# Installation, Service & Operation Manual

## SoftH$_2$O PRO

SPECTRUM™

WATER SOFTENER

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# 1. General Notes

The H20 soft duo range are water softeners that are based on one pressure vessel containing resin and an automatic valve that monitors the amount of water going through the softener and triggers regeneration when the softening capacity of one pressure vessel expires.  This manual is for a range of softeners based on the spectrum 5, 7 and 12 valve  going from 25 to 350 litres of resin. Please take a look at the model supplied as this will have an influence on various parameters for starting up your softener, especially on the programming side. Softeners once installed are low in maintenance. They need salt in order to operate properly. Please ensure that the brine tank has got a minimum level of salt at all times. 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 a high sodium content which can be unadapted for babies on infant formula, people on sodium restricted diets or people with risk of heart diseases.

# 2. Description & Equipment Adjustments

SPECTRUM™

| | | | | | |
|---|---|---|---|---|---|
| Installation Number | | | Nominal Capacity | | $m^3$ °tH |
| Valve Serial Number | | | Inlet Water Hardness | | °tH |
| Tank Size | | | Treated Water Volume | | litres |
| Resin Type | | | Outlet Water Hardness | | °tH |
| Resin Volume | | litres | Salt Quantity per Regeneration | | kg |

## Regeneration Mode

| | | |
|---|---|---|
| Volumetric | | $m^3$ |

## Regeneration Type

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

## Electrical Supply

Low Voltage DC Transformer

# 3. Components, Features & Functions

| Component | Features | Functions |
|---|---|---|
| SPECTRUM 5, 7 or 12 softening control valve | GRP valves with great corrosion resistance, operates with 5.5V DC transformed electrical power for SPECTRUM 5<br><br>7.5V transformed for SPECTRUM 7 and 12 valves | • 24 hours control and monitoring with a timer and meter; automatically regenerates the media bed once the capacity of a pressure vessel expires<br>• Cycle Process:<br>  • 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<br>  • 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<br>  • 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: Standard water softener operation |
| | Regeneration Mode | Volumetric immediate or delayed with electronic timer |
| | Water Hardness can be adjusted | User can adjust the mixing valve to get desired outlet water hardness |
| | Display Format | Metric format |
| Media | NSF 61 and FDA approved SPECTRUM resin | Food grade SPECTRUM softening resin |
| Pressure Vessel | • NSF 44 tested and certified<br>• Polyethene material manufactured for the Food & Beverage industries<br>• Light, high pressure resistance<br>• Strong corrosion resistance<br>• Polyethylene liner with reinforced fiberglass | 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 | • Prevents the brine tank from overflowing<br>• 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. SPECTRUM 5, 7 or 12 Valve

## 4.2. SPECTRUM Riser Tube

## 4.3. SPECTRUM Brine Tank

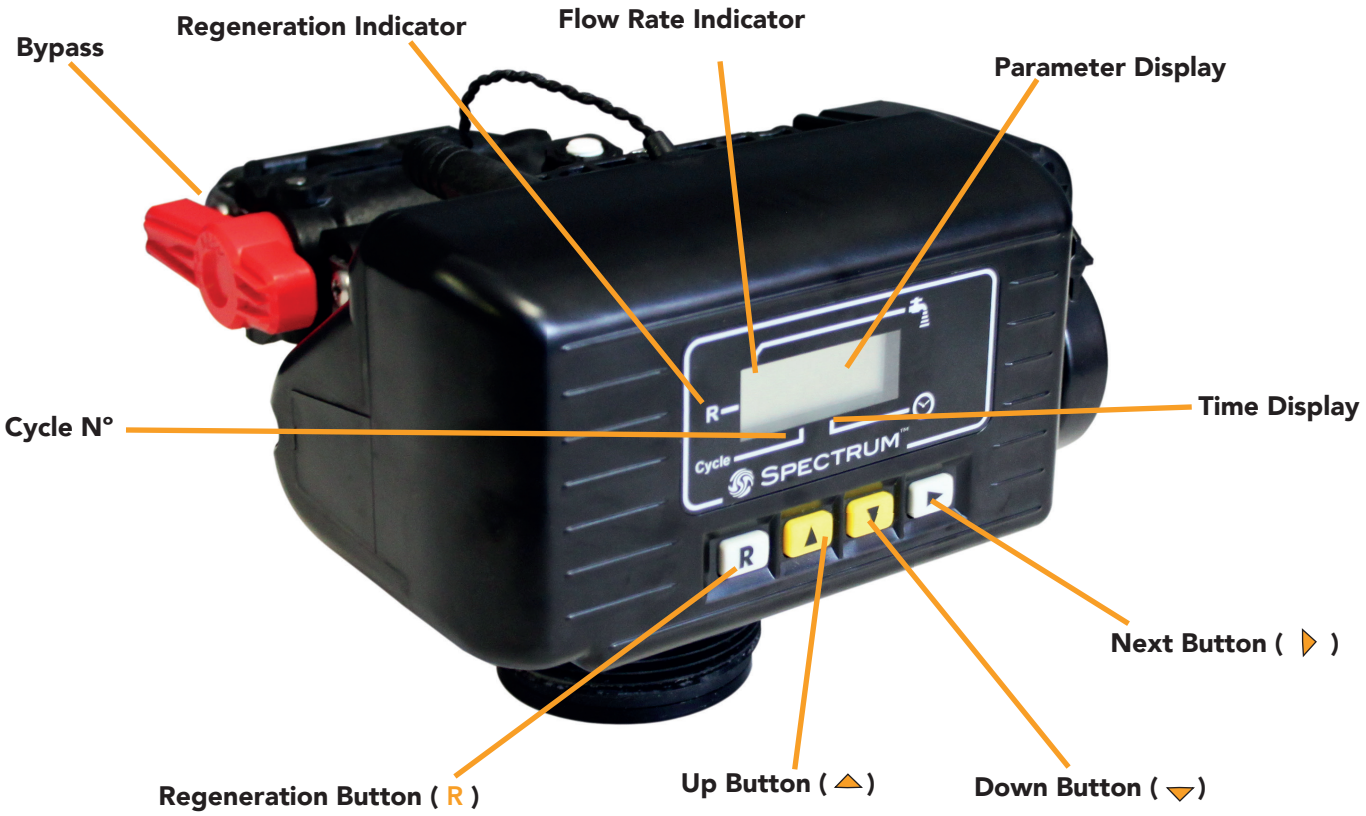
Dimension varies according to model, also includes brine tube and safety brine valve.

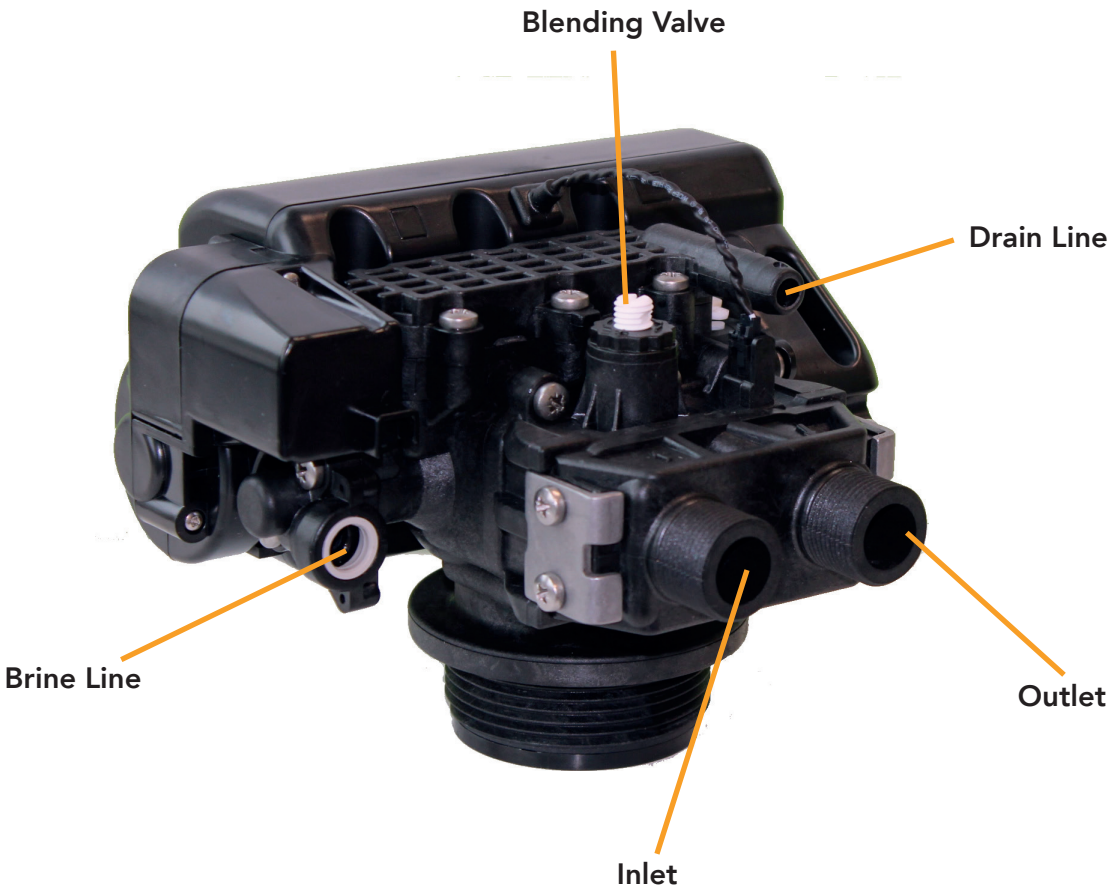
## 4.4. SPECTRUM Softening Resin

Volume varies according to the model.

# 5. Valve User Interface

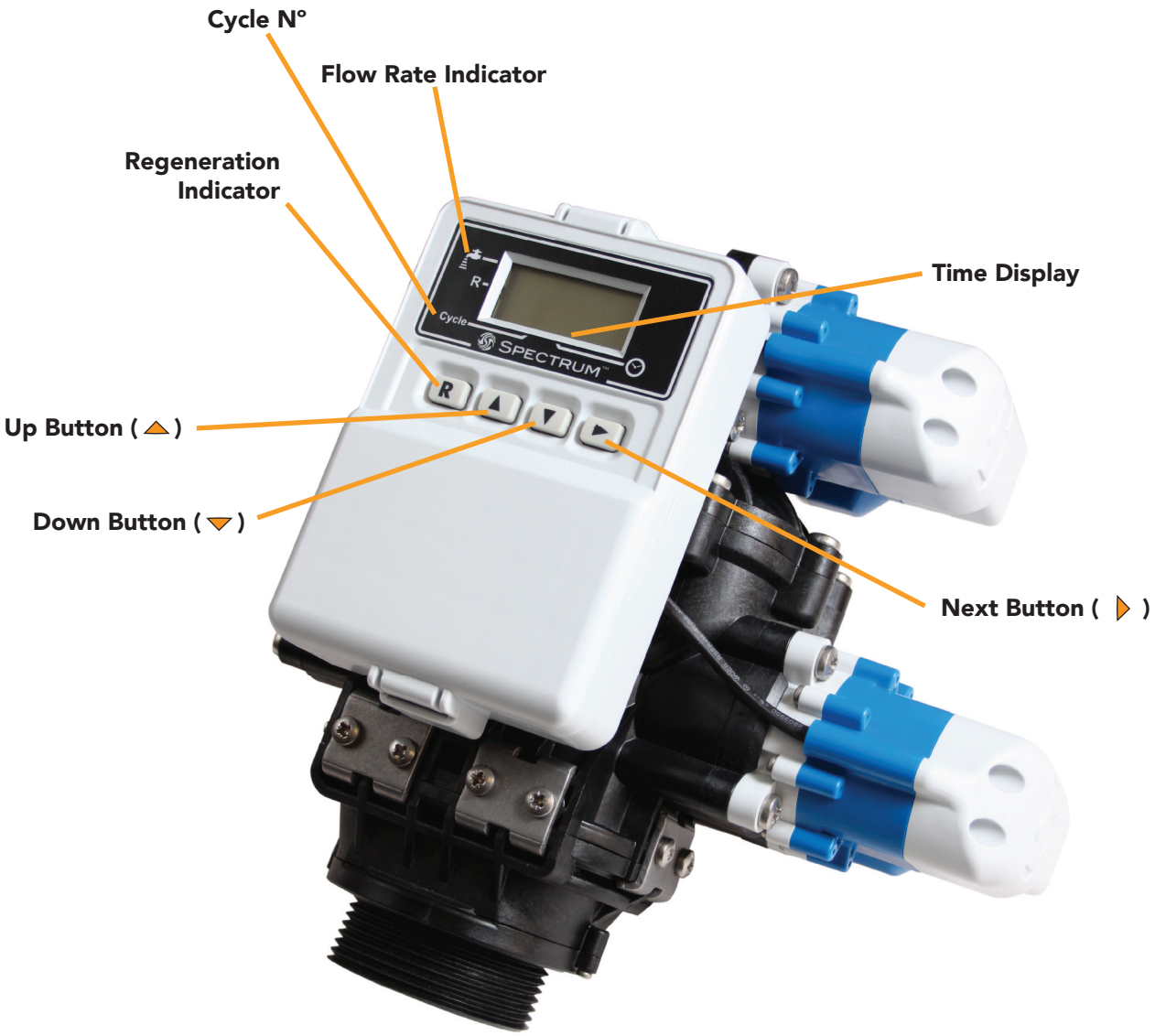
## 5.1. SPECTRUM 5 Valve



# 5. Valve User Interface

## 5.2. SPECTRUM 7 & 12 Valve



# 6. Installation Instructions

## 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.

Your softener will require space for maintenance and operation. Please allow enough room on the top 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**
The water needs to have a pressure between 2-8 bar and 4-42 degrees. Under 2 bar a booster pump would be required, over 8 bar, a pressure reducer should be fitted before the softener. It is recommended to add the necessary pre-filtration before the softener should the T.S.S. (Total suspended solids) go over 1ppm. Suspended solids could be trapped between the pistons and seals and cause premature wear of your softener internals. They could also clog prematurely the brine injection system lowering the performance of your system.

**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 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 spillage and flooding.

Both the drain line and the overflow should not be higher than the softening 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

Put the riser tube assembly into the pressure vessel if it has been removed for transport and seal the top in order to avoid resin getting in the inside of the riser tube. Depending on sizes, the riser tube assembly will either be supplied with a cone type screen or for bigger sizes, a star type distribution system with a hub and laterals. Ensure that there is no resin on the tank threads. Once the distributor tube is centred, fill the pressure vessel with water, lubricate the valve distributor tube o-ring with a 100% silicon lubricant and screw the valve onto the top of the pressure vessel. It is preferable to use a funnel in order to minimise resin being spread outside the pressure vessel.

**CAUTION: RESIN IS SLIPPERY REMOVE ANY EXCESS RESIN THAT MAY HAVE BEEN SPILT**

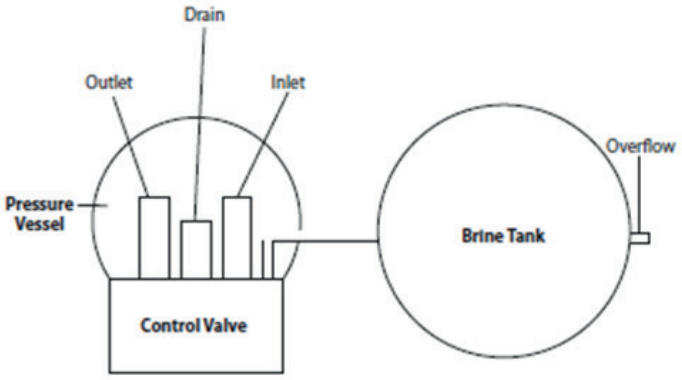
# 6. Installation Instructions

Install the pressure vessel with the valve in a convenient location . Ensure the floor under the brine tank is clear and flat. Connect the brine tube to the valve on one side and to the safety brine valve included in the brine tank. The piping should be waterproof as any air entering through the brine line will affect the performance of your system.

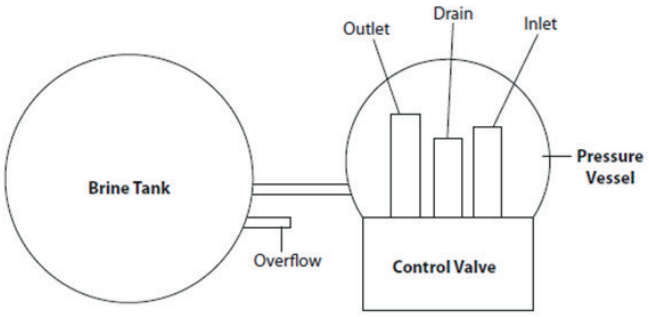
Use Teflon® tape if necessary in order to seal between the drain fitting and the outlet flow control.

## 6.3. Connecting

**SPECTRUM 5 Valve**




**SPECTRUM 7 & 12 Valves**




## 6.4. Start Up

Fill the brine tank with water until half of its level. Add salt until the ¼ of the level so that in total the brine tank is ¾ full. Switch on the electrical power. On units with by-pass, place in by-pass position. Turn on the main water supply. Open a cold soft water tap nearby and let run a few minutes or until the system is free from foreign material (usually solder) that may have resulted from the installation. Once clean, close the water tap. Place the by-pass in service position and let water flow into the pressure vessel. When water flow stops, slowly open a cold water tap nearby and let run until the air is purged from the unit. Plug the valve to a power source. Once plugged the valve may do a cycle on its own in order to go to service position.

Start a regeneration by pressing the [R] button on the controller to go through a first complete cycle in order to initialise the system. This operation can last up to an hour.

**Notes: Some items may not be shown depending on timer configuration. The timer will discard any changes and exit Master Programming Mode if any button is not pressed for sixty seconds.**

# 7. Valve Initial Set-Up

## 7.1. Programming

Notes: Some items may not be shown depending on timer configuration. The timer will discard any changes and exit Master Programming Mode if any button is not pressed for sixty seconds.

This mode is entered by setting the time to 23:45 and pressing the next button for 8 seconds.

| Parameter | Option | Description |
|---|---|---|
| Mode of Regeneration | R-1 | Chronometric |
| | R-2 | Volumetric immediate |
| | R-3 | Volumetric delayed |
| | R-4 | Adaptive brining |
| | R-5 | Filter: Chronometric |
| | R-6 | Filter: Volumetric immediate |
| | R-7 | Filter: Volumetric delayed |

Choose the most appropriate way of regeneration for your softener. Since our range is volumetric, we recommend R-2 Volumetric immediate or R-3 Volumetric delayed.

Volumetric immediate triggers the regeneration as soon as the capacity of the resin has expired.
Volumetric delayed will trigger the regeneration at the time set in the programming, once the capacity expired.

| Parameter | Option | Description |
|---|---|---|
| Brine Flow Direction | t-df | Down flow regeneration |
| | t-uf | Up flow regeneration |

For your softener, please choose the Downflow setting.

| Parameter | Option | Description |
|---|---|---|
| Volume | 0.00 | Volume of water to be treated |

This is the volume in cubic meters your system can soften. The capacity can be determined with the chart in annex 1.

| Parameter | Option | Description |
|---|---|---|
| Chlorine Level | cl-0 | Chlorination: Disabled |
| | cl-1 | Chlorination: Weak |
| | cl-2 | Chlorination: Average |
| | cl-3 | Chlorination: Strong |

This is the volume in cubic meters your system can soften. The capacity can be determined with the chart in annex 1.

| Parameter | Option | Description |
|---|---|---|
| Frequency of regeneration or calendar forcing | F-xx | Volumetric: Calendar forcing every x days<br>Chronometric: No of days between regenerations |
| | F-of | Volumetric: Calendar forcing disabled<br>Chronometric: Weekly mode activated |

# 7. Valve Initial Set-Up

This is a regeneration override function. Typically, it is used as a "holiday" mode. When there is no regeneration after a determined number of days, the override will trigger a regeneration. The point is to flush the pressure vessel in order to avoid bacteria growth.

| Parameter | Option | Description |
|---|---|---|
| Volume of treated water | IF xx.x | Volumetric: Calendar forcing every x days<br>Chronometric: No of days between regenerations |
| | IF-oF | Volumetric: Calendar forcing disabled<br>Chronometric: Weekly mode activated |

Chose the volume of water to treat (Can be found in the capacity calculation chart)
If oF is selected, then the next menu capacity / Hardness mode will be displayed.

| Parameter | Option | Description |
|---|---|---|
| Resin capacity | C xxx | Resin capacity (m3°tH) |

Input the resin capacity indicated by your resin manufacturer (Only displayed in capacity/hardness mode).

| Parameter | Option | Description |
|---|---|---|
| Water Hardness | H xx | Water hardness (°tH) |

Insert your water hardness (Only displayed in capacity/hardness mode).

| Parameter | Option | Description |
|---|---|---|
| Water Reserve | o-x.x | Water reserve ($m^3$) |

This is a reserve capacity used as a safety buffer in meter delayed mode. It will decrease the chance of having hard water between the theoretical regeneration time and the set regeneration time. However, it will reduce the efficiency of the softener.

| Parameter | Option | Description |
|---|---|---|
| Weekly Regeneration | J1-1 | Monday regeneration activated |
| | J1-o | Monday regeneration disabled |
| | J2-1 | Tuesday regeneration activated |
| | J2-o | Tuesday regeneration disabled |
| | J3-1 | Wednesday regeneration activated |
| | J3-o | Wednesday regeneration disabled |
| | J4-1 | Thursday regeneration activated |
| | J4-o | Thursday regeneration disabled |
| | J5-1 | Friday regeneration activated |
| | J5-o | Friday regeneration disabled |
| | J6-1 | Saturday regeneration activated |
| | J6-o | Saturday regeneration disabled |
| | J7-1 | Sunday regeneration activated |
| | J7-o | Sunday regeneration disabled |

# 7. Valve Initial Set-Up

Only displayed in chronometric mode. Allows to choose which days of the week the valve will regenerate.

| Parameter | Option | Description |
|---|---|---|
| Current Day Indication | d-1 | Monday |
| | d-2 | Tuesday |
| | d-3 | Wednesday |
| | d-4 | Thursday |
| | d-5 | Friday |
| | d-6 | Saturday |
| | d-7 | Sunday |

Select the value corresponding to the current day of the week.

| Parameter | Option | Description |
|---|---|---|
| Length of 1st cycle | 1-xx | Length of cycle in minutes |
| Length of 2nd cycle | 2-xx | Length of cycle in minutes |
| Length of 3rd cycle | 3-xx | Length of cycle in minutes |
| Length of 4th cycle | 4-xx | Length of cycle in minutes |
| Length of 5th cycle | 5-xx | Length of cycle in minutes |

Input the value in minutes according to the cycle time chart.

| Parameter | Option | Description |
|---|---|---|
| 1st regeneration time slot | xx:H1 | Regeneration time |
| | oF:H1 | Regeneration time slot disabled |
| 2nd regeneration time slot | xx:H2 | Regeneration time |
| | oF:H2 | Regeneration time slot disabled |
| 3rd regeneration time slot | xx:H3 | Regeneration time |
| | oF:H3 | Regeneration time slot disabled |
| 4th regeneration time slot | xx:H4 | Regeneration time |
| | oF:H4 | Regeneration time slot disabled |

You can choose up to 4 regeneration slots in delayed mode, allowing you to minimise the risk of hard water after expiring capacity.

| Parameter | Option | Description |
|---|---|---|
| Salt alarm | E | Number of regenerations before starting the alarm |

The number of regenerations before displaying the salt alarm display.

# 8. TROUBLESHOOTING

## 8.1. PRO System

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| A. Controller does not work | 1. Power off<br>2. Transformer is not plugged in<br>3. Defective power cord<br>4. Defective transformer | 1. Switch on power<br>2. Connect to constant power source<br>3. Replace cord<br>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<br>2. Time of regeneration is too long<br>3. Resin disabled | 1. Contact your supplier for assistance<br>2. Reset time of regeneration<br>3. Re-regeneration or use new resin |
| G. Softener fails to use salt | 1. Water pressure is too low<br>2. Brine line blocked<br>3. Injector is blocked<br>4. Internal control leak | 1. Line pressure must be at least 20 psi<br>2. Clean brine line<br>3. Clean or replace injector & screen<br>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<br>2. Brine concentration is poor<br>3. Injector is plugged | 1. Check power of controller<br>2. Keep brine tank full of salt<br>3. Disassemble the injector and clear it by washing with water |
| K. Untreated water leakage during service | 1. Improper regeneration<br>2. Leaking of bypass valve<br>3. O-ring around riser tube damaged<br>4. Incorrect regeneration cycle setting | 1. Repeat regeneration making certain that the correct salt dosage is set<br>2. & 3. Replace O-ring<br>4. Reset regeneration cycle |

# 8. TROUBLESHOOTING

## 8.2. PRO Valve

| Problem | Possible Cause | Possible Solution |
|---|---|---|
| A. The system will not regenerate | 1. Used or defective batteries<br>2. Disrupted electric supply<br>3. Damaged meter cable<br>4. Water meter turbine blocked<br>5. Defective drive motor<br>6. Defective electronic board | 1. Replace old batteries<br>2. Recover the power supply<br>3. Verify the connection & inspect cable<br>4. Clean or replace the turbine<br>5. Replace the drive motor<br>6. Replace the electronic board |
| B. There is hard water coming from the outlet | 1. No salt in the brine tank<br>2. System in bypass position<br>3. Internal leak in valve<br>4. Dirty breech<br>5. Low brine tank refill<br>6. See symptoms in "A" | 1. Refill the brine tank<br>2. Return the system to service position<br>3. Change the internal seals<br>4. Clean the breech<br>5. Change the two breech seals<br>6. See resolution in "A" |
| C. Decrease in pressure and flow | 1. Iron build up in the water supply<br>2. Iron build up in the system<br>3. Levels of iron too high in the feed water | 1. Clean or replace the supply line to the system<br>2. Clean the valve and the resin bed.<br>3. Increase backwash time to prevent fouling. Specifically install an additional filter to remove iron. |
| D. High levels of brine present in the brine tank | 1. Clogged drain line<br>2. Defective cycle time | 1. Check and clean the drain line<br>2. Adjust the cycle times |
| E. The outlet water tastes "salty" | 1. Clogged injectors<br>2. Clogged drain line<br>3. Clogged brine valve<br>4. Defective cycle time<br>5. Damaged drain flow control | 1. Clean the injectors<br>2. Check the drain line and flow control<br>3. Clean or replace the piston assembly<br>4. Adjust the cycle time<br>5. Change the flow control |
| F. There is a constant leak during normal operation | 1. Defective seal<br>2. Defective piston<br>3. Control valve blocked in regeneration<br>4. Defective power head | 1. Change the seals<br>2. Change the piston<br>3. Change the piston and the seals and spacers<br>4. Change the power head |
| G. Valve regenerates continuously | 1. Defective power head | 1. Change the power head |

# 9. CAUTIONS

1. Without reading and understanding the contents of this user manual, DO NOT perform any operations on the control valve.
2. Strictly prohibit a leaning position when shipping, installing and using this product as this could cause damage.
3. During the regeneration, water from the tap will NOT be softened. It is NOT recommended to use water during regeneration; otherwise a negative effect on the regeneration result will occur.
4. Initiate a regeneration cycle when the softener has been inactive for a long 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 distribution.
6. If water usage or hardness of raw water dramatically increases (compared to the normal usage), then the frequency of regeneration should 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.

# 10. Technical Information

| Model (litres of resin) | 25 | 50 | 75 | 100 | 150 | 250 | 350 |
|---|---|---|---|---|---|---|---|
| Maximum Operating Temperature (°C) | 42 | | | | | | |
| Minimum Operating Temperature (°C) | 2 | | | | | | |
| Maximum Operating Pressure (bar) | 8 | | | | | | |
| Minimum Operating Pressure (bar) | 2 | | | | | | |
| Max Flow Rate ($m^3$/hr) | 4.5 | 4.5 | 4.5 | 7 | 7 | 7 | 12 |
| Optimal Flow Rate ($m^3$/hr) | 1 | 2 | 3 | 4 | 5.5 | 8.5 | 9 |
| Inlet / Outlet (") | ¾ BSP | ¾ BSP | ¾ BSP | 1¼ BSP | 1¼ BSP | 1¼ BSP | 1½ BSP |
| Valve | 512 | 512 | 512 | 716 | 721 | 721 | 1236 |
| Drain (") | ½ hose fit | ½ hose fit | ½ hose fit | ½ hose fit | ¾ BSP | ¾ BSP | 1 BSP |
| Brine Line (") | ⅜ push fit | ⅜ push fit | ⅜ push fit | ⅜ push fit | ½ push fit | ½ push fit | ½ push fit |
| Power Requirements (V) | 240V or 3V Battery | 240V or 3V Battery | 240V or 3V Battery | 240V at $50H_3$ | 240V at $50H_3$ | 240V at $50H_3$ | 240V at $50H_3$ |
| Resin Volume (l) | 25 | 50 | 75 | 100 | 150 | 250 | 350 |
| Salt Consumption Per Regeneration (kg) | 3 | 6 | 9 | 12 | 18 | 30 | 42 |
| Pressure Tank Thread (") | 2½ | 2½ | 2½ | 2½ | 2½ | 4 | 4 |
| Vessel Size | 09x35 | 10x54 | 13x54 | 14x65 | 16x65 | 21x62 | 24x72 |
| Brine Tank Volume (l) | 70 | 100 | 140 | 140 | 350 | 500 | 500 |
| Brine Tank Dimensions (mm) | 332 x 332 x 880 | 382 x 382 x 880 | 582 x 362 x 904 | 582 x 362 x 904 | ø 740 x 1275 | ø 840 x 1335 | ø 840 x 1335 |
| Total Height (mm) | 1017 | 1500 | 1517 | 1943 | 1975 | 1990 | 2187 |
| Total Weight (kg) | 38 | 67 | 97 | 127 | 191 | 316 | 425 |