

**CLORADOR SALINO
SALT WATER CHLORINATOR
ÉLECTROLYSEUR AU SEL**

**PRO200 / PRO250 / PRO500 /
PRO750 / PRO1000**

**MANUAL DE USUARIO
USER MANUAL
MANUEL DE L'UTILISATEUR**

1)	Español	3
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CHLORINATOR INFORMATION

PLEASE NOTE IN THE FOLLOWING CARD THE REGISTRATION DATA OF THE EQUIPMENT YOU HAVE PURCHASED, WHICH ARE FOUND ON THE SIDE LABEL.

THESE DATA WILL BE OF USE IF YOU WISH TO MAKE ANY ENQUIRY TO YOUR SUPPLIER OR TO BSV ELECTRONIC S.L.

MODEL.....
REF.
VOLTAGE.....
SERIAL NUMBER.....

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ATTENTION

Before installing the salt water chlorinator, please read this manual carefully. If you need to clarify any point or have any doubts, please contact your dealer or BSV ELECTRONIC S.L. directly. We will be delighted to assist you.

1-GENERAL DESCRIPTION

1.2 BSV PRO salt water chlorination equipment

Thank you for purchasing our BSPOOL salt water chlorinator, which will enable you to enjoy your swimming pool in perfect conditions, without the need to add any chemical disinfectants.

The salt water chlorination system produces chlorine directly in the filtering installations by means of electrolysis of slightly salted water. "Free chlorine" (hypochlorous acid, HClO) is produced which is a strong bactericide. Results are similar to the chemical products that are normally added.

Saline electrolysis is a reversible process, meaning that once active elements react with organisms present in the water, it reverts to common salt and water.

The equipment includes an electronic monitoring and regulation control and an electrolysis cell through which the pool water circulates and which is installed in the filtering circuit return

If the salt water chlorinator equipment is left to work permanently, it will not be necessary to change the swimming pool water for several years (8 to 15 depending on its use). You will therefore be collaborating with environment preservation policies and water management and saving.



1.2- Technical specifications

1.2.1- Equipment

Models	PRO200	PRO250	PRO500	PRO750	PRO1000
Supply voltage	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz
Chlorine production g/hour	200	250	500	750	1000
Max. power	1350W	1750W	3500W	5250W	7000W
Cell current	36A	45A	45A	45A	45A
Dimensions					
Weight	15Kg	20Kg	30Kg	40Kg	50Kg
Protection	IP57	IP57	IP57	IP57	IP57

1.2.2 – Common characteristics on the PRO units

- Adjustment of chlorine production by switched mode power supply
- Power supply performance >90%
- Automatic switch-off owing to lack of water flow
- Automatic voltage adjustment depending on the concentration of salt and the temperature, keeping continuous chlorine production.
- Automatic cleaning cycle of electrodes.
- Automatic restart in the event of supply failure.

1.3- Recommendations and safety precautions

- The equipment should always be installed by qualified staff.
- Disconnect the equipment from the mains before performing any assembly or maintenance operation.
- **Make sure that the electrical installation has all compulsory protection elements (circuit breaker and differential switch) in perfect condition.**

- **It is important to ensure that the supply cables of the electrolysis cell are tightly connected, otherwise the equipment could overheat and break down.**
- Ensure that the heatsink wings are not blocked and that air can easily circulate through them.
- BSV PRO equipment incorporate protection systems against short circuits in the cell, absence of water detector and other safety systems that give an acoustic and visual alarm in the event of any anomaly. However, for optimum results, you should ensure the correct hydraulic operation of your swimming pool.
- Corrosive environments may reduce the lifespan of the equipment. Do not leave open containers with acids near the equipment.

2- PREPARING THE SWIMMING POOL

2.1- Adding salt to the water

Para que el clorador funcione correctamente deberá incorporarse una pequeña cantidad de sal y asegurarse de que el nivel de pH del agua sea el adecuado.

Los niveles de **sal y pH** recomendados son los siguientes:

pH del agua de la piscina----- 7,1 a 7,4
Proporción de SAL en kg/m3----- 4 a 6

To ensure that the chlorinator works correctly, a small amount of salt should be added and the pH level should be suitable.

The recommended **salt and pH** levels are the following:

pH of the swimming pool water----- 7.1 to 7.4
Proportion of SALT in kg/m3----- 4 to 6

Although the equipment will start to operate with lower amounts of salt, the optimum production of salt will be reached with concentrations of over 4kg/m3. We recommend a concentration of 5Kg/m3 to offset small losses of salt occurring when cleaning the filter, the effect of rainfall, etc.

To calculate the salt to be added, multiply the total m3 of your swimming pool x 5.

Example : *A swimming pool measuring 9m in length x 4.5m in width x 1.6m in depth.*

9 x 4.5 x 1.6= 64.8 cubic metres. 64.8 x 5 = 324 Kg of salt to be added.

We recommend using salt that is especially prepared for use in salt water chlorination installations, as it is especially prepared for rapid dissolution and to achieve optimum results. You can find it at retailers specializing in swimming pool products.



ATTENTION

When adding salt to the swimming pool, first disconnect the chlorinator (position **OFF**), and start-up the filter for 3 or 4 hours, in order for the salt to dissolve and not to overload the equipment. Once dissolved, start-up the chlorinator.

It is advisable to add salt to the swimming pool gradually, in 2 or 3 times so as not to exceed the recommended amount. Excess salt can overload the chlorinator, in which case it will automatically stop working and water will have to be added to reduce the concentration.

We also recommend not to add salt near the drain, to avoid undissolved salt from circulating in the water circuit.

2.2 Chemical balance of the water

The effectiveness of chlorination and the quality of water for healthy bathing, depends largely on the pH of the water. Therefore, it should be checked regularly and adjusted as necessary.

There are other parameters which should be considered for the correct operation of the salt water chlorinator. We recommend an in-depth analysis of the water when installing a salt water chlorinator.

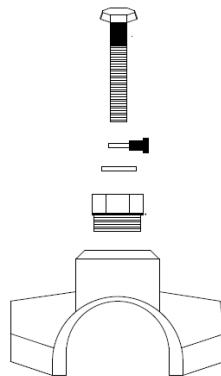
Parameter	Minimum Value	Maximum Value
PH	7.0	7.8
FREE CHLORINE (mg/l)	0.5	2.5
COMBINED CHLORINE (mg/l)	--	0.6
TOTAL BROMIDE (mg/l)	3.0	6.0
BIGUANIDE (mg/l)	25	50
ISOCYANURIC ACID (mg/l)	--	<75
OZONE (GLASS) (mg/l)	--	0
OZONE (before)	0.4	--
TURBIDITY (NTU)	--	<1
OXIDES (mg/l)	--	<3
NITRATES (mg/l)	--	<20
AMMONIA (mg/l)	--	<0.3
IRON (mg/l)	--	<0.3

COPPER (mg/l)	--	<1.5
ALKALINITY (mg/l)	100	160
CONDUCTIVITY (us/cm)	--	<1700
TDS (mg/l)	--	<1000
HARDNESS (mg/l)	150	250

3-INSTALLATION OF THE EQUIPMENT

3.1- General considerations::

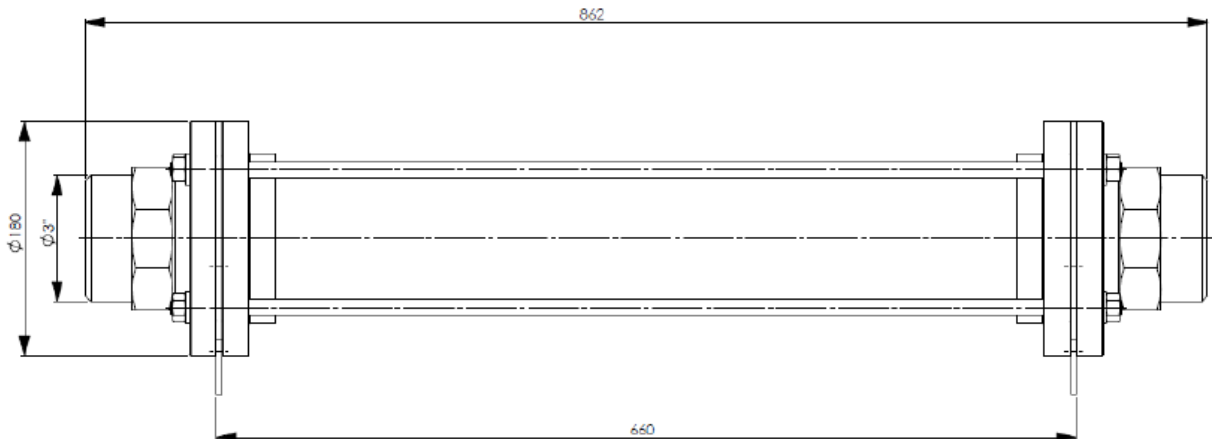
- Place the chlorination cell in the highest position possible of the purification circuit and always after the filter.
- If possible, it is recommended to install the cell with a by-pass system with its corresponding shut-off valves. This is to facilitate maintenance of the cell.
- A **good earth connection is essential**. Use a differential relay with max. 30mA of sensitivity.
 - **If a good quality earth connection is not available, place an earth connection kit between the electrolysis cell and the redox probe. OPTIONAL KIT**



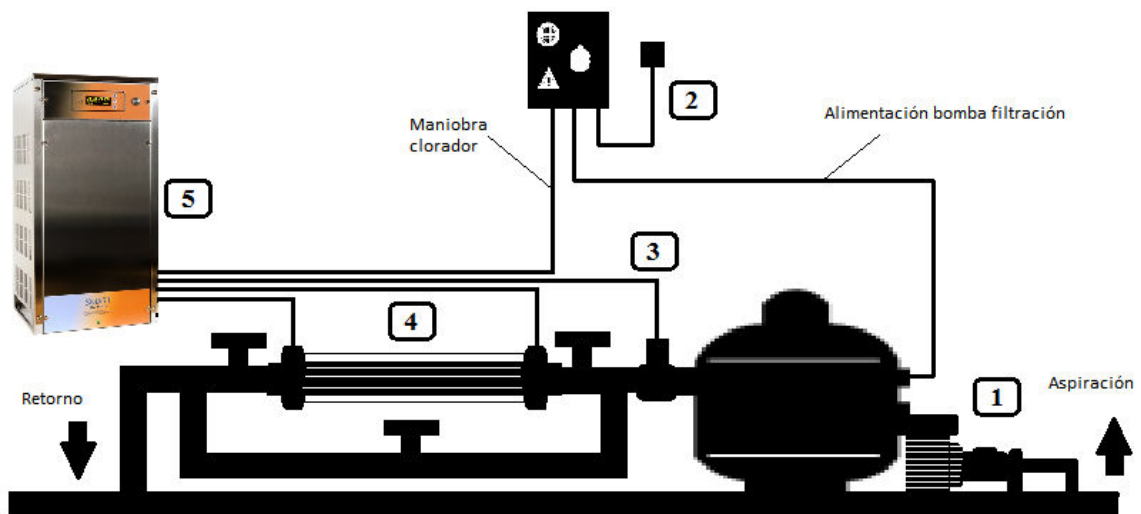
3.2- Hydraulic connection diagram

3.2.1- Diagram

Electrolysis cell

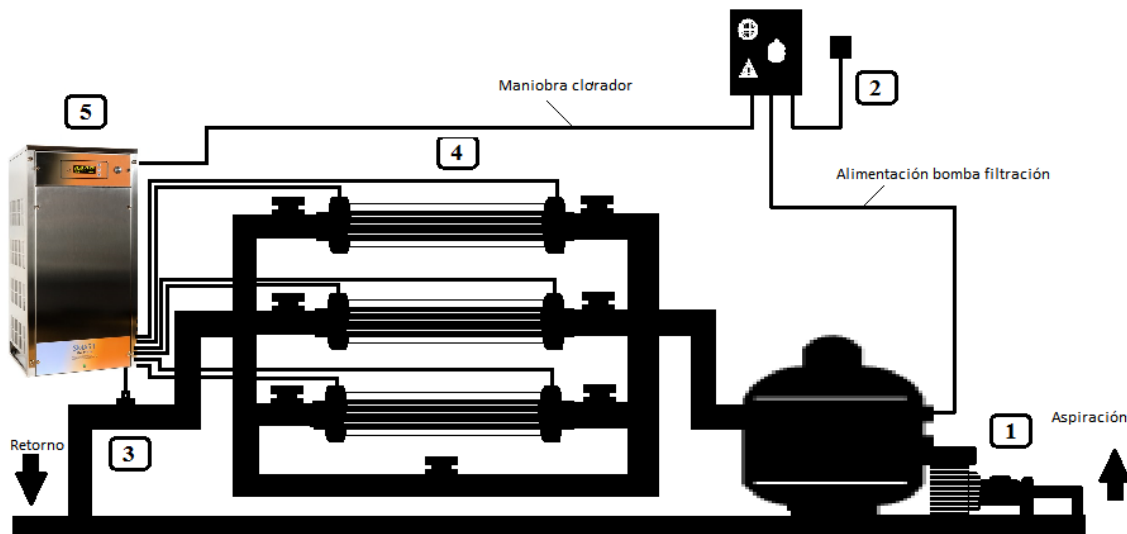


Recommended installation (PRO250)



1. FILTRATION
2. CONTROL PANEL
3. FLOW SWITCH
4. ELECTROLYSIS CELL
5. PRO250 UNIT(*)

Recommended installation (PRO750)



1. FILTRATION
2. CONTROL PANEL
3. FLOW SWITCH
4. ELECTROLYSIS CELL
5. PRO750 UNIT(*)

- (*) The PRO250, PRO500, PRO750 and PRO1000 units follows the same hydraulic scheme, connecting **in parallel** as many cells as power modules.
- It is highly recommended to install a by-pass system, to be able to block the water flow in each cell for maintenance purposes.

3.2.2- Amperometric probe kit (free chlorine) OPTIONAL.

Amperometric analysis consists of measuring the intensity of current generated in the reduction or oxidation reaction of an analyte once a suitable electric potential is applied.

Current intensity is proportional to the amount of hypochlorous acid present in the solution.

Bear in mind that hypochlorous acid is a weak acid and as such its distribution depends on the pH of the medium.

Not only does hypochlorous acid respond to the working potential of the amperometric sensor, but the hypochlorite also reacts. It is therefore advisable to compensate the response of the sensor depending on

the pH value at the middle point, within the range from pH 7.0 to 7.4. Outside these ranges of pH, side reactions occur on the surface of the electrode which prevent the readings generated from being corrected.

3.2.2.1- Indications

STATUS INDICATOR LED

Fixed blue Led: normal operation

Quick flashing blue Led (2Hz): automatic cleaning

Slow flashing blue Led (1Hz): Stabilization time after cleaning.

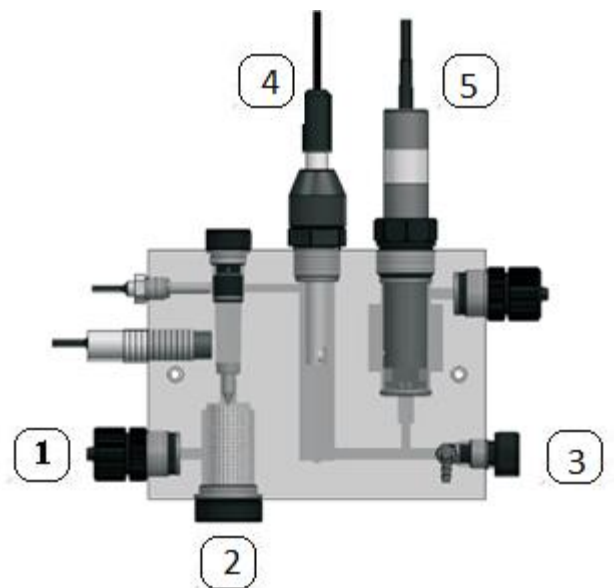
Fixed red Led: reading outside measurement range

3.2.2.2- Installation

The sensor should be installed where a constant flow of water is guaranteed, without the possibility for forming air bubbles in the measuring cell.

It is recommended to install it in the Multifunction sensor holder (ref. 44-020), which is especially designed for this application. It includes:

- 1 Flow controller
- 2 Inlet filter
- 3 Sampling device
- 4 pH sensor housing
- 5 Amperometric probe housing



3.2.2.3- Stabilization of the probe

After downtime or if it is connected for the first time, the sensor requires conditioning time. Before calibrating the sensor, place it correctly in the sensor holder, and let water containing free residual chlorine run through for 1 hour, in order to correctly polarize the cell.



If the sensor has been working at 0, without a water flow, or without water for 1 hour or more, you will have to wait for 60 minutes for the correct polarization of the sensor and to have a correct reading.



The sensor can be passivated if it has been working at over 3 ppm for hours. In this case, the sensor should be cleaned in an HC10. 1M solution for 20 seconds. The sensor can then be prepared and calibrated again.

3.3- ELECTRICAL CONNECTION DIAGRAM

3.3.1- PRO250/500/750/1000 units

- All the PRO series units can be configured to work with single or three-phase supply, depending on the installation needs.
- instalación.

Single-phase connection

- Ensure the line supply has all the protections and the correct cable size according with the current consumption (see table on page 32)
- Remove the upper cover of the unit to be able to see the terminal strips.
- Connect the single-phase cables (230V) to the input strips. The neutral must be connected to the blue strip while the phase must be connected to one of the three strips marked as (L1-L2-L3).
- In single-phase configuration, the three phase strips must be connected together by means of a connection bar (see the following picture **marked with a red circle**):

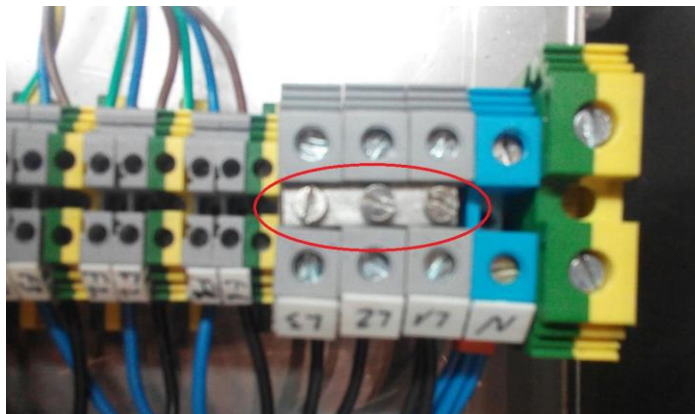


Figura 3.1: Single-phase connection

- Connect the earth cable to the corresponding strip.
- Connect the flow switch to the position shown at 3.3 figure.

Connection to the three-phase line:

- Ensure the line supply has all the protections and the correct cable size according with the current consumption (see table on page 32)
- Remove the upper cover of the unit to be able to see the terminal strips.
- Connect the cables to the three-phase line (380V). **The three-phase line has to have neutral and earth connection.**
- The connection will be done according with the labels on the strips. The neutral cable will be connected to the blue strip, while the three phases must be connected to the L1-L2-L3 inputs.
- Check that the connection bar shown in the 3.2 figure is **removed** (see the red circle).

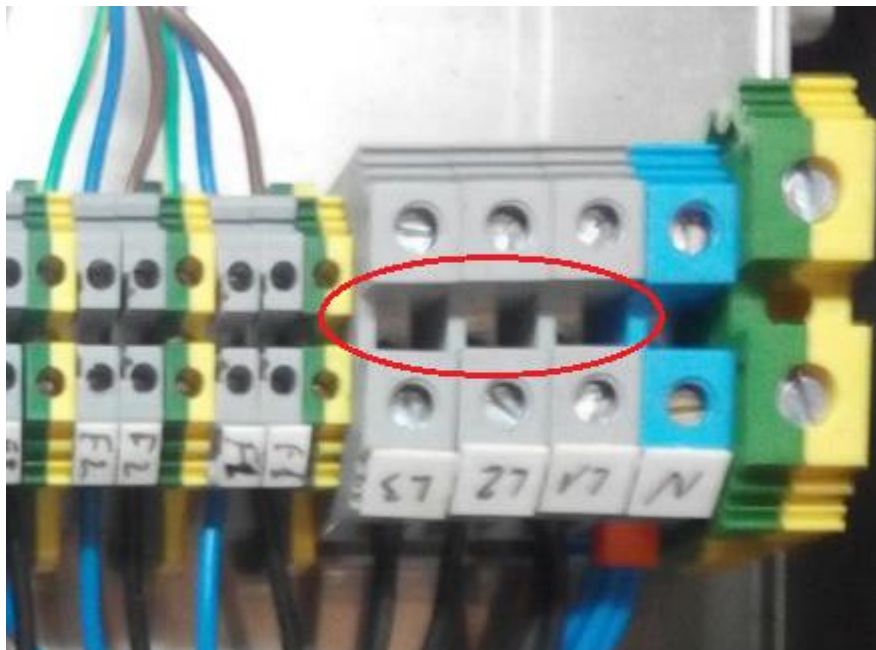


Figure 3.2: Three-phase connection

Synchronization of the unit with the filtration pump:

There are two options to ensure that the chlorination works only when the filtration pump is on:

Option A) Line supply by means of the filtration pump contactor:

- **Connect the chlorinator's input line directly to the filtration pump contactor**
- **Ensure that the contactor is correctly sized to be able to hold the pump + chlorinator current (see page 32).**
- **Use separate contacts to supply the pump and the chlorinator.**

Option B) Chlorinator directly connected to the line, and remote start/stop activation (recommended):

- **Connect the "FILTER" input of the auxiliary board (see figure 3.3) to the filtration pump contactor. This contactor must supply 230V to the "FILTER" input at the same time that the pump is turned on. The power requirements for the "FILTER" input is only a few miliamperes.**
- **Connect the input line of the chlorinator directly to the mains (single-phase or three-phase) depending on how it's been configured.**
- **Remove the LK1 jumper to enable the start/stop mode.**

Whith this configuration, the chlorinator will start the chlorine production when the filtration pump is on, and will stop it when it's off while a "stop" message is shown on the display.

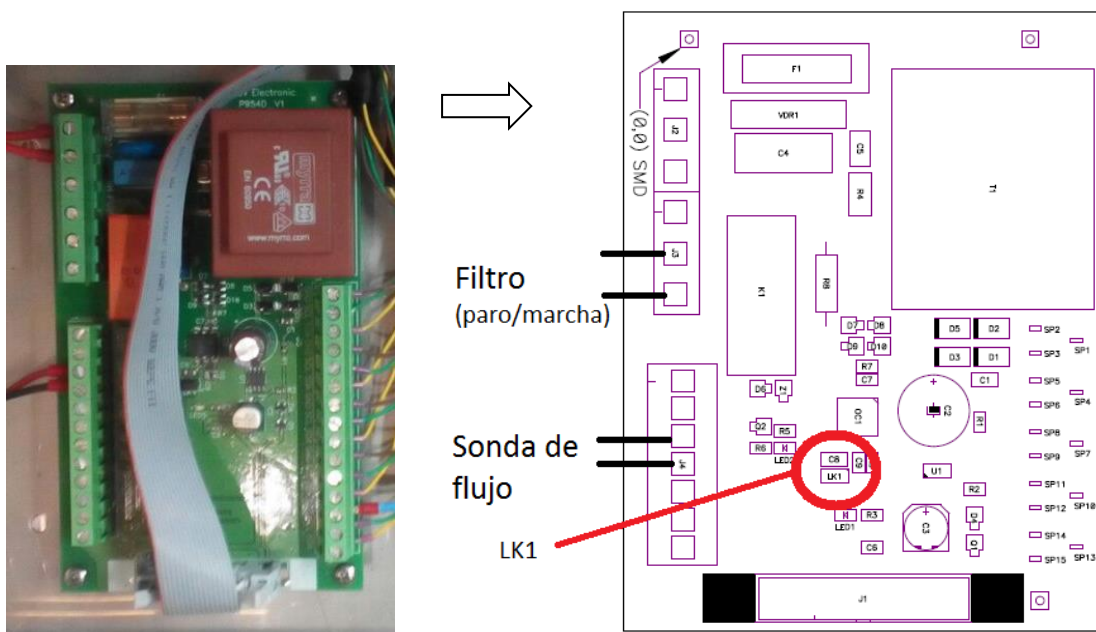
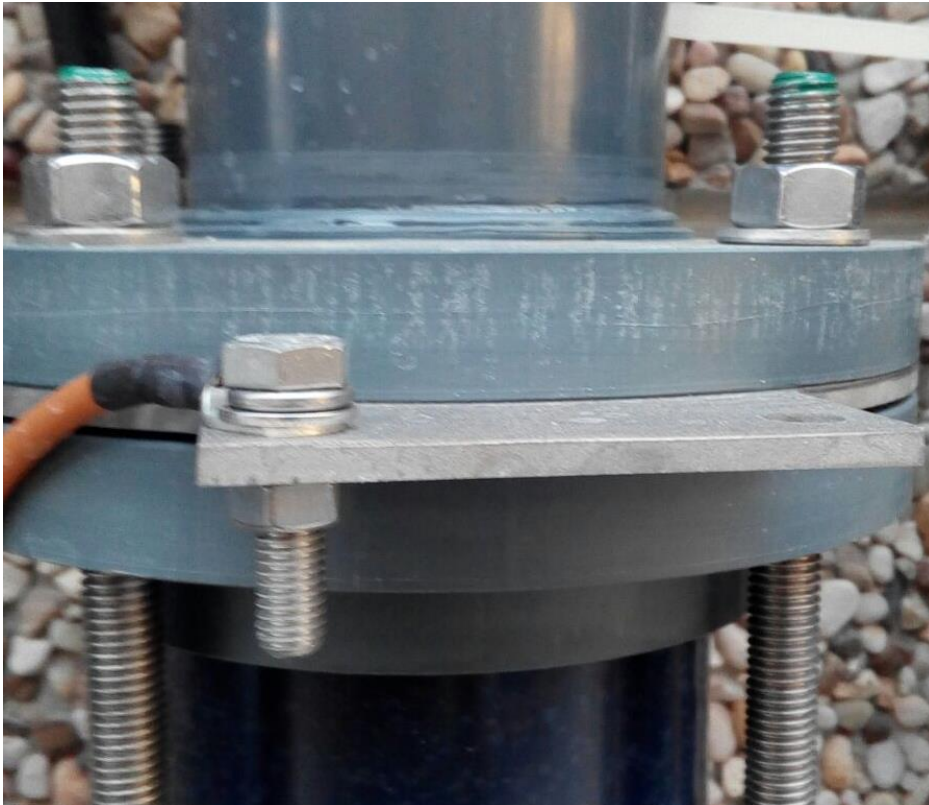


Figure 3.3: Auxiliary connection board

Cell cable connection

All the PRO series chlorinators are supplied with the cables already connected to its power supplies.

Once the cells are installed, connect every power supply to its cell, using the included hardware to attach it on every side of the cell.



- Ensure all the cables are tightly connected with the cell.
- In case that the unit has two or more cells, it is advisable to follow the same rule for all the cell connections (for example: all the brown cables at the upper side of all the cells, and the blue cables to the down side).

4- OPERATION

4.1 PRO250, PRO500, PRO750, PRO1000 units

The SMART series equipment has an LCD screen, in which you can view and configure all operations of the equipment. The following table shows how to organize the configuration menu of the equipment:

Chlorinator Menu	Chlorinator menu
Main menu	Production %
	Free chlorine adjust
Configuration	Superchlorination
Chlorine	Free chlorine probe calibration
Configuration menu	
Language	
Control	
Cell cleaning	

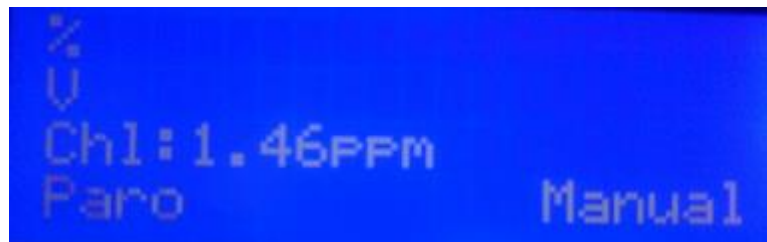
When browsing through the menus, an arrow is displayed on the left hand side → which indicates the selected line.

When there is more than one line to select, the buttons ↓ ↑ enable you to move the arrow up or down to select the required option. The **OK** button confirms selection.

When a value has to be adjusted, for example the time or level of chlorine, the buttons ↓ ↑ enable you to increase or decrease the value. Press the **OK** button to confirm the value.

4.1.1- Main screen

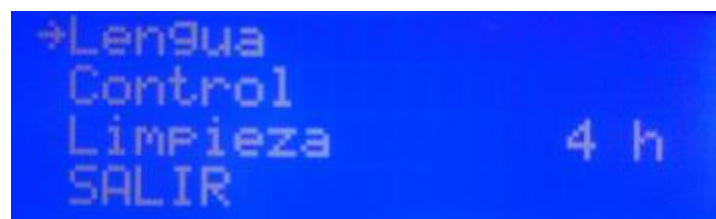
On starting up the equipment, a screen will be displayed with the main parameters.



- En la línea superior se muestra el % de producción de cada una de las fuentes que incorpore el equipo
- En la segunda línea se muestra la tensión de cada fuente
- La tercera línea muestra la lectura de la sonda de cloro libre, en caso de estar instalada.
- La cuarta línea muestra el estado del equipo y el modo de control
- The upper line shows the production % of each installed power supply
- The second line shows the voltage of each installed power supply
- The third line shows the free chlorine probe value (it can be hidden on the control menu)
- The line number four shows the unit status and the selected control mode.

4.1.2- Main menu

Press the "OK" button from the main screen to access the main menu.



Using the buttons ↓ ↑ you can select a line of the menu, indicated by the arrow (→). The **OK** button is used to confirm the selection.

To access the configuration menu, you need to confirm the operation by selecting (S) through the arrow, ↑ and pressing **OK**.

4.1.3- Language

From the configuration menu select "Language", press the OK button, and once the required language has been selected, press the **OK** button and **EXIT**.

4.1.4- Control

The equipment allows you to select from 2 different modes of control:

⊙ **Manual:** The equipment produces chlorine continuously, depending on the % of production selected. If you have a fitted FREE CHLORINE PROBE, it will ignore its value and chlorination will not stop even though the set value has been exceeded. When selecting this mode, the equipment will ask if you want to display the value of the PPM on the main screen.

Select this mode if you do not have a FREE CHLORINE PROBE KIT, by adjusting production and hours of filtering depending on the nature of your swimming pool, its volume number of bathers and season of the year.

⊙ **Automatic**

Select this mode only if you do not have an Amperometric probe kit. If you do not have a probe, the equipment will act at random and end up by stopping and showing an error.

This mode enables you to automatically adjust the level of chlorine in your swimming pool. Based on the adjusted set value in the "chlorine" menu, the equipment will stop when it reaches this value, and start-up again automatically when there is a need for chlorine.

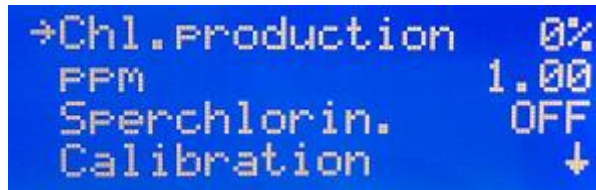
4.1.5- Cleaning

The equipment includes an automatic cleaning system, based on reversing polarity in the electrolysis cell. These cleaning cycles are performed regularly. The time between cleaning (in hours) can be adjusted depending on the water hardness of your swimming pool.

It is possible to select cleaning intervals from 1 to 8 hours.

4.1.6- Chlorine menu

With this menu you can select all parameters related to chlorine production.



4.1.6.1- Chlorine production

Configuration of the maximum production of chlorine.
From 0% to 100% Press "OK" and use the arrows ↓ ↑ to change the value.
Press "OK" to confirm the adjustment.

Note: Chlorine production may be limited regardless of the operation mode (manual, automatic...) that is selected.

4.1.6.2- Adjustment of the set value (Max. PPM)

En el cual se instala una sonda de cloro libre (OPCIONAL)

In this case, adjust the value in ppm as required. A value between 1ppm and 1.5ppm is correct.

NOTE: if working in automatic, you can also adjust the production percentage from 0% to 100%,

On connecting the equipment in automatic mode, the ORP value will flash for 5 min before the equipment starts to produce chlorine.

4.1.6.3- Free chlorine probe calibration

If you have a free chlorine probe, a menu will appear for you to calibrate it.

Press OK
when is stable
PPM: 1.11

Once the reading has stabilized and the chlorine measurement has been taken with **DPD1**, adjust the **PPM** value provided by the DPD1 measurement.

4.2- Warning message and alarms

In the event of abnormal operation, the SMART series equipment will display an **alarm** message on the 4th line of the screen, together with an acoustic warning. The alarms shutdown the equipment until the problem is solved. Similarly, it will display a **warning** also in the 4th line, but without an acoustic signal or shutting down the equipment. In this case, the equipment can continue operating, although you are informed that corrective action should be taken.

4.2.1- Warning messages

Message:	Causes:	Action required:
"LACK OF SALT"	Lack of salt in the water.	Add salt to the swimming pool.
	Incrustations or objects in the electrolysis cell causing excess current.	Clean the cell.
	The electrolysis cell is worn.	Replace the electrolysis cell with a new one.
"EXCESS SALT"	Excess salt in the water.	No action required if excess is not very significant.
	Incrustations or objects in the electrolysis cell causing excess current.	Clean the cell.
"CLEANING"	The chlorinator is in the self-cleaning process. The process lasts 5 minutes	None.
"TEMPERATURE".	The ambient temperature is >40°	Try and place the equipment in another position where it is not over 40° or perform forced ventilation. Leave the equipment to rest for a few minutes. Consult section number 4. Installation

	The radiator fins are obstructed or are not in a vertical position.	Place the equipment so that air is circulated for correct cooling.
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4.2.2- Alarm Messages

<i>In the following cases, the chlorinator shuts down and the alarm and acoustic alarm LED is activated (automatic reset once the fault is solved):</i>		
"NO WATER FLOW"	Excess gas in the electrolysis cell. It may have occurred because the pump has shutdown. The gas is hydrogen gas which is highly flammable.	The piping should be drained to eliminate gas or accumulated water. Check the pump.
	Sensor cable of the cell is incorrectly connected or broken.	Check the sensor cable (white cable)
	Cell sensor is dirty.	Clean. See maintenance.
	No water flow	Check the water system
"SHORT CIRCUIT"	The cell is incorrectly connected.	Check wiring.
	Metal body in the cell.	Turn off the equipment and remove the metal body from the plates
"OPEN CIRCUIT"	Cell is incorrectly connected.	Check the cell connection and ensure that cables and connection terminals are in good condition.
	Cell is damaged or completely worn down.	Check the condition of the cell electrodes, and replace it if any damage is observed.
	Swimming pool water with very low salt concentration.	Ensure that the water has salt and that it is dissolved.
"Chl. error"	Chlorine probe is incorrectly connected or damaged	Check the cabling of the probe and the probe itself. Check 5.1. It can work in manual mode if necessary.
	Water contains very low redox potential.	Leave the equipment to chlorate in manual mode for at least 2 hours. Check the chemical balance of the water. (appendix 1)

	The equipment does not have a probe and is in "automatic mode".	Install a Redox or Free Chlorine probe, or configure "manual" mode.
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4.3- Working hours

It may be useful to see the operation times for regular maintenance operations. From the main screen, press both buttons ↓ ↑ at the same time.

5- MAINTENANCE

5.1- Checking and maintenance of the Amperometric probe (free chlorine)

Maintenance of this probe is based on maintaining its electrodes free from dirt and incrustations. The probe has a self-cleaning system. However, if dirt is observed, the electrodes can be submerged in the cleaning liquid supplied with the probe.

Also check that the inlet filter of the probe holder is not blocked.

To locate any possible problems, you can follow the recommendations in the following table:

PROBLEMS	CAUSE	SOLUTION
Reading = 0, does not coincide with the DPD-1 measurement	Failure in the connection of the sensor with the controller	Check connections
	Insufficient flow in the sensor holders or the chlorine sensor is not in contact with the water	Adjust the flow reaching the sensor holders. Clean the filter and the flow regulator of the sensor holders
	There are air bubbles in the measuring zone of the sensor	Bleed the sensor holder and ensure that there is no air remaining in the measuring zone.
	The sensor has been a number of hours measuring	Let water containing free chlorine circulate through the sensor holders for

	the water without free chlorine	1 hour.
Reading below the DPD-1 measurement	Insufficient flow in the sensor holders	Adjust the flow reaching the sensor holders. Clean the filter and the flow regulator of the sensor holders.
	There are air bubbles in the measuring zone of the sensor	Bleed the sensor holders and ensure that there is no air remaining in the measuring zone.
	Sensor passivated for working at more than 3 mg/l	Clean the sensor by submerging it in an HC10.1M solution for 20 seconds.
	The pH of the water is higher than at the time of calibration	Calibrate the sensor to the new pH value.
	The pH is above 9, and therefore outside the recommended reading zone,	Adjust the pH within the acceptable pH range: 6.5-9
Reading above the DPD-1	The sensor has been calibrated without waiting for sufficient conditioning time	Repeat conditioning of the sensor and recalibrate.
	DP-1 Reactives are worn	Repeat the DPD-1 measurement with new reactives
	DPD-1 measurement is incorrect owing to a sample of water with high salinity	Increase the waiting time in the reaction of the DPD measurement reactives.

	Failure in sealing of the sensor	Check sealing rings of the sensor
	The pH of the water is lower than at the time of calibration	Calibrate the sensor at the new pH value
	The pH is lower than 6.5 and therefore outside the recommended reading zone	Adjust the pH to within the acceptable pH margin
Unstable reading	Failure in the connection of the sensor with the controller	Check connections
	The water flow reaching the sensor holders is unstable and the flow regulator is not operating.	Stabilize pressure in the piping where samples are taken for the sensor holders and check the flow regulator.
	There are air bubbles in the measuring zone of the sensor	Bleed the sensor holder and ensure that there is no air remaining in the measuring zone.
	External electrical interference	Eliminate the source of disturbance. It may be useful to connect water to an earth connection.
	Interference from other oxidizing agents	Do not use more than one oxidizing agent to disinfect the water.
	The pH is unstable	Stabilize the pH.

6-WARRANTY AND SERVICE

BSV Electronic S.L. guarantees its BSPOOL equipment for a period of 2 years in control centres.

The electrolysis cells have a control of two years, as long as they have not exceeded 10,000 hours of use.

This guarantee is given to the owner of the equipment and it is not transferable. All chlorinators are checked at the factory before packing. If any electrical or mechanical problems occur within 24 months from purchase, owing to unlikely malfunctioning or to faulty components, the parts will be repaired or changed. A part will not be changed unless the faulty component is returned.

This guarantee does not cover damage caused by corrosion, excess damp, current, temperature or vibration, or by incorrect installation, unsuitable handling, overvoltage, accidents or any other cause beyond the operation of the equipment.

In the event of an equipment failure, it should be returned to the manufacturer or distributor. Transport costs will be covered by the equipment owner.

It is important to bear in mind that all repairs under guarantee are performed at the factory.

BSV Electronic S.L. reserves the right to modify the equipment and the instructions manual without prior notice.

Thank you for choosing the BSPOOL Salt Water Chlorinator for your swimming pool.

Help desk

902.883.660

sat@bsvelectronic.com

www.bsvelectronic.com

Annex 1: Electrical connection schematic

