

# 2510, 2750 & 2850 DX 2050 Series

## **Installation Operation Maintenance Manual**

**Duplex Softener  
(Simplex Option)  
With 2510, 2750 & 2850 Series  
Downflow Brining Valve  
25 - 500 litres Resin**

**Cold Water & Hot Water Versions**

Models:

2050 Surface Mount Controller

2051 Panel Mount Controller

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### 1 GENERAL NOTES

These instructions cover the 2510, 2750 and 2850 range of Duplex Cold and Hot Water Softeners, which includes models ranging in size from 25-350 litres resin volume fitted with ES2050 surface mounted controller or ES2051 panel mounted controller.

It is recommended that these instructions are read throughout before commencing any work on the unit, particularly if you have no previous experience of installing and using a water softener.

The installation of a softener is very straightforward, and the only adjustments to be made to the controller program are to the capacity or number of days between regeneration, depending on if the valve is a time clock or metered version. This is detailed in section 8.

This softener will require salt for regeneration. We recommend the used of proprietary 'pellet' or 'tablet' salt.

Drinking softened water has not been shown to be harmful to normal healthy children and adults, but softened water contains a higher level of Sodium than a hard town mains supply. This is of concern to individuals on low Sodium diets or for babies fed with powder formula milk that already contains Sodium. It is therefore recommended that a separate un-softened drinking water supply is left in place or installed on a drinking water faucet. If a cartridge type water filter is installed on the drinking water line, this must be fed with un-softened water.

We have also supplied with the system the original valve manufacturer's handbook. This is written principally for American customers and has a number of small differences in the setting up instructions from those used in Europe. In the event of confusion, refer to the data in this manual rather than in the valve manufacturer's handbook!

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### 2 THE SOFTENING PROCESS

Hardness in water is caused by the presence of dissolved salts of Calcium and Magnesium. In order to overcome the problems associated with the use of hard water, these salts must be removed. This process is called 'Softening'. One means of removing the salts is to exchange them for soluble Sodium salts. This technique is known as 'Ion Exchange Softening'.

#### 2.1 IN SERVICE

In order to soften the water, it is passed through a bed of Ion Exchange resin beads which are contained inside a vertical cylindrical vessel. These beads are made of a synthetic material, and are usually amber or dark brown in colour and between 0.5 and 1.0 mm in diameter.

As the water flows down through the resin, the Calcium and Magnesium in the hard water are progressively exchanged for Sodium, with the result that the water which flows out of the unit contains only Sodium salts, which are not scale-forming. The Calcium and Magnesium remain, attached to the resin.

The Ion Exchange resin does not have an unlimited capacity for exchanging Calcium and Magnesium, so to keep the exit water soft it is necessary to periodically 'Regenerate' the resin to restore its capacity to soften the water.

#### 2.2 REGENERATION

The softening process can be reversed if a strong solution of Sodium Chloride (i.e. Common salt dissolved in water -'brine') is passed through the resin.

The high concentration of Sodium allows it to exchange for the Calcium and Magnesium held on the resin, and these are then carried away to drain. The resin is left full of Sodium to enable it to soften water again.

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### 2.3 THE REGENERATION PROCESS

The regeneration process consists of four stages:-

**Backwash** - Water flows upwards through the resin bed, and out to a drain. As it does so, it loosens the ion exchange beads, removes any resin 'fines' (i.e. small pieces of broken beads etc.) and cleans off any particles of dirt or pipework corrosion products which may have accumulated during the service cycle.

**Brine injection/Displacement Rinse** - During the first part of this stage, the concentrated salt -solution is drawn from the salt storage tank, blended with water to reduce the concentration to the correct level, and passed down through the resin. When the required quantity of brine has been drawn in, the water flows alone to push the remaining brine through the resin at the correct rate, and ensure that all the resin sees the right amount of regenerant.

**Fast Rinse** - This follows the brine injection and displacement rinse stage, and entails rinsing away the residual brine and Calcium and Magnesium salts from the resin and re-packing the resin bed down. This is done down with water flowing through the resin in the direction of service.

**Salt/Brine Tank Refill** - Following the fast rinse, a quantity of water sufficient to dissolve the correct amount of salt for the next regeneration is returned to the salt tank. When this has finished, the unit automatically returns to service. If the system has been configured with a brine measuring tank for use with a salt saturator, this will automatically refill when the regeneration cycle has ended

### 2.4 METER CONTROL OF REGENERATION INITIATION

A water meter is installed downstream of the outlet from the softener, to measure the volume of water which passes to service. This meter drives a turbine, the movement of which is measured by a magnetic sensor which sends signals to the regeneration controller. The controller microprocessor uses this information to calculate when the unit should be regenerated.

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### 2.5 DUPLEX OPERATION

A 'Duplex' system is a means of operation to achieve a constant flow of soft water to service, without the need for extensive treated water storage.

The system is essentially two vessels, which are connected to common inlet and outlet pipework, and which are in service alternately. Each vessels are served by a single regeneration/isolation valve.

In a duty/standby configuration, one vessel will be in service at any one time, the other being in its regeneration cycle, or regenerated and on stand by, ready to enter service.

The vessel in service will operate until the water meter impulses total up in the controller to reach its pre-set volume. At this stage, the stand-by vessel is switched into service, and the vessel which had been in service enters its regeneration cycle. At the end of regeneration, this vessel goes into stand by, and waits for the vessel now in service to complete its pre- set volume, at which point the vessels swap over again, and the whole cycle starts again.

In parallel run configuration, both vessels are in service at the same time, with one vessel regenerating and returning to service after a pre-set volume of water has been used from the pair of vessels. The other vessel then regenerates after the pre-set volume has been measured again.

### 2.6 HOT WATER VERSIONS

Hot water versions are built with special flanged hot water vessels and distribution systems rated to 80°C, special hot water versions of the regeneration valves rated to 82°C and hot water meters rated to 90°C. Due to the use of top & bottom flanged hot water vessels, these units are 200-400mm taller than the equivalent cold water version. In addition, the backwash flow of the hot water versions are higher than the cold water version due to the lower viscosity of hot water.

### 2.7 SIMPLEX VERSIONS

A simplex version is a single vessel unit that will provide softened water until the capacity is exceeded, then a regeneration will commence. During a regeneration no water will pass forward. At the end of regeneration the unit will go back into service

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### **3 UNPACKING AND PARTS IDENTIFICATION**

#### **3.1 BASIC PACKAGES**

The softener will be delivered in a number of packages which include a glass fibre reinforced pressure vessel, a control valve, a brine tank, and a number of 25 litre bags, or part bags of resin and a funnel to fill the vessels.

#### **3.2 UNPACKING NOTES**

The unpacking of the softener is quite straightforward, and there are no 'hidden' items. It is advisable to keep the packages sealed until such time as they are used, to prevent dust or water entry.

Care should be taken in lifting the softener or its parts out of their cartons. It is advisable to lay large cartons on their side and slide out the softener or parts prior to standing them up.

#### **3.3 MISSING OR DAMAGED GOODS**

Immediately on receipt of the goods, it is advisable to check that all items ordered have been received. If you have any doubt that goods have been supplied as requested, please contact your supplier immediately. If any items are missing or damaged, the carrier and your supplier must be notified in writing within 3 days of receipt if a claim is to be made.

### **4 TEMPORARY STORAGE**

If installation is not to start immediately after delivery, the equipment should be stored in a clean dry area, where it will not be damaged, or be subjected to temperatures below freezing.

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### 5 DESCRIPTION OF PLANT COMPONENTS

#### 5.1 SOFTENER VESSEL AND INTERNALS

The pressure vessel which contains the ion exchange resin is made from a fibreglass/epoxy resin outer layer surrounding an inner, seamless shell made from Polyethylene, Polypropylene or ABS.

All vessels are equipped with a distribution system. This is attached to a central riser tube, which is connected to the control valve, and passes water into and out of the resin bed. On smaller systems this will have a single distributor fitted to the riser. On larger and high flow systems there will be multiple distributors built up as a 'hub and laterals' on the bottom of the riser tube.

#### 5.2 CONTROL VALVE

The valve is mounted on top of the vessel, and directs the water flow in and out of the resin bed during the service and regeneration cycles.

The valve carries out its various functions by moving pistons backwards and forwards in a series of seals and spacers contained within the body casting. The movement of these pistons is controlled by a rotating cam, which is driven from the controller. Further cams in the controller direct the movement of the valve controlling the brine system.

If the control valves are used to open and close the supply then solenoids are fitted to the service lines of each valves and controlled by the EWS 2050 controller from a high level signal, closed calling for water.

#### 5.3 REGENERATION CONTROLLER AND TRANSFORMER

The regeneration controller is pre-cabled for each valve, and is contained in a plastic housing (2050) or built into a panel (2051).

The controller is powered by 24v AC electricity. The standard surface mounted 2050 controller has an integral 240-240 transformer. Special order systems can be supplied with 2050 controllers that require an external 24v AC power supply.

All 2051 panel mounted controllers are supplied as 24v versions that require a separate 24v supply from within the panel.

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### 5.4 BRINE SYSTEM – SALT TANK

The brine system consists of a moulded polyethylene tank into which the brine well and brine pick up are assembled. The tank forms the salt storage container.

The brine pick-up tube within the brine well is connected to the pipe from the control valve which sucks the brine from the tank. At the bottom of the brine pick-up tube is an air check valve. This serves to prevent air entering the valve when all the brine has been drawn in. Air in the system could cause spurting and 'hammering' at the taps or outlets.

### 5.5 BRINE SYSTEM – MEASURING TANK

The brine system consists of a moulded polyethylene tank into which the brine pick ups are assembled. The tank is fed with brine from a salt storage system known as a saturator with the brine refill and level controlled by a float switch and brine inlet solenoid.

The brine pick-up tube within the measuring tank is connected to the pipe from the control valve which sucks the brine from the tank. At the bottom of the brine pick-up tube is an air check valve. This serves to prevent air entering the valve when all the brine has been drawn in. Air in the system could cause spurting and 'hammering' at the taps or outlets.

## 6 PRE-INSTALLATION

### 6.1 MECHANICAL

#### 6.1.1 Foundation/Drainage

The softener will not require any special foundations, provided that a firm, level area which is capable of supporting the working weight is available. (See Engineering Data, Section 12.2)

Unwanted water from the regeneration process must flow to drain, and so an open drain or gully, capable of passing the necessary flow is required (see Process and Operating Data, 12.1, for relevant flows). The total flow of water to drain depends on site conditions, but will be approximately 6 times the resin volume. The drain may be at a level no higher than 500mm above the softener valve.

A second drain is required for the brine tank overflow. This is a safety drain which will only discharge water if there is a malfunction in the control valve. Where possible this should be installed through an outside wall like a cistern overflow, where it will give a visual indication of any failure.

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### 6.1.2 Operating Space

The space occupied by the softener can be found in the Engineering Data (Section 12.2).

Access will be required to refill the brine tank, and to carry out adjustments or maintenance on the equipment. It is therefore recommended that a minimum of 500mm clearance be allowed in front of the unit for this purpose.

### 6.1.3 Incoming Water

The raw water to be fed to the softener must comply with the following:-

1. Available at all times at a flow equal to the required service flow or greater, and
2. At a pressure between 1.7 and 5.5 bar
3. Temperature between 0 and 50°C for cold water systems and below 80 °C for hot water systems
4. Suspended solids less than 1 ppm
5. Iron less than 0.2 ppm, Manganese less than 0.1 ppm, Free Chlorine less than 1 ppm if temperature is less than 15°C, less than 0.3 ppm if temperature higher (up to 30°C)

### 6.1.4 Pipework

Pipework to be connected to the softener should not have an excessive amount of hardness scale deposit. Piping that is heavily built up with scale (or Iron deposits) should be replaced.

Make sure that the pipework can be connected to the softener in such a way as to impose no stresses on the control valve, and that it is properly aligned and supported.

A system for the complete by-passing and isolation of the softener should be installed (see Section 7.1.7).

### 6.1.5 Water Supply Company Requirements

It is essential that if the equipment is to be connected directly to a mains water supply, the local bylaws must be adhered to. These cover both plumbing and the prevention of backflow into the mains. If there is any doubt, the local water inspector should be consulted, but in general, the installation of a 'Double check valve assembly' conforming to BS6282 part 2 will be required in the feed pipework to the softener.

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If the pressure available from the mains is not adequate it will be necessary to install a booster pump arrangement. Such a system would be covered by additional bylaws, and the water storage tank needed must comply with these.

### 6.2 ELECTRICAL

A continuous supply of 24v, 75 VA is required by the softener. A suitable 240v –24v transformer is built into the standard surface mounted 2050 controller with an adequate output. This controller should be connected to an uninterrupted 240v 50 Hz mains supply, which is separately 1 Amp fused, and does not have any additional switch.

A plug is not provided with this softener since the cable should be connected to fused spur outlet. However if that is not possible then a plug should be fitted to the cable with a 1 amp fuse. The socket used should be un-switched to prevent the softener from being inadvertently turned off.

For either the special order 24v AC version of the 2050 surface mounted controller or the standard 24v AC version of the panel mounted 2051 controller a separate 240-24v isolating transformer will be required with a recommended output of 115VA.

## 7 ASSEMBLY/INSTALLATION

### 7.1 MECHANICAL

Check all the items against the parts list and shipping documents, and ensure you have them all before starting work. In addition to the softener you will require installation materials and basic tools, (i.e., spanners, screwdrivers etc., and PTFE tape)

#### 7.1.1 Assembling Vessel, Riser Tube and Internals

The units are shipped as pre-assembled components to reduce the risk of transit damage. These need to be assembled on site. Open the cartons containing the pressure vessels and remove them. Check that the vessels have not been damaged in transit. Pay particular attention to the vessel's top hole threads, as this is where the valve will seal. Check that there is no dirt or swarf inside.

##### **Riser Tube/Bottom Filter**

This comprises a length of pipe (the 'riser tube') to one end of which is bonded a moulded screen or hub and lateral. The other end is fitted into the

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bottom of the control valve. To make sure the riser fits properly, and there is no leakage, it will be supplied to the correct length prior to despatch.

### 7.1.2 Charging the Resin

The ion exchange resin is supplied in 25 litre bags and/or part bags if applicable - half for each vessel. All models will be supplied with exactly the right quantity of resin. It is important that only the correct volume of resin is put into each vessel or the system will not function properly. (See **Section 12.1.2** for data)

Place the vessel in its final location - once filled with resin and water they should not be moved. Fill the vessel about 1/5 –1/3 full with clean water. A cover is provided to be slipped over the end of the riser when filling with resin. This must be carefully removed without disturbing the riser prior to fitting the control valve. Carefully open the resin bags and pour the resin into the vessel, using a funnel, keeping the riser tube central and upright. Take great care not to spill resin on the floor. If any is spilt, make sure it is swept up immediately, as it is very easy to slip on it. Wash away any loose resin from the threads of the vessel or adapter collar. Remove the riser cover and check that the top of the riser is still correctly located

### 7.1.3 Assembling the Control Valve

Carefully remove the control valve from the packing, and check that all parts are present. Attach the top distributor to the valve.

### 7.1.4 Attaching the Control Valve

Carefully fit the valve on to the vessel, taking care to ensure that the riser tube locates correctly into the valve base through the top distributor, and that the threads are not crossed on the 2910 valve. Also take care to make sure that the 'O' rings are properly seated and not pinched.

### 7.1.5 Brine System

Move brine tank into position and connect the outer port of the bulk head union to the brine draw connection on the valves using tubing provided. Make sure that this connection is also tight to stop air leaking in.

If the brine draw tubing is adjusted for length during installation, ensure that brass tubing inserts are refitted into tubing end prior to connecting into brine tank and control valve.

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### 7.1.6 Pipework

Pipework should be assembled incorporating the features shown in the Recommended Installation PID (Section 14.1). It is essential that inlet and outlet isolating valves and a by-pass valve are provided, and that the water main is protected by a double check valve where appropriate (see Local Water Bye-laws).

In domestic premises it is recommended that a hard water supply is still used for drinking water (see General Notes Section 1.0).

Pipework can be constructed from any normally acceptable material (Copper, Galvanised, Plastic), provided it is properly supported and aligned. Ensure that the pipe is sufficiently large to accommodate the flow of water required, making due allowance for the pressure drop between the softener and the point of discharge of soft water.

***NOTE: IF BRAZED OR SOLDERED FITTINGS ARE TO BE USED, THE PIPEWORK MUST BE DISCONNECTED FROM THE VALVE DURING HEATING AND COOLING. EXCESS HEAT CAN CAUSE PERMANENT DAMAGE TO SOME OF THE VALVE COMPONENTS.***

### 7.1.7 Storage tank ball valve

Conventional ball float valves pass water at a slow trickle into storage tanks and cisterns when they are shutting off. Trickle flow is not recommended for satisfactory functioning of a water softener since channelling can occur through the resin bed and the meter may not accurately monitor very low flows. It is therefore recommended that main storage tanks for softened water should have the ball valve replaced with a servo type valve such as a Torbeck, Fluidmaster or Aylesbury which permit full flow until they close off. These are inexpensive and are a direct replacement for the more common brass ball float valves.

### 7.1.8 Drains and overflow connections

Connect the overflow fitting on the brine tank to a suitable drain, using flexible or rigid tubing. Make sure that there is a clear gap of approximately 50 mm between the end of the tube and the top of the drain tundish or gully edge.

The drain connection from the valves will range from a 1/2" hose barb (150 litre 2910) up to a 2" BSPM thread (1250 litre 3900). Appropriate tube should

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be run from this connection to a drain capable of taking the maximum flow in regeneration (see Section 12.1), and leaving a similar gap above the drain edge. The drain must not be at a higher level than the 500mm above the control valve and preferably should have an air break at the same height as the control valve.

### Water Meter

The water meter supplied must be installed in the softened water line downstream of the point where each valve outlet is tee'd back together. The meter used SHOULD be supported to prevent strain on the pipework.

## 7.2 ELECTRICAL

Electrical installation is very straightforward, but should still be carried out by a competent electrician, and must conform to the appropriate standards of safety.

### 7.2.1 Mains Supply

The mains supply should be through a separate, switched supply, fused and earthed in accordance with Institute of Electrical Engineers Regulations. Current rating should be 1 Amp.

### 7.2.2 Transformer and Controller

A safety transformer is provided within the 2050 surface mounted controller to reduce the voltage to 24 Volts to operate the controls.

This controller should be attached to a convenient wall. **DO NOT SWITCH ON THE ELECTRICAL SUPPLY AT THIS STAGE**

### 7.2.3 Valve cabling

Surface mount controllers are usually supplied pre-cabled with multi-core cable terminated with cable sockets that mate to chassis plugs fitted to the valves. The cables need to be routed to each valve and supported as appropriate for the installation. When plugged in the cable socket outer ring should be tightened down on to the chassis plug thread.

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### 7.2.4 Meter cabling

The downstream water meter will need to be cabled back to the controller and connected to terminals 34 and 35. Either core of the cable to connected to either terminal.

If the cable is not long enough due to the positioning of the meter, it can be extended with two core cable at least 0.5mm<sup>2</sup>, connected with an insulated extender or in a water proof terminal strip enclosure.

### 7.2.5 Softened Water Tank Level Cabling

The duplex unit can be used to control the filling of the softened water tank if a solenoid NC is fitted to the service outlet. This is wired as per the wiring diagram with a high level float in the softened tank closed for demand wired into terminals 38 and 39.

## 8 COMMISSIONING

### 8.1 INTRODUCTION

It is recommended that the commissioning of the plant is undertaken by a trained service engineer, who will be able to put the plant into service quickly, and most efficiently. However, if the services of an experienced engineer are not available, following the steps outlined below will result in the system being properly commissioned.

### 8.2 CONTROLLER SETTING

Full details of all the programming options for the controllers can be found in the manual in the appendix.

The controller will have been configured with an appropriate regeneration program, but some adjustments may still need to be made on site. The valves must not be regenerating when controller settings are adjusted, but the controller must be powered up.

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### 8.2.1 Setting the Time of Day



Press the 'Clock' button and change the settings using the arrow keys to move the digit to be altered and the # key to make the changes.

### 8.2.2 Site programming - Setting the water hardness



A correct raw water hardness level needs to be entered to ensure that the system operates reliably and efficiently. The unit is programmed to accept a raw water hardness level indicated in ppm (mg/l). It will then calculate the system capacity based on the core capacity entered during factory programming.

The factory default setting is 300ppm unless advised otherwise when the system is ordered.

Press the 'Water Drop' hardness button and change the settings using the arrow key move the digit to be altered and the # key to make the changes.

## 8.3 BRINE SYSTEM

### 8.3.1 Brine Tank Filling – Salt Tank

Place approximately 100 mm depth of water in the bottom of the brine tank. Fill with pellet salt (recommended) until the brine tank it is full or with granular salt until it is 3/4 full.

Overfilling the brine tank with granular salt can result in an overflow of brine. This cannot happen with pellet salt, which is why it is recommended.

Under no circumstances use cooking salt or Pure Vacuum Dried (PVD) salt to fill the brine tank as either of these will damage the resin and the internal components of the regeneration valve and brine draw system.

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### 8.3.2 Brine Tank Filling – Measuring Tank

A system built with a brine measuring tank fed by a salt saturator will need an appropriate connection made to the inlet of the brine inlet/shut off solenoid valve.

When the system is powered up, the brine measuring tank will automatically fill.

### 8.4 PRE-SERVICE FLUSH AND REGENERATION

Set the manual isolating valves so that water will by-pass the softener. Turn on the main water supply. Open a soft water tap close by and let the water run for a few minutes to flush out any debris or foreign matter from the pipework system.

**Turn on the power supply to the controller and press the green on/off button to 'On'.**

One of the valves' lower adapter motors will move to the 'service' position.



Press the manual regeneration button indicated by the 'hand' on the controller and hold it down for two seconds.

The indicator lights on the controller will indicate that the service valve has changed over and valve previously in service is now moving into regeneration.

The process begins with the standby vessel being put on line. 30 seconds later the old service vessel will come off line. 30 seconds after that the valve on the old service vessel will drive the regeneration piston to backwash. When this has occurred, slowly open the inlet isolating valve on this vessel. Air will initially be expelled as the vessel fills from the bottom. When the air has been expelled, water will run to drain. When this begins, open the inlet valve fully and leave this to run for the full backwash duration to rinse off the resin and remove fines.



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When the controller moves the valve to the brine draw phase, the valve can be fast cycled by pressing manual regeneration and 'information' button together and holding down for two seconds.

The controllers internal timer switches from minutes to seconds for the remainder of the current program step, after which it will return to normal so that the next regeneration step proceeds normally.

Advance the controller through the fast rinse phase, but leave the brine refill phase to run normally if the system has been supplied with two brine tanks, in order to fill the brine tank ready for the next regeneration.

When this has been completed repeat the process to fill and flush out the second vessel. If the unit has been supplied with one common brine tank for both vessels, it is essential that a normal brine refill is completed at the end of this phase.

Open the outlet valves and test the water output from a downstream tap.

If it has not already been done, fill the brine tank(s) with tablet salt to 6" from the top or to approximately  $\frac{3}{4}$  full if granular salt is used. (**Not salt saturator brine measuring tank**)

## 9 OPERATION

### 9.1 NORMAL OPERATION

Operation is completely automatic, with regeneration being initiated whenever required by the meter controller.

### 9.2 REFILLING WITH SALT

Since salt is used in the regeneration process, the level of salt in the brine tank(s) will fall after each regeneration. It should not be allowed to fall below 200 mm above the bottom of the tank. When the low level is approached (or more often, as a routine) the tank should be refilled to the top with pellet salt or  $\frac{3}{4}$  filled with granular salt.

The approximate capacity of the tank(s) for salt is shown in Section 12.1.

### 9.3 MANUAL REGENERATION

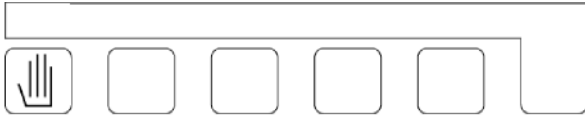
There can be occasions during the life of equipment such as softeners when the original design basis is not applicable. For example, after a shutdown period, the demand for soft water may far exceed the design flow rate for a short period. Another possibility is that the Water Service Plc finds it necessary to change to a supply which is much harder than that normally

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received. It will then be necessary to give the unit an additional regeneration to ensure that soft water continues to be available to service.

This additional regeneration is initiated manually.



Press the manual regeneration button indicated by the 'hand' on the controller and hold it down for two seconds.

The indicator lights on the controller will indicate that the service valve has changed over and valve previously in service is now moving into regeneration.

The process begins with the standby vessel being put on line. 30 seconds later the old service vessel will come off line. 30 seconds after that the valve on the old service vessel will drive the regeneration piston to backwash.

### 9.4 BY-PASSING THE SOFTENER

There may be occasions when it is desirable to by-pass the softener, to allow hard water to go to service, or if the softener is for some reason not performing properly.

To do this, open the by-pass isolating valve and close the softener outlet isolating valve (see Installation Diagram, Fig 3 in Section 14.2). The softener can still be safely regenerated with the valves in this position. If for any reason, it is desired to completely isolate the softener, it will be necessary to close the inlet isolating valve as well.

### 9.5 TEMPORARY SHUT-DOWN

If the softener needs to be taken out of service for some time for any other reason, it is recommended that one or two simple procedures be undertaken to ensure the return to operation is as smooth as possible.

1. The unit should be left with both columns fully regenerated.
2. The electrical supply should be turned off.
3. The inlet and outlet manual isolating valves should be closed.
4. The valve should be drained of water if there is the possibility of the system freezing.

On restart, it is recommended that the vessel is manually regenerated.

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### 9.6 CHANGES IN INCOMING WATER

There is a much greater tendency these days for the Water supply Plc to use water from more than one source. It is unlikely that two sources will have similar chemical composition, and so when this happens the raw water being fed to the unit may also change. It is suggested that routine monitoring be undertaken to check whether this is the case (see 9.9). If variation greater than 5% is found, it will be necessary to check whether the settings for regeneration need changing. Resetting is the same as setting.

### 9.7 ROUTINE MONITORING

The following recommendations are made to help the user of the softener confirm that it is performing as required, and to give early warning of possible problems. The operation of the softener is completely automatic, and should not require adjustment (except as above).

#### **Weekly**

Check the treated water hardness with a hardness test kit.  
Inspect the level of salt in the salt tank and refill if necessary.

#### **Monthly**

Check raw water hardness, and record. Compare with original hardness and adjust volume capacity setting if required (see Section 13.1).

#### **Annually**

Inspect and clean/replace as necessary the brine injector, piston and the internal seals. This should be performed by a competent engineer familiar with Fleck valves.

## 10 FAULT FINDING AND RECTIFICATION

Modern water softeners are extremely reliable and unlikely to give any problems if they are installed and operated correctly.

### 10.1 NO FLOW TO SERVICE

Check mains pressure is above 1.8 bar.

Check inlet and outlet isolating valves are open.

Check service outlet valve is open.

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Check pressure drop across resin. If excessive, resin may be fouled, or internals blocked. Initiate a regeneration. If this does not free up the resin the softener will need to be inspected and serviced by a competent engineer.

### 10.2 POOR TREATED WATER QUALITY

Check manual by-pass closed.

Check blending valve (if fitted) has not been opened or adjusted.

Check salt level in brine tank(s). Refill if necessary.

Trickle flow through conventional ball valve in storage tank. Replace with Torbeck, Fluidmaster or Aylesbury servo valve.

Check raw water pressure above minimum. If flow is less than minimum, channelling of water can occur in resin which results in inadequate treatment.

Check injector strainer and injector not blocked (see Appendix for drawings). Clean if necessary.

Check brine pick-up screen not blocked. Clean if necessary.

Check brine line not split. Replace if necessary.

Check raw water hardness, and then check if controller setting is correct for this hardness (see Section 8)

### 10.3 NO REGENERATION

Check electrical supply, fuses etc. satisfactory.

Check control head motor runs, by initiating a manual regeneration. Replace if necessary.

### 10.4 UNSATISFACTORY CAPACITY BETWEEN REGENERATIONS

See Section 10.2.

Check condition of resin. Resin may have become fouled, inhibiting the regeneration process. If fouled, it should be cleaned or replaced.

Check incoming water for presence of Chlorine. If Chlorine level too high, the resin may have been degraded.

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Check raw water pressure. Too high pressure may mean the brine draw stage of regeneration is not effective

### **11 WARRANTY AND SERVICE**

#### **11.1 AFTER SALE WARRANTY**

Your softener is covered by a parts warranty for a period of one year from installation.

Should you have any problems with your softener or require routine service, please contact your supplier.

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### 12 DATA

#### 12.1 PROCESS AND OPERATING DATA

##### 12.1.1 2510 Series Water Softeners 20-120 litre

MODEL		20 L	25 L	30 L	40 L	50 L	60L	75L	100L	120L
<b>PARAMETER</b>	<b>UNITS</b>									
Max. Service Flow	M3/hr	0.80	1.00	1.20	1.60	2.00	2.40	3.00	4.00	4.30
Min Service Flow	M3/hr	0.10	0.12	0.15	0.20	0.25	0.30	0.37	0.50	0.60
Capacity	m3	1.0	1.25	1.50	2.0	2.5	3.0	3.75	5.0	6.0
Volume treated between regens (300 ppm CaCO <sub>3</sub> , 21° Clarke)	M3	3.3	4.2	5.0	6.7	8.4	10.0	12.5	16.7	20.0
Salt used per regeneration	kg	2.8	3.5	4.2	5.6	7.0	8.4	10.5	14.0	16.8
Regeneration Time	mins	48	48	68	72	72	72	72	96	96
Resin Volume	litres	20	25	30	40	50	60	75	100	120
Salt Storage Capacity	kg	80	80	80	120	120	160	160	250	250
No of Regens Salt stored	-	28	22	19	35	17	19	15	17	14
Maximum Flow to drain	Lit/min	4.4	5.5	8.8	8.8	8.8	12.95	14.8	18.5	18.5

#### IMPORTANT NOTES

Much of the data quoted in the above table is affected by the inlet pressure, and so should be regarded as nominal only.

Total flow to drain will be similarly affected and is therefore not quoted, but will be about 6 times the resin volume.

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## Installation Operation Maintenance Manual

### 12.1.2 2750 Series Water Softeners 50-350 litre

MODEL		50 L	60L	75L	120L	140L	250L	350L
<b>PARAMETER</b>	<b>UNITS</b>							
Max. Service Flow	M3/hr	2.00	2.40	3.10	4.80	5.60	5.90	5.90
Min Service Flow	M3/hr	0.25	0.30	0.37	0.60	0.70	1.20	1.75
Capacity	m3	2.5	3.0	3.75	6.0	7.00	12.5	17.5
Volume treated between regens (300 ppm CaCO <sub>3</sub> , 21° Clarke)	M3	8.3	10.0	12.5	20.0	23.3	41.75	58.45
Salt used per regeneration	kg	7.0	8.4	10.5	16.8	19.6	35.0	49.0
Regeneration Time	mins	72	72	72	96	96	120	140
Resin Volume	litres	50	60	75	120	140	250	350
Salt Storage Capacity	kg	120	160	160	250	350	500	750
No of Regens Salt stored	-	17	19	15	14	20	14	15
Maximum Flow to drain	Lit/min	8.8	12.9	14.9	18.5	25.9	37.0	55.5

### IMPORTANT NOTES

Much of the data quoted in the above table is affected by the inlet pressure, and so should be regarded as nominal only.

Total flow to drain will be similarly affected and is therefore not quoted, but will be about 6 times the resin volume.

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## Installation Operation Maintenance Manual

### 12.1.2.1 2850 Series Water Softeners 100-500 litre

MODEL		100L	120L	140	250L	350L	500L
PARAMETER	UNITS						
Max. Service Flow	M3/hr	4.00	4.80	5.60	10.0	11.6	11.6
Min Service Flow	M3/hr	0.50	0.60	0.75	1.25	1.75	2.5
Capacity	m3	5.0	6.0	7.00	12.5	17.5	25.0
Volume treated between regens (300 ppm CaCO <sub>3</sub> , 21° Clarke)	M3	16.7	20.0	23.3	41.75	58.45	83.5
Salt used per regeneration	kg	14.0	16.8	19.6	35.0	49.0	70.0
Regeneration Time	mins	96	96	96	120	140	140
Resin Volume	litres	100	120	140	250	350	500
Salt Storage Capacity	kg	250	250	350	500	750	1000
No of Regens Salt stored	-	17	14	20	14	15	14
Maximum Flow to drain	Lit/min	18.5	18.5	25.9	37.0	55.5	129.0

### IMPORTANT NOTES

Much of the data quoted in the above table is affected by the inlet pressure, and so should be regarded as nominal only.

Total flow to drain will be similarly affected and is therefore not quoted, but will be about 6 times the resin volume.

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### 12.2 ENGINEERING DATA

#### 12.2.1 2510 Series Water Softeners 20-120 lit

MODEL		20L	25L	30L	40L	50L	60L	75L	100L	120L
PARAMETER	UNITS									
Diameter of vessel	mm	203	229	254	254	254	315	305	356	356
Height to top of valve	mm	1100	1100	1100	1330	1590	1430	1590	1984	1984
Diameter of brine tank	mm	285	285	285	430	430	460	560	560	560
Height of brine tank	mm	960	960	960	960	960	835	1000	1180	1180
Inlet Conn.BSPF	ins	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Outlet Conn.BSPF	ins	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drain Conn.	ins	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Brine Tank Overflow Conn.	ins	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Delivered Wt.	Kg.	35	40	45	50	58	68	85	115	130
Working Wt. (approx)	Kg	150	160	190	205	225	300	350	600	700
Electrical power	v	240	240	240	240	240	240	240	240	240
	Hz	50	50	50	50	50	50	50	50	50
	V/A	75	75	75	75	75	75	75	75	75

MAXIMUM OPERATING PRESSURE 5.5 Bar MINIMUM OPERATING PRESSURE 1.7 Bar  
 MAXIMUM OPERATING TEMPERATURE 50.0C  
 HEADROOM - Allow 100 mm greater than overall height.

**NB Vessels can vary depending on manufacturer used, dimensions are therefore nominal.**

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### 12.2.2 2750 Series Water Softeners 50-350 lit

MODEL		50L	60L	80L	120L	140L	250L	350L
PARAMETER	UNITS							
Diameter of vessel	mm	254	315	330	355	406	533	609
Height to top of valve	mm	1590	1430	1590	1984	1988	2038	2225
Diameter of brine tank	mm	430	457	475	560	650	830	970
Height of brine tank	mm	960	1016	1016	1180	1240	1200	1240
Inlet Conn.BSPF	ins	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Outlet Conn.BSPF	ins	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drain Conn.	ins	1/2	1/2	1/2	1/2	1/2	3/4	3/4
Brine Tank Overflow Conn.	ins	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Delivered Wt.	Kg.	65	75	100	150	170	280	380
Working Wt. (approx)	Kg	225	300	350	700	750	1100	1250
Electrical power	v	240	240	240	240	240	240	240
	Hz	50	50	50	50	50	50	50
	V/A	75	75	75	75	75	75	75

MAXIMUM OPERATING PRESSURE 5.5 Bar MINIMUM OPERATING PRESSURE 1.7 Bar  
 MAXIMUM OPERATING TEMPERATURE 50.0C  
 HEADROOM - Allow 100 mm greater than overall height.

NB Vessels can vary depending on manufacturer used, dimensions are therefore nominal.

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### 12.2.3 2850 Series Water Softeners 100-500 lit

MODEL		100L	120L	140L	250L	350L	500L
PARAMETER	UNITS						
Diameter of vessel	mm	355	355	406	533	609	762
Height to top of valve	mm	1984	1984	1988	2038	2225	2450
Diameter of brine tank	mm	560	560	650	830	970	1050
Height of brine tank	mm	1180	1180	1240	1200	1240	1500
Inlet Conn.BSPF	ins	1.5	1.5	1.5	1.5	1.5	1.5
Outlet Conn.BSPF	ins	1.5	1.5	1.5	1.5	1.5	1.5
Drain Conn.	ins	1.0	1.0	1.0	1.0	1.0	1.0
Brine Tank Overflow Conn.	ins	3/4	3/4	3/4	3/4	3/4	3/4
Delivered Wt.	Kg.	135	150	170	280	380	500
Working Wt. (approx)	Kg	350	700	750	1100	1250	1800
Electrical power	v	240	240	240	240	240	240
	Hz	50	50	50	50	50	50
	V/A	75	75	75	75	75	75

MAXIMUM OPERATING PRESSURE 5.5 Bar MINIMUM OPERATING PRESSURE 1.7 Bar  
 MAXIMUM OPERATING TEMPERATURE 50.0C  
 HEADROOM - Allow 200 mm greater than overall height.

**NB Vessels can vary depending on manufacturer used, dimensions are therefore nominal.**

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## Installation Operation Maintenance Manual

### 13 ES2050 Controller Settings for Fleck 2510, 2750 and 2850 duplex systems

The ES2050 surface mounted controller has been set up with a typical operating program suitable for duty standby duplex systems.

The controller has a 240v input and generates 24v outputs using an internal transformer. To reduce the load on the controller transformer, the valve motors are set to run one at a time with 30 second intervals.

#### Example :

**Column 1 is going into regeneration and column 2 is going from standby into service**

- The service valve of column 2 will be opened
- Then after 30 seconds the service valve of column 1 will be closed
- Then after 30 seconds the regeneration motor will be activated

#### **Changing the program mode. For information only - this has been set prior to shipping :**

- Switch off the controller.
- Press the 2<sup>nd</sup> key from the left side and switch on the controller while keeping the key pressed.
- The following message will appear in the LCD display :  
Program 30s  
Standard Y/N
- Now you can go to the programming of the motor type by pressing the “#”-key.  
Program 30s  
Motorvalve Y/N
- Program this parameter at Yes by pressing the „>“-key (cursor beneath “Y“)
- Now press the 2<sup>nd</sup> key of the left again and the programming will be saved
- The controller is now suitable for 24 Volt motors with high current.

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The cycle time and capacities are nominal only and can be changed to suit site conditions. The assumptions used to program the controller are as follows.

## 2510 valves

Softener Lit	Tank	B/wash lpm	Injector Std	BLFC	Slow Rinse lpm	B/wash time	BSR time	Fast Rinse time	Brine refill time	Regen time
20	835	4.54	1	0.25	1.52	4	40	4	8	48
25	935	5.68	1	0.25	1.52	4	40	4	10	48
30	1035	9.08	1	0.25	1.52	4	60	4	12	64
40	1044	9.08	1	0.25	1.52	6	60	6	16	72
50	1054	9.08	1	0.5	1.52	6	60	6	10	72
60	1248	13.25	2	0.5	3.03	6	60	6	12	72
75	1354	15.14	2	0.5	3.03	6	60	6	16	72
100	1465	18.93	2	1	3.03	8	80	8	10	96
120	1465	18.93	2	1	3.03	8	80	8	12	96

## 2750 valves

Softener Lit	Tank	B/wash lpm	Injector Std	BLFC	Slow Rinse lpm	B/wash time	BSR time	Fast Rinse	Brine refill time	Regen time
50	1054	9.08	1	0.5	1.51	6	60	6	10	72
60	1248	13.25	2	0.5	3.03	6	60	6	12	72
80	1354	15.14	2	0.51	3.03	6	60	6	18	72
120	1465	18.93	2	1	3.03	8	80	8	12	96
140	1665	26.50	3	1	4.16	8	80	8	14	96
250	2162	37.85	C4	2	8.71	10	100	10	14	120
350	2472	56.78	C4	2	8.71	10	120	10	18	140

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### 2850 valves

Softener Lit	Tank	B/wash lpm	Injector Std	BLFC	Slow Rinse lpm	B/wash time	BSR time	Fast rinse	Brine refill time	Regen time
50	1054	9.08	1	0.5	1.51	6	60	6	10	72
60	1248	13.25	2	0.5	3.03	6	60	6	12	72
80	1354	15.14	2	0.51	3.03	6	60	6	18	72
120	1465	18.93	2	1	3.03	8	80	8	12	96
140	1665	26.50	3	1	4.16	8	80	8	14	96
250	2162	37.85	C4	2	8.71	10	100	10	14	120
350	2472	56.78	C4	2	8.71	10	120	10	18	140

\* Brine refill is set to 1 min on all systems with a brine measuring tank. Using a small 1.2gpm BLFC this flushes a small amount of water into the measuring tank which flushes out the brine valve and brine line, increasing reliability.

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Full details of how to modify the program can be found in the controller manufacturer's manual.

*Items in italics below only appear during initial configuration and will not appear during program verification.*

The settings used for this system are:

Program Step	Display	Setting	Function
1.1	<i>Single unit</i>	<i>N (Y for Simplex Option will jump to 3.1)</i>	<i>Not a single column system (will not appear after programming 1.2)</i>
1.2	2-tank alter	Y	Sets controller to duplex alternating system (duty/standby)
2.0	Pre regen.	N	Unit regenerated at the end of a service run, not at beginning
3.1	Time delayed	N	No periods when regeneration cannot take place
3.6	Time start	N	Not set for timed regeneration
4.1	Interim start	N	Not set for fixed time intervals
5.1	Min,reg.time	N	Not set for minimum time between regenerations
6.1	Watermeter	Y	System uses a water meter
6.2	Pulse period	100 L	100 litres per impulse
7.1	Flow pulse	1.0 S	Impulse repeater relay has 1 second contact
8.1	<i>Hardness [°D]</i>	<i>N</i>	<i>Hardness not set in degrees German (will not appear after programming 8.4)</i>
8.2	<i>Hardness [°F]</i>	<i>N</i>	<i>Hardness not set in degrees French (will not appear after programming 8.4)</i>
8.3	<i>Hardness [°E]</i>	<i>N</i>	<i>Hardness not set in degrees Clarke (English) (will not appear after programming 8.4)</i>
8.4	Hardness mg/l	Y	Hardness is set in mg/l (ppm)
9.0	Capacity	1253 1503 2505 3757 6012 7515 10000 12500 17500 25000	Capacity setting for 9" 25 lit Resin Capacity setting for 10" 30 lit Resin Capacity setting for 10" 50 lit Resin Capacity setting for 13" 75 lit Resin Capacity setting for 14" 120 lit Resin Capacity setting for 16" 150 lit Resin Capacity setting for 18/21" 200 lit Resin Capacity setting for 21" 250 lit Resin Capacity setting for 24" 350 lit Resin Capacity setting for 30" 500 lit Resin
10.1	Pre contact	N	No advance external warning set
11.0	Stage	5	5 cycle valve
12.1	Changeover	Y	Set to 'changeover' microswitch operation on valve cams
14.1	Time phase 1	10	Backwash time setting
14.1	Time phase 2	60	Brine/slow rinse setting
14.1	Time phase 3	10	Fast Rinse time setting
14.1	Time phase 4	10 12 10 16 12 14 14 14 18 1	Brine refill setting for 9" 25 lit Resin Brine refill setting for 10" 30 lit Resin Brine refill setting for 10" 50 lit Resin Brine refill setting for 13" 75 lit Resin Brine refill setting for 14" 120 lit Resin Brine refill setting for 16" 150 lit Resin Brine refill setting for 18/21" 200 lit Resin Brine refill setting for 21" 250 lit Resin Brine refill setting for 24" 350 lit Resin Setting for all units with a brine measuring tank

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15.1	Output	AD	'Additional program' setting used to isolate brine tank refill valve during regeneration on systems with brine measuring tank
15.2	Start Phase	1	Additional program starts at beginning of regeneration
15.3	Time On	81	Set to full regeneration cycle for system with brine measuring tank
16.1	Cap. exceeded	N	No warning if capacity exceeded
16.5	Supply fail	N	No alarm after supply failure
16.8	Reg. tank low	N	No Regenerant tank low alarm
16.12	Wait	Y	Wait input – function as in 17.1
16.13	Alarm	N	No alarm if wait input active
16.14	Warning	Y	Warning signal if wait input active
17.1		Service	Unit will open and close outlet valves on signal from storage tank
18.1	Reg. Delay 1	0	No delay in regeneration start
18.2	Reg. Delay 2	0	No delay in regeneration interruption
19.1	Maintenance	N	No maintenance program set

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## 14 Softener output (capacity) at differing hardness levels

Outputs detailed in cubic meters (1000 Litres per cubic meter)  
Hardness in ppm

Res vol Lit	Max cont flow m3/h	Max cont flow lpm	Output m3pp m	@100 ppm Deg Cl 7	@150 ppm Deg Cl 10.5	@200 ppm Deg Cl 14	@250 ppm Deg Cl 17.5	@300 ppm Deg Cl 21	@350 ppm Deg Cl 25	@400 ppm Deg Cl 28	Salt kg (Nom)
20	0.80	13.33	1000	10.00	6.67	5.00	4.00	3.33	2.86	2.50	2.80
25	1.00	16.67	1250	12.50	8.33	6.25	5.00	4.17	3.57	3.13	3.50
30	1.20	20.00	1500	15.00	10.00	7.50	6.00	5.00	4.29	3.75	4.20
40	1.60	26.67	2000	20.00	13.33	10.00	8.00	6.67	5.71	5.00	5.60
50	2.00	33.33	2500	25.00	16.67	12.50	10.00	8.33	7.14	6.25	7.00
60	2.40	40.00	3000	30.00	20.00	15.00	12.00	10.00	8.57	7.50	8.40
75	3.00	50.00	3750	37.50	25.00	18.75	15.00	12.50	10.71	9.38	10.50
80	3.20	53.33	4000	40.00	26.67	20.00	16.00	13.33	11.43	10.00	11.20
100	4.00	66.67	5000	50.00	33.33	25.00	20.00	16.67	14.29	12.50	14.00
120	4.80	80.00	6000	60.00	40.00	30.00	24.00	20.00	17.14	15.00	16.80
140	5.60	93.33	7000	70.00	46.67	35.00	28.00	23.33	20.00	17.50	19.60
150	6.00	100.00	7500	75.00	50.00	37.50	30.00	25.00	21.43	18.75	21.00
190	7.60	126.67	9500	95.00	63.33	47.50	38.00	31.67	27.14	23.75	26.60
200	8.00	133.33	10000	100.00	66.67	50.00	40.00	33.33	28.57	25.00	28.00
250	10.00	166.67	12500	125.00	83.33	62.50	50.00	41.67	35.71	31.25	35.00
300	12.00	200.00	15000	150.00	100.00	75.00	60.00	50.00	42.86	37.50	42.00
350	14.00	233.33	17500	175.00	116.67	87.50	70.00	58.33	50.00	43.75	49.00
500	20.00	333.33	25000	250.00	167.50	125.00	100.00	83.50	71.50	62.50	160.00

The factory default setting is the capacity at 300 ppm.

The maximum flow rate of larger systems is determined by the control valve.

2510 1"valves are limited to 4.3 m3/h

2750 1" valves are limited to 5.9 m3/h

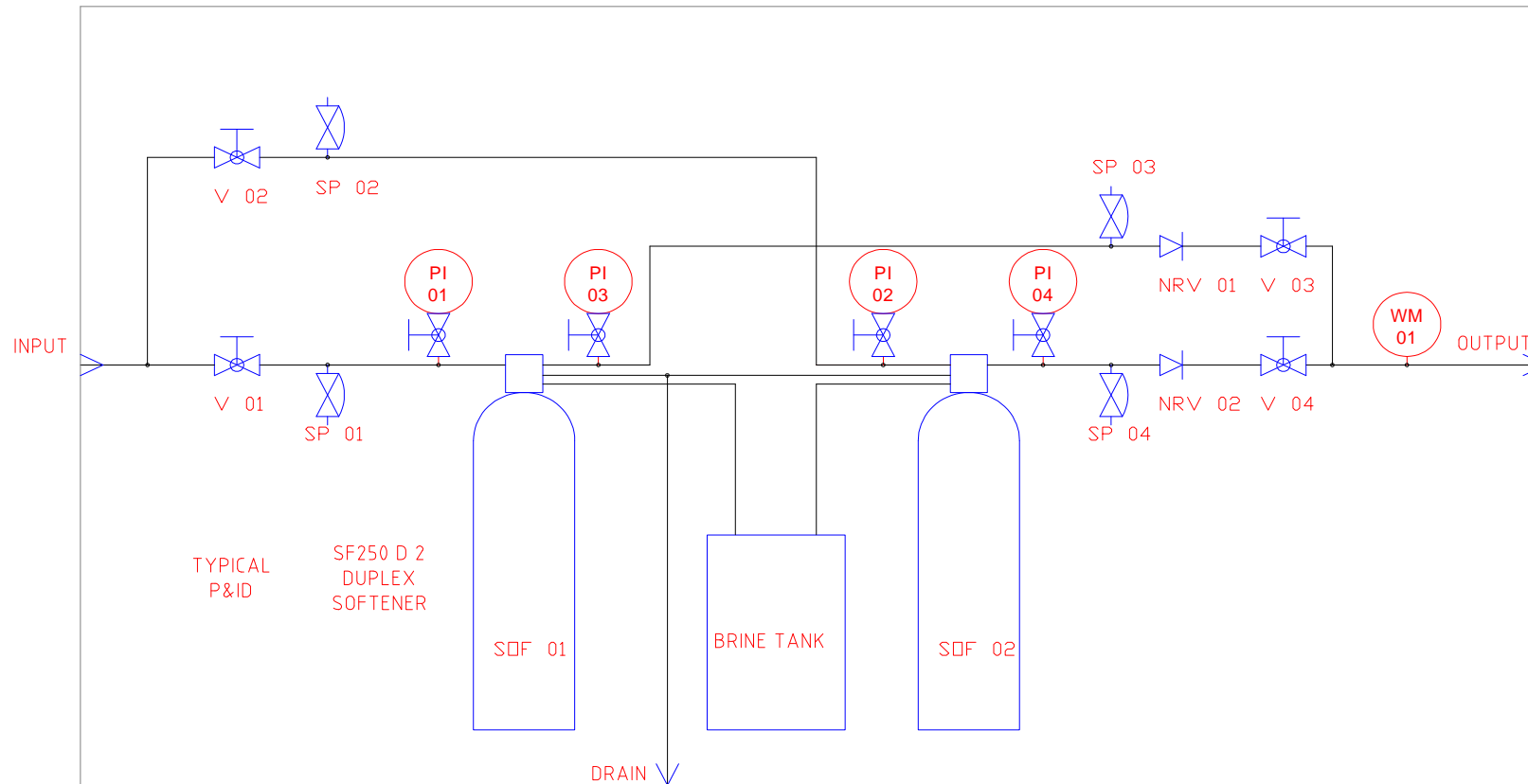
2850 1.1/2" valves are limited to 11.60m3/h

# 2510/2750/2850 Series

## 15 DRAWINGS

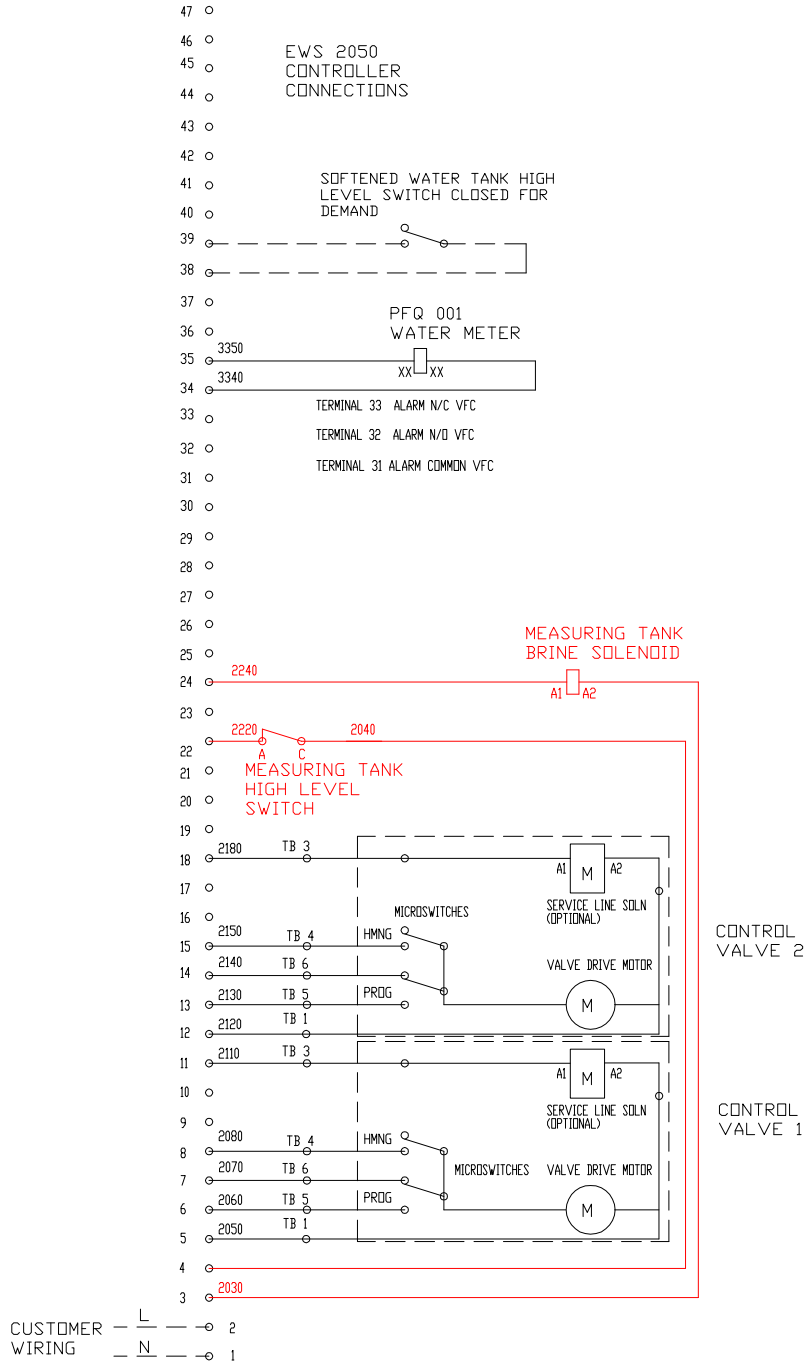
### 15.1 RECOMMENDED INSTALLATION PID

Note: Isolating valves, pressure gauges, sample ports and interconnecting pipework are not supplied as standard.



# 2510/2750/2850 Series

## 15.2 WIRING DIAGRAM (for simplex only Control Valve 1 present)



# 2510/2750/2850 Watersoftener

Installation Operation Maintenance Manual

16 CE CERTIFICATE

## Manufacturer's Declaration of Conformity

We the undersigned

**EURAQUA UK, HITCHIN, ENGLAND**

Certify that the product

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*type: DUPLEX or SIMPLEX WATER SOFTENER WITH FLECK 2510/2750/2850  
24 VOLT AC VALVE WITH 2050/2051 CONTROLLER*

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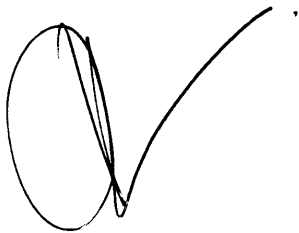
*has been designed and manufactured in accordance with the  
specifications of the following:*

**Directive**

Machinery Directive 89/392/EEC  
Low Voltage Directive 73/23/EEC  
EMC-Directive 89/336/EEC

**Standard**

EN 292-1, EN 292-2  
EN 60 335-1  
EN 55 014



RT Adam  
Director

**Hitchin, England 01/01/05**  
*Issue place & date*