WK1

WK1-E

WK1P

WK2

WK3

WK4

AQUA-REX®

Physical Water Conditioner To Treat Hard Water

Introduction

Aqua-Rex is the name used in the USA for the product known as Water-King in the rest of the world. Aqua-Rex is an electronic Physical Water Conditioner that inhibits scale formation in hot and cold water services, removes existing scale deposits and makes hot water softer. It is effective at reducing scaling in plumbing systems, shower heads, swimming pools, cooling towers, water features - in homes, hotels, apartment buildings, offices, prisons; anywhere that calcium can build up. It is installed by wrapping wires around the cold water supply pipe which can be made of any material. It requires no pipe cutting for installation and there is no need for ongoing maintenance or servicing.

The technology explained

Aqua-Rex uses pre-programed microchips to transmit radio waves into the water at varying frequencies and amplitudes. These radio waves cause certain minerals in the water to form sub-microscopic clusters. When the water is then heated, the clusters act as nucleation seeds upon which the calcium carbonate (limescale) precipitates. Instead of the hard encrustation on pipes and heating elements that normally occurs when water is heated, the precipitation takes the form of tiny calcium carbonate crystals that float suspended in the water. These ultra-fine crystals are carried away with the flowing water. Aqua-Rex has been performance tested under IAPMO IGC 335-2018 Rapid Scaling Test and proven to reduce scaling by up to 83% at 180O F. To see a full IAPMO R&T Lab report go to the Technical Library on our website.

Applications

With over 500,000 installations around the world since 1993, Aqua-Rex is a well proven reliable product that has demonstrated its effectiveness in most applications where conventional water softeners would normally be used. Aqua-Rex is less expensive to install and maintain than ion exchange softeners. Aqua-Rex requires very little space, no special plumbing, no waste water connection and no supply of salt. There is no loss of water pressure nor any additional corrosion problems. Aqua-Rex can provide most of the benefits of a water softener without any chloride discharge and at much reduced initial and ongoing running costs.

How is The Water Softened without removing the Calcium?

The nucleation seeds in the water stimulate precipitation so more of the dissolved calcium converts to solids in suspension. The hot water has less dissolved calcium and is therefore softer. Total calcium stays the same, so a titration test will show no change as it measures total calcium not just dissolved calcium. Aqua-Rex is the only electronic device of its kind that has been proven by independent laboratory tests to produce softer hot water.

Drinking Water and Salinity

Unlike ion exchange softened water, where minerals are removed and replaced by sodium, Aqua-Rex treated water is good for drinking. There is no need for a separate drinking water supply, no health risks and no chloride effluent. It can be used for reducing scale in irrigation systems and is good for use in recycling water.

Removal of Existing Scale Deposits

Aqua-Rex is very effective at removing existing scale deposits from water heaters, general plumbing and cooling towers thus reducing the habitat for Legionellae making it far easier to control. Descaling occurs within a few weeks. The scale breaks away in flakes as it loses adhesion with the surface that it is encrusting. In existing systems, that are already badly scaled, it may be worth installing one or more filters to protect sensitive equipment such as heaters and heat exchangers.

Lifecycle Costs

Running costs of all units is just a few dollars per month. The design life is in excess of 25 years with a 20-year manufacturer's warranty. Aqua-Rex comes with an unconditional 100-day money-back satisfaction guarantee. This is extendable subject to negotiation.

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Location of Units

Correctly Locating Aqua-Rex is essential to ensure optimum performance. The flexibility of Aqua-Rex is helped by the Signal Propagation whereby the effect is transmitted both upstream (back signal) and downstream. Unlike other water treatment products it is not necessary to pass the water through the unit to get effective treatment. It is also capable of treating static water in a tank. Aqua-Rex treatment is in two stages. First the nucleation seed is created and then a "scaling event", such as heating the water has to occur. The first stage can be negated by a pump in the system. Once the scale is in suspension after stage two, the treatment is permanent.

Aqua-Rex can be installed at the point of entry to the property or plant room, or on a softener loop, but in general it is more effective when it is placed close to where the scale is likely to form – on the cold inlet to the water heater. It is frequently more effective to install a number of units close to dispersed water heaters, especially when they are electric heaters, than one large unit on the main cold supply.

Tank Water Heater in the Home

Install the Aqua-Rex on the cold inlet to the heater. The flexible connection is a good place to wrap the wires. The back signal will treat all the cold water in the home. If a hot water return (HWR) is attached to the tank drain, the unit on the cold supply close to the tank will treat all the water in the tank.

Tank Water Heater in Larger Properties

Treat the cold water supply but also install a unit on the hot water return after the pump.

Tankless Water Heater

Install the Aqua-Rex on the cold inlet to the heater, close to the heater. If there are multiple heaters in parallel with a hot water return, install the unit on the cold supply, preferably after the junction with the return.

Dishwashers

Because a dishwasher uses an internal pump, treatment with Aqua-Rex may not be very effective. We recommend using hard water rinse aids, or a dedicated softener for large commercial dishwashers. Aqua-Rex can be used to reduce scaling in an electric booster heater.

Booster Pumps

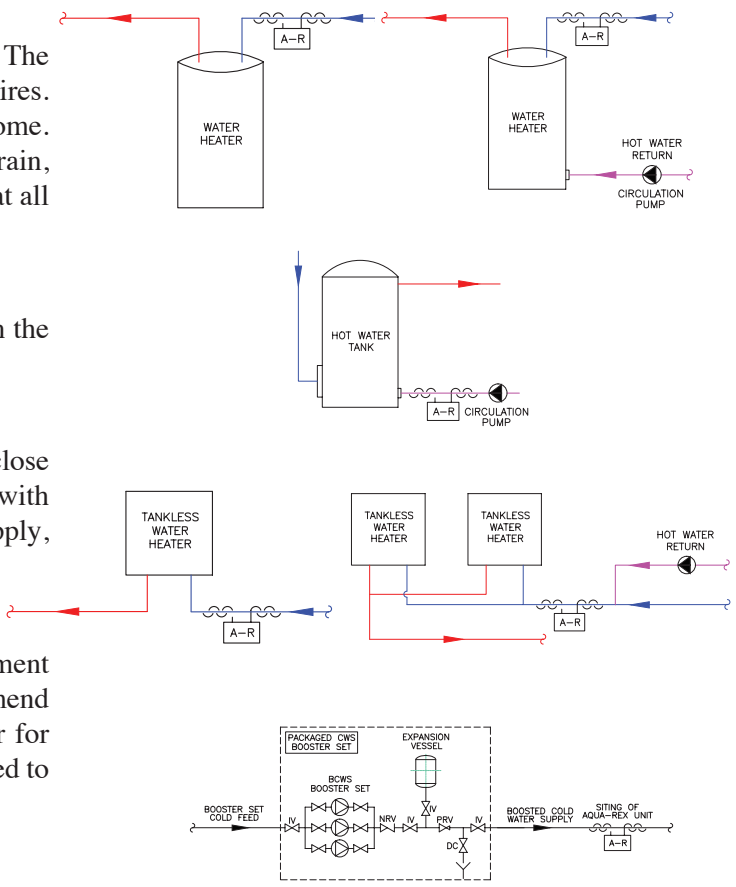
Pumps cause a significant reduction in the effectiveness of Aqua-Rex so in general, wherever there is a pump there should be an Aqua-Rex unit located on the discharge side.

Cold Water Tanks and Break Tanks

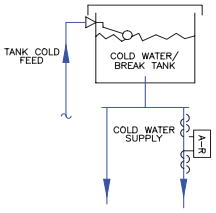
Cold water tanks generally cause a discontinuity in the signal transmission resulting in decay of the nucleation seeds generated by the Aqua-Rex. This problem can be overcome by installing a unit on one of the outlet pipes from the tank or on a drop from the header and making use of the back signal to treat the stored water within the tank.

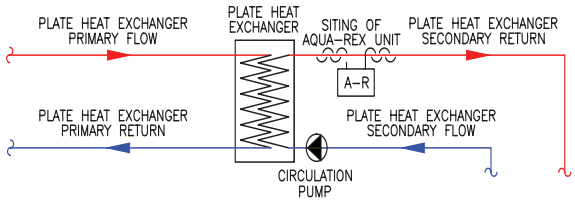
Heat Exchangers

Treat the cold inlet. If there is a pump close coupled on the inlet side then treat the discharge side and the back signal will treat the heat exchanger.



Installation Of Aqua-Rex On A Booster Pump And Circulation Pump





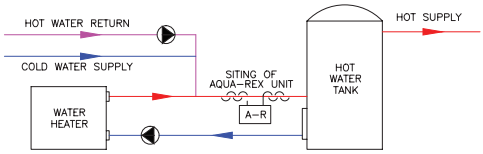
Installation Of Aqua-Rex On A Plate Heat Exchanger

Cold Water Supply to Mixing Valves and Showers

Most of the scale formed in these fittings is precipitated from the cold water. The cold water supply to these appliances should also be treated with an Aqua-Rex unit. When a conventional water softener is installed to treat only the hot water services, it is common to find scale forming in mixing valves, shower heads and faucets. An Aqua-Rex unit installed on the cold services will reduce this scaling.

Water Heaters (Boilers) with Stored Hot Water Tank

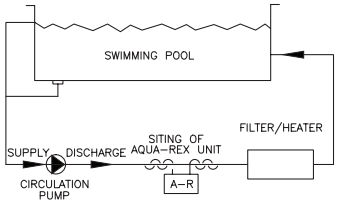
Generally there is a pump on the supply line from the tank to the water heater or there may be a pump on the back of the water heater. An Aqua-Rex unit should be installed on the return line from the water heater to the tank. The signal travels back into the heater at its hottest point and the cold make up water and hot water return are also treated.



Installation Of Aqua-Rex On Copper Fins

Swimming Pools

Treat the circulation system after the pump. Aqua-Rex will remove existing scale from tiles and keep them free of calcium and magnesium scale. Silica scale is resistant to Aqua-Rex nor will it react to muriatic acid which is the easiest way to test for it. Aqua-Rex will also remove or soften the scale in a salt cell and will reduce phosphates, making the water clearer. It can stabilize or reduce TDS and can enhance the effect of biocides meaning less chlorine is needed.

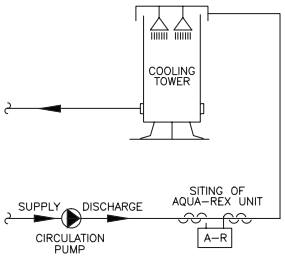


Installation Of Aqua-Rex On Re-Circulating Systems And Swimming Pools

Cooling Towers

Aqua-Rex should be installed on the feed to the cooling tower. It can be installed where the pipe reduces to a lesser diameter relying on the back signal to treat all the feed from the circulating pump.

Scale will be removed from resistant surfaces leaving less habitat for Legionellae. TDS can also be reduced in the same way as described under softening, so if a filter is used to remove the suspended solids, less blowdown will be required and water saved.



Re-Circulating Systems

Plumbing Requirements and Pipe Material

Each Aqua-Rex aerial requires about 3 inches of pipe. There is no minimum nor maximum gap between aerials. They can be fitted either side of bends on horizontal or on vertical pipes. Aqua-Rex can be fitted to pipes of any material except cast iron and lead. The pipe does not need to be cut, there is no plumbing involved, nor is there any requirement for a isolating bypass with associated valves. Insulation may be fitted over the aerials after installation. The unit should be located within eighteen inches of the pipe that is being treated. In many cases it can be suspended from the pipe with plastic ties rather than being fixed to a surface.

Power Requirements

Most units have a seven foot power cable terminating in a USB-A plug. A 120v power adapter is provided. The waterproof units have a 9v AC power cable connecting to a 120v transformer with a total cable length of 9 feet.

Evaporative Systems

Where systems are designed to operate with make up water for evaporation, such as cooling towers or humidifiers, adequate provision must be made to clear any deposits by regular “blow down” or other means.

Suggested Specification For Water Treatment

One or more Aqua-Rex Physical Water Conditioners shall be provided on the CW supply and HWR in accordance with the manufacturer’s recommendations. The unit shall have one or more pairs of open ended aerials wrapped around the pipework generating a series of square waves of random length and occurrence between 1 kHz and 10 kHz. The peak to peak output voltage will be in excess of 80 volts. The device shall have been tested under IAPMO IGC 335 and shown to reduce scaling by at least 80%.

Selecting the Correct Size of Unit

Pipe Diameter

Having decided where to locate the Aqua-Rex, select the appropriate sized unit according to the pipe diameter.

Flow Rate and Water Hardness

When specifying Aqua-Rex neither the flow rate nor the water hardness is an issue. Only when Fe is less than 10ppb is there a reduction in performance.

* The WK1 and WK1-E can be installed on a 1¼" softener loop.

Maximum pipe diameter	WK1 1" *	WK1-E 1" *	WK1P See Note under "Product Features" below	WK2 1½"	WK3 3"	WK3RT 3"	WK4 4"	WK5 6"
Antenna number/length	2/6′	4/6′	2/10′	4/6′6″	4/16′	4/16′	4/23′	6/30′
Minimum antenna wraps	12 wraps	12 wraps	12 wraps	12 wraps	15 wraps	15 wraps	15 wraps	15 wraps
Frequency range	1-10 kHz.	1-10 kHz.	1-10 kHz.	1-10 kHz.	1-10 kHz.	1-10 kHz.	1-10 kHz.	1-10 kHz.
Peak to peak output voltage	82 V.	82 V.	82 V.	82 V.	82 V.	82 V.	82 V.	82 V.
Power supply required	USB	USB	120v AC	USB	USB	120v AC	USB	USB
Input current at 5v	150mA	200mA	150mA	175mA	200mA	200mA	300mA	500mA
Max wattage	0.75	1.0	0.75	0.875	1.0	1.0	1.5	2.0
Lead length	7′	7′	9′	7′	7′	9′	7′	7′
Dimensions (inches.)	5 x 3 x 2	5 x 3 x 2	5 x 3 x 2	8 x 6 x 2	8 x 6 x 2	8 x 6 x 2	11 x 8 x 5	11 x 8 x 5
Weight	1lb	2lb	2lb	2.2lb	2.2lb	2.2lb	6.6lb	7lb
Ambient temperature	160°F	160°F	160°F	160°F	160°F	160°F	160°F	160°F
Humidity non-condensing	80%	80%	100%	80%	80%	100%	80%	80%
BMS output	No	No	No	Yes	Yes	No	Yes	Yes

Product Features

WK1 Suitable for most residential installations, especially gas tank and tankless heaters on city water.

WK1-E This unit should be used with electric water heaters and also when treating well water with either gas or electric heaters.

WK1P A fully waterproof version of the WK1 which can be left outside exposed to the weather. It can be used to reduce scaling in swimming pools by attaching it to 2" re-circulation pipes between the pump and the water filter. It can be used on 1" supply pipes to externally mounted water heaters. It must not be used on 2" supply pipes.

WK2 An intermediate sized unit. The extra pair of aerials can be used for treating a second pipe as well as reinforcing the signal applied to a single pipe. The WK2 is ideal for larger properties and treating especially hard water where a WK1 might be less effective.

WK3 A powerful unit that will handle the majority of commercial applications. It is frequently specified to treat the cold supply to direct fired water heaters and paired with a WK1 on the hot water return. It has output for a Building Management System (BMS) to detect power failure. The WK3RT is a waterproof and UV resistant version of the WK3 recommended for rooftop tankless racks.

WK4 & WK5 These units have a comprehensive fault monitoring system that detects if aerials are not correctly plugged in or have been grounded to a pipe in error. They have automatic data logging which records whether the power supply has been interrupted or disconnected. All faults set off an alarm to the BMS connection.

Larger units than the WK5 are available as a special order.

Approvals and certification

Aqua-Rex has been performance tested under IAPMO IGC 335-2018 Rapid Scaling Test and proven to reduce scaling by up to 83% at 180O F. To see a full IAPMO R&T Lab report go to the Technical Library on our website where you will find cut sheets, IOM's and Revit files and schematics.

Self-Diagnostic "Guard Chip"

Aqua-Rex units are equipped with an additional "Guard Chip" program which monitors the performance of the main program and resets the system automatically if it detects a variation or system failure. There is no need for manual resetting after power outage.

Technical Assistance for specifications

Our technical department is very experienced at advising consultants and contractors of the most effective way of treating water using Aqua-Rex technology. We are able to receive drawings by email to info@aqua-rex.com and will respond immediately.