



No chemicals.
Simply chemistry.



Electrochemical &
Ion Exchange Water Treatment



With a focus on creating an environment where systems can operate at their optimum performance with a view to maintaining efficiency, reliability & reduced call outs & costs as a result of incorrect water treatment. eleXion presents a range of products which engineers the largest component of any heating or cooling system which is often neglected; **The water itself.**

The system water is the largest component of any wet system and much like the body, where the blood is critical for survival and pumped around by the heart, many similarities can be found in HVAC systems.



Our simple approach creates an environment where corrosion is kept to an absolute minimum by following these four key steps.

+ **Correct pH levels** – It is possible using a slightly alkaline environment for the metals within the system to build up their own natural oxide levels. Where inhibitor creates a false layer of protection, having a pH level between 8.2–10 allows metals to become passive and protected even in the presence of oxygen.

+ **Low conductivity** – It has long been known that having a high level of conductivity creates an environment where corrosion is accelerated. This is because of galvanic corrosion caused via transfer of electrons between different metals.

+ **Reduced Oxygen** – Removal of oxygen is vital for any system to remain healthy. The design of the system should incorporate methods to effectively remove air & dissolved oxygen from the system water.

+ **Design, Commissioning & Maintenance** – These are pivotal for any successful system.

elexion engineering a better class of water



VDI 2035 facts in brief

It is well known and accepted that chemicals such as corrosion inhibitors, oxygen binders or hardness stabilisers are not necessary to prevent malfunctions and damage in heating systems or other closed water circuits.

The VDI 2035 standard is built around creating an environment where corrosion is unlikely. The methods used are based on natural science rather than using chemical additives.

According to VDI 2035, Part 2, the addition of chemicals should be limited to exceptional cases.

What we know from VDI 2035 is that by reducing the level of electrical conductivity we can create an environment where the risk of corrosion has been greatly reduced.

If we raise the pH level between 8.2–10 metals within the system will build up their own natural levels of protection against corrosion. Even in the presences of oxygen the metals are able to withstand the effects of corrosion.

It is possible for the metals to build up their own natural layer of protection without the requirement for inhibitors.

A system low in salt & minerals content can be achieved by pre-treating the system fill water by use of ion exchange to completely demineralise the water entering the system.

Operation with low salt content requires demineralisation of the water to < 100 µS/cm.

The VDI 2035 refers to correct system design, the system being commissioned correctly and having the correct maintenance regime in place.

Who's using VDI 2035?

VDI 2035 is now the go to standard from the vast majority of manufactures in the HVAC industry.

Many of the world's top manufactures are intrusting their long warranty periods as they have the belief that the VDI2035 standard will protect their equipment.

These manufactures are from all sectors of our industry including boiler, pump, biomass, chillers and heat pump manufactures.

Conclusion

Blockages, scale, damage to pumps, seals & gaskets etc can greatly affect the reliability of any heating/cooling system and can reduce the lifespan of expensive components let alone the hassle of unwanted and untimely down time.

Even a build-up of 1mm of scale which is formed on the heat exchanger of the heat source can reduce the efficiency by 10%.

With a view to a simpler approach which is based on natural science rather than chemical additives our moto is no chemical cocktails just 100% natural science. Our methods are complaint with such guidelines as the German guideline VDI 2035, Swiss guideline SWKI BT 102-01, Austrian guideline ÖNORM H5195-1 & endorsed via the majority of HVAC manufactures.

BENEFITS

Easy to understand without the need of vast chemical knowledge.

Being able to asses onsite without the need for lab testing.

Environmentally friendly.

Simple monitoring without the need for chemical contractors.

Multiple system component in the form of one elector reaction tank.

No handling or storage of chemicals.

No disposal of chemicals.

No COSHH reports required/ reduced health & safety.

Reduced calls outs as a result of incorrect system water.

Being able to add a water treatment regime to current PPM contracts improving your offer/system care package for you clients.

Visual monitoring via product displays or remote monitoring.

Electro chemical water treatment

Common cause of plant failure, reduced efficiency and problematic systems is almost always caused by incorrect water treatment. Resulting poor water can often easily be identified by sludge particle (magnetite), visual discolouration of the system water, sticking balancing valves/PICV valves/diverter valves & leaks caused to diaphragms/cartridges/seals & gaskets. However not all damage is always visual at first from harmful minerals and formation of scale within heating/cooling systems.

electro reaction tanks address these issues in the form of Electrochemical water treatment.

Electrochemical water treatment is a process which relies on creating a galvanic corrosion cell where two dissimilar metals are used to form the galvanic cell. High purity magnesium is used as our anode & 316 stainless steel to produce our cathode, The Galvanic cell is activated as soon as the electrolyte (water) enters the tank. A completely natural form of water treatment is produced without the need for chemical additives or electrical supply.

The main purpose of the reaction tank is to promote the following:

- ① pH regulation
- ② Consumption of dissolved oxygen
- ③ Dirt filtration
- ④ Removal of air

Be on the safe side with elector!

- + Stable pH > 8.3 for the natural corrosion protection of metals, even in low temperature systems, without the use of chemicals.
- + Continuous deaeration and electrochemical consumption of dissolved gases, such as oxygen and free carbon dioxide.
- + Proven to avoid sludge in underfloor heating, even at installations with old non-diffusion protected plastic pipes.
- + System protection by separation of circulating magnetic particles and impurities.
- + Low-salt alkaline heating water in combination with deionised filling water, according to guideline recommendations.

Having an increased pH level allows the metal in the system to build up their own natural layers to protect against corrosion. With pH levels between 8.2–10 metals are protected against corrosion even in the presence of oxygen.

Thanks to the passing of electrons from the anode to the cathode dissolved oxygen is absorbed at the cathode. This process removes oxygen from the circulation water which is a main driving factor in waterside corrosion.



TOP TIPS

The use of an elector tank can reduce the need for additional system items with air separation, dirt separation & water treatment from one system component reducing costs during the installation process while making for an easier install due to less components being required.

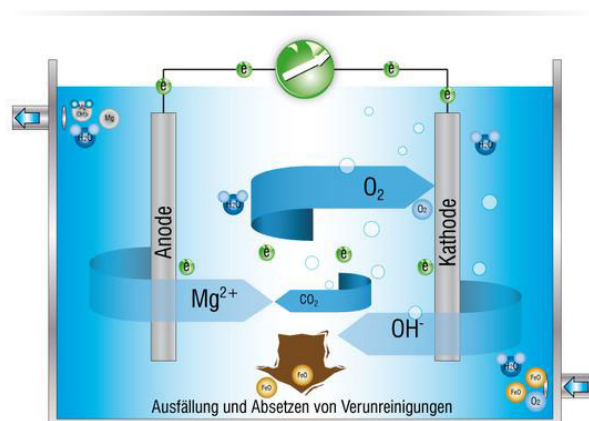
Filtration of dirt particles due to the cyclone effect and increased pH range creates a fluctuant where gradual system cleaning can take place when prolonged down time & costs are a factor in cleaning existing systems.

For over 25 years elector have been successfully treating systems by use of electrochemical water treatment. We provide tried & tested methods which are effective, easy to understand & are environmentally friendly.

The method is based on the spontaneous formation of a galvanic element in the elector reaction tanks.

As a result of a series of chemical and physical reactions, the amount of dissolved oxygen in the heating water is reduced and the pH is stabilised.

In combination with deionised filling water, an elector enables the heating system to be protected with a low-salt alkaline heating water.



| | Type | Maximum Heating System Volume | Installation Type | m3/h |
|---|--------------------------|-------------------------------|-------------------|------|
|  | electorXS5 | 0.5 m ³ | Full Flow | 2.4 |
| | electorS10-V | 1.5 m ³ | Full Flow | 4.3 |
| | electorS10-B | 1.5 m ³ | Bypass | 0.12 |
|  | electorM25 | 5 m ³ | Bypass | 0.3 |
| | electorL60 | 10 m ³ | Bypass | 0.6 |
| | electorXL130 | 30 m ³ | Bypass | 1.2 |
|  | elector XL+300 | 80 m ³ | Bypass | 3 |
| | elector XL+500pro | 150 m ³ | Bypass | 10 |

Demineralised water – Conditioned water

It has long been known that water with a high electrical conductivity provides an accelerated path for corrosion to take place.

Water contains different minerals & salts which all carry different charges, this is what gives water its electrical conductivity.

These minerals and salts not only provide a path for corrosion to take place but they also contribute to the formation of scale within our heating systems. The formation of scale within our heating systems will not only cause damage but have a severe effect on the efficiency of the system. As little as 1mm formation of scale build up can reduce efficiency by up to 10%.

The formation of scale also greatly reduces the life span of the heating system. Reduced efficiency as a result of scale formations within our heat exchangers, pipes, valves etc leads to reduced thermal heat transfers, blockages and stress fractures.

With modern heating & cooling equipment becoming ever more efficient it has never been more important to have a correct method of water treatment. Increased efficiency is a result of smaller water ways & internal components designed to maximise the heat sources ability to transfer heat & energy. Incorrect water treatment can cause catastrophic failure & costly repairs let alone the unnecessary downtime & increased maintenance costs.

Using a method known as the demineralisation process via ion exchange we can combat the effects of water high in conductivity, minerals and salts providing a better class of conditioned water for our systems.



THE SCIENCE

Using a mixed bed resin system we can simply & effectively remove these harmful minerals & salts. Minerals within the water carry different charges some are negative (anions) & others positive (cations). The mixed bed resin consists of two types of polymer beads one which carry a negative charge and others which carry a positive charge. When the water enters the device and is forced through the resin an ion exchange takes place where Cations in the feed water are exchanged for hydrogen (H^+) ions and Anions are exchanged for hydroxyl (OH^-) ions. The result is water: (H^+) + (OH^-) H_2O .



Filling devices



CLARIMAX 1200 DM pH+

The CLARIMAX 1200 DM pH+ has been designed & manufactured in Germany in conjunction with Brita®. Used for domestic and light commercial systems the Clarimax is a cartridge based system which balances the pH of the fill water giving an ideal level of 8.2-8.5 at time of filling. The cartridge based system allows for a quick and easy changeover of the resin without the service engineer ever coming into contact with the resin.

Accurate fill monitoring thanks to German electronics the CLARIMAX 1200 DM pH+ filter head includes conductivity and capacity monitoring via a simple traffic light system.

The Clarimax can be used for initial filling or inline treatment where system draining or downtime is not preferable.

Technical details

Application:

Water filter system for heating system filling with water according to guidelines such as VDI 2035, SWKI BT 102-01 or ÖNORM H 5195-1 with integrated balancing of the pH.

Operating temperature: 4 to 60°C

Operating pressure: 2 - 6.9 bar

Nominal flow: ~8.3 l/min

Connection: 3/4" male thread

Weight: ~21,5 kgs ready to use



Mobile PUROFILL VA

The mobile PUROFILL VA ion exchange system is typically used for systems with a larger water volume. It can be utilised for either filling systems or inline water conditioning while a system is operating under its natural operating conditions.

The ion exchange tanks for heating water treatment are suitable for operating temperatures of up to 80°C and a pressure range of up to 10 bar this is especially desirable for in-line heating water treatment.

The tank made of stainless steel 1.4571 is characterised by excellent resistance and can be used flexibly for both softening with ion exchange resins and for complete demineralisation with ion exchange resins.

Replacement resin is supplied in air tight vacuum packed bags. Designed using the perfect blend of industry leading ion exchange resin our special inhouse mixture engineers a better class of water providing a corrosion free environment for heating/cooling systems.

Mounted to a mobile trolley for ease of transport and supplied with inlet & outlet monitors which provide information to the service engineer such as the system flow rate, litres treated, electrical conductivity & TDS readings with functions such as auto monitoring & audible alarms to assist the engineer.

Technical details

Type designation: PUROFILL-VA.40

Cap. of ion exchanger: 40 liters

Dimensions WxH (mm): 239 x 1029

Empty weight kg: 11

Material: Stainless steel 1.4571 (AISI 316 Ti)

Operating temperature: 80°C

Operating pressure: 10 bar

Features:

- Quick release with vent valve and O-ring seal
- 3/4" inlet and outlet, flat sealing
- Stainless steel water supply and water extraction system with nylon fabric (140 µm) as a resin trap
- Stainless steel container made of V4A (316Ti) with plastic transport ring and stand ring
- Supplied with inlet & outlet meters
- Mounted on a lightweight trolley



Onsite refill devices

To prevent undesirable minerals & salts entering the system we have a range of RE-FILL devices which are left onsite which pre-treat the system top up water before it enters the system. The RE-FILL is typically installed before the filling connection or if a pressurisation unit is utilised the RE-FILL will be installed in between the outlet of the PU and connection to the system.

RE-FILL is available in either a floor standing stainless steel VA models or our wall hung Poly-glass models. REFILL has a stainless steel wall bracket, a water meter, the ion exchange cartridge for full demineralisation with the integrated MINIGarde capacity indicator and a valve for taking water samples and venting the water filter system. The system can be supplied with an optional RPZ valve (RE-FILL Plus) should the installation require this to meet the local water regulations.

The water treated with REFILL meets the requirements for low-salt top-up and top-up water in accordance with the applicable guidelines. Within the capacity range, the total hardness is <0.1°dH and the electrical conductivity of the top-up and top-up water is at a level of <10 µS / cm.

The installation of REFILL in the system top up line ensures that the system water quality is not adversely affected by any refill processes and that warranty claims are upheld.

Technical details

Application:

Full desalination of the top-up and top-up water in accordance with VDI guideline 2035, low-salt operation, as well as in accordance with SWKI BT 102-01 or ÖNORM H 5195-1.

Maximum operating pressure with poly glass bottle:

6 bar

Maximum operating temperature with poly glass bottle:

50°C

Maximum operating pressure with stainless steel cartridge:

10 bar

Maximum operating temperature with stainless steel cartridge:

90°C

Connection: 3/4"AG



Inline filtration

Inline heating water treatment is a safe & instant method that has proven itself many times in the ability to clean existing systems thoroughly. It is possible using inline water treatment to adjust the water quality in heating systems and other closed water circuits to a desired level without having to replace the existing system water or interrupt system operation. These techniques are particularly appealing for systems where down time is not preferable due to interruption of the supply. Added benefits of inline treatment is it is more eco-friendly. This is as a result of not being required to drain an existing system water into our drainage system where special permits would be required.

As soon as a new appliance is installed in existing heating/cooling systems they are liable to be effected by the system water which can lead to potential issues from day one. Either the water quality in the existing heating system does not match the boiler manufacturer's specifications (which can invalidate the warranty), the existing water quality promotes corrosion or there is a risk of loss of heating capacity & efficiency due to scale formation.

Poor water quality can have catastrophic effect to the main system components but it also plays a major role in having a reliable and efficient system. Modern systems have items such as PIC Valves, Balancing Valves, Pumps, Expansion Vessels etc which can all be affected by incorrect water treatment or over dosing

with use of chemicals. These items are intricate and modern systems are designed with efficiency in mind where the margin for error has been greatly reduced and are liable to fail if the system water is not correct.

The FTK fine filter system can be used as a standalone device or in conjunction with our Purofill VA system which will increase the system cleaning procedure offering fine particle separation along with demineralising the circulating system water. Using this combined system we can achieve a system water quality which is clean from debris, low in electrical conductivity with low salt and low mineral content to comply with such standards as VDI 2035, SWKI BT 102-01 and ÖNORM H5195-1.

Installed in a by-pass circuit the FTK fine filter system will effectively filter down particles to 1 µm. The system includes either a 8 m3/hr or 5 m3/hr pump to circulate the existing system water in a bypass installation. The system incorporates a differential pressure switch which automatically switches off the pump when the filter has become fully blocked allowing the service engineer time on site to get on with other tasks without constantly monitoring the system and its progression.

The FTK fine filter system is supplied on a light weight aluminon trolley for ease of transport and is available to purchase or rent alongside Purofill VA stainless steel demineralising ion exchange resin systems.



The advantage of in-line heating water treatment is clear, the system water quality can be cleaned & treated without interrupting the systems operation. These methods have great benefits to communal heating systems, hospitals, health clubs & hotels where down time is not preferable but drastic treatment and flushing is required.



ADDED BONUS

1

Environmentally friendly – no chemical wastage into the drainage system.

2

No COSHH – no adding of harmful cleaners to the system.

3

No waste water licence – Saving time and money.








4

No oxygen ingress – No draining of the system prevents additional oxygen entering the system.

5

Instant effect – When used in conjunction with Purofill VA new & existing systems can be cleaned & treated at the same time.

The uninterrupted heating water treatment in the circulation process, also called inline desalination or inline heating water treatment, is usually used for the following measures:

-  Commissioning rehabilitation of silted underfloor heating
-  Removal of silt and circulating impurities from the heating water
-  Removal of disruptive substances, e.g. oil in the heating water
-  Lowering the heating water total hardness
-  Heating water desalination during operation, thus lowering the electrical conductivity of the heating water
-  Correction of the pH value
-  Targeted removal of corrosive salts from the heating water



Suitable as a mobile and stationary particle filter system in a bypass installation for closed water circuits.

Effective fine filtration with a filter sharpness of 1 µm. For comparison: A human hair has an average size of 20 µm.

Huge filter area of effectively 1.8 m².

Including automatic differential pressure-controlled automatic switch-off.


Mounted ready for connection on a light aluminium cart.





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A dynamic splash of water with many bubbles, captured in a high-speed shot, spanning the width of the page above the main text.

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