FIMAP®

SERVICE MANUAL

AQUÆ

FIMAP®

chemical-free cleaning solution

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EN | series PERFORMANCE

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INTRODUCTION

Manual purpose

Good service requires thorough training and well-structured training materials.

This service manual has been created to assist certified service technicians with instructions and reference guide. It is recommended that you read this document completely before servicing the machine.

History updating

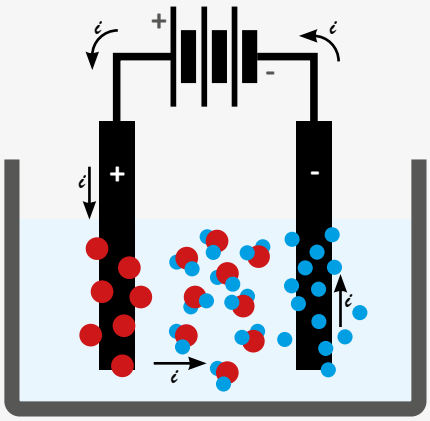
VERSION	CHANGE	REFERENCES	
	Update history added	Sez.	Pag.

AQUAE SYSTEM

Operating principles

AQUAE is intended to be an environmentally friendly alternative to the traditional multipurpose cleaner generally used in maintenance cleaning.

To obtain the solution, the electrolysis process is used to obtain HYPOCHLOROSIS ACID.



Electrolysis of water is an electrolytic process in which the passage of an electric current causes the breakdown of water into oxygen and hydrogen gas.

Example of a table with analysis of the composition of tap water:

WATER QUALITY	Municipality: ZEVIO Periodo: 1° SEMESTRE 2023		
DESCRIPTION	LIMITS	U.m.	VALUE
pH	6,5 ÷ 9,5		7,6
Conductivity	2500	µS/cm	520
Fixed residue at 180°C	1500	mg/l	390
Durezza	15 ÷ 50	°F	30
Bicarbonates		mg/l	231
Magnesium		mg/l	28
Calcium		mg/l	74
Sodium	200	mg/l	5
Potassium		mg/l	2
Ammonia	0,50	mg/l	<0,05
Fluorides	1,50	mg/l	0,10
Chlorides	250	mg/l	9
Sulphates	250		29
Nitrites	0,50		<0,02
Nitraties	50	mg/l	19
Manganese	50	µg/l	<5
Arsenic	10	µg/l	1
Residual chlorine	0,2	mg/l	<0,1

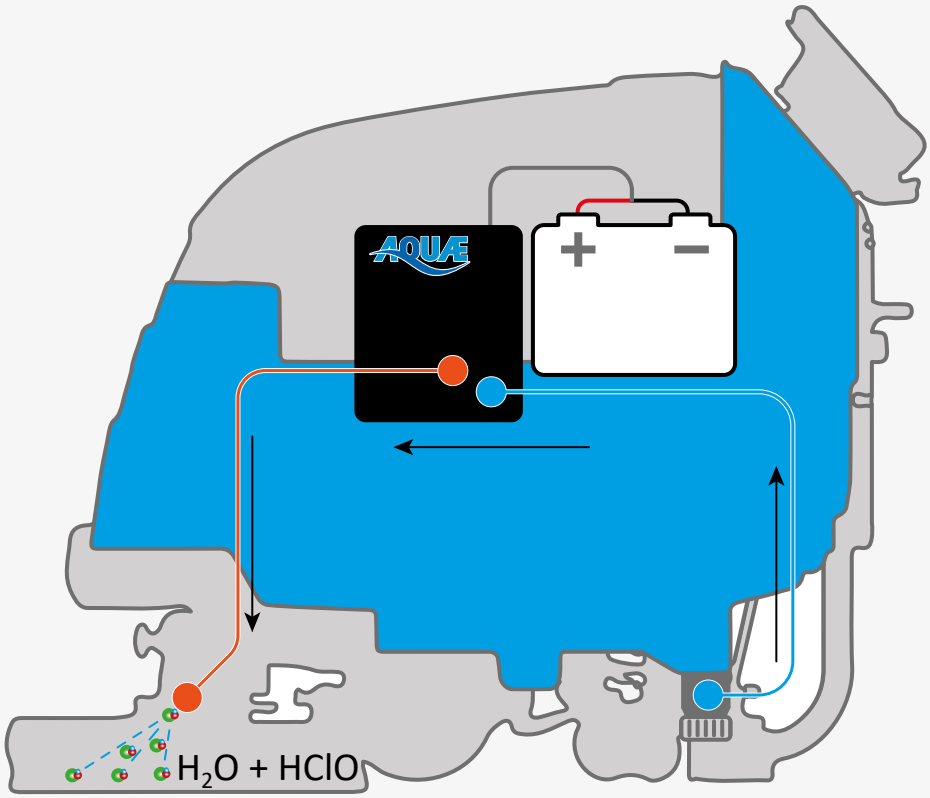
To obtain HYPOCHLOROSIS ACID, it is important that there is a minimum concentration of chlorides (10ppm) in the water used for the chemical reaction, as well as a water hardness of about 5°F.

It is advisable to use softened water and avoid hard water as it deposits limescale inside the system over time, significantly reducing its performance.

The hypochlorous acid generated returns quickly in the form of chloride without leaving any residue (5h).

If the equipment is used under the intended conditions (with softened water and without detergents in the solution tank), it requires no maintenance.

Hydraulic system

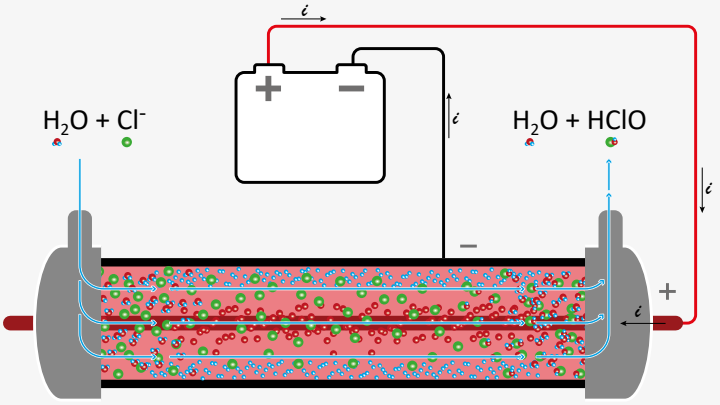


The contents of the main tank should preferably be softened mains water, in which dissolved Cl- chlorides are naturally present.

Distilled water cannot be used, because electrolysis of pure water does not produce HClO.

Both acidic (pH 1 diluted to 2%) and basic (pH 14 diluted to 2%) solutions can also be used without adverse effects, but it is not recommended to put the detergent in the solution tank.

Reactors (or electrolytic cells) consist of two coaxial electrodes, between which the water flow passes and to which an electrical potential difference is applied.



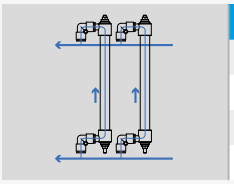
The supply voltage is that of the washer-dryer (24V or 36V) and results in an increase in consumption of approximately 5÷10A depending on the washer-dryer on which it is installed, the set water flow rates and the specific electrical conductivity of the water used

Additional kits

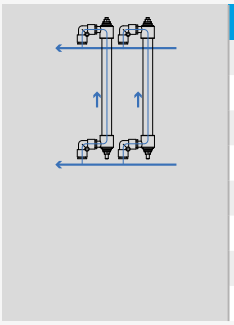
- Doser kit (DS)
  This is an additional pump with a small tank of detergent that can be injected directly into the centre of the washing brushes if required. This function is activated by means of the "POWER MODE" control in synergy with the usual actions to improve cleaning (reduced speed, increased solution flow, possible extra basement pressure).
- Gun kit
  Operation is the same as the traditional tank cleaning gun, but the water is electrolysed before being.

Set-ups

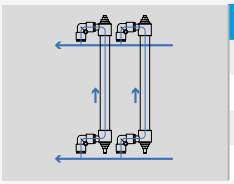
The line of machines on which this technology will be present has been confirmed. The line will cover washer-dryer models:



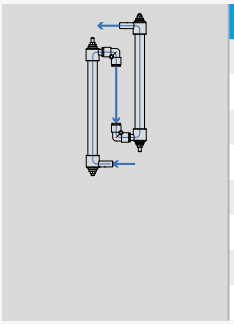
EMX GRUPPO IDRICO	
232744	AQUAE
232740	AQUAE + DS
232739	AQUAE + GUN
232571	AQUAE + DS + GUN



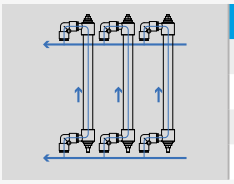
MAXIMA GRUPPO IDRICO	
232850	AQUAE
232851	AQUAE + DS
232852	AQUAE + GUN
232853	AQUAE + DS + GUN
232953	AQUAE
232954	AQUAE + DS
232955	AQUAE + GUN
232956	AQUAE + DS + GUN



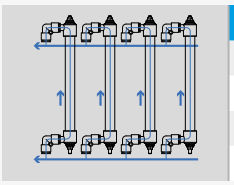
MXL GRUPPO IDRICO	
232854	AQUAE
232855	AQUAE + DS
232856	AQUAE + GUN
232857	AQUAE + DS + GUN



BMG GRUPPO IDRICO	
232858	AQUAE
232859	AQUAE + DS
232860	AQUAE + GUN
232861	AQUAE + DS + GUN
232957	AQUAE
232958	AQUAE + DS
232959	AQUAE + GUN
232960	AQUAE + DS + GUN



MMG GRUPPO IDRICO	
232862	AQUAE
232863	AQUAE + DS
232864	AQUAE + PISTOLA
232865	AQUAE + DS + PISTOLA

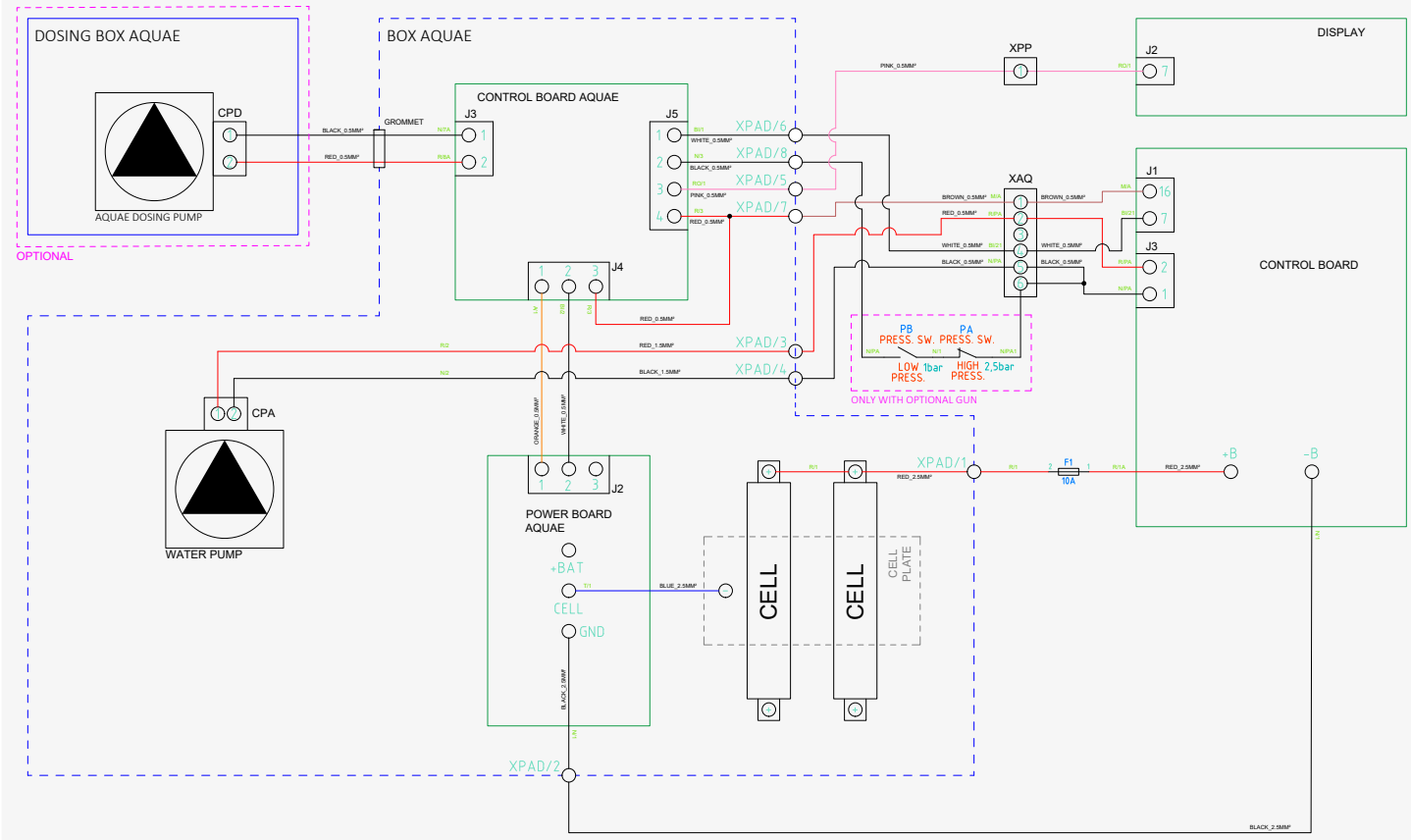


MAGNA GRUPPO IDRICO	
232866	AQUAE
232867	AQUAE + DS
232868	AQUAE + GUN
232869	AQUAE + DS + GUN

The number of cells to be inserted on the machines will vary depending on the flow rates and will range from two to four electrolytic cells depending on the machine configuration.

Electrical system

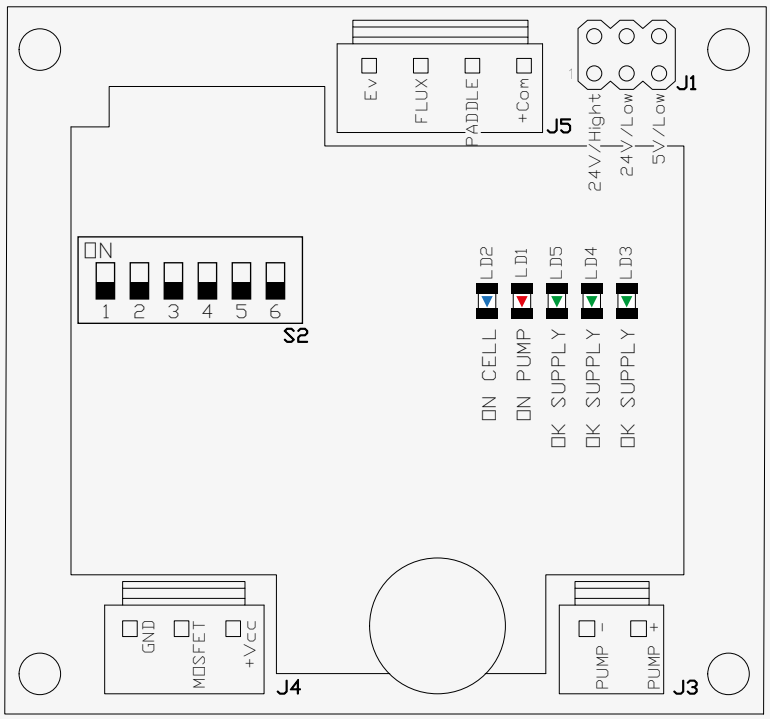
Electrical diagram



Electrical diagram

This board has two main functions, namely:

1. Cell Power Supply/Off (ON/OFF)
2. Dosing pump power on/off (optional)

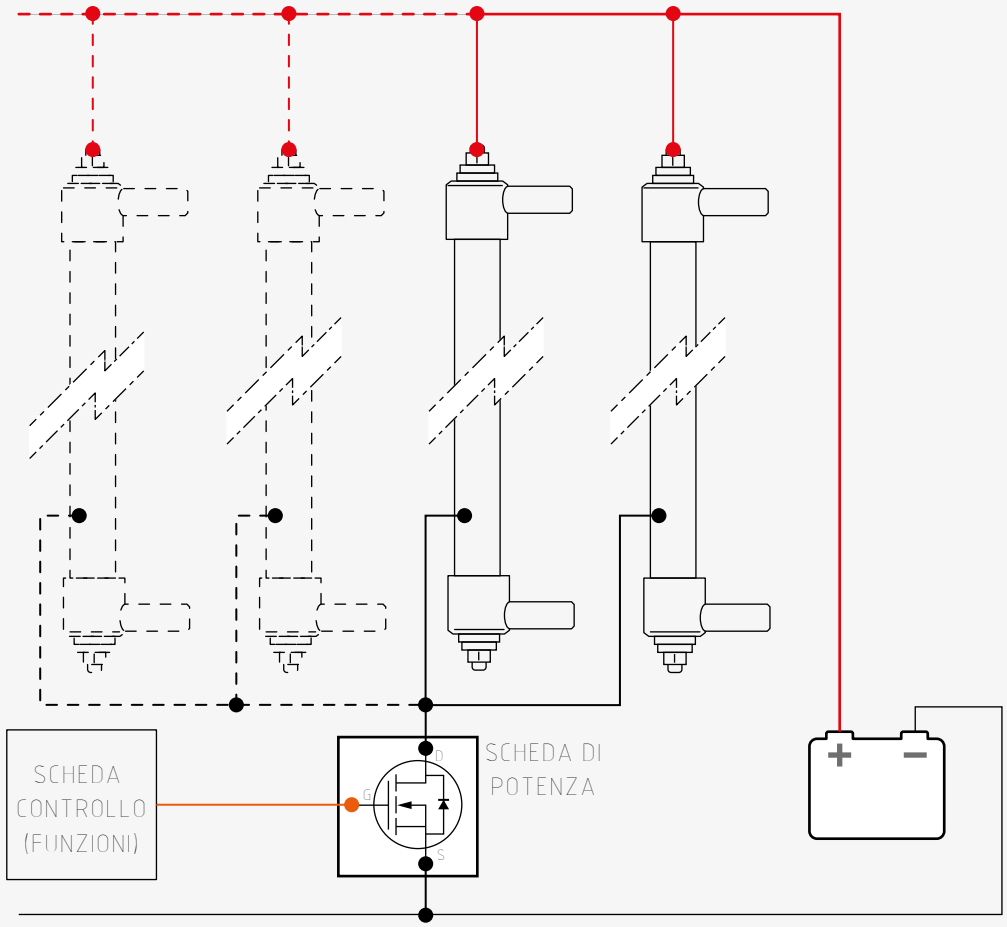


Legend:

1. LD1= Dosing Pump Command OK
2. LD2= Cell Command OK
3. LD3= Presence of Power Supply (Battery)
4. LD4= 12V voltage present on board
5. LD5= 5V voltage present on board

Cell Power Supply and Shutdown

The board controls the power supply to the cells when certain conditions occur, without any modulation (ON/OFF only). It does this by sending the power command to the power board, which controls the negative of the cells.



The following conditions must be fulfilled to supply the cells:

- Solenoid Valve Input Active (solenoid valve energised)
- Flux Input Active (pump powered)

It is sufficient for one of the two to be active.

To cut power to the cells (once powered) it is sufficient for one of the two inputs listed above to be switched off. The switch-off occurs with a certain delay time, defined according to the configuration set on DIP-Switch S2. It can be configured as follows:

DS1	DS2	DELAY
OFF	OFF	0 sec
ON	OFF	5 sec
OFF	ON	15 sec
ON	ON	30 sec

Dosing Pump Power Supply *(Optional)*

The pump is controlled by a PWM modulated signal, so that it can handle various detergent flow rates.

The following conditions must be met to control the dosing pump:

- Paddle input POWER On for less than 60 or 120 sec. (Machine in POWER mode)
- Solenoid Valve Input Active (Solenoid Valve energized)

Both must be checked.
When the Paddle POWER input is enabled, the board controls the pump with the modulation and time configured via DIP-Switch S2.

DS3	DS4	DS5	TON	TOFF	Duty Cycle
OFF	OFF	OFF	1 sec	9 sec	10 %
ON	OFF	OFF	2 sec	8 sec	20 %
OFF	ON	OFF	3 sec	7 sec	30 %
ON	ON	OFF	4 sec	6 sec	40 %
OFF	OFF	ON	5 sec	5 sec	50 %
ON	OFF	ON	6 sec	4 sec	60 %
OFF	ON	ON	7 ec	3 sec	70 %
ON	ON	ON	10 sec	0 sec	100 %

DS6	Operating time
OFF	60 sec
ON	120 sec

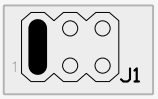
When the board is switched on, an 8-second filter is set within which the Paddle POWER input is not monitored.

When the power input is switched on, the countdown starts and the countdown does not stop regardless of the mode of operation of the machine. The power input is no longer taken into account before the end of any countdown in progress.

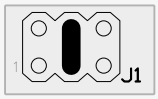
Example:

1. *Solenoid Valve Input Active*
2. *Paddle input Active*
3. *Pump is controlled and 60s count starts*
4. *30s pass, then solenoid valve input is deactivated*
5. *Pump is switched off*
6. *5s pass, then solenoid valve input is activated again*
7. *Pump must be switched on for 25s, then off*

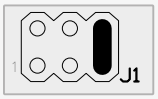
The board does not monitor any changes in the status of the Paddle POWER input during counting.
It is possible to select this mode via the jumpers on connector J1



PW activation mode:
V+ Power 24 V



PW activation mode:
V-

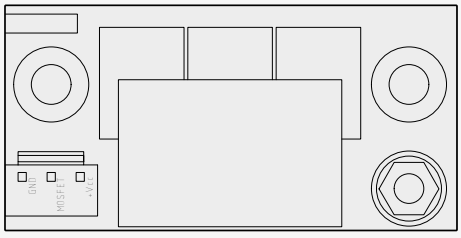


PW activation mode:
J1 V+ Power 5 V

An anti-rebound filter of 100ms is present on all inputs, so that any spikes or noise can unintentionally enable the functions.

Power board

This board has one main function, i.e. to supply power to all cells installed on the machine once a command is received from the control board.



Cell power supply	Single cell consumption
24 V	2,5 A
36 V	3 A

The board is protected against system malfunctions (e.g. cell shorts) by means of a fuse and thermal circuit breaker

Troubleshooting

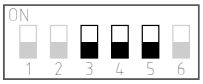
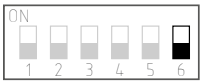
Power board

LED 1	LED 2	LED 3	LED 4	LED 5	KEY	DESCRIPTION	
■	■	□	□	□	✓	No power supply Driver board	Check wiring
■	■	■	□	□	✓	Board fault	Replace board

Power board

LED 1	LED 2	LED 3	LED 4	LED 5	KEY	DESCRIPTION	
□	■	■	■	■	✓	Cell control side fault	Check voltage between-B (JMD) and pin J5 1 (EV) WITH GUN OPERATION Verify voltage between-B (JMD) and pin J5 2 (Flux)
■	□	■	■	■	✓	Power control side fault	• Check voltage between -B (JMD) and pin J5 3 (Paddle); • if the above is OK, check the status of JUMPER J1

Configuration problems

LED 1	LED 2	LED 3	LED 4	LED 5	KEY	DESCRIPTION	
■	□	■	■	■	✓	Cell control side fault	Check the Cell Power Supply Dip Switch setting
Led display: Cell Power Supply							
□	■	■	■	■	✓	Time not consistent with expectations	Check the Pump Modulation Dip Switch setting  and the Dip Switch Pump Feeding Time 
Led display: Pump modulation							

Legenda:
■ ON □ OFF ■ Unaffected by setting

If the production of Hypochloric Acid (HClO) is odourless:	
The MOSFET board has burnt out, check the concentration of chlorides in the solution.	• Use a current clamp to check cell consumption; • Verify the integrity of the fuse; • Verify the concentration of chlorides within the solution; • Verify the integrity of the MOSFET board by checking that it is not short-circuited (place the tester tips between the GND-Battery and-Cell screws).

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