



SF WATER SOFTENER



Installation & Operating Manual

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Congratulations on selecting a Dayliff SF Water Softener. They are manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important, though should there be any queries they should be referred to the equipment supplier.

1. SPECIFICATIONS



The Dayliff SF range of water softeners are ion exchange type softeners for the removal of hardness in water. The units have been carefully designed to provide the highest levels of performance for all types of domestic, industrial and institutional applications.

Particular features include:

- An extended model range with capacities from 1 to 20m³/hr with higher capacities being available using paired units.
- Technology leading electronic control valves providing fully automatic process control and volumetric regeneration.
- High performance resin with enhanced exchange capacity and increased life.
- Generously sized brine tanks with all the necessary fittings for reliable regeneration.
- An option of a Low Pressure vessel rated at a maximum of 3 bar using tried and tested Dayliff CXD non-corroding GRP vessels or High Pressure PXD vessels rated at a maximum of 10 bar using high specification Structural GRP pressure vessels.

Dayliff SF softeners provide a most effective, reliable and economic solution for all boiler feed and other general softening requirements.

The combination of quality components, integrated design and assured Dayliff quality ensures efficient and dependable softeners that can be relied upon to give many years of trouble free operation

SOFTENER SIZING

Softeners are rated by their exchange capacity, which is the quantity of Calcium that is removable between regenerations and is determined by the resin performance and specified in gms CaCO_3 . Equipment sizing is then computed on the basis of the raw water hardness and the required brine regeneration period, 24hrs generally being the minimum. An example for sizing an SF600 unit is as follows:-

Exchange Capacity: If resin capacity is 75gms CaCO_3 /litre*and resin volume 350litres, $= 75 \times 350 = 26,250\text{gms } \text{CaCO}_3$

Softening Capacity: Assume water hardness = 300ppm CaCO_3 = $26,250/300 = 87.5\text{m}^3$

Flow Rate: Assuming a 20hr operating period/day required flow rate = $87.5/20 = 4.4\text{m}^3/\text{hr}$, therefore SF 600 is suitable

Note that softening performance is reduced by increased TDS levels and it is necessary to compute compensated hardness when TDS levels are greater than 400ppm as follows:-

Compensated Hardness(ppm CaCO_3) =
$$\frac{\text{Measured Hardness ppm } \text{CaCO}_3 \times 9,000}{9,000 - \text{TDS level (ppm)}}$$

Operating Conditions

Raw Water Appearance: Clear

Iron: <0.1 ppm

Residual Chlorine: < 1 ppm

Bacteria: Free

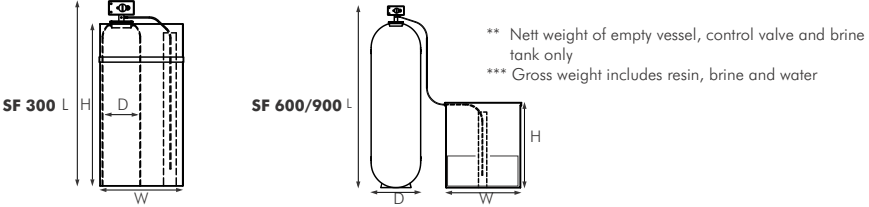
Temperature Range: 5°C-40°C

Min Inlet Pressure: 1.7 Bar

Max Operating Pressure :(SF-H models) 10 Bar

EQUIPMENT SPECIFICATION

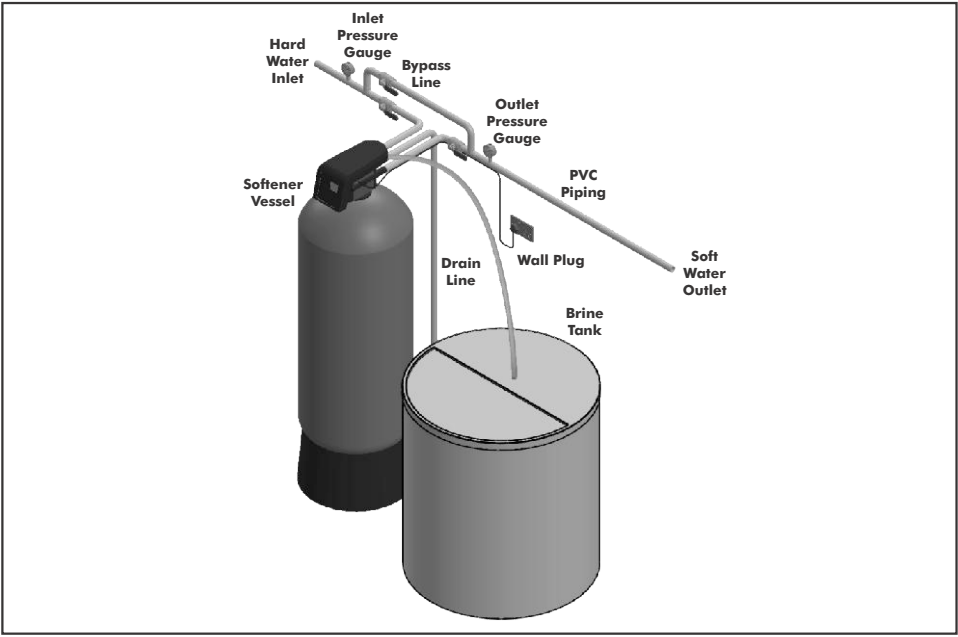
Model	Resin Volume	Exchange Capacity	Indicative Softening Capacity			Rated Service Flow	Brine Tank Volume	Valve	Tank Dimensions (mm)		Outlet Sizes (")	Weights (kg)	
			100	200	300				Diameter	Height		Nett	Gross
SF 200H	18	1,350	14	7	5	3.3	100L	Autotrol 368	200	900	1	5	20
SF 240H	40	3,000	30	15	10	3.3	200L	Autotrol 368	250	1,370	1	15	30
SF 300	50	3,750	40	20	13	5.6	300L	Autotrol 255	300	1,450	1	50	90
SF 400H	100	7,500	75	40	25	5.6	500L	Autotrol 278	400	1,830	1	30	90
SF 500H	175	13,125	130	65	45	9.8	500L	Autotrol 278	550	1,770	1	40	150
SF 600	350	26,250	260	130	90	9.8	600L	Autotrol 278	620	2,200	1	100	400
SF 900	750	56,250	560	280	190	18	1,200L	Magnum 298IT	925	2,400	2	170	800
SF 900H	550	41,250	410	205	140	18	1,200L	Magnum 298IT	930	2,150	2	110	580



2. INSTALLATION

2.1 Location

Locate the softener in a protected dry and level area. Position the tanks so that the brine tank and the control valve are easily accessible. The softener should be placed in a well-ventilated position to ensure adequate ventilation and cooling of the pump motors. Adequate room should be provided for working and service of the brine and resin tanks.



The Dayliff SF water softener has been designed such that the resin tank is to be installed next to the brine tank. This provides a simple and easy to install equipment with no extra pipework required for the brine suction.



Inlet pressure must not exceed 3 bar for low pressure and 10bar for high pressure vessels.

Due to the corrosive nature of the regeneration salt, it is recommended that non-metallic pipes such as uPVC or PE pipe be used in the installation.



DO NOT use lead pipes, as soft water will pick up the lead from the pipes, which is a serious health concern.



Ensure installation is done in the right direction with the Flow IN and Flow OUT directions.

2.2 Installation of a by-pass

It is highly recommended that a by-pass line is incorporated into the piping.

2.3 Startup

1. Position the softener unit in place.
2. Use a funnel to add the resin to the tank.
3. Clean the O-ring seats, mount the valve onto the resin tank and tighten carefully. Ensure that the cone shaped strainer is securely attached to the bottom of the valve.
4. Connect the brine tank to the softener control valve, by attaching one end of the 1/4" brine suction tube to the injector of the automatic control valve. See Figure below.



Figure 1: Brine Tank

5. Slowly open the inlet and outlet valves and let the unit fill up with water. This will take a few minutes. Once the sound of running water has stopped and the softener is full, close the bypass valve.
6. Add appropriate number of salt to the brine tank, and carefully add water as per equipment specification table. Ensure that the brine level in the brine well is always below the salt level!

2.4 Drain Line Connection

A drain for the regeneration and/or backwashing cycles is required. Locate the drain within 10m of the water softener. Connect the drain port of the valve to the drain using a flexible hose of adequate sizing. This hose will be under pressure when the regeneration/backwash cycle is working; therefore make sure the drain line is secured.

Allow an air gap between the drain tubing and waste line to prevent the possibility of reverse siphoning and/or bacteria spreading up from the drain into the drain line and subsequently into the delivery.

2.5 Brine Tank Refill

The system is designed so as to allow for refilling half the amount of brine drawn. For example, if 500 litres of brine is drawn, the softener will automatically refill about 250 litres. A hosepipe or bucket should therefore be provided to fill up the brine tank.

3. OPERATION

The control valve is controlled by a timer that is set to count the operating cycles. Once the set regeneration time is reached, the system will regenerate automatically, preferably at night at 1am to 3am.

If power is disconnected, the system could regenerate at a time when soft water is required. Therefore, always regenerate manually if water consumption is not continuous. The system allows a bypass when regenerating, so hard water is passed into supply during this period.

3.1 Service

Hard water flows through the cation exchange resin in a downward direction and is softened. The cation exchange process continues for a particular length of time set to allow the resin to be exhausted. At this point, the resin must be regenerated; a process that occurs automatically. The standard service flow rate is contained in the equipment specification table on page 3. This cycle is most efficient when the flowrate is 16 bed volumes of resin per hour.

For total hardness of 300ppm, the service flow for this softener has been set to 20 hours before regeneration at a flow rate of equipment specification table



Any continuous operation above 22m³/hr may result in channeling, bed compaction, and hardness leakage.

3.2 Backwash

This is the first step of the regeneration process, in which water flows upwards through the resin bed to release any accumulation of dirt within the resin bed and to fluff the bed, allowing more efficient contact between brine and resin during the brine draw stage.

Water enters the resin tank from the bottom and comes out at the top out to the drain.

3.3 Brine Draw

This is the second step of the regeneration process where the control valve draws a concentrated brine solution from the brine tank.

The brine flows through the resin bed in a downward direction, replacing the hardness minerals captured during the service stage thus restoring its capacity.

3.4 Slow Rinse

At the end of the brine draw, water is passed through the resin to replace the brine and rinse it out into the drain.

3.5 Rapid Rinse

The rinsing flow rate is increased to eliminate any lingering brine pockets within the resin. This ensures that the resin is free from any salt prior to the return to service.

3.6 Brine tank Refill

Water is refilled into the brine tank.



The brine and salt levels in the brine tank should always be checked to ensure there is enough brine for regeneration.



Drain water should not be directed to a garden as the high salt content (sodium) affects plant growth.

3.7 Control Valve Timer Settings

The valve is supplied with factory-set timer intervals.

Qualified technical staff may only carry out any changes to these settings.

4. MAINTENANCE

4.1 General

- A softener should be kept regenerated at all times to avoid hard water flowing into the pipes and water-using appliances. As a minimum guideline, regenerate the unit every week.
- Check and clean the brine valve and float assembly weekly.
- The presence of excess iron, bacteria, or hydrogen sulfide quickly can inhibit the effectiveness of a water-softening unit. In these cases installation of the proper pre-softening treatment equipment is important.
- If the softener has a manual or semiautomatic backwashing system, continue the backwashing operation until the water runs clear. If backwash time is adjustable on a fully automatic unit, check to be sure the timer provides for sufficient back washing to produce clear water in the drain. If the water is still dirty, reset the timer for longer back washing.
- Adequate back washing is essential to keep the bed of the unit clean for adequate regeneration.

4.2 Cleaning of Softener Brine Tank

- Usually it is not necessary to clean out a brine tank, unless the salt product being used is high in water-insoluble matter, or dirt is noticed in the brine.
- Inspect the brine tank at least once in three months for build-up of insoluble matter.

4.3 Softener Resin Replacement

If it is noticed over time that the water softening is not efficient enough, the first consideration should be problems with the salt that is used, or mechanical malfunction of softener components.

When it is established that these elements are not the cause of the unsatisfactory water softening, it may be time to replace the softener resin.

Softener resin may need replacement every 2 – 3 years on average.

4.4 Maintenance Checks

Daily

- Check the operation of the automatic control valve to ensure that it's continuously in operation.
- Check the system gate valves and ensure they are all open.
- Check the brine tank to ensure availability of enough brine.

Weekly

- Add salt to the brine tank
- Check the brine tank for any deposits of dirt.

4.5 To Manually Regenerate the Softener At Any Time:

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 its initial position, at the end of the regeneration.

5. TROUBLE SHOOTING

PROBLEM

Softener fails to regenerate.

Hard water

POSSIBLE CAUSE

Electrical service to unit has been interrupted

Timer is defective

Power failure

By-pass valve is open

No salt in brine tank

Injectors or screen plugged

Insufficient water flowing into brine tank

Hot water tank hardness

Leak at distributor tube

Internal valve leak

SOLUTION

Assure permanent electrical service (check fuse, plug, pull chain or switch)

Replace timer

Reset time of day

Back wash the filter

Add salt to brine tank and maintain salt level above water level

Clean injector screen

Check brine tank fill time and clean brine line flow if plugged

Repeated flushings of the hot water tank is required

Make sure distributor tube is not cracked. Check o-ring and tube pilot

Replace seals and spacers and/or piston

PROBLEM	POSSIBLE CAUSE	SOLUTION
Unit uses too much salt	Improper salt settings	Check salt usage and salt settings
	Excessive water in brine tank	Add salt to brine tank and maintain salt level above water level
Loss of water pressure	Iron build up in line to water conditioner	Clean line to water conditioner
	Iron build up in water conditioner	Clean control and add mineral bed. Increase frequency of regeneration
	Inlet of control plugged due to foreign material broken loose from pipes by recent work done on plumbing system	Repeated flushings of the hot water tank is required
Loss of mineral through drain line	Air in water system	Assure that well system has proper air eliminator control check for dry well condition
	Improperly sized drain line flow control	Drain the sludge
Iron in conditioned water	Fouled mineral bed	Check backwash, brine draw and brine tank fill. Increase frequency of regeneration. Increase backwash time
Excessive water in brine tank	Plugged drain line flow control	Check that the pump performance has not dropped drastically
	Plugged injector system	Clean injector and screen
	Timer not cycling	Replace timer
	Foreign material in brine valve	Replace brine valve seat and clean valve
	Foreign material in brine line flow control	Clean brine line flow control

PROBLEM

POSSIBLE CAUSE

SOLUTION

Softener fails to draw brine

Control cycles continuously

Drain line flow control plugged

Injector is blocked

Injector screen is plugged

Line pressure is too low

Internal control leak

Service adapter did not cycle

Misadjusted, broken or shorted switch

Clean injector and replace screen

Clean injector

Clean screen

Increase line pressure to 20 p.s.i

Change seals, spacers and piston assembly

Check drive motor and switches

Determine if switch or timer is faulty and replace it, or replace complete power head

6. TERMS OF WARRANTY

i) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Dayliff (hereafter called the Distributor) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Distributor's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Distributor is informed of the failure.**
- This warranty applies solely to equipment supplied and **no claim for consequential damages**, however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Distributors's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties.**

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to three years - The item will be replaced or repaired at no charge.**
- **Over three years, less than five years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates.

DAYLIFF is a brand of **Davis & Shirtliff**
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