

INSTALLATION, SERVICE & OPERATION MANUAL

PWS DUPLEX SOFTENER



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1. GENERAL NOTES



The SPECTRUM PWS water softeners utilise two resin pressure vessels. Compared to single pressure vessel water softeners, this setup ensures 24/7 access to soft water. Whilst one pressure vessel is in service, the other one is either in standby or in regeneration. The control valve monitors the amount of water going through the softener and triggers the regeneration cycle when the softening capacity of one pressure vessel expires. This manual is for a range of softeners using the 9100 and 9500 valves with various volumes of resin ranging from 50 to 280 litres.

Please take a look at the model supplied as this will have an influence on various parameters for starting up your softener, especially during programming. Once installed softeners are low in maintenance and only require a top up of salt in order to operate properly. Please ensure that the brine tank has got a minimum level of salt at all times. Although the original valve manual is included, it is preferable to use this O.E.M. manual as all settings and information will be adapted to the configuration of your specific system.

Water softeners will fall under laws and guidelines of the country where it is installed. Please check the current legal framework in order to be compliant.

Artificially softened water can have high sodium content which can be unsuitable for babies on infant formula, people on sodium restricted diets or people with risk of heart diseases.

2. DESCRIPTION & EQUIPMENT ADJUSTMENTS

Please use this sheet to keep a record of your system parameters and installation.

Installation Number		Nominal Capacity		m ³
Valve Serial Number		Inlet Water Hardness		ppm/mg/l
Tank Size		Treated Water Volume		litres
Resin Type		Outlet Water Hardness		ppm/mg/l
Resin Volume		Salt Quantity per Regeneration		kg
	litres			

Regeneration Mode

Volumetric		m ³
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Regeneration Type

Down Flow Brining		
1) Brining & Rinse		min
2) Backwash		min
3) Rapid Rinse		min
4) Brine Tank Refill		min

Electrical Supply

Low Voltage DC Transformer

3. COMPONENTS, FEATURES & FUNCTIONS



Component	Features	Functions
Automatic Control Valve	- FDA compliant Noryl plastic - Strong corrosion resistance - Innovative design - CE Marked	24 hours control and monitoring with a timer; automatically regenerates the media bed at the system's set time of regeneration according to the set regeneration frequency. - Automatically calculates a cycle plan according to the quality of supply water and the user's actual water use. - Cycle Process: In service: Once the water is supplied with correct pressure and flow, the cations contained in hard water will be replaced by Na⁺ in regenerants, then the softening system will supply softened water through its outlet. Backwash: When the ion exchange resin has been exhausted, the resin bed needs to be regenerated. Before the regeneration of the resin bed, a backwash step is necessary for two main purposes; removing the residue in the resin bed and loosening the impacted resin bed for better regeneration efficiency. Rinse: Rinse the resin bed to remove the residual regenerant (salt) after the brining step until the water from outlet contains no regenerant; rinse could also compact the resin bed for a better softening effect. Refill: Refill the brine tank with water to dissolve salt for the next regeneration.
	Valve Operation Mode	Softener: Duplex water softener operation
	Regeneration Mode	Volumetric immediate with electronic timer
	Outlet water hardness can be adjusted	User can adjust the mixing valve to get desired outlet water hardness
	Display Format	Metric
Media	NSF 61and FDA compliant	Food grade SPECTRUM softening resin
Pressure Vessel	- NSF 44 tested and certified - Polyethylene material manufactured for the Food & Beverage industries - Light, high pressure resistance - Strong corrosion resistance - Polyethylene liner with reinforced fibreglass - PED compliant	Pressure vessel holds the resin and a distribution system
Riser Tube & Distribution System		A riser tube and distribution system disperse water evenly through the resin bed
Brine Valve & Tank	High pressure resistance	- Brine valve prevents the brine tank from overflowing - Water and salt mix in the brine tank. Salt will dissolve continuously until the water is saturated by salts

4. COMPONENT CONTENTS

Please unpack your goods and ensure that all components are included. If something is missing, or damaged you should contact us immediately. If you are planning to store the components before installation, they should be secured in a dry area with no risk of freezing as it could affect sensitive components such as plastics becoming brittle or electronics potentially failing.

4.1. Fleck 9100/9500



4.2. SPECTRUM Pressure Vessel & Riser Tube



4. COMPONENT CONTENTS

4.3. SPECTRUM Brine Tank

Dimension varies according to model, also includes brine tube and safety brine valve.

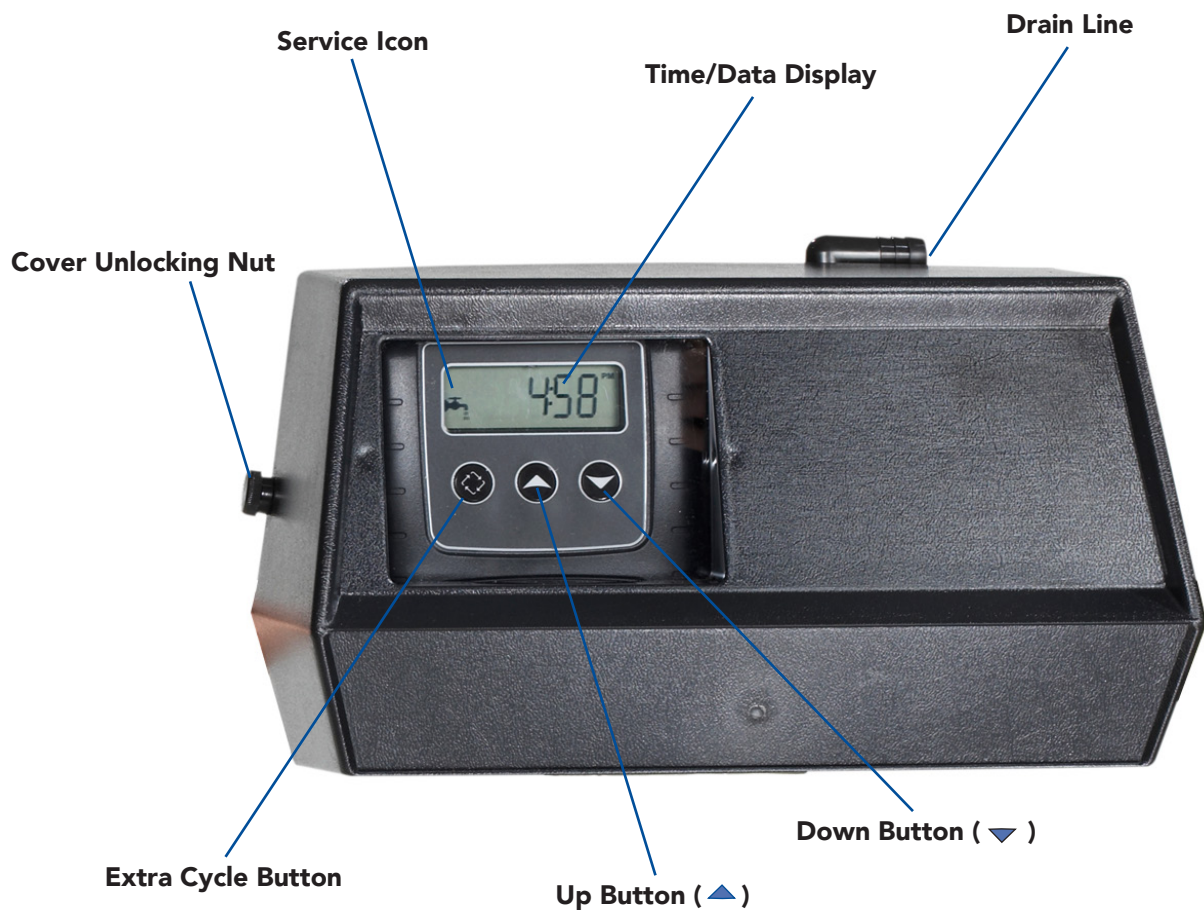


4.4. SPECTRUM Softening Resin

Volume varies according to the model.



5.1. Fleck 9100/9500



6.1. Prerequisites

The softener needs to be installed onto the mains water supply. Piping has to comply with the regulations of the country where it is installed should be installed and repaired by a qualified person.

Your softener will require space for maintenance and operation. Please allow enough room at the top of the system to remove the valve should it be needed. Also ensure access to the valve is clear in order to be able to visualise or adjust settings on the electronic board. It should be installed on a dry flat surface.

The softener uses mains power 230-240V AC 50Hz which is transformed into 5.5V or 7.5V DC. Please ensure that the electrical supply is protected from water or extreme conditions. All electrical installations have to comply with laws of the country in which it is installed.

Inlet water

An inlet pressure between 2-8 bar is required with a temperature range of 4-42°C. For applications with an incoming pressure under 2 bar a booster pump is required, over 8 bar, a pressure reducer must be fitted before the softener. It is recommended to add the necessary pre-filtration before the softener should the TSS (Total Suspended Solids) go over 1ppm. Suspended solids could become trapped between the piston and seals and cause premature wear of the internal mechanisms of the valve.

You will need two drain connections:

One is for the water rejected to the drain during the regeneration process. This will be connected to the valve, which is defined as the drainline. Water volume and flow estimations are made in the technical data chart at the end of the document. The diameter of the flexible drain pipe should be able to accommodate the flow of water to the drain. If the water does not flow to the drain properly, this will affect the performance of your softener. The drain should never be higher than the valve height as the back pressure will affect the flow of the drain.

Secondly, you will need a connection going from the brine tank overflow to the drain. Although your brine tank is equipped with a safety brine valve, it is an extra measure to avoid damage caused by flooding.

Both the drain line and the overflow should not be higher than the control valve otherwise, this will affect the softeners performance.

The softener should be piped with an external bypass in order to be able to take it off the water line for maintenance purposes. The soldering on the pipework has to be connected before the water softener as heating could damage the water softener.

6.2 Assembly

1. Place the riser tube inside the first pressure vessel. Depending on the size of the vessel, the system will either be supplied in a classic cone shape configuration or, for larger vessels, a star-type distribution system. Assemble the star type distribution system if applicable.
2. Centre the distribution system inside the vessel and seal the top of the riser tube to ensure that no resin enters the distribution system.
3. Fill the vessel (up to 85%) with the softening resin, ensuring that the distribution system remains upright and central.

N.B. A funnel (pn PVRESINFUNNEL) is recommended to aid the filling process and prevent excess resin from being spilt.

CAUTION

RESIN IS SLIPPERY, REMOVE ANY EXCESS RESIN THAT MAY HAVE BEEN SPILT

6. INSTALLATION INSTRUCTIONS

- Lubricate the internal valve O-ring with 100% silicon lubricant and screw the valve onto the top of the pressure vessel, again making sure that the distribution system locates securely into the valve body.
- Repeat steps 1-4 for the secondary (slave) vessel.
- Connect one end of the brine tube to the valve and the other end of the brine tube to the safety brine valve located inside the brine tank. (The tubing should be secure to ensure that no air enters the system).

On the side of the motor there is a diagram which illustrates various information regarding the valve's regeneration cycle. The top arrow indicates the regeneration cycle. The bottom arrow indicates which tank is in service. This information will have to be entered during the valve programming.

6.3. Connecting

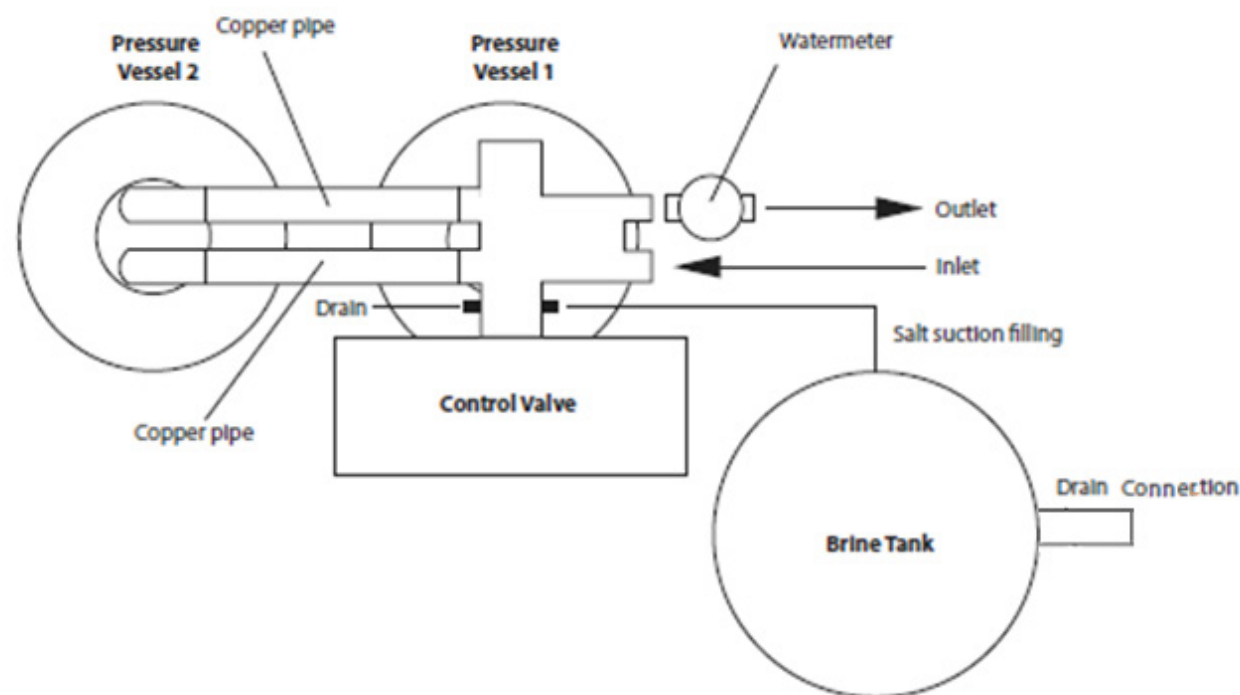
- Two drain connections will be required. The first drain should be connected directly to the valve. (For the 9100 a ½" hose, for 9500 a ¾" BSP). The diameter of the flexible drain hose should be able to accommodate the flow of water to the drain.

N.B. If water cannot flow to the drain properly, the performance of the softening system will be affected. The drain should never be connected at a point higher than the softener as the back pressure will affect flow.

- The second drain should be connected to the brine tank over flow elbow. This is in place to ensure that if for any reason the brine tank should overflow the excess is sent to the drain. The diameter of the flexible hose should be able to accommodate the flow and the outlet should not be connected above the height of the system.

N.B. The softening system should be connected with an external bypass in order to allow the system to be taken offline without affecting water supply elsewhere.

N.B. Any joint work or metal work should be completed prior to installation of the softening system.

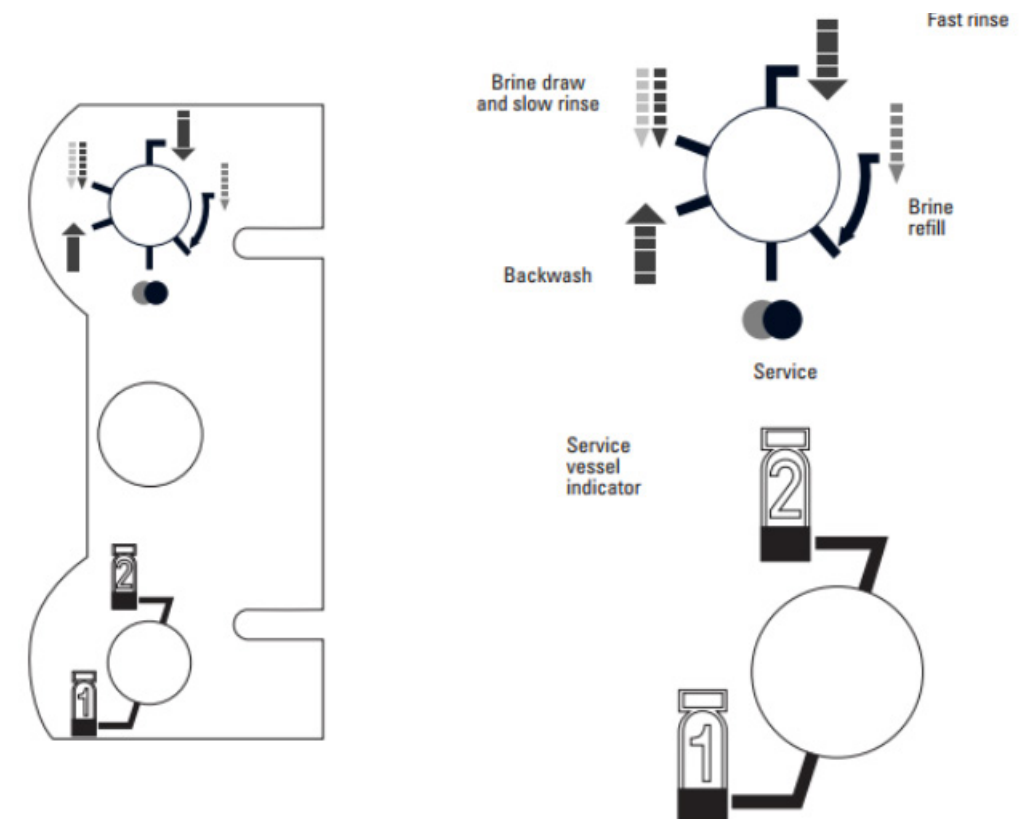


6. INSTALLATION INSTRUCTIONS

6.4 Start-Up

- Build brine tank-place salt grid into base and connect brine valve etc.
- Fill the brine tank until the water reaches top of brine grid
- Add salt until the tank in total is approximately ¾ full.
N.B. If the valve has a bypass function, place the system in the bypass position.
- Turn on the mains water supply.
- Open a cold soft water tap nearby and allow to run until all foreign material has been removed from the system.
- Once clean, close the soft water tap.
- Move the bypass in service position and allow water to flow into the pressure vessels.
- Open a cold soft water tap nearby and allow to run until the system has been purged of air.
- Plug the valve into a power source. Once the valve has been connected to a power source, it may cycle on its own in order to return to the service position.
- Start regeneration by pressing and holding the  button on the controller and to bring the 2nd (slave) vessel into service. Run through the cycle programmes in order to empty residual air in the first vessel.
- Repeat step 10 for the second vessel.
- Once complete, press  and allow the valve to go through a full cycle independently.

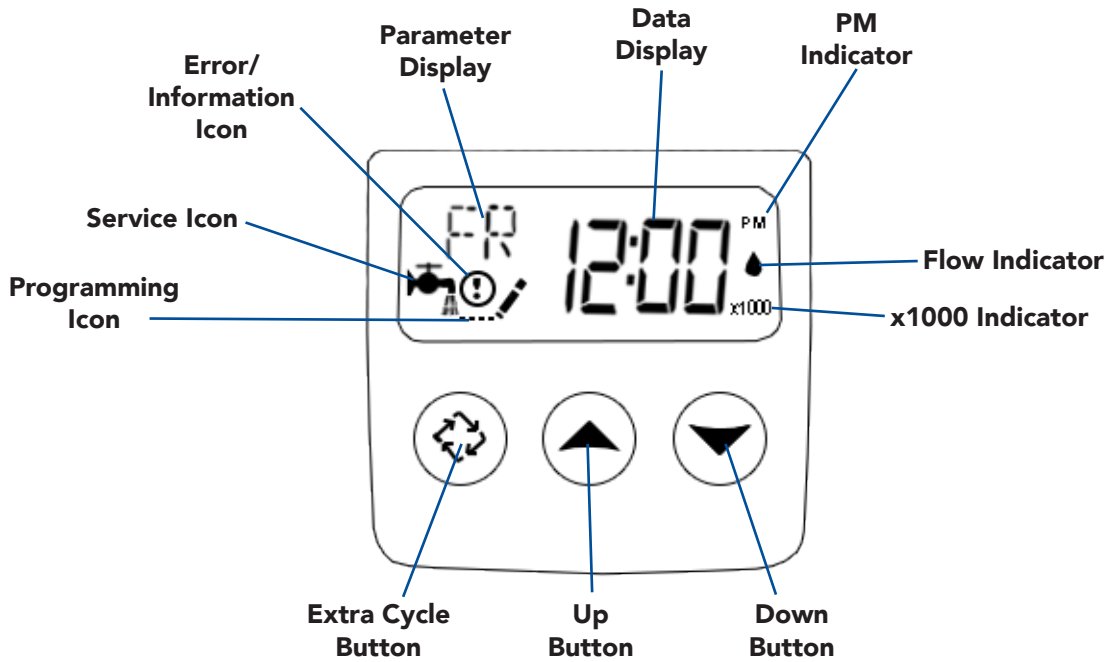
6.5 Valve's Regeneration Cycle



In grey are the options to select to ensure the proper operation of your system
In yellow are values to input based on your individual installation.

Abbreviation	Parameter	Option Abbreviation	Options Functions
DF	Display format	GAL	Gallons
		Ltr	Litres
VT	Valve type	dF1b	Standard downflow/Upflow single backwash
		dF2b	Standard downflow/Upflow double backwash
		Fltr	Filter
		Ufbd	Upflow brine first
		UFtr	Upflow filter
		Othr	Other
CT	Control type	Fd	Meter (flow) delayed
		FI	Meter (flow) immediate
		tc	Time clock
		dAY	Day of week
NT	Number of tanks	1	Single tank system
		2	Two tank system
TS	Tank in service	U1	Tank 1 in Service
		U2	Tank 2 in Service
C	Unit capacity		Unit capacity (litres) for capacity, please view chart A
H	Feedwater hardness		Hardness of inlet water
RS	Reserve selection	SF	Percentage safety factor
		rc	Fixed reserve capacity
SF	Safety factor		Percentage of the system capacity to be used
RC	Fixed reserve		Fixed volume to be used as a reserve
DO	Day override		The systems day override setting
RT	Regen time		The time of day the system will regenerate
BW, BD, RR, BF	Regen cycle step times		The time duration for each regeneration step. Adjustable from OFF and 0-199 mins. Note if "other" is chosen under "Valve Type" then R1, R2, R3 etc will be displayed instead
D1, D2, D3, D4, D5, D6 & D7	Day of week settings		Regeneration setting (ON or OFF) for each day of the week on day-of-week systems
CD	Current day		The current day of the week
		P0.7	3/4" (Flec 9100) Paddle wheel meter
		P1.5	1.5" (Flec 9500) Paddle wheel meter

7.1. Timer Operation



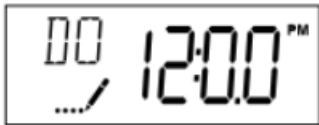
Features of the SXT:

- Power backup that continues to keep time and the passage of days for a minimum of 48 hours in the event of power failure. During a power outage, the control goes into a power-saving mode. It does not monitor water usage during a power failure, but it does store the volume remaining at the time of power failure.
- Settings for both valve (basic system) and control type (method used to trigger regeneration).
- Day-of-the-Week controls.
- While in service, the display alternates between time of day, volume remaining or days to regeneration, and tank in service (twin tank systems only).
- The Flow Indicator flashes when outlet flow is detected.
- The Service Icon flashes if a regeneration cycle has been queued.
- Regeneration can be triggered immediately by pressing the Extra Cycle button for five seconds.
- The Parameter Display shows the current Cycle Step (BW, BF, RR, etc) during regeneration, and the data display counts down the time remaining for that cycle step. While the valve is transferring to a new cycle step, the display will flash. The parameter display will identify the destination cycle step (BW, BF, RR, etc) and the data display will read "----". Once the valve reaches the cycle step, the display will stop flashing and the data display will change to the time remaining. During regeneration, the user can force the control to advance to the next cycle step immediately by pressing the extra cycle button.

When the Master Programming Mode is entered, all available option setting displays may be viewed and set as needed. Depending on current option settings, some parameters cannot be viewed or set.

8.1 Setting the Time of Day

1. Press and hold either the ‘Up’ or ‘Down’ buttons until the programming icon replaces the service icon and the parameter display reads ‘DO’.
2. Adjust the displayed time with the ‘Up’ and ‘Down’ buttons.
3. When the desired time is set, press the ‘Extra Cycle’ button to resume normal operation. The unit will also return to normal operation after 5 seconds if no buttons are pressed.



8.2. Entering Master Programming Mode

Set the Time of Day display to 12:01 P.M. Press the ‘Extra Cycle’ button (to exit Setting Time of Day mode). Then press and hold the ‘Up’ and ‘Down’ buttons together until the programming icon replaces the service icon and the Display Format screen appears.

8.3. Exiting Master Programming Mode

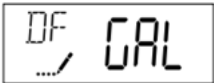
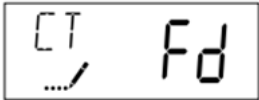
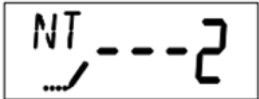
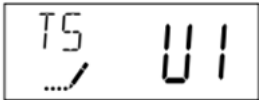
Press the ‘Extra Cycle’ button to accept the displayed settings and cycle to the next parameter. Press the ‘Extra Cycle’ button at the last parameter to save all settings and return to normal operation. The control will automatically disregard any programming changes and return to normal operation if it is left in Master Programming mode for 5 minutes without any keypad input.

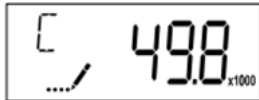
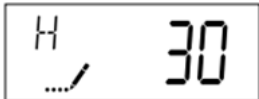
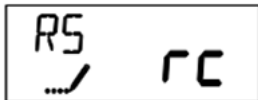
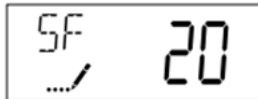
8.4. Resets

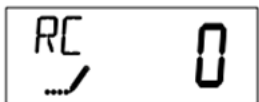
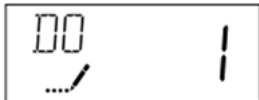
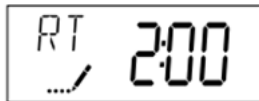
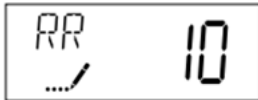
Soft Reset: Press and hold the ‘Extra Cycle’ and ‘Down’ buttons for 25 seconds while in normal Service mode. This resets all parameters to the system default values, except the volume remaining in meter immediate or meter de-layed systems and days since regeneration in the time clock system.

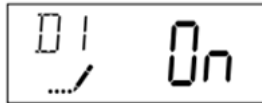
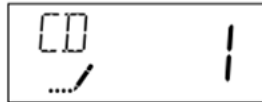
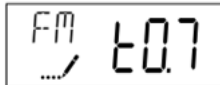
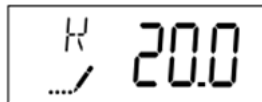
Master Reset: Hold the ‘Extra Cycle’ button while powering up the unit. This resets all of the parameters in the unit. Check and verify the choices selected in Master Programming Mode.

*As detailed on page 11

Parameter		Value	Description	Parameter Image														
1. Display format	DF	Ltr	This is the first screen that appears when entering Master Programming Mode. The Display Format setting specifies the unit of measure that will be used for volume and how the control will display the Time of Day. This option setting is identified by “DF” in the upper left hand corner of the screen.	<table border="1"><tr><th>Display Format Setting</th><th>Unit of Volume</th><th>Time Display</th></tr><tr><td>GAL</td><td>U.S. Gallons</td><td>12-Hour AM/PM</td></tr><tr><td>Ltr</td><td>Liters</td><td>24-Hour</td></tr></table> 	Display Format Setting	Unit of Volume	Time Display	GAL	U.S. Gallons	12-Hour AM/PM	Ltr	Liters	24-Hour					
Display Format Setting	Unit of Volume	Time Display																
GAL	U.S. Gallons	12-Hour AM/PM																
Ltr	Liters	24-Hour																
2. Valve type	VT	dF1b	Press the Extra Cycle button. Use this display to set the Valve Type. The Valve Type setting specifies the type of cycle that the valve follows during regeneration. Note that some valve types require that the valve be built with specific subcomponents. Ensure the valve is configured properly before changing the Valve Type setting. This option setting is identified by “VT” in the upper left hand corner of the screen.	<table border="1"><tr><th>Abbreviation</th><th>Parameter</th></tr><tr><td>dF1b</td><td>Standard Downflow/Upflow, Single Backwash</td></tr><tr><td>dF2b</td><td>Standard Downflow/Upflow, Double Backwash</td></tr><tr><td>Ftr</td><td>Filter</td></tr><tr><td>UFbd</td><td>Upflow Brine First</td></tr><tr><td>UFtr</td><td>Upflow Filter</td></tr><tr><td>Othr</td><td>Other</td></tr></table> 	Abbreviation	Parameter	dF1b	Standard Downflow/Upflow, Single Backwash	dF2b	Standard Downflow/Upflow, Double Backwash	Ftr	Filter	UFbd	Upflow Brine First	UFtr	Upflow Filter	Othr	Other
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Othr	Other																	
3. Control type	CT	Fl	Press the Extra Cycle button. Use this display to set the Control Type. This specifies how the control determines when to trigger regeneration. For details on how the various options function, refer to the “Timer Operation” section of this service manual. This option setting is identified by “CT” in the upper left hand corner of the screen.															
4. Number of tanks	NT	2	Press the Extra Cycle button. Use this display to set the Number of Tanks in your system. This option setting is identified by “NT” in the upper left hand corner of the screen.															
5. Tank in service	TS	U1	Press the Extra Cycle button. Use this display to set whether tank one or tank two is in service. This option setting is identified by “TS” in the upper left hand corner of the screen. This parameter is only available if the number of tanks has been set to 2. There are two possible settings: Look on the side label next to the motor, the bottom arrow indicates which tank is in service. If the arrow indicates tank 1, then select U1. If the arrow indicates tank 2 then choose U2–.															

Parameter		Value	Description	Parameter Image				
6. Unit capacity	C	mg	Press the Extra Cycle button. Use this display to set the Unit Capacity. This setting specifies the treatment capacity of the system media. Enter the capacity of the media bed in grains of hardness when configuring a softener system, and in the desired volume capacity when configuring a filter system. This option setting is identified by “C” in the upper left hand corner of the screen. The Unit Capacity parameter is only available if the control type has been set to one of the metered options. Use the Up and Down buttons to adjust the value as needed. Input the value indicated in the programming chart corresponding to your model.					
7. Feed water hardness	H	ppm CaCO3	Press the Extra Cycle button. Use this display to set the Feed water Hardness. Enter the feed water hardness in the same unit chosen for determining the capacity .volume for softener systems, This option setting is identified by “H” in the upper left hand corner of the screen. Use the Up and Down buttons to adjust the value as needed.					
8. Reserve selection	RS	rc	Press the Extra Cycle button. Use this display to set the Safety Factor. Use this display to select the type of reserve to be used in your system. This setting is identified by “RS” in the upper left-hand corner of the screen	<table border="1"><tr><td>FS</td><td>Safety Factor</td></tr><tr><td>rc</td><td>Fixed Reserve Capacity</td></tr></table> 	FS	Safety Factor	rc	Fixed Reserve Capacity
FS	Safety Factor							
rc	Fixed Reserve Capacity							
9. Safety factor	SF	0-50%	Press the Extra Cycle button. Use this display to set the Safety Factor. This setting specifies what percentage of the system capacity will be held as a reserve. Since this value is expressed as a percentage, any change to the unit capacity or feed water hardness that changes the calculated system capacity will result in a corresponding change to the reserve volume. This option setting is identified by “SF” in the upper left hand corner of the screen. Use the Up and Down buttons to adjust the value from 0 to 50% as needed.	 Range: 0-50%				

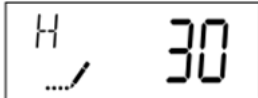
Parameter		Value	Description	Parameter Image												
10. Fixed reserve capacity	RC		Press the Extra Cycle button. Use this display to set the Reserve Capacity. This setting specifies a fixed volume that will be held as a reserve. The reserve capacity cannot be set to a value greater than one-half of the calculated system capacity. The reserve capacity is a fixed volume and does not change if the unit capacity or feed water hardness are changed. This option setting is identified by "RC" in the upper left-hand corner of the screen. Use the Up and Down buttons to adjust the value as needed.													
11. Day override	DO		This setting specifies the maximum number of days between regeneration cycles. The system will regenerate regardless of usage if the days since last regeneration cycle equal the day override setting. Setting the day override value to "OFF" disables this function. This option setting is identified by "DO" in the upper left hand corner of the screen. Use the Up and Down buttons to adjust the value as needed. This parameter is dependant by your individual needs.													
12. Regeneration time	RT		Press the Extra Cycle button. Use this display to set the Regeneration Time. This setting specifies the time of day the control will initiate a manually queued, or day override triggered regeneration. This option setting is identified by "RT" in the upper left hand corner of the screen. Use the Up and Down buttons to adjust the value as needed.													
13. Regeneration cycle step times	BD BF BW RR SV	0-199	Press the Extra Cycle button. Use this display to set the Regeneration Cycle Step Times. The different regeneration cycles are listed in sequence based on the valve type selected for the system, and are identified by an abbreviation in the upper left-hand corner of the screen. The abbreviations used are listed below although not necessarily in that order. The values to input are dependent on your own model and can be found in the table in Section 11. Use the Up and Down buttons to adjust the value as needed. Press the Extra Cycle button to accept the current setting and move to the next parameter.	<table border="1"><thead><tr><th>Abbreviation</th><th>Cycle Step</th></tr></thead><tbody><tr><td>BD</td><td>Brine Draw</td></tr><tr><td>BF</td><td>Brine Fill</td></tr><tr><td>BW</td><td>Backwash</td></tr><tr><td>RR</td><td>Rapid Rinse</td></tr><tr><td>SV</td><td>Service</td></tr></tbody></table> 	Abbreviation	Cycle Step	BD	Brine Draw	BF	Brine Fill	BW	Backwash	RR	Rapid Rinse	SV	Service
Abbreviation	Cycle Step															
BD	Brine Draw															
BF	Brine Fill															
BW	Backwash															
RR	Rapid Rinse															
SV	Service															

Parameter		Value	Description	Parameter Image																
14. Day of week	D1	ON or OFF	Press the Extra Cycle button. Use this display to set the regeneration schedule for a system configured as a Day of Week control. The different days of the week are identified as D1, D2, D3, D4, D5, D6, and D7 in the upper left-hand corner of the display. Set the value to "ON" to schedule a regeneration or "OFF" to skip regeneration for each day. Use the Up and Down buttons to adjust the setting as needed. Press the Extra Cycle button to accept the setting and move to the next day. Note that the control requires at least one day to be set to "ON." If all 7 days are set to "OFF", the unit will return to Day One until one or more days are set to "ON."																	
	D2																			
	D3																			
	D4																			
	D5																			
	D6																			
	D7																			
15. Current day	CD	1-7	Press the Extra Cycle button. Use this display to set the current day on systems that have been configured as Day of Week controls. This setting is identified by "CD" in the upper left-hand corner of the screen. Use the Up and Down buttons to select from Day 1 through Day 7.																	
16. Flow meter type	FM		Press the Extra Cycle button. Use this display to set the type of flow meter connected to the control. This option setting is identified by "FM" in the upper left-hand corner of the screen. Use the Up and Down buttons to select one of the 7 available settings.	<table border="1"><tr><td>10.7</td><td>Fleck 3/4" Turbine Meter</td></tr><tr><td>P0.7</td><td>Fleck 3/4" Paddle Wheel Meter</td></tr><tr><td>t1.0</td><td>Fleck 1" Turbine Meter</td></tr><tr><td>P1.0</td><td>Fleck 1" Paddle Wheel Meter</td></tr><tr><td>t1.5</td><td>Fleck 1 1/2" Turbine Meter</td></tr><tr><td>P1.5</td><td>Fleck 1 1/2" Paddle Wheel Meter</td></tr><tr><td>P2.0</td><td>Fleck 2" Paddle Wheel Meter</td></tr><tr><td>GEn</td><td>Generic/Other Meter</td></tr></table>	10.7	Fleck 3/4" Turbine Meter	P0.7	Fleck 3/4" Paddle Wheel Meter	t1.0	Fleck 1" Turbine Meter	P1.0	Fleck 1" Paddle Wheel Meter	t1.5	Fleck 1 1/2" Turbine Meter	P1.5	Fleck 1 1/2" Paddle Wheel Meter	P2.0	Fleck 2" Paddle Wheel Meter	GEn	Generic/Other Meter
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P1.5	Fleck 1 1/2" Paddle Wheel Meter																			
P2.0	Fleck 2" Paddle Wheel Meter																			
GEn	Generic/Other Meter																			
		The values to input are dependent on your own model and can be found in the table in Section 11.																		
17. Meter pulse setting	K		Press the Extra Cycle button. Use this display to specify the meter pulse setting for a non-standard flow meter. This option setting is identified by "K" in the upper left-hand corner of the screen. Use the Up and Down buttons to enter the meter constant in pulses per unit volume.																	
18. End of master programming mode			Press the Extra Cycle button to save all settings and exit Master Programming Mode.																	

Abbreviation	Parameter	Description
DO	Day override	The time's day override setting
RT	Regeneration time	The time of day that the system will regenerate (meter delayed timeclock, and day-of-week systems)
H	Feed water hardness	The hardness of the inlet water - used to calculate system capacity for metered systems
RC or SF	Reserve capacity	The fixed reserve capacity
CD	Current day	The current day of week

N.B. Press the Up and Down buttons for five seconds while in service, and the time of day is NOT set to 12:01 PM.

9.1. Timer Operation

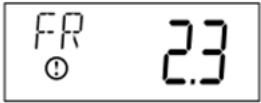
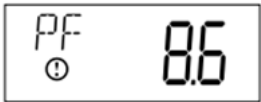
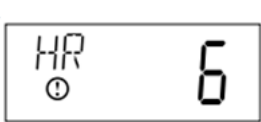
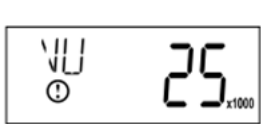
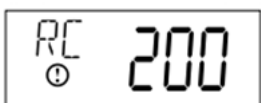
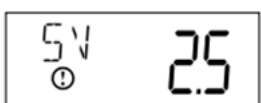
Parameter		Description	Parameter Image
1. Day override	DO	Use this display to adjust the Day Override. This option setting is identified by "DO" in the upper left hand corner of the screen.	
2. Regeneration time	RT	Press the Extra Cycle button. Use this display to adjust the Regeneration Time. This option setting is identified by "RT" in the upper left hand corner of the screen.	
3. Feed water hardness	H	Press the Extra Cycle button. Use this display to adjust the Feed Water Hardness. This option setting is identified by "H" in the upper left hand corner of the screen.	
4. Reserve capacity	RC	Press the Extra Cycle button. Use this display to adjust the Fixed Reserve Capacity. This option setting is identified by "RC" or "SF" in the upper left-hand Corner of the screen.	

Abbreviation	Parameter	Description
FR	Flow rate	Displays the current outlet flow rate
PF	Peak flow rate	Displays the highest flow rate measured since the last regeneration
HR	Hours in service	Displays the total hours that the unit has been in service
VU	Volume used	Displays the total volume of water treated by the unit
RC	Reserve capacity	Displays the system's reserve capacity calculated from the system capacity, feed water hardness, and safety factor
SV	Software version	Displays the software version installed on the controller

N.B. Some items may not be shown depending on timer configuration. The timer will exit Diagnostic Mode after 60 seconds if no buttons are pressed. Press the Extra Cycle button to exit Diagnostic Mode at any time.

Press the Up and Extra Cycle buttons for five seconds while in service.

10.1. Diagnostic Programming Mode Steps

Parameter		Description	Parameter Image
1. Flow rate	FR	Use this display to view the current Flow Rate. This option setting is identified by "FR" in the upper left hand corner of the screen. It is expressed in m3/hr.	
2. Peak flow rate	PF	Press the Up button. Use this display to view the Peak Flow Rate since the last regeneration cycle. This option setting is identified by "PF" in the upper left hand corner of the screen. Its expressed in m3/hr.	
3. Hours in service	HR	Press the Up button. Use this display to view the Hours in Service since the last regeneration cycle. This option setting is identified by "HR" in the upper left hand corner of the screen.	
4. Volume used	VU	Press the Up button. Use this display to view the Volume Used since the last regeneration cycle. This option setting is identified by "VU" in the upper left hand corner of the screen.	
5. Reserve capacity	RC	Press the Up button. Use this display to view the Reserve Capacity. This option setting is identified by "RC" in the upper left hand corner of the screen.	
6. Software version	SV	Press the Up button. Use this display to view the Software Version. This option setting is identified by "SV" in the upper left hand corner of the screen.	
7. End diagnostic programming mode		Press the Extra Cycle button to end Diagnostic Programming mode.	

11.1. Capacity Calculation Table

Hardness Level (ppm CaCO ₃)			
	PWS-2.5M	PWS-5.0M	PWS-12.5M
100	25000	50000	125000
120	20833	41667	104167
140	17857	35714	89286
160	15625	31250	78125
180	13889	27778	69444
200	12500	25000	62500
220	11364	22727	56818
240	10417	20833	52083
260	9615	19231§	48077
280	8929	17857	44643
300	8333	16667	41667
320	7813	15625	39063
340	7353	14706	36765
360	6944	13889	34722
380	6579	13158	32895
400	6250	12500	31250
420	5952	11905	29762
440	5682	11364	28409
460	5435	10870	27174
480	5208	10417	26042
500	5000	10000	25000

11.2 Cycle Time Table

The chart below can be used to help programme steps 13 and 16 in the Master Programming Mode.

PWS Programming Chart							
Parameter Softener	Capacity C	Backwash BW	Brine draw BD	Rapid rinse RR	Brine refill BR	Total	Flow meter FM
PWS-2.5M	2,500,000	10	70	10	10	100	0.75
PWS-5.0M	5,000,000	10	70	10	10	100	0.75
PWS-12.5M	12,500,000	15	90	15	14	134	1.5

12.1. PWS System

Problem	Possible Cause	Possible Solution
A. Controller does not work	1. Power off 2. Transformer is not plugged in 3. Defective power cord 4. Defective transformer	1. Switch on power 2. Connect to constant power source 3. Replace cord 4. Replace the transformer
B. Incorrect time of regeneration	1. Power outage causes inaccurate timing	1. Reset the timer
C. Leaking	1. Loose connections	1. Tighten joints
D. Noisy	1. Air pressure in the system	1. Re-backwash the system to vent air
E. Milk-white water	1. Air exists in the system	1. Turn on the tap to vent air
F. Unsatisfied water hardness	1. Poor raw water quality 2. Time of regeneration is too long 3. Resin disabled	1. Contact your supplier for assistance 2. Reset time of regeneration 3. Re-regeneration or use new resin
G. Softener fails to use salt	1. Water pressure is too low 2. Brine line blocked 3. Injector is blocked 4. Internal control leak	1. Line pressure must be at least 20 psi 2. Clean brine line 3. Clean or replace injector & screen 4. Check piston, seals and spacers
H. Brine container overflow	1. Refill time too long	1. Contact your supplier for assistance
I. Water hardness remains	1. Fail to regenerate automatically 2. Brine concentration is poor 3. Injector is plugged	1. Check power of controller 2. Keep brine tank full of salt 3. Disassemble the injector and clear it by washing with water
K. Untreated water leakage during service	1. Improper regeneration 2. Leaking of bypass valve 3. O-ring around riser tube damaged 4. Incorrect regeneration cycle setting	1. Repeat regeneration making certain that the correct salt dosage is set 2. & 3. Replace O-ring 4. Reset regeneration cycle

Important Notice

The controlling components are driven by an electric circuit. Some programmed parameters will be lost if a power outage lasts over 8 hours and the water softener will carry out the regeneration process at the incorrect time. We strongly recommend that after a power outage, users should check the time and adjust accordingly.

12.2. PWS Valve

Problem	Possible Cause	Possible Solution
A. Unit fails to initiate a regeneration cycle	1. No power supply	Check electrical service, fuse, etc
	2. Power Failure	Reset time of day
B. Water is hard	1. By-pass valve open	Close by-pass valve
	2. Out of salt	Add salt to tank
	3. Plugged injector / screen	Clean parts
	4. Flow of water blocked to brine tank	Check brine tank refill rate
	5. Leak between valve and central tube	Check if riser tube is cracked or o-ring is damaged. Replace faulty parts
	6. Internal valve leak	Replace valve seals, spacer and piston assembly
C. Salt use is high	1. Refill time is too long	Check refill time setting
D. Low water pressure	1. Iron or scale builds up in line feeding unit	Clean pipes
	2. Iron build up inside valve or tank	Clean control and add resin cleaner to clean the bed. Increase regeneration frequency
	3. Inlet of control blocked due to foreign matter	Remove piston and clean control valve
F. Too much water in brine tank	1. Blocked injector or screen	Clean parts
	2. Foreign material in brine tank	Clean parts
G. Unit fails to draw brine	1. Drain line flow control is blocked	Clean parts
	2. Injector or screen is blocked	Clean parts
	3. Inlet pressure too low	Increase pressure to 25 PSI
	4. Internal valve leak	Replace seals, spacers and piston assembly
H. Valve continuously cycles	1. Broken Gear	Replace faulty parts
I. Flows to drain continuously	1. Valve settings incorrect	Check valve settings
	2. Foreign material in control valve	Clean control
	3. Internal leak	Replace seals, spacers and piston assembly

1. DO NOT perform any operations on the control valve without reading and understanding the contents of this manual.
2. Ensure the system does not lean during shipping, installation and use, as this is may cause damage.
3. During regeneration the water from the tap will NOT be softened. It is NOT recommended to use the water during regeneration as this may have a negative effect on the cycle.
4. Initiate a regeneration cycle when the softener has been inactive for an extended period of time and then turn on the tap for several minutes before resuming normal use.
5. Do not disconnect power during service to prevent timer disruption.
6. If water usage or hardness of raw water dramatically increases (compared to the normal usage), then the frequency of regeneration will increase.
7. Hot water could cause severe damage to the softener system, for water boiler and water heaters users, ensure the total-run of the piping between the softener and the boiler is not less than 3 metres. It is recommended to install a check valve between the filter and the boiler if unable to meet the required piping length.
8. The input water pressure must be between 2 & 8 bar.
9. No chemicals should be present at the inlet and outlet connecting sectors.
10. Besides the system, spare part connection materials are not included in the scope of the manufacturer’s warranty.
11. The required environmental temperature for a softener is 1-42°C. Outside these parameters may cause the softener to malfunction.
12. Do not apply pressure to the softener.
13. Indoor installation is preferred. Avoid exposure to direct sunlight, radiation from other heating sources and avoid extreme weather conditions including rain and snow.
14. Use salt granules or tablets designed for softeners.
15. No tools should be used for connecting the plastic parts as over tightening or excessive force could result in damage.
16. If necessary use food grade silica sealant for lubricating rubber O-rings.
17. Only qualified personnel should adjust or remove the adaptor locking clips on the reverse of the valve, as this can tamper with the valve settings. Should this be required pressure must firstly be discharged from inside the water softener

Model	PWS-2.5M	PWS-5.0M	PWS-12.5M
Maximum Operating Temperature (°C)	42		
Minimum Operating Temperature (°C)	2		
Maximum Operating Pressure (bar)	8		
Minimum Operating Pressure (bar)	2		
Optimal Flow Rate (m³/hr)	2.2	3.9	6.9
Max Flow Rate (m³/hr)	4.5	4.5	8.6
Inlet / Outlet (")	¾	¾	1½
Valve	FLECK 9100 SXT	FLECK 9100 SXT	FLECK 9500 SXT
Drain (")	1	1	1
Brine Line (")	¾	¾	½
Power Requirements	240V 50Hz	240V 50Hz	240V 50Hz
Resin Volume (l)	50	100	250
Salt Consumption Per Regeneration (kg)	7	14	35
Pressure Tank Thread (")	2½	2½	4
Vessel Size	10x54	14x65	21x62
Brine Tank Volume (l)	140	140	350
Brine Tank Dimensions (mm)	582x362 x904	ø 740 x 1275	ø 740 x 1275
Total Height (mm)	1550	1860	1940
Total Weight (kg)	100	250	580
Regen Water Consumption (L)	250	467	1295



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