Calmag
Calming troubled waters

ESSENTIAL FOR ENERGY SAVINGS

Commercial and Industrial

Water Softeners for businesses

SAVE ENERGY, SAVE MONEY WITH EFFICIENT WATER SOFTENERS

INTRODUCING **CALSIMPLEX** AND **CALDUPLEX**
EXCLUSIVELY DESIGNED BY CALMAG

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Introduction

Calmag - the water treatment experts

At Calmag, our water treatment experts are specialists in the development and manufacture of the most **diverse range of water treatment solutions available in the UK**.

Founded in 2002, Calmag is the only independently owned UK manufacturer to produce a complete range of products and services to meet the needs of both domestic and commercial customers. Our continuous investment in stringent design, production and testing programmes are your assurance of great quality, reliable performance and best value, all backed by long Calmag guarantees, technical support and after-sales care.

Calmag domestic products offer the widest choice of home water solutions, to deliver the quality of water you want, with the added benefits of reduced energy usage and significant savings on household bills and maintenance costs. Calmag Commercial specialists design products to exacting project specifications, resulting in **the most effective and efficient solutions** to meet heavy industrial demands.

Our work with industry partners and trade associations reflects our total commitment to supporting best practice and the continual development of water treatment excellence. Professional installers have confidence in Calmag, with products that give **optimum performance combined with ease of installation**. Our many customers include some of the world's largest plumbers' merchant chains, UK independent merchants, and public sector organisations.

Products that are tried, tested and approved

Calmag is one of the largest independent manufacturers of water conditioning products in Europe, offering solutions to practically every water-related need for the home and industry.

The Calmag product range includes scale inhibitors, water softeners, water filters, ultra violet disinfection, reverse osmosis, pH correction, nitrate removal, iron removal, water chillers, calcium treatment, chemical inhibitors and cleaners.

We're always here to help

If you have any queries or require advice on any of our products, please give us a call on our Helpline on 01535 210320 or visit www.calmagltd.com. **You can always rely on us for technical support and after-sales care**.

CHARLES WYSOCKI
MANAGING DIRECTOR
CALMAG

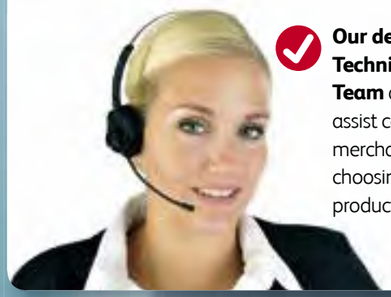
Our commitment

Confidence in water quality

Calmag's fresh, **innovative approach to water quality** has led to the development of the most extensive and effective range of water treatment solutions within the UK water treatment industry. Our products are **designed with the needs of all our customers in mind**, be they the consultant, the specifier, the merchant, the installer or the consumer.

Our entire business is based on providing products and services to meet the real needs of all our customers. We don't simply produce 'me too' products: at Calmag we have the **unique design and production capabilities** to produce exactly the products that you need - when you need them.

- **We solve problems** – we are the only UK company to offer products for every water-related issue – whether hard or soft, primary or secondary.
- **We design bespoke products** using our unique manufacturing, design and production capabilities.
- **We form strong partnerships** with our customers to develop the best product and service packages.
- **Our experience** in design, prototyping, production and scheduling enables us to transform concepts into products within tight timescales.
- **All products are tested** before they leave Calmag – through multi-stage processes and wet testing. This is your guarantee of optimum performance.
- **Product performance is of paramount importance** to Calmag, delivered through our strong commitment to quality assurance and continual improvement programmes.



- **Our dedicated Technical Support Team** are available to assist consultants, specifiers, merchants and installers in choosing the most effective product solutions.
- **We control all the stages** of production from design concept through to product release - ensuring that our customers receive the highest possible standards in delivery and service.
- **Calmag's growth and expansion** has led to a move to a larger design and manufacturing facility in 2013 - reflecting our commitment to excellence and innovation.
- **Calmag products carry extensive guarantees** – our Customer Service Team ensure that customers receive a high level of service before and after purchase.
- **Calmag is the only company** to be members of both the United Kingdom Water Trade Association (UKWTA), the Domestic Water Treatment Association (DWTA) and SAVE International.
- Calmag are members of the **Chartered Institute of Plumbing and Heating Engineers (CIPHE)**.
- Calmag are registered to **International Quality Management Standard ISO 9001**.
- The Calmag name is your assurance of **excellence in design, value and quality.**

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International Standards

Giving extra value to our products

Calmag is the only water treatment company in the UK to be a member of the United Kingdom Water Trade Association (**UKWTA**), the Domestic Water Treatment Association (**DWTA**) and **SAVE International**.

Value Engineering (VE) is a conscious and explicit set of disciplined procedures designed to ensure optimum value for both initial and long-term investment. SAVE International was formed in 1959 as a professional society dedicated to the advancement of Value Engineering through a better understanding of the primary methods and concepts involved. SAVE has grown to over 1,500 members and Calmag believe that being part of the SAVE organisation gives us a competitive edge and also offers our customers the confidence that we look at all aspects of the project.

The value methodology (VM) is a systematic and structured approach that improves projects, products, and processes. It is used to analyse manufacturing products and processes, design and construction projects, and business and administrative processes. VM helps achieve balance between required functions, performance, quality, safety, and scope, with the cost and other resources necessary to accomplish those requirements. The proper balance results in the maximum value for the project.

SAVE International's standard job plan consists of six phases:

1. **Information Phase:** Gather information to better understand the project
2. **Function Analysis Phase:** Analyse the project to understand and clarify the required functions.
3. **Creative Phase:** Generate ideas on all the possible ways to accomplish the required functions.
4. **Evaluation Phase:** Synthesize ideas and concepts to select feasible ideas for development into specific value improvement.
5. **Development Phase:** Select and prepare the ''best'' alternative (s) for improving value.
6. **Presentation Phase:** Present the value recommendation to project stakeholders.

At the planning stage of development, there are additional benefits to be derived from a Value Engineering Workshop.

At Calmag we follow the procedures below:

- **Review** the program
- **Perform** a functional analysis of the facility
- **Obtain** the owner/users definition of value
- **Define** the key criteria and objects for the project
- **Verify/validate** the proposed program
- **Review** master plan utility (e.g. Central Product Plant versus individual systems)
- **Offer** alternative solutions (square footage needs per function, adjacenct solutions, etc.)
- **Verify** if the budget is adequate for the developed program.

The benefits are tremendous. Any changes to the program at this stage have very little impact on the schedule or redesign costs. The VM process produces the best results when applied by a multi-disciplined team with experience and expertise relative to the type of project studied.

VM is embraced by a global spectrum of businesses and industries: building designers and contractors; automobile manufacturers; chemical processors; pharmaceutical companies; etc. Benefits realised by those companies using VM far exceeds the investment. **Savings in time, cost and quality contribute to improving an organisations competitive position**.

Conclusion

In the final analysis, Value Engineering is not only beneficial, but essential because:

- The functionality of the project is often improved as well as producing tremendous savings on both initial and Life-Cycle cost.
- A ''second look'' at the design produced by the architect and engineers gives the assurance that all reasonable alternatives have been explored.
- Cost estimates and scope statements are checked thoroughly, ensuring that nothing has been omitted or underestimated.
- It ensures that the best value will be obtained over the life of the building.

The United Kingdom Water Treatment Association (UKWTA)

The United Kingdom Water Treatment Association (UKWTA) is the national trade association of companies involved in the sale and use of point-of entry/point-of-use water treatment chemicals and equipment in the UK. Its principal role is to establish the facts about the different types of water treatment products available and to advise industry, government and the public about the genuine performance benefits delivered.

By bringing together suppliers of products with end users, the Association seeks to develop best practice and produce information that will assist in product selection and information.

The Domestic Water Treatment Association (DWTA)

The Domestic Water Treatment Association (DWTA) is an industry backed organisation, dedicted to promoting product and installation quality standards for the chemical water treatment sector. The DWTA works with the heating industry, Government and consumer groups to ensure chemical water treatment contributes to improving the overall performance of heating systems.

The aim of the DWTA is to establish chemical water treatment as best practice for heating systems. Domestic Water Treatment plays a crucial role in maintaining the efficiency and efficacy of central heating systems to benefit the customer.

Water for Business

Essential products to save money

Concerns over the quality of water in the business circle has dramatically increased the demand for various types of treatment. Your water will normally contain chlorine and varying amounts of dissolved minerals including Calcium (limescale), Magnesium, Sodium, Chlorides and Sulphates. It is also not uncommon to find traces of Iron, Manganese, Copper, Aluminium, Nitrates, Insecticides and Herbicides also.

Within industry, water related problems accounts for **millions of pounds spent on down time and maintenance**. However, problems associated with poor water quality can be rectified by installing equipment to help **preserve and improve** the life of equipment such as commercial boilers and plant machinery.

Calmag's money-saving solutions for limescale prevention

Water Hardness Protection and pre-treatment for:

- All hot and cold water applications other than potable water
- Cooling Towers
- Steam Boilers
- Heat Exchangers
- Steam Generators
- Hot Water Heaters
- Electric Showers
- Combi Boilers
- Immersion Heaters
- Dishwashers
- Washing Machines
- And all Water Heating appliances.

Typical Users

- Hospitals
- Laundries
- Cooling Towers
- Schools and Colleges
- Hotels
- Commercial Kitchens
- Manufacturing Plants
- Theatres
- Clinics
- Offices
- Sports and Leisure Facilities
- Restaurants
- Steam Boilers.

Benefits

- Permanently removes the hardness minerals that cause scale and scum
- Low maintenance
- Whole system and single appliance protection
- Helps reduce water heating costs
- Helps reduce the cost of soaps and detergents
- Fully automatic in operation
- Sizes to suit most appliances
- Proven technology.

Installation Notes:

Sizing of water softeners will depend on a number of factors:

• Water hardness • Flow rate • Daily water consumption • Pressure • System design

APPLIANCE/SYSTEM	RECOMMENDED WATER TREATMENT PRODUCT
Dishwasher/Glasswasher	Water Softener if over 80-90 ppm
Steamer/Bain Marie	Water Softener if over 50-60 ppm.
Combination Oven	Water Softener or Calcium Treatment Unit if over 50 ppm.
Vending Machines/Ice Maker	Scale Inhibitor, filter with resin cartridge or/and activated carbon cartridge depending on hardness level and whether there is a requirement to improve taste of water.
Tea Boilers	Point of use Electronic Scale Inhibitor or Calcium Treatment Unit if water hardness is over 80 ppm.
Drinking Water Outlets	Possibly Water Filters for vending machines or drinking water fountains.
Water Chiller/Cooler	Mains fed coolers preferred for safe chlorinated water (rather than bottled water) with filtration and Ultra Violet water disinfection if required.
Laundries/Washing Machines	Water Softener if over 90-120 ppm especially if high levels of water are used.
Sluices and Bedpan washers	Water Softener if over 90-120 ppm especially if high levels of hot water are used.
Autoclaves and Sterilisation Equipment	Water Softener if over 50 ppm.
Instrument washers	Water Softener if over 80-90 ppm.
Endoscopy	Endoscope washers require purified water - softening, filtration below 1 micron or reverse osmosis and possibly Ultra Violet Treatment.
Dialysis	Require purified water usually reverse osmosis possibly with additional Ultra Violet Treatment.
Bathrooms/Sanitary Fittings and Urinals	Scale control recommended if hardness is over 100-120 ppm, Scale Inhibitor or Water Softener.
Calorifiers/ Direct Fired Gas Water Heaters	Water Softener or Scale Inhibitor required if over 120-140 ppm.
Plate Heat Exchangers	Water Softener or Scale Inhibitor required if over 80-100 ppm.
Small Point of Use Water Heaters, Electric Showers and Small Hot Water Cylinders	In-Line Scale Inhibitor on cold feed to appliance.
Air Conditioning and Cooling Towers	Water Softening if water hardness above 100 ppm or as directed by manufacturer.
Steam Boilers	Water Softening if over 20 ppm.
Electrode Boilers (Vapac type) Steam Humidifiers (Calomax)	Water Softening or Scale Inhibitors if over 100 ppm ~ refer to manufacturers recommendations.
Ambient Temperature High Pressure Mist Type Humidifiers	Water Filtration and Ultra Violet Treatment, sometimes also water softening.

Water Softeners

Requirements for industrial & commercial use

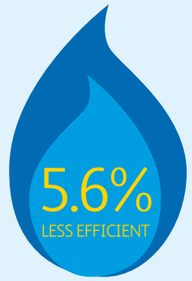
A water softener **reduces the dissolved calcium**, magnesium and, to some degree, manganese and ferrous iron ion concentration in hard water. These "hardness ions" cause **three major kinds of undesired effects.**

Most visibly, metal ions react with soaps and calcium-sensitive detergents, hindering their ability to lather and forming a precipitate - the familiar "bathtub ring". Presence of "hardness ions" also inhibits the cleaning effect of detergent formulations.

Second, calcium and magnesium carbonates tend to precipitate out as hard deposits on the surfaces of pipes and heat exchanger surfaces. This is principally caused by thermal decomposition of bi-carbonate ions but also happens, to some extent, even in the absence of such ions. The resulting build-up of scale can restrict water flow in pipes. In boilers, the deposits act as an insulation that impairs the flow of heat into water, reducing the heating efficiency and allowing the metal boiler components to overheat. In a pressurized system, this can lead to failure of the boiler.

Third, the presence of ions in an electrolyte, in this case hard water, can also lead to galvanic corrosion, in which one metal will preferentially corrode when in contact with another type of metal, when both are in contact with an electrolyte. However the sodium (or potassium) ions released during conventional water softening are much more electrolytically active than the calcium or magnesium ions that they replace and galvanic corrosion would be expected to be substantially increased by water softening and not decreased. Similarly if any lead plumbing is in use, softened water is likely to be substantially more plumbo-solvent than hard water.

Scale wastes both energy and money.
Just **one eight of an inch** of limescale reduces heating efficiency by **25%**.*



9 grams of scale reduces boiler efficiency by **5.6%**.*
Fuel consumption and CO2 emissions increase by that amount too.

The Problems

The need to reduce the hardness of water is the most common form of water treatment. Hard water is created when naturally soft rain water percolates through subterranean rock strata and dissolves many solids including, in particular, Calcium and Magnesium. There are many areas, therefore, where the supply water contains a significant level of these salts. It is called hard water because of the hard deposits created when this type of water is used in many applications.

The deposits are often called scale. However it is actually more like concrete, forming a thick coating on heat exchange elements and the insides of boilers, tanks and pipes. In addition, the hard minerals left in solution significantly detract from the performance of soaps and detergents which then have to be used in greater quantities to achieve the necessary cleaning performance. This not only adds to the level of deposits occurring inside systems and equipment, it also adds significantly to the chemical waste discharged into our sewer systems.

The other main problem created by scale build up is the reduction in efficiency of all heat exchange systems due to the insulating effect of the deposit. This will increase the energy costs and, in addition, can create overheating on the surfaces of the heat source, thereby causing premature failure.

The Solutions

A cost effective way to solve these problems is to remove the dissolved hard mineral salts from the water, exchanging them with "soft salts" which are more soluble at high temperatures and therefore do not form hard scale. This is achieved by using one of our wide range of fully automatic water softeners.

They work by a process known as ion exchange. The hard water passes through a high quality exchange resin column inside a pressure vessel. The resin removes the Calcium and Magnesium ions from solution and exchanges them for Sodium ions. When the resin is about to become exhausted the softener commences the regeneration phase which is initiated by timer or volume control. The actual regeneration is achieved when the softener draws a solution of common salt water (brine) through the column of resin which displaces the captured Calcium and Magnesium ions and replaces them with the Sodium ions in the brine.

Throughout the regeneration period, the unwanted ions and the subsequent rinse water is flushed to drain and does not enter the service line. The regeneration period takes between 60 and 120 minutes depending upon the size of the softener and can be repeated as necessary over many years without significant loss of performance.

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Water Softeners

Simplex or Duplex?

Choosing the correct type of **water softener depends on the applications** for which it will be used. In situations where operation is not continuous or where a good amount of water storage exists, Simplex units are best.

CalSimplex softeners

Simplex or single column water softeners are best suited to steady demand applications up to moderate capacities, for the domestic and commercial markets. Industrial and other large demand systems often use duplex softening which is described over the page.

Regeneration is programmed to occur during low water usage periods, typically 2am. However instantaneous regeneration systems are available. During the regeneration cycle, simplex systems will normally bypass hard water to service to maintain supply unless otherwise specified.

Generally, simplex softeners will need to be sized to give at least one day's supply of softened water output before regeneration. This can be worked out using the flow rate information and capacity table that follow in the brochure.

These types of softeners are very reliable and give many years of good service with minimal maintenance. They are therefore extremely cost effective.

Simplex softeners can be specified with a number of different valve options depending on system variables and application.

Case Study

Solutions for business using the Calmag water softener

Customer

Oxford Gardens
Kensington, London

Schmidt & Sons

Installation

CalSimplex 250 Water Softener

Application

Residential Property

Problem

To provide softened water to a large 7 bed residential property including swimming pool area as there had been a continuing problem of limescale building up on appliances and pipework.

Resolution

Mendick Waring Consultants specified a Calmag CalSimplex 250 Water Softener which was installed by Schmidt and Son's Heating Engineers via a national plumbers merchant chain.

The installation of a Calmag water softener resolved the problem and provided long term cost savings and benefits associated with softened water.

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Water Softeners

Simplex or Duplex?

Duplex softeners are better for applications with **variable or inconsistent water usage** or for 24 hour operations. Duplex softeners are also meter controlled, so offer optimum plant efficiency compared to a simplex delayed regen unit.

CalDuplex softeners

Duplex softeners function similarly to simplex units, except that they consist of two resin vessels where one is in service and the second is on standby. The flow of water to service is metered and when the first vessel reaches exhaustion the control valve automatically switches the service flow to the second vessel and then regenerates the exhausted first vessel. It is then put on standby until required again for service.

In this way a duplex softener is capable of giving a continuous 24 hour supply of softened water. Duplex softeners are therefore ideal for sites with large variations in water demand or for applications where a continuous and uninterrupted supply of soft water is essential. It is normal practice to size a duplex unit on the basis that each vessel regenerates once each day. Due to the ability to change vessels only as required, it is possible to minimize salt usage.

CalDuplex softeners can be specified with a number of different valve options depending on system variables and applications. On larger systems there may be two complete valves with a separate control box.

Case Study

Solutions for business using the Calmag water softener

Customer

Satellite Dialysis Unit, Gloucestershire Hospitals NHS Foundation Trust.

Imec Solutions

Installation

CalDuplex 140 Water Softener

Application

Research and Development Laboratories

Problem

Requirement of softened water to protection of heating system and aid in the cleaning process required within the medical aspect of this development.

Resolution

Through close communication with ESDP Ltd Calmag specified an appropriate CalDuplex 140 water softener based on flow requirements to provide via Imec Solutions installation and solution to the clients requirements.

The installation of a Calmag water softener resolved the problem and provided the long term cost savings and benefits associated with softened water.

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Getting it right

Selecting the right water softener

At Calmag, we are experts at ensuring that you **choose exactly the right unit** for your application. In order to understand the criteria that are relevant to your application, we **complete a site survey form**. Using this, we can then make a recommendation taking into consideration the following criteria:

Plant Selection

- Softener sizing is dictated by the water flow per hour (max & std), total daily usage and water hardness.
- Softener must be capable of handling the volume of water required between regenerations, and the valve must be capable of handling the maximum flow rate.
- Ideally the maximum flow rate should be no more than 40 times the resin bed volume of the softener (in litres per hour). So the maximum flow rate of a 100 litre softener should not be more than 40 x100 litres per hour.
- The flow rate can intermittently rise above this up to an absolute maximum of 80 times the bed volume. Prolonged use at this rate will reduce the overall capacity and softness of the water.
- In most parts of the UK however, a softener sized on the 40 bed volumes rule will have too small an exchange capacity between regenerations (or just over 4 hours at 4000 litres per hour).
- Hence, use the total exchange capacity chart provided to size the unit. In this instance a 750 litre simplex softener would be needed to give 24 hours of water!.

Site Survey Information (example)

1. What is the pipe size? ..... *litres*
2. What volume of softened water is required each day? .....
3. How many days in your working week? .....
4. How many hours in your working day? .....
5. What is the incoming water pressure? .....
6. Are there any peak demands during the day? ☐ YES ☐ NO
   If yes, please give details .....
   ..... *litres/per min*
7. What is the maximum flow rate? ..... *litres/per min*
8. What is the minimum flow rate? .....
9. Type of application. *ie Feeding kitchen in nursing home* .....
   .....
10. Is a continuous softened water supply required: ☐ If yes - DUPLEX ☐ If no - SIMPLEX
11. Is there a drain near to where the equipment is to be installed? ☐ YES ☐ NO
12. Is there an appropriate power supply? ☐ YES ☐ NO
13. Are there any space constraints? .....
    If yes, please give details .....
    .....
14. Is there an existing plant? ☐ YES ☐ NO
    Does this need to be removed ☐ YES ☐ NO
15. Are there any limitations to site access? ☐ YES ☐ NO
    If yes, please give details .....
    .....
16. What is going to be down service of the softener?

	QTY	LITRES	SUB TOTAL
BATH		x 110	
SHOWER		x 40	
WASH BASIN		x 5	
DISHWASHER		x 150	
WC		x 10	
SINK		x 15	
WASHING MACHINE		x 150	
OTHER EQUIPMENT			
		TOTAL VOLUME	

17. What is going to be up service of the softener?
    .....
    .....
    .....

Average water requirements per day individual is 200 litres!

Rough guide calculation if little or no information given:
Number of people in house x 200 ÷ 4
(average water used in 4hr period)
This will give the capacity required in litres/hour
(m3/hr - conversion factor ÷ 1000)

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CalSimplex
Water softeners

Simplex or single column water softeners are best suited to **steady demand applications** up to moderate capacities, for the domestic and commercial markets.

Scale wastes both energy and money.
Just **one eight of an inch** of limescale reduces heating efficiency by **25%**.*

9 grams of scale reduces boiler efficiency by **5.6%**.*
Fuel consumption and CO2 emissions increase by that amount too.

Valve Specification

Softener control valves are sized and specified according to the flow rate of the application. The inlet and outlet connection ports generally range between 3/4" and 3" for standard control valves with flow rates up to 50m3 per hour. Steady demand applications are suitable for either timer control or volume control. Variable demand systems are better served by using volume control via in-built metering.

Specifying & Sizing

Fundamentally, the size of a water softener is governed by the amount of exchange capacity that is required by the application. The capacity of ion exchange resin is a function of the volume of the water that passes through it, the hardness of the incoming water, and the regeneration brine setting.

On the chart below we show the capacity of each size of softener assuming the feed water has a hardness of 300mg/litre (21 degrees Clark) and a brining rate of 140g NaCl per litre of resin. The volume can be adjusted on a pro-rata rate for different levels of hardness. Another important criteria to consider is the continuous flow rate required. This affects the size of valve that can be used and sometimes the size of the resin vessel, since the water needs to have a minimum contact time with the resin to achieve full softening. Short time higher peak flows can be tolerated, but this sometimes results in a low level of hardness passing through into service and can increase the pressure drop across the softener. At design flow rates you can expect a pressure drop of between 10-15psi. Usually, all automatic water softeners need a minimum supply of 25psi and can operate up to at least 100psi.

All softeners require an electrical supply of 240 Volts and come with 24 Volt transformers.

Consumables & Maintenance

Automatic water softeners need a supply of appropriate salt to make the required brine for regeneration purposes. Salt is most commonly supplied in 25kg bags of either granular or pellet type. This type of salt is manufactured specifically for water softening purposes and has a very high purity level. Sometimes on very large systems P.V.D. salt can be supplied in bulk. Other types of salt should not be used due to the levels of impurity or additives. The only attention required from the user is to check on a regular basis that the level of salt in the brine tank is kept topped up to ensure a saturated brine solution is available for regeneration.

Although softeners are very reliable, as with any other piece of essential plant, routine servicing is strongly recommended. This is generally straight forward and will ensure many years of reliable service from the plant.

Valve Control Units (VCU)

Timer Control

Some water softeners are based on a reliable time clock principal. This type of valve control unit (VCU) is set on a timed basis for regeneration intervals between 1-12 days. These units are factory set to regenerate at 2 am, when water usage is historically low. Simple pins are depressed for setting the regeneration intervals. A manual override which enables regeneration at any time is also provided.

Volumetric Control

Water softeners with volumetric VCU, measure the volume of water passing through the water softener and will regenerate at pre-programmed capacities. Regeneration can take place when the full capacity has been used, or maybe delayed to a time when there will be a little or no water usage.

CalSimplex Water Softener Sizing Table

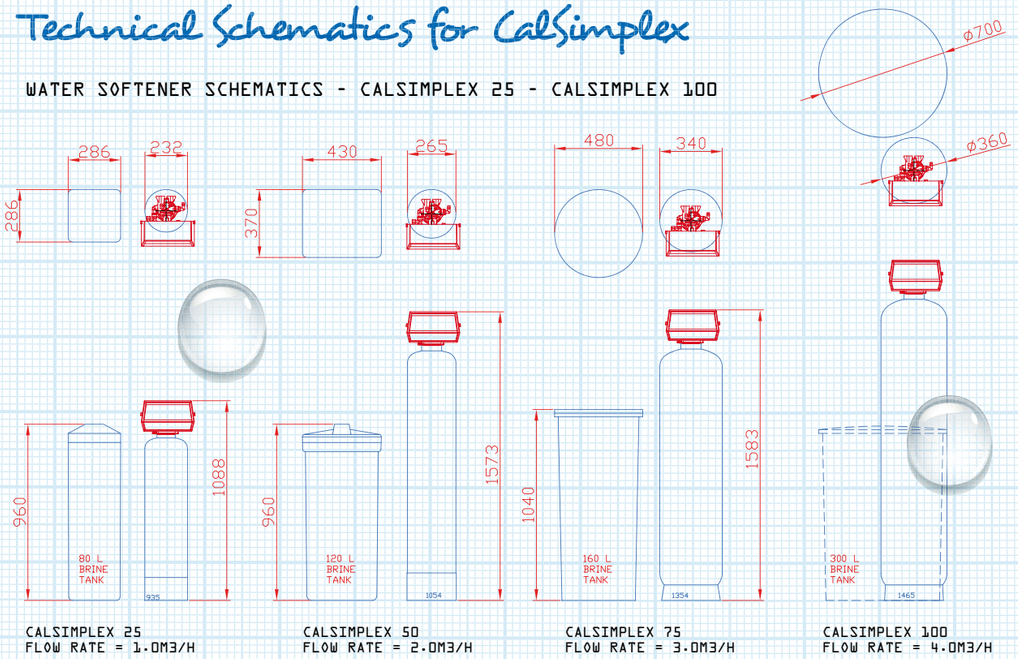
CalSimplex		25	50	75	100	150	250	350	500	750	1000	1250	1500 (multi valve)	2000 (multi valve)
Service Flow (m3/hr) Valve Size	**1"**	1.0	2.0	3.0	4.0	6.0								
	1.5"						10	11.6						
	2"							14.0	20	24				
	3"										40	50	60	80
Vessel Type		935	1054	1354	1465	1665	2162	2472	3072	3672	4272	4872	6367	6386
Brine Tank Volume (Litres)		80	120	160	160	300	500	500	750	1000	1000	1000	1500 (measuring tank)	1500 (measuring tank)
Salt Used Per Regen (Kg)		3.5	7.0	10.50	14.0	21.0	35.0	49.0	70.0	105	140	175	210	280

CalSimplex Capacity Table

CalSimplex	25	50	75	100	150	250	350	500	750	1000	1250	1500	2000
Capacity at 100ppm (m3)	12.5	25.0	37.50	50.00	75.00	125.00	175.00	250.00	375.00	500.00	625.00	750.00	1000.00
Capacity at 150ppm (m3)	8.37	16.75	25.125	33.50	50.25	83.75	117.25	167.50	251.25	335.00	418.75	502.50	670.00
Capacity at 200ppm (m3)	6.25	12.50	18.750	25.00	37.50	62.50	87.50	125.00	187.50	250.00	312.50	375.00	500.00
Capacity at 250ppm (m3)	5.00	10.0	15.00	20.00	30.00	50.00	70.00	100.00	150.00	200.00	250.00	300.00	400.00
Capacity at 300ppm (m3)	4.175	8.30	12.525	16.70	25.05	41.75	58.45	83.50	125.25	167.00	208.75	250.50	334.00
Capacity at 350ppm (m3)	3.575	7.10	10.75	14.30	21.50	35.75	50.05	71.50	107.25	143.00	178.75	214.50	286.00
Capacity at 400ppm (m3)	3.125	6.25	9.375	12.50	18.75	31.25	43.75	62.50	93.75	1250.00	156.25	187.50	250.00

Technical Schematics for CalSimplex

WATER SOFTENER SCHEMATICS - CALSIMPLEX 25 - CALSIMPLEX 100



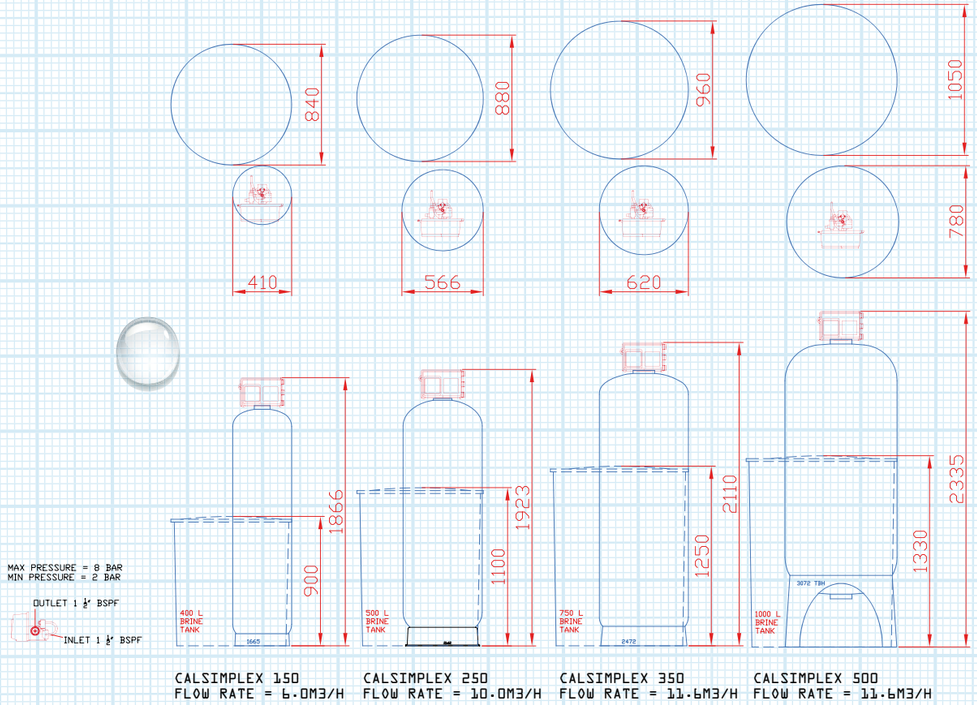
CALSIMPLEX 25
FLOW RATE = 1.0M3/H

CALSIMPLEX 50
FLOW RATE = 2.0M3/H

CALSIMPLEX 75
FLOW RATE = 3.0M3/H

CALSIMPLEX 100
FLOW RATE = 4.0M3/H

WATER SOFTENER SCHEMATICS - CALSIMPLEX 25 - CALSIMPLEX 100



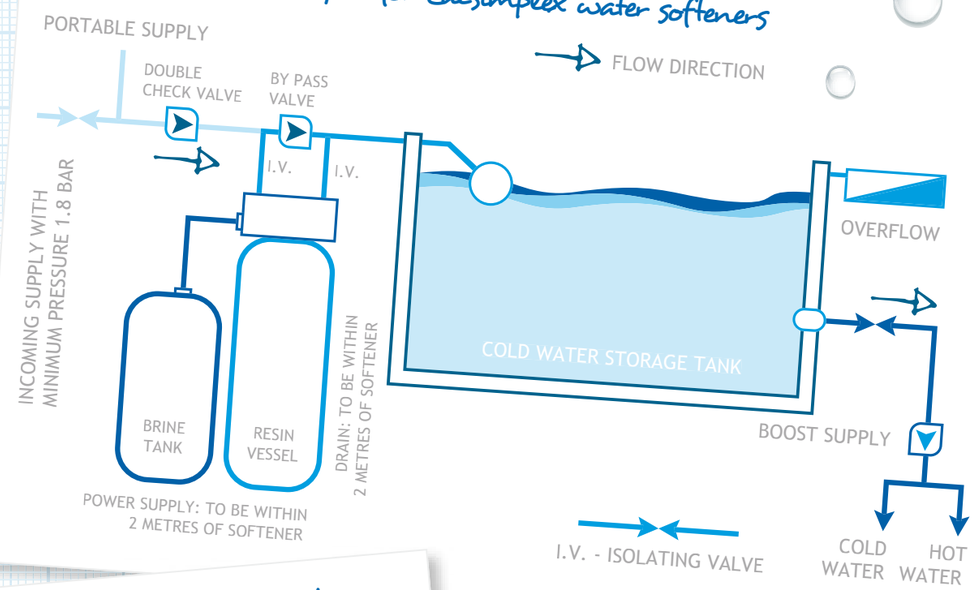
CALSIMPLEX 150
FLOW RATE = 6.0M3/H

CALSIMPLEX 250
FLOW RATE = 10.0M3/H

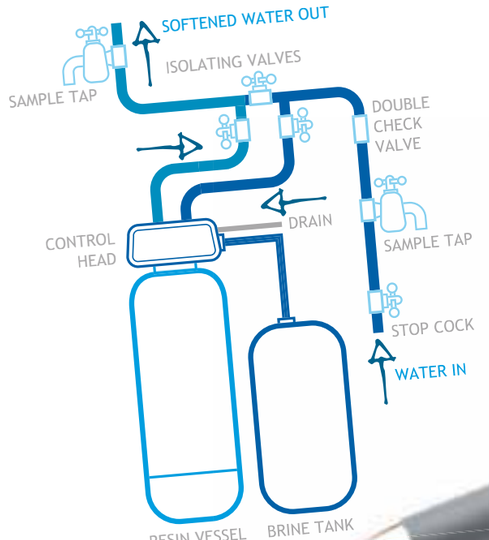
CALSIMPLEX 350
FLOW RATE = 11.6M3/H

CALSIMPLEX 500
FLOW RATE = 11.6M3/H

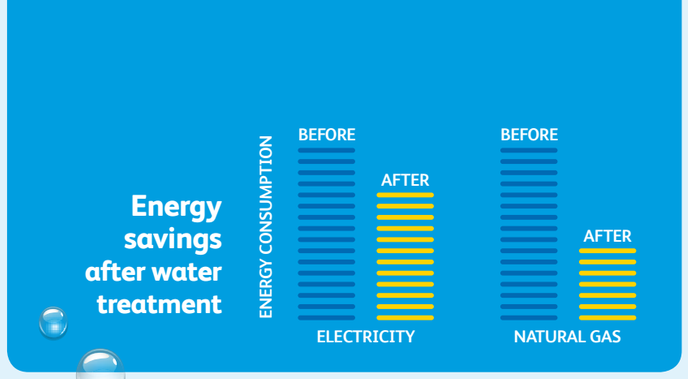
Typical Installation Diagrams Layout for CalSimplex water softeners



CalSimplex: Softener Installation



CalDuplex
Water softeners



Duplex softeners are better for applications with variable or inconsistent water usage or for 24 hour operations. Duplex softeners are also meter controlled, so **offer optimum plant efficiency** compared to a simplex delayed regen unit.

Valve Specification

Softener control valves are sized and specified according to the flow rate of the application. The inlet and outlet connection ports generally range between 1-3 inches and in standard configurations can achieve flow rates of up to 50m3 per hour.

Specifying & Sizing

The size of any water softener is governed by the amount of exchange capacity that is required for the application. The capacity of ion exchange resin is a function of the volume of the water that passes through it, the hardness of the incoming water, and the regeneration brine setting. On the chart overleaf we show the capacity of each size of softener assuming the feed water has a hardness of 300mg/litre (21 degrees Clarke) and a brining rate of 140g NaCl per litre of resin. It is possible periodically to allow for higher capacities than shown (up to two regenerations per column per day) to accommodate exceptional demand periods. The plant should not be sized in this way for routine use as there would be a danger of a loss of quality of the softened water. The figures shown assume the feed water has a hardness of 300mg/litre (21 degrees Clarke). These volumes can be adjusted on a pro-rata basis for different levels of hardness.

Another important criteria to consider is the continuous flow rate required. This affects the size of the valve that can be used and the size of the resin column, since the water needs to have a minimum contact time with the resin to achieve full softening. Short term higher peak flows can be tolerated, but this will sometimes result in a low level of hardness passing through to service and increase the pressure drop across the softener. At the design flow rates shown there would be a pressure drop of between 10-15 psi across the plant. All automatic water softeners need a minimum supply water pressure of 25 psi. In the case of duplex units, this pressure must be available at the design flow rate so that there is sufficient pressure to allow a regeneration to occur whilst the demand flow is passing through the service column. They are designed to operate up to at least 100 psi.

All softeners require an electrical supply of 240 Volts and come with 24 Volt transformers.

Consumables & Maintenance

Automatic water softeners need a supply of appropriate salt to make the required brine for regeneration purposes. Salt is most commonly supplied in 25kg bags of either granular or pellet type. This type of salt is manufactured specifically for water softening purposes and has a very high purity level. Sometimes on very large systems P.V.D. salt can be supplied in bulk. Other types of salt should not be used due to the levels of impurity or additives. The only attention required from the user is to check on a regular basis that the level of salt in the brine tank is kept topped up to ensure a saturated brine solution is available for regeneration.

Although softeners are very reliable, as with any other piece of essential plant, routine servicing is strongly recommended. This is generally straight forward and will ensure many years of reliable service from the plant.

Duplex - These are available with single valve head complete with common manifold or twin valved head VCU - dependent on size of unit.

Triplex - versions are also available whereby 3 vessels are used for high capacity applications and potential space constraints.

Service

As with any water softener regular servicing is essential and this can be undertaken by our team of dedicated service engineers. Our service engineers are fully trained and employed directly by the company.

Sizing, Installation and Consultation

The sizing of a water softener will depend on a number of variable factors including hardness of the water, volumes of water used, flow rate required and type of application. Our technical sales team are available to help you with all aspects of design, from the sizing of the unit to the best and most practical location. They can also provide invaluable help in selecting the most appropriate ancillaries and accessories to ensure your finished installation is both efficient and effective.

Assembly and Commissioning

We will be pleased to provide details of assembly and commissioning services, developed to ensure your softener is set up correctly and working to its optimum performance. All large capacity water softeners with 1.5" VCU's are normally assembled on site by our fully trained engineers (subject to terms and conditions). Larger models usually require expansion joints and anti-hammer check valves, which can also be supplied.

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CalDuplex
continued...

On the chart below we show the **capacity of each size of softener** assuming the feed water has a hardness of 300mg/litre (21 degrees Clark) and a brining rate of 140g NaCl per litre of resin.

CalDuplex Water Softener Sizing Table

CalDuplex		25	50	75	100	150	250	350	500	750	1000	1250	1500 (multi valve)	2000 (multi valve)
Service Flow (m3/hr) Valve Size	**1”**	1.0	2.0	3.0	4.0	6.0								
	1.5”						10	11.6						
	2”							14.0	20	24				
	3”										40	50	60	80
Vessel Type		935	1054	1354	1465	1665	2162	2472	3072	3672	4272	4872	6367	6386
Brine Tank Volume (Litres)		120	160	300	300	500	750	1000	1000	1000	1500	1750	1500 (measuring tank)	1500 (measuring tank)
Salt Used Per Regen (Kg)		3.5	7.0	10.50	14.0	21.0	35.0	49.0	70.0	105	140	175	210	280

CalDuplex Capacity Table

CalDuplex	25	50	75	100	150	250	350	500	750	1000	1250	1500	2000
Capacity at 100ppm (m3)	12.5	25.0	37.50	50.00	75.00	125.00	175.00	250.00	375.00	500.00	625.00	750.00	1000.00
Capacity at 150ppm (m3)	8.37	16.75	25.125	33.50	50.25	83.75	117.25	167.50	251.25	335.00	418.75	502.50	670.00
Capacity at 200ppm (m3)	6.25	12.50	18.750	25.00	37.50	62.50	87.50	125.00	187.50	250.00	312.50	375.00	500.00
Capacity at 250ppm (m3)	5.00	10.0	15.00	20.00	30.00	50.00	70.00	100.00	150.00	200.00	250.00	300.00	400.00
Capacity at 300ppm (m3)	4.175	8.30	12.525	16.70	25.05	41.75	58.45	83.50	125.25	167.00	208.75	250.50	334.00
Capacity at 350ppm (m3)	3.575	7.10	10.75	14.30	21.50	35.75	50.05	71.50	107.25	143.00	178.75	214.50	286.00
Capacity at 400ppm (m3)	3.125	6.25	9.375	12.50	18.75	31.25	43.75	62.50	93.75	1250.00	156.25	187.50	250.00

Case Study

Solutions for business using the Calmag water softener

Customer
Tate Britain Art Gallery
Millbank, London

Piggott & Whitfield

Installation
CalDuplex 120 Water Softener

Application
Art Gallery

With the creation of the new gallery at Bankside, the gallery at Millbank was able to return to its original function as the national gallery of British art. In preparation for this, a major Centenary Development project was completed, providing the site with ten new galleries, five refurbished galleries and a dramatic new entrance on Atterburt Street.

In 2000, the four galleries were re-branded with the opening of the new gallery at Bankside: Tate Britain, Tate Modern, Tate Liverpool and Tate St Ives.

A number of building projects are now underway to further develop and expand the galleries.

Problem
Due to an extensive expansion and restoration project at the gallery a new water softener was required to provide softened water throughout the building.

Resolution
Due to the specified product no longer being applicable Piggott & Whitfield contractors contacted Calmag to provide a compatible alternative to resolve the issue.

The installation of a Calmag water softener resolved the problem and provided the long term cost savings and benefits associated with softened water.

Customer
Surrey Satellite Technology Ltd
Guildford, Surrey

Working Environments

Installation
CalDuplex 14 Water Softener and Reverse Osmosis Unit

Application
Research and Development Laboratories

The 3,700sqm (40,000 sqft) building is co-located with SSTL’s headquarters building in Guildford, UK and will house approximately 40 permanent staff and anything up to 100 further project specific staff from across the company at peak test and integration periods. An integral part of the new facility are the world-class test halls that provide two 125 cubic metre walk-in thermal chambers, a seismic test platform, 15,000kg & 3,200kg monorail cranes, 10,000kg & 8,000kg gantry cranes, and reinforced floors, providing the greatest possible flexibility for integration and testing of both small and larger spacecraft.

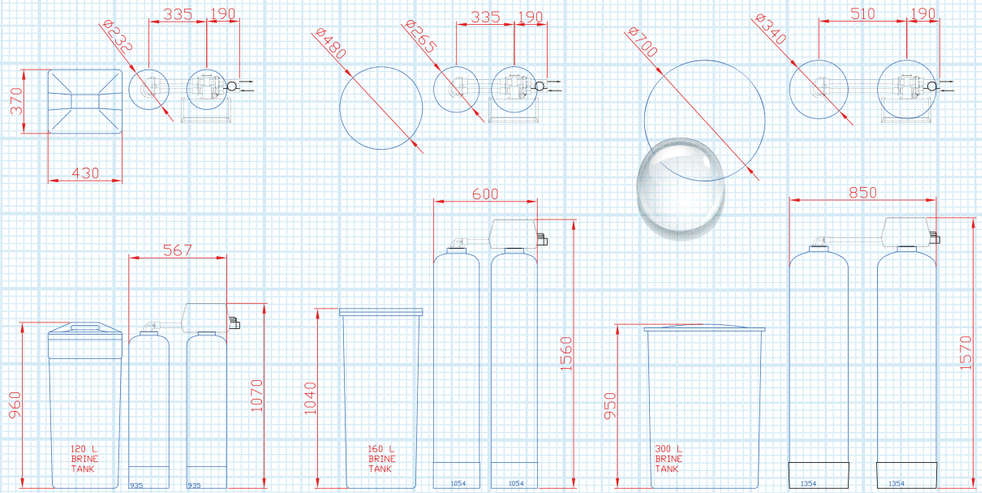
Problem
In order to cool and prevent limescale formation on 4 air conditioning humidifiers Milieu Consultants specified a Duplex Water Softener to provide 24 hour constantly softened water.

Resolution
Via BSS Industrial Projects Team in Southhampton Working Environments installed Calmag’s CalDuplex 14 unit to provide the humidified air and limescale protection. A Reverse Osmosis Unit has also been installed as part of the water quality requirements.

The installation of a Calmag water softener and Calmag Reverse Osmosis Unit resolved the problem and provided the long term cost savings and benefits associated for the application.

Technical Schematics for CalDuplex

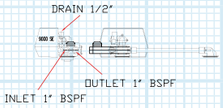
WATER SOFTENER SCHEMATICS - CALDUPLEX 25 - CALDUPLEX 75



CALDUPLEX 25
FLOW RATE = 1.0M3/H
CAPACITY = 4.18 M3
VESSELS = 9 X 35 (ENPRESS)
BRINE TANK = 120L

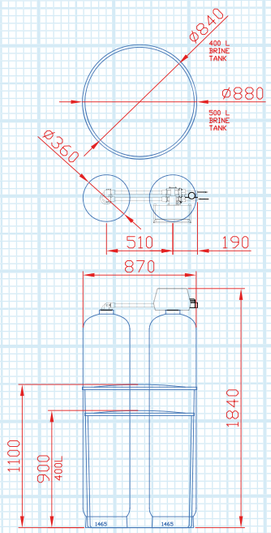
CALDUPLEX 50
FLOW RATE = 2.0M3/H
CAPACITY = 8.35 M3
VESSELS = 10 X 54 (ENPRESS)
BRINE TANK = 160L

CALDUPLEX 75
FLOW RATE = 3.0M3/H
CAPACITY = 12.53 M3
VESSELS = 13 X 54 (ENPRESS)
BRINE TANK = 300L

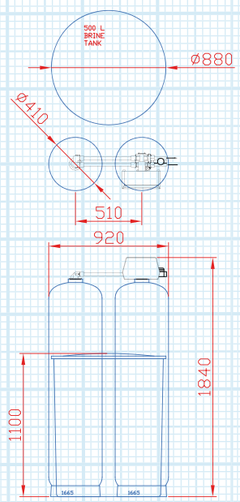


VAVLE DETAILS -
PRESSURE = MIN 2 BAR, MAX 8 BAR
MAX FLOW = 4.8 M3/H
CONNECTIONS (IN/OUT) = 1" BSPF
HOSES = 1" S/S BRAIDED (Where apt)
METER ASSY =3/4" (1" Where apt)
BRINE LINE = 3/8"
DRAIN LINE 1/2"

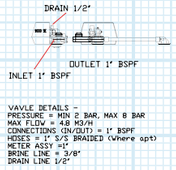
WATER SOFTENER SCHEMATICS - CALDUPLEX 100 - CALDUPLEX 150



CALDUPLEX 100
FLOW RATE = 4.0M3/H
CAPACITY = 16.7 M3
VESSELS = 14 X 65 (WC)
BRINE TANK = 400L

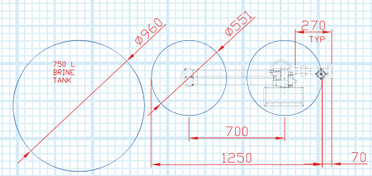


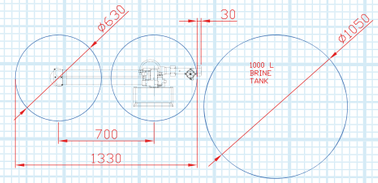
CALDUPLEX 150
FLOW RATE = 6.0M3/H
CAPACITY = 25.05 M3
VESSELS = 16 X 65 (WC)
BRINE TANK = 500L



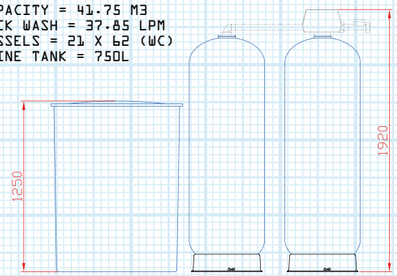
VAVLE DETAILS -
PRESSURE = MIN 2 BAR, MAX 8 BAR
MAX FLOW = 4.8 M3/H
CONNECTIONS (IN/OUT) = 1" BSPF
HOSES = 1" S/S BRAIDED (Where apt)
METER ASSY =1"
BRINE LINE = 3/8"
DRAIN LINE 1/2"

WATER SOFTENER SCHEMATICS - CALDUPLEX 250 - CALDUPLEX 350

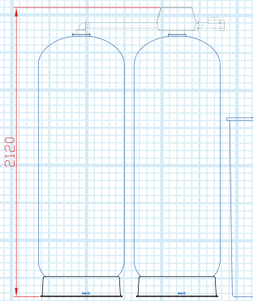




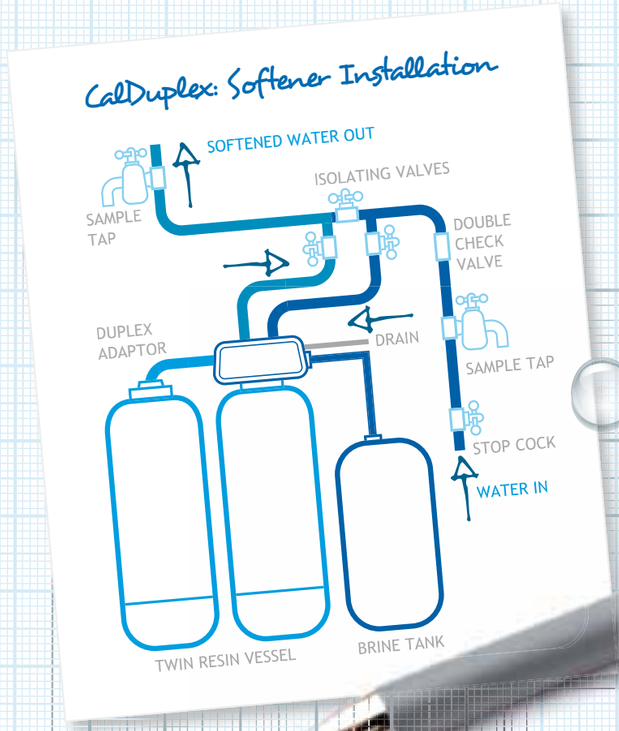
CALDUPLEX 250
FLOW RATE = 10.0M3/H
CAPACITY = 41.75 M3
BACK WASH = 37.85 LPM
VESSELS = 21 X 62 (WC)
BRINE TANK = 750L



CALDUPLEX 350
FLOW RATE = 11.6M3/H
CAPACITY = 58.45 M3
BACK WASH = 56.8 LPM
VESSELS = 24 X 72 (WC)
BRINE TANK = 1000L



FLECK 9500 VAVLE DETAILS -
PRESSURE = MIN 2 BAR, MAX 8 BAR
MAX FLOW = 96 M3/H
CONNECTIONS (IN/OUT) = 1 1/2" BSPF
HOSES = 1 1/2" S/S BRAIDED
BRINE LINE = 1/2"
DRAIN LINE 1"



Maintenance Tips

For Calmag Water Softeners

Calmag water softeners are **simple to install** and are engineered for trouble-free working over a long lifecycle, with the **minimum of maintenance**. The following tips will help to ensure that your Calmag water softener operates at **maximum efficiency**.

Normal operation

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

Refilling with salt

Since salt is used in the regeneration process, the level of salt in the brine tank will fall after each regeneration. It should not be allowed to fall below 75 mm above the bottom of the cabinet and should be refilled to the top with pellet salt or 3/4 filled with granular salt.

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

The additional regeneration is initiated manually.

Remove the timer cover and index the program wheel knob approximately 6mm clockwise until a loud click is heard. Regeneration will proceed automatically immediately. However due to the slow rotation of the program wheel and piston motors, it will be some minutes until regeneration water starts to pass to drain.

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. 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.

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 both columns the unit be regenerated again before being put into service.

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 compositions, 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. If variation greater than 5 % is found it will be necessary to check whether the settings for regeneration need changing.

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.

Weekly

Check the treated water hardness with a hardness 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.

Annually

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

For technical advice call **01535 210349** | For customer support call **01535 210320** | or visit **www.calmagltd.com**

Water Softener

Output calculations guide

Use the following guide to **calculate the size of water softener that you need** for your application. If you need any help or advice, please call our Technical Advice line listed below.

Output in cubic metres (hardness PPM CaC03)
Optimum Salt 140g/L

RESIN VOLUME LITRES	MAX CONT FLOW M3/H	MAX CONT FLOW LPM	100PPM 7 DEG CLK	150 PPM 10.5	200PPM 14.0	250PPM 17.5	300PPM 21	350PPM 25	400PPM 28	SALT lb	SALT Kg
4	0.16	2.67	2.000	1.340	1.000	0.800	0.668	0.572	0.500	1.28	0.56
6	0.24	4.00	3.000	2.010	1.500	1.200	1.002	0.858	0.750	1.92	0.84
7	0.28	4.67	3.500	2.345	1.750	1.400	1.169	1.001	0.875	2.24	0.98
10	0.40	6.67	5.000	3.350	2.500	2.000	1.670	1.430	1.250	3.20	1.40
14	0.56	9.33	7.000	4.690	3.500	2.800	2.338	2.002	1.750	4.48	1.96
15	0.60	10.00	7.500	5.025	3.750	3.000	2.505	2.145	1.875	4.80	2.10
20	0.80	13.33	10.000	6.700	5.000	4.000	3.340	2.860	2.500	6.40	2.80
25	1.00	16.67	12.500	8.375	6.250	5.000	4.175	3.575	3.125	8.00	3.50
30	1.20	20.00	15.000	10.050	7.500	6.000	5.010	4.290	3.750	9.60	4.20
40	1.60	26.67	20.000	13.400	10.000	8.000	6.680	5.720	5.000	12.80	5.60
50	2.00	33.33	25.000	16.750	12.500	10.000	8.350	7.150	6.250	16.00	7.00
60	2.40	40.00	30.000	20.10	15.000	12.000	10.020	8.580	7.500	19.20	8.40
75	3.00	50.00	37.500	25.125	18.750	15.000	12.525	10.725	9.375	24.00	10.50
80	3.20	53.33	40.000	26.800	20.000	16.000	13.360	11.440	10.000	25.60	11.20
100	4.00	66.67	50.000	33.500	25.000	20.000	16.700	14.300	12.500	32.00	14.00
120	4.80	80.00	60.000	40.200	30.000	24.000	20.040	17.160	15.000	38.40	16.80
140	5.60	93.33	70.000	46.900	35.000	28.000	23.380	20.020	17.500	44.80	19.60
200	8.00	133.33	100.000	67.000	50.000	40.000	33.400	28.600	25.000	64.00	28.00
250	10.00	166.67	125.000	83.750	62.500	50.000	41.750	35.750	31.250	80.00	35.00
300	12.00	200.00	150.000	100.500	75.000	60.000	50.100	42.900	37.500	96.00	42.00
350	14.00	233.33	175.00	117.250	87.500	70.000	58.450	50.050	43.750	112.00	49.00
400	16.00	266.67	200.000	134.000	100.000	80.000	66.800	57.200	50.000	128.00	56.00
450	18.00	300.00	225.000	150.750	112.500	90.000	75.150	64.350	56.250	144.00	63.00
500	20.00	333.33	250.000	167.500	125.000	100.000	83.500	71.500	62.500	160.00	70.00
750	30.00	500.00	375.000	251.250	187.500	150.000	125.250	107.250	93.750	240.00	105.00
1000	40.00	666.67	500.000	335.000	250.000	200.000	167.000	143.00	125.000	320.00	140.00
1250	50.00	833.33	625.000	418.750	312.500	250.000	208.750	178.750	156.250	400.00	175.00
1500	60.00	1000.00	750.000	502.500	375.000	300.000	250.500	214.500	187.500	480.00	210.00
2000	80.00	1333.33	1000.000	670.000	500.000	400.000	334.000	286.000	250.00	640.00	280.00

For technical advice call **01535 210349** | For customer support call **01535 210320** | or visit **www.calmagltd.com**

Calmag
Calming troubled waters

Guaranteed
confidence in water quality

Calmag's **fresh, innovative approach** to water quality has led to the development of the most extensive and effective range of water treatment solutions within the UK water treatment industry – our products are designed with the **needs of our customers** in mind – the merchant, installer and consumer. Calmag's philosophy is based on providing products and services to meet the real needs of all our customers – we don't simply produce what we think you should buy - Calmag have the **unique design** and production capabilities to produce what you want - when you want it!

QUALITY ASSURED AND TESTED

Beware of imitations!

There have been a number of instances when customers have been under the impression that they have bought a Calmag product but, in reality, have been supplied with an alternative and inferior product that fails to match the industry-leading performance and aesthetic appeal of ours. So we strongly advise customers to **ask for our product by name**. Other products may seem to offer similar qualities, but if it isn't Calmag, it simply won't perform to our standards.

There are **two key ways to check** that you've purchased a genuine Calmag product: they carry the **WRAS approval** on scale inhibitors, and **BuildCert** and **ESTr** approvals on a range of chemical inhibitors.

Calmag is a member of and in partnership with:

DWTA Domestic Water Treatment Association · iphe Industrial Association · UK TA · SAVE International


Acid Neutralisers


Water Softeners


Water Filtration


Powerflushing

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* All figures are taken from various published figures

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