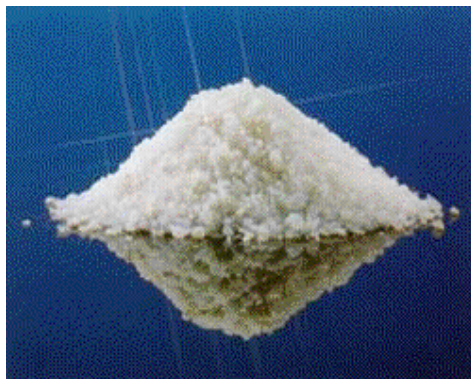




Installation, Operation & Maintenance Guide

Crystal Right
CR100 & CR200



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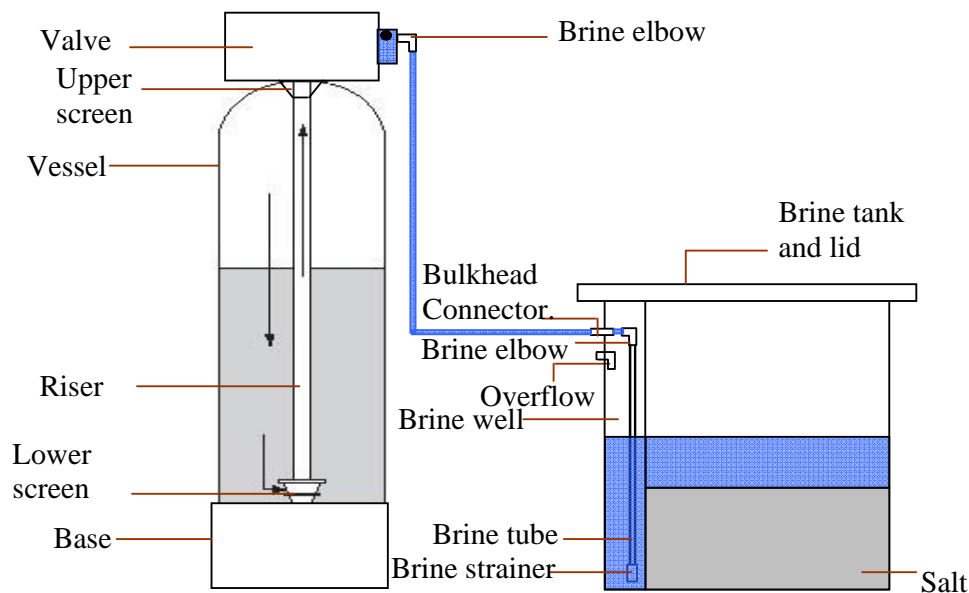
Thank you for purchasing this filter System. We are sure that it will provide you with trouble free service for many years to come. Please use the following pages to assist you with the assembly and installation of your new system.

1. Unpacking.

PLEASE USE THE ACCOMPANYING PACKING DOCUMENTS TO CHECK THAT ALL ITEMS ARE PRESENT AND CORRECT.

If any item is missing or damaged your carrier and supplier must be notified within 2 days of receipt if a claim is to be made.

The main parts of the system include:



2. Installation.

Please observe the regulations concerning the installation of your filter system. Check that you have allowed space for access to the unit for possible future maintenance. This installation may require plumbing work and will require an electrical outlet to be fitted near the system. Only attempt this if you have the necessary skills.

2.1 Pre-installation checks.

The area needs to be level, frost free have access to electricity and an open drain. Check the incoming water quality is within any parameters specified for that media (see technical information at the back of the manual). In addition to this check the incoming water pressure is between 2 and 8 bar (preferably approx. 4 bar) and the water temperature is between 3°C and 45°C.

2.2 Fitting the Bottom Distribution System.

Fit the bottom distribution system into the vessel – the bottom screen should be pre glued to the riser tube (fig A.1). If the system uses bottom laterals (typically 16" diameter and above) these need to be assembled inside the vessel (fig A.2), Move the vessel to its final position as it will be difficult to move once the media has been added.



Fig A.1



Fig A.2



Fig A.3

2.3 Adding the Media.

Block the top of the riser tube to stop media getting down the tube (see fig A.3). Add about 1/3 by volume of water to the vessel so when the media is poured in it doesn't damage the bottom distribution system. If you have been supplied gravel with your kit this should be added first to cover the bottom distribution system. Add the other media supplied but make sure there is 30% free space left above the media so when the system is backwashed the media can expand into the space and the sediment and contaminants can be backwashed away (there may be media left over). Unblock the riser tube.

2.4 Fitting the Valve.

Add a small amount of silicone grease to the valve outer and inner o-rings (fig A.4 & 5).



Fig A.4



Fig A.5

If a top screen is supplied this should be attached next.

Slide the valve onto the riser tube and gently push it down onto the vessel threads. Screw the valve on until you start to squeeze the main O ring and then finally give the valve a final tighten by tapping the rear side of the valve with the palm of your hand (fig A.6)



Fig A.6

2.5 Brine Tank Connections.

Attach the brine line tubing to the brine tank and valve using the connectors fitted to the brine tank (Fig A.7), valve (Fig A.8), or air check bottle on 255 valve. (Fig A.9)

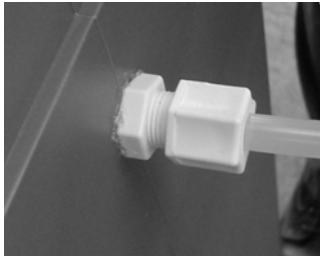


Fig A.7

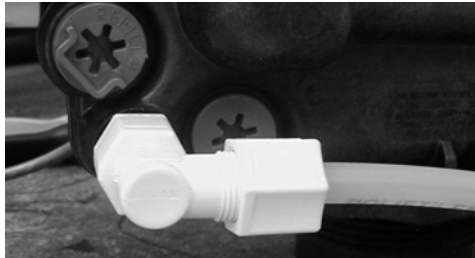


Fig A.8



Fig A.9

2.5 Hydraulic Connections.

Attach the supplied manifold or tails before you connect your pipe work to the valve (fig A.10). You can connect with fixed or flexible pipe work for the $\frac{3}{4}$ or 1" valve units and fixed pipe work for the 2" valve units. (Fig A.10)



Fig A.10



Fig A.10

2.6 Drain Line Flow Connections.

Check the service and backwash flow rates (see technical information at the end of the manual). If the service flow rates are exceeded then the filter will not give good quality water. If the back wash flow rates are not available when backwashing there will not be sufficient water to lift the bed and wash away all the impurities. The backwash flow rate should be limited by either internal or external drain line flow controls (DLFCs). If the DLFC is external then it should be listed on the packing documents and should be screwed on to the waste connection of the valve. A drain hose should then be attached which needs to terminate in an open drain (back pressure or a kinked waste tube will cause the system to malfunction). If the DLFC is internal it will be fitted inside the valve (normally used on vessels 10 inch diameter and smaller).

2.7 Electrical connection.



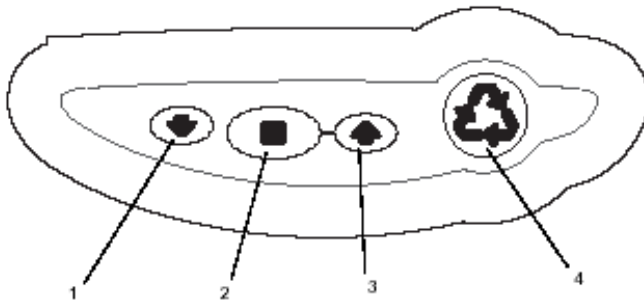
All valves are low voltage valves with a 240V transformer. With the power off connect the transformer provided to 240V supply. With the power OFF plug the flying lead into the connector on the controller (Fig A.11). If you have an in line transformer this needs to be wired into a fused switch. Ensure that the flying lead cannot get caught on the camshaft or any of the valves moving parts.

Fig A.11

2.8 Programming the Valve.

This programming relates to the Autotrol 74x and 76x logix series timers.

The valve should already have been set up with the basic settings in the factory. The only settings you should need to enter are the time of day and day of the week.



1. Down arrow. Used to scroll down or increment through a group of choices.
2. Set. Used to accept a setting to store in the memory.
3. Up arrow. Used to scroll up or increment up through a group of choices.
4. Regenerate. Used to command the controller to regenerate.

Initial Power Up.



Plug the transformer into the rear of the control panel; this is located to the left top corner of the panel if viewing from the front. Once the power is connected the display may briefly show the valve number for the system (742 or 762 versions). The valve type will be printed on the side of the valve and should also appear on the delivery documentation.

Note. During the set up process the display may revert to service mode (after 25 seconds).



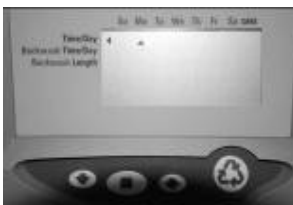
By repeatedly pressing the set button you can scroll to the part of the set up programme you require.

If you receive an ERR3 message allow the cam shaft to turn for a few moments and this code should disappear. If the cam does not move check that the Cam Shaft is fitted correctly and that the optical sensor is in position.



Set Time.

Press the set button. The TIME should now be flashing, use the up and down arrows to set the correct time of day (24hrs format). Once the correct time has been selected, press the set button to confirm. The following will then be displayed.



Set Day of the Week.

Press the set button to display the screen shown. The display will flash, use the up and down buttons to advance the arrow to underneath the correct day. Once under the correct day press the set button to confirm. The following will then be displayed.



Time when system Regenerates.

This normally defaults to 2.00am but can easily be changed to a more suitable time if required by pressing the square set button to start the display flashing, adjusting the time using the up and down arrows then press the square set button to confirm. The following will then be displayed.



Calendar Override Days.

The system should have this pre-programmed to a suggested number of days but this may need altering to suit your needs. This function allows the filter bed to backwash regardless of usage; this is to ensure that the filter bed remains fresh.

Press the set button to start the display flashing then alter the figure using the up and down arrows, then press the set button to confirm the setting.



Hardness Setting.

The hardness setting will need to be set on site, the setting is in ppm.

Press the set button to start the display flashing and adjust the hardness value up or down using the up and down arrows, when the correct figure is displayed press the square button to set.

Hardness setting = Total hardness ppm (CaCO₃) + 2 x Sodium level (ppm). If the Sodium level is unknown typically add 60 to the total hardness.



Capacity.

System capacity is displayed in kilograms of hardness removed before regeneration is necessary. This should be factory set but should it require setting you need to press the set button to start the display flashing, then adjust the figure using the up and down arrows and press the set button to confirm the figure. (see section 5.1)

2.9 Resetting the Valve Programming.

Occasionally it maybe necessary to reset the valve to factory defaults.

The programmed valve type (softener) can be checked by pressing and holding the SET and DOWN buttons simultaneously for 5 seconds. H0 and a resin volume is displayed e.g. H0 100, the valve has been set as a softener. If in doubt contact your supplier.

To reset the valve: with H0 displayed, press and hold the SET for 5 seconds

For 762 timers (light grey surround) the valve type will now be shown eg 255, 278. Choose the correct valve (255, 278, 298) and press the SET button. Three dashes will now show on screen, this is the resin volume and should be set accordingly using the up and down arrows set the amount of resin applicable to your system (see programming details)

It will now be necessary to reset the time, day, regeneration time and override days.

2.10 Normal Valve Operation

During normal operation the 762 display will alternate between flow rate and the volume of water remaining in cubic meters before the system will need to regenerate.

3. Commissioning the Filter

3.1 Introduction.

With the system fully plumbed and the valve programmed commissioning can start.

3.2 Regeneration.

When the system is fully functional the regeneration will happen at the pre-set time (see programming the valve section). However, running a manual regeneration during commissioning is the best way of removing air from the system, bedding in the media and flushing the system through.

Add clean water to the brine tank (approx 10 litres for a 10,12 or 13 inch diameter tank, 20 litres for 14 to 18 inch, 50 l 21 and 24 inch and 100 litres for 30 and 36 inch vessels. Make sure the water inlet and outlet are closed. Press and hold the regeneration button for 5 seconds. The cam will rotate to the backwash position (C1). Slowly half open the water inlet to the system, and then slowly open the outlet to allow the air to be purged from the system. Once this has been done you can fully open the inlet and outlet and allow the system to continue through the regeneration cycle, this will allow you to check for leaks and also purge any remaining air from the system. After a backwash the system will move through a brine draw routine, some pressure equalising and further rinse cycles before stopping in the service position. The system needs to perform a full regeneration before going in to service because it is triple washed before delivery and so initially it doesn't have its full working capacity. Full capacity will be gained after the first regeneration.

To initiate a delayed regeneration press the regeneration button once quickly to start the regen symbol flashing, this will start the backwash at the backwash pre-set time.

If during a regeneration cycle you need to skip through the cycle this can be done in the following ways. To skip to the next stage press the square set button and up arrow together for a second. To skip to the end of the cycle press and hold the square set button and up arrow until the egg timer starts flashing.

3.3 Service.

Water flows into the valve at the top, down through the media and then up through the 'riser' tube in the middle of the vessel. As the water travels through the media the contaminants are removed. The timer options are set to automatically self clean (regenerate) and wash away any of the accumulated contaminants.

4. Routine Maintenance.

The system is designed to run with the minimum of maintenance and does not normally require much adjustment or work required.

Weekly.

Check the salt level (this may need to be checked more regularly dependant on use)
Check there is no sign of damage or leaks,
Check the quality of the treated water.

Monthly.

Check the quality of the incoming water to see if it has changed significantly

Yearly.

Soda Ash Regeneration. (See section 5.4)

5. Technical Information.

5.1 Identifying your System.

Your softener will have a identification label fixed to the outer carton and the control valve, this will look similar to the picture shown here.

The information listed can be read as follows:

4202035013	Stock Number:	Manufacturers part number.
SNo 08090137	Serial No:	Serial No.
Mis	Id Code:	System type identification code.
0919-255-760	Configuration:	Vessel size, Valve type & Controller type.

Identify the settings relevant to your softener from the chart below by looking at the vessel size and controller type.

5.2 Programming Details and Operating Data.

Please note specific settings for CR100 & CR200 (P7 and Capacity)

All figures based on a hardness of 100ppm CaCO3							
Vessel Size		1044	1054	1252	1354	1465	1665
Media Volume to program		30	45	55	70	100	130
Valve		255-762	255-762	255-762	268-762	268-762	278-762
Parameters							
Time of day (HH:MM)	P1				Set on site		
Day of week	P2				Set on site		
Time of regeneration (HH:MM)	P3				Set on site / Factory default 2:00am		
Calendar override days	P4				Set on site / Factory default 5 days		
Salt ammount (gms)	P6	120	120	120	120	120	120
Capacity in Kg	CR100 P7	0.7	1.3	1.7	2.2	3	3.8
Capacity in Kg	CR200 P7	1.2	2.1	2.2	3.1	4	5.1
Hardness in ppm CaCO3	P8	Set on site (See hardness setting page 7 to calculate)					
Service flow rate m3/hr		1.5	1.5	1.8	2	2.5	3
Max Iron + Manganese in ppm		8	10	12	15	15	15
Pipe connection size (inches)		3/4	3/4	3/4	3/4	1	1
Drain connection size (inches)		3/4	3/4	3/4	3/4	3/4	3/4
Salt usage in Kg		4	5.2	6.6	7.5	10.5	13.8
Capacity - m3	CR100	7.4	13.4	17.4	21.8	29.7	38
Capacity - m3	CR200	12.4	20.7	26	31.2	39.5	50.8

All figures based on a hardness of 100ppm CaCO3						
Vessel Size		1865	2160	2469	3072	3672
Media Volume to program		170	200	300	525	700
Valve		278-762	298-762	298-762	298-762	298-762
Parameters						
Time of day (HH:MM)	P1	Set on site				
Day of week	P2	Set on site				
Time of regeneration (HH:MM)	P3	Set on site / Factory default 2:00am				
Calendar override days	P4	Set on site / Factory default 5 days				
Salt ammount (gms)	P6	120	120	120	120	120
Capacity in Kg	CR100 P7	5.1	5.9	9.3	16.1	22.1
Capacity in Kg	CR200 P7	6.8	7.9	12.4	21.5	29.4
Hardness in ppm CaCO3	P8	Set on site (See hardness setting page 7 to calculate)				
Service flow rate m3/hr		4	5.5	7	11	15
Max Iron + Manganese in ppm		15	15	15	15	15
Pipe connection size (inches)		1	2	2	2	2
Drain connection size (inches)		3/4	2	2	2	2
Salt usage in Kg		17.3	20.7	32.2	55.3	73.5
Capacity - m3	CR100	51	59	93	161	293
Capacity - m3	CR200	67.8	79	124	214	293

5.3 Media.

Crystal Right CR100 & CR200.

Crystal Right works by an ion exchange process which removes iron, manganese **and** hardness. The minimum pH requirement is 6.0 and Crystal Right will raise the pH in these acidic waters. Crystal Right works at its best on clear water, i.e. when the iron/manganese is in a dissolved form. Crystal Right will also remove hardness with no extra treatment. Ammonia, lead, hydrogen sulphide and copper can also be reduced. The media bed can be sanitised with chlorine from time to time. The regeneration process is exactly the same as that used in a water softener and requires regeneration with salt (sodium chloride).

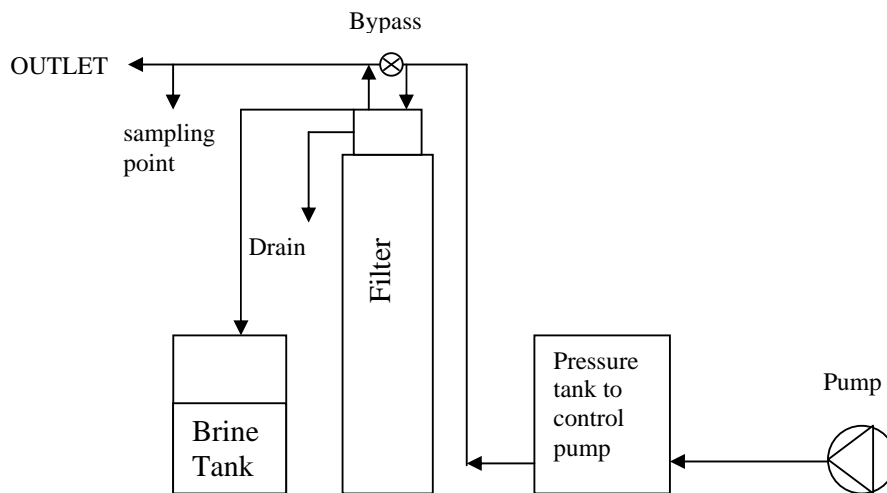
There are two types of Crystal Right. CR100 is used where the pH is between 6 and 7 and will increase the pH, CR200 is used where the pH is 7 or above.

Limitations.

The pH must be above 6 (7 for CR200), Hardness 50 to 600ppm as CaCO₃.

Total dissolved solids needs to be 80 ppm minimum (120µS), Iron and Manganese max 10ppm for units under 1054 and 15ppm over 1054.

5.4 Installation layout.



5.5 Soda Ash Regeneration.

GUIDELINES FOR THE USE OF SODA ASH AS A REGENERANT IN CRYSTAL – RIGHT INSTALLATIONS

Crystal Right is a well proven iron and manganese reduction media. Provided that the guidelines are followed with regard to the water analysis and selecting the correct grade and volume of media, then problems are rare. However there can be certain ground conditions where dissolved gases in the raw water may lead to a reduction in operating capacity.

During the normal service run gases present in ground water will be absorbed by the Crystal Right, and most of these gases are released during the standard brine regeneration. However some gases [especially CO₂] may not be and stay retained in the crystals. This leads to a small reduction in Crystal-Right's exchange capacity per cycle which after a while can lead to a significant decrease in the exchange capacity of the unit.

To reverse the loss of capacity we have to carry out a regeneration that will release the remaining elements retained by the crystals that have not been removed by the standard brine regenerations. The way we can achieve this is to do regeneration with Sodium Carbonate [Na₂CO₃] which is also known as Soda Ash. To reverse capacity loss we would suggest 'shock treatment' regeneration with Soda Ash followed by further routine regenerations at set intervals to prevent a further build up of problem elements on the crystals. It can also be beneficial to periodically regenerate Crystal-Right units that are working satisfactorily with Soda Ash purely as a preventative measure; it will be beneficial to the crystals.

Soda Ash Regeneration Procedure As a Routine Maintenance

Soda Ash is a powder which needs to be dissolved in water to make a liquid that can be drawn into the unit during a regeneration cycle, warm water will dissolve the Soda Ash faster, stirring the mixture also helps to dissolve it. Once the measured amount has been dissolved it is added to the brine solution in the brine tank and regeneration is initiated, during the injection cycle the mixture of brine and liquid soda ash will be drawn into the Crystal-Right bed in the normal way. If the brine tank is fitted with a brine well you can ensure the liquid soda ash makes direct contact with the brine by introducing it via the top of the brine well.

Soda Ash Shock Treatment

The Soda Ash is prepared in the same way and to the same strength as the routine procedure, the difference being during the shock procedure it is drawn direct from the container it is prepared in. The easiest way to do this is to disconnect the regular brine draw tube from the brine elbow, re-connect a piece of flexible tube to the elbow the other end of which is put into the Soda Ash solution.

- I. The first stage of the shock treatment is to backwash the unit for the standard length of time
- II. After the backwash the liquid soda ash is drawn into the bed as per the above guidelines, **immediately** all the soda ash solution has been drawn into the valve the original brine line is re attached to the brine elbow and the brine draw initiated and the standard regeneration cycle allowed to run its course.
- III. **Important** When using the shock method monitor the pH of the rinse water going to drain, if CO₂ is being released from the Crystal-Right the pH of the rinse water will drop, the lower the pH the more gas is being released from the crystals.

What Concentration and how much Soda Ash

The correct solution strength is made by dissolving 200 grams of Soda Ash in 1 litre of water. Each cubic foot of Crystal Right will require 2 Litres of Soda Ash solution for regeneration.

CRYSTAL RIGHT SODA ASH REGENERATION CHART			
Vessel Size	Crystal Right Volume	Soda Ash Ammount	Dissolved In Water
1044	1.0 CU,FT	400 Gramms	2 Ltrs
1054	1.5 CU,FT	600 Gramms	3 Ltrs
1252	2.0 CU,FT	800 Gramms	4 Ltrs
1354	2.5 CU,FT	1.0 KG	5 Ltrs
1465	3.5 CU,FT	1.4 KG	7 Ltrs
1665	4.5 CU,FT	1.8 KG	9 Ltrs
1865	6.0 CU,FT	2.4 KG	12 Ltrs
2160	7.0 CU,FT	2.8 KG	14 Ltrs
2469	11 CU,FT	4.4 KG	22 Ltrs
3072	19 CU,FT	7.6 KG	38 Ltrs
3672	26 CU,FT	10.4 KG	52 Ltrs
Mixing the Soda Ash with warm water will dissolve the granuals quicker			

5.6 Troubleshooting.

Following you can find a guide as to the most common problems that may arise; please consult this section before contacting your supplying dealer as most problems are easily cured by following this information.

700 Series Controller Troubleshooting.

Problem	Possible cause	Solution
ERR 1 is displayed.	Controller power has been connected and the control is not sure of the state of operation.	Press the up arrow and the control should reset.
ERR 2 is displayed	Controller power does not match 50 or 60 Hz	Disconnect and reconnect the power. If the problem persists, obtain the appropriate controller or AC adapter for either 50 or 60 Hz power.
ERR 3 is displayed	Controller does not know the position of the camshaft. Camshaft should be rotating to find home position.	Wait for two minutes for the controller to return to home position. The hour glass should be flashing on the display indicating the motor is running.
	Camshaft is not turning during ERR 3 display.	Check that motor is connected. Verify that the motor wire harness is connected to the motor and controller module. Verify the optical sensor is connected and in place. Verify that motor gear has engaged cam gear. If everything is connected, try replacing in this order: Wire harness Motor Optical sensor Controller
	If camshaft is turning for more than five minutes to find home position.	Verify that the optical sensor is in place and connected to wire. Verify that the camshaft is connected appropriately. Verify that no dirt or rubbish is clogging any of the cam slots. If motor continues to rotate indefinitely replace the following in this order: Wire harness Motor Optical sensor Controller
Four dashes displayed	Power failure occurred	Press SET to reset time display.

System Troubleshooting

Problem	Possible cause	Solution
1. Regenerant Tank Overflow. See also 4.	<ul style="list-style-type: none"> a. Drain line restricted. b. Uncontrolled refill flow rate c. Air leak in regenerant line d. Drain control clogged with resin or other debris. e. Sinking air check ball (255 only) f. Incorrect drain control fitted. g. Regenerant valve disc 1 being held open. h. Valve disc 2 not closed during regenerant draw causing a refill. 	<ul style="list-style-type: none"> a. Check the drain line is not blocked or kinked. b. Remove refill flow control to clean ball and seat. c. Check all connections in regenerant line for leaks. d. Clean drain control. e. Replace air check ball. f. Too small of a drain control with a larger injector may reduce draw rates. g. Remove obstruction. h. Remove obstruction.
2. Water flow from drain or regenerant line when in service.	<ul style="list-style-type: none"> a. Flapper valve return spring weak. b. Debris stopping flapper valve from closing. 	<ul style="list-style-type: none"> a. Replace valve spring. (contact dealer) b. Remove debris.
3. Hard water after regeneration.	<ul style="list-style-type: none"> a. Incorrect / failed regeneration. b. Leaking external bypass valve. c. O-Ring around riser damaged. d. Capacity too low due to incorrect setting. 	<ul style="list-style-type: none"> a. Repeat regeneration after checking settings. b. Replace bypass (contact dealer) c. Replace O Ring (contact dealer) d. Check settings and adjust if required.
4. Will not draw regenerant or intermittent or irregular draw.	<ul style="list-style-type: none"> a. Low water pressure b. Drain line restricted. c. Injector plugged. d. Injector defective. e. Flapper valve 2 &/or 3 not fully closed. f. Air check prematurely closed. 	<ul style="list-style-type: none"> a. Fit pump (contact dealer) b. Check the drain line is not blocked or kinked. c. Clean injector and screen. d. Replace injector. e. Remove debris, check flapper for closing or replace. (contact dealer) f. Put control into refill C8, replace or repair air check if needed. (contact dealer)
5. System will not regenerate automatically.	<ul style="list-style-type: none"> a. Power not connected. b. Defective motor c. Fouled or defective turbine d. Defective turbine cable. 	<ul style="list-style-type: none"> a. Connect power. b. Replace motor. (contact dealer) c. Clean or replace turbine. d. Replace turbine cable.
6. System regenerated at the wrong time.	<ul style="list-style-type: none"> a. Settings incorrect. 	<ul style="list-style-type: none"> a. Correct settings.
7. No conditioned water after regeneration.	<ul style="list-style-type: none"> a. No salt in regenerant tank. b. Injector plugged. e. Air check closes prematurely. 	<ul style="list-style-type: none"> a. Add salt to regenerant tank. (Salt must be above the water level) b. Clean injector and screen. e. Check connections for air leaks and check air check ball (255) floats. See also 1.e. & 4.f.
8. Backwashes at excessively low or high rate.	<ul style="list-style-type: none"> a. Incorrect drain controller used. b. Debris affecting valve operation. 	<ul style="list-style-type: none"> a. Replace with correct size. b. Remove drain controller and clean. volume to correct setting.

System Troubleshooting

Problem	Possible cause	Solution
9. Valve will not draw brine.	<ul style="list-style-type: none"> a. Low water pressure b. Drain line restriced. c. Injector plugged. d. Injector defective. e. Air check closes prematurely. 	<ul style="list-style-type: none"> a. Fit pump (contact dealer) b. Check the drain line is not blocked or kinked. c. Clean injector and screen. d. Replace injector. e. Put control into brine draw C2 to check. Repair or replace if needed.
10. Uses more or less salt than setting.	<ul style="list-style-type: none"> a. Foreign matter in valve causing incorrect flow rates. 	<ul style="list-style-type: none"> a. Remove brine control and flush out any debris. Put system through a regeneration to flush valve.
11. No water flow display on metered valves.	<ul style="list-style-type: none"> a. Bypass valve in bypass. b. Meter probe not connected to control or turbine housing. c. Restricted turbine rotation due to foreign matter in turbine. 	<ul style="list-style-type: none"> a. Open bypass. b. Connect correctly. c. Remove and clean turbine, Turbine should spin freely, if not replace.
12. Run out of conditioned water between regenerations.	<ul style="list-style-type: none"> a. Impropper regeneration. b. Incorrect regenerant setting. c. Incorrect hardness or capacity settings. d. Water hardness has increased. e. Restricted turbine rotation 	<ul style="list-style-type: none"> a. Repeat regeneration after checking the correct regenerant doseage is set. b. Set correct salt setting. c. Set to correct values. d. Set hardness to new value. e. See 11.c

Notes:

