



**Physical Water Conditioner To Treat Hard Water**



**WK1**



**WK1-E**



**WK1P**



**WK2**



**WK3**



**WK4**

**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 partially softens hot water. 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 requires no pipe cutting for installation and there is no need for ongoing maintenance or servicing.

**The technology explained**

Aqua-Rex uses pre-programmed micro-chips to transmit pulses of electrical charge into the water at varying frequencies and amplitudes. These radio “signals” cause some of the 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.

**Applications**

With over 250,000 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 created by Aqua-Rex stimulate the conversion of more of the dissolved calcium bicarbonate in the water into crystals in suspension than would otherwise occur. The resulting hot water, with less calcium bicarbonate, is now chemically softer. 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.

**Removal of Existing Scale Deposits**

Aqua-Rex is very effective at removing existing scale deposits from water heaters, general plumbing and cooling towers. 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. We also suggest scheduling a hot water tank drain and clean after three months.

**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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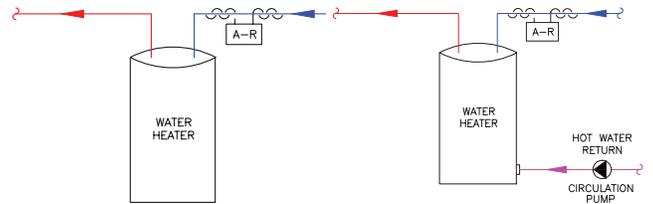
## Location of Units

**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. On the negative side, water passed through a pump loses most of the treatment imparted by Aqua-Rex. As a general rule, wherever there is a pump, an Aqua-Rex should be located downstream of it.

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.

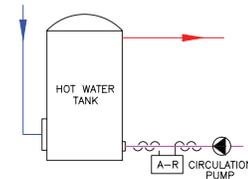
### Tank Water Heater in the Home

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.



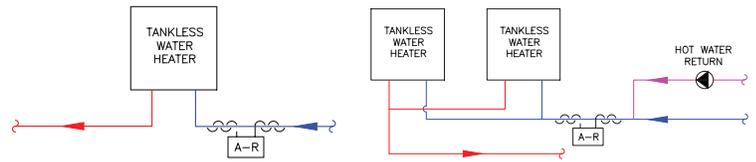
### Tank Water Heater in Larger Properties

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



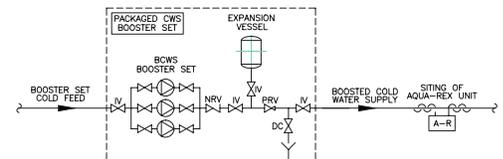
### Tankless Water Heater

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.



### Booster Pumps.

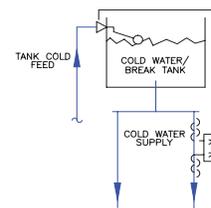
Pumps cause a significant reduction in the effectiveness of Aqua-Rex so, wherever there is a pump, in general there should be an Aqua-Rex unit located downstream from it.



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

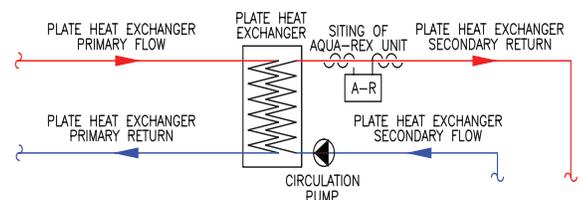
### Cold Water Tanks and Break Tanks

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

We recommend that both the cold inlet and the heated discharge of heat exchangers are treated. This is more easily achieved with one of the units which has four antennas, by applying one pair of antennas to each of the inlet and discharge pipes. If a pump is close coupled to the heat exchanger, treat only the discharge side. This applies especially to plate heat exchangers.



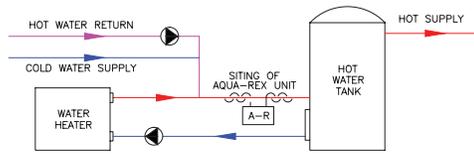
Installation Of Aqua-Rex On A Plate Heat Exchanger

## 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.

## Low Water Content Finned Type Water Heaters (Copper Fins)

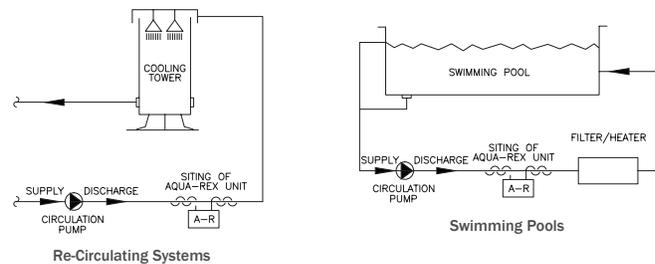
Generally this type of water heater is highly resistant to scaling, but to protect tanks and other downstream appliances we recommend treatment of the return to the tank at a point after the HWR and make up water.



Installation Of Aqua-Rex On Copper Fins

## Re-Circulating Systems & Swimming Pools

Where water is being constantly circulated, such as through a cooling tower or swimming pool, the Aqua-Rex unit should be fitted on the circulating system downstream from the pump and as close as possible to where the heating process or pressure drop is occurring. There is no need to treat the make up water. Adequate provision must be made for filtering to remove suspended solids.

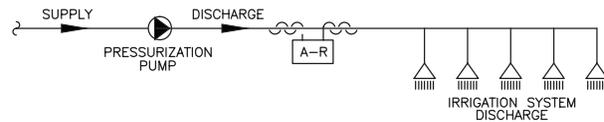


Installation Of Aqua-Rex On Re-Circulating Systems And Swimming Pools

On a swimming pool the unit should be installed between the pump and the filter or heater.

## Irrigation Systems and Misters

Install an Aqua-Rex unit after the pump. On high pressure mister lines we recommend a WK1 unit is installed on each line



Installation Of Aqua-Rex On Irrigation Systems

## Plumbing Requirements and Pipe Material

Each Aqua-Rex antenna 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. The pipe does not need to be cut, there is no plumbing involved, nor is there any requirement for an isolating bypass with associated valves. Insulation may be fitted over the antennas after installation.

## Power Requirements

Each unit requires an outlet within three feet of the unit except the WK1P which can be extended to six feet. Each of the units with external transformers can have the low voltage two core lead extended by splicing in suitable cable such as speaker cable. Tests have shown this extension to be satisfactory over half a mile. The unit should be located within eighteen inches of the pipe that is being treated.

## 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 antennas 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.

## 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 and Mg is high relative to Ca 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"	WK4 4"	WK5 6"
Antenna number/length	2/6'	4/6	2/10'	4/6' 6"	4/16'	4/23	6/30'
Minimum antenna wraps	12 wraps	12 wraps	12 wraps	12 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
Peak to peak output voltage	82 V.	82 V.	82 V.	82 V.	82 V.	82 V.	82 V.
Power supply required	120 V.	120 V.	120 V.	120 V.	120 V.	240 V or 120 V.	240 V or 120 V.
Input current	0.02 A.	0.03 A.	0.02 A.	0.03 A.	0.04 A.	0.08 A.	0.1 A.
Power consumption	1 W.	1 W.	1 W.	1 W.	2 W.	2 W.	3 W.
Transformer output	9 V. ac	9 V. ac	9 V. ac	9 V. ac	9 V. ac	Internal	Internal
Lead length	5'	5'	10'	5	5'	5'	5
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	11 x 8 x 5	11 x 8 x 5
Weight	1lb	2lb	2lb	2.2lb	2.2lb	6.6lb	7lb
Ambient temperature	160°F	160°F	160°F	160°F	160°F	160°F	160°F
Humidity non-condensing	80%	80%	100%	80%	80%	80%	80%
BMS output	No	No	No	No	Yes	Yes	Yes

## Product Features

**WK 1** An easy to install unit with an external transformer. Suitable for most residential applications.

**WK 1-E** This unit should be used with electric water heaters with up to 1" inlets, and especially when treating well water.

**WK 1P** The same output as the WK1 but fully waterproof so it 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. The transformer is rated for internal use only so it requires protection from the weather.

**WK 2** An intermediate sized unit with external transformer. The extra pair of antennas 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.

**WK 3** 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.

**WK 4** This unit is designed to treat larger pipe sizes up to 4". It has internal transformers, rated at either 120 or 240 volts. The enclosure is rated IP65.

**WK 5** This is the largest standard Aqua-Rex unit with the same dimensions, transformer options and features as the WK4. It has six antenna outputs arranged as three pairs and is capable of treating pipe sizes up to 6".

**Larger units** than the WK5 for use on cooling towers are available as a special order.

**UL Approval** All external transformers are UL approved. The WK4 and WK5 are UL approved as Physical Water Conditioners and listed under manufacturer Lifescience Products Ltd E353945.

### 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 e-mail to [specifier@aquar-ex.com](mailto:specifier@aquar-ex.com) and will respond immediately.

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