



AQUALINE

INDUSTRIAL COMMERCIAL AND TECHNICAL REPORT



Description

Aqualine is an innovative patented device that has the ability to eliminate existing limestone in water and to prevent its formation.

This device is equipped with a Nobilizer: it is a system that delivers a mixture that uses an innovative technique capable of dissolving inert gases in water, in order to enhance the function of water as a universal solvent. It is a mixture of food gases with a high level of sanitation which allows the dissolution of existing limestone and prevents the formation of new encrustations, effectively extending the life of the systems and connected equipment.



The plumbing systems of any industrial, civil or hospital building and of any irrigation system, in addition to water, transport countless other organic and inorganic substances inside. These substances tend to form encrustations which stratify inside the pipes and become real impenetrable rocks. Encrusted surfaces, in addition to being an ideal environment for the proliferation of microorganisms, significantly cause pressure drops in the systems, forcing them to operate at greater pressure. All this causes failures and damage to the entire hydraulic system, as well as greater electricity consumption.

The presence of carbonate deposits therefore represents not only the main problem at the level of hydro-sanitary and irrigation systems, but constitutes the triggering cause of a whole series of further problems which we will analyze in detail below.

Mechanism of Action and Advantages

The standard gas mixture present inside the Aqualine NOBILIZER acts on the transformation process of Calcium and Magnesium carbonates (solid phase) into bicarbonates (soluble in water) through the following reactions:



Dependence of solubility on the pressure of the solute in the gaseous state (Henry's Law)

By maintaining the temperature of a solution constant, the solubility of the gases dissolved in it depends on the partial pressure that the gas itself exerts on the solution. In fact, there is an equilibrium between the solute present in the gaseous phase and the same dissolved within the solvent. William Henry formulated a law relating the solubility of gas and its partial pressure. The Henry's law decrees that a gas is more soluble the more the partial pressure it exerts increases, according to a constant of proportionality called Henry's constant, depending on the nature of both the solvent and the solute.

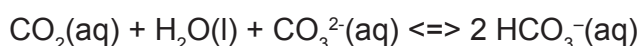
Indicating the concentration of the gas with c , with p its partial pressure and k as a constant, Henry's law is described by the formula:

$$c_{(\text{gas})} = k_{(\text{gas/solv})} \cdot p_{(\text{gas})}$$

The Aqualine device exploits the principle on which Henry's law is based in order to avoid the formation and precipitation of calcium carbonate. Specifically, it acts on the balance of bicarbonate formation by moving it to the right (i.e. increasing the formation of products) due to the effect of the common ion given by the inert gas dissolved in solution. The concentration of the gas to be introduced is, in accordance with Henry's law, proportional to the pressure of the hydraulic circuit on which the device is installed.

Mechanism of Action and Advantages

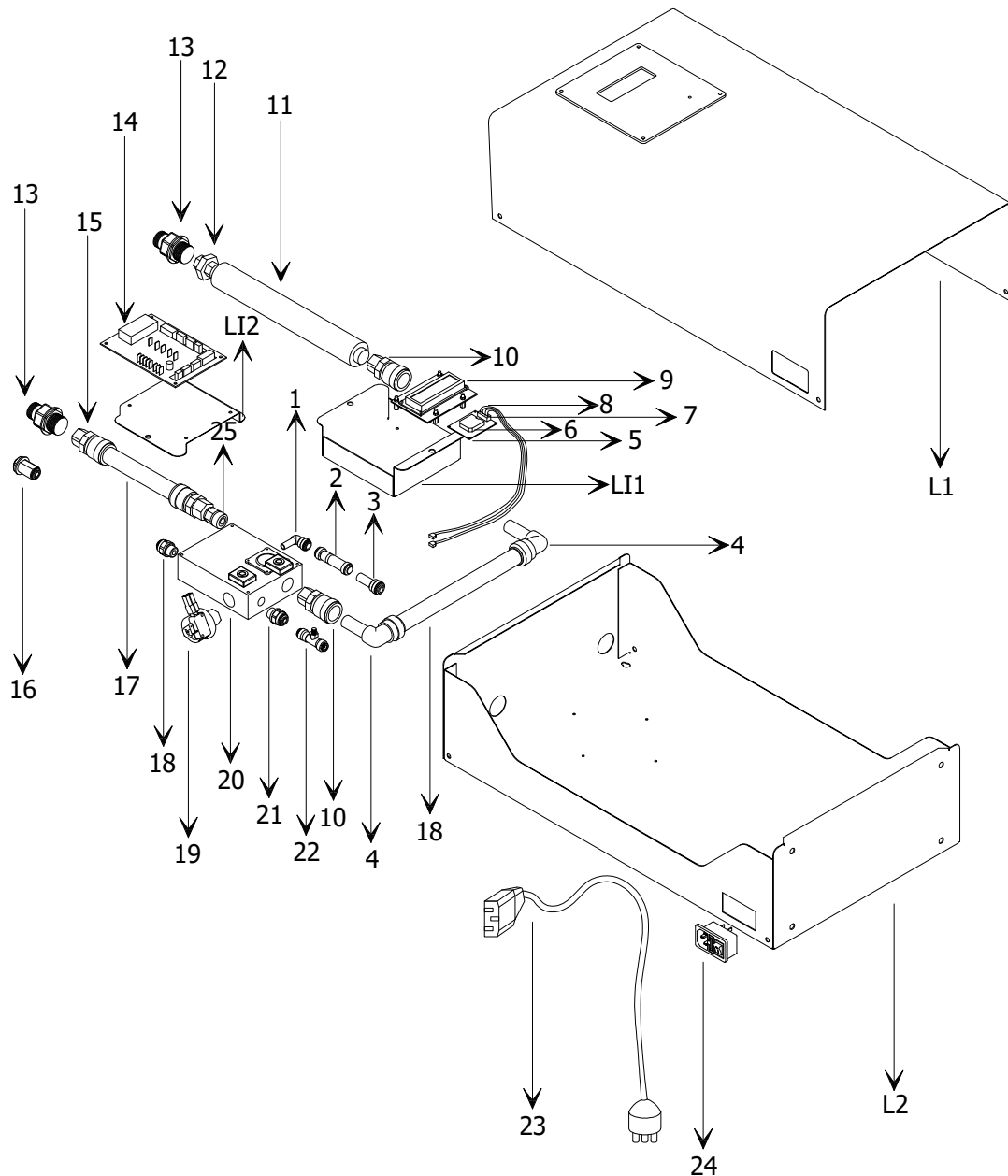
As we described previously, there is a dynamic equilibrium relationship between carbonates, water and carbon dioxide (CO₂), governed by temperature, pressure, pH of the solution etc. This equilibrium is described as follows, omitting the writing of the ions (Calcium or Magnesium) since they do not take part in this reaction:



To the right of this balance we have the bicarbonate ion, a species whose concentration we aim to increase due to its high solubility in water. To do this, we exploit Le Chatelier's principle ("when a system is disturbed as a result of an external action, it reacts in such a way as to reduce or cancel the stress itself, re-establishing equilibrium"), increasing the concentration of carbon dioxide in solution second quantity according to Henry's law; the equilibrium of the reaction described above will be shifted to the right, thus increasing the formation of bicarbonates and consequently inhibiting the precipitation of carbonate, thus obtaining the expected result.

Device Description

Exploded view



Order Example:

ITEM 5	SP-MOD-WIFI	WI-FI MODULE	PZ. 1
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Device Description

ITEM	DEVICE	ITEM COD	DESCRIPTION
1	ENK3.4	PM480622E	ELBOW NPTF 6mm -1/4"
2	ENK3.4	SP-FMBVNR	6mm CHECK VALVE
3	ENK3.4	PM060604E	STEM REDUCER 6mm-4mm
4	ENK3.4	PM-PM222222E	PLUG IN ELBOW 22mm
5	ENK3.4	SP-MOD-WIFI	Wi-Fi MODULE
6	ENK3.4	SP-BASMODWIFI	Wi-Fi METAL BRACKET
7	ENK3.4	SP-CONN4POLWIFI	4 POLES Wi-Fi CONNECTOR
8	ENK3.4	SP-CV4F50CM	4 PIN ELECTRICAL WIRE
9	ENK3.4	SP-DISPLALIEPR	LCD DISPLAY
10	ENK3.4	PM-CM012216S	SPEEDFIT STRAIGHT ADAPTER PVC PIPE, 22mm-3/4" BSP
11	ENK3.4	SP.MISCSTDN20	STATIC MIXER FEMALE 3/4" DN20
12	ENK3.4	SP-RACOTT3PZ3/4M-F	BRASS INLET PLUG 3PCS 3/4" MALE-FEMALE
13	ENK3.4	SP-OTATTSERB34	COUPLING JOINT TANK 3/4"
14	ENK3.4	SP-SCHECSEMPLUNIK	ELECTRONIC SYSTEM WAPLC CONTROL
15	ENK3.4	PM-PSE3202W	SPEEDFIT FEMALE COUPLER/TAP CONNECTOR 22mm × 3/4"
16	ENK3.4	NCPI1208S-P	BULKHEAD CONNECTOR WITH PL
17	ENK3.4	PM-22BPEX	CROSS LINKED POLYETHYLENE (PE-X) PLASTIC PIPE 22mm
18	ENK3.4	PI010812S	ACETAL GRAY MALE CONNECTOR (BSPP Thread) 1/4"X1/4"
19	ENK3.4	RO-SPAF15DD35	1,5BAR PRESSURE GAUGE
20	ENK3.4	SP-MONBLDECAL	DELACIFICATION INTEGRATED SYSTEM
21	ENK3.4	PM010412E	METRIC ACETAL BLACK MALE CONNECTOR (BSPP Thread) 4mmX1/4"
22	ENK3.4	SP-REGFL4	FLOW RATE REDUCER
23	ENK3.4	H5V310N02010A-C	ELECTRIC WELD 3XTL~2ME SCHUCKO PLUG
24	ENK3.4	FM-PP	CONNETTOR 2FUSES WISWITCH
25	ENK3.4	SP-FLSSMTR3/4	BRASS FLOW RATE METER 3/4"
L1	ENK3.5	0001B	UPPER METAL COVER
L2	ENK3.6	0001C	LOWER METAL COVER
LI1	ENK3.7	0001ST	Wi-Fi METAL WRENCH
LI2	ENK3.8	0002ST	PLC METAL WRENCH

Aqualine Commercial Industrial

The system is installed on No. 2 AISI 304 stainless steel skids, the final dimensions of which are approx:

Aqualine industrial: upto 4mt x 1mt (dimensions subject to change) 54 inch pipe.

System (Bespoke size to each build).

