



## **Nitrate Systems**

### **Installation, Operation & Maintenance Guide**



# Contents

	Page
1. Unpacking Instructions	3
2. Installation	4
Pre-installation checks	
Fitting the bottom distribution system	
Adding the media	
Fitting the valve	
Brine tank connections	
Hydraulic connections	
Drain line flow connections	
Connecting the valves together (duplex units)	
Electrical Connections	
Programming the valve	
Resetting the valve programming	
Service display screen(s)	
3. Commissioning	10
Introduction	
Regeneration	
Service	
4. Routine Maintenance	10
Weekly	
5. Technical Information	11
Identifying your system	
Programming and Operating Details	
How to calculate the days between regeneration	
Flow rates and overall dimensions	
System requirements	
How your system works	
Troubleshooting	

Thank you for purchasing this 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.

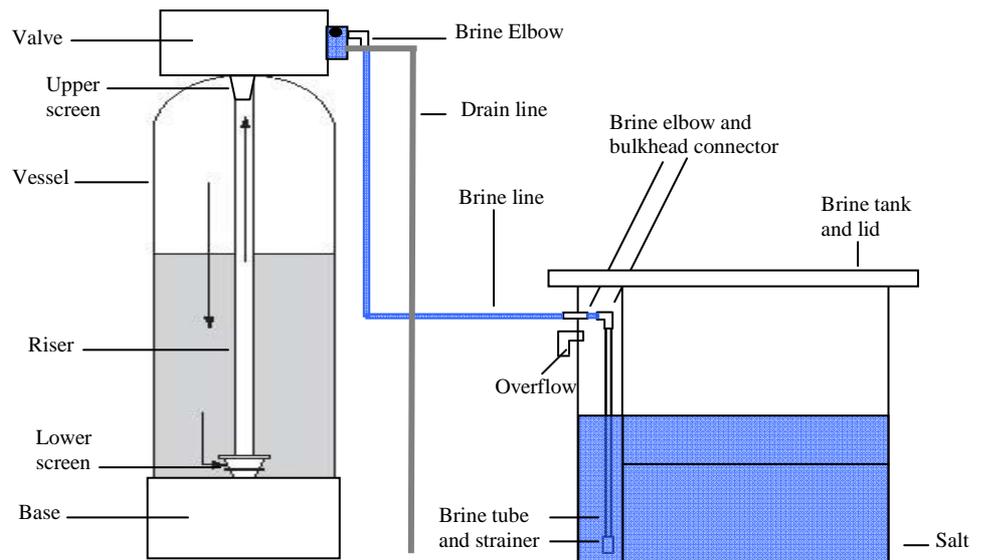
# 1. Unpacking.

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

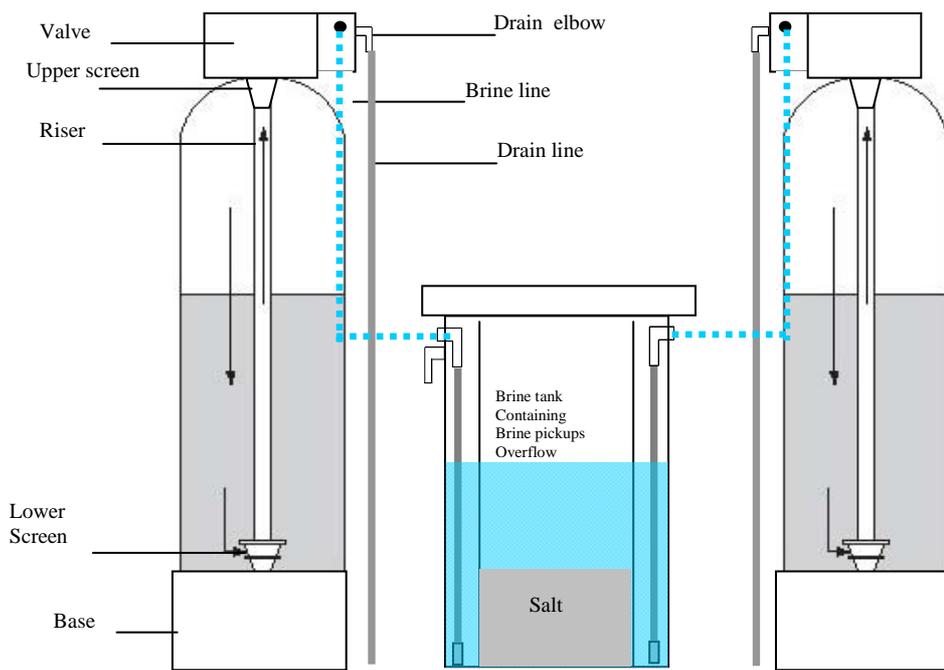
If any item is missing or damaged your carrier and supplier must be notified within 2 days of receipt if a claim is to be made.



**Cabinet System**



**Simplex Nitrate System**



**Duplex Nitrate System**

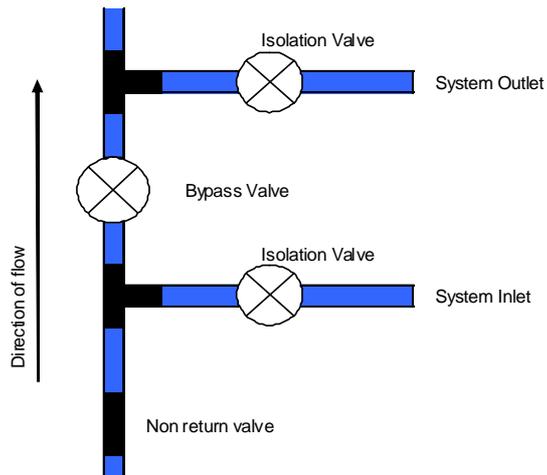
## 2. Installation.

Please observe the regulations concerning the installation of your nitrate system. Check that you have allowed space for access to the unit for possible future maintenance (see section 5 for system specifications). 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.

Typical bypass setup using three isolation valves plus a non return valve



If your system is a small cabinet unit proceed to section 2.6

### 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 1). If the system uses bottom laterals (typically 16” diameter and above) these need to be assembled inside the vessel (Fig 2), Move the vessel to its final position as it will be difficult to move once the media has been added.



Fig 1



Fig 2

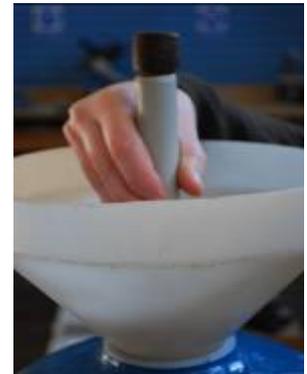


Fig 3

### 2.3 Adding the Media.

Block the top of the riser tube to stop media getting down the tube (see Fig 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. Add the media supplied but make sure there is free space left above the media so when the system is backwashed the media can expand into the space and any sediment or 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 4 & 5).



Fig 4



Fig 5

The top screen should be attached next.

Slide the valve(s) onto the riser tube and gently push down onto the vessel threads. Screw the valve(s) 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 6)

Fig 6



## 2.5 Brine Tank Connections.

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



Fig 7

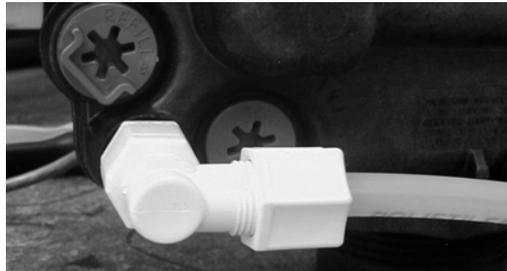


Fig 8



Fig 9

## 2.6 Hydraulic Connections.

Simplex Units (single vessel and brine tank)

Attach the supplied manifold or tails before you connect your pipe work to the valve (Fig 10). You can connect with fixed or flexible pipe work for the ¾ or 1" valve units and fixed pipe work for the 2" valve units. (Fig 11)



Fig 10



Fig 11

### Duplex Units (two vessel system)

Interconnecting pipe work kits with bypasses and 1" BSP connections (Fig 12) are supplied for the ¾" or 1" valves; these can be connected using fixed or flexible pipe work. Duplex systems with 2" valves do not come with interconnecting pipe work kits and will need to be plumbed on site with connections to the 2" solvent weld tails provided.

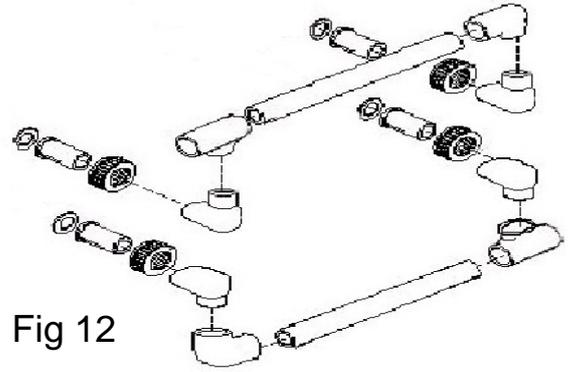


Fig 12

## 2.7 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 system may not work correctly. 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(s). 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(s) (normally used on vessels 10 inch diameter and smaller).

## 2.8 Connecting the Valves together (Duplex units only).

The valves are connected together with the interconnecting cable supplied, the loose end needs to be connected to the other valve. (Fig.13)

Take care that the connection is made correctly and the retaining clip locks over the retaining block.

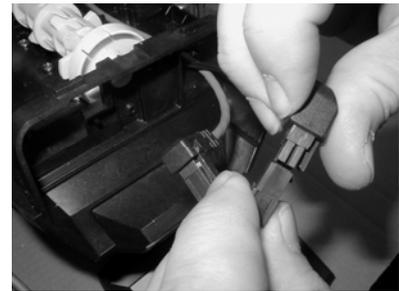


Fig 13

## 2.9 Electrical connection.



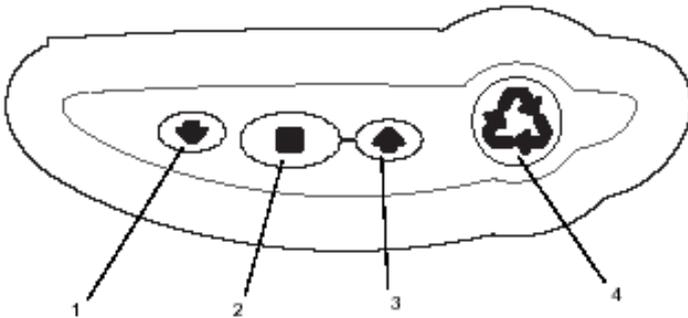
Fig 14

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.14). 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.

## 2.10 Programming the Valve.

This programming relates to the Autotrol Logix 700 series timers. The valve should already have been programmed 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 (nitrate level for metered and duplex units).

When programming these units the controller may indicate ERR3 and/or ERR4. This is NOT a fault, allow the cams to turn and settle back to the service and continue programming.



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. 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).



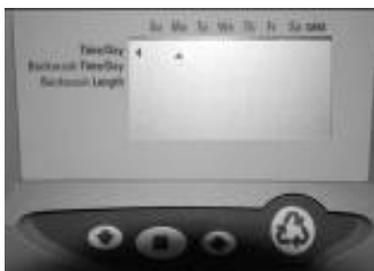
By repeatedly pressing the set button you can scroll to the part of the set up programme you require.

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 (square) 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. And move on to the next setting.



### 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 (square) button to confirm.



### Time when system Regenerates.

This normally defaults to 2.00am so the system regenerates when no one requires water. It 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. For duplex systems the valve monitor the water use and regenerate when they need to which can be any time. (the other vessel goes online to replace it).



### Calendar Override Days.

This is the number of days between regenerations for time based systems (740/742). The system should have this pre-programmed to a suggested number of days but this may need altering to suit your needs (see section 5 calculating regeneration days). For metered versions (760/762) or duplex (764) this function allows the system to backwash regardless of usage 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.



### Salt Setting

Set the amount of salt used for regeneration. For nitrate this is typically 170g/l.

Press the set button to start the display flashing and adjust the salt setting up or down using the up and down arrows, when the correct figure is displayed press the set button to confirm..



### Capacity (On metered 762 or duplex 764 models only)

System capacity is displayed in kilograms of nitrate removed before regeneration is necessary. **This cannot be altered on the 742/760 controller.** The value is based on the resin volume: see programming detail section 5 for more details. Press the set button to start the display flashing and adjust the salt setting up or down using the up and down arrows, when the correct figure is displayed press the set button to confirm.



### Nitrate Setting (On metered 762 or duplex 764 models)

For systems with meter control the nitrate 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 nitrate value up or down using the up and down arrows, when the correct figure is displayed press the set button to confirm.

## 2.11 Resetting the Valve Programming

Occasionally it may be necessary to reset the valve to factory defaults.

The programmed valve type 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.. If in doubt contact your supplier.

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

The valve type will now be shown e.g. 255, 278. Choose the correct valve (255, 278 or 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, see the programming details in section 5 for more information.

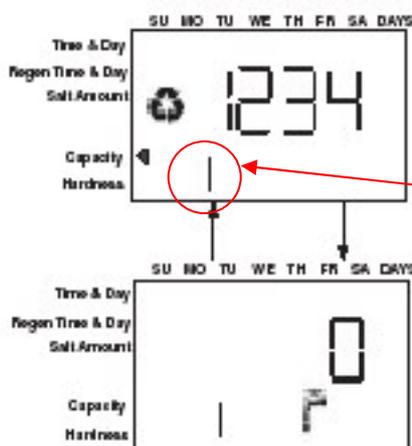
## 2.12 In Service Display

In normal service the information on the display depends on the type of system you have. Section 5.1 shows you how to identify your system.

Time based simplex system (742 timer): The display will show the current time.

Metered based 762 system alternate between the capacity remaining (m3) and the water flowing designated with a tap symbol (l/minute)

764 Electronic Multi-Tank "A" Alternating Control:



Service display – The number of the tank in service and alternating capacity remaining and flow rate with faucet icon of tank in service.  
Tank in service.

764 Electronic Multi-Tank "P" Parallel Control:

Service display – Alternating three times  
Capacity remaining for tank 1 with digit "1" displayed  
Capacity remaining for tank 2 with digit "2" displayed  
System flow rate (Tank 1 + Tank 2 added with faucet icon.)

## 3. Commissioning the System

### 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 automatically. However, running a manual regeneration during commissioning is the best way of removing air from the system, bedding in the resin and flushing the system through.

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 .

For new systems or after a resin change, or for duplex systems it maybe necessary to run two regenerations to fully charge the resin (check the water at the end of the backwash is running clear).

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 resin the nitrate is held. The valves and controllers are set to automatically regenerate when specified.

## 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).  
In normal service the salt level should be higher than the water level.

Check there is no sign of damage or leaks,  
Check the quality of the treated water.

## 5. Technical Information

### 5.1 Identifying your System

Your system will have an 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 SNo 08090137 Mis 0919-255-760	Stock Number:	Manufacturers part number.
	Serial No:	Serial No.
	Id Code:	System type identification code.
	Configuration:	Vessel size, Valve type & <b>timer type</b> .

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

### 5.2 Programming Details and Operating Data

Nitrate Simplex Units (small)								
Vessel Size		1023	835	935	1035	1044	1054	1252
Resin Volume (litres)		22	25	30	35	35	40	50
Valve type		255	255	255	255	255	255	255
Connections		3/4" BSP in/out, & drain						
Parameter								
Time of day (HH:MM)	P1	Set on site						
Day of week (DAY)	P2	Set on site						
Time of regeneration (HH:MM)	P3	Set on site / Factory default 2.00am						
Calendar override days	P4	3	3	3	3	3	3	3
Regen interval	P5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Salt amount (gms)	P6	170	170	170	170	170	170	170
Capacity (Kg) (742 Cannot be changed)	P7	1.4	1.7	2.1	2.4	2.4	2.8	3.5
Capacity (Kg) (762 only)	P7	0.3	0.5	0.6	0.7	0.7	0.8	1
Nitrate in ppm NO <sub>3</sub> (762 only)	P8	Set on site						
Refill rate (gpm x 100)	P14	33	33	33	33	33	33	33
Brine Draw Rate (gpm x 100)	P15	14	22	22	26	26	26	38

Nitrate Simplex Systems (large)									
Vessel Size		1354	1465	1665	1865	2160	2469	3072	3672
Resin Volume (litres)		75	100	125	175	225	300	500	700
Valve type		268	268	278	278	298	298	298	298
Connections		1" in/out, 3/4" drain				2" in/out, 1 1/2" drain			
Parameter									
Time of day (HH:MM)	P1	Set on site							
Day of week (DAY)	P2	Set on site							
Time of regeneration (HH:MM)	P3	Set on site / Factory default 2.00am							
Calendar override days	P4	3	3	3	3	3	3	3	3
Regen interval	P5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Salt amount (g/l)	P6	170	170	170	170	170	170	170	170
Capacity (Kg) (742 Cannot be changed)	P7	5.2	7	7.6	9.9	12.4	16.1	27.7	38.8
Capacity (Kg) (762 only)	P7	1.5	2	2.5	3.5	4.5	6	10	14
Nitrate in ppm NO <sub>3</sub> (762 only)	P8	Set on site							
Refill rate (gpm x 100)	P14	33	33	130	130	140	200	300	500
Brine Draw Rate (gpm x 100)	P15	50	50	80	84	90	140	200	330

Nitrate Duplex Units (764 series)								
Vessel Size		835	935	1035	1044	1054	1252	1354
Resin Volume (litres) per vessel		20	30	35	35	40	50	75
Valve type (764 timer)		255	255	255	255	255	255	255
Connections		1" in/out, 3/4" drain						
Parameter								
Time of day (HH:MM)	P1	Set on site						
Day of week (DAY)	P2	Set on site						
Time of regeneration (HH:MM)	P3	Set on site / Factory default 2.00am						
Calendar override days	P4	5	5	5	5	3	5	5
Regen interval	P5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Salt amount (g/l)	P6	170	170	170	170	170	170	170
Capacity (Kg)	P7	0.3	0.5	0.7	0.7	0.8	1	1.5
Nitrate in ppm NO3 (762 only)	P8	Set on site						
Refill rate (gpm x 100)	P14	33	33	33	33	33	33	33
Brine Draw Rate (gpm x 100)	P15	14	22	26	26	26	38	50

### 5.3 How to calculate the days between regenerations

(Time based systems 742 only)

You will need to know the nitrate level in your incoming water. If you don't know talk to your dealer about getting the water tested or a nitrate test kit.

You will need to know how much resin is in your system – use the charts above to find this.

Each litre of nitrate reduction resin can remove 20,000mg of nitrates (as NO3) so a system with 15 litres of resin can remove 20,000 x 15 = 300,000mg of nitrate (0.3Kg capacity P7)  
 eg If the water contains 80mg/l nitrate the 15 litre system can treat = 300,000/80 = 3750 litres.  
 An average person use 120 to 160 litres per day. So a family of 4 uses about 640 l/day.  
 Capacity = 3750/640 = 5.8 days. Set the system to regenerate every 5 days (6 days would mean it would run out of capacity half way through the last day). Nitrate levels vary from week to week so err on the side of caution when setting the days.

### 5.4 Flow rates and overall dimensions

Measurements and flow rates are approximate and may vary for individual set-ups.

Model	Mistral22	C935	C1035	1054	1248	1354	1465	1665	1865	2160	2469	3072	3672
Service flow rate m <sup>3</sup> /hr	0.9	1.2	1.4	1.7	2.0	3.0	4.0	5.0	5.7	9	12	15	15.0
Capacity (m <sup>3</sup> ) @ 50ppm Nitrate	8.8	12	14	17	20	30	40	50	70	90	120	200	280
Resin Volume	22	20	30	45	50	75	100	150	200	250	350	500	700
Salt Usage (Kg)	3.5	3.2	4.8	7.2	8.0	12.0	16.0	24.0	32.0	40.0	56.0	80.0	112.0
Brine Tank vol	35	75	75	125	125	200	300	300	300	300	500	750	750
Brine Tank Øxh (cm)	30x49	52x54	52x54	43x84	43x84	56x83	63x98	63x98	63x98	63x98	75x115	93x111	93x111
Overall height cm	85	119	119	159	144	158	182	182	194	188	213	229	229
Approx footprint cm	30x49	77x52	77x52	69x43	74x43	89x56	99x63	103x63	109x63	117x63	136x75	169x93	184x93
Approx weight Kg	28	53	53	65	77	125	190	195	250	300	435	640	846

## 5.5 System requirements

The water should be low in turbidity (<4NTU),  
 pH between 4.5 and 8.5  
 water pressure between 2 and 6 bar  
 water temperature between 2°C and 38°C  
 ambient temperature between 2 and 50°C  
 Power consumption (max) 5W, average 1W  
 Electrical rating 12V 50Hz

## 5.6 How your system works

Nitrate levels in many waters are often high. Over 60% of nitrate enters water from agricultural land. High concentrations of nitrate in water can cause methaemoglobinaemia in very young children (blue baby syndrome). In extreme cases this can be fatal. The nitrate is converted to nitrite in the body which in turn interferes with oxygen up take in the blood. The current regulatory standard of 50 mg/l nitrate is derived from the standard in the European Union's Drinking Water Directive. which is intended to ensure that drinking water will not cause methaemoglobinaemia.

One of the most common method of removing nitrate is with an ion exchange resin. The nitrate rich water passes over the resin where the nitrate is held. When no more nitrate can be exchanged the resin needs to be regenerated by rinsing with brine.  
 The nitrate resin is (DWI) approved for the use on public water supply in the UK.

## 5.7 Troubleshooting

Detailed here is a guide to the most common problems; please read this before contacting you supplying dealer as most problems are easily cured by following this information.

Problem	Possible Causes	Solution
ERR 1	Controller power has been connected and the controller is not sure of the state of operation	Press the up arrow and the control should reset
ERR 2	Controller power does not match 50 or 60 Hz	Disconnect and reconnect the power. If the problem persist, obtain the appropriate controller or AC adapter for either 50 or 60 Hz power.
ERR 3	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 indicating the motor is running.
	Camshaft is not turning during ERR 3 display	Check that the motor is connected and the cables are all pushed home. Verify the optical sensor is connected and clipped in place. Verify the motor gear has engaged.
	If camshaft is turning for more than five minutes to find the home position	Verify that the optical sensor is in place and connected. Verify the camshaft is fitted correctly. Verify no dirt is clogging and of the cam slots. If the motor continues to rotate replace in order the wire harness, optical sensor, controller
ERR 4	Duplex units only. For the first two minutes of ERR4 vessel two could be finding its home position. Longer than two minutes could mean similar problems as an ERR 3	
Four dashes - - - -	Power failure occurred	Reset the time

<b>Problem</b>	<b>Possible Causes</b>	<b>Solution</b>
1. Brine tank overflow	<ul style="list-style-type: none"> <li>a. Uncontrolled refill flow rate.</li> <li>b. Air Leak in brine line to air check.</li> <li>c. Drain control clogged with resin or other debris.</li> <li>d. Aircheck ball on 255 valve prematurely seating due to air leak.</li> </ul>	<ul style="list-style-type: none"> <li>a. Remove refill flow control to clean ball and seat.</li> <li>b. Check all connections in brine line for leaks.</li> <li>c. Clean drain control.</li> <li>d. Check all connections in brine line for leaks.</li> </ul>
2. Flowing or dripping water at drain or brine line after regeneration	<ul style="list-style-type: none"> <li>a. Valve stem return spring weak.</li> <li>b. Debris is preventing valve disc from closing.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace spring. (Contact dealer).</li> <li>b. Remove debris.</li> </ul>
3. Hard water after regeneration	<ul style="list-style-type: none"> <li>a. Improper regeneration.</li> <li>b. Leaking of external bypass valve.</li> <li>c. O-Ring around riser pipe damaged.</li> <li>d. System capacity too low due to incorrect resin volume setting.</li> </ul>	<ul style="list-style-type: none"> <li>a. Repeat regeneration after making certain correct brine dosage was set.</li> <li>b. Replace bypass valve. (Contact dealer).</li> <li>c. Replace O-ring.</li> <li>d. Reset control and program resin volume to correct setting.</li> </ul>
4. Will not draw brine or irregular draw	<ul style="list-style-type: none"> <li>a. Low water pressure.</li> <li>b. Restricted drain line.</li> <li>c. Injector plugged.</li> <li>d. Injector defective.</li> <li>e. Valve disc 2 and/or 3 not closed.</li> <li>f. Air check valve prematurely closed.</li> </ul>	<ul style="list-style-type: none"> <li>a. Make correct setting according to instructions.</li> <li>b. Remove restriction.</li> <li>c. Clean injector and screen.</li> <li>d. Replace injector and cap. (Contact dealer).</li> <li>e. Remove foreign matter from disc and check disc for closing by pushing in on stem. Replace if needed. (Contact dealer).</li> <li>f. Put control momentarily into brine refill. Replace or repair air check if needed. (Contact dealer).</li> </ul>
5. Will not regenerate automatically	<ul style="list-style-type: none"> <li>a. AC adapter or motor not connected.</li> <li>b. Defective motor.</li> </ul>	<ul style="list-style-type: none"> <li>a. Connect power.</li> <li>b. Replace motor. (Contact dealer).</li> </ul>
6. Regenerates at wrong time	<ul style="list-style-type: none"> <li>a. Controller set incorrectly.</li> </ul>	<ul style="list-style-type: none"> <li>a. Correct the time setting according to instructions.</li> </ul>
7. No conditioned water after regeneration	<ul style="list-style-type: none"> <li>a. No brine in brine tank.</li> <li>b. Injector plugged.</li> <li>c. Air check valve closes prematurely.</li> </ul>	<ul style="list-style-type: none"> <li>a. Add brine to brine tank. (must be above water level)</li> <li>b. Clean injector and screen.</li> <li>c. Quick cycle control into brine draw/slow rinse. Replace or repair air check if needed. (Contact dealer).</li> </ul>
8. Backwashes at excessively low or high rate	<ul style="list-style-type: none"> <li>a. Incorrect drain controller used.</li> <li>b. Foreign matter affecting valve operation.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace with correct size controller (Contact dealer).</li> <li>b. Remove drain controller and clean ball and seat.</li> </ul>
9. Uses more or less salt	Incorrect programming	Check programming
10. No water flow display (on 762 and 764 models only)	Turbine stuck or cable dislodged	Clean turbine and check cable.



