

Dear Customer,

Thank you for choosing a **MAMNET SALT ELECTROLYSIS** system for your swimming pool.

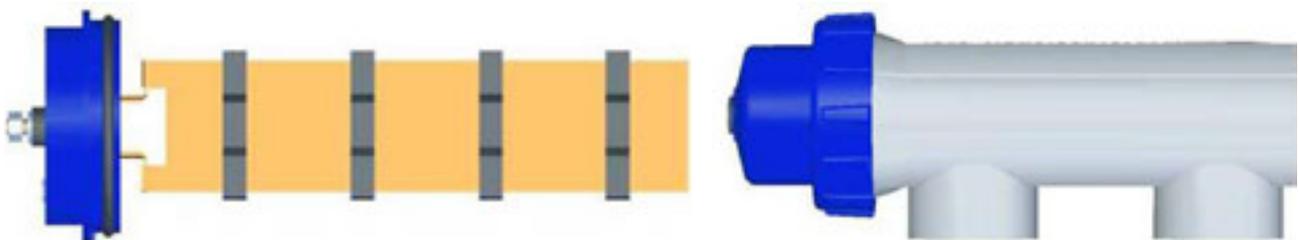
**MAMNET SALT ELECTROLYSIS SYSTEMS** have been designed and manufactured for the specific requirements of the water in your swimming pool. Its simple management, easy installation and low maintenance ensure that you will almost never have to worry about it.

Before beginning installation, carefully read this instructions manual and once the system has been started, keep it in a safe place for future reference.

The instructions in this manual describe the operation of the models **Mamnet 18 and Mamnet 35**.

CHECK elements supplied:

1. Central Processing Unit (CPU)
2. Electrode
3. Electrode holder
4. Manual



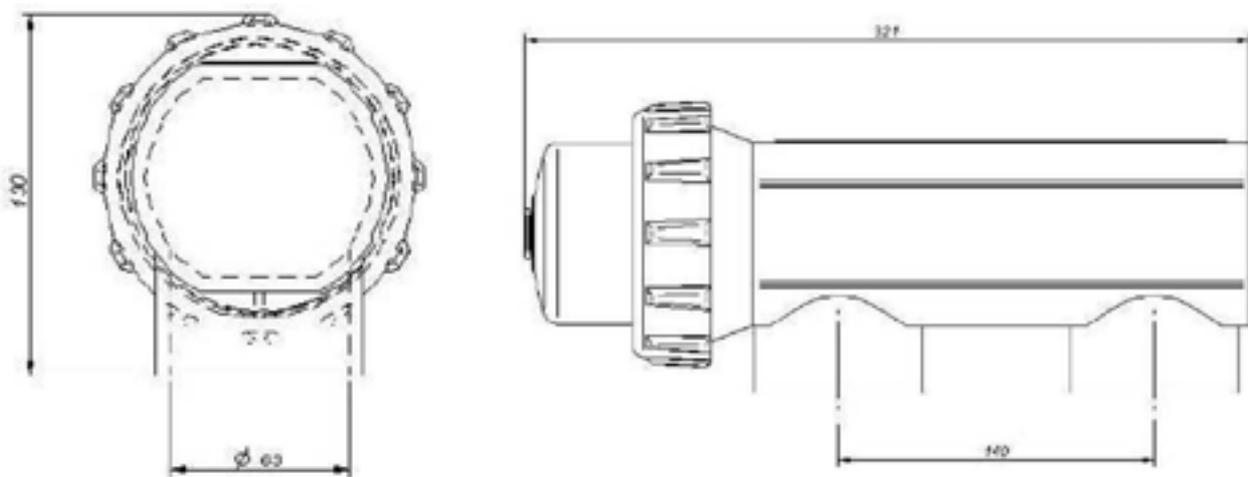
## VERY IMPORTANT

Before installation or carrying out any maintenance task, disconnect the power cable from the CPU (230 Vac).

- The system must be installed by qualified personnel, in accordance with all local and national electrical regulations.
- Check that the power supply voltage corresponds to that which is indicated on the label located on the side.
- Be sure the electrical connections are firm in order to avoid false contacts, resulting in over-heating.
- Do not connect the network power supply cable before having made all power supply connections to the electrolysis cell.
- Choose an installation site where the system will be easy to access and enable easy viewing of the CPU and the electrode.

## TECHNICAL SPECIFICATIONS:

### DIMENSIONS:



### CPU SPECIFICATIONS:

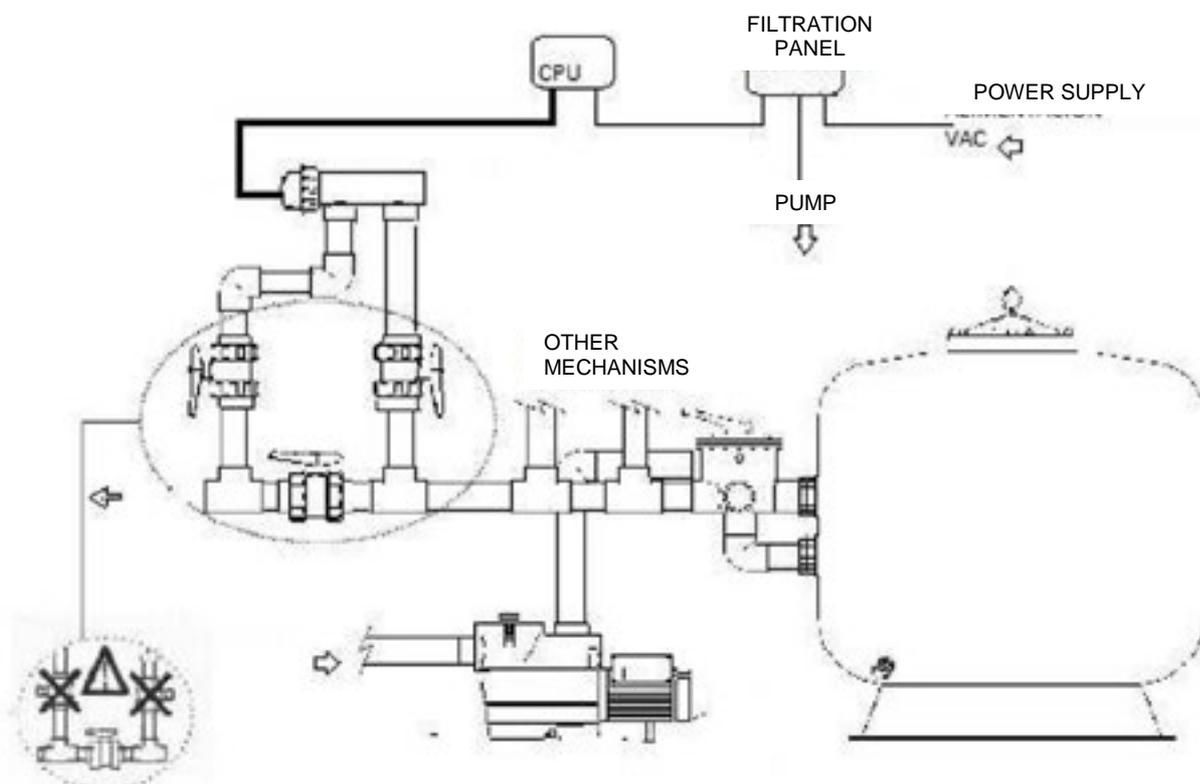
CONTROL	MICROPROCESSOR
POWER SUPPLY	230 V ac/50-60Hz/H50RR-F-3G (3 x 1 mm <sup>2</sup> )
OUTPUT	6 Vcc, 20A (MAMNET18)/40A (MAMNET35 max. RV-K-1000V 2X6 mm <sup>2</sup> CABLE ELECTRODES
CABLE FOR TEMPERATURE + WATER DETECTOR	3x1 mm <sup>2</sup> H05VV-F-3G1
SELF-CLEANING	AUTOMATIC PROGRAMMABLE POLARITY CHANGE
FUSIBLE	1,25A (MAMNET18)/3,15A (MAMNET35)
REFRIGERATION	CONVECTION/FORCED

## ELECTRODE SPECIFICATIONS:

RECOMMENDED SALINITY	4.5 gr NaCl / Litre
SALINITY RANGE	4-6 gr/L
ELECTRODE	TITANIUM WITH SPECIAL OXIDES
MAXIMUM PRESSURE	1,5 kg/cm <sup>2</sup>
ELECTRODE HOLDER	POLYMER FROM THE METHACRYLATE FAMILY
CONNECTION TO PIPEWORK	GLUED WITH PVC ADHESIVE / Ø 63
NaClO PRODUCTION (25°C 4,5 gr/L NaCl)	35gr/h 840gr/day MAMNET35 18gr/h 432 gr/day MAMNET18
MINIMUM FLOW RECOMMENDED	6m <sup>3</sup> /h MAMNET35 3m <sup>3</sup> /h MAMNET18
No OF PLATES PER ELECTRODE	10+ MAMNET 35 FLOW DETECTOR 6+ MAMNET 18 FLOW DETECTOR
TEMPERATURE DETECTOR	SEMI-CONDUCTOR
LOAD LOSS 20 m <sup>3</sup> /h	< 0,15 Kgr/cm <sup>2</sup>

## HOW TO INSTALL:

Recommended installation diagram:



## CPU :

- Always install the MAMNET system CPU vertically and on a rigid surface (wall).
- To guarantee a good state of conservation, the equipment must always be stored in a dry and well-ventilated place. Given the level of water-tightness of the MAMNET system's CPU, do not install during bad weather.
- The CPU must be installed sufficiently far away from the electrode holder so that it is not subject to accidental water splashes. It must also be installed above the CPU.
- **Be especially careful to avoid corrosive environments due to minimised pH solutions (particularly those made with hydrochloric acid "HCl", also known commercially as "muriatic acid" or "spirits of salt").**
- **It is recommended to use minimised pH (pH minus) based on diluted sulphur to avoid corrosive environments in the technical area.**
- **The CPUs "ALARM" contact must be connected to a potential-free contact in the purifier's control panel, so that the pump and the MAMNET system are connected simultaneously. If the pump stops for any reason, the CPU will also stop.**

## ELECTRODE HOLDER:

The electrode holder is made of a transparent polymer which houses the electrode. Ensure the electrode holder is in a place that is protected from bad weather **and always behind the filtration system**. If there are other devices in the facility such as heat pumps, control systems, etc., these must always be put into place before the electrolysis system.

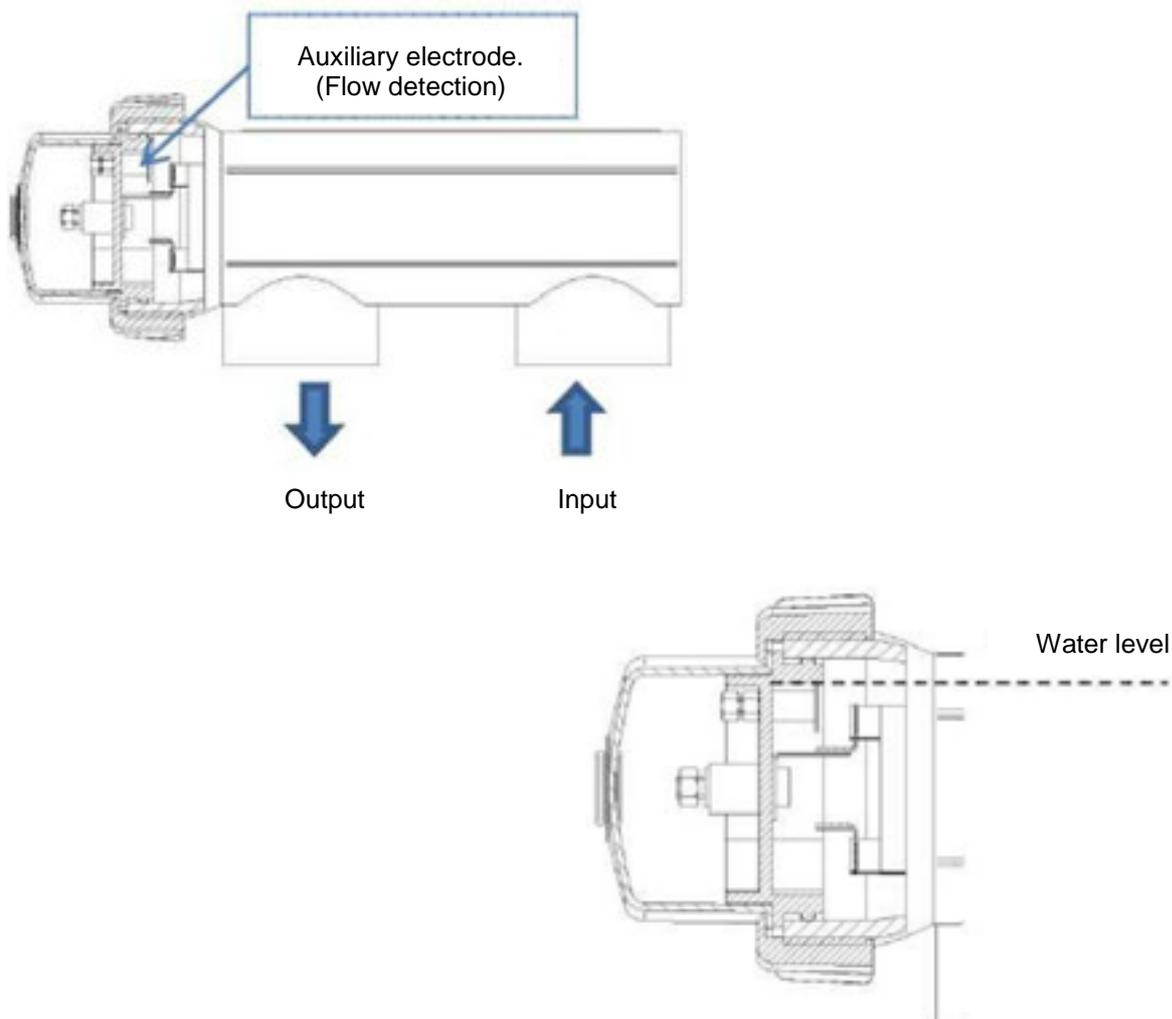
The installation must allow the user to easily access the electrode.

The electrode holder must always be placed **HORIZONTALLY** in a place in the pipes so that it is separate from the rest of the installation by two valves. This ensures maintenance tasks can be carried out with no need to totally or partially empty the swimming pool.

If the electrode holder is installed in bypass (recommended option) insert a valve that regulates the flow.

The following notes must be taken into consideration before definitively installing the system:

1. Flow direction must be respected (input / output).
2. The re-circulation system must guarantee the minimum flow indicated in the technical SPECIFICATIONS TABLE for each model.
3. The float detector system is activated if there is no re-circulation (water flow through the cell, or if it is very low). If the electrolysis gas is not evacuated, a pocket will be generated that electronically isolates it from the auxiliary electrode. Thus, when the electrode is inserted into the electrode holder, the level probe (auxiliary electrode) must be located on the upper part of the electrode holder. The safest arrangement is indicated in the recommended installation diagram (page 3).



## METHODS FOR INSTALLING THE ELECTRODE HOLDER:

Other arrangements are only acceptable if they also enable low flow to be detected. Installations according to the “not acceptable” configuration must be avoided, since it will not be possible to detect "No Flow" or a large gas bubble may form.

### CORRECT:

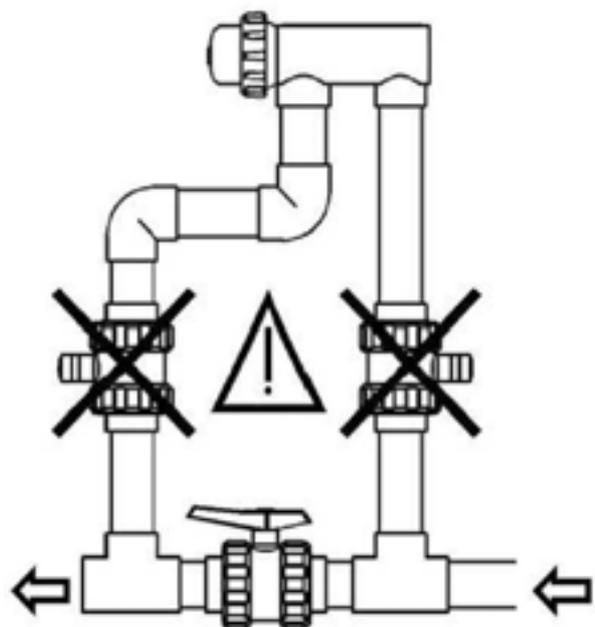


### NOT ACCEPTABLE:



### HAZARD WARNING:

If the input and output valves to the pipe where the electrode holder is installed are closed simultaneously, the flow detector will not work correctly, with a risk of rupture resulting. Although it is an extremely unusual situation, **blocking can be avoided, once the equipment is installed, the return valve to the swimming pool, so that it cannot be manipulated accidentally.**



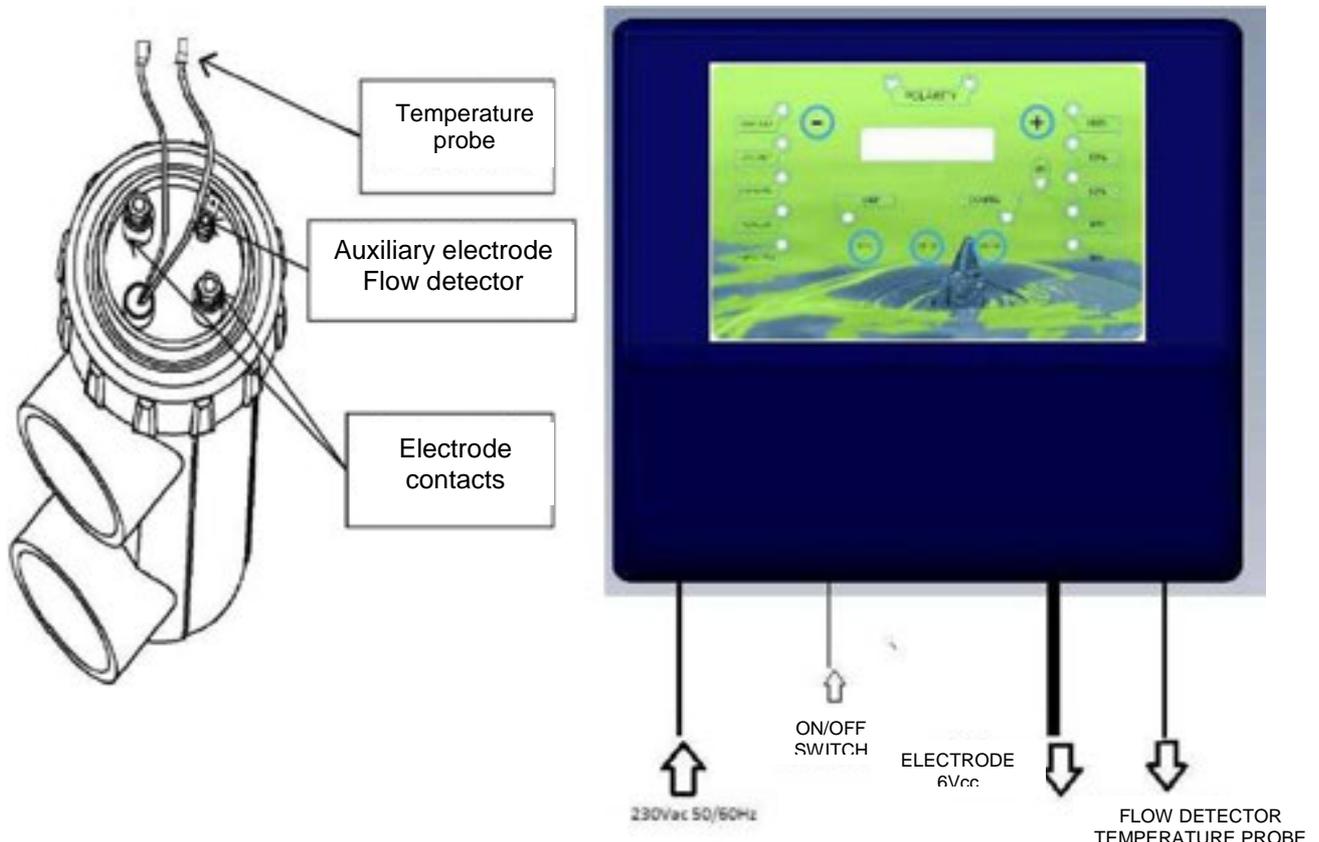


## ELECTRICAL CONNECTION:

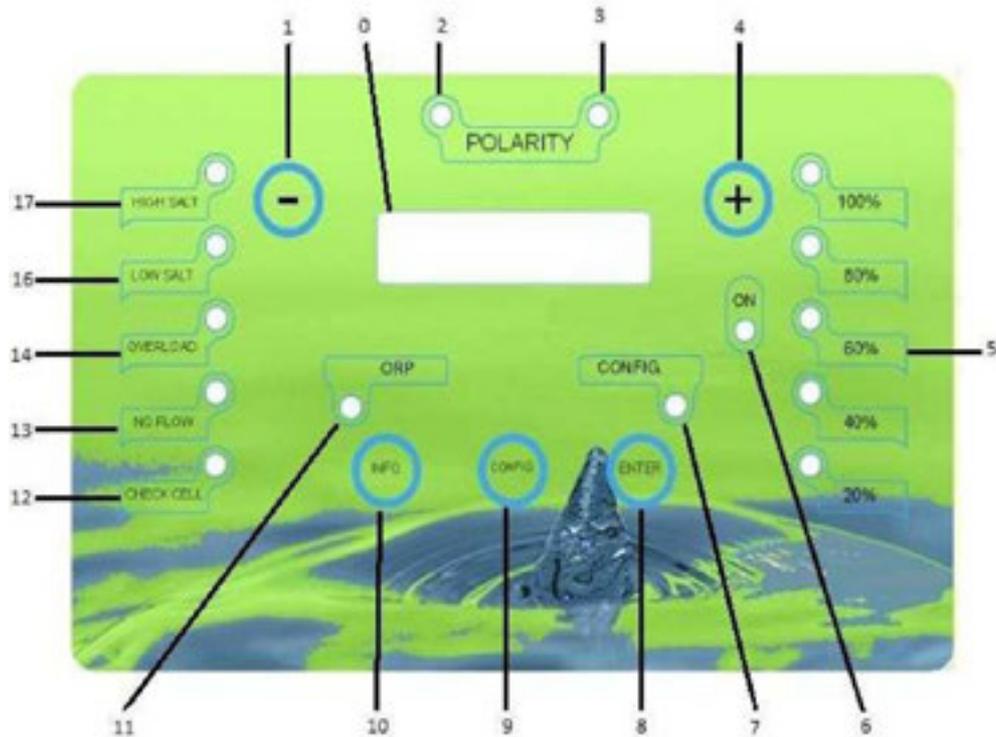
- Check that all connections are firm in order to avoid false contacts, which results in over-heating.
- Connect the electrode and the **CPU** according to the diagram on this page.
- The system changes the electrodes' polarity automatically, depending on the programming, resulting in the self-cleaning effect (anodic calcification). When "Contact 1" is cathode "Contact 2" is anode and vice versa.

**IMPORTANT:** Due to the relatively high continual current intensity that circulates the electrode power supply cables, their lengths and sections must not be modified without first consulting the authorised distributor.

The **CPU - ELECTRODE**, connection cable must be from the recommended section in this manual.



## MAMNET FUNCTIONS:



### 0. SCREEN THAT SHOWS THE INDICATIONS AS WELL AS FAULTS AND STATUS

**1.** Button to reduce chlorine production and move around the menu.

**2.** LED that indicates the equipment is operating in direct current.

**3.** LED that indicates the equipment is operating in reverse current.

**4.** Button to reduce chlorine production and move around the menu.

**5.** LEDs to indicate the approx. power being used by the CPU.

**6.** LED to indicate there is voltage.

**7.** LED to indicate the equipment is in configuration mode.

**8.** Button to execute commands and move around the menu.

**9.** Button to configure the system and move around the menu.

**10.** Button for MAMNET information and to move around the menu.

**11.** LED to indicate whether the ORP function is connected or not.

**12.** LED to indicate that the electrode needs to be checked.

**13.** LED to indicate lack of water in the electrode holder.

**14.** LED to indicate an over-consumption in the MAMNET system.

**16.** LED to indicate a low salt level.

**17.** LED to indicate a high salt level.

## HOW TO MOVE AROUND THE MENUS:

### MENU CONFIGURATION:

The screen usually shows the production programmed on the upper line and the system status on the lower line. There are two menus; the INFO information menu and the CONFIG configuration menu.

**LANGUAGE** screen: Pressing **CONFIG** shows the language selected at this time. The language can be changed using the +/- buttons and searching for another: (English, Spanish, Catalanian, French, Flamenco, Italian and Russian\*). Whether the language is changed or not, pressing **CONFIG** passes to the next screen and pressing **ENTER** returns to the start screen.

**ORP** screen: Shows the current selection. The +/- buttons are used to change the current option (- = No) (+=Yes). If "No" is selected, the **CLEANING TIMES** screen will appear. If the option is **Yes**, the +/- can be used to select the desired setting (4-20mA, 0-10V, NC contact, NO contact). Once selected by pressing **CONFIG**, the next screen will appear and pressing **ENTER** will return to the start screen.

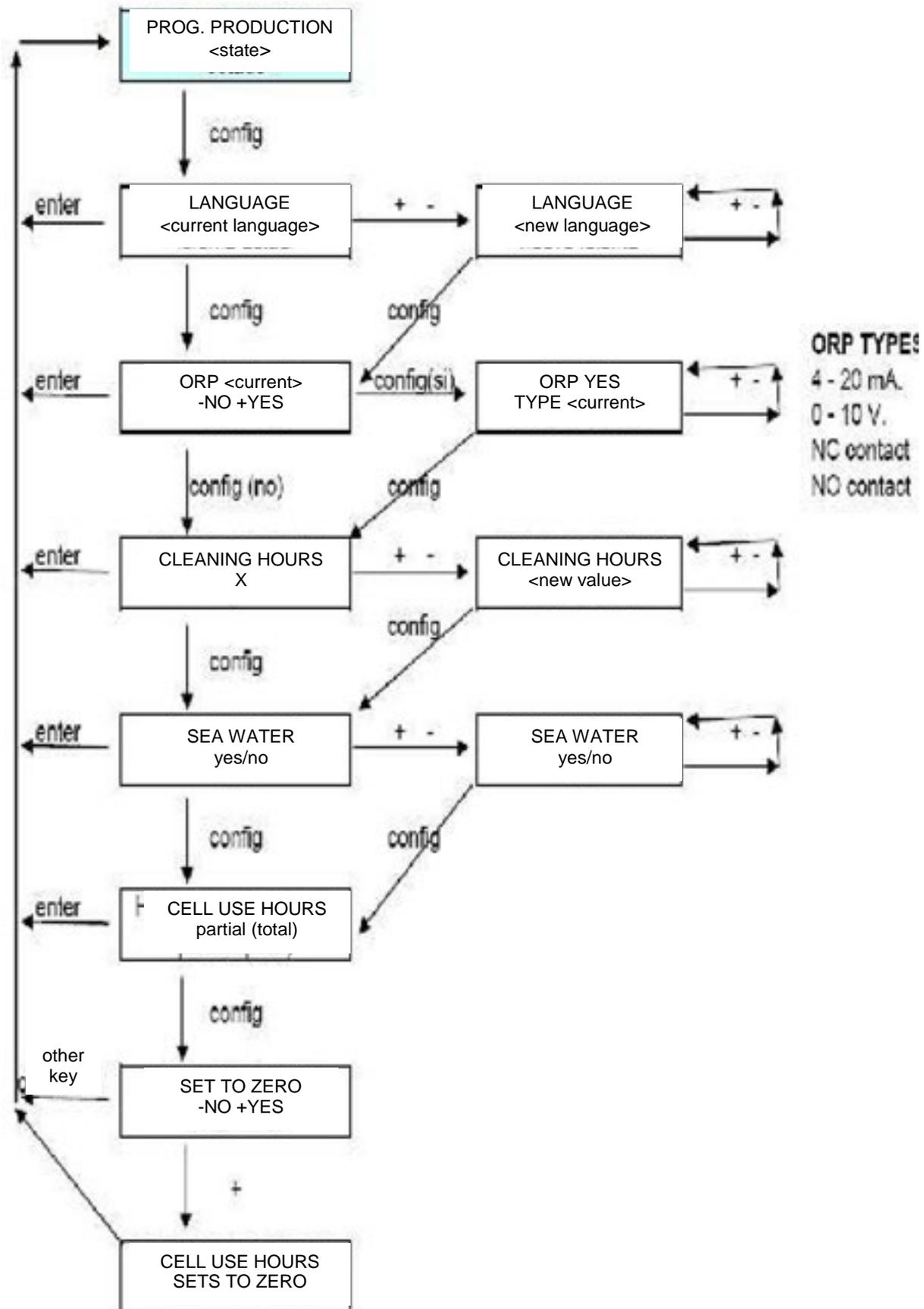
**CLEANING HOURS** screen: Shows the current selection, if the selection is changed by pressing **CONFIG**, the **SEAWATER** screen will appear. Use the +/- buttons to change the current option (no cleaning or every 3h, 4h up to 8h). The hours selected are those that will change the polarity. *The higher the calcium content in the water, the less time will pass between changes in polarity!* Once the time has been selected by pressing **CONFIG**, the next screen will appear and pressing **ENTER** will return to the start screen.

**SEA WATER** screen: Shows the current selection. If the selection is not changed, pressing **CONFIG** will go to the **ELECTRODE HOURS USE** screen. Use the +/- buttons to change the current option (Yes / No). Press **ENTER** to return to the start screen.

**ELECTRODE HOURS USE** screen: shows the total and partial hours of operation: Pressing **CONFIG** goes to the next screen **SET TO ZERO** and pressing **ENTER** returns to the start screen.

**SET TO ZERO** screen: Use the + / - buttons to set the partial hours counter to zero. The total will not change. When the **CHECK CELL** LED is illuminated, requesting to check the electrode, and once it has been checked, go to this screen and set the partial to zero, which will turn off the LED. If do not set to zero (No -) is selected, the system will return to the start menu. If yes (Yes +) is selected, the set to zero screen will be displayed and the system will return to the start screen.

# CONFIG



## **MENU INFORMATION:**

Starting from the first screen, which indicates the status and the programmed production.

Pressing **INFO** shows the screen with the actual production in **gr/h** and the **%** of power used by the **CPU**. Pressing **ENTER** returns to the start screen.

Pressing **INFO** shows the screen with the water temperature in the electrode holder in **°C** and **°F**. Pressing **ENTER** returns to the start screen.

Pressing **INFO** shows the screen with the salt concentration in the water in **gr/L** and **ppm** from the last test made. Pressing **ENTER** returns to the start screen.

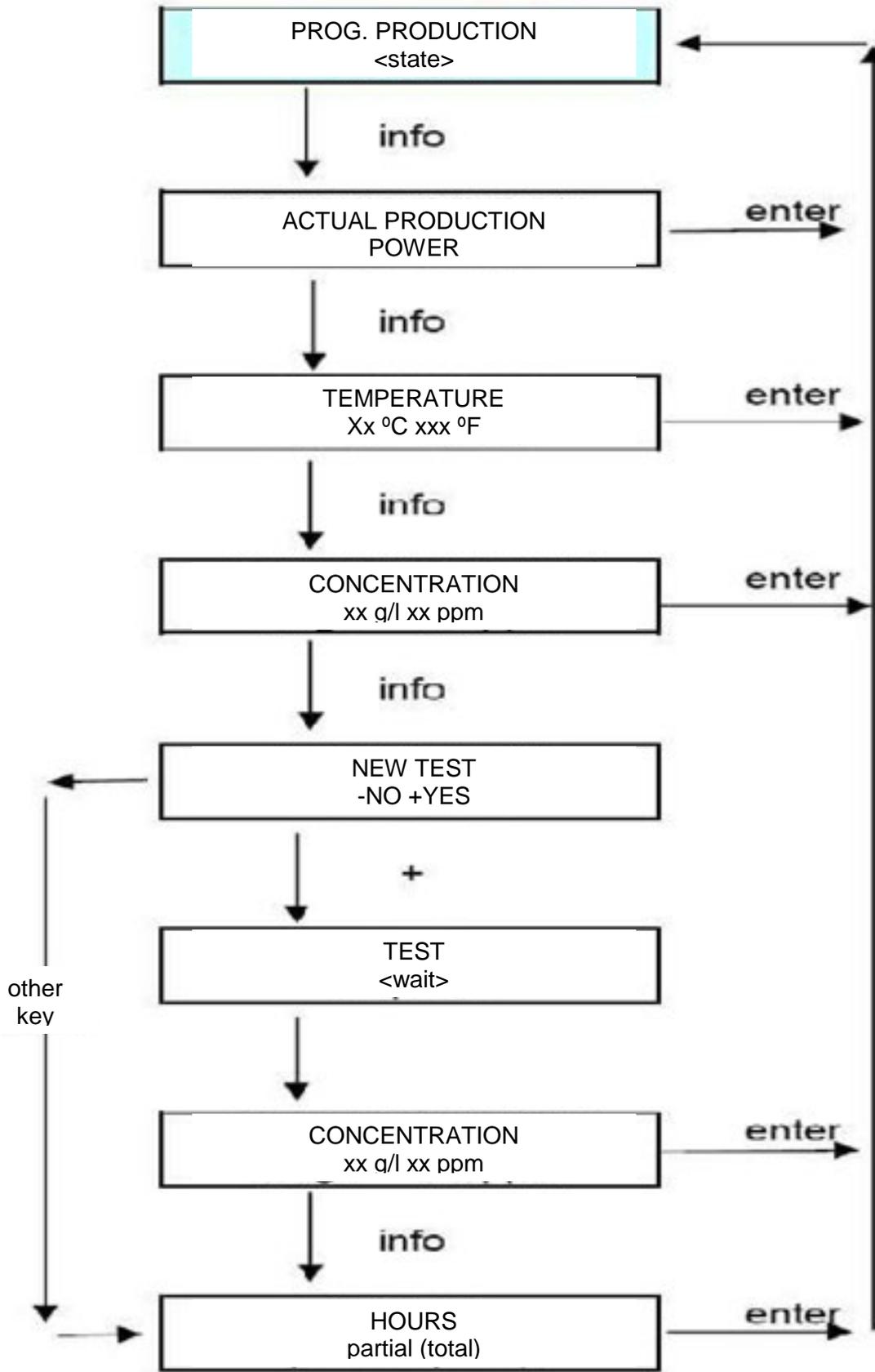
Pressing **INFO** shows the screen where a new test can be made and (Yes+/No-) can be used to select:

⇒ Selecting “NO” returns to the **OPERATING HOURS** screen.

⇒ Selecting “YES” starts a new test and after a few seconds, the screen with the current reading will appear. Pressing **ENTER** returns to the start screen.

Press **INFO** to return to the **OPERATING HOURS** screen. Pressing **ENTER** returns to the start screen.

# INFO



**HIGHSALT, LED alarm:** This LED illuminates when the salt concentration in the water is high. The alarm does not stop the system (informative alarm).

Stopping the unit is not a problem when working in these high salt statuses since it is self-regulating. However, keep in mind that it will be reaching a possible “overload” situation (high salt excess) and the unit will stop to protect itself from a production overload, (overload alarm, high conductivity). **This option does not work when working with seawater.**

**LOW SALT, LED alarm:** This LED illuminates when the salt concentration in the water is low. The alarm does not stop the system (informative alarm).

Even though this alarm is informative, the status "**LOW SALT**" is not recommended since it greatly reduces the life-time of the electrode and reduces the oxidation-disinfection efficiency of the equipment. The system will attempt to produce the quantity that has been programmed and will thus be using 100% of power with little production.

**OVERLOAD, LED alarm:** This LED will illuminate when the continual output current is above the maximum allowed value. The "overload" status usually occurs due to high conductivity in the water (high-temperature and/or salt concentration). Although it is unusual, a short-circuit in the electrode will produce the same effect. When the unit detects an "overload", it will go to "**Verification Mode**" and attempt to re-start. The unit will go into operation when it detects the problem is resolved. It is recommended to verify the electrode and water conductivity status. If necessary, slightly dilute the salt concentration in the swimming pool. While the alarm is active, the system cannot operate and production will be null.

**NO FLOW, LED alarm:** This LED illuminates if the production shows “0”. If this happens, it may be that:

1. There is no re-circulation
2. The re-circulation is very low within the cell
3. A gas bubble has formed around the auxiliary electrode

The **CPU** will not apply output current (without production) while the flow has not been re-established or the gas bubble is eliminated.

**CHECK CELL, LED alarm:** When this LED is eliminated, the electrodes status must be checked since there may be several reasons for the CHECK CELL alarm activation (calcium deposits or lifetime expired or routine maintenance is required). The alarm does not stop the unit (informative alarm). When this alarm is active, the salt values obtained are not viable.

## **MAINTENANCE:**

When the unit has been operating for 500 hours, the CHECK CELL alarm will activate. This is a reminder to carry out an inspection operation and maintenance, if necessary, in case calcium deposits are observed on the electrodes (page 20).

To reset the counter to zero, go to the **HOURS OF USE** screen in **CONFIG** and this will enable the unit to advise within another 500 hours. •

## **RE-POSITION:**

When the electrode is inactive (depleted), the unit activates the alarm. The saline electrolysis is made up of titanium laminates covered in high-noble metal oxides. This covering also has a limited lifetime.

After several thousand hours of service, the covering will deactivate and must be replaced.

In order to confirm the depletion, the output current must be compared in the two polarities. If depletion exists, differences above 30% must be observed. When this occurs, the unit will also show the **LOW SALT** alarm.

## START-UP:

Ensure the filter is 100% clean, and that the swimming pool and the installation do not contain copper, iron or seaweed.

Balance the water in the swimming pool. This enables a more efficient treatment to be obtained with a lower concentration of free chlorine in the water, as well as a more prolonged operation of the electrode due to a lower formation of calcium deposits in the swimming pool.

- **The pH must be between 7.2 - 7.4 and 6.8 - 7.0 for polyester swimming pools.**
- **The total alkalinity must be between 60 - 150 ppm.**
- **Stabiliser (cyanuric acid) 40 to 60 ppm.**
- **Dissolved metals = 0**
- **Free chlorine 1.5 ppm**
- **Ensure the salt level is from 4.5 gr/L (4 - 6 gr/L).**

Add 4.5 kg of salt per m<sup>3</sup> of water if the water did not previously contain salt. Always use common salt (sodium chloride), without additives such as iodides or anti-caking agents, and that the quality is suitable for human consumption. Never add the salt through the electrodes holder. Add the salt directly to the swimming pool or to the compensation tank.

When adding salt, and in the case the swimming pool will be used immediately, treat with chlorine. As an initial dose, 2 gr./m<sup>3</sup> of trichloro-isocyanuric (powder or tablet) maybe added to destroy the residual contamination of the salt.

Before beginning the work cycle, disconnect the **CPU** and run the purifying pump for 24 hours to ensure the salt is completely dissolved. During this time, the intake will only occur through the drain that facilitates the salt dissolving process.

Next, start the saline electrolysis system by programming the production, so that the free chlorine level is maintained within the recommended parameters (0.5 -1.5 ppm).

In swimming pools with a high exposure to sunlight or intensive use, it is advisable to maintain a level of 40 gr/m<sup>3</sup> of stabiliser (isocyanuric acid). If the system is started without stabiliser, it is recommended to always add 1 kg of stabiliser for each 100 kg of salt added to the swimming pool. This means that if the concentration of salt is known, the concentration of stabiliser will be known. Thus when the salt concentration is 4,500ppm (4.5gr/L), the stabiliser will be 45ppm (1:100 relation). **Remember that if trichloro-isocyanuric (powder or tablet) is added, stabiliser will also be added to the water (half its weight is stabiliser). In any case, it must be ensured that the stabiliser never exceeds 75ppm.**

## SYSTEM OPERATION:

After installing the unit according to these instructions, connect **MAMNET** to the power supply. When the "LED on" is illuminated, the CPU is operational.

## ELECTROLYSIS UNIT CONFIGURATION:

It is recommended to first configure the unit by: **CONFIG**. Change to the language of your choice. The unit is configured in the factory with the following settings:

- ORP = NO
- SEAWATER = NO
- HOURS OF USE = 0

## SYSTEM CONTROL:

It is essential that water is circulating through the electrode in order to start the system.

## TOTAL CONTROL FROM THE CPU:

Open the CPU and place a bridge on the ALARM contact of the electronic power plate (this is already installed in the factory).

## CONTROL FROM THE FILTRATION PANEL:

Remove the bridge from the ALARM contact the power plate. Place a **Power and voltage free** bridge on this contact, from the filtration panel, so that when the filtration pump is started, the contact will close and the filtration system will start. If the filtration pump stops for any reason, the contact will open, and the chlorination system will stop.

## PRODUCTION SELECTION:

Use the +/- buttons to select the unit's production, from **0 to 18/35 gr./L**, depending on the model. (Keep in mind that **ORP = NO** has been selected in the configuration). If 0 is selected, the system will not produce. Next, press **INFO** to see the actual production and the % of power used.

## CHANGE POLARITY:

The option exists in CONFIG to select whether or not to change the polarity. (This serves to loosen eventual small calcium deposits on the electrode). There is an option to select not to make changes, or to make changes every 3h up to 8h. The selection will depend on the calcium level in the water: **(+cal = - h) (- cal = +h)**.

**Important note.** Chlorine production by means of electrolysis means that the pH will increase, which means that calcium will form. Also, more heat means more precipitation, and the higher the pH the less the disinfection. For this reason, pH control is reiterated. If you do not have time to make the tests and adjustments, it is advisable to install a pH minus pump-instrument, so that the water in the swimming pool is always maintained in a perfect state.

## REGULATION BY ORP:

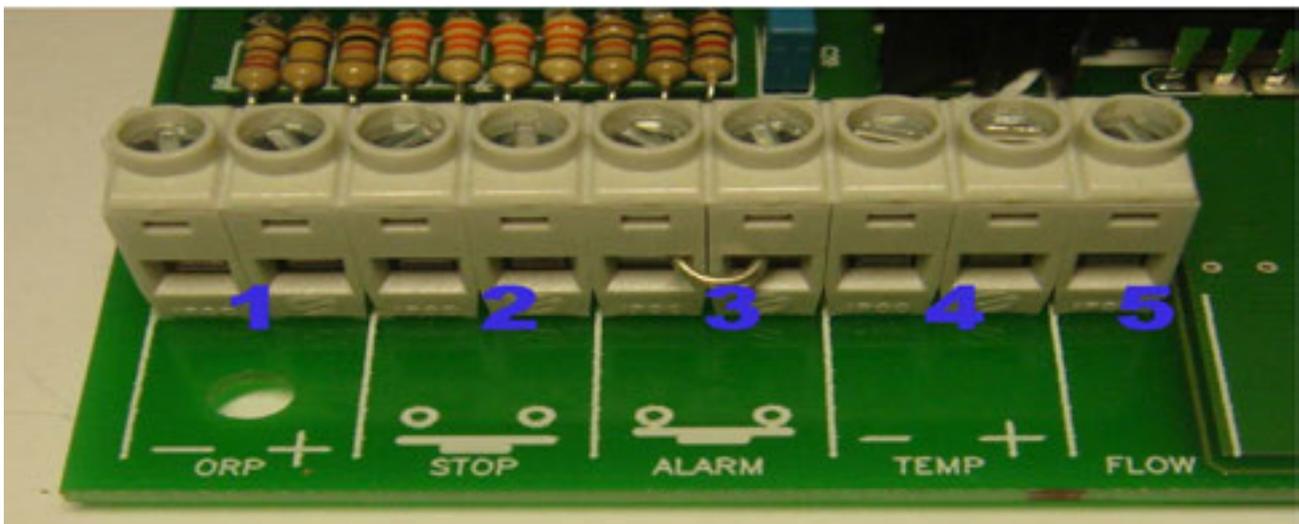
This is the regulation of the system by means of a 4-20mA or 0-10Vcc signal (**ORP**). The schematic diagram shows the power plate with the different connections.

When the user selects the **ORP** option with the **CONFIG** button, this will control the production increase or decrease by means of an external regulator. This control enables 18/35gr/h to 0gr/h production.

When the ORP is below the "set point", the electrolysis unit will begin to produce. When the ORP value is above the set point, electrolysis will stop. The production value will vary depending on the "set point" difference and the actual value of the reading

## DIGITAL REGULATION:

When the user selects the **ORP** option with the **CONFIG** button, production can be selected at 0 or 18/35gr/L by programming the power free contact, which may be NO or NC. Opening or closing the contact will change the production from 0 to the maximum.



1 = 4-20mA, 0-10V, Contact NC



Contact NO. **ORP**

2 = This contact must be open in order for the system to start.

3 = This contact must be closed in order for the system to start.

4 = Temperature detector.

5= Flow detector.

## **MAINTENANCE:**

### **CHLORINE LEVEL CONTROL:**

In hot periods, the system requires a longer operating time, since higher water temperature and increased solar radiation accelerate decomposition of the chlorine generated. The water's chlorine requirement also increases when bathers are more frequently using the pool (higher level of organic material). To ensure chlorine production is correct, regularly check the chlorine level. If the reading is low (<0.750 ppm), increase the system's production level with the (+) button or connect the filtration for more hours per day. If the reading is low (>1.75 ppm), reduce the system's production level with the (-) button or reduce the filtration operating time.

It is recommended to distribute the saline electrolysis system's operating time to operate during the day and the night. If the correct levels of chlorine are not detected in the water after a period of normal operation, check that the system is producing chlorine by performing the following measurements.

1. Check that the filtration and the MAMNET system are connected and operating.
2. With an analysis test kit, take a sample of water as close as possible to the swimming pool's driving nozzles. To take the sample, place the thumb over the end of the test tube and place it just in front of the nozzle to ensure the water sample taken comes directly from the nozzle (X).
3. Now take a reading of the total and free chlorine levels.
4. Take another water sample as far away as possible from the nozzles, and measure the total and free chlorine levels again (Y).
5. Compare the measurements. If reading "X" is much higher than "Y" and the system is well dimensioned in terms of the swimming pool capacity and its level of use, it is possibly producing chlorine instability. To avoid this, add 45 gr/m<sup>3</sup> of cyanuric acid. Instability (disappearance of active chlorine in the water) occurs naturally due to exposure to the sun and high water temperature.
6. If the combined chlorine is much higher than the free, its disappearance is due to the reaction with organic material.

## pH LEVEL IN THE SWIMMING POOL:

The pH level must be maintained within the recommended range.

It is very important to control this parameter twice per week or more, depending on exposure to the sun and the number of bathers in the pool.

a) Avoid that the water is corrosive (low pH < 6.8 / 7.2 depending on the type of swimming pool) or that it has a tendency to calcify (high pH, >7.8).

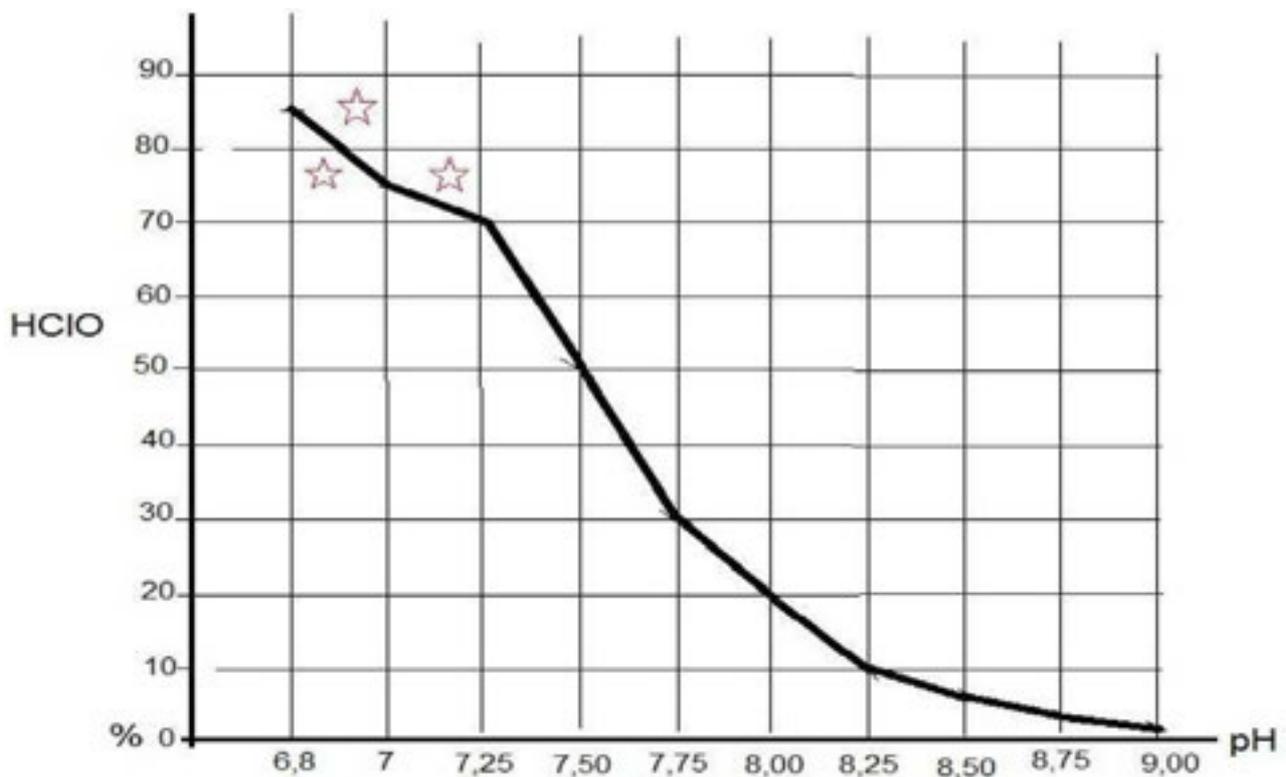
This may deteriorate the installation of the swimming pool.

b) Correct pH value (lower than pH 7.5) will help to improve the lifetime of the electrode since the formation of calcium will be minimised.

c) A high pH value has a low HClO % (Hypochlorous) and a high ClO % (hypochlorite). HClO is actually the oxidant-disinfectant agent in the swimming pool; which explains that a pH of 6.8, 7.2 is the most reasonable and recommended depending on the type of swimming pool.

In general, when electrolysis system is used to control PH, an agent must be applied (solid-liquid) pH-minus. Products based on diluted sulphur are recommended. Avoid hydrochloric acid (HCl) since this produces a corrosive atmosphere in the place where it is found, even though it is covered. The use of automatic pH regulators (pumps-instrument) is recommended.

Depending on the pH, the chlorine produced will act differently. At the recommended pH a higher % of hypochlorous than hypochlorite. Hypochlorous is much more oxidant-disinfectant (HClO).



## ELECTRODE:

The electrode must be maintained in perfect condition to ensure a long operating life.

The system has automatic and programmable cleaning of the electrode. This avoids calcium encrustations forming on the electrodes, and therefore it is not essential to clean them. However, if cleaning is required, follow these instructions:

- a. Disconnect the 230Vac power supply to the CPU.
  - b. Disconnect the power supply cable from the electrode temperature probe and flow detector.
  - c. Unscrew the closing screw and remove the electrode.
  - d. Using rubber gloves and safety glasses, make a diluted solution of hydrochloric acid (**one part "spirits of salt" to 10 parts of water; always pouring the acid on top of the water**), submerge the electrode without touching the connections for a maximum of 10 minutes. Observe the solution effervescing (carbonates dissolving) (**see page 22**).
- e) Never scrape or brush the electrode.

Keep in mind that the electrode is made of titanium laminates covered in a layer of noble metal oxides. Their use results in progressive wear and tear. With the aim to optimise their lifetime, keep the following aspects in mind:

- 1) Do not clean the electrodes as described above too often.
- 2) Although it is a SELF-CLEANING saline electrolysis system, prolonged operation of the system and pH values above 7.4 in water with a higher level of hardness may result in the accumulation of calcium deposits on the surface of the electrode. These deposits progressively deteriorate the covering, resulting in a reduced useful lifetime.
- 3) Prolonged operation at salinities less than those recommended will cause premature deterioration of the electrode.
- 4) Frequent use of algaecide products with a high copper content may result in copper deposits on the electrode, progressively damaging the covering. Remember that the best algaecide is chlorine. If the levels of chlorine and pH are correct, algaecides are not required.

Max. submergible  
limit

