

EES ET ESS PRO

Electrolyzers



INSTALLATION AND OPERATING INSTRUCTIONS

(to be read carefully and kept for future reference)

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1. PRODUCT DESCRIPTION AND OPERATING INSTRUCTIONS

EES and EES Pro are pool water treatment devices that electrolyse salt (Sodium Chloride) dissolved in the pool water.

The process therefore requires that solid salt is first dissolved in the pool water. The salt concentration necessary is approximately 10 times less than that of sea water, this means that neither the perceived taste of salt nor salt deposition will be significant.

As the water flows through the chlorinator cell, chloride ions are transformed into free chlorine at the electrodes connected to the positive terminal of the electrical panel (the anodes). This transformation is achieved through the circulation of a SVLV (Safety Very Low Voltage) within the cell.

The active Chlorine (a fraction of which is transformed into inactive Chlorine depending on the pH) disinfects the pool water (kills micro-organisms).

The production of active Chlorine by salt water electrolysis causes a slow, gradual rise of the water's pH, this must be compensated by the regular addition of a suitable quantity of acid.

Two EES (Pro) models are available:

- for pools containing up to 80 m³ water
- for pools containing up to 150 m³ water

There are two versions of each model: EES and EES Pro.

EES Pro differs from EES in that it regulates:

- the concentration of free Chlorine (via the Redox potential) in the pool water, only producing Chlorine when necessary;
- the water's pH, by injecting acid into the hydraulic circuit to lower the pH when necessary.

EES regulates neither free Chlorine nor the pH. It produces Chlorine continuously as long as water is flowing through the pipe on which it is mounted. These parameters will need to be measured regularly and the pH will need to be adjusted when necessary.

With the acid dosing pump option installed, EES can inject acid to lower the pH but there is no precise regulation. The acid dosing pump also descales the cell automatically while filtration is stopped.

The Product is installed in the pool plant house, it comprises two main components:

- An electrical/ control panel that is mounted on a vertical wall at a height inaccessible to young children;
- An electrolysis cell that is mounted on a by-pass loop on the hydraulic circuit after any other devices (pump, filter, heating, etc.)

The salt water electrolysis process offers many advantages when compared to conventional chlorination processes:

- No handling or storing of dangerous, concentrated chlorinated products (salt is harmless and chemically inert);
- No risk of over-stabilisation of the pool water;
- The process regularly produces active Chlorine, this limits the formation of foul smelling chloramines that irritate the bather's skin and eyes: bathing is a much more pleasant experience;
- The destruction of chloramines releases chlorides that can be transformed into active Chlorine in the cell. Chlorine is regenerated, limiting the amount of salt that needs to be added over time;

The Pro model of the EES provides a comprehensive pool water pH regulation and free Chlorine regulation solution.

The electrolysis of chlorides at the anodes is accompanied by the formation of sodium hydroxide at the cathodes, this generates a very high pH at the cathode that can cause the deposition of limescale on the cathodes. To limit scaling, EES and EES pro are equipped with a system that switches electrode polarity at regular operating intervals. The duration of the polarity inversion cycle is controlled automatically by the device, it may not be set by the user.

2. SAFETY RECOMMENDATIONS:

2.1 User safety

The EES and EES Pro electrical/ control panel should be wired in by a qualified professional, according to the standards in effect in the country of installation. It should be located at least 3.5 m from the pool.

Should this be impossible, it may be positioned closer than 3.5 metres, but not less than 2 m from the pool (the control panel has a protection rating of IP56, against splashing), subject to the condition that the power cable is connected directly to a 30 mA residual circuit device.



Never remove the cover protecting the electrical panel connection terminals while the electrical panel is energised. Always cut the power supply to the electrical panel beforehand. The cover should be replaced immediately after the intervention.

In the event of damage to the power cable, have it replaced immediately by a professional.

Locate the electrical/ control panel high enough to be out of the reach of children.

- !** **The electrolyser cell is powered by a 12V direct current supply from the electrical/ control panel. There is therefore no electrical risks to bathers using the pool while the device is in operation.**

Safety recommendations concerning the acid dosing pump:

The acid dosing pump aspirates and injects concentrated acid into the hydraulic circuit.

When handling acid, and during interventions on the pump or its tubing, protective glasses and clothing should be worn to protect against splashes. In the event of contact with the skin, flush the area abundantly with water, seek medical attention immediately if the eyes are effected.

Check the condition of the tubing through which the acid flows regularly and replace it immediately if it appears worn or damaged or is leaking.

2.2 Safety of materials and premises:

The electrical/ control panel power cable must be protected by a suitably rated thermo magnetic circuit breaker.

Never operate the device by electrically bypassing the flow sensor. If no water is flowing through the cell, there is a risk that inflammable vapours could accumulate in the pool's hydraulic circuit.

Never operate the device while the hydraulic circuit upstream and downstream from the device is blocked. Vapours accumulating in the cell could cause an overpressure leading to the rupture of the cell.

Be careful of freezing temperatures! Like other hydraulic equipment, the cell, the flow sensor, the pump and the sensors are very sensitive to icing. Ensure that the temperature in the plant room is always above zero to prevent this type of damage.

Make sure the pool's machine room is properly vented to avoid damage from acid vapors.

Under no circumstances should the machine room be used to store equipment, furniture, sports gear or any other equipment that is not related to the pool including spare acid containers. The machine room must be aired and vented prior to entering it.

The acid container must be stored inside a spill containment vessel (a basin to hold acid in case of overflow or tipping of the acid container).

2.3 Locking/ unlocking the key pad :

The electrolyser's electrical/ control panel key pad can be locked to prevent any manipulation by unauthorised personnel.

To lock the key pad: press the  key and  key simultaneously until the  icon appears.

To unlock the key pad, press the same keys simultaneously until the icon disappears.



3. PACKAGE CONTENTS

Part	qty	Comments		EES	EES Pro
Electrical/ control panel	1	The panels of all models have the same outer appearance and the same dimensions. Nevertheless, the electrical specifications, functional specifications and the internal components are different. N.B.: the power cable is not included.		X	X
Set of 2 screws and 2 bushings	1	to mount the panel on the wall		X	X
Panel - cell connecting cable	1	At one end, the cable has 2 quick fit connectors for connection to the cell, at the other end, it features two stripped wires to be screwed to the relevant terminals in the panel.		X	X
Cell	1	From the exterior, the cell looks identical for all the models. The cell for the 80 m ³ models features 3 electrodes (plates), the cell for the 150 m ³ models features 5 electrodes.		X	X
Cell unions	2	63 mm, solvent unions		X	X

Part	qty	Comments		EES	EES Pro
Cell lid	1	The lid may be used to plug one end of the cell in order to pour in a descaling bath (manual descaling)		X	X
Flow sensor and temperature sensor	1	The flow sensor is premounted on a Tee, diameter 63 mm. The temperature sensor is positionned on the Tee at the base of the flow sensor. Both are connected to a terminal in the control panel.		X	X
Acid dosing pump	1	The acid dosing pump is used to inject acid into the hydraulic circuit. The acid dosing pump kit includes: 2 saddles (50 + 63mm), 3/8" to 1/2" adaptor, a check valve valve, internal replacement tube, 2 x 3m polyethylene tube, foot filter and weight		X	X
Sensor mounting Tee	1	Tee, diameter 63 mm, with two 63/50 reduction fittings		X	X
pH sensor	1			X	X
Redox sensor	1			X	X
63-50 reduction fittings	*	2 for the flow sensor tee, 2 for the sensor tees, 2 for the cell barrel unions, or for the assembly (cell + acid dosing pump)		X	X
Ballasted acid suction strainer	1	To be mounted on the end of the suction tube delivered with the acid dosing pump		X	X
Buffer solutions pH = 4 et pH = 7 to calibrate the pH sensor ORP buffer solutions R Redox 650 mV solutions				X	X

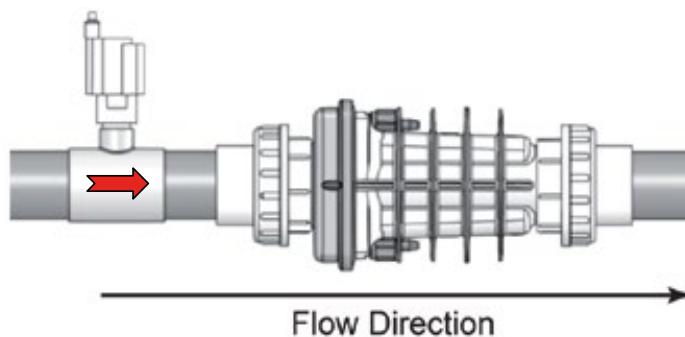
4. INSTALLATION:

4.1 Hydraulic connections

IMPORTANT: when selecting the installation sites of the various components, and before creating the by-pass loops on the installation, make sure that the power cables of each of the components are long enough to reach the electrical panel from the selected installation site.

In the plant room, create a by-pass loop, downstream from all other devices mounted on the hydraulic circuit, to allow installation of the cell, the flow sensor and the acid dosing pump (if one is being installed).

The cell may be oriented vertically or horizontally, **provided that the direction of flow indicated in the diagram is respected.**



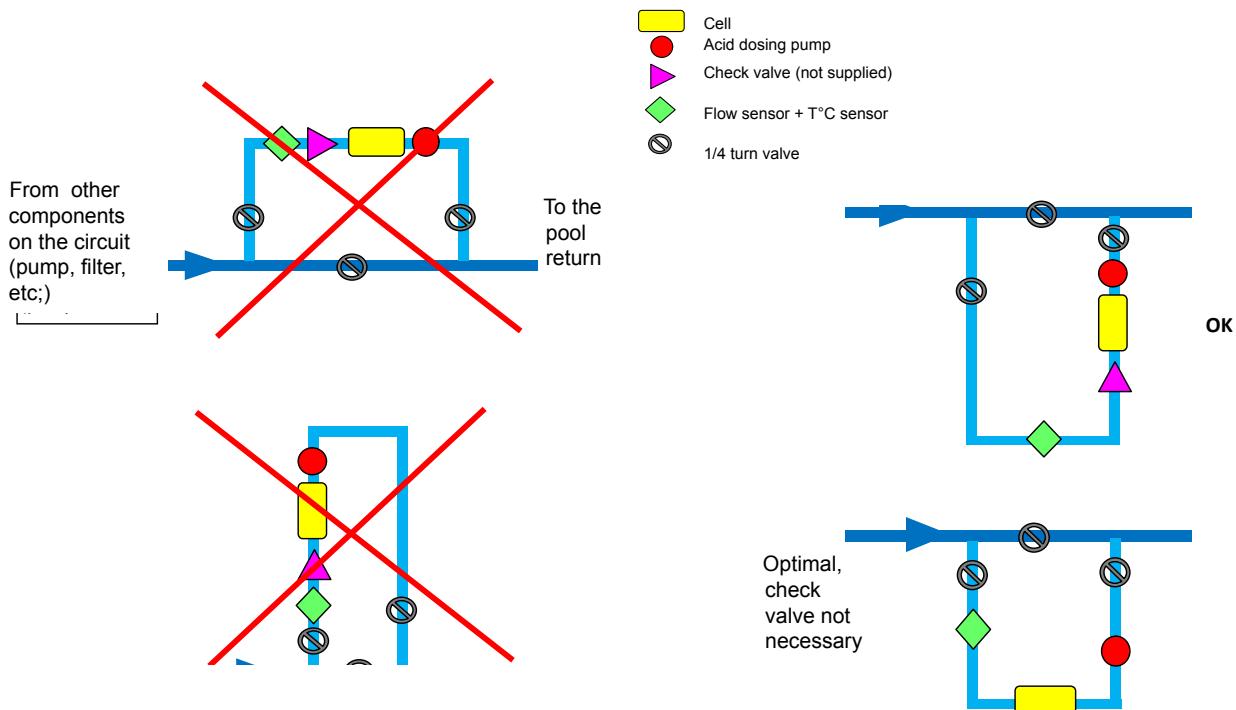
To avoid the accumulation of air in the cell in the event that air enters the hydraulic circuit, **the cell should not be installed at a high point on the hydraulic circuit.**

If installing an **acid dosing pump**, this should be located downstream just after the cell.

The by-pass should be designed such that acid injected to descale the cell (when filtration stops) remains in the cell. In some configurations, this will require installation of a check valve.

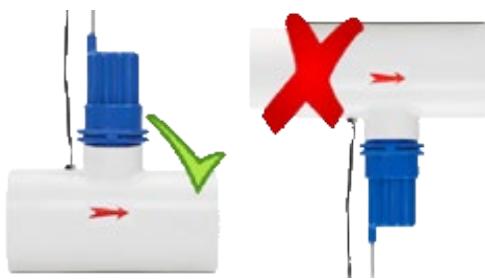
The flow sensor should be positioned such that the acid used to descale the cell will not touch it. A check valve can ensure this.

4.2 Sample configurations



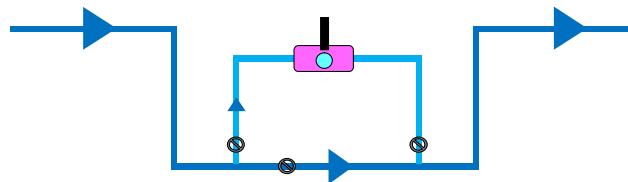
Respect the direction of flow of water (red arrow) through the **flow switch**.

If the flow sensor is mounted horizontally, the blue head must be oriented upwards (otherwise impurities can gather in the mechanism and prevent correct operation).



4.3 Location of EES PRO pH and Redox sensors

Ideally, the pH and Redox sensors should be mounted **on a by-pass loop located between the pump and the filter** to ensure that the values measured are representative. In fact, if it is contaminated with organic pollutants, the filter can modify the Redox and pH values of the water flowing through it.



The sensors should be mounted upstream of any heating system: temperature changes will modify the pH and Redox values.

To prevent damage to the sensors by gravel or sand, the by-pass valves should be adjusted so that the flow past the sensors is slow.

To prevent static and interference, sensor cables should not be run in the same sheaths as the other electrical cables.

The sensor mounting tee should be mounted on a horizontal section of the by-pass loop, and oriented such that the pH sensor is vertical. **Nevertheless, the sensors should not be located at a high point on the hydraulic circuit so that they will remain immersed in water even if air enters the hydraulic circuit.**

- ! Always keep the tips of the pH and ORP sensors submerged in liquid. Drying will damage the sensor and void its warranty

4.4 Precautions concerning the sensors

4.4.1 The submerged sections of the sensor

- must always be immersed in pool water or tap water, even when not in use
- must never be touched with fingers
- must never be wiped
- must not be allowed to be caught in ice
- must be descaled when necessary

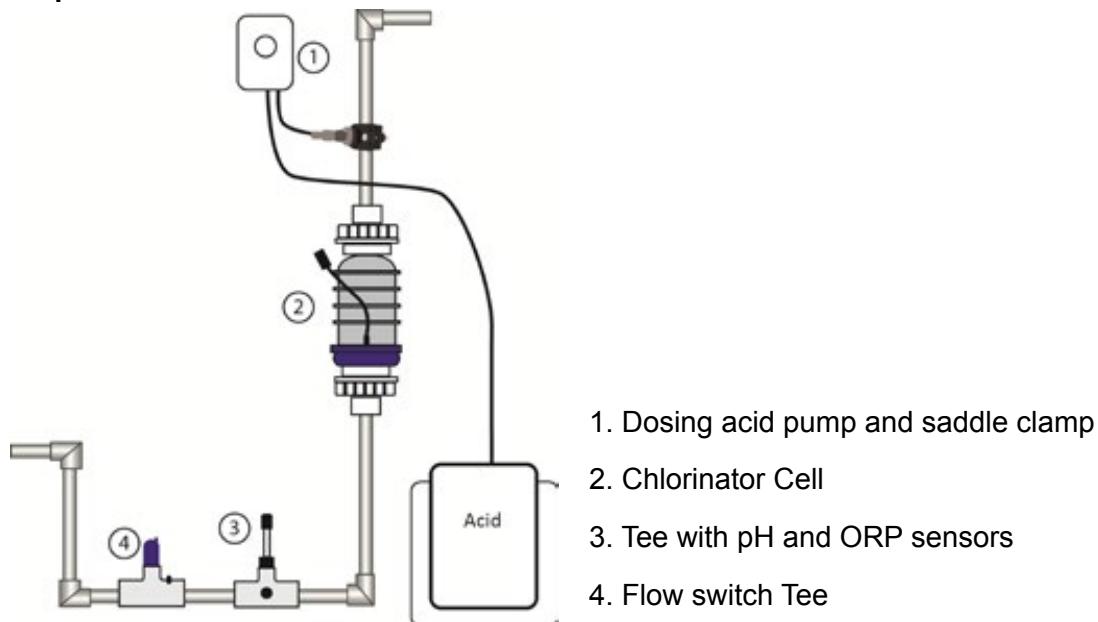
4.4.2 the ph and redox sensors must be calibrated

- Upon reopening the pool
- Every four to twelve weeks depending on the bather load

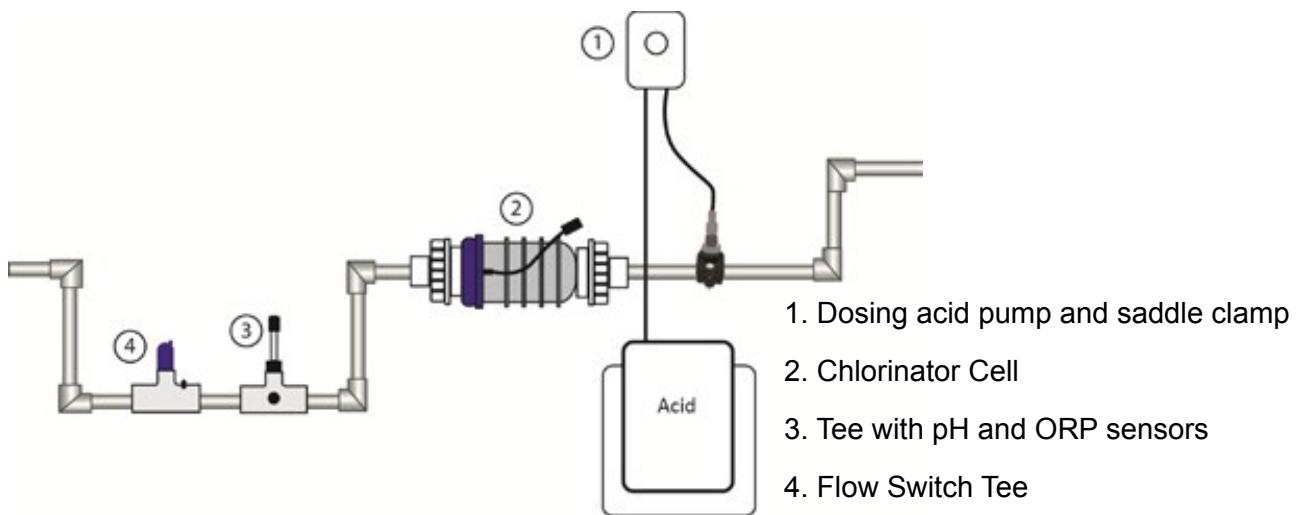
4.5 Installation of the acid dosing pump

The acid dosing pump should be installed right after the chlorinator cell, in a way that ensures the cell stays full of water even when the circulation pump turns off. Choose one of the plumbing configuration options below:

4.5.1 U shape installation



4.5.2 Horizontal installation



! NOTE: A plumbing trap is required to keep the cell flooded with water when the dosing acid pump washes the cell during the circulation pump downtime. Create the trap so the acid injected by the dosing acid pump will be focused on the cell and not flow back to the pool or equipment set.

! WARNINGS

Disconnect ALL power before work commences.

Open the control box lid to make sure the unit is turned OFF.

It is recommended to wear rubber or polyethylene protective gloves and safety glasses. It is also advisable to protect your clothes.

Make sure the pool's machine room is properly vented to avoid damage from acid vapors.

Under no circumstances should the machine room be used to store equipment, furniture, sports gear or any other equipment that is not related to the pool, including spare acid containers. The machine room must be aired and vented prior to entering it.

Acid container must be stored inside a spill containment vessel (a basin to hold acid in case of overflow or tipping of the acid container).

4.5.3 Procedure

- Determine the location where you wish to install the acid pump on the wall.
- Check that the all components: electrical wiring, tubes etc. reach their position.
- Drill and attach the acid pump's clip to the wall and hang the pump on it.



- Open the control box service panel.
- Find the acid pump connection point marked "acid pump". Insert the signal cable that originates from the pump through the hole at the bottom of the control box and connect it to the acid pump terminal. Make sure the cable is secured and put the panel cover back in position.



- Connect the electrical cable of the acid pump to the main power source in the machine room (240V) parallel to the circulation pump. This must be performed by a licensed electrician!
- Establish the pipe diameter you have installed and make sure you have the correct pipe saddle (50 or 63mm).
- The saddle clamp for the acid pump must be installed on the pipe right after the electrolysis cell.
- Select the point where the acid will be injected, and drill a 9mm hole in the pipe.

- Turn the top part of the saddle clamp over and make sure the o-ring is in position. place the 2 sections of the clamp over the hole you just drilled.



Insert the two screws through the saddle clamp holes and tighten them using a 13 mm wrench.



- Wrap the threads of the saddle clamp adapter ($\frac{1}{2}$ to $\frac{3}{8}$) with Teflon tape and insert it into the saddle clamp. Wrap the check valve threading with Teflon tape and insert it into the adapter.



- Cut the tube supplied to the required length - this will become the injection tube. Attach one end to the outlet of the acid pump (right side) and the other end to the check valve.
- Note the arrows visible on the transparent cover of the acid pump, these indicate the suction and injection direction of the acid.



- Cut another piece of tube to the required length - this will become the suction tube. Attach one end to the acid pump inlet (left side).



- Thread the other end of the tube through the lid of the acid tank, attach it to the ballast weight and strainer.
- Close the lid of the acid tank and make sure the suction tube cannot be pulled out of the tank.
- Place the acid tank inside a spill containment vessel (a basin to hold acid in case of overflow or tipping of the acid tank).



- Turn the control box on. Run the acid pump in MANUAL mode for a few minutes.
- Make sure the red light on the pump is energised, that it is running and that acid is being sucked from the acid container and expelled through the injection tube.

4.5.4 When starting up for the first time

- run the acid dosing pump in MANUAL mode until the pump is primed.
- **Check the entire circuit for leaks** from suction from the tank to injection into the pool's hydraulic circuit.

4.6 Installing the sensors

The sensors are mounted on the same tee, diameter 63 mm.

4.6.1 The REDOX sensor

After removing the pliable protective cap (which should be kept to winterize the sensor), insert the threaded end of the sensor into the tapped port taking care not to twist the filament, use Teflon and tighten the sensor to achieve a leaktight seal.

4.6.2 pH sensor:

Unscrew the white cap and withdraw the sensor from its vial of liquid. Remove the black o-ring and the white cap from the sensor and replace them on the vial (keep this to winterize the sensor).

Unscrew the black nut from the tee, be careful not to lose the removable parts.



Thread the black ring, the metallic washer and the compression ring onto the body of the sensor.

Make sure that the o-ring is correctly positioned on the tee union.

Push the end of the sensor into the union until the end of the sensor is located in the centre of the pipe through which the water is flowing.



Screw the nut firmly onto the union, and check that the sensor cannot be removed by pulling gently.

Next, connect the two sensors to the electrical panel.

! **IMPORTANT** The active tips of the pH and ORP sensors must always be immersed, see the section on hydraulic connections.

4.7 Installing the electrical/ control panel

Reminder:

The control panel is IP56 rated (according to the standard EN 60529). It will not be damaged by splashing, however it should be located at least 3.5 metres from the pool.

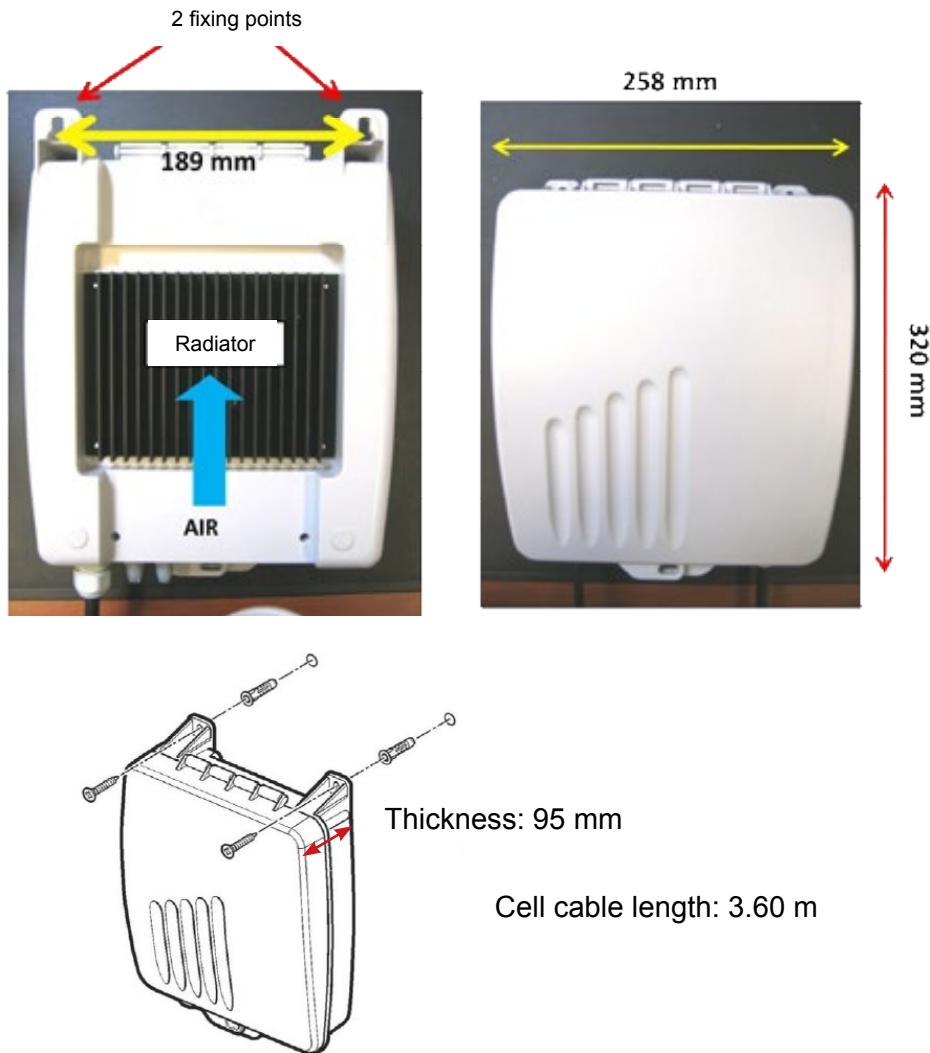
If this is not possible, it may be positioned closer to the pool, but under no circumstances closer than

2 metres, subject to the condition that its power cable is directly connected to a 30mA residual current device (as stipulated in the standard NF C 15-100).

Mount the panel on a flat, solid, vertical wall in the plant room using the 2 mounting brackets. For added safety, position the panel at a height inaccessible to children.

! IMPORTANT

- To allow the panel to cool properly, do not obstruct the flow of air behind the panel.
- Do not install the panel in a closet or any other place where inadequate ventilation could cause the device to overheat and catch fire.

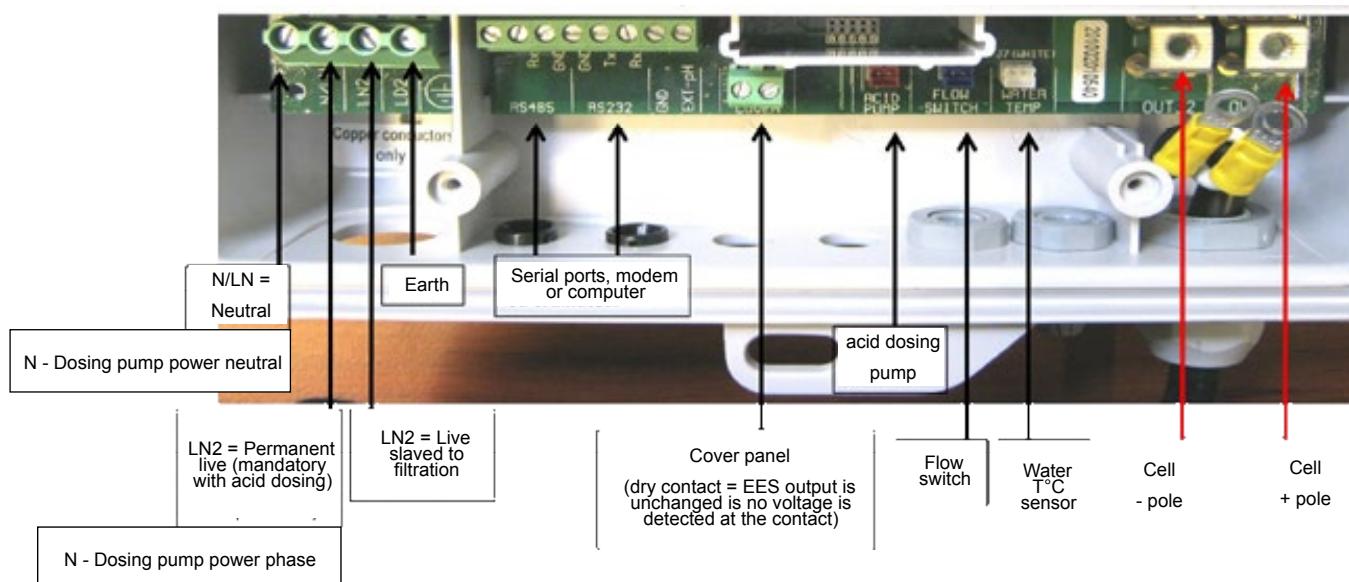
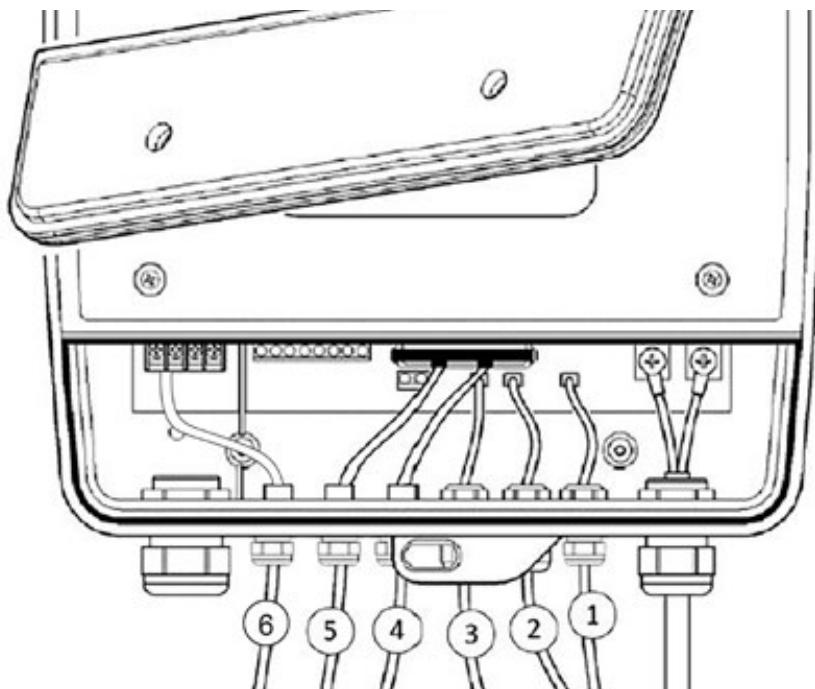


4.7.1 Connection of the various components to the electrical panel

Remove the cover from the compartment containing the terminal connections.

Pass the connection cables through the cable glands located below the connection points.

1. Temperature sensor (White)
2. Flow switch (Blue)
3. Acid dosing pump (Red)
4. pH sensor
5. Redox sensor
6. Dosing pump power



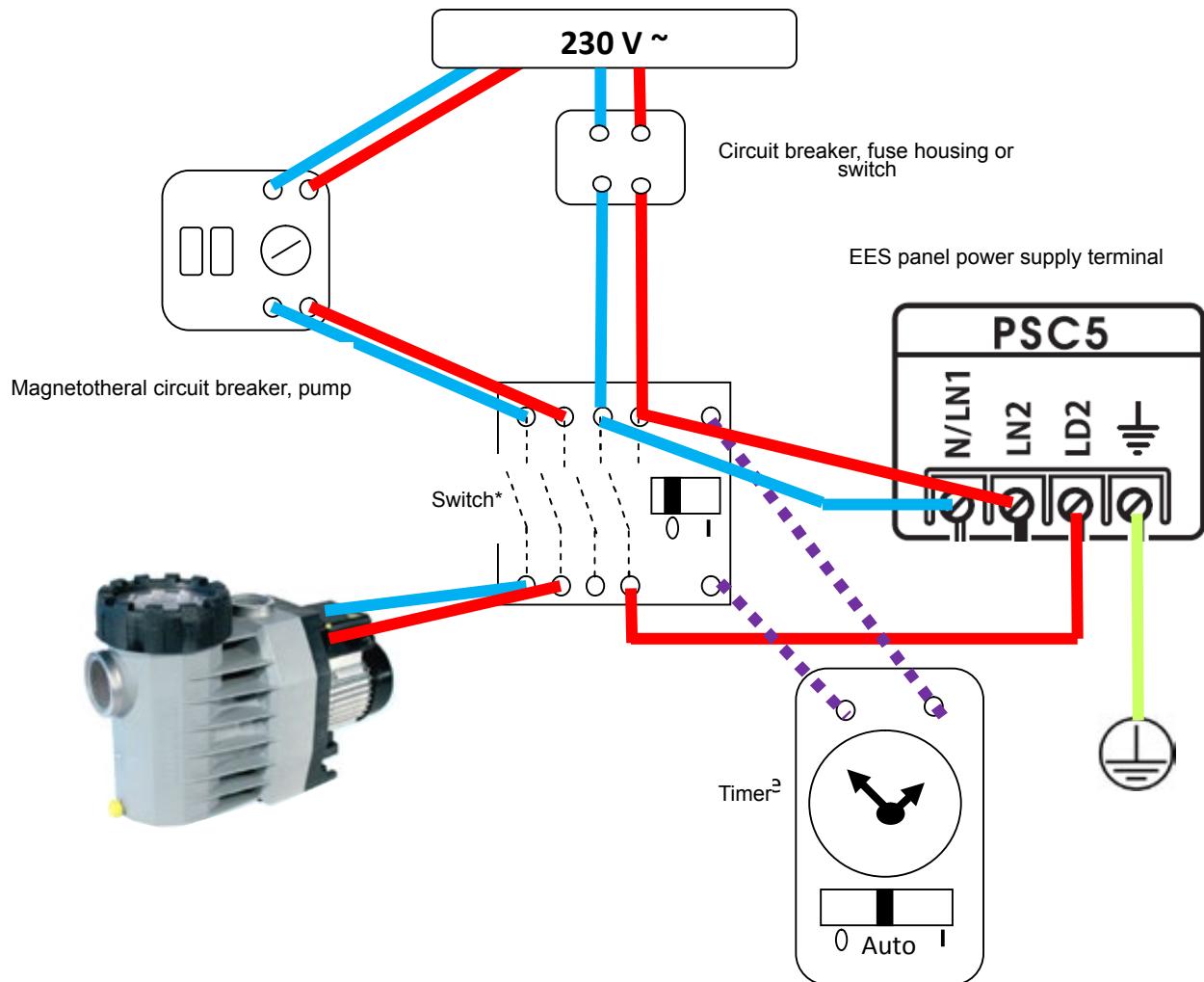
The cell is connected to the panel with cables fitted with quick fit connectors (cable length approx. 3.60 m). The two tabs keep each pair of connectors correctly assembled with respect to each other. Check that they are firmly connected by pulling lightly on each connector.



NEVER MODIFY, SHORTEN OR LENGTHEN THE CABLES.

4.7.2 wiring in the control panel

Principal: production of Chlorine by the cell must be slaved to operation of the filtration pump and circulation of water through the flow sensor.



N/LN1 = permanent neutral

LN2 = permanent live (panel and acid dosing pump)

LD2 = slaved live (cell)

*Nota bene: to avoid electrical disturbances when the pump starts and stops, the EES power cables should not be in contact with those of the filtration pump: use a contactor with 4 power inputs/outputs as illustrated in the diagram, or failing this a contactor with 2 power inputs/outputs for the pump and a relay for the EES, both slaved to the filtration timer.

The power rating of the panels are as follows:

Panels for pools up to 80 m³ = 0.6 A

Panels for pools up to 150 m³ = 1.2 A

To connect the control panel to the contactor and the contactor to the mains, we recommend that you use cables with a strand cross section of 1.5 mm². If the cable is very long, use one with a strand cross section of 2.5 mm².

5. ADDING SALT TO THE POOL:

Before adding salt to the pool, check that each of the water equilibrium parameters are within range:

- pH, ideally between 7.2 and 7.4 with EES
- Calcium hardness (water hardness = concentration of dissolved calcium), between 200 and 400 ppm
- T.A. (total alkalinity), between 80 and 120 ppm

Use these parameters to ensure that the water is correctly balanced (Taylor balance or Langelier index – see appendix 1)

! **IMPORTANT** If the pool was treated with PHMB in the past, eliminate all of this disinfectant before starting the electrolyser.

! **Only use pool grade salt as stipulated in the standard EN 16-401. No other types of salt should be used.**

If the pool has not just been entirely refilled, measure the salt concentration with a suitable device because it may contain a little salt if the water was treated with Chlorine before the electrolyser was installed.

Calculate the weight of salt to be dissolved to achieve a concentration of 3.5 g/litre (3500 ppm) in the pool water. This will depend on the volume of water in the pool (do not forget the buffer tank if the pool has an overflow feature), and the initial salt concentration measured beforehand.

USE THE FOLLOWING TABLE:

Initial salt concentration (ppm) in the pool

	0	500	1000	1500	2000	2500	3000	3500	4500
Volume (in m ³) of water	Quantity (in kg) of salt to be added to the pool								
10	40	35	30	25	20	15	10	5	0
20	80	70	60	50	40	30	20	10	0
30	120	105	90	75	60	45	30	15	0
40	160	140	120	100	80	60	40	20	0
50	200	175	150	125	100	75	50	25	0
60	240	210	180	150	120	90	60	30	0
70	280	245	210	175	140	105	70	35	0
80	320	280	240	200	160	120	80	40	0
90	360	315	270	225	180	135	90	45	0
100	400	350	300	250	200	150	100	50	0
110	440	385	330	275	220	165	110	55	0
120	480	420	360	300	240	180	120	60	0
130	520	455	390	325	260	195	130	65	0
140	560	490	420	350	280	210	140	70	0
150	600	525	450	375	300	225	150	75	0

EXAMPLE:

A pool containing 100 m³ of water with an initial salt concentration of 1000 ppm (1g/litre) -> add 300 kg of salt to obtain a final salt concentration of 3.5 g/litre.

The quantity of salt calculated should be added as follows:

- Spread the salt evenly over the entire surface of the pool: the salt pellets settle on the floor of the pool;
- Start the filtration pump and let it run continuously until the salt is totally dissolved (approximately 8 hours);

! **IMPORTANT** Do not turn the electrolyser on while the salt is dissolving.

6. CHLORINE STABILISATION:

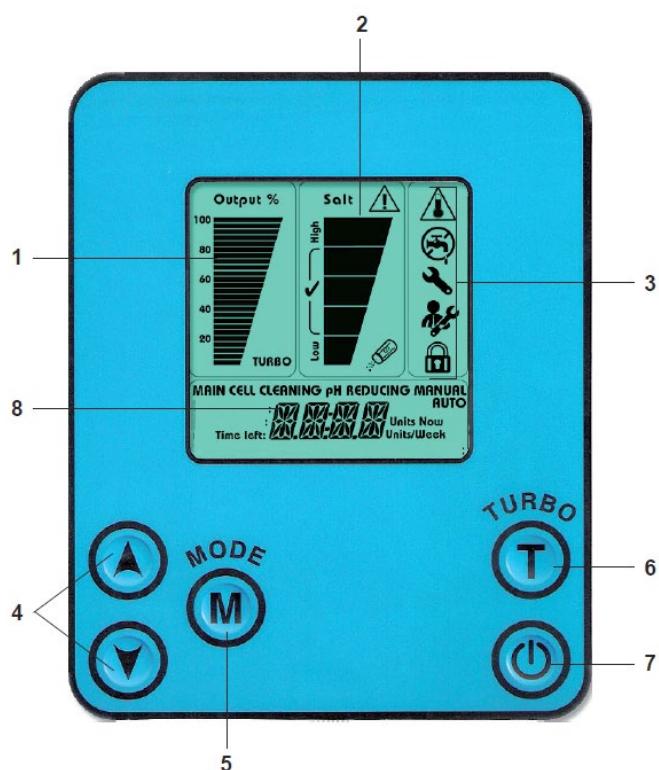
The Chlorine introduced into the pool by the electrolysis cell is unstabilised active Chlorine that is easily destroyed by UV light and heat.

To limit this phenomenon while the pool is uncovered, the addition of a Chlorine stabiliser, Isocyanuric acid (concentration approx. 30 ppm) is recommended.

The Chlorine stabiliser does not break down over time; if the pool was disinfected with Chlorine before the electrolyser was installed, measure the initial stabiliser concentration before adding any more. Excess stabiliser (above 75 ppm) will block the action of Chlorine and falsify measurement of the Redox potential.

7. STARTING THE ELECTROLYSER:

Once the electrolyser is wired in, hydraulic connections have been made, the water parameters have been adjusted and the salt and stabiliser have been completely dissolved, the device may be switched on.



Upon being energised, the message **OFF** is displayed on the LCD screen. Press the **ON/OFF** button (7).

If the flow of water past the flow sensor is adequate ($> 5 \text{ m}^3/\text{h}$), the message **ON (EES)** or **AUTO (EES Pro)** - indicating that production of Chlorine is controlled by the pH and Redox sensors) is displayed at the bottom of the LCD screen: the device is able to produce Chlorine.

If the message **STD-BY** (stand-by) is shown, the filtration timer is not currently at a run cycle: check that the timer is in Auto mode and wait for the next filtration cycle, or force filtration on by switching the timer to the I position.

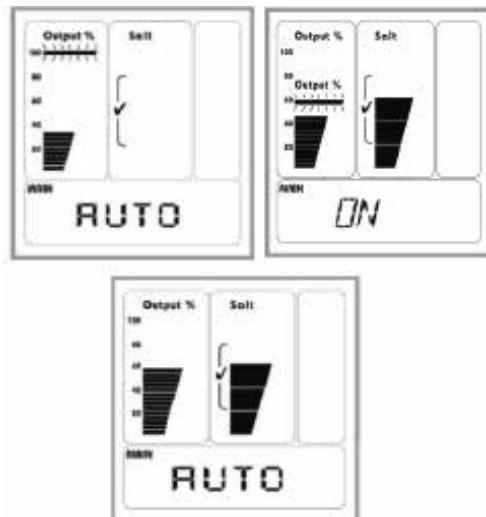
If the timer triggers the filtration pump to run, but the water flow rate is too low ($< 3 \text{ m}^3$) or there is no flow, the message **NO FLOW** is displayed. Check the following:

- the filtration pump is running
- the pump is properly primed
- the pump is rotating in the correct direction (in the case of a 3 phase pump)
- The valves on the by-pass loop are correctly adjusted: the central valve is sufficiently closed and the 2 valves upstream and downstream of the EES electrolyser are sufficiently open;
- water is flowing in the correct direction past the flow sensor, and the flow sensor has not been mounted

upside down.

- the flow sensor is correctly connected to the EES control panel
- Disconnect the flow sensor and using an ohmmeter check the continuity of the 2 connector contacts while water is circulating.

When production is possible (**ON** for EES, **AUTO** for EES Pro), the device begins by measuring water salinity, this value is displayed 1 minute after the device starts up. After this delay, if the salt concentration is within acceptable limits, the production of Chlorine begins and gradually increases. Upon reaching the required level, the bar under Output % stops blinking and disappears.



FROM NOW ON THE SYSTEM WILL RUN AUTOMATICALLY, MONITORING THE WATER CHEMISTRY AND PRODUCING CHLORINE UPON DEMAND!

8. PARAMETER SETTINGS AND FUNCTIONS

8.1 Chlorine output

On the **EES** models only, the chlorine output can be adjusted manually by the user by pressing the two arrow keys **▲** and **▼**.

This setting will be saved to memory for when the device is started in the future, even if it is disconnected from its power supply in the mean time.

EES Pro models automatically adjust the Chlorine output depending on the Chlorine demand detected, the user may not intervene manually. Nota bene: while there is no Chlorine demand, and so no Chlorine production, the output scale is not displayed on the screen.

8.2 Viewing the measured pH and redox values (**EES Pro** only)

! **IMPORTANT** To ensure the accuracy of the pH sensor, calibrate the sensor before setting the set point. See the calibration procedure in paragraph 10.2 et 10.3.

On EES Pro, use the **▲** and **▼** arrow keys to view the pH and Redox potential measured by the sensors:

- Press one of the two arrows once, the measured pH value is displayed.
- Second press, a few seconds after the first, the Redox potential is displayed.
- The display returns to AUTO after a few seconds.

8.3 Setting the pH and redox set point (EES Pro only) :

8.3.1 pH

- The pH measures the degree of acidity or alkalinity of the water and has a strong influence on the efficacy of Chlorine, and on bather comfort.
- The pH set point is set at 7.5 in the factory.
- The pH set point may be modified within the range 7.0 – 8.1.

To do this:

- Press twice on the  button: the current pH set point will be displayed.
- To modify this value, press the arrow keys ▲ and ▼ until the desired value is displayed.
- To validate the new value and exit setting mode, press the  button twice.

8.3.2 Redox:

The Redox potential of water is a measurement that is in tight correlation with the concentration of free Chlorine. However, this correlation is influenced by the following water parameters:

- pH (when the free Chlorine concentration is fixed, the Redox potential will decrease as the pH increases)
- temperature (when the free Chlorine concentration is fixed, the Redox potential will decrease as the temperature rises)
- stabiliser concentration (when the free Chlorine concentration is fixed, the Redox value will decrease as the concentration of stabiliser increases)

Therefore, in order to establish the Redox value that should be selected as the set point:

- bring the pH of the pool to the set point value,
- adjust the concentration of stabiliser in the pool to the desired value,
- heat the pool to the desired temperature, and maintain it at this temperature (if the pool is not equipped with a heating system, simply wait until the water naturally reaches the lowest temperature at which bathers will use the pool).
- Next, adjust the concentration of free Chlorine to the desired level.
- To do this, add Chlorine in successive increments and measure the free Chlorine concentration after each addition using a photometer that measures free Chlorine concentration with adequate precision and that has been calibrated at least within the last year.
- Do this until the desired concentration of free Chlorine has been reached (usually between 0.75 and 1.25 ppm). Check that the pH is still correct, adjust it if necessary.
- Chlorine may be added either manually using non stabilised liquid Chlorine, or by forcing the electrolyser on in Turbo mode for decreasing periods of time (see paragraph 8.4) (caution: in Turbo mode, the set point is not taken into consideration).
- Once the desired concentration of free Chlorine has been reached, display the Redox potential measured by EES Pro. This value will be the set point.

The Redox value set point factory setting is 650 mV.

The Redox set point may be modified within the range 550 – 900 mV.

To do this:

- Press the  button once: the current Redox set point will be displayed.
- To modify this value, press the arrow keys ▲ and ▼ until the desired value is displayed.
- To validate the new value and exit setting mode, press the  button once.

! **IMPORTANT** An increase of the Redox set point will cause an increase of the free Chlorine concentration in the pool, while decreasing the Redox set point will entail a decrease of the free Chlorine concentration.

! **IMPORTANT** The correlation between the Redox potential and the desired free Chlorine concentration should be re-established:

- Each year when the pool is reopened, if the pool was winterized
- if a significant volume of the pool water (more than 1/3) is renewed
- if a decision to alter the stabiliser concentration is made

To do this you will need a photometer capable of measuring the Chlorine concentration with adequate precision, and that has been calibrated within the last year; if necessary adjust the concentration by adding small amounts of Chlorine successively, until the required concentration is reached. Note the Redox potential measured by EES Pro, this is the set point. If a regular drift from the Redox value is noticed, or if there is a sudden change in this value, replace the Redox sensor.

! **ATTENTION** The Redox system does not allow precise regulation of the free Chlorine concentration at high set point values (above 2 ppm, that is approximately 725 mV at pH = 7.4).

8.4 Turbo mode

The Turbo  function allows continual production of Chlorine at maximum output (100%) over a duration set by the user.

Press the  button to switch to Turbo mode: the word Turbo blinks at the bottom of the output scale.



The Turbo mode duration is set to 12 hours in the factory, this setting is displayed on screen.

Successive presses on the T button will increase the duration in increments of 12 hours up to a maximum duration of 72 hours (then returns to 0).

For finer adjustment, in intervals of one minute, use the arrow keys, **▲** and **▼**.

EXAMPLE:

*To activate Turbo mode for a duration of 26 hours and 30 minutes. After having activated Turbo mode, press the T button once -> 24:00 is displayed. To set the minutes, keep the **▲** key pressed down (rapid scroll) and then press successively until 26:30 is displayed. If the value is overshot, use the **▼** key to return to the desired value.*

Next, the displayed time will start to count down, this represents the time remaining for the Turbo cycle.

! **IMPORTANT** begin setting the duration of the Turbo cycle with the T button within 5 seconds of entering Turbo mode. Each successive press on the T button to modify the length of the cycle must occur within 5 seconds of the last. Otherwise, pressing the T button will cause the device to exit Turbo mode.

There are 3 ways to exit Turbo mode:

- allow more than 5 seconds to elapse and then press the T button.
- stop the device using the ON/OFF button
- set the duration of the cycle to 00 : 00

Neither activation nor exiting Turbo mode will effect settings in AUTO mode.

! **IMPORTANT** Even in Turbo mode, the device will not run with an output of 100% if the salt concentration in the water is too low. It will run at its highest possible output for the current concentration of salt in the water.

8.5 Cover mode

This mode concerns pools equipped with a cover and a system that detects when the cover is deployed over the pool and closes a dry contact.

This is mainly useful for pools fitted with the EES model because this model does not regulate the concentration of Chlorine in the water but rather produces Chlorine for as long as the filtration cycle is running. While the cover is deployed over the pool, the free Chlorine is protected from destruction by UV radiation and is not being consumed by pollution introduced by bathers, therefore there is a risk that it will accumulate in the water while filtration is running.

The two wires of the dry contact should be connected to the COVER terminal in the control panel (see paragraph 4), and the contact should close when the cover is deployed over the pool.

While the cover is deployed, the message MODE AUX is displayed on the panel's LCD screen, and the production of Chlorine is decreased to 20% by default.

The value by which Chlorine production is decreased while the pool is covered may be modified by the user using the arrow keys ▼ and ▲.

The new value will be saved automatically, this will then be the Chlorine output in Cover mode until the value is modified again.

8.6 Descaling the cell by injecting acid using the acid dosing pump

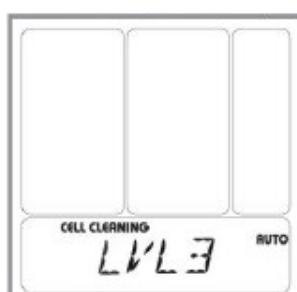
Reminder: the acid dosing pump is an integral part of EES Pro, and is available as an option for EES.

The automatic electrode polarity switching system helps slow, and evenly distributed deposition of scale on the electrodes in the cell (see paragraph 1 for the explanations).

Nevertheless, and even if the concentration of calcium dissolved in the water is within allowed limits, there is a risk that this phenomenon will occur.

The scaling phenomenon may be counteracted by programming the injection of small quantities of acid (approx 70 cm³) into the cell using the acid dosing peristaltic pump while filtration is stopped (Stand-by mode). The acid injection frequency is set as follows:

- stop filtration
- press the  button to enter CELL CLEANING – AUTO mode



- choose an injection frequency (LVL) between 0 and 9 using the arrow keys ▼ and ▲ according to the following table:

LVL	0	1	2	3	4	5	6	7	8	9
Min. filtration duration (hours) prior to injection	No injection	54	48	42	36	30	24	18	12	6

To cancel periodic injections of acid, set the level LVL to 0.

Nota bene: for EES Pro the factory setting is LVL = 9.

It is also possible to carry out an immediate injection of acid, and to set the volume of acid to be injected:

- stop filtration

- press the  button twice to enter **CELL CLEANING–MANUAL** mode.

- Select and injection volume LVL between 1 and 4 using the arrow keys ▼ and ▲ ,

LVL = 1 -> volume = 70 cm³

LVL = 2 -> volume = 2 x 70 = 140 cm³...

A few seconds after the setting is selected, the pump starts to inject the selected volume. To cancel injection, either before or during, simply start filtration.

! **IMPORTANT** if the acid dosing pump option is not installed with an EES, the cell must be removed from the hydraulic circuit for descaling.

8.7 Punctual or periodic reduction of the pH by the acid dosing pump

This function concerns EES Pro, and also EES if the acid dosing pump option is installed.

The acid dosing pump may be set to inject acid *during filtration cycles*, either at periodic intervals, or one single time:

8.7.1 Periodic injection:

- Make sure that filtration is running

- press the  button to enter pH REDUCING – AUTO mode.

8.7.2 Punctual injection:

- Make sure that filtration is running

- press the  button three times to enter pH REDUCING – MANUAL mode

- Using the arrow keys ▼ and ▲, select an injection volume LVL,

LVL = 1 -> volume = 70 cm³

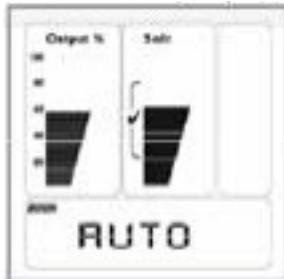
LVL = 2 -> volume = 2 x 70 = 140 cm³...

A few seconds after the volume is set, the pump will begin to inject the selected volume. To cancel injection, either before or during, stop the filtration pump.

9. WARNING AND ERROR MESSAGES

9.1 Salt concentration too low or too high

When the salt concentration is within acceptable limits, the salt gauge will rise to a point within the ticked (✓) zone.



9.1.1 Salt concentration too low



Low salt, the gauge is below the ticked range. The word 'Low' and a salt shaker appear:

- Fixed if the salt concentration is between 2 and 3 g/litre
- Blinking if the salt concentration is between 1 and 2 g/litre

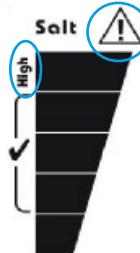
Below a salt concentration of 1 g/litre, the cell will stop producing Chlorine and the message NO CELL is displayed at the bottom of the LCD screen LCD.

! IMPORTANT

A low salt warning could be triggered by excessive build up of scale on the electrodes rather than a real lack of salt. In the event of a low salt warning, check that the electrodes are clean and check the salt concentration with a suitable tester in case of doubt.

A **faulty temperature sensor** could also cause a low salt warning

9.1.2 Salt concentration too high



High salt, the gauge is above the ticked range. in addition:

- between 5.5 and 6.5 g/litre, the message "High" is displayed.
- between 6.5 and 8.0 g/litre, the icon is displayed.
- Above 8.0 g/litre, both the message and the icon blink.

At a salt concentration above 10.0 g/litre, the cell stops producing Chlorine and the icon  is displayed to the right of the LCD screen. The high salt icons blink continuously and the message **HIGH SALT** or **SHRT CELL** is displayed at the bottom of the screen.

The salt concentration is lowered by renewing a volume of pool water.

If the salt concentration is higher than 6.5 g/l, a volume of the pool water must be renewed immediately in order to bring the salt concentration down to an acceptable level.

9.2 Electrical problems with the cell

2 types of electrical problems are signaled if detected:

9.2.1 Short circuit in the cell power supply circuit

The message SHRT CELL is displayed at the bottom of the screen.

- Cut power to the control panel
- Inspect the cable linking the panel to the cell very carefully, starting at the terminal in the connection compartment of the panel. Contact your agent if any damage is visible.

! **IMPORTANT** This message is also displayed, in parallel with other indicators if the salt concentration is too high as described previously.

9.2.2 No current in the circuit powering the cell

(eg: the cable is cut, connector not pushed all the way in, connector contact corroded or damaged): the message NO CELL is displayed at the bottom of the screen.

- Cut power to the cell
- Remove the cover over the panel connection terminals, and check that the two lugs on the cell power cable are correctly tightened.
- Undo the quick connectors at the cell, check that the contacts inside the connectors are not dirty (corrosion, etc.)
- Check that the connectors are pushed in until a 'click' is heard.
- Inspect the cable linking the panel and the cell carefully, starting from the terminals in the panel connection box. Contact your agent if the cable is damaged.

! **IMPORTANT** This message is also displayed, along with other indicators, if the salt concentration is too low as described previously.

9.3 Flow rate too low

The message **NO FLOW** and the icon  appear, indicating that there is either no flow or insufficient flow past the flow controller (subject to the reservation that the device is correctly assembled).

Stepwise resolution of the problem (if the problem is not resolved after verifying that one step is ok, move on to the next step):

- Check that the filtration pump motor is running;
- Make sure that the filtration pump is primed;
- Make sure that suction and return manifold valves in the plant room are not closed;
- Make sure that filtration pump prefilter basket is not clogged with impurities;
- Make sure that the filter is not clogged with impurities;
- Make sure that the cut-off valves at the bypass loop inlet and outlet are open;
- Close the valve between the inlet and the outlet valve on the main circuit completely so that all of the flow is directed past the flow sensor;
- **Cut power to the electrical/ control panel**, remove the lid from the panel terminal connection box, disconnect the flow sensor cable, check the condition of the connector contacts, the two wires coming from the cable, and the pins on the connector, then push the connector back in fully and the right way around.
- Check the entire length of the flow sensor cable for damage.

9.4 Water temperature is too low

If the water temperature is **less than 15 °C**, the message **LOW TEMP**, is displayed:

- Between 10 and 15 °C, the maximum Chlorine output possible is 50 %
- Below 10°C, Chlorine output cannot rise above 25 %

! **IMPORTANT** Never disconnect the temperature sensor, because in the absence of any indication, the device will assume that the water temperature is 26.5° and produce Chlorine at 100%.

For the same reason, precautions should be taken with the sensor wire, it should also be checked for damage.

Forcing the output on at 100% by disconnecting the sensor can lead to premature damage of the cell electrodes.

9.5 Temperature in the electrical panel is too high

If the temperature within the electrical panel is greater than 65 °C, the icon  appears. Above 70°C, Chlorine production is limited to 50%.

9.6 Replace the acid feed tube (EES Pro only)

After installation, every 180 days the device will display the message **ACID PIPE**, recommending replacement of the acid feed tube abd check valve.

Refer to paragraph 10.4 for the tube replacement procedure.

After replacing the tube, reset the counter as follows:

- Press the button M four times
- Press the arrow  : the messages NEW PIPE and 180 DAYS are displayed at the bottom of the screen
- The 180 days interval may be reduced in 10 day increments using the arrow keys.
- Confirm reset of the counter by pressing the M button.

9.7 Pump disconnected (EES Pro only)

If the system tries to activate the pump while the pump is disconnected, the message **NEED PUMP** is displayed at the bottom of the LCD screen.

- **Cut power to the electrical/ control panel**, open the lid of the connection terminal compartment, check the condition of the connector contacts, the two wires coming out of the cable and the connector pins, then put the connector back into position, taking care to push it in fully and the right way around.
- Inspect the length of the pump cable and make sure that it is not damaged.

9.8 High and low ph and redox alarms (EES Pro only)

9.8.1 pH HIGH

This message is displayed when the pH value measured by the pH sensor is greater than 8.5 (**NB: this warning will not stop injection of acid by the acid dosing pump**).

If no previous event explains this situation, try to resolve the problem by carrying out the following steps in the order indicated (if the problem is not resolved by one step, proceed with the next):

- Make sure that the pH set point is correct.
- Check that there is enough acid in the buffer tank
- Check that the acid dosing pump motor is working and that acid is being expelled (stop the pump, disconnect the injection tube from the injector, put the tip into an empty container and restart the pump)
- Verify the accuracy of the pH sensor by measuring the pH of the pool water using a recently calibrated photometer that measures pH. If there is a difference of more than 0.2 pH units, calibrate the pH sensor and check again.
- If the values measured by EES and the photometer correspond, and the pH is above 8.5, adjust the pH back to the set point by adding acid and wait to see if this phenomenon reoccurs.

9.8.2 PH LOW

This message is displayed when the pH measured by the pH sensor is **less than 6.7**.

If no previous event explains this situation, try to resolve the problem by carrying out the following steps in the order indicated (if the problem is not resolved by one step, proceed with the next):

- Make sure that the pH set point is correct.
- Check that the acid dosing pump stops injecting acid when the pH falls below the set point.
- Check that the sensor is clean and undamaged.
- Verify the accuracy of the pH sensor by measuring the pH of the pool water using a recently calibrated photometer that measures pH. If there is a difference of more than 0.2 pH units, calibrate the pH sensor and check again.
- If the values measured by EES and the photometer correspond, and the pH is less than 6.7, add base to bring the pH back to the set point and wait to see if this phenomenon reoccurs.

9.8.3 ORP HIGH

This message is displayed if the value measured by the Redox sensor **greater than 925 mV**.

If no previous event explains this situation, try to resolve the problem by carrying out the following steps in the order indicated (if the problem is not resolved by one step, proceed with the next):

- Make sure that the Redox set point value is correct.
- Check that the device is not in Turbo mode and that it is not producing Chlorine
- Using a recently calibrated photometer, measure the concentration of free Chlorine in the pool water to see if this value corresponds with the (abnormally high) Redox potential displayed.
- Calibrate the Redox sensor
- Wait for the Chlorine concentration to fall and to see if the phenomenon reoccurs.

9.8.4 ORP LOW

ORP LOW: this message is displayed when the value measured by the Redox sensor is less than 525 mV.

If no previous event explains this situation, try to resolve the problem by carrying out the following steps in the order indicated (if the problem is not resolved by one step, proceed with the next):

- Make sure that the Redox set point value is correct.
- Check that the sensor is clean and undamaged.
- Using a recently calibrated photometer, measure the concentration of free Chlorine in the pool water to see if this value corresponds with the (abnormally low) Redox potential displayed.
- Calibrate the Redox sensor
- Check that filtration is running for long enough each day (at least 10 hours a day during the pool season)
- Visually inspect the cell to verify that it is producing and that the electrodes are not covered in scale.
- Check the stabiliser (Isocyanuric acid) concentration in the pool. It should be between 30 and 50 mg/l
- Increase the concentration of free Chlorine and wait to see if this phenomenon reoccurs.

All these alarms are automatically reset when the parameter returns to within an acceptable range.

9.9 pH or Redox sensor faults (EES Pro only)

PH Probe: pH sensor not detected.

ORP Probe: Redox sensor not detected.

- **Cut power to the electrical/ control panel**, open the connection terminal compartment and check that the two sensors are properly connected at the correct positions on the PCB.
- Remove the sensor PCB from its housing and check that the pins are clean and in good condition. Reinsert it fully into its housing.
- Inspect the entire length of the wires of each sensor and make sure that they are not damaged.
- Close the by-pass loop shut-off valves and remove the sensors to check them for damage.

9.10 pH/Redox circuit board fault (EES Pro only)

NO CARD sensor connection board not detected.

- Cut power to the electrical/ control panel, open the connection terminal compartment.

- Remove the sensor PCB from its housing and check that the pins are clean and in good condition. Reinsert it fully into its housing.

10. MAINTENANCE

10.1 Maintenance of ph and redox sensors (EES Pro only)

During use, scale may build up on the pH and Redox sensors, or a greasy deposit may accumulate on their tips. This may be the case if their response times are getting longer.

The sensors should be removed from their mounting tee and inspected at regular intervals (first make sure that the by-pass loop inlet and outlet shut-off valves are closed, and place a bucket under the tee to collect any water).

! NEVER CLEAN THE TIPS OF THE SENSORS BY RUBBING OR WIPING THEM

If necessary, descale the electrodes by soaking the tips of the electrodes in a 10% solution of Hydrochloric acid for a few minutes.

To degrease the sensors, dip them in soapy water and agitate them. Rinse the sensors thoroughly after degreasing.

After being descaled and degreased, the sensors should be recalibrated (see the next paragraph), and the correspondence between the Redox potential measured by the Redox sensor and the actual concentration of free Chlorine should be verified.

! Always keep the tips of the pH and ORP sensors submerged in liquid. Drying will damage the sensor and void its guarantee.

10.2 Calibrating the ph sensor (EES Pro only)

The sensor must be clean (see the previous paragraph)

10.2.1 Frequency of calibration

The ph sensor should be calibrated :

- The first time the device is put into operation,
- upon reopening the pool after winterizing,
- Approximately every 4 weeks during the pool season.

10.2.2 Materials required

Calibration requires the following materials:

- Glass of tap water, or a tap nearby
- Buffer solution pH = 7
- Buffer solution pH = 4

10.2.3 Procedure:

- Start the device leaving the filtration pump off (**ST-BY mode**), close the valves of the by-pass loop on which the tee housing the sensors is mounted. (place a bucket under the tee to collect any water)
- Remove the pH sensor, rinse it and shake it to remove any drops without wiping it, then immerse it in a buffer solution **pH = 7**
- Wait 2 minutes, moving the sensor gently in the solution every now and then.

- Switch the device off (button), then press **M** to begin calibration
- Wait for the read out to stabilise, and press **M** to adjust the sensor to pH = 7
- Remove the pH sensor, rinse it, shake it to remove any drops (do not wipe it), then immerse it in a **pH 4** buffer solution.
- Wait for the read out to stabilise, and press **M** to adjust the sensor to pH = 4
- The message **DONE** is displayed, confirming that calibration is complete.

10.3 Calibrating the Redox sensor (EES Pro only)

This operation requires both the pH and Redox sensors.

- !** Check first that the sensors are clean, then rinse with clear water, this will ensure that the calibration process is more accurate.

10.3.1 Frequency of calibration

The redox sensor should be calibrated:

- The first time the device is put into operation,
- upon reopening the pool after winterizing,
- Approximately every 6 weeks during the pool season.

10.3.2 Materials required

Calibration requires the following materials:

- Glass of tap water, or a tap nearby
- Redox buffer solution

10.3.3 Procedure:

- Start the device leaving the filtration pump off (**ST-BY mode**), close the valves of the by-pass loop on which the tee housing the sensors is mounted. (place a bucket under the tee to collect any water)
- Remove **the pH and the Redox sensor**, rinse them and shake them to remove any drops (do not wipe), then immerse them in the Redox buffer solution and move them gently in the solution.
- Wait approximately 1 minute
- Switch the device off ( button), the LCD display will show "OFF".
- Press **M** to enter calibration mode.
- When ORP is displayed, press the  button.
- Press the button **M** again to begin calibration.
- Wait for the read out to stabilise, then, using the arrow keys, adjust this value to that indicated on the redox buffer solution bottle.
- Press the button **M** again to confirm this setting.
- The message **DONE** is displayed, confirming that calibration is complete.

10.4 Replacing the internal tube of the acid dosing pump

It is recommended to replace the check valve and internal tube of the dosing acid pump before starting a new bathing season and/or every six months during the season. Please contact your local dealer to obtain a new tube. The internal tube requires replacing when ACID PIPE message is visible

- !** **WARNING** As there is a high risk of acid splashing or leaking out, safety glasses, gloves and protective clothing should be worn.

- Remove the transparent protective cover



- Carefully slip off the rubber tube from its slot. Gently pull the tube out (clock wise) assisting with the other hand to turn the pump's wheel and help free the tube until it is completely out.



- Note: It is advisable to flush the pump with running tap water in order to dilute any remaining acid which may have spilled from the tube.
- Disconnect both ends of the internal tube by unscrewing the nuts from the nipples.



- Screw in both ends of the NEW internal tube making sure the nuts are tightly secured.



- Gently insert the tube back into place making sure the black bases of the tubes are tightly in their slots in the casing.



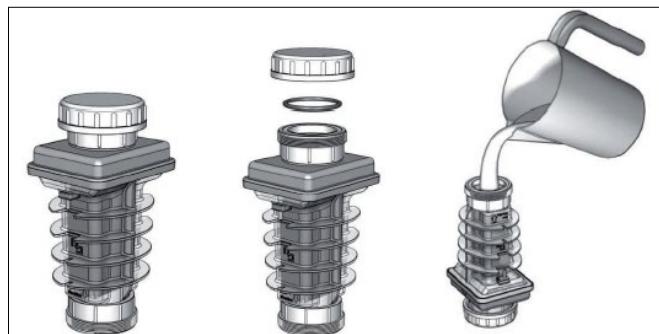
- Put the transparent cover back in position.



Check for leaks and leave the pump running in manual mode for 10-20 minutes in order to release the air in the system.

10.5 Manual dismantling and descaling of the cell

- If filtration is stopped, force it on for approximately one minute so that water flows through the cell in case acid was just injected.
- Isolate the by-pass loop on which the cell is mounted by completely closing the shut-off valves at the loop inlet and outlet.
- Disconnect the quick connectors of the cell power cables.
- Unscrew the white barrel unions on either end of the cell, and remove the cell.
- Screw the white blanking cap onto one of the cell openings, first making sure that the o-ring is correctly positioned.
- Turn the cell the other way round and stand it vertically on the white cap.
- Pour white distilled vinegar or 10% Hydrochloric acid into the cell.
- Wait until the scale is completely dissolved (stops frothing),
- If scale is still present, empty the cell and repeat the procedure with vinegar or acid.
- Rinse the cell with water.



- Make sure that the o-rings are in position at either end of the cell and remount it. Put the installation back into operational status (cell power cable, by-pass, valves, filtration timer)

10.6 Winterizing

10.6.1 Passive winterizing:

In the event that pool filtration is completely stopped during the winter, proceed as follows to avoid any damage that could be caused by freezing or clogging with algae:

Close the two shut-off valves on the by-pass loop on which the cell and acid dosing pump are mounted.

ACID DOSING PUMP:

- Rinse the pump tubing as follows to remove any traces of acid:
 - Pull the suction tube and strainer carefully out of the acid buffer tank and immerse it into a bucket of water.
 - run the pump either in pH Reducing - Manual mode if filtration is running, or in Cell Cleaning Manual mode if filtration is stopped.
 - When at least half of the bucket has been emptied, stop the pump.

- Disconnect the acid suction tube from the blue connector on the pump.
- Remove the transparent splash guard.
- Carefully disconnect the acid injection tube from the injection nipple and allow water from the pumping circuit to empty into a bucket placed below.

CELL:

- Descale and clean the cell (ref VIII.5), either using the acid dosing pump before it is winterized, or manually after dismantling the cell (ref. X.5) ;
- Open the bottom union to drain water from the cell, then screw the union shut ;
- Unscrew the blue head of the flow sensor and remove it.

SENSORS:

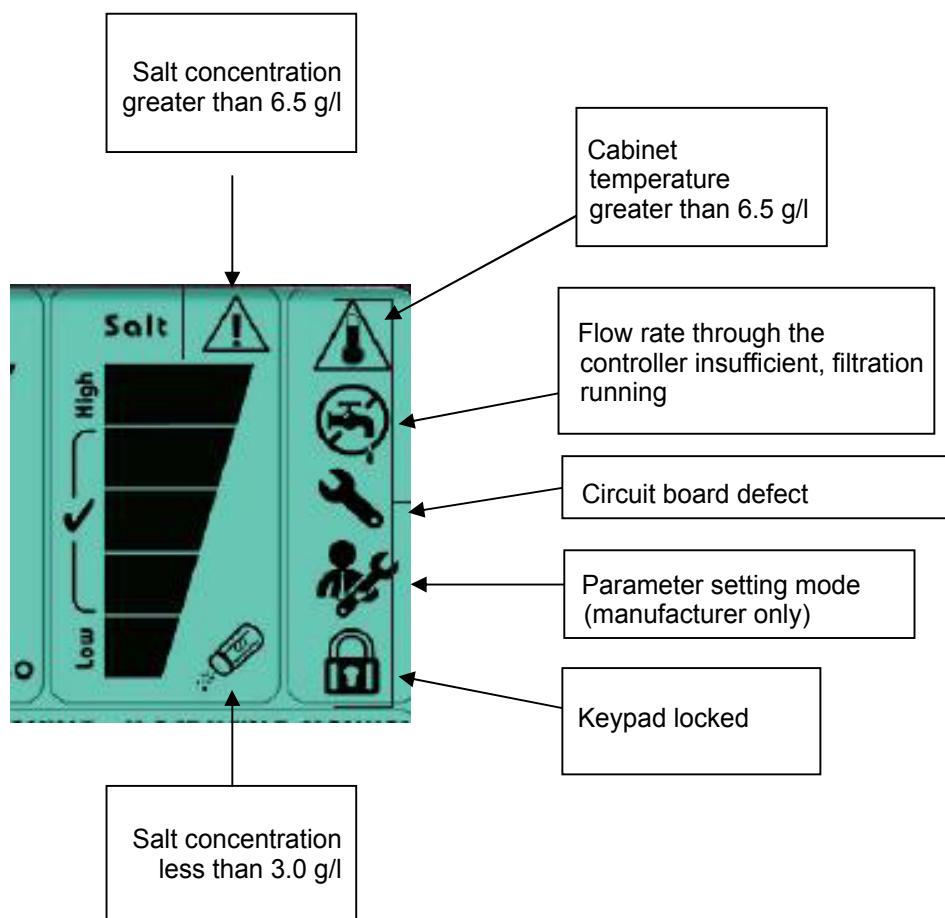
- Cut the power supply to the electrical/ control panel;
- Disconnect the sensors from the electrical/ control panel;
- Close the shut-off valve on the by-pass loop on which the sensors are mounted;
- remove the sensors and place them in their phials of buffer solution and store them in an area protected against freezing.

10.7 Active winterizing

Cut the power supply to the electrical/ control panel.

The various components may be left in place if suitable winterizing chemicals are added to the water to prevent the growth of algae and filtration is run every day.

Filtration must notably be run while the ambient temperature in the plant room where the material is installed is +2°C or less.



11. APPENDIX 1 - TROUBLESHOOTING

Problem	Possible cause	Solution
Concentration of free Chlorine in the pool is too low	The device is not working correctly	Check to see if an error message is displayed on the control panel screen, and refer to the corresponding list.
	The device remains off even though it should be running	See above
	The Redox sensor is badly calibrated (EES Pro only)	Calibrate the Redox sensor
	The Redox set point is not high enough (EES Pro only)	Check that the Redox set point is correct, modify the set point if necessary. If the set point is correct, check that this value corresponds to the desired Chlorine concentration (create a water sample of the desired Chlorine concentration and test using a photometer)
	Filtration run time is not long enough	Check the filtration run time, increase it if it is less than 10 h/day
	The salt concentration is barely within range	Measure the salt concentration and, if necessary, adjust it so that it is between 4.5 and 5.0 g/l
	Scale is starting to build up on the electrodes	Inspect the electrodes and descale if necessary
	Free Chlorine stabiliser (Isocyanuric acid) concentration is too low	Measure the concentration of Isocyanuric acid, this should be between 30 and 50 ppm
	The concentration of Phosphate in the water is high	Check that the water's phosphate concentration is less than 100 ppm.
Water is turning green, or brown stains are appearing on the pool walls and floor.	The concentration of free Chlorine is too low	Check the concentration of free Chlorine, correct if necessary.
	The water contains too much stabiliser	Measure the concentration of Isocyanuric acid. Renew a fraction of the pool water volume to bring the stabiliser concentration back below 50 ppm.
	The water contains too much dissolved metal (copper, iron, manganese) (brown stains on PVC waterproofing membranes)	Measure the concentration of metals. Add a metal flocculent.

Problem	Possible cause	Solution
The device remains off, even though it should be working	The system was turned off	Turn it on
	The panel power supply has short circuited	Check the fuse or circuit breaker on the electrolyser panel power line
	The power cable connection to the panel is loose	Cut power to the panel, remove the lid covering the panel connection terminals and tighten the power cable connections
	The fuse protecting the main circuit board has blown	Contact the after sales service for inspection and replacement if this proves necessary.
	One or both wires in the power cable is cut.	Inspect the cable and check the electrical continuity using a multimeter
The Chlorine output cannot reach 100%	It is not set at 100%	Check and correct if necessary
	Electrode surfaces are dirty (limescale, etc.)	Descale the cell
	The cell is worn out after being used for a long time	Replace the cell



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