AG SELECT R pH – RX – CL Controller

Table of contents

1. General information

Electronic instruments controlling electrochemical parameters such as pH, Redox or Chlorine are widely used in swimming pools, waterworks and water treatment plants.

The B Series Controllers stand out for the following features:

- Capability of performing the most possible measurements with just one type of electronic board: pH, Redox (mV), Cl (ppm).

- Simple and easy to learn programming procedure providing two types of menu: a BASIC menu allowing the user to control indispensable functions, and a FULL menu giving the user the full capability of setting all functions.

- Galvanically isolated electronics providing a high level of immunity to disturbances.

2. Technical data

| Parameter	Value	
Input voltage	24 - 230 VAC 50/60 Hz 20-48 VDC	-10 / +15% Voltage range
Power consumption	6 W (1 A peak current)	
Operating temperature range	0 – 40°C	
SETPOINT relay output terminals max current	16 ampere with resistive load 3 ampere with inductive load	2 setpoints
Auxiliary relay output terminals max current	5 ampere with resistive load 0.7 ampere with inductive load	1 auxiliary output
Alarm relay output terminals max current	5 ampere with resistive load 0.7 ampere with inductive load	1 alarm output
Current output	4 - 20 mA (dynamic 0..500 Ω)	2 current outputs
TTL output	0 – 999 pulse/min	2 open collector TTL outputs
pH range	0 … 14	0.01 pH resolution
Rx range (mV)	- 1000 ….+1400	± 1 mV Rx resolution
Chlorine range	0÷2; 0÷20; 0÷200; 0÷2000 ppm	0,001/0,01/0,1/1 ppm – Resolution
Temperature range	0 – 100°C	0.1°C
Level control – PT100 connection – Relay output 6A (resistive load) 1A (inductive load)		

3. Connection diagram
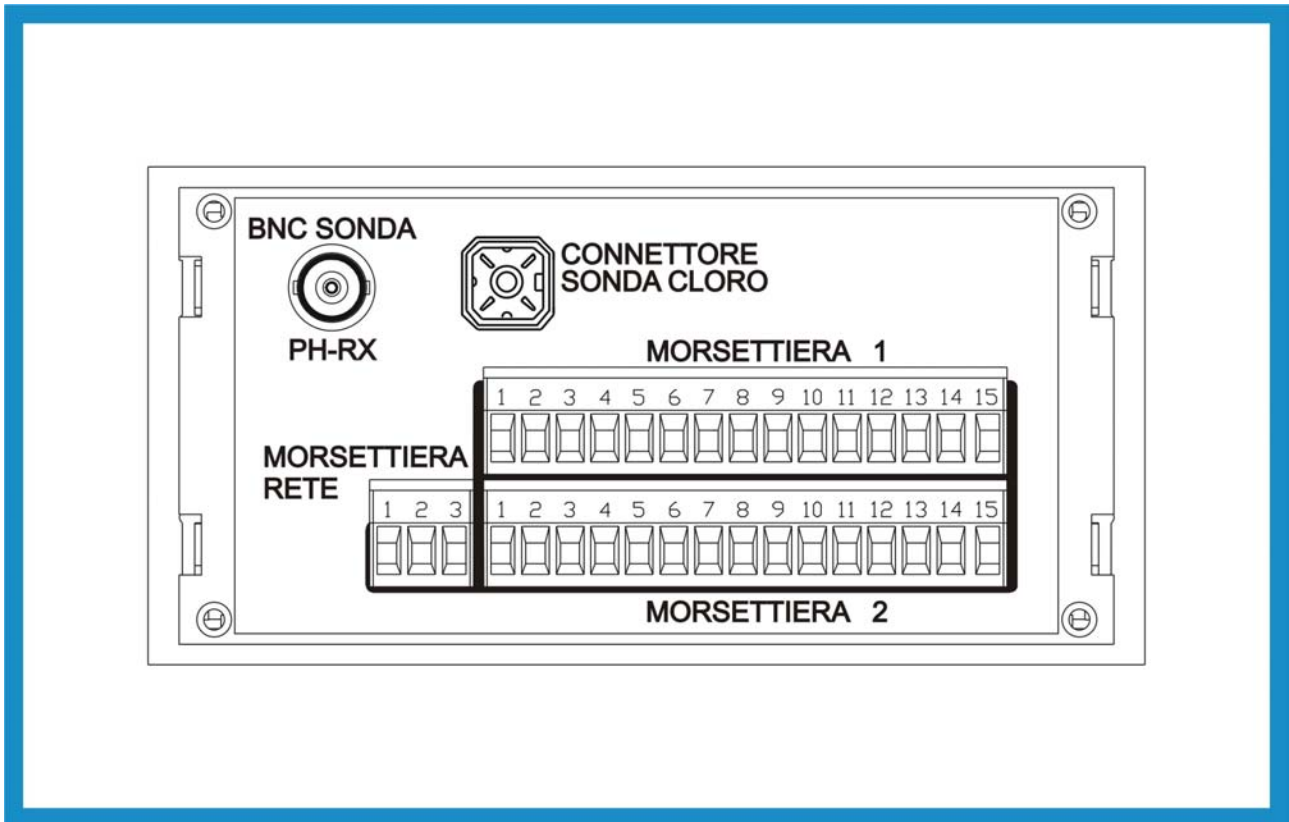
Fig. 1

3.1. Chlorine probe connections

A BNC connector for connecting pH or Redox probes, and a 4-pin connector for connecting a Chlorine probe, are provided in the bottom of the instrument.
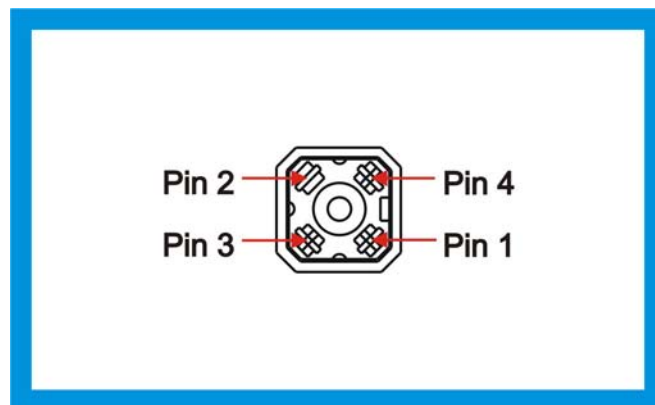The connection diagram is as follows:

Fig. 2

Pin 1 – Chlorine probe positive supply (+5 V)
Pin 2 – N.C.
Pin 3 – N.C.
Pin 4 – Chlorine probe negative supply (-5 V)

3.2. Description of connections

Pin number	Description
1	**Phase 1** of power supply (Brown)
2	**Phase 2** of power supply (Blu)
3	**Ground** of power supply (Yellow/green)

3.3. Connection 1.

Pin number	Description
1	**SET 1** (Normally closed)
2	**SET 1** (Common)
3	**SET 1** (Normally open)
4	**SET 2** (Normally closed)
5	**SET 2** (Common)
6	**SET 2** (Normally open)
7	**ALARM** (Normally closed)
8	**ALARM** (Common)
9	**ALARM** (Normally open)
10	**Auxiliary output** (Common)
11	**Auxiliary output** (Normally open)
12	**Serial output** (gnd)
13	**Serial output** (gnd)
14	**Serial output** (12 Vdc)
15	**Serial output** (TX/RX)

3.4. Connection 2.

Pin number	Description
1	**TTL1** (open collector)
2	**TTL** (gnd)
3	**TTL2** (open collector)
4	**mA 1** output
5	**mA** (gnd)
6	**mA 2** output
7	**Level 1**
8	**Level** (gnd)
9	**Level 2**
10	**Remote Control** (gnd)
11	**Remote Control** (Proximity switch)
12	**GND**
13	**Common PT**100
14	**Common PT**100
15	**PT**100

4. Description of display icons
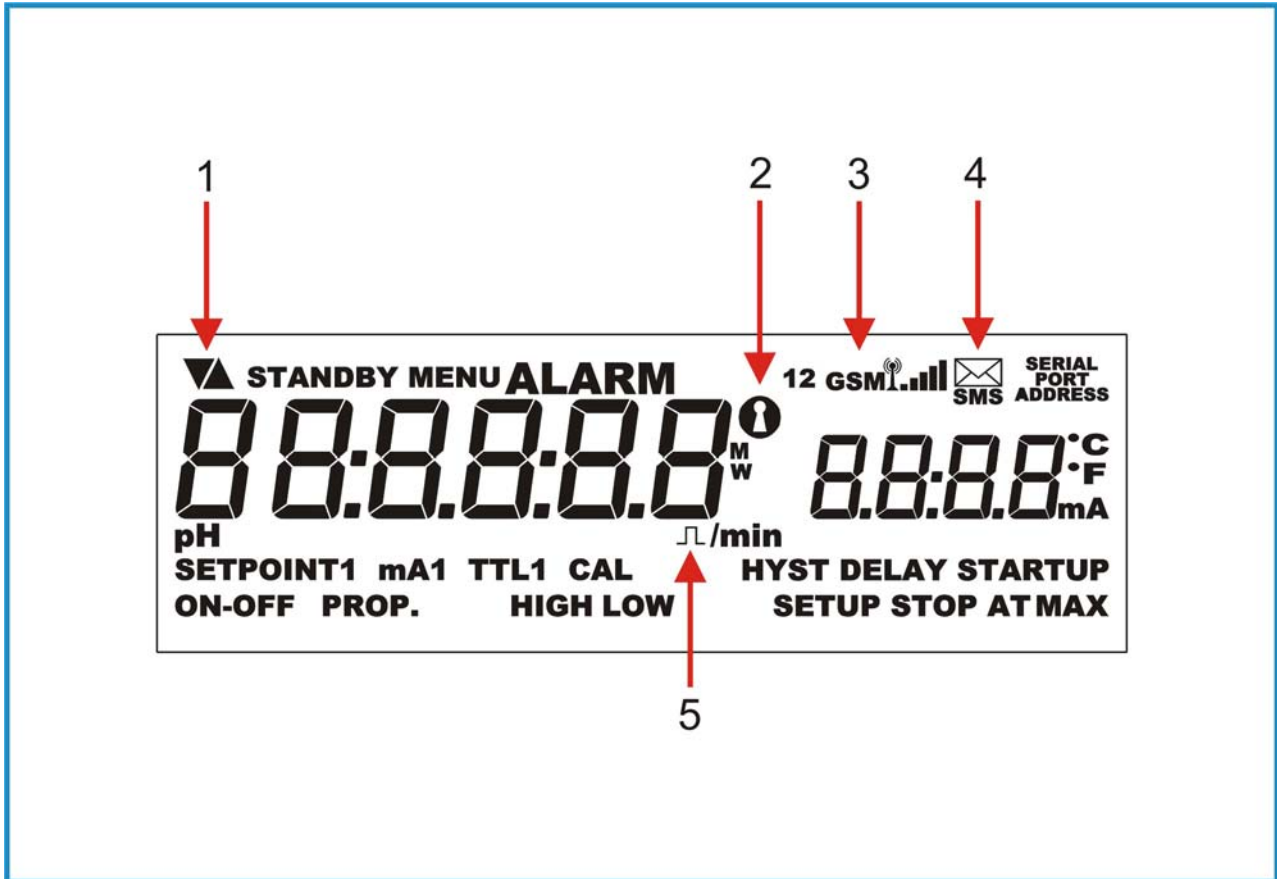
Icon 1 – Meaning of action (up arrow increases value, down arrow decreases value)
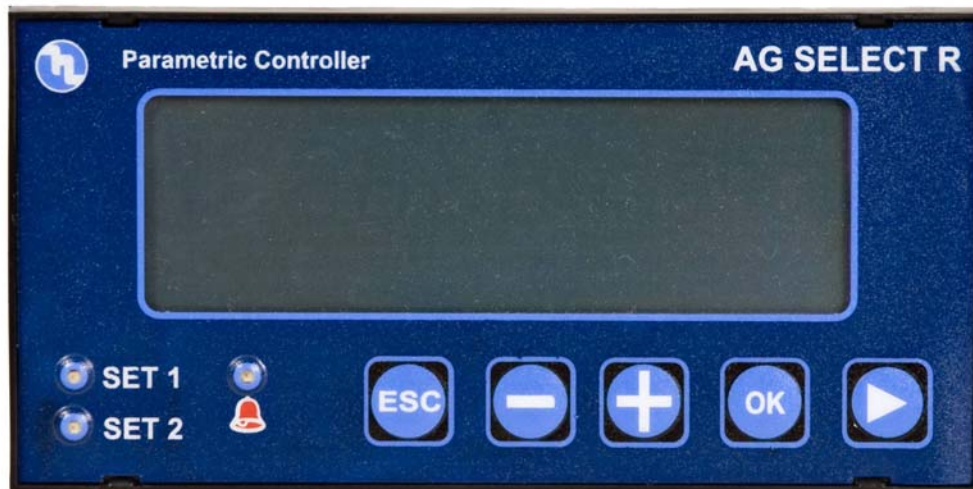**Icon 2** – Password
Icon 3 – GSM device connected and operating
Icon 4 – GSM forwarding or receiving
Icon 5 – Pulse(s)

5. Control panel description

5.1. Light signs

	SET 1 active
	SET 2 active
	ALARM SIGNAL

5.2. Keyboard

	ESC – Comes one step back in the programming procedure.
	Minus symbol – Decreases numbers and defines functions within specific programming menus. E.g.: when selecting the type of measurement allows the user to shift between pH, Rx and Chlorine.
	Plus symbol – Increases numbers and defines functions within specific programming menus. E.g.: when selecting the type of measurement allows the user to shift between pH, Rx and Chlorine.
	Shift right – Used to select the digit to modify when setting passwords or times.
	OK – Allows the user to proceed by confirming the selections made.

6. Dimensions

115 mm

144 mm

Parametric Controller

AG SELECT R

SET 1
SET 2

ESC

OK

72 mm
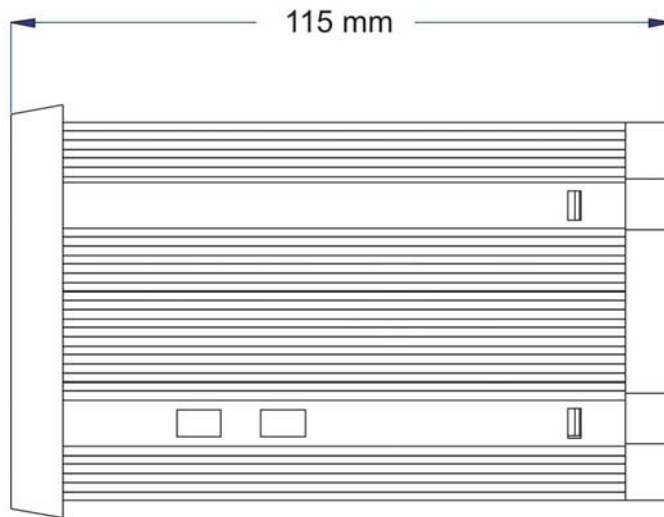
7. Parameter defaults

No.	Function	pH default	Rx default mV	Cl default ppm
1	Setpoint 1	7.2	600	1
2	Setpoint 2	6.8	450	0.5
3	Type of action	Acid	Oxidising	Direct
4	Hysteresis	0.05	10	0.05
5	SETPOINT 1 and 2 actuation delay	00:03 m:s	00:03 m:s	00:03 m:s
6	TTL 1 and 2 outputs max frequency	120	120	120
7	Measurement at TTL 1 and 2 max frequency	14.00	1400	14
8	mA output 1 and 2, measurement at 4 mA	0.00	0	0
9	mA output 1 and 2, measurement at 20 mA	14.00	1400	10
10	Alarm – high threshold	14.00	1400	10
11	Alarm – low threshold	0.00	0	0
12	Alarm – overdosage (OVER)	99:59 h:m	99:59 h:m	99:59 h:m
13	Menu mode	BASIC	BASIC	BASIC
14	Password	OFF	OFF	OFF
15	Temperature unit	°C	°C	°C
16	Temperature compensation mode	Manual 25°C	Manual 25°C	Manual 25°C
17	Calibration menu delay	5'	5'	5'
18	Actuation delay when switching on	5"	5"	5"

8. Programming the controller

All programming parameters and modes of operation of the instrument can be set using its keyboard and dedicated display.

8.1. Starting controller operation

The instrument, according to its initial configuration, can be set to control three distinct types of measurements: pH, Rx or Chlorine.

To perform that, when switching on the controller for the first time, the operator is requested to select the intended type of measurement by operating as follows:
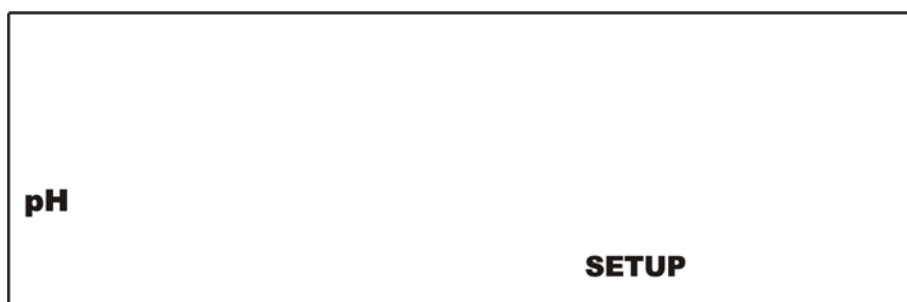
Upon switching on the instrument, the display shows the message "SETUP pH"; press the

 or

key to select the measurement that the instrument must control: pH, Rx, Cl.

When the indication of the measurement that the instrument must control shows up, press the

key to confirm the selection.
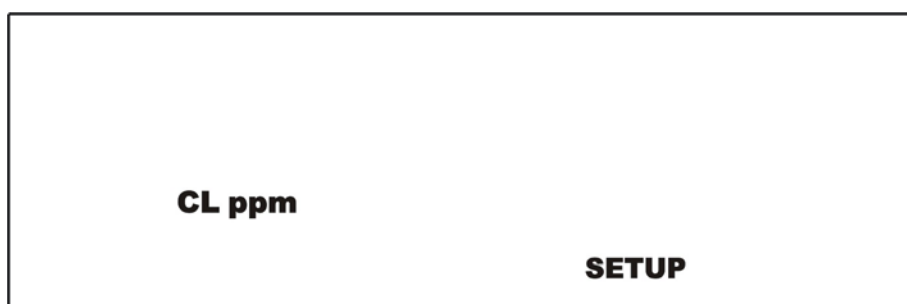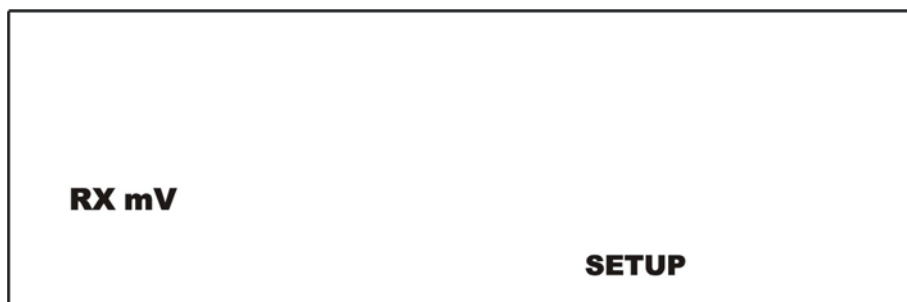
The request for setting the type of measurement that the instrument must control is made only when the instrument is switched on for the first time; that selection can be modified afterwards by using the SETUP menu (see section 8.3.1).

8.2. The display in the various operation modes (Ph – Rx – Cl)

When the instrument is switched on, the display shows the measurement value and the type of measurement.

The display in **pH** mode

The display in **Redox** mode

The display in **Chlorine** mode

8.3. Programming procedure

When the instrument is installed for the first time, it must be set according to the type of measurement and control that must be carried out.

When setting the instrument, it is advisable to follow the programming procedure outlined below. Conversely, if only a single parameter must be changed, it is advisable to go directly to the menu comprising the concerned function, and perform the necessary changes or settings.

```
MENU


SETPOINT1
```

```
MENU



            4 20mA
```
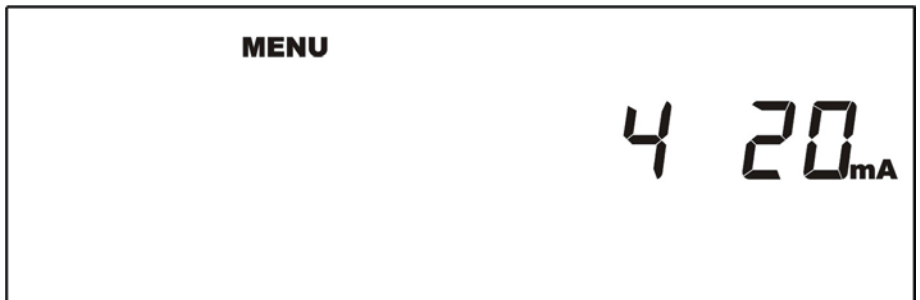
Press the **OK** key to go to the main menu, and press the **−** or **+** key to select the menu that needs programming.

```
MENU




            CAL
```

```
MENU ALARM
```
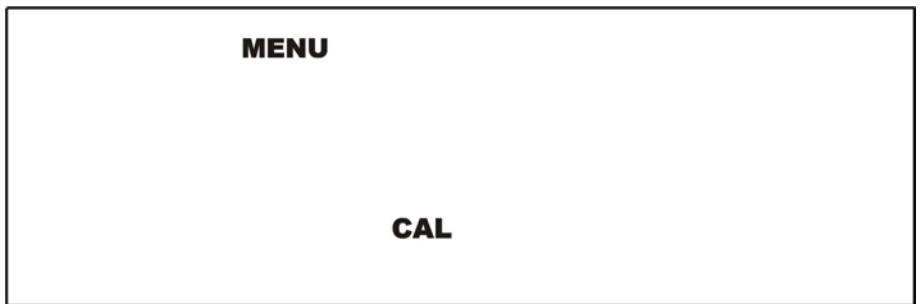
The menus **4 20 mA** and **ALARM** are comprised only within the "FULL" mode.

```
MENU




                    SETUP
```
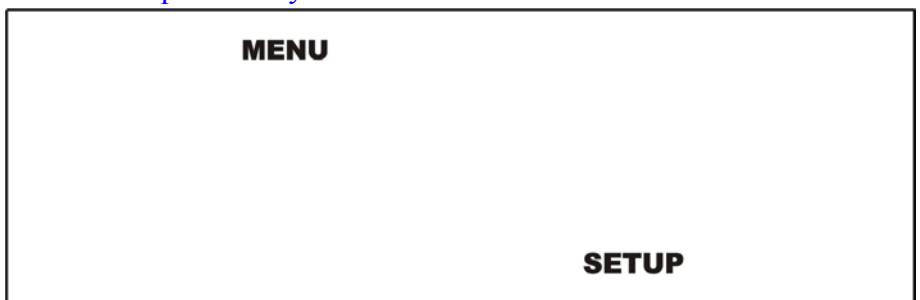
The MAIN menu is comprised of 6 submenus, by using which all instrument's functions can be set:

SETPOINT 1 – SETPOINT 2 - 4 20 mA – CAL – ALARM - SETUP.

8.3.1. Setting up the controller

When the display shows "MENU – SETUP" press the

[OK] key. Two types of programming are available: the advanced mode (FULL) allows the experienced user to set all parameters affecting pH control; the simplified mode (BASIC) allows control of only a few parameters essential for controlling the measured value.

MENU

SETUP
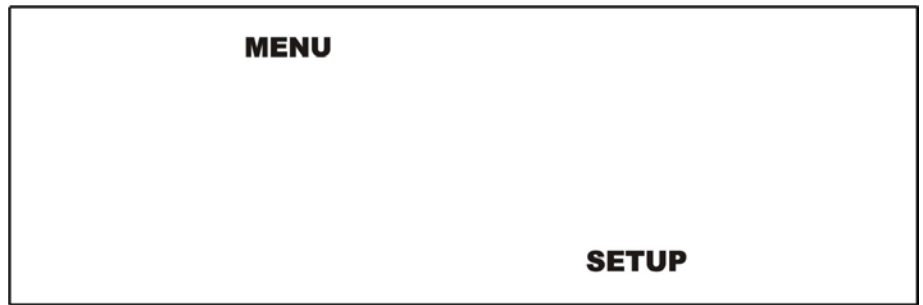
To shift between FULL and BASIC selections use the

[−] or [+] key

and press the [OK] key to confirm the selection.

FULL

bASIC

BEWARE

The instrument can carry out three distinct types of measurement: pH, Redox or Chlorine; that means that, depending on the requirements of the system and type of probe connected, the user can decide what type of measurement to control.

To outline the programming procedure, the example shows the pH control setting, however the procedure is the same for controlling the Redox potential or Chlorine.

As soon as the type of programming is defined, the type of measurement that the instrument is to control can be set: pH, Redox or Cl-ppm. Use the following keys to select the type of

measurement: or

, and press the

 key to confirm the selection.

The selection of the type of measurement needs to be changed only when the type of probe is changed.

pH	
	SETUP

RX mV	
	SETUP

CL ppm	
	SETUP

As soon as the measurement is selected, proceeding within the SETUP menu, the user can decide to activate the password security and the relating 6 digits code.

The password can be any number between 000000 and 999999: press the keys

 to select the digit to set, and press the keys

 to set the selected digit; press the

 key at end to confirm the digit.

oFF 🔒

000000 🔒

Repeat the procedure for every digit to be set.

As soon as the password is set, the unit of measure for temperature can be selected (°C or °F). Press the

[−] or [+] key to set the unit, and the

[OK] key to confirm the selection.

°F

°C

As soon as the unit of measure is set, the instrument allows two distinct modes of temperature compensation to be defined: through a PT100 or PT1000 probe (see the connection diagram at section 3), or setting the temperature manually.

In case the MAN function is selected, the reference value will be requested, while if the PT function is selected, the instrument will read directly the temperature value from the probe connected.

°C

MAN

°C

PT

Press the [−] or [+] key to select the function and the [OK] key to confirm the selection.

Selecting PT function, the temperature measured by PT100 probe is shown on the display (while the visualization of the measure is in progress).

If the manual function is selected, the instrument's display shows the default temperature (25°C); by

pressing the [−] or

[+] key, the

25.0°C

MAN

temperature value can be set in the range between 0 and 99.9°C. Press the [OK] key to confirm the setting.

Proceeding with the SETUP menu, two time values can be set:
CAL DELAY, representing the exit delay time from the programming menu in case no keys are pressed during the probe calibration stage;
STARTUP DELAY, defining the delay time of measurement actuation from switching on the instrument.

Press the

[−] or [+] key
to set the intended delay
time (m:s) and the
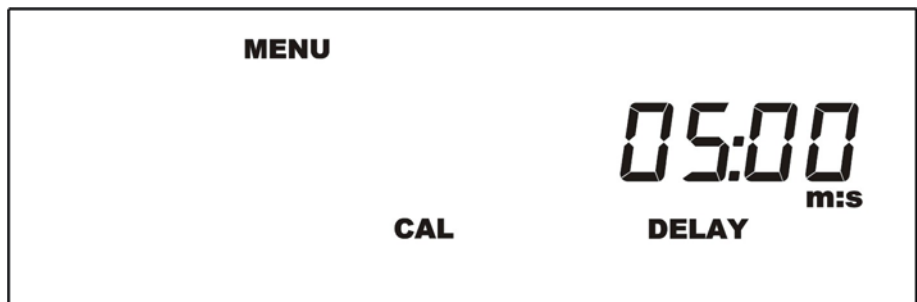
MENU

05:00
m:s

CAL   DELAY

[▶] key to shift from minutes to seconds and back, and lastly press the [OK] key to confirm the setting.

Follow the same procedure to set the startup delay time.
Press the

[−] or [+] key

00:03
m:s
DELAY STARTUP

to set the intended delay time (m:s) and the [▶] key to shift from minutes to seconds and

back, and lastly press the [OK] key to confirm the setting.

The controller has a calendar and an internal clock for the management of the exits with timer and the storage of the data recorded by the controller; in order to set up the clock the following settings must be carried out.

Select the programme on which the settings need to be carried out by pressing the

key and change the chosen value by using the keys
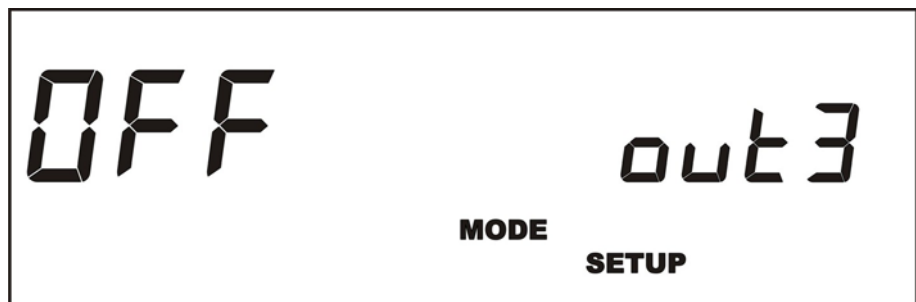
, Once the date and time are set, by pressing the OK key, the SETUP menu (main) can follow
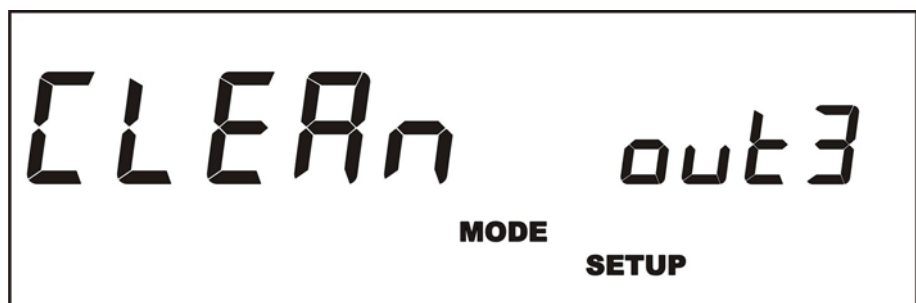
In OFF position, out3 output is deactivated, pressing OK while this mode is selected the SETUP menu is closed.

By using the Flocculant function it is possible to activate the flocculant dosing system, up to a maximum of 4 interventions (timer and scheduled mode) during the day.

By using the Cleaning function it is possible to activate a dosing pump for the cleaning of the electrode, up to a maximum of 4 interventions (timer and scheduled mode) during the day; the difference from the flocculant mode, is that the Cleaning mode interrupts the tool's operations (disabling the set-point). At the end of such intervention the tool awaits the start up time (see Start-up delay).

Once one of the two functions is activated (flocculant or cleaning) it is necessary to set the auxiliary outputs that need to be activated.

Pressing

 keys, select the days in which the auxiliary output needs to be activated; scroll down all the possible options until the day or the combination of days that need to be activated appears:

- Off.
- Whole week.
- 5 day week.
- 6 day week.
- Saturday and Sunday.
- Days odd numbered.
- Days even numbered.
- Monday.
- Tuesday.
- Wednesday.
- Thursday.
- Friday.
- Saturday.
- Sunday.

Pressing

keys, select the days in which the auxiliary output needs to be activated; scroll down all the possible options until the day or the combination of days that need to be activated appears:

- Off.
- Whole week.
- 5 day week.
- 6 day week.
- Saturday and Sunday.
- Days odd numbered.
- Days even numbered.
- Monday.
- Tuesday.
- Wednesday.
- Thursday.
- Friday.
- Saturday.
- Sunday.

out3   MO START 1 15:30

out3   TU START 1 15:30

out3   WE START 1 15:30

out3   TH START 1 15:30

out3   FR START 1 15:30
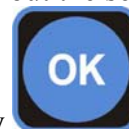
out3   SA START 1 15:30

After having selected the days or the day in which the intervention needs to be carried out, the

activation time needs to be set. Press the buttons to set the hours or the minutes

and use the button to select the field (hours/minutes) on which to carry out the settings.

Carry on with the programming to define the activation times by pressing the key .

After having established the day or days of the intervention, the duration of it needs to be set. Regarding the **Cleaning** function, it is possible to set the seconds of the auxiliary output activation, where the message on the display is as follow:

Use the keys

to set the seconds of activation and press

to confirm.

In the case of the **Flocculant** function it is possible to set hours and minutes of activation of the auxiliary output; the message appearing on the display is as follow:
Use the keys

to set hours or minutes of activation..

Use the key to select the field (hours/minutes) and press key to confirm.
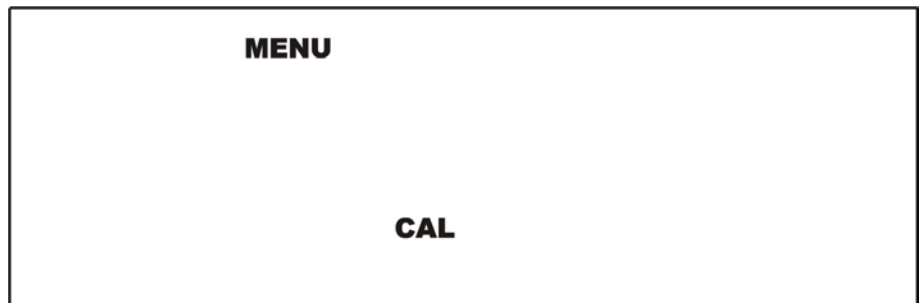
8.3.2. Calibration menu

The menu CAL allows the user to calibrate the instrument through programming and using reference solutions.
Dipping the probe in the pH 7 buffer solution is the calibration procedure's first step.

Select the CAL (calibration) function from the main menu

by pressing the **OK** key.

Once in the calibration function, the display shows the message POINT1; at this point press the **−** or **+** key until the value

7.00 shows up, then press the **OK** key to confirm the operation; the display shows the message POINT2.

Dip the probe in a pH 4 or pH 9 buffer solution.

Press the **−** or **+** key until the value 4.00 or 9.00 shows up,

then press the **OK** key to confirm the operation.
The instrument is so calibrated.

For Redox and Chlorine, calibrate first calibration point by using buffer solution (e.g. 650mV) o by using a photometer.
Second calibration point (available in FULL mode only) is the "ZERO", which is possible to calibrate by disconnect the probe and shortcutting BNC input connector.

8.3.3. Setting setpoints

After setting up and calibrating the instrument, the SETPOINT values must be set: the instrument features two independent SETPOINTs actuating two relating relay outputs.
The reference values to be adopted as target values for the system can be set by programming the SETPOINT 1 or 2 menu.

Choosing the SETPOINT to set (1 or 2) by pressing the

key is the first operation to carry out.

MENU

SETPOINT1
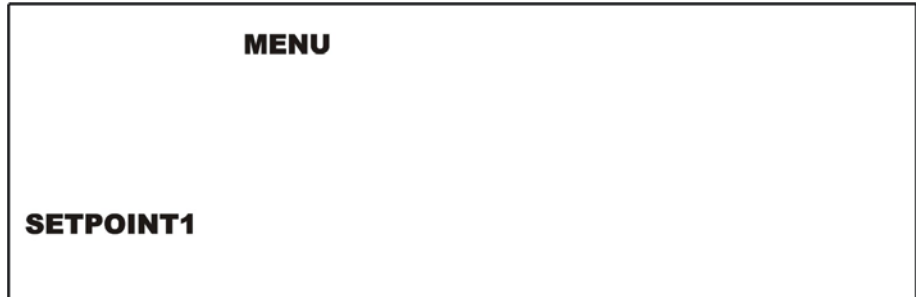
At this point in the programming procedure the intended value must be set by pressing the

or

key. Confirm the operation by pressing the

key.

7.00

pH
SETPOINT1

Defining the type of actuation is the next step: the down arrow indicates that the action tends to lower the measurement value (in the case of pH it represents an action of the acid type), the up arrow indicates that the action tends to increase the measurement value (in the case of pH it represents an action of the alkaline type).

Press the

or

key to define the direction of the arrow,

and press the
key to confirm the choice.

▼
d ir

SETPOINT1

▲
d ir

SETPOINT1

After defining the type of actuation, setting the hysteresis value is the next step.

Press the

or key to set the value, and press

the key to confirm the selection.

The instrument allows the user to define a delay time relating to SETPOINT actuation. Set the following value to activate that function.

Press the

or key to set the minutes or seconds, press the

key to select the

field to change (minutes or seconds) and confirm the choice by pressing the key.

The instrument features two TTL (1-2) outputs that can operate in the proportional or ON-OFF mode.

Press the

or key to choose the operation mode of the TTL output selected: PROP (proportional) or ON-OFF. In the proportional mode the frequency of pulses decreases approaching the SETPOINT until the minimum set value is reached, whilst in the ON-OFF mode the TTL output is actuated when the

corresponding SETPOINT relay changes its position. Press the [OK] key to confirm the choice.

When choosing the proportional mode, three parameters must be set to allow the TTL output to operate correctly, as follows:

1. Pulse width
2. Measurement value at maximum frequency
3. Maximum frequency value (between 0 and 999 pulse/min)
4. Frequency value corresponding to the SETPOINT.

To set the value of the pulse width press the [–] or [+] key, then press the [OK] key to confirm the choice. **Value is in milliseconds.**

80

ЛWIDTH

TTL1

To set the measurement value at maximum frequency press the [–] or [+] key, then press the [OK] key to confirm the choice.

14.00

pH   MAX

TTL1

At this point the instrument asks the maximum frequency value; press the [–] or [+] key, then press the [OK] key to confirm the choice.

120

MAX Л/m

TTL1

As soon as the maximum frequency value is set, the minimum frequency value, corresponding to SETPOINT actuation must be set.
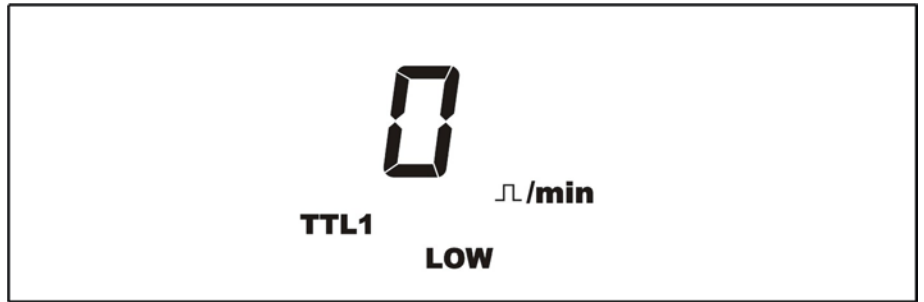
To set that value, press the

⊖ or ⊕ key,

then press the OK key to confirm the choice.

8.3.4. Configuring alarms

The instrument features various alarms that can be configured by the user; three types of alarm can be set:

HIGH – The instrument raises an alarm above a given measurement value.
LOW – The instrument raises an alarm below a given measurement value.
OVER – The instrument raises an alarm when a given time interval has elapsed and the measurement has not come back to the intended setpoint values.

In the main menu press

OK

when the message "MENU ALARM" shows up.

MENU **ALARM**

At this point the HIGH alarm can be set; press the

– or **+** key to set the pH value above which the instrument must raise an

alarm, and press the **OK** key to confirm the choice.

ALARM
14.00
pH
HIGH

Proceeding with the ALARM menu, the LOW alarm can be set; press the

– or **+** key to set the pH value below which
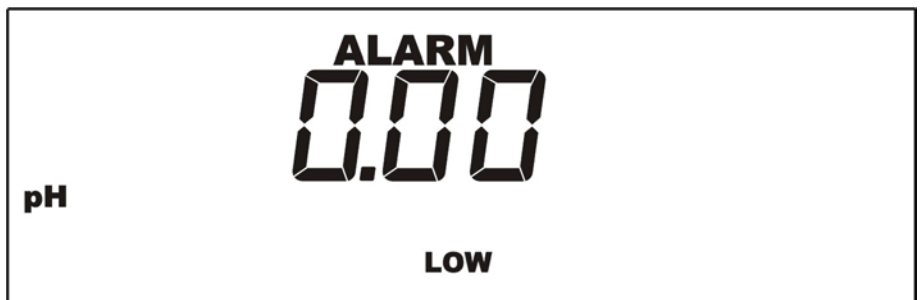
the instrument must raise an alarm, and press the **OK** key to confirm the choice.

ALARM
0.00
pH
LOW

The instrument can raise an alarm when the measurement value does not come back to the setpoint value within the established time interval; to activate that function proceed as follows:
Press the

ALARM

99:59 h:m

OVER
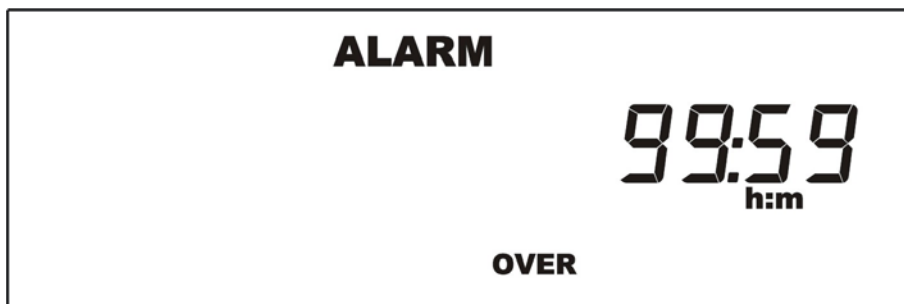
or key to set the hours or minutes, press the key to select the field to

OK

change (hours or minutes), and confirm the choice by pressing the key.

When the "ALARM" message shows up, during the regular operation of the instrument, the corresponding relay contacts switch over, making it possible to signal the alarm at a distance.

Level Alarm On one of the pumps connected to the SETPOINT 1 or 2 *AUX output goes from normally open to normally closed*	**ALARM** LEVEL **9.14** pH
Maximum alarm It is activated, when the maximum measure value is exceeded, above which the tool should block. *AUX output goes from normally open to normally closed*	**ALARM** **13.79** pH **HIGH**
Minimum alarm It is activated, when the minimum measure value is exceeded, above which the tool should block. *AUX output goes from normally open to normally closed*	**ALARM** **1.87** pH **LOW**

Over alarm It is activated, when the maximum foreseen time is exceeded, within which the measure should reach the SETPOINT value. *AUX output goes from normally open to normally closed*	ALARM **13.89** pH OVER
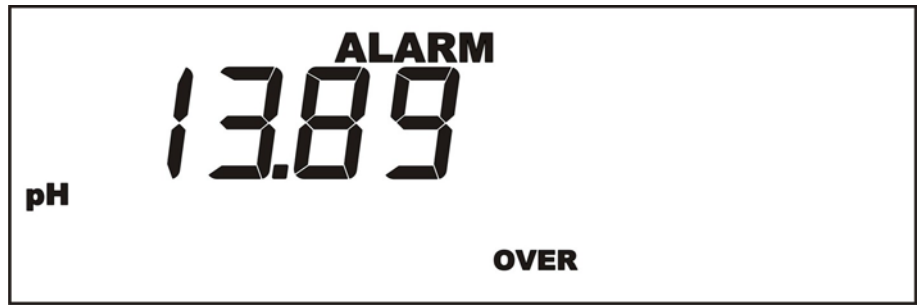
8.3.5. Current outputs menu

The instrument is equipped with two current outputs settable by the user; the measurement value corresponding to 4 or 20 mA can be set for every output.

In the main menu press

OK

when the message "MENU 4 20 mA" shows up.

MENU
4 20mA

Press the

— or **+** key to set the pH value for the first current output, corresponding to 4 mA.

0.00 pH mA1
4.00mA

OK

Press to confirm the choice.

14.00 pH mA1
20.00mA

Press the

— or **+** key to set the pH value for the first current output, corresponding to 20 mA.

0.00 pH mA 2
4.00mA

OK

Press to confirm the choice.

Press the

— or **+** key to set the pH value for the second current output, corresponding to 4 mA.

OK

Press to confirm the choice.

Press the

 or key to set the pH value for the second current output, corresponding to 20 mA.

Press to confirm the choice.

8.4. Proximity sensor

The controller B1 have 1 input denominated REMOTE to which proximity sensor can be connected (see Fig. 1) that inserted in the probeholder, signal the presence of water in the installation and therefore the need to start the inspection.

In order to activate the controller, the proximity sensor should be Normally Closed

8.5. PT100 connection

As it is possible to see on the connection diagram represented in Fig. 1 the controller foresees the mounting of the PT100 3 wire sensors.

Regarding the two poles PT100 it is necessary to short circuit the two terminals of the clamps marked "C" with a clevis (fig.1) and connect the two wires of the PT100 between one of the above poles "C" and the third pole which is still free; instead for the four wire one it is necessary to connect both wires to one of the two pairs of twisted wires at the third pole and the other two wires of the other twisted pair to the two poles marked "C".

9. Reset procedure

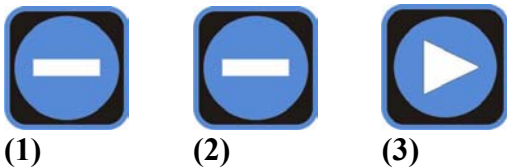Switch off the instrument, then switch it on again.

Enter the main menu.

MENU

SETPOINT1
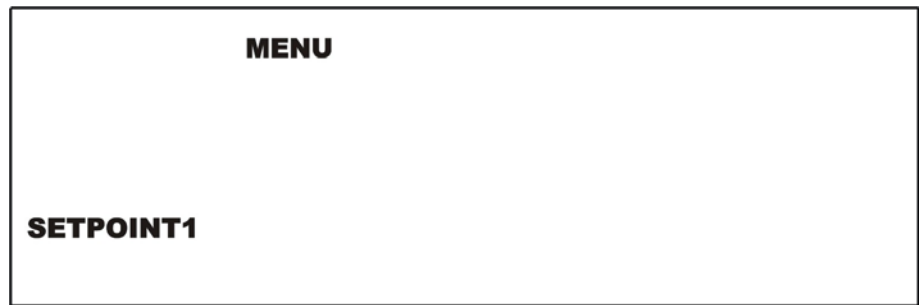
Simultaneously press the keys [−] and [+] within 15" from the time of switching on the instrument.

The display shows the message RESET.

r E S E t

At this point, in order to perform a **partial RESET** (saving the calibration of the instrument), press the following keys in the order indicated:

(1) [−]   **(2)** [−]   **(3)** [▶]

Conversely, to perform a **full RESET** press the following keys in the order indicated:

(1) [+]   **(2)** [+]   **(3)** [▶]

Beware: after 15" from entering the main menu, the RESET procedure can no longer be activated.

## 10. Password restricted menu

Password may be enabled in order to prevent access to setting menus.

When a password is introduced, the user is still going to be able to adjust one single calibration point. This will allow him, for example, to perform small measure adjustments by means of a photometer.

If a password is present, menu-access-settings change from what beforehand specified in paragraph 8.3.

By pressing while the controller is in measuring mode, the user gets into a special menu where he is asked if he intends to perform a single point calibration or instead to enter the required password in order to get access to regular setting menus.
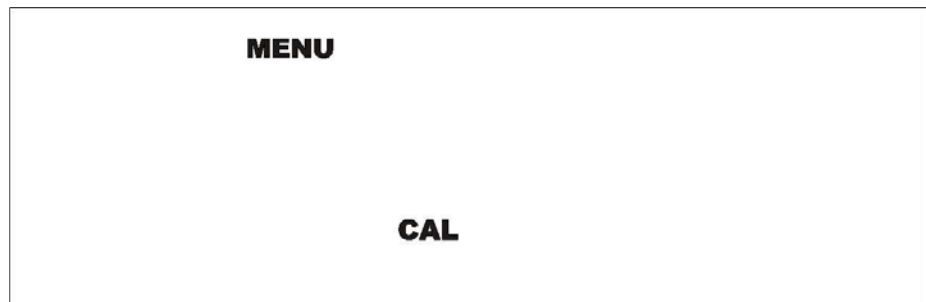
The requested selection can be done through

  and

In case calibration has been selected, please refer to paragraph 8.3.2.
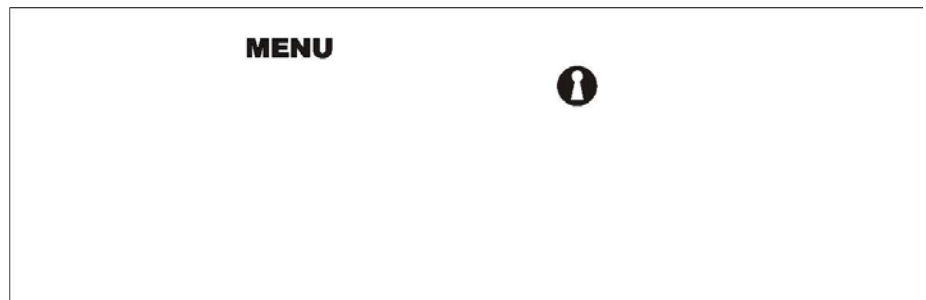
Notice that, in this case, only one calibration point may be adjusted. In particular:

- pH case → second calibration point (the one with value different from 7.00);
- all other cases → first calibration point (the one with value different from 0.00).

On the other hand, if the user has selected to get access to regular setting menus, the relevant password must be entered, as described in paragraph 8.3.1.

11. Display FIRMWARE Version
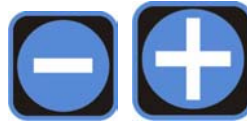
When is shown measure values press simultaneously   keys, on display will appear the revision number of the firmware.

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Press key to return on NORMAL visualization.

12. Priming of the pumps

To facilitate the priming of the pumps, it is possible to manually activate the output of the SETPOINT.
Such procedure is accessible even in presence of password by pressing simultaneously two keys (as following described) while the visualization of the measure is in progress.

The procedure of priming of the pumps involves:
· Activation of the relay SETPOINT
· 4-20mA output is set to 20mA
· If in ON/OFF mode, TTL relay is activated; if in PROPORTIONAL mode, the TTL output is set to the maximum frequency.

To effect such operation:

For the pump 1 press simultaneously the keys and .
Until the keys stay pressed the whole outputs remain activated.

For the pump 2 press simultaneously the keys and .
Until the keys stay pressed the whole outputs remain activated.