P6.02 pH/ORP Monitor and Transmitter

INSTRUCTION MANUAL

EN 10-07

Table of Contents

1. Introduction

1.1. Safety Instructions

CAUTION

General Statements

- Do not install and service the instrument without following the Instruction Manual.
- This unit is designed to be connected to other instruments which can be hazardous if used improperly. Read and follow all associated instrument manuals before using with this instrument.
- Unit installation and wiring connections should only be performed by qualified staff.
- Do not modify product construction.

Installation and Commissioning Statements

- Remove power to the instrument before wiring input and output connections.
- Do not exceed maximum specifications using the instrument.
- To clean the unit, use only chemical compatible products.

1.2. Unpacking

Please verify that the product is complete and without any damage. The following items must be included:
- P6.02 pH/ORP Monitor and Transmitter
- Instruction Manual for P6.02 pH/ORP Monitor and Transmitter

2. Description

2.1. Design

The FLS ChemX3 F6.02 pH\ORP Monitor and Transmitter is designed to convert the signal from pH and ORP probes into a display indication and a 4…20 mA signal for long distance transmission and it also provides two relay outputs. A very high flexibility is achieved via only one packaging for panel or wall installation. Self explaining calibration menus allow a customized setup of all measuring parameters and the state of the art electronic design ensures long-term reliable and stable signals.

2.2. Technical Features

- Removable Cover
- 3 line LCD display
- OUT 2 LED (Relay)
- 5-button silicone rubber keypad
- ¼ DIN, IP65 monolithic enclosure
- 12-digit alphanumeric line
- 12-digit alphanumeric line
- Output status icon line
- OUT 1 LED (Relay)

3. Specifications

3.1. Technical Data

General
Materials:
- Case: PC
- Panel gasket: Neoprene
- Wall gasket: EPDM
- Keypad: 5-button silicone rubber

Display:
- 3 line LCD: 2 x 12 alphanumeric lines + 1 icon line
- Update rate: 1 second
- Contrast: User adjustable with 5 levels

Enclosure: IP65 front

pH monitor
Sensor Input range: 0÷14,00 pH
Accuracy:±0.01 pH

Redox monitor
Sensor Input range: ±1500 mV
Accuracy: 1 mV

Temperature Range: 0÷100°C with PT100 three wires
Temperature Accuracy:1°C

Electrical
Supply Voltage: 24 VAC/DC $\pm$ 20%
Current output:
- 4…20 mA (±0.05%, ±0.01mA), isolated, fully adjustable and reversible
- Max loop impedance: 500 Ω

Relay output:
- Mechanical SPDT contact
- Contact 10A 250V

Input Voltage: 15÷30 Vac/dc Optically isolated
Protection Fuse: 150 mA (Regenerate)
Environmental
Operating temperature: -10 to +60°C (14 to 158°F)
Storage temperature: -15 to +80°C (5 to 176°F)
Relative humidity: 0 to 95% non condensing
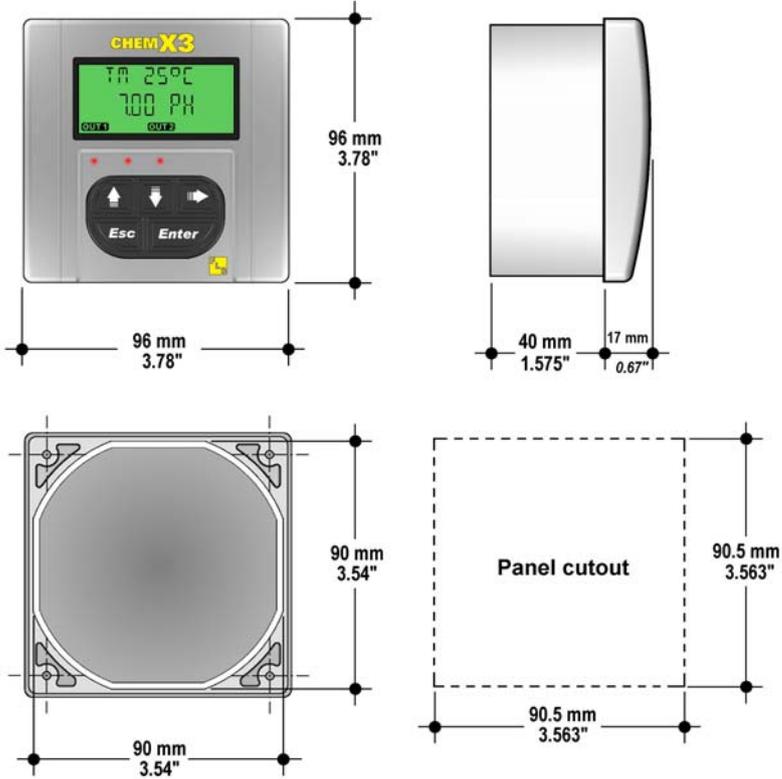**Standards and Approvals**
Manufactured under ISO 9001
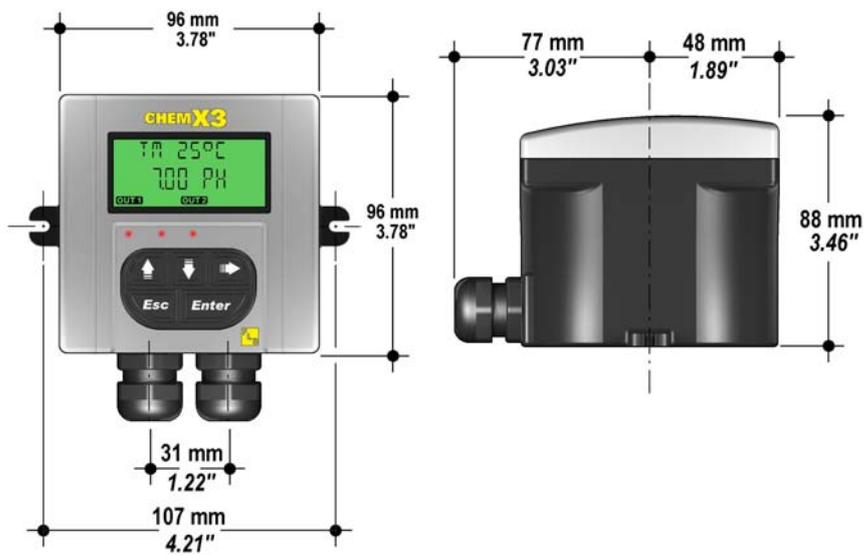Manufactured under ISO 14001
CE

3.2. Dimensions

Panel Mount

CHEM X3

TM 25°C
7.00 PH
OUT 1   OUT 2

Esc   Enter

96 mm
3.78"

96 mm
3.78"

40 mm
1.575"

17 mm
0.67"

90 mm
3.54"

90 mm
3.54"

Panel cutout

90.5 mm
3.563"

90.5 mm
3.563"

Wall Mount

96 mm
3.78"

CHEM X3

TM 25°C
7.00 PH
OUT 1   OUT 2

Esc   Enter

96 mm
3.78"

31 mm
1.22"

107 mm
4.21"

77 mm
3.03"

48 mm
1.89"

88 mm
3.46"

4. Installation

The pH\ORP monitor & transmitter is available just in one packaging for panel or wall installation. The panel version is installed using the panel mounting kit (F9.KP1), while the wall mounting version is fixed with the wall mounting kit (F9.KWX).The mounting kits can be ordered directly connected to the monitor or separately and then simply installed on it.
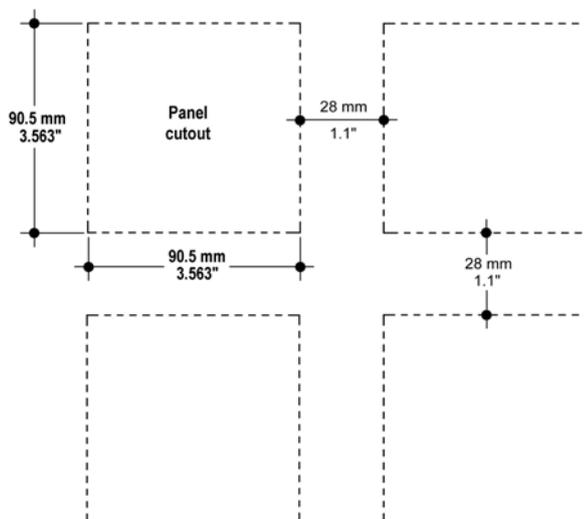
4.1. Panel Installation

The panel mounting version consists of the monitor and the mounting bracket kit F9.KP1 with gasket for IP65 watertight panel installation. The monitor perfectly fits into a standard ¼ DIN panel cutout.
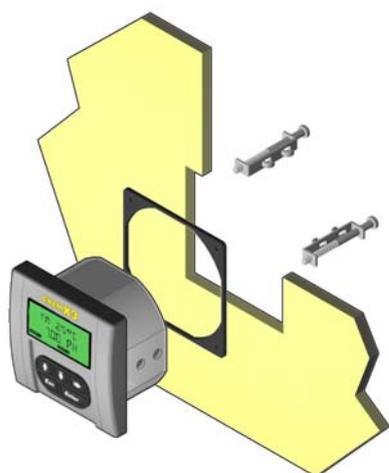
1. Cut out the panel: the P6.02 requires a panel opening of 90,5 x 90,5 mm (3,563" x 3,563"). ¼ DIN punches are recommended, alternatively a jigsaw or another cutting tool may be used.
2. Recommended minimum clearance between panel cutouts is 28 mm (1.1") as illustrated.

3. Place gasket on the instrument and install into the panel. Be sure the panel gasket is properly seated against the panel and around the instrument case.
4. Place the panel fixing screws in the apposite seats. Screw down the screws until the instrument is perfectly fixed.

To REMOVE: Unscrew the screws and remove them from the apposite seats. Do not allow the instrument to fall out of the panel opening: it may be helpful to secure the instrument temporarily with tape from front.

4.2. Wall Installation

The wall mounting version consists of the monitor and the wall mounting kit. The F9.KW1 kit includes the plastic adapter with gasket for IP65 watertight wall installation and the fixing screws. The F9.KW2 includes also a 110/230 VAC to 24 VDC power supply directly mounted into the plastic adapter to provide a low voltage regulated output to the flow monitor.

1. Fix the wall mounting kit to a solid wall using the included screws.
2. Pull the electrical cables through liquid tight connectors.
3. Make wiring connections according to wiring diagrams.
4. Secure carefully the P6.02 to the wall mounting kit using the included screws until finger tight.
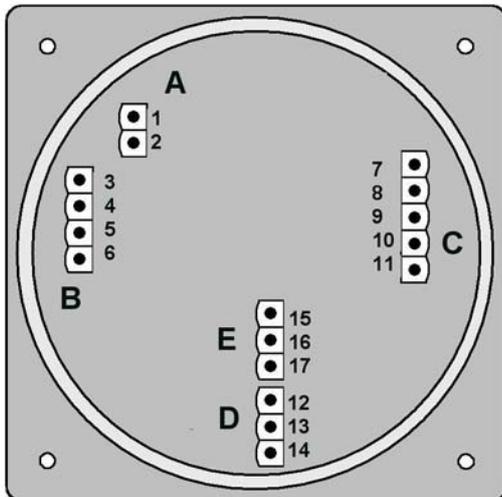5. Assemble the front cover.

4.4. Wiring

All wiring connections to P6.02 are made via removable terminals. The pH\ORP sensor terminals are orange, all other terminals are green.

⚠ CAUTION

General recommendation

- ❑ Always ensure the power supply is switched off before working on the device.
- ❑ Terminals accept 26 to 12 AWG (0.08 to 2.5 mm^2)
- ❑ Strip around 10 mm (0.4") of insulation from the wire tips and tin bare ends to avoid fraying.
- ❑ Ferrules are suggested when connecting more than one wire to a single terminal.
- ❑ Remove the upper part of the terminals for an easy cabling.
- ❑ Insert wire tip or ferrule completely into the terminal and fix with the screw until finger tight.

Rear Terminal View

1	+ Vac/dc	**A**
2	- Vac/dc	

3	+ HOLD	
4	- HOLD	**B**
5	+ LOOP	
6	- LOOP	

7	P	
8	T 1	
9	0 0	**C**
10	+ IN	
11	- IN	

12	NC	
13	COM	**D**
14	NO	

15	NC	
16	COM	**E**
17	NO	

Power / Loop Wiring Diagram

Stand-alone application

Power Supply				
+ 24 Vac\dc	**+**		1	+ Vac\dc
- 24 Vac\dc	**—**		2	- Vac\dc
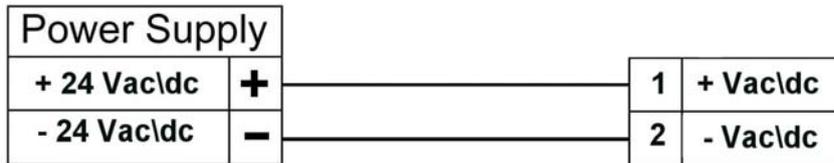
A

Hold Connection \ Output current

	3	+ HOLD
15 - 30 Vac\dc	4	- HOLD
I = 4 - 20 mA	5	+ LOOP
A	6	- LOOP
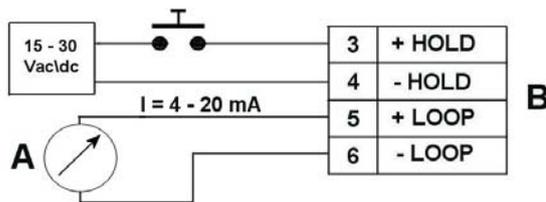
B

Probe Wiring Diagram
without pt 100

	7	PT100
1	8	
	9	
	10	+ IN
Probe	11	- IN

C

1 : Signal
2 : Shield
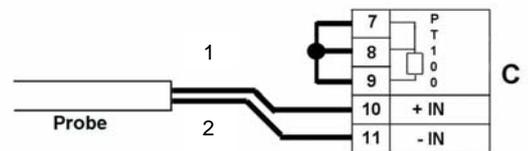
Probe Wiring Diagram
with pt 100 three wires

Probe Wiring Diagram
with pt 100 two wires

Relay Wiring Diagram

	RELAY 1	
AC or DC Power	12	NC
	13	COM
Alarm	14	NO
		D
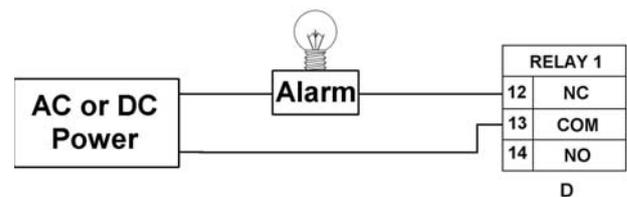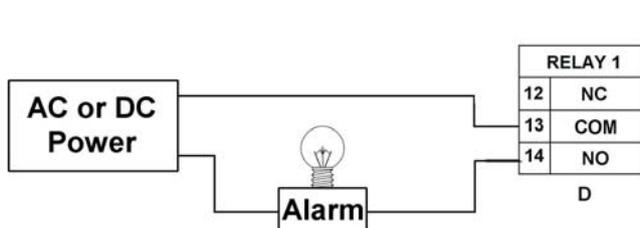
The alarm is OFF during normal operation and goes ON according to Relay settings.

	RELAY 1	
AC or DC Power	12	NC
Alarm	13	COM
	14	NO
		D

The alarm is ON during normal operation and goes OFF according to Relay settings

5. Operational Overview

The ChemX3 P6.02 pH/ORP monitor and transmitter, like all members of X3 Line, features a digital display and a five-button keypad for system set-up, calibration and operation. This section contains a description of the keypad functions and the general operation flowchart of the instrument.

5.1. Keypad Functions

The five push buttons of the keypad are used to navigate display levels and modify settings.

⚠️ **CAUTION** The function of each button may change according to display level; please refer to following table:

	↑	↓	⇥	Esc	Enter
Level	**Function**				
View	Scroll through items	Scroll through items	Select items marked with >	---------	Go to Menu Directory Level
Menu Directory	Scroll through items	Scroll through items	Enter menu for editing	Return to View	---------
Menu	Scroll through items	Scroll through items	Enter menu item for editing	Return to Menu Directory	---------
Edit	Modify an item or a flashing digit	Modify an item or a flashing digit	Scroll right through flashing digits	Return to Menu without saving	Save new settings

5.2. General Operation

The P6.02 pH\ORP monitor and transmitter features four different levels:

- **View Level:** this is the default level. After instrument set-up, all measured values and status of outputs will be available. Refer to section **6. View Level** for details.
- **Menu Directory Level:** there are two different Menu Directories for different set-up and calibration. Refer to section **7. Menu Directory Level** for details.
  Access to this level can be free or password protected. Entering the correct password allows direct access to next levels and to all editable items in all menus, until a return to View Level.
- **Menu Level:** the current setting for each item in a Menu can be viewed and selected for editing at this level.
- **Edit Level:** all instrument parameters can be set, modified and saved at this level. Refer to section **8. Menu and Edit Levels** for details.

6. View Level

- During normal operation, the pH/ORP monitor and transmitter is in View Level displaying all measured values and the status of the analog output and Relay output.
- If the pH/ORP monitor is in a different level and no activity occurs for more than 3 minutes, it will return to View Level.
- To select the item you want displayed, press UP or DOWN arrows.
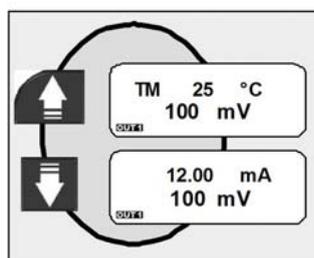- **Changing display indication does not affect or interrupt instrument operation and calculation.**

View Level

Description pH
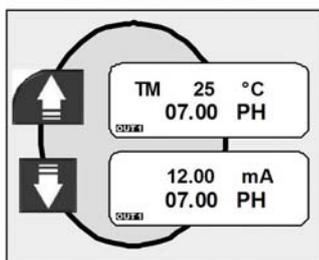
Temperature manual\automatic and pH value

4 – 20mA Loop Output and pH value

View Level

Description ORP

Temperature manual\automatic and ORP value

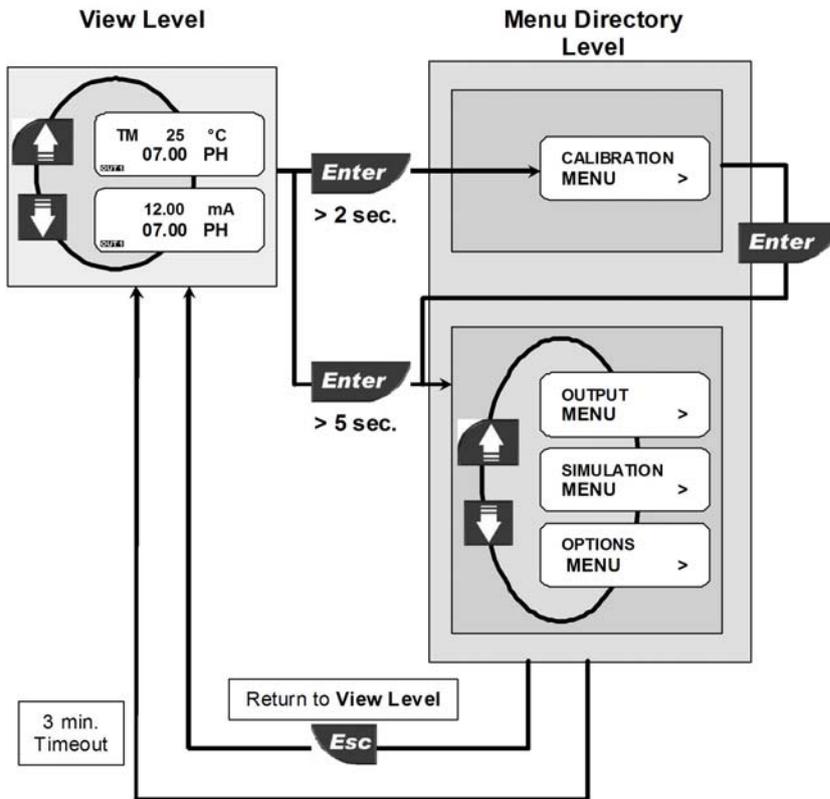4 – 20mA Loop Output and ORP value

7. Menu Directory Level

Access to this level can be free or password protected. Entering the correct password allows direct access to next levels and to all editable items in all menus, until a return to View Level (refer to **section 8.4.6. Menu PWD** to select password protected access).

Four different menus are available to fully set-up the P6.02 pH\ORP monitor and transmitter. These menus are separated in two different Menu Directories.
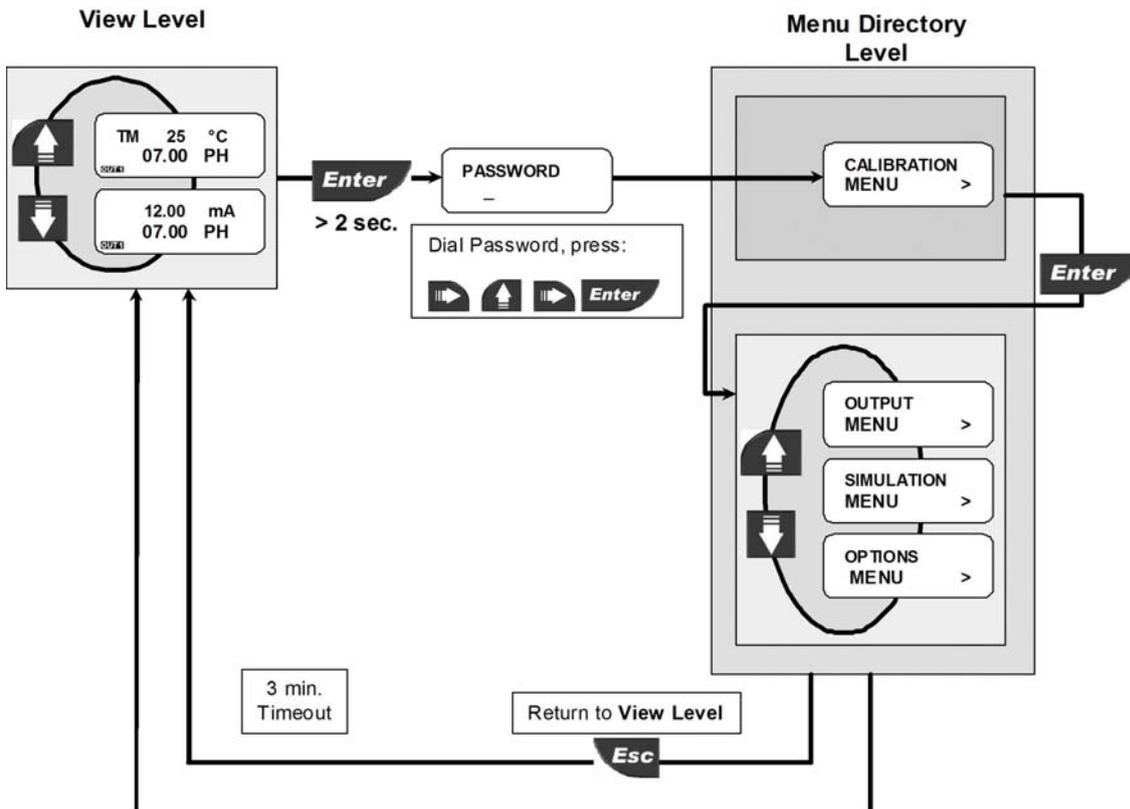In terms of getting started and making measurements, Calibration Menu is the most important menu in the P6.02 and it is the only one included in the first Menu Directory.
Output Menu, Simulation Menu, Option Menu and Statistic Menu are included together in the second Menu Directory.
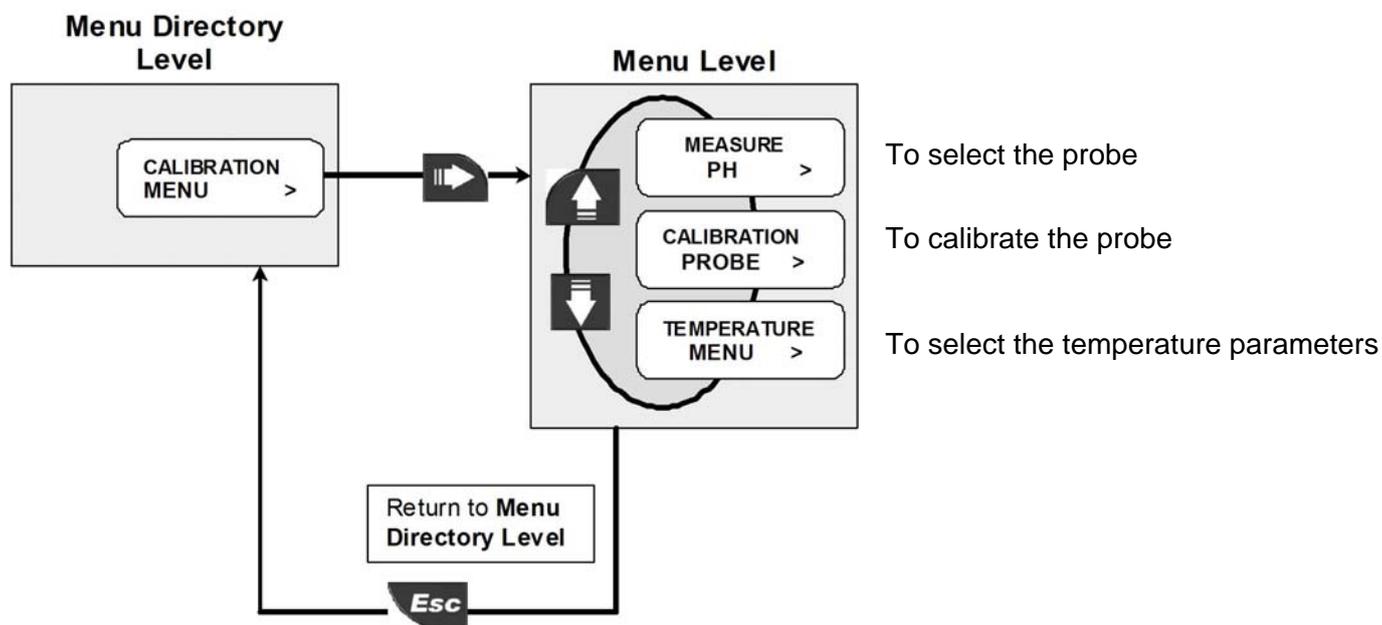
7.1. Free access (no password required)

View Level

TM 25 °C
07.00 PH

12.00 mA
07.00 PH

Enter
> 2 sec.

Enter
> 5 sec.

Menu Directory Level

CALIBRATION MENU >

Enter

OUTPUT MENU >

SIMULATION MENU >

OPTIONS MENU >

Return to **View Level**

Esc

3 min. Timeout

7.2. Password protected access

View Level

TM 25 °C
07.00 PH

12.00 mA
07.00 PH

Enter
> 2 sec.

PASSWORD
–

Dial Password, press:

Enter

Menu Directory Level

CALIBRATION MENU >

Enter

OUTPUT MENU >

SIMULATION MENU >

OPTIONS MENU >

3 min. Timeout

Return to **View Level**

Esc

8. Menu and Edit Levels

8.1. Calibration Menu

The P6.02 basic settings are made in this menu:

Menu Directory Level → **Menu Level**

- MEASURE PH > — To select the probe
- CALIBRATION PROBE > — To calibrate the probe
- TEMPERATURE MENU > — To select the temperature parameters

Return to **Menu Directory Level** — **Esc**

8.1.1. Measure

To select the probe, the monitor can be used as pHmeter or ORPmeter.

Menu Level → **Edit Level**

- MEASURE PH >
- CALIBRATION PROBE >
- TEMPERATURE MENU >

Edit Level:
- MEASURE PH
- MEASURE REDOX
- **Enter**
- SAVED

Save and return

Return to **Menu Level** — **Esc**

8.1.2. Calibration Probe

To select the automatic or manual calibration for pH\ORP sensors.

8.1.2.1.   pH probe Automatic Calibration

Automatic calibration for the pH probe is possible only using buffer solutions 7.00, 4.00 or 9.22 pH.

Place the probe in 7.00 pH buffer

Wait 60 sec until measure stability is reached.

Sensor quality

Place the probe in 4.00 pH or 9.22 pH buffer

Wait 60 sec until measure stability is reached. After 30 sec the monitor recognizes automatically the buffer if it's 4.00 or 9.22 pH.

Sensor quality, push press to accept the calibration

8.1.2.2.   pH sensor Manual Calibration

Manual calibration for the pH probe is required when buffers different from 7.00, 4.00 or 9.22 pH are used.

Menu Level

- MEASURE PH >
- CALIBRATION PROBE >
- TEMPERATURE MENU >

Return to **Menu Level** — Esc

Edit Level

- CALIBRATION AUTOMAITIC
- CALIBRATION MANUAL

Return to **Menu Level** — Esc

Edit Level

Save and return

- MANUAL 7.00 PH
- MANUAL 7.00 PH — Enter
- WAIT 60 7.00 PH — Automatic after 60 sec
- QUALITY 100 7.00 PH — Enter
- MANUAL 7.00 PH
- MANUAL 4.00 PH — Enter
- WAIT 60 4.00 PH — Automatic after 60 sec
- QUALITY 75 4.00 PH — Enter
- SAVED

Place the probe in the first buffer solution.

Enter the same value of the solution with the arrows up and down

Wait 60 sec until measure stability is reached.

Sensor quality

Place the sensor in the second buffer solution.

Enter the same value of the solution with the arrows up and down

Wait 60 sec until measure stability is reached.

Sensor quality, press enter to accept the calibration

8.1.2.3. ORP sensor Automatic Calibration

Automatic calibration for the ORP probe is possible only using buffer solution 465 mV.
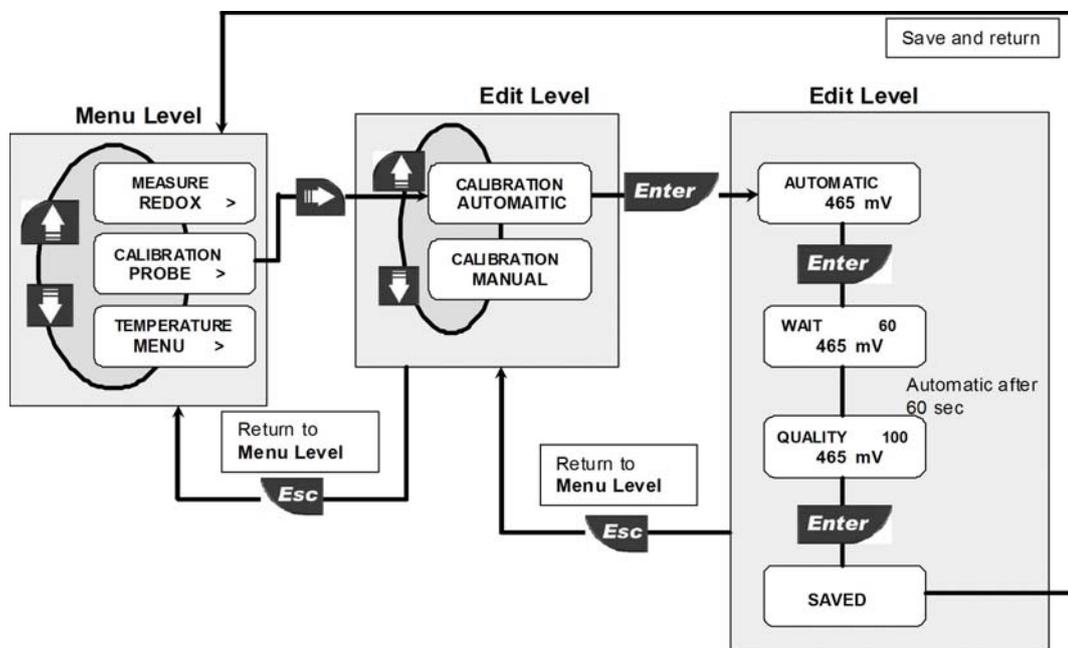
Place the sensor in 465 mV buffer

Wait 60 sec until measure stability is reached.

Sensor quality, press enter to accept the calibration

8.1.2.4. Manual Calibration ORP sensor

Manual calibration for the ORP probe is required when buffer different from 465 mV is used.
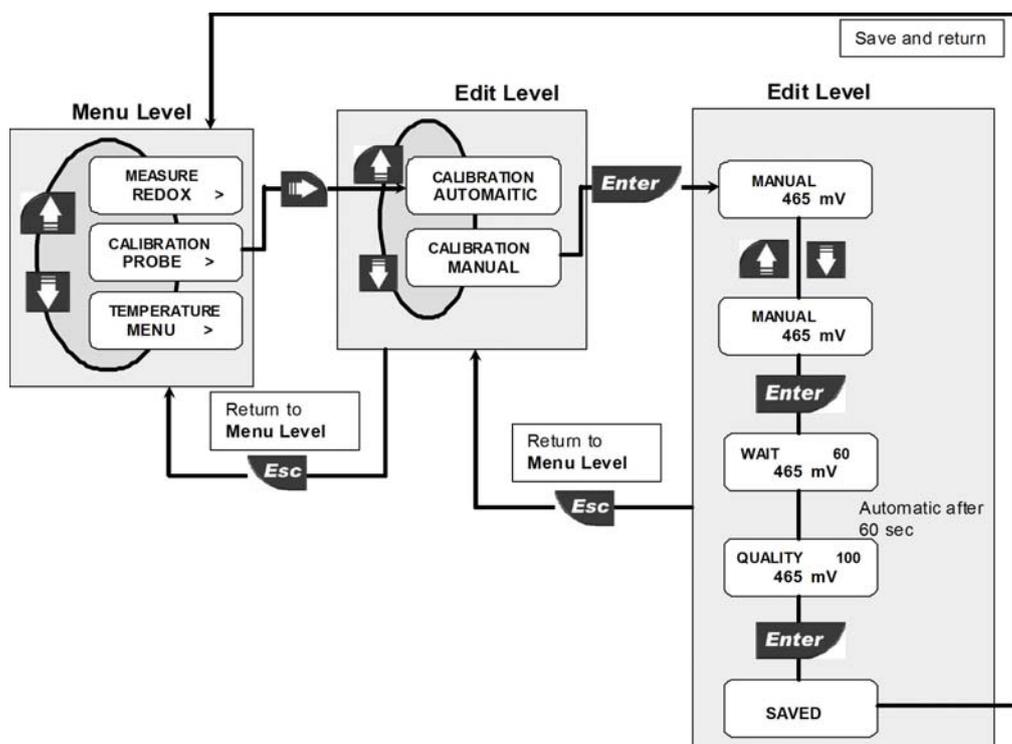
Place the sensor in the first buffer solution.

Enter the same value of the solution with the arrows up and down

Wait 60 sec until measure stability is reached.

Sensor quality, press enter to accept the calibration.

8.1.3.   Temperature menu

Set the temperature engineering units, the manual value and if the PT 100 is connected also calibrate of the temperature sensor.
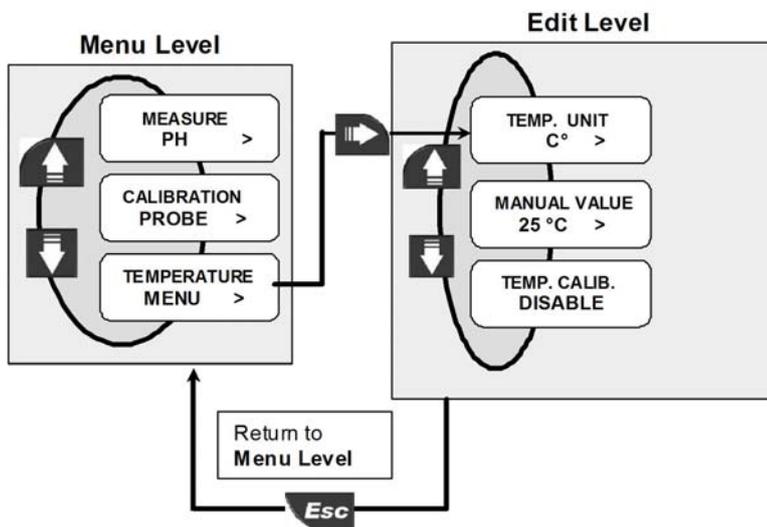
To set the temperature Engineering Units

To set the manual value of the temperature

To calibrate PT100 sensor if it's available. If the sensor is connected the instrument will display ENABLE

8.1.3.1. Temperature Units

Set the engineering units for the temperature, all the options available are displayed on the LCD.
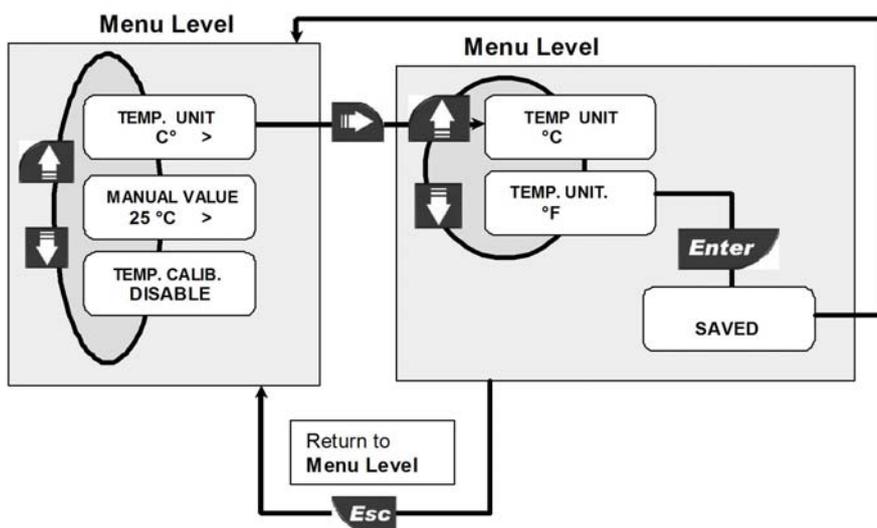
8.1.3.2. Manual Value

Set the manual value.
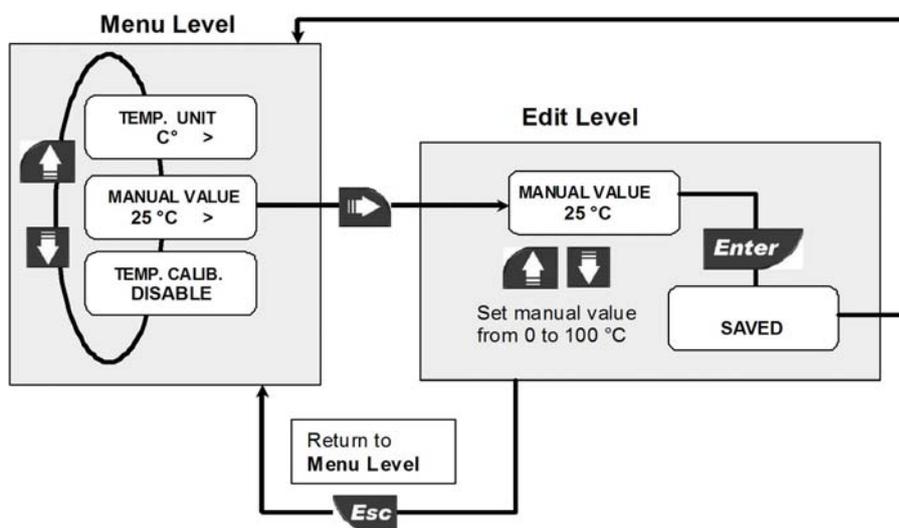
8.1.3.3. Temperature Calibration

If PT100 is connected it's possible to calibrate the sensor.
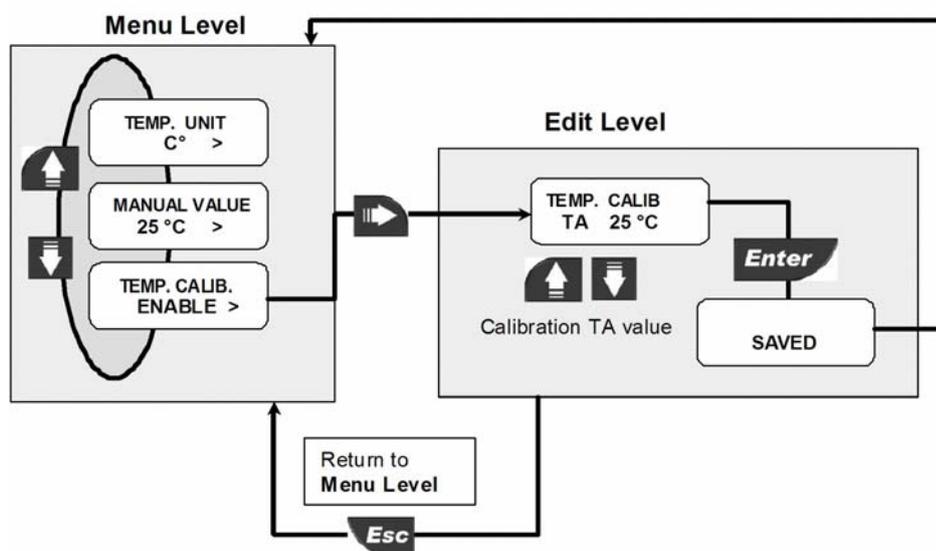
It's possible to change the value until ± 10 °C or ± 18 °F

8.2. Output Menu

The P6.02 analog and digital output are set-up in this menu:
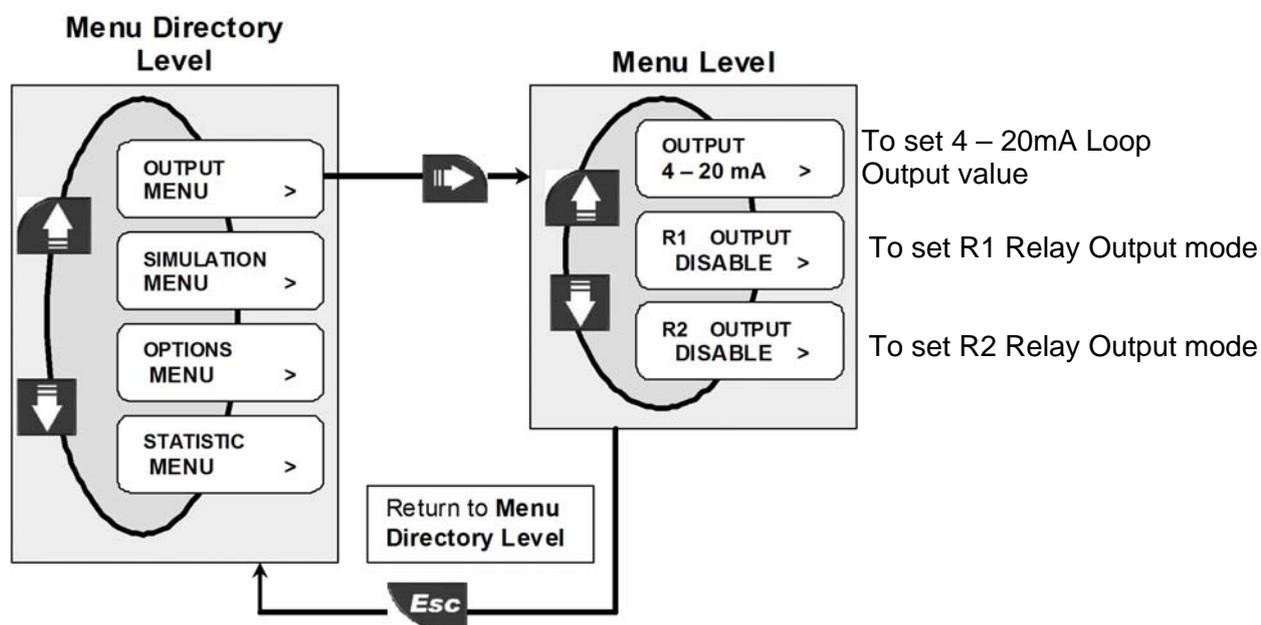
8.2.1.   4 - 20mA Output

The measuring range of the pH\ORP, corresponding to the 4-20mA output current is entered here by selecting the minimum and maximum values for the current loop. The P6.02 will allow any value from 0.0 to 14.00 pH for pH monitor, from -1500 to + 1500 mV for Redox monitor and the beginning of the measuring range can be larger than the end of it (inverted output signal).
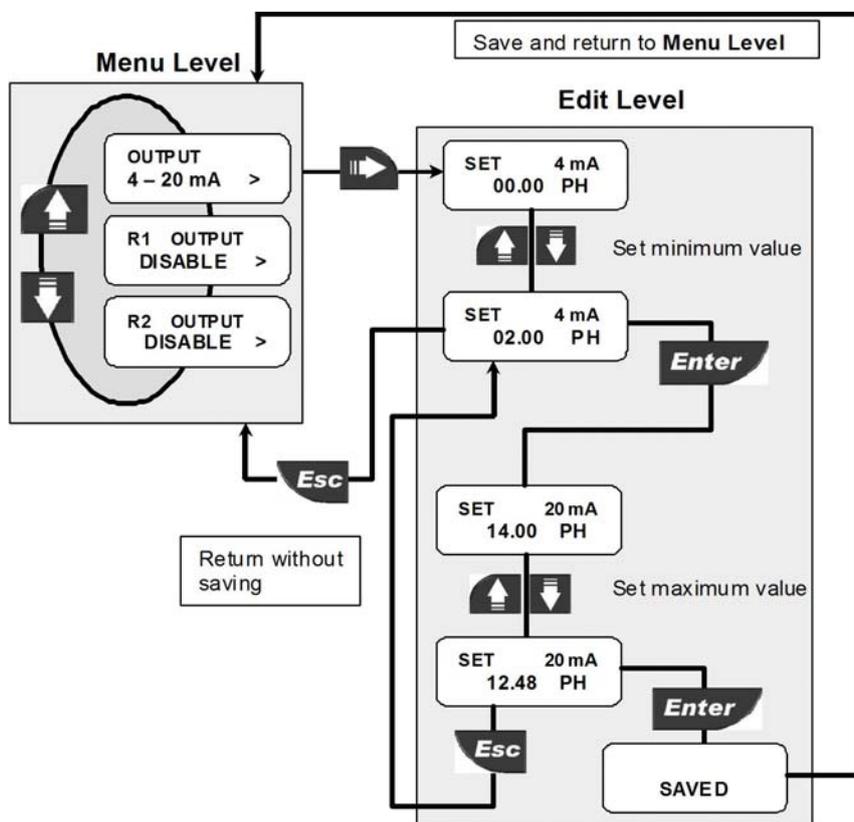
8.2.2. R1 Output (OUT1)

All R1 Output (OUT1) settings repeat for R2 Output (OUT2)
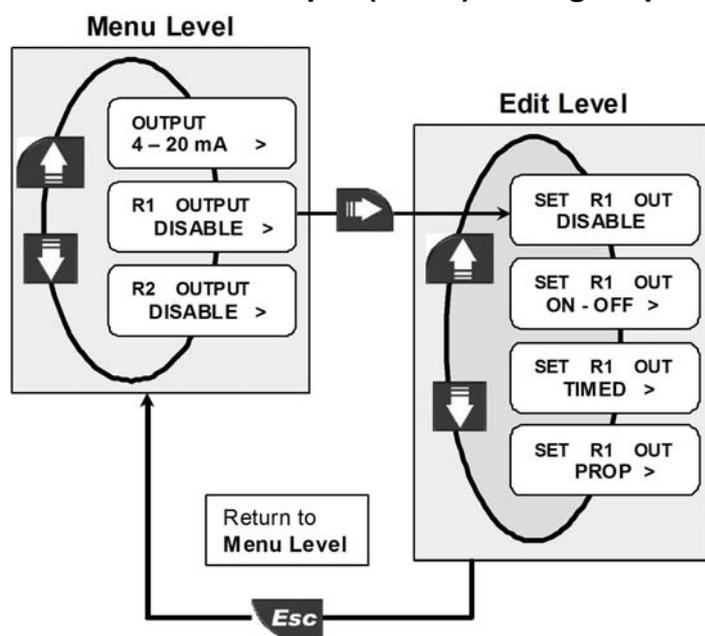
The mode of operation for the R1 Output (OUT1) can be selected between different options: ON-OFF mode, TIMED mode, Prop mode.

The signal can be disabled (set to Disable) if not used.

If the R1 Output is programmed the OUT1 icon will appear on the third line of the display.

8.2.2.1. R1 Output (OUT1): ON-OFF mode
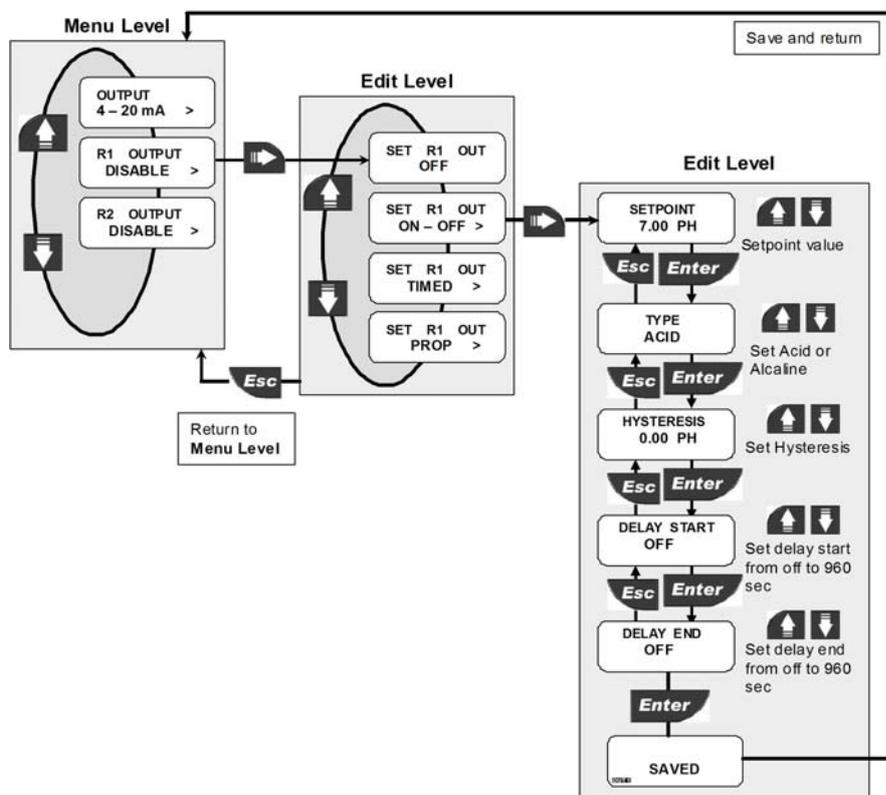
If the R1 has been programmed as Acid type the output triggers when the pH\ORP is greater than the setpoint: LED placed below OUT1 icon will switch on.
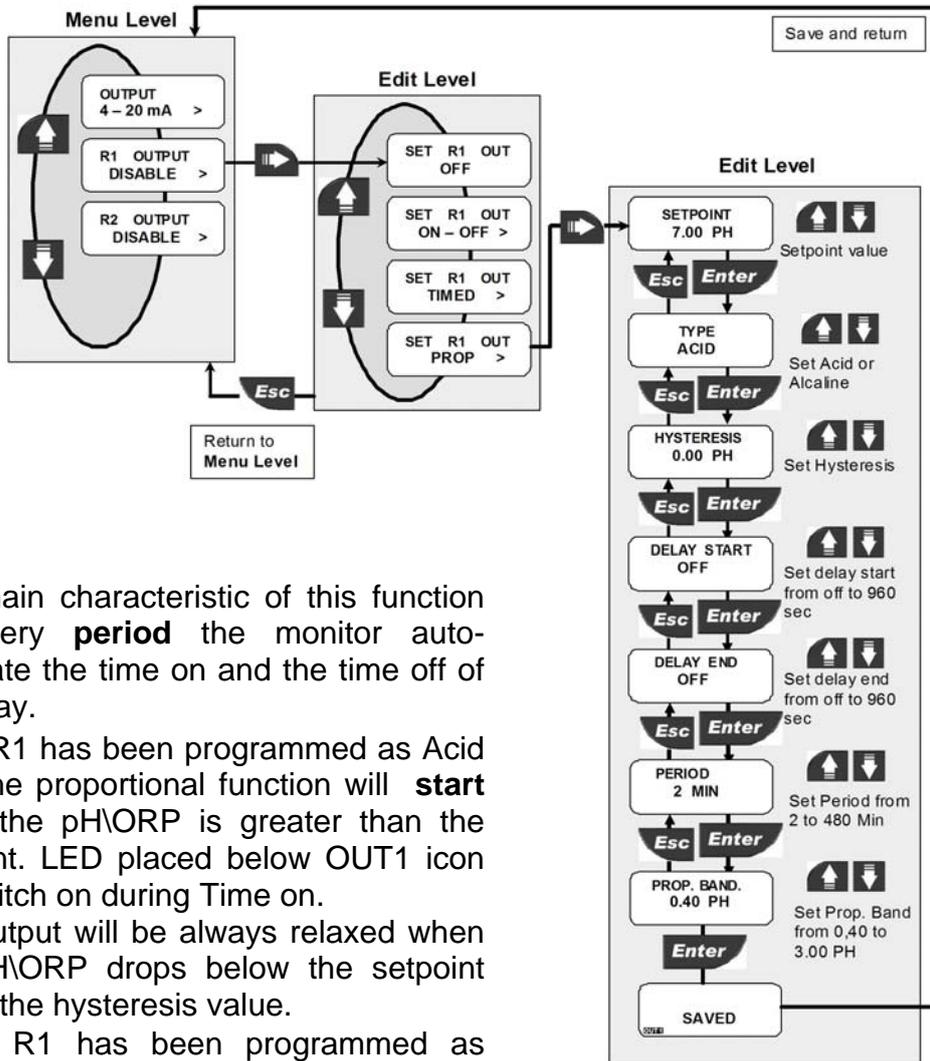The output will relax when the pH\ORP drops below the setpoint minus the hysteresis value.

If the R1 has been programmed as Alcaline type the output triggers when the pH\ORP drops below the setpoint: LED placed below OUT1 icon will switch on.
The output will relax when the pH\ORP moves above the setpoint plus the hysteresis value.

If the value Delay Start (D-1) and Delay End (D-2) are programmed differently of OFF the output will have a late answer equal to the time programmed. **This possibility is repeated for the other kind of output.**
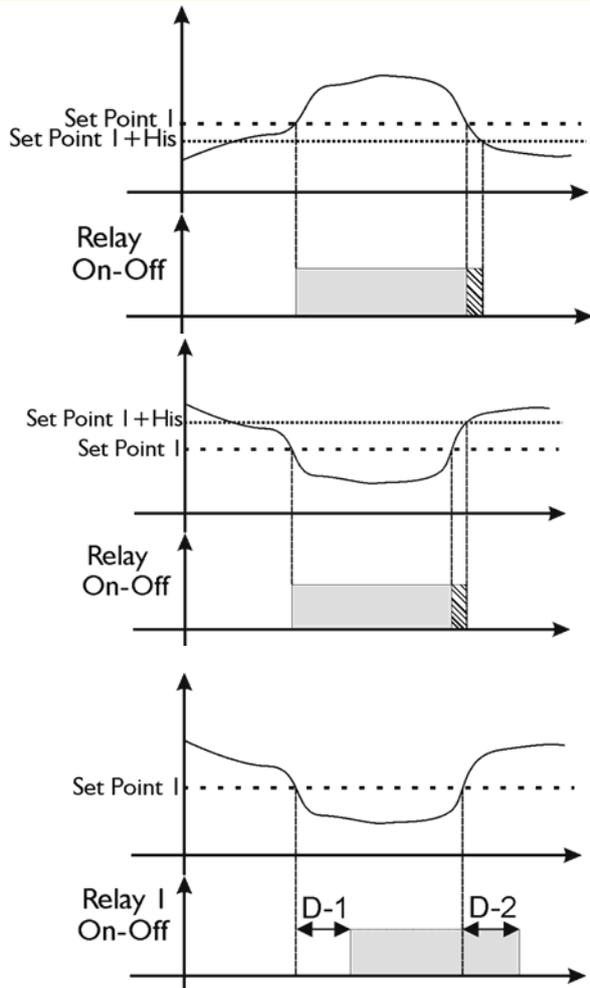
8.2.2.2. R1 Output (OUT1): Timed mode
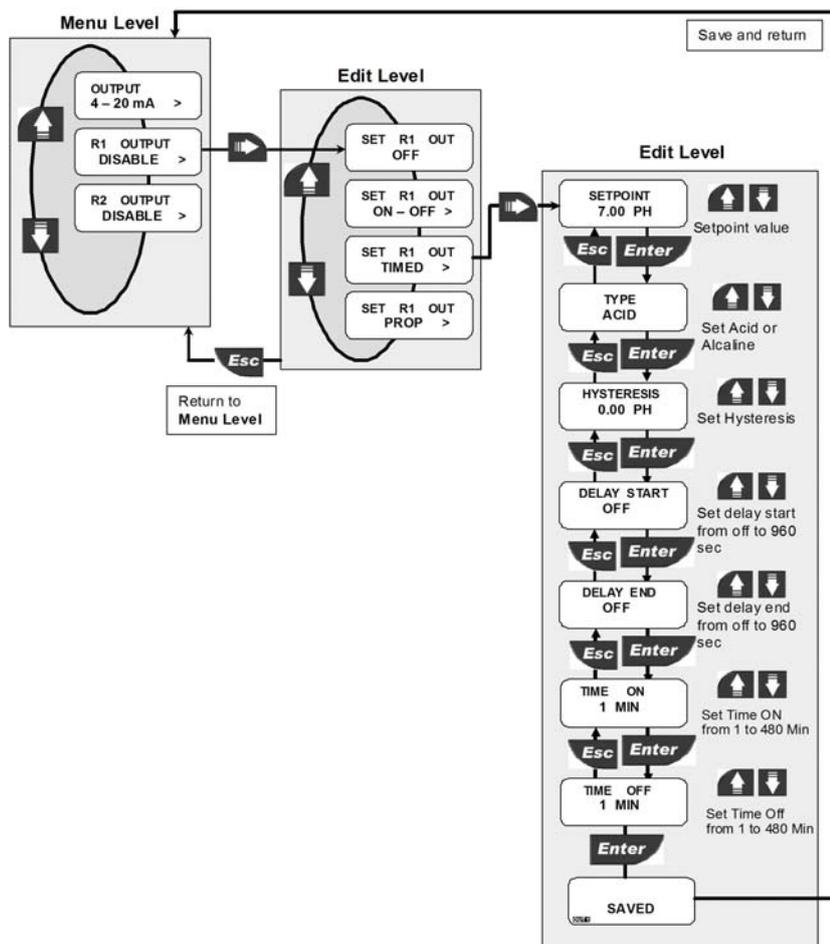
To Delay start and Delay end see section R1 output ON-OFF for details

If the R1 has been programmed as Acid type and when the pH\ORP is greater than the setpoint the output triggers for the Time on and the output will relax during the Time off : LED placed below OUT1 icon will switch on during Time on.

The output will relax when the pH\ORP drops below the setpoint minus the hysteresis value.

If the R1 has been programmed as Alcaline type when the pH\ORP drops below the setpoint the output triggers for the Time On and the output will relax during the Time Off: LED placed below OUT1 icon will switch on during Time on.

The output will relax when the pH\ORP moves above the setpoint plus the hysteresis value.
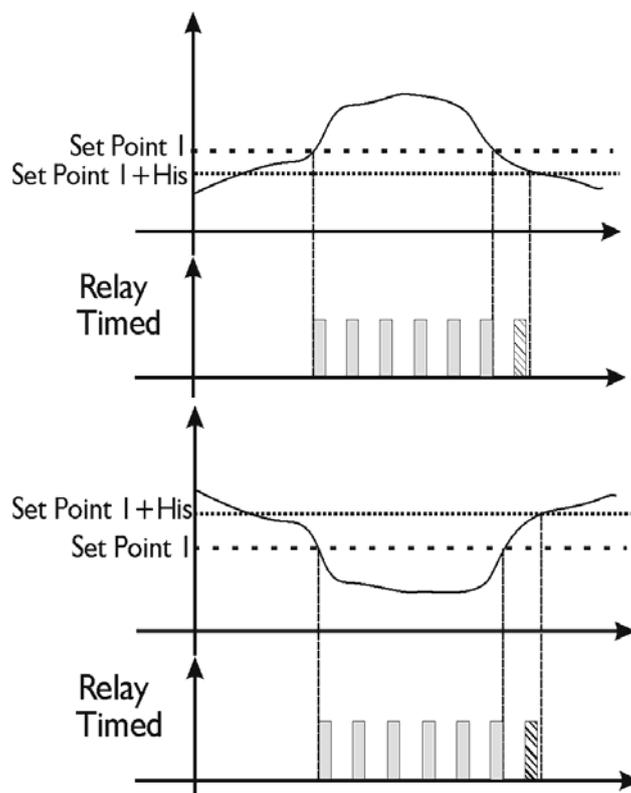
8.2.2.4. R1 Output (OUT1): PROP mode

The main characteristic of this function is: every **period** the monitor auto-calculate the time on and the time off of the relay.

If the R1 has been programmed as Acid type the proportional function will **start** when the pH\ORP is greater than the setpoint. LED placed below OUT1 icon will switch on during Time on.

The output will be always relaxed when the pH\ORP drops below the setpoint minus the hysteresis value.

If the R1 has been programmed as Alcaline type the proportional function will start when the pH\ORP drops below the setpoint: LED placed below OUT1 icon will switch on during Time on.

The output will relax when the pH\ORP moves above the setpoint plus the hysteresis value.
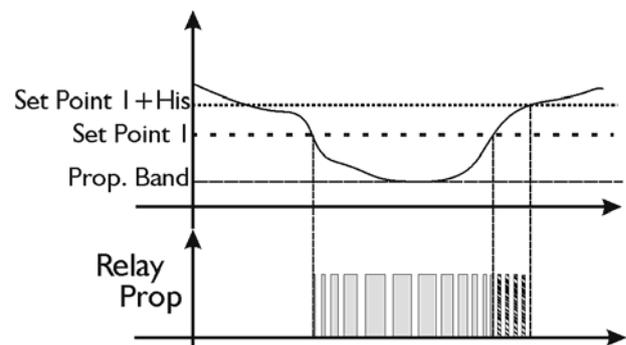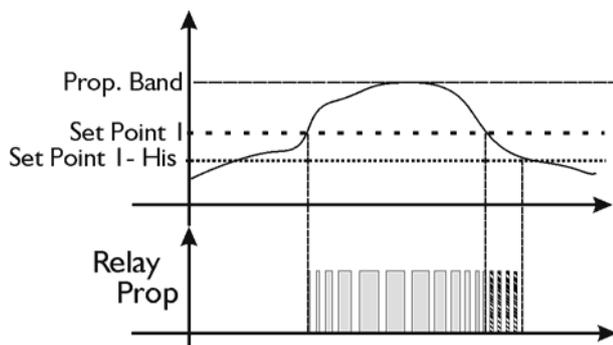
8.2.3. R2 Output (OUT2): Alarm mode

This function can be activated if the OUT1 is programmed otherwise this function is not displayed.
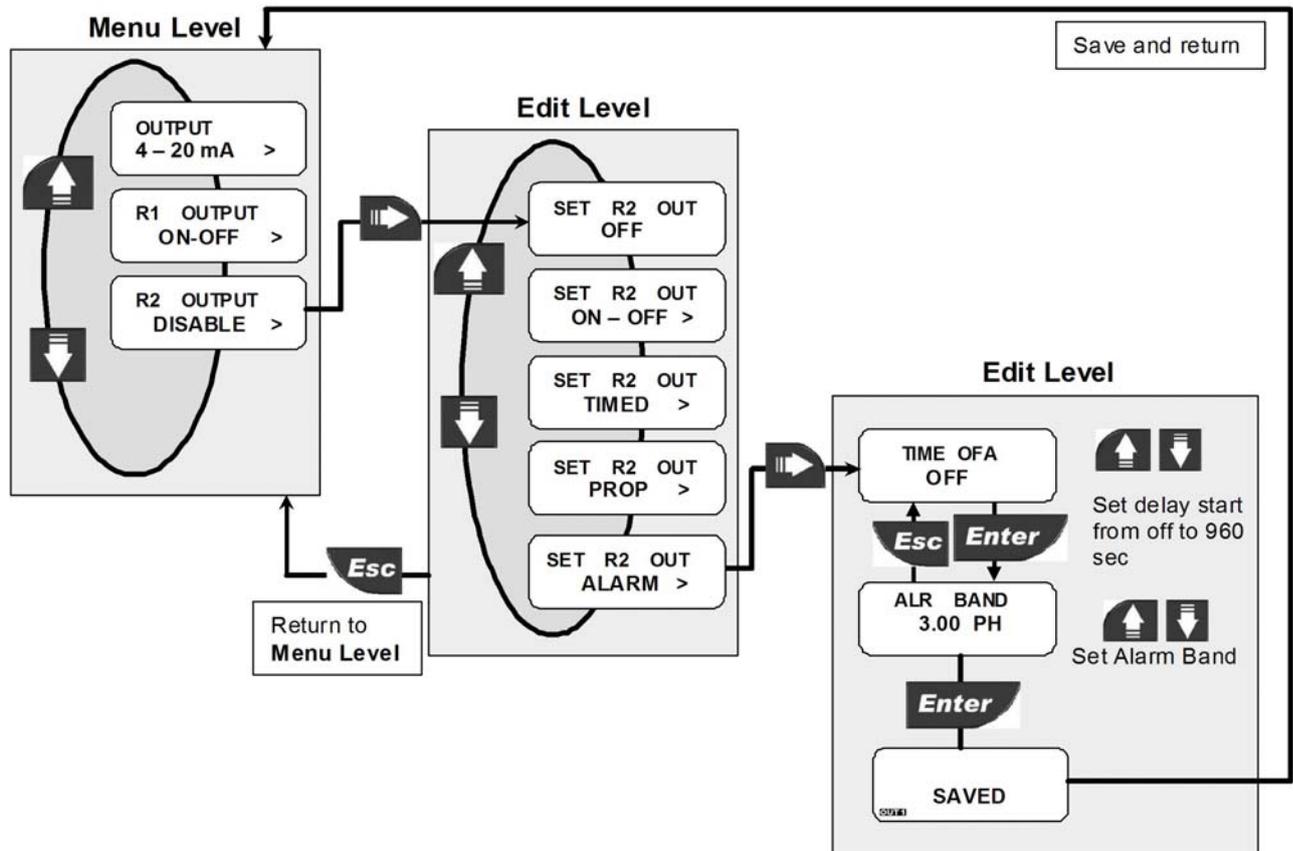
Set the Alarm Band: when the measure is out of the limit the error message ALR BAND will be displaying and the OUT2 triggers.
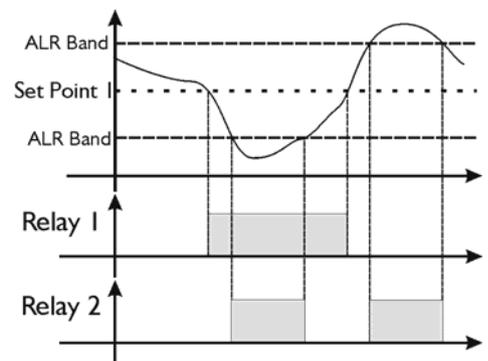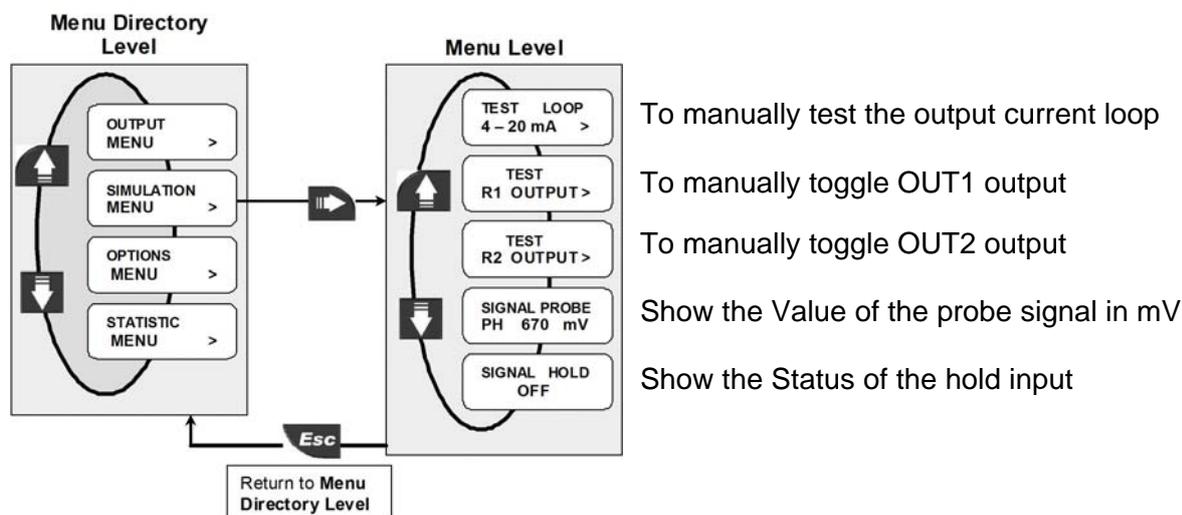
If it's programmed the OFA time (Over Feed Alarm) and if the OUT1 is in alarm after the OFA time the monitor will be displaying OFA STOP and the OUT2 triggers.
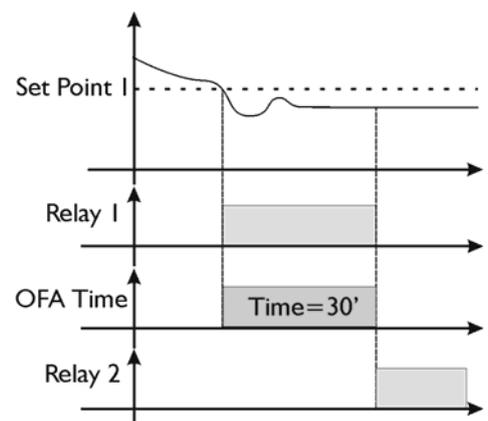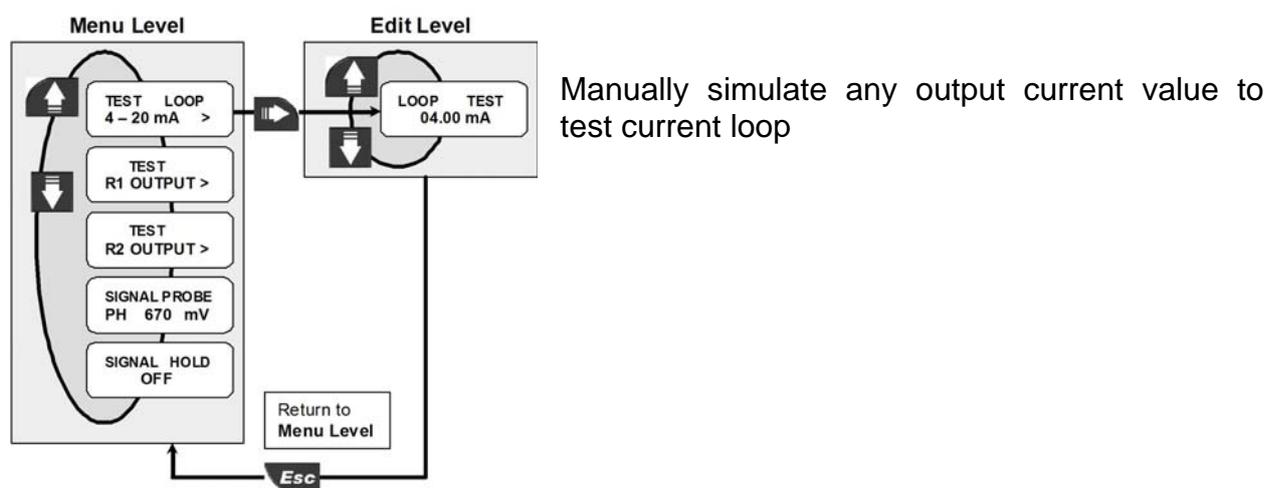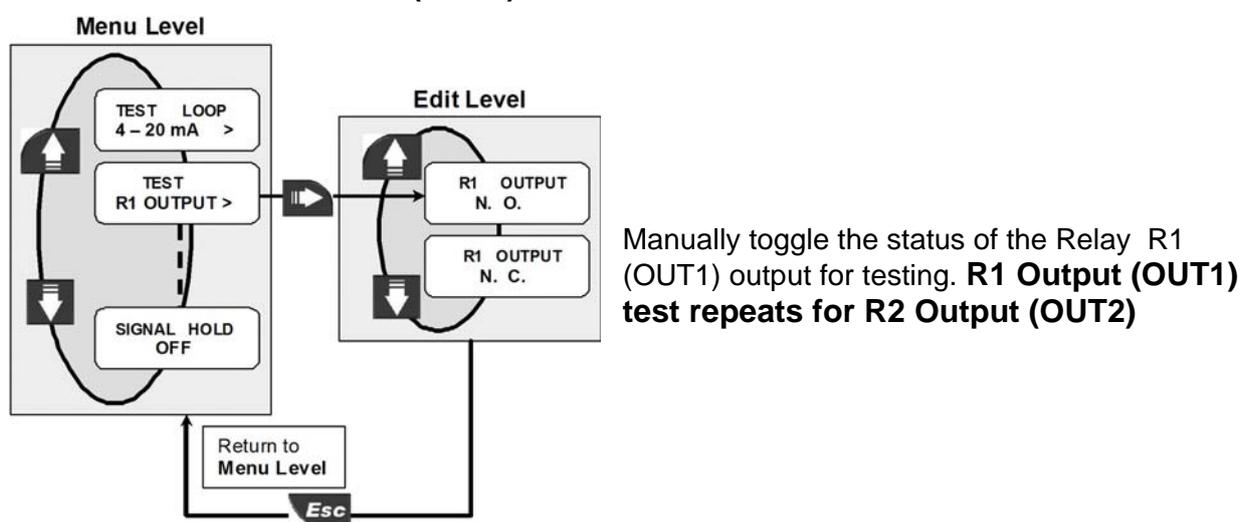
8.3. Simulation menu

The P6.02 analog and digital output can be simulated and tested in this menu moreover the value in mV of the probe and the status of the hold signal can be displayed.
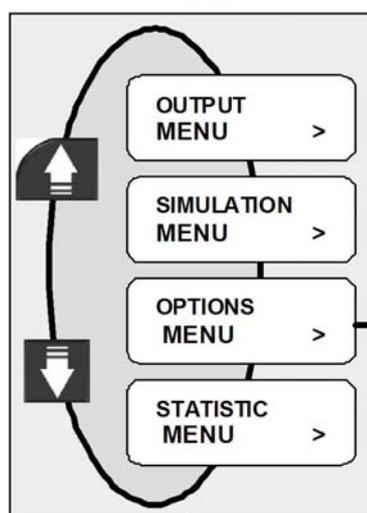

To manually test the output current loop

To manually toggle OUT1 output

To manually toggle OUT2 output

Show the Value of the probe signal in mV

Show the Status of the hold input

8.3.1. Test 4 – 20 mA Loop

Manually simulate any output current value to test current loop

8.3.2. Test R1 OutPut (OUT1)

Manually toggle the status of the Relay R1 (OUT1) output for testing. **R1 Output (OUT1) test repeats for R2 Output (OUT2)**

8.4. Options Menu

Menu Directory Level

OUTPUT MENU >

SIMULATION MENU >

OPTIONS MENU >

STATISTIC MENU >

Return to **Menu Directory Level**

Esc

Menu Level
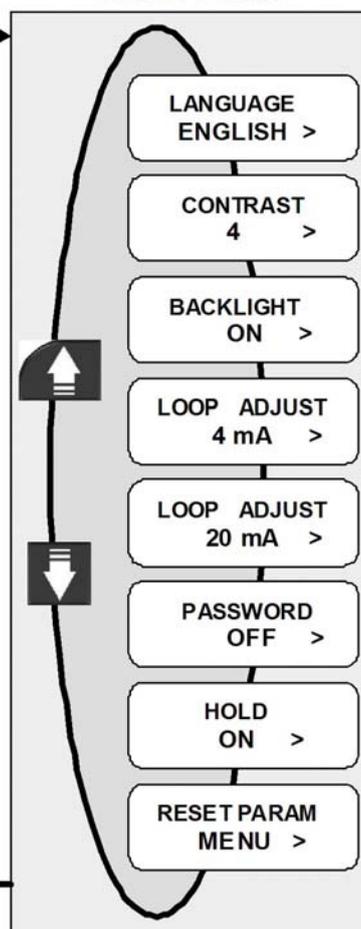
LANGUAGE ENGLISH >   To select the language

CONTRAST 4 >   To adjust LCD contrast

BACKLIGHT ON >   To set ON or OFF Backlight

LOOP ADJUST 4 mA >   To adjust the minimum current output

LOOP ADJUST 20 mA >   To adjust the maximum current output

PASSWORD OFF >   To set ON or OFF password protection to enter Menu Levels

HOLD ON >   To set On or OFF Hold Input

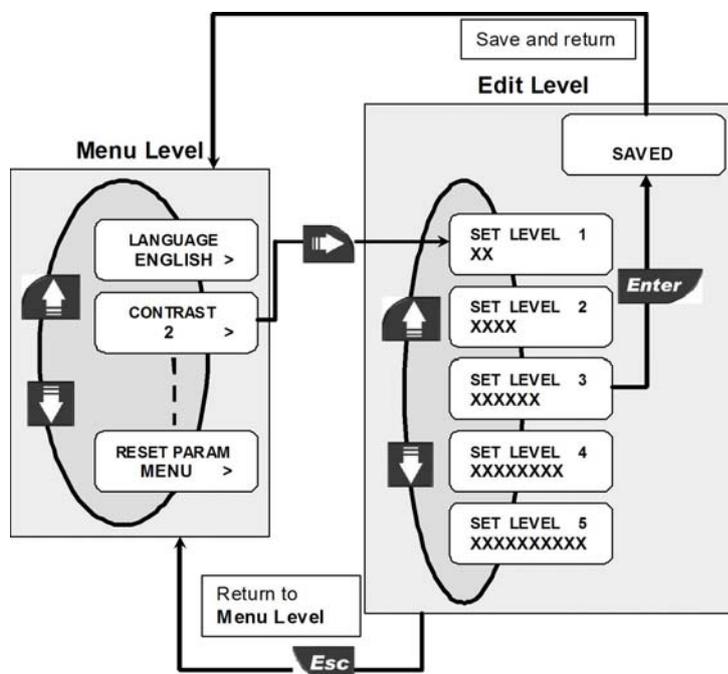RESET PARAM MENU >   To reset the parameters

8.4.1. Language

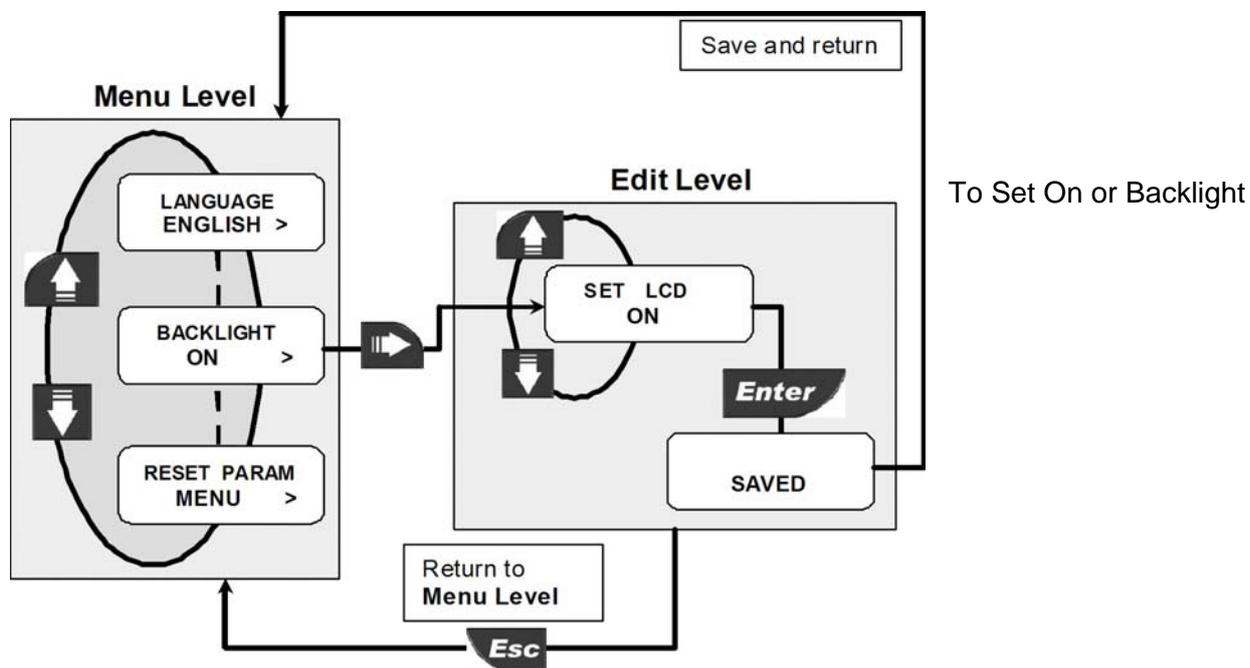This option offers to select the display language
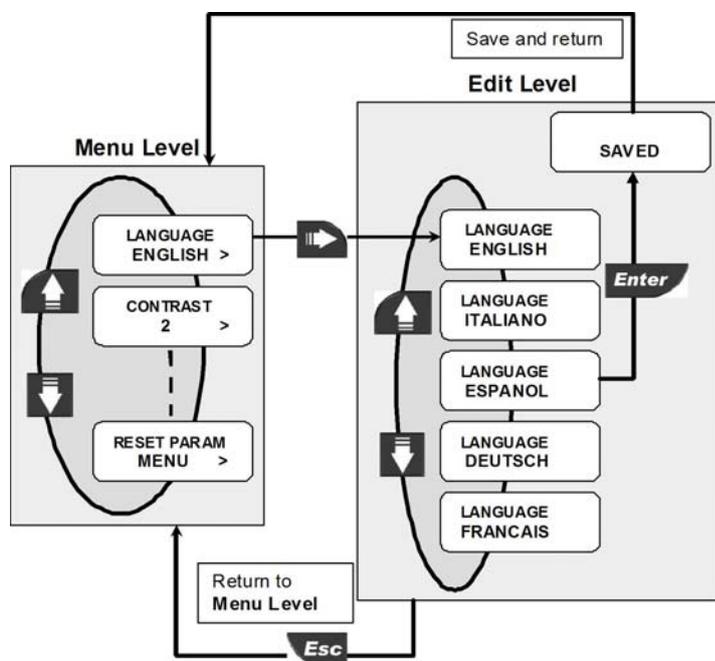
ToSet the Language

8.4.2. Contrast

Adjust the LCD contrast for best viewing.
Five different levels are available, from 1 for low contrast up to 5 for high contrast.
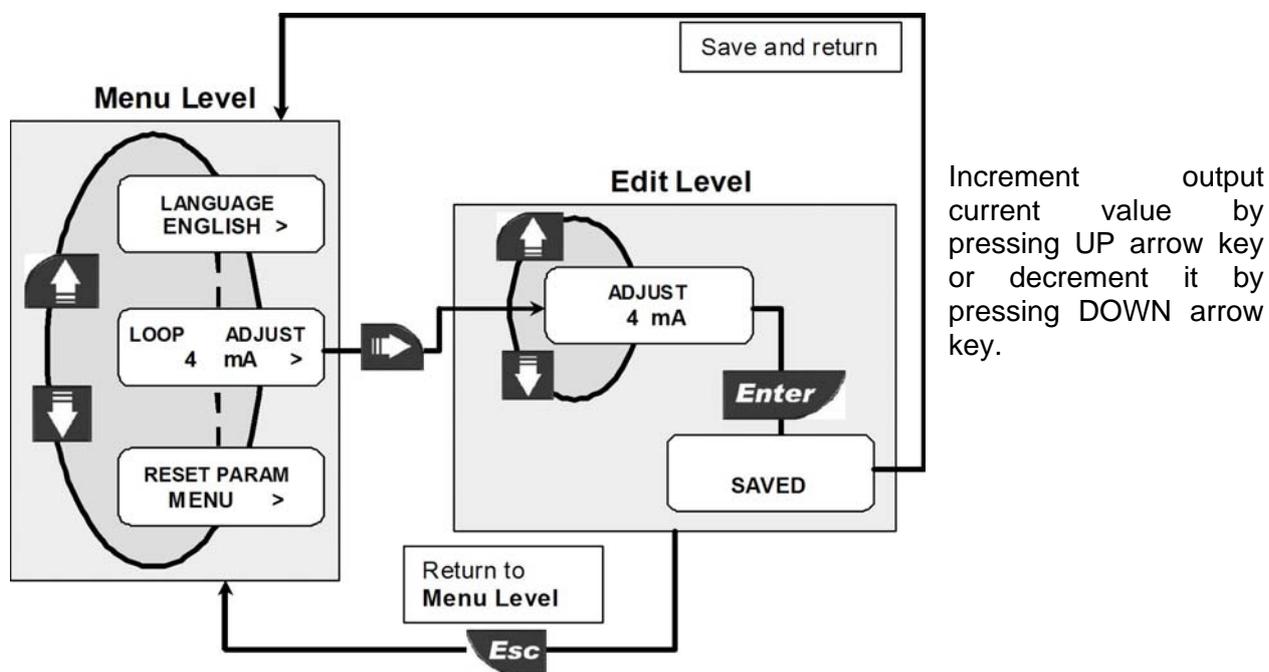
8.4.3. Backlight

Set On or Off to switch on or switch off the Backlight

To Set On or Backlight

8.4.4. Loop adjust 4mA

This option can be used to modify the basic 4mA setting to match the transmitter output to any external device.


Increment output current value by pressing UP arrow key or decrement it by pressing DOWN arrow key.

8.4.5. Loop Adjust 20mA

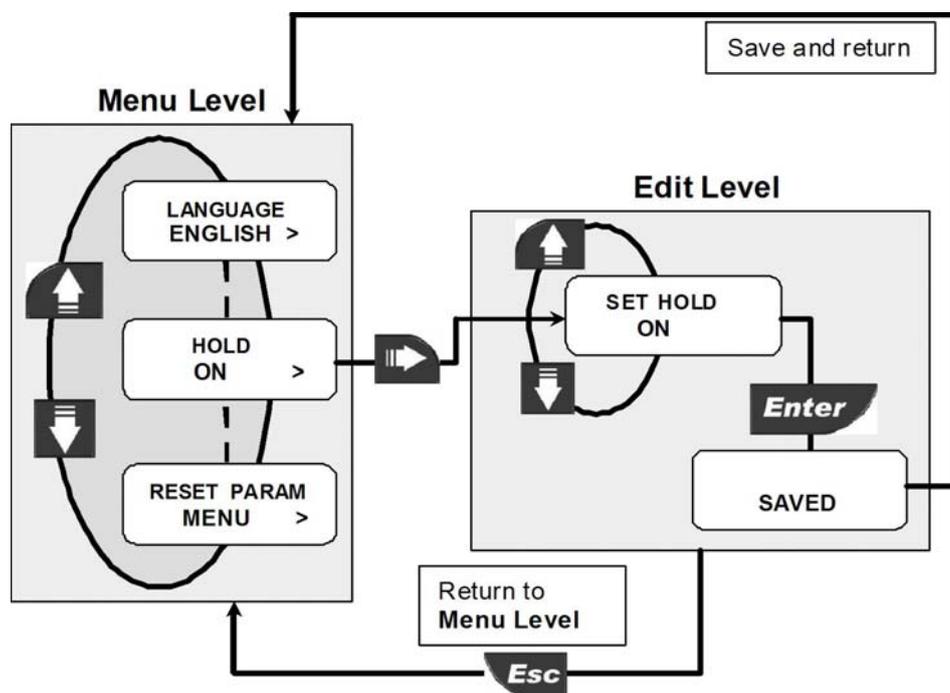This option can be used to modify the basic 20mA setting to match the transmitter output to any external device.
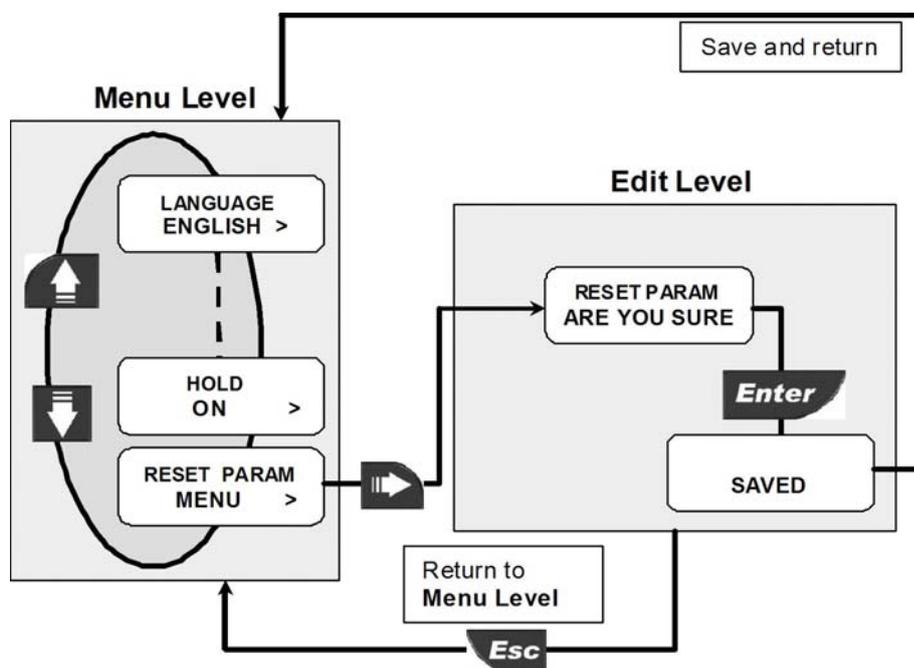

Increment output current value by pressing UP arrow key or decrement it by pressing DOWN arrow key.

8.4.6. Menu PWD

Set ON the Menu PWD to protect access to Menu Directory Level and next levels.
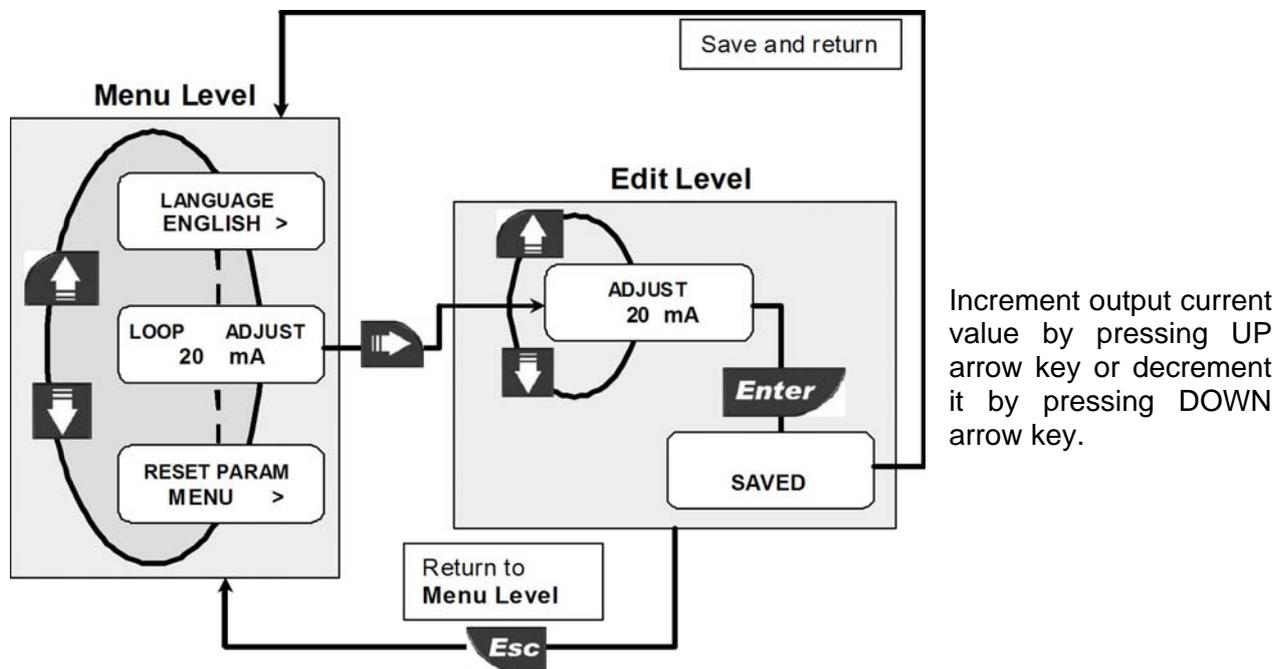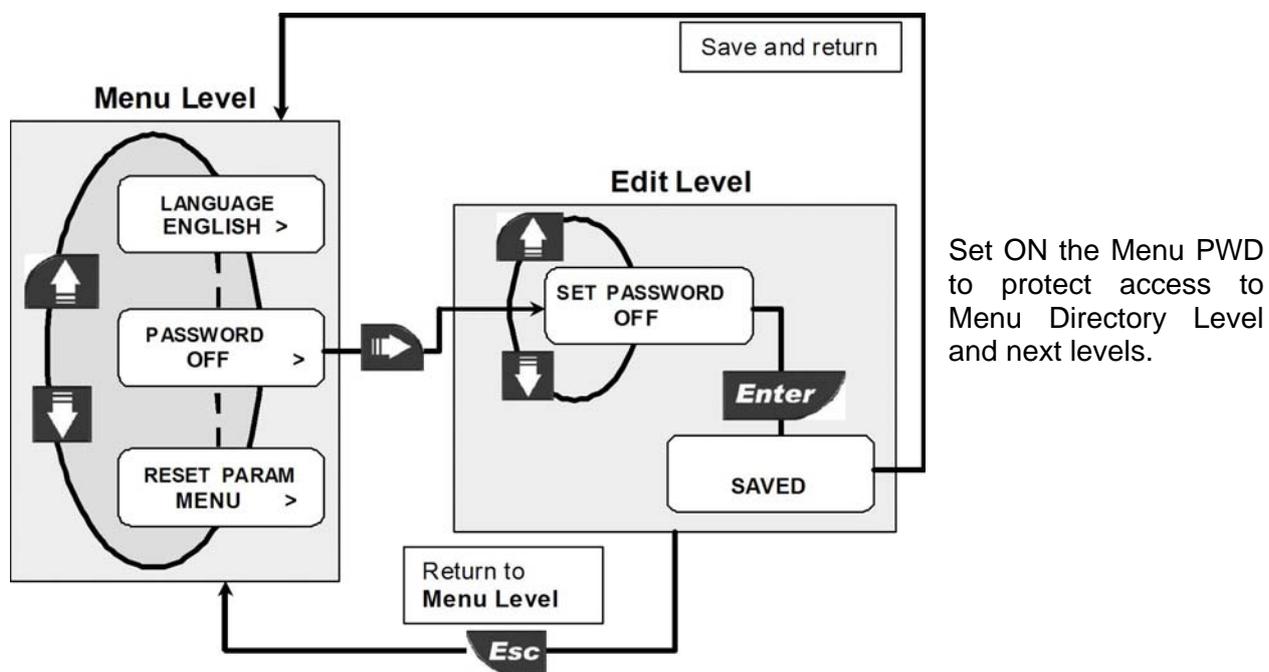
NOTE: the standard password is [arrow] [up] [arrow] [Enter] and it cannot be modified.
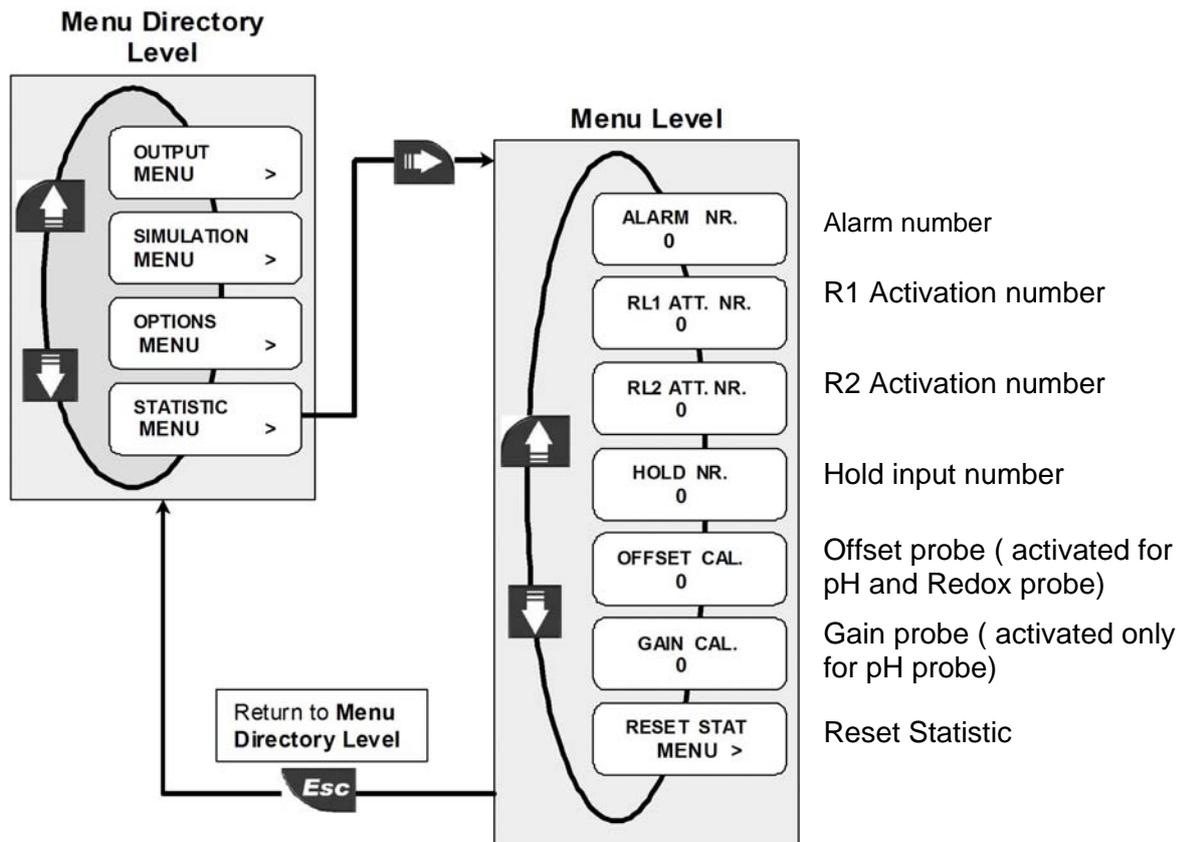
8.4.7. Hold Input

Set the Hold input.
This function is activated with an input Power Supply (15 – 30 Vac-dc). The power supply is provided between the pin 3 and 4
The monitor will display "HOLD", the output relays will be in the relaxed status. Furthermore the output current will be positioned at the minimum level if growing (4-20 mA), at the maximum one if decreasing (20 – 4 mA).
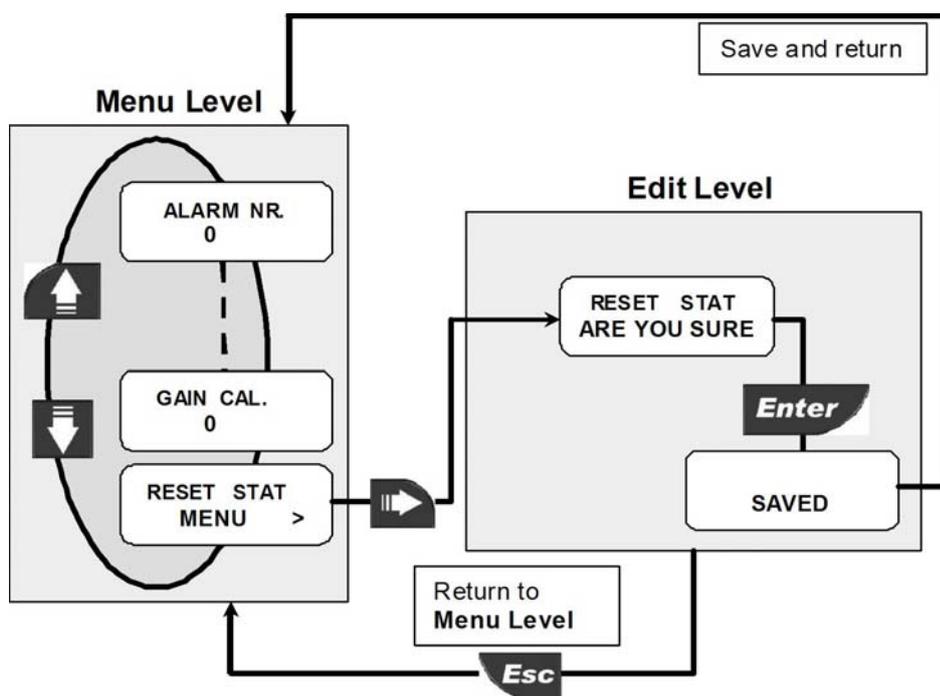
8.4.8. Reset Parameter

With this menu it's possible to return to the default values.

8.5. Statistic menu

Alarm number

R1 Activation number

R2 Activation number

Hold input number

Offset probe (activated for pH and Redox probe)

Gain probe (activated only for pH probe)

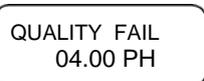Reset Statistic

8.5.1 Reset Statistic

With this menu it's possible to reset all the statistics

9. Troubleshooting

The instrument correctly installed is maintenance-free. The case and the front panel can be cleaned with soft cloth and an appropriate cleaning agent.

9.1. Display messages

Display	Causes	Solutions
	• The display is OFF: no power supply provided	• Check power supply connection. Check "bridges" between terminals.
TM 25 °C 07.00 PH	• Instable chemistry measurement	• Check the sensor wiring connection
QUALITY FAIL 04.00 PH	• The quality of the sensor is too low	• Change the pH\ORP sensor
AUTOMATIC **ERR 0.00 PH**	• The sensor is not connected in proper way	• Check the sensor wiring connection

10. Ordering Data

ChemX3 P6.02

Part No.	Description	Power Supply	Input	Output
P6.02	pH\ORP Monitor & Transmitter	24 VAC\VDC	pH and ORP probe	1 (4…20mA) 2 (Relay)

Part No.	Description	Power Supply	Input	Output
P6.02.P1	pH\ORP Monitor & Transmitter	24 VAC\VDC	pH and ORP probe	1 (4…20mA) 2 (Relay)

Part No.	Description	Power Supply	Input	Output
P6.02.W1	Wall Mount pH\ORP Monitor & Transmitter	24 VAC\VDC	pH and ORP probe	1 (4…20mA) 2 (Relay)
P6.02.W2	Wall Mount pH\ORP Monitor & Transmitter	110 to 230 VAC	pH and ORP probe	1 (4…20mA) 2 (Relay)

Mounting Kits

Part No.	Name	Description
F9.KP1	Panel mounting Kit	Mounting bracket with gasket
F9.KW1	Wall mounting Kit	Plastic adapter with gasket and fixing screws
F9.KW2	Wall mounting Kit with Power Supply	Plastic adapter with gasket, fixing screws and 110/230VAC to 24VDC power supply included
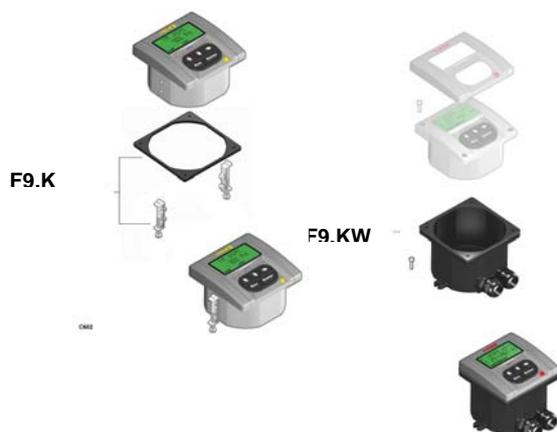
Spare Parts

Item	Part No.	Name	Description
1	F9.SP2	Cover	PC front cover, 3 LED
2	F9.SP4.1	PG 13.5	PG13.5 Cable Gland for Wall mounting Kit
2	F9.SP4.2	PG 11	PG11 Cable Gland for Wall mounting Kit