

## Location of Units

### Location

In general a Water-King unit should be installed as close as possible to the appliance where water is to be heated and scale is likely to form. This means in practice it should be installed on the cold service within the same plant room as the calorifier or water heater. If point-of-use electric water heaters are being used, either in dwellings or in an office environment, it is best to fit a dedicated unit such as the Sentry to each heater.

### Signal Propagation

The signal generated by Water-King is transmitted through the water both upstream and downstream from the unit (back signal). This means that appliances and storage tanks upstream from the unit can be treated, although ideally water should pass the unit for best effect.

### Cold Water Storage Tanks and Break Tanks

Vented cold water storage tanks generally cause a discontinuity in the signal transmission resulting in decay of the clustering effect generated by the Water-King. This problem can be overcome by installing a unit on one of the outlet pipes from the tank or header and utilising the back signal to treat the stored water within the tank. Where hot and cold tanks are close coupled, or there is no ready access to the outlet, the "Air Gap" can be bridged by installing a unit on the supply pipe and grounding one of the aerials to the tank. This procedure is fully explained in the installation instructions.

### Booster Sets and Circulation Pumps

Water passing through a pump will lose the effect created by an electro-magnetic water conditioner. A Water-King should always be fitted between a booster set or circulation pump and a water heater.

### Hot Water Secondary Return (HWSR)

We recommend that the HWSR should be treated with a Water-King unit installed between the circulation pump and the calorifier or water heater.

### 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 four aerial units by applying one pair of aerials to each of the inlet and discharge pipes. If a pump is close coupled to the heat exchanger, treat only the discharge side.

### Blending Valves and Showers

Most of the scale formed in these fittings is precipitated from the cold water. It is essential that the cold water services to these appliances are treated as well as the hot.

### Re-Circulating Systems

Where water is being constantly circulated, such as through a cooling tower, the Water-King 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.

### Low Water Content Finned Type Water Heaters

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

## Plumbing Requirements and Pipe Composition

Each Water-King aerial requires up to 6 cm of straight pipe. They can be fitted either side of bends on horizontal or vertical pipes. Water-King can be fitted to pipes of any material except lead. 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 aerials after installation.

### Power Requirements

Each unit requires mains voltage supply within one metre of the unit. The unit should be located within 45 cm of the pipe being treated.

### Evaporative Systems

Where appliances are designed to operate by make up water and evaporation, such as cooling towers or humidifiers, adequate provision must be made to clear the build up of any sludgy deposits by regular "blow down" or other means.

## Suggested Specification For Water Treatment

One or more electronic water conditioners shall be fitted to the cold mains supply and HWSR 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.

## Selecting the Correct Size of Unit

### Pipe Diameter

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

If hot water is provided by a Direct Fired Water Heater then select the larger size according to maximum output rating.

### Direct Fired Water Heaters

We recommend maximum heat ratings for different sized units and this also varies according to whether they are gas fired, oil fired or heated electrically.

### Flow Rate

Flow rate is immaterial as far as Water-King is concerned. The greater the flow, the more effective the unit tends to be.

Selection	WK1	SENTRY	WK2	WK3	WK4	WK5
<b>Maximum pipe diameter</b>	<b>28mm</b>	<b>28mm</b>	<b>42mm</b>	<b>67mm</b>	<b>108mm</b>	<b>159mm</b>
Direct fired gas / oil boiler	35 kW.	35 kW.	50 kW.	350 kW.	750 kW.	1125 kW.
Electrical boiler	15 kW.	15 kW.	30 kW.	50 kW.	100 kW.	150 kW.
<b>Product Data</b>						
Aerial number/length	2/1.8 m.	2/2.0 m.	4/2.0 m.	4/5.0 m.	4/7.0 m.	6/9.0 m.
Minimum aerial turns	12 turns	12 turns	12 turns	15 turns	15 turns	15 turns
Frequency range	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.
Power supply required	230 V or 110 V.	230 V or 110 V.	230 V or 110 V.	230 V or 110 V.	230 V or 110 V.	230 V or 110 V.
Input current	0.02 A.	0.02 A.	0.03 A.	0.04 A.	0.08 A.	0.1 A.
Power consumption	1 W.	1 W.	1 W.	2 W.	2 W.	3 W.
Transformer output	9 V. ac	Internal	9 V. ac	Internal	Internal	Internal
Lead length	1.5 m.	1.5 m.	1.5 m.	1.5 m.	1.5 m.	1.5 m.
Dimensions (mm.)	140 x 85 x 50	140 x 85 x 50	220 x 155 x 67	220 x 165 x 60	280 x 210 x 140	280 x 210 x 140
Weight	0.75 kg.	0.80 kg.	1.00 kg.	0.80 kg.	3.00 kg.	3.25 kg.
Ambient temperature	0 - 70°C	0 - 70°C	0 - 70°C	0 - 70°C	0 - 70°C	0 - 70°C
Humidity non-condensing	80%	Waterproof	80%	80%	80%	80%
IP Rating		IP 68		IP 65	IP 65	IP 65
BMS output	No	No	No	Yes	Yes	Yes

### Self-Diagnostic "Guard Chip"

Every computer system is prone to malfunction, especially if there is a sudden variation in the power supply which can jam the program. Most systems have to be reset by manual re-booting. Water-King units overcome this problem by 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.

## Product Features

### WK 1

A simple to fit unit with external transformer. It has identical power output to the Sentry. The external transformer is available in a full range of pin configurations and supply voltages.

### Sentry

A high security unit designed specifically for Public Authority and Housing Associations where theft or tampering could occur. Also recommended in all Commercial applications. It is waterproof (IPX8 3 meters) with an internal transformer and intended to be wired to a fused (3 amp) outlet. It is supplied with a plug, which can be removed. Being fully waterproof it is suitable for commercial catering, shower blocks, urinals and other damp or hostile environments. It is especially suitable for protection of individual appliances but is also powerful enough to handle most domestic and light commercial requirements.

### WK 2

An intermediate sized unit with external transformer. The extra pair of aerials can be used for treating a second pipe as well as reinforcing the signal applied to a single pipe.

### 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 Sentry on the secondary return. It has output for a Building Management System to detect power failure.

### WK 4

This unit is designed to treat larger pipe sizes up to 108mm. It has mains input with integral transformers, normally rated at 230 volts, but UL-approved 110 volt transformers can be supplied as an option. The enclosure is rated IP65.

### WK 5

This is the largest standard Water-King unit with the same dimensions, transformer options and features as the WK4. It has six aerial outputs arranged as three pairs and is capable of treating pipe sizes up to 159mm.



**Water Conditioner & Electronic Water Softener**

**Introduction**

Water-King is a non intrusive water conditioner that inhibits scale formation, removes existing scale deposits and partially softens hot water. It requires no plumbing and there is no need for ongoing maintenance nor servicing.

**The technology explained**

Water-King uses pre-programmed micro-chips to transmit pulses of electrical charge into the water at varying frequencies and amplitudes. These "signals" cause some of the salts 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 invisible fine crystals are carried away with the flowing water.

**Applications**

Field trials conducted over the past fifteen years have demonstrated the effectiveness of Water-King in most applications where conventional water softeners would normally be used. Water-King is less expensive to install and maintain than ion exchange softeners. In larger applications it is also less expensive and simpler to install than inline magnetic and electro magnetic systems. Water-King requires very little space, no special plumbing, no waste water connection nor access for the supply of salt and its storage. There is no head loss nor any additional corrosion problems.

**How Is The Water Softened Without Removing The Calcium?**

The clusters created by Water-King 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. Water-King is the only electronic device of its kind that has been proven by independent laboratory tests to produce softer water.

**Drinking Water**

Unlike ion exchange softened water, where minerals are removed and replaced by sodium, Water-King treated water is suitable for drinking. There is no need for a separate drinking water supply, no health risks and no salt effluent. The problems of head loss and increased corrosion do not occur.

**Removal of Existing Scale Deposits**

Water-King is very effective at removing existing scale deposits from water heaters, calorifiers and pipes. Descaling occurs within a few weeks. The scale breaks away in small plates as it loses adhesion with the surface that it is encrusting. In existing systems that are already badly scaled it may be worth considering fitting a filter on the hot flow from the water heaters to protect blending valves and other appliances.

**Lifecycle Costs**

Running costs of all units is less than £15.00 per annum. The design life is in excess of 25 years with a 5-year manufacturer's warranty. Water-King has a no quibble 100-day money-back satisfaction guarantee, which is extendable, subject to negotiation.



WK1



SENTRY



WK2



WK3



WK4

Water Treatment

**Commercial / plumbing options**

**High Level Cold Cistern With Low Level Plant Room**

Treat the CWDS close to the water heater with a second unit on the HWSR after the circulation pump. One of the CWS drops from the header is treated with a third unit.

**Hot Water Storage Pumped to Water Heater**

Locate a Water-King after the pump. On low water content finned type water heaters it should be on the return. On plate and frame heat exchangers it may be fitted on the return only.

**Cold Water Storage Cistern with Booster Set**

A Water-King is fitted to the common cold services on the outlet of the booster set. A second Water-King is fitted to the HWSR.

**Offices with Electric Water Heaters**

**Electric Water Heaters in Offices**

Due to the length of time the water resides in the heater, it is best to treat each heater with a dedicated Water-King unit.

These diagrams are illustrative for siting of Water-King units. They are not intended to be examples of definitive domestic water services.

**Domestic plumbing options**

**Unvented System with Combination Boiler**

A typical domestic application on an unvented system to protect a combi boiler. The installation is on the rising main and may be close to the boiler. It will also protect other appliances in the home through the back signal.

**Multi-occupancy residential building**

**Electric Water Heaters**

Due to the high local temperature and magnetic fields created by the heater element, these heaters are best treated with local dedicated units.

**Gas Water Heaters**

Install a Water-King on each riser or at the point of entry to the building.

**Technical Assistance for specifications**

Our technical department is very experienced at advising consultants and contractors of the most effective way of treating water using Water-King technology. We are always available to assist immediately by telephone and able to receive drawings by post or AUTOCAD via e-mail to specifier@lifescience.co.uk