER. WT.
	A	AA	B(1)	C	D(2)	E	F(3)	H	K	MIN. DRAIN PIPE SIZE		
HSS-180	50	76	74	28	20	54	24	62	14	1"	8.3gpm	2,200 lb.
HSS-300	60	90	75	34	24	54	30	63	18	1"	10gpm	2,600 lb.
HSS-450	66	102	76	34	30	54	30	64	24	1"	15gpm	4,200 lb.
HSS-600	78	120	86	40	36	60	36	74	29.75	1 1/2"	25gpm	6,100 lb.
HSS-750	84	126	86	46	36	60	42	74	29.75	1 1/2"	25gpm	7,000 lb.
HSS-900	90	138	98	46	42	60	42	86	35.75	1 1/2"	35gpm	7,500 lb.



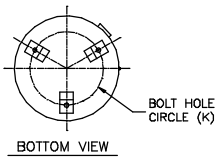
SIMPLEX INSTALLATION



PARALLEL DUPLEX INSTALLATION

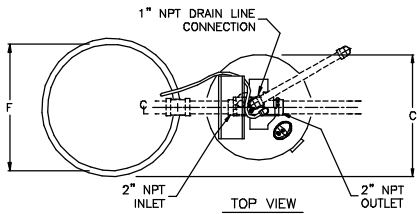


ALTERNATING DUPLEX INSTALLATION



BOTTOM VIEW

				Culligan® NORTHBROOK, ILLINOIS			
SCALE	00.00	DETAILED BY	KMR	CHECKED BY		APPROVED	
REF. NO.		DATE	3/15/99	DATE		DATE	
LET	CHANGE	BY	APP	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® 52 (STEEL TANK) AUTOMATIC SOFTENER TECHNICAL DATA SHEET		PART NO. S52_S SHEET 1 OF 1	

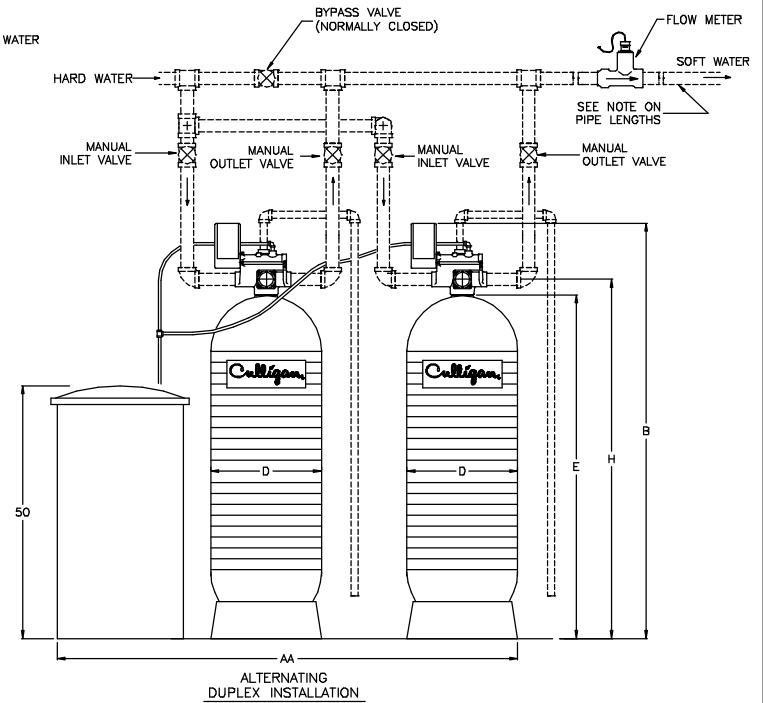
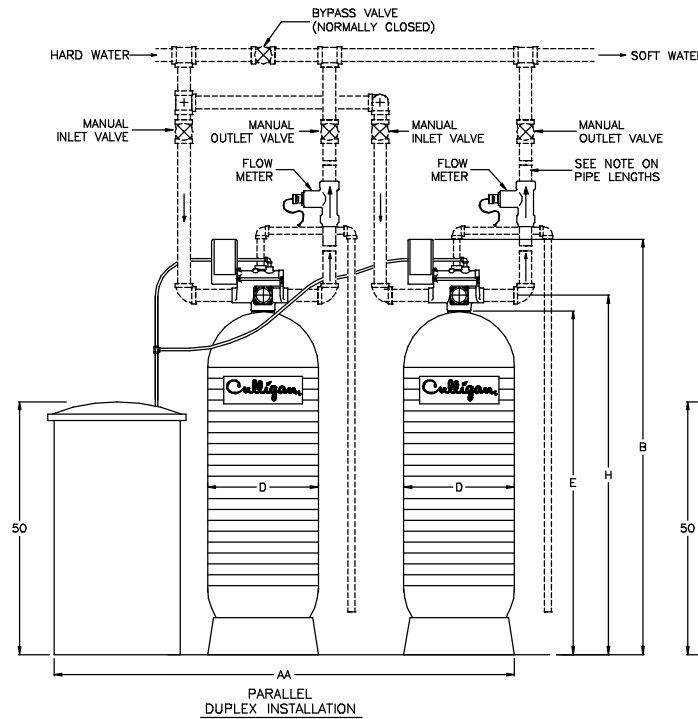
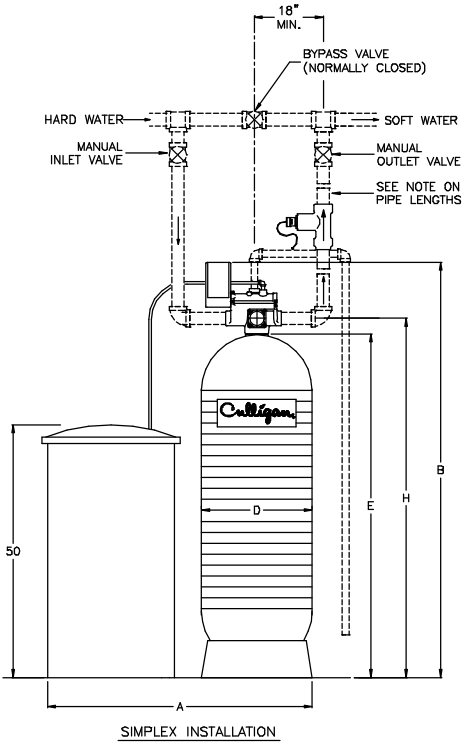


NOTES:

- (1) ALLOW 24 INCHES ABOVE SOFTENER FOR FILLING.
- (2) INSIDE DIAMETER—ALLOW A MINIMUM OF 4 INCHES FOR OUTSIDE CLEARANCE DUE TO TANK COVER.
- (3) SYSTEM USES FRP TANKS WHICH MUST NOT BE SUBJECTED TO VACUUM. INSTALL SIPHON BREAK ON DRAIN LINE. INSTALL VACUUM BREAKER ON INLET PIPING IF THE SERVICE LINE IS SUBJECT TO A VACUUM.
- (4) PIPE AND FITTINGS SHOWN DASHED TO BE FURNISHED BY OTHERS.
- (5) AN ELECTRICAL OUTLET SHOULD BE PROVIDED WITHIN FIVE FEET OF THE EQUIPMENT LOCATION.
- (6) ALL DIMENSIONS ARE ±1 INCH AND SUBJECT TO CHANGE WITHOUT NOTICE.
- (7) METER HOUSINGS (OPTIONAL) ARE SHOWN FOR LOCATION ONLY. REFER TO INSTALLATION INSTRUCTIONS.
- (8) STRAIGHT PIPE OF AT LEAST TEN TIME THE INSIDE DIAMETER UPSTREAM OF THE METER AND FIVE TIMES THE INSIDE DIAMETER DOWNSTREAM ARE STRONGLY RECOMMENDED OR SIGNIFICANT INACCURACY MAY RESULT.

* 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. DO NOT INSTALL A VALVE IN DRAIN LINE OR USE PIPE SMALLER THAN LISTED IN TABLE.

MODEL	DIMENSIONS (INCHES)								MIN. DRAIN PIPE SIZE	DRAIN FLOW	SIMPLEX OPER. WT.
	A	AA	B(1)	C	D(2)	E	F(3)	H			
HSF-180	53	78	83	28	21	71	24	74	1"	8.3gpm	2,000 lb.
HSF-300	62	90	86	34	24	73	30	76	1"	10gpm	2,600 lb.
HSF-450	68	102	93	34	30	81	30	84	1"	15gpm	3,300 lb.
HSF-600	78	120	93	40	36	81	36	84	1 1/2"	25gpm	5,800 lb.



Culligan [®]			
NORTHBROOK, ILLINOIS			
SCALE	DETAILED BY	CHECKED BY	APPROVED
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REF. NO.	DATE	DATE	DATE
	3/15/99		
LET	CHANGE	BY	APP. DATE
PRINT & BILL OF MATERIALS ARE NOT TO BE USED WITHOUT THE WRITTEN CONSENT OF CULLIGAN USA			NAME
DO NOT SCALE FROM DRAWING			HI-FLO 52 (FIBERGLASS) AUTOMATIC SOFTENER TECHNICAL DATA SHEET
			PART NO. S52_F SHEET 1 OF 1



ENGINEER'S SPECIFICATION

AUTOMATIC WATER SOFTENER HI-FLO® 52	CUSTOMER:
	DATE:

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 electronic 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® 52 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 CaCO₃ 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

(Standard vessel)

Tank(s) shall be electrical welded pressure vessel quality low carbon steel construction rated for 100 psig working pressure.

(ASME vessel)

Tank(s) shall be electrical welded pressure vessel quality low carbon steel construction rated for 125 psig working pressure and hydrostatically tested at 50% in excess of the working pressure. Tank construction shall conform to the latest edition of Section VIII for ASME Code pressure vessels and shall be so stamped and certified.

(Fiberglass vessel)

Tank(s) shall be manufactured of polyester reinforced by a continuous roving glass filament overwrap. The top opening will be 4"-8 UN threaded and the tank bottom will be supported on a molded structural base.

4.1.1 Access Openings

(Steel and ASME vessel)

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

4.1.2 Tank Supports

(Steel and ASME vessel)

Tank supports shall be structural steel legs that permit skid mounting and comply with Seismic Zone 4 loading requirements, UBC importance factor 1.0.

(Steel vessel)

4.1.3 Tank Finish – Exterior

Tank finish on the exterior shall be a high solids polyurethane monochromatic gloss enamel applied to a 1.25 to 1.50 mils DFT over a 1.00 to 1.25 mil DFT prime coat.

(*Steel vessel*)

4.1.4 Tank Finish – Interior

Tank interior shall have near white sandblast and be coated to 8 to 10 mil DFT with an epoxy phenolic designed specifically as a high chemical resistant, non toxic, odorless protective coating. The lining shall meet the requirements of the US Federal Register, Food and Drug Regulations, Title 21, Chapter 1, Paragraph 175.300.

4.2 INTERNAL DISTRIBUTION

4.2.1 The upper distribution system shall be of the baffle type to dispense water laterally to avoid channeling within the resin bed.

(*20" models, 24" FG models*)

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 two layer subfill of washed inorganic material to support the resin bed.

(*24" steel models, 30" and larger models*)

4.2.2 The lower distribution system shall be of the hub and radial arm type, constructed of PVC pipe, a hub radial and individual distributors arranged for even flow distribution through the resin bed. No distributor slots will face upwards to minimize the opportunity for channeling. The distribution system shall be embedded in a single layer 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 corrosion resistant alloy material and sized with 2 inch NPTI inlet and outlet connections. The main operating valve will have provision for either left-to-right or right-to-left plumbing flow to simplify installation while maintaining a forward facing timer for ease of service.

Hard-coat anodization of the valve shall be mandatory. The hard-anodized layer will be 2 mil in thickness or greater and shall be final coated with a flouroplate polymer to further enhance corrosion resistance. The valve shall be capable of passing a 1000 hour/5 percent salt spray test without signs of corrosion. The valve finishing process shall be considered by the USEPA to be an environmentally friendly process. The valve body material shall be considered as generally safe by the USFDA.

The main operating valve will provide water to service through two smooth-port diaphragm valves. The diaphragm valves shall be slow opening and closing, free of water hammer. Regeneration will be controlled through two (2) plastic pistons operating through Teflon® seals.

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.

The main operating valve shall be designed and manufactured by the same manufacturer as the water softener system.

(*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

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 3 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

(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.

(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.

(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.

(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.

(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.

(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.

(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.

(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.

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.

(*Meter Initiated systems ONLY*)

4.4.3 Flow Sensor(s)

(*1.5" Plastic Turbine Meter*)

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.

(*2.0" Meter*)

A flow sensor package shall be provided consisting of an insertion-type Hall Effect flow transducer with an appropriately sized installation fitting; the package shall include a total of _____ flow sensors with fittings.

The fitting provided shall be 2.0 inches, compatible with the specified piping. It will be designed to allow ease of removal of the sensor for inspection without modification of the piping system. A 25-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 3 to 275 gpm and will be provided with a threaded tee flow sensor installation fitting.

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 such as polypropylene, black Polyvinylidene (PVDF) and titanium.

The flow sensor shall have an accuracy to 1.5% over full range.

4.5 EXCHANGE RESIN

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.

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.
- 4.7.4 Vacuum Breaker for protecting Fiberglass tanks from vacuum.

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.