



Italconsulting

Tecnologic System Research Division

TECHNICAL BOOK

DESCALER & ANTIBACTERIA DEVICE

H₂O WATER

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INTRODUCTION

The device described in the present technical book is referred to as **H2O WATER**.

This device is the result of years of research and tests conducted by some of the most well known institutes as CNR (Consiglio Nazionale delle Ricerche) and MIT (Massachusetts Institute of Technology).

The **H2O WATER** device is based on the studies conducted on the influence of electric fields on the material.

As everything that surrounds us is or may be influenced by electric fields of magnitude more or less intense, we have thought to produce a device capable to generate a sufficiently intense electric field to obtain the desired effect.

To accomplish this we have studied and produced the sequential rephasing transformer, the heart of all H2O devices (other than the device described in this manual H2O is currently producing a model to crack carbon particles in oil based products).

These transformers as well as all the H2O devices are covered by world patents.

In this technical book we are providing the necessary technical knowledge which the device is based on without detailing the construction of the **H2O WATER** for obvious patent protection reasons.

ELECTRIC FIELDS – THE BASICS

The **H2O WATER** device is based on the principal of variable electric fields.

In order to comprehend the behaviour of a variable electric field and how it influences material we will commence with a brief explanation on how an electric field is generated.

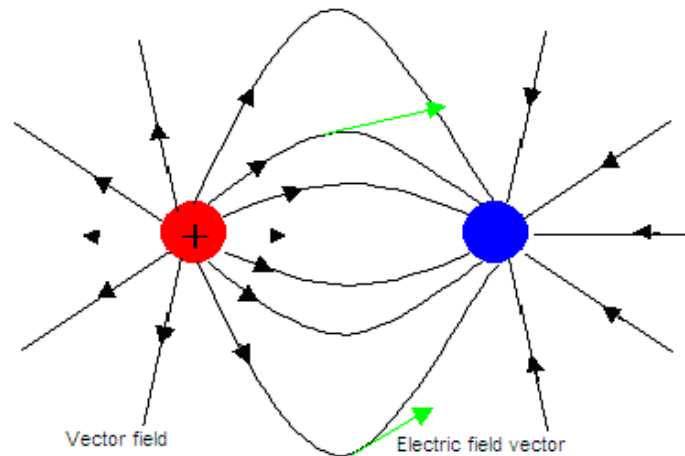
An **electric field** is a physical phenomenon that describes the influence of an **electric charge** on the surrounding space. It reveals itself under the form of a force that acts on the charges that are within the field. There are two types of electric charge, conventionally referred as + and - .

Charges with opposite sign generate an attraction field and charges with same sign generate a repulsive field. The elementary particle having positive sign is called **proton** which constitutes with the **neutrino**, that has no electric charge (neutral), the atomic nucleus. Negative charge is associated with the **electron**.

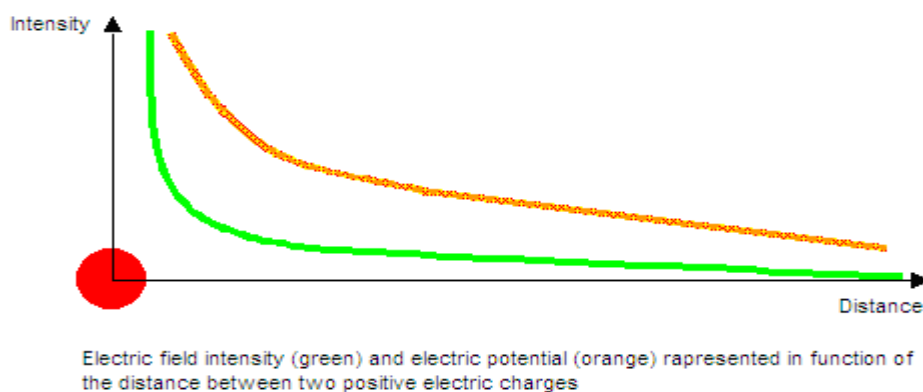
Theoretically speaking, an electric field generated by a charge extends its effects for an infinitive distance, but in practice the effects diminish the square of the distance so at a certain distance the effects are neglect able. It is obvious that the distance at which the force is to be considered neglect able depends on the intensity generated by the source.

The electric field is a **vector force** as it can be represented in any position within the field by an arrow that indicates **intensity, direction** and **versus**. A simply way to represent an electric field is by using the **field lines**.

Field lines are lines tangent in every point to the vector field lines that converge to the most intense point of the field.



Together with the electric field one must keep into consideration another force referred to as **electric potential**, commonly known as **tension**. The tension is measured in **Volts**. Within a space where the field is constant its value can be obtained dividing the potential measured between two points and the distance that separates them. In this way we obtain the measuring unit of the electric field: **Volt/meter**. In example: between two points distant 0,1 m the electric potential measured is equal to 100 Volt; therefore, the electric field is $100/0,1=1000$ Volt/meter.



The presence of charges free to move within a field determines an arranged movement which is referred to as **electric current**. Inside metal a part of electrons are free to move; therefore, by applying tension on the extremes of a wire it is possible to measure the passage of current.

In nature the electric field is responsible of the **atomic structures** and **molecular bonds**.

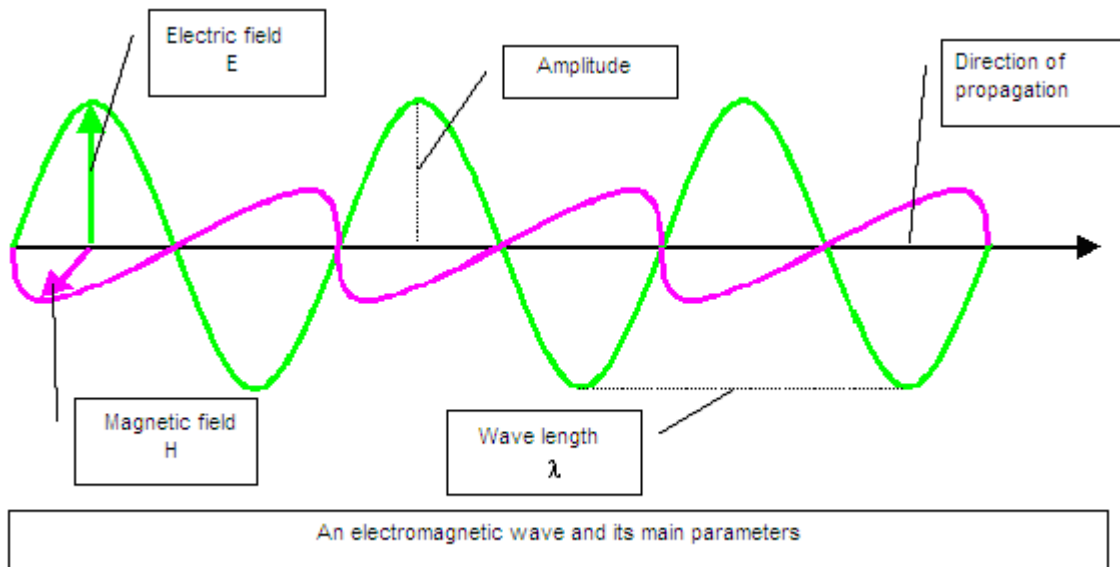
The electric field can propagate under the form of a wave. In the most simple model, an electric field oscillates with a sinusoidal routine. As all oscillating phenomena we can define a **period T** and a **wave length** λ respectively as the time used by an electric field to complete an oscillation and the shortest distance between two points in which the fields achieves its maximum peak.

Using V to indicate the wave propagation speed, the relation becomes as follows: $\lambda = V \times T$.

In example, an electromagnetic wave having a period of 0,000000001 seconds (waves commonly received by mobile phones) will have a length of

$$\lambda = 300.000.000 \text{ m/s} \times 0,000000001 \text{ s} = 0,3 \text{ meters} = 30 \text{ centimetres.}$$

This formula may be applied to any oscillating phenomena.



Another value that characterises waves is **frequency** (n), which is the number of oscillations per second. Frequency is measured in **Hertz** (Hz), in honour of the German physician, where $1 \text{ Hz} = 1/\text{s}$. Between period and frequency the relation is $n = 1/T$. Therefore, the wave we examined earlier will have a frequency $n = 1/0,000000001 \text{ s} = 1.000.000.000 \text{ Hz}$. The **amplitude** represents the maximum intensity of the wave.

WORKING PRINCIPALS OF THE H2O WATER DEVICE

The electric field is made of two fundamental units of measure: intensity measured in **Volt** and frequency measured in **Hertz**.

Any material that is immersed in an electric field will be subject to its influence.

The **H2O WATER** device makes use of this peculiarity of every material to treat the water that flows through the tube, which constitutes one of the two parts of the unit.

H2O WATER is made of two parts: a special transformer called **sequential rephasing transformer** and a **hydraulic part** constituted by a tube in which the water flows.

The tube is constituted of two parts: a tube having a section equal to that of the pipeline in which the device will be mounted and a larger tube containing a group of coils that raps the first.

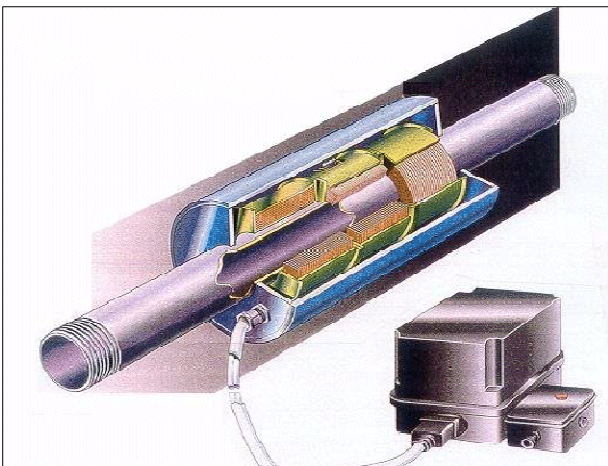
THE HYDRAULIC PART

The cylinder that wraps the tube in which the water flows contains a group of coils (3 or 4 depending on the size of the device)

The coils are made of copper and silver wire wound in a specific way to ensure the correct amplification of the signal coming from the transformer.

The central coil has been designed so that two reels of wire are overlapped (L1 and L2). Each coil is driven separately by the sequential rephasing transformer.

Water flows through the central tube without entering in contact with the group of coils, but undergoing the generated electric field.



The photo does not represent the actual product

SEQUENTIAL REPHASING TRANSFORMER

The heart of the system is its **sequential rephasing transformer**.

The transformer reduces the mains electric voltage to a tension between 12 and 24 Volts (depending on the dimension of the device) and generates frequencies which are multiple of the line frequency up to 400 Hz.

This is made possible through its particular patented design.

The transformer is made of two primary and two secondary windings having the first two in opposing phase.

The signal generated is sent to the group of coils after a first passage to a transistor mounted on a heat dissipater above the hydraulic tube to cut the wave peaks.

The frequency generated in the tube is between 150 Hz and 5,5 MHz.



The photo does not represent the actual product

WATER

Water has variable dielectric properties; in fact water's electric conductivity depends on the minerals and micro organisms that it contains.

The water that flows inside the tube is a fundamental part of the system as it interacts with the device creating the condition to obtain the necessary electric field for the water treatment. In other words the **H₂O WATER** acts as a mono stable oscillator.

To better understand what happens inside the device we need to explain the effects of an electric field.

An electric field can generate different effects depending on the type of material and the mobility of the electric charges that constitute it. When the electric charges have a long range mobility inside of the material we obtain a current flow; therefore, we talk about of electric conductor.

When the mobility of the electric charges is contained within a limited space the material is said to be an isolator and defined as dielectric.

In this case the main phenomenon that can be observed is an accumulation of energy within the material due to the formation of a "total electric moment".

The most important property of dielectric material from a practical point of view is the effect you obtain when the material is inserted between two conductive armours. In fact, the capacity of the condenser (the relation between the electric charge and the difference in potential) increases when a dielectric is included. The type of material inserted in the electric field is referred as *dielectric constant*.

The dielectric constant is an intensive property of the material and it depends on its thermodynamic status; therefore, it is in function of the pressure and temperature or volume and temperature.

Looking to the phenomenon at a molecular level we can observe that the positive electric charges and the negative electric charges that constitute the material of the dielectric tend to move away from each other due to the applied electric field. The electric field that acts on the dielectric, that in our case is water, cannot be too intense as above a threshold value (*dielectric rigidity*) we can observe an electric shock that destroys irreversibly the material.

The **H2O WATER** device solves the problems linked to application of high voltages by generating high frequencies.

In other words, the **H2O WATER** generates low tension and high frequencies to prevent damaging water's molecular structure intervening only on those elements that constitute interference in the electric bond between oxygen and hydrogen.

DESCALER FUNCTION

Due to its chemical properties, dissolution of CO₂ in water is followed by hydration with a slight formation of carbonic acid.

Carbonic acid, if it is not influenced by other factors, partially divides itself giving to the solution an acid basis,

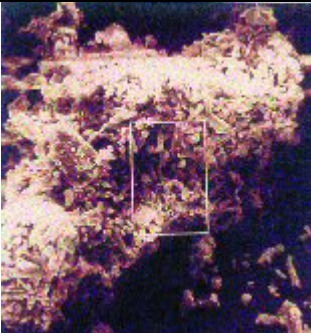
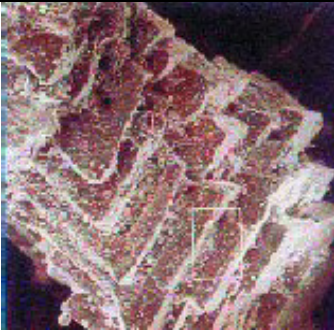
carbonate anions freed during the process form insoluble salt with diffused cations, in example calcium cations Ca²⁺ and magnesium Mg²⁺.

Calcium carbonate is found in nature in limestone rocks and as a mineral mainly under the form of **calcite** or **aragonite**.

In water calcium carbonate tends to organise itself in trigonite structures (**calcite**), which are compact, scarcely soluble and extremely adhesive.

By applying an electric field as the one generated by the **H2O WATER** device, it is possible to block the formation of calcite crystals and to form rhombic shaped crystals that undergo by the name of **aragonite**.

Therefore, with the action of radio waves generated by the **H2O WATER** device, the para-colloidal particles of calcium carbonate charged by ionic absorption do not become calcite, but assume a rhombic form becoming aragonite, a friable and not adhesive structure.

	
<p>Aragonite: the photo taken with an electronic microscope clearly shows the delicate structure of aragonite</p>	<p>Calcite: the photo taken with an electronic microscope clearly shows the high cohesion this kind of structure has</p>

The fact that calcium carbonate does not become calcite prevents the formation of deposits of scale and allows pre-existing scale to be removed by the abrasion effect that water has.

Aragonite is in fact not capable of closing the cracks formed in the deposits of scale due to its friable structure.

ANTI-BACTERIA EFFECT

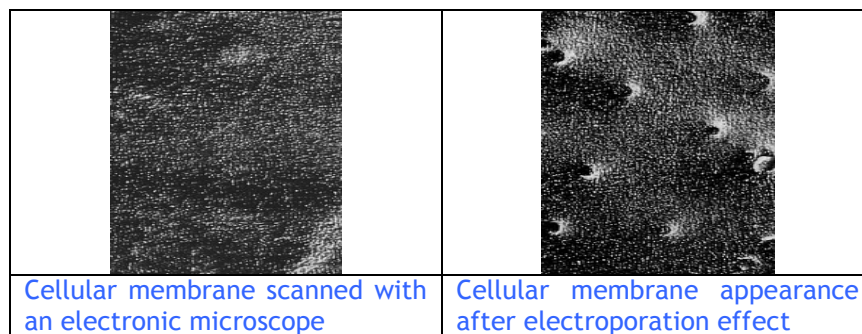
To diminish the amount of bacteria present in water, the **H2O WATER** device produce an anti-bacteria effect

This particular construction allows the device to generate an other frequency slightly different from the one emitted by the group of coils.

The effect that is obtained is a further improvement in the amplification of the frequencies generated by the transformer causing a more efficient descaling and molecular organisation. Moreover a low voltage is directly applied in water with the consequence of drastically diminishing the quantity of bacteria (up to 95%) by **electroporation**.

The flow of electricity that spreads in water procures a dielectric brake-down of the bacteria's membrane forming a number of pores.

The pores formed on the membrane prevent the bacteria from proliferating and surviving.



The frequencies generated by the **H2O WATER** device organise water molecules strengthening the electric bond between oxygen and hydrogen inhibiting anything that could cause interference to it including bacteria.

INSTALLATION

The hydraulic part of the **H2O WATER** device is installed on the main cold water pipe before any thermo shock and after the water counter.

Install the hydraulic part respecting the arrow direction shown on the device.

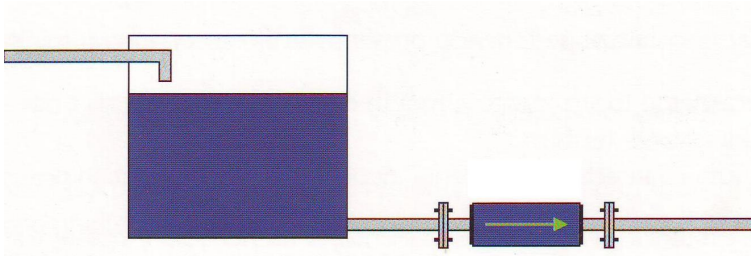
The transformer must be placed at a minimum distance of 60 cm. from the hydraulic part.

Both transformer and hydraulic part must be placed minimum at 30 cm. from any nearby device.

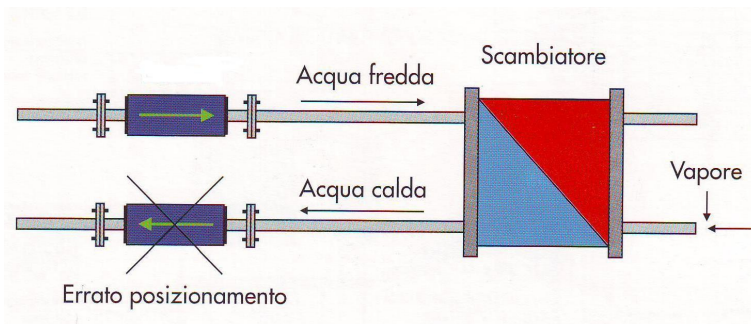
No length adjustment can be made to the cord that links the transformer to the hydraulic part.

Inserting the plug in the mains will cause the two LED mounted on the plastic cover of the transformer light-up: RED LED confirms the presence of electricity from the mains and GREEN LED the correct operation of the device.

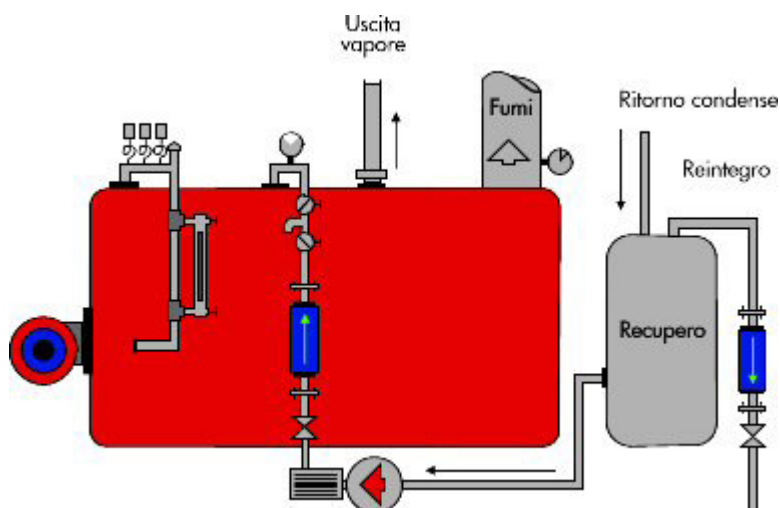
It is recommended to install the hydraulic part on a by-pass linked to the main cold water pipe line.



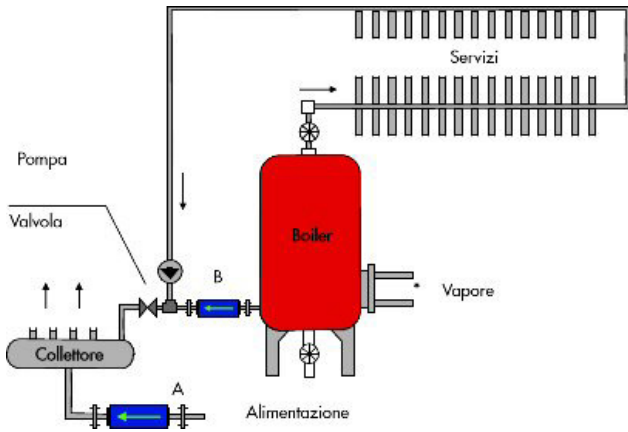
When there is a tank the **H2O WATER** device must be installed after it



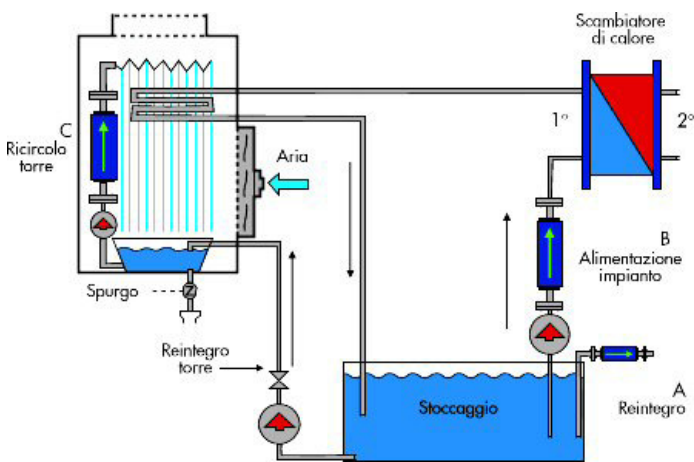
When there is an heat exchanger **H2O WATER** device must be installed on the cold water pipe



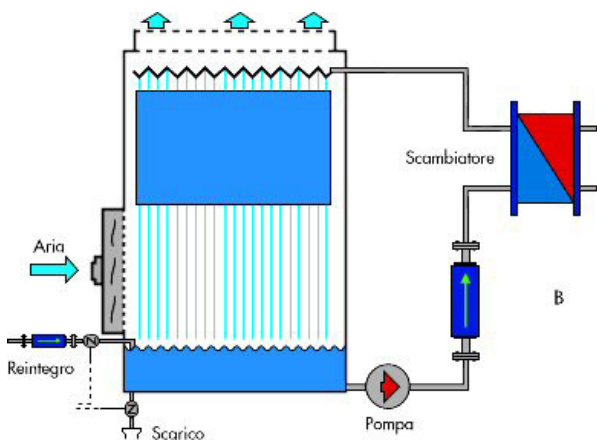
Example of application of the **H2O WATER** device in the steam generators



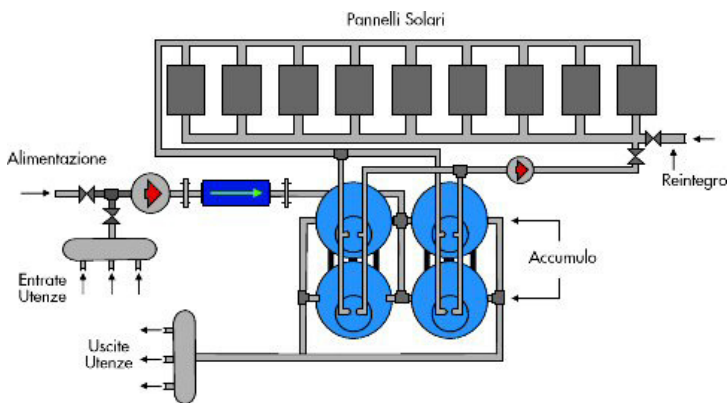
Another example of application of the **H2O WATER** device in the steam generators



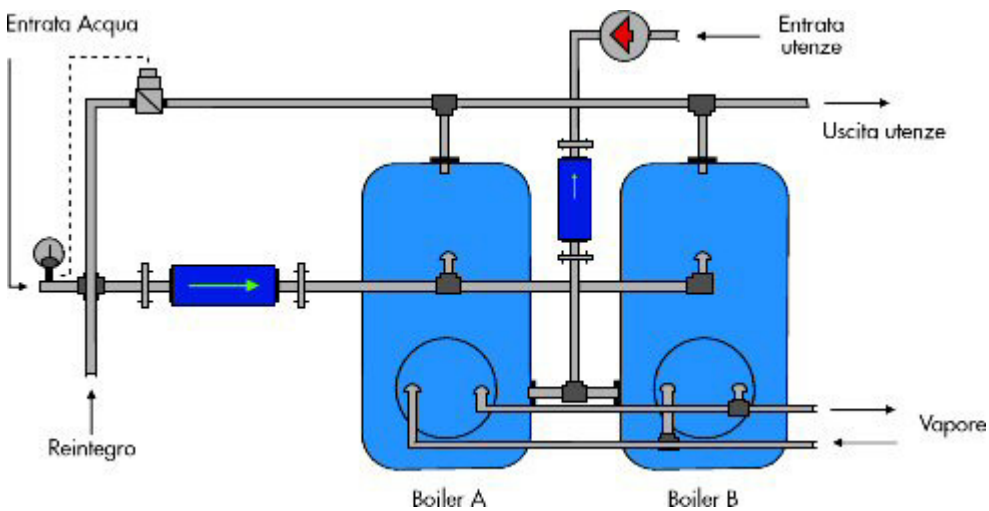
Application of **H2O WATER** device in cooling tower



Application of **H2O WATER** device in cooling tower



Application of **H2O WATER** device in the circuit of solar panels



Application of **H2O WATER** device in water heating system with boiler.

When there are tanks or standing water (eg. Artificial lakes) it is possible to treat the water contained therein by the introduction of special bars made of hydrates of aluminium.

The bars are immersed in the water and connected to a transformer similar to the one used to supply electrical power at the **H2O WATER** device.

The release of hydrated aluminium happens gradually according to the characteristics of the treated water.

For this reason it is necessary to provide data on the characteristics of water before proceeding with the installation of the water treatment system.

The bars need to be replaced, according to the characteristics of the water, at regular intervals that may vary from 6 to 12 months.

The water that exits the tank must be treated by an **H2O WATER** device in order to obtain a descaling effect

OPERATING CHARACTERISTICS

Operating Voltage: 230 Volt / 50 Hz (Europe)
110 Volt / 60 Hz (USA)

Operating Temperature: Min. -5°C / Max +80°C

Water Flow: assuming that the hydraulic system has been correctly dimensioned and installed, the **H2O WATER** device ensures the treatment of all the water that passes through it.
As an example :

H2O WATER DIAMETER	3/8"	1/2"	3/4"	1"	1" 1/2	2"	2" 1/2	3"	4"	6"
WATER FLOW MC/H	23	35	65	120	270	470	750	1060	1900	2.550

Maintenance: H2O WATER device doesn't need any maintenance

TECHNICAL CHARACTERISTICS

POWER CONSUMPTION

CODE	DESCRIPTION	DIAMETER (inch)	W/H
1037.FI.CE	Con elettrodo antibatterico	3/8	46
1050.FI.CE	Con elettrodo antibatterico	1/2	56
1075.FI.CE	Con elettrodo antibatterico	3/4	83
1100.FI.CE	Con elettrodo antibatterico	1	116
1100.FI.PE	Specifico per piscine	1	116
1150.FI.CE	Con elettrodo antibatterico	1 1/2	170
1150.FI.PE	Specifico per piscine	1 1/2	170
1200.FI.CE	Con elettrodo antibatterico	2	210
1200.FI.PE	Specifico per piscine	2	210
1250.FI.CE	Con elettrodo antibatterico	2 1/2	255
1300.FI.CE	Con elettrodo antibatterico	3	285
1400.FI.CE	Con elettrodo antibatterico	4	320
1600.FI.CE	Con elettrodo antibatterico	6	360
1800.FI.CE	Con elettrodo antibatterico	8	410

The power consumption value are the maximum measured with maximum load

DIMENSIONS

CODE	DIAMETER (inch)	WEIGHT (kg)	TOTAL LENGTH (mm)	ESTERNAL DIAMETER (mm)
1037.FI.CE	3/8	n.d.	315	60
1050.FI.CE	1/2	n.d.	315	60
1075.FI.CE	3/4	n.d.	478	75
1100.FI.CE	1	n.d.	575	95
1150.FI.CE	1 1/2	n.d.	575	95
1200.FI.CE	2	n.d.	n.d.	n.d.
1250.FI.CE	2 1/2	n.d.	n.d.	n.d.
1300.FI.CE	3	n.d.	n.d.	n.d.
1400.FI.CE	4	n.d.	n.d.	n.d.
1600.FI.CE	6	n.d.	n.d.	n.d.
1800.FI.CE	8	n.d.	n.d.	n.d.



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