This manual contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Keep the instrument protected from sun and water.
Avoid water splashes.

# OPERATING INSTRUCTIONS FOR "LDSRH PLUS" INSTRUMENT SERIES

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Read Carefully !

ENGLISH Version

R2-04-15

NORME CE
EC RULES(STANDARD EC)
NORMAS DE LA CE

Direttiva Bassa Tensione
Low Voltage Directive
Directiva de baja tensión
} **2014/35/UE**

Direttiva EMC Compatibilità Elettromagnetica
EMC electromagnetic compatibility directive
EMC directiva de compatibilidad electromagnética
} **2014/30/UE**

## GENERAL SAFETY GUIDELINES

Danger!

In emergencies the instrument should be switched off immediately! Disconnect the power cable from the power supply!

When installing always observe local regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that may cause injury, damage to persons and / or materials.

Caution!

Instrument must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device to automatically shut-off the pumps when there is no flow!

Pumps and accessories must be serviced and repaired by qualified and authorized personnel only!

Always discharge the liquid end before servicing the instrument!

Empty and rinse the liquid end before work on a pump which has been used with hazardous or unknown chemicals!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

Instrument must be operated / serviced by trained technicians only!

All connection operations must be performed while the instrument is not connected to main supply!

Missed activation for Min/Max alarm and Maximum Dosing Alarm may cause hazardous overdosing!

# 1. Introduction

LDSRH is a microprocessor based digital regulator for Redox with temperature reading / compensation and mA module (feed forward). On/Off, impulsive proportional, proportional PWM or fixed PWM, Water Meter and PID are main working modes. Also available FEED FORWARD setting for mA module. Pulses per minute can be set for outputs. Working ranges are: from 0 to 999 mV.. All information are provided through a large LCD display. Using a revolutionary wheel control the instrument can be easily programmed. LDSRH is housed in a IP65 plastic box.

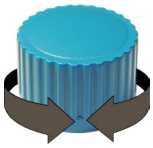
INPUTS:
- Stand-by
- Flow
- Reodx level
- Redox probe
- Temperature probe
- Water Meter

OUTPUTS:
- 2 relay outputs (Redox and alarm)
- 2 opto coupled pulses outputs (Redox and temperature)
- 2 current outputs (Redox and Temperature)
- Main alarm

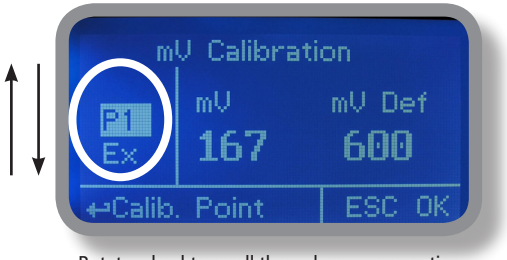
# 2. The wheel

Located in the upper right side of LDSRH there is a wheel that must be used to control the instrument. Wheel can be rotated in both directions to scroll over the menus and / or pressed to confirm highlighted selection / value.

NOTE: Once changes are made press "OK" to save and exit from submenu. Press "ESC" to exit without saving.



SCROLL



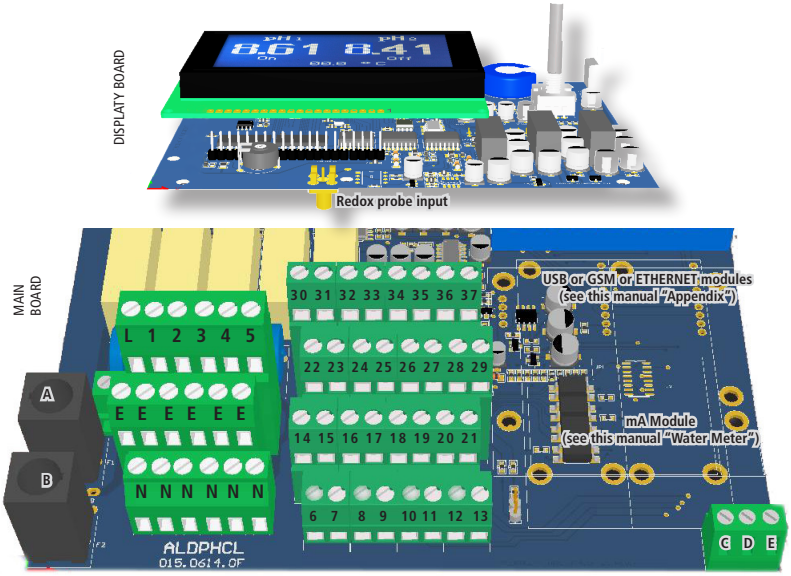

Rotate wheel to scroll through menus or options

SELECT


Press wheel to select highlighted option

# 3. Mainboard Connections

Unplug instrument from main power supply then perform connections by following the above picture.




A: Main Fuse (6A T)
B: Instrument Fuse (3.15A T)
C - D - E : Factory reserved +5V

L(Live) - E(Earth) - N(Neutral): 85÷264VAC* or 18÷36VAC* 50/60 Hz ***see instrument's label**
1(Live) - E(Earth) - N(Neutral): 85÷264VAC - 5A 50/60 Hz Relay Output "mV Relay 2". To use with ON/OFF or PWM device
2(Live) - E(Earth) - N(Neutral): 85÷264VAC - 5A 50/60 Hz Relay Output "mV Relay". To use with ON/OFF or PWM device
3(Live) - E(Earth) - N(Neutral): 85÷264VAC alarm output (MAX 5A)
4(Live) - E(Earth) - N(Neutral): 85÷264VAC "SELF CLEAN" output (MAX 5A)
5(Live) - E(Earth) - N(Neutral): 85÷264VAC "CIRCULATOR PUMP" output (MAX 5A)

6(Green) - 7(Brown) - 8(White) - 9(Yellow): PT100 temperature probe (remove jumper / resistor prior to install probe)

11(-) - 10(+): Standby contact
11(-) - 12(+): mV Level 1 contact
19(-) - 18(+): mV Level 2 contact

14(+ Brown) - 15(Black) - 16(- Blue) - 17(GND): Proximity sensor mod. "SEPR" (dont' remove jumper between blocks 16 and 17)

21(GND) - 28(+RS485) - 29(-RS485): RS485 (no MODBUS)

24(-) - 25(+): Opto coupled output "mV PULSE". To use with "IS", "MF", "PLUS" series dosing pumps
26(-) - 27(+): Opto coupled output "mV PULSE 2". To use with "IS", "MF", "PLUS" series dosing pumps

31(-) - 32(+): mA Current Output mV
34(-) - 35(+): mA Current Output Temperature
31(-) - 30(+): mA Current Output PID
} Max resistive load: 500 Ohm

36(+) ; 37(-): WM Input (max input frequency 500Hz)

Warning: Connections must be perfomed by qualified and trained personnel only.

# 4. Main Screen

When into normal operating mode, LDSRH shows the following main screen:


**Main screen zones:**

**(1) UNIT**

"mV" is the measuring unit for ORP / Redox probe.

**According to selected probe, this field may appear different.**

**(2) VALUES**

These numbers are values read by the probes.

**According to selected probe, this field may appear different.**

**(3) OUTPUTS STATUS**

These fields are related to current outputs status and instrument activity.

For more information rotate the wheel when into main screen. (see next page)

**WARNING MESSAGE NOTIFICATION AREA**

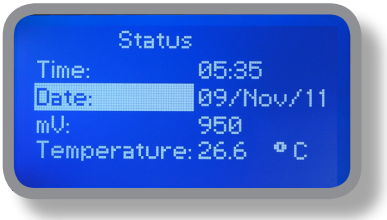
During critical situations a warning / alarm message may appear. To in-depth explanation **completely rotate clockwise** the wheel to review main instrument parameters and current outputs status.

*sold as option

**Note: the word "PUMP" as shown into this manual refers to a "dosing device" connected to the instrument!**

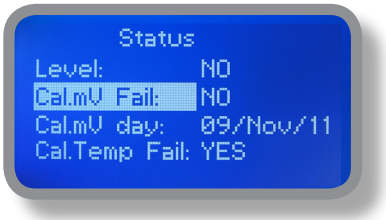
# 5. Quick status check

From main screen **completely rotate clockwise** the wheel to review main instrument parameters and current outputs status.



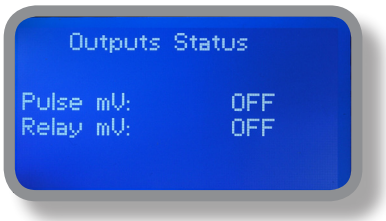

Local Time
Local Date
ORP probe reading
Temperature probe reading


Dosing alarm condition
Probe failure status
Alarm contact status
Flow contact status




Tank Level status
Last ORP calibration result
Last ORP calibration date
Last Temp. calibration result


Last Temp. calibration date




Outputs Status

See mainboard (page 4) for related connetions.

# 6. Password

To grant access into "Main Menu" press the wheel from main screen and enter the passcode.
If this is the first time here then the passcode is 0000 (factory preset). Press wheel 5 times to enter into "Main Menu". Otherwise press the wheel 1 time and enter the passcode. Numbers can be selected rotating the wheel.

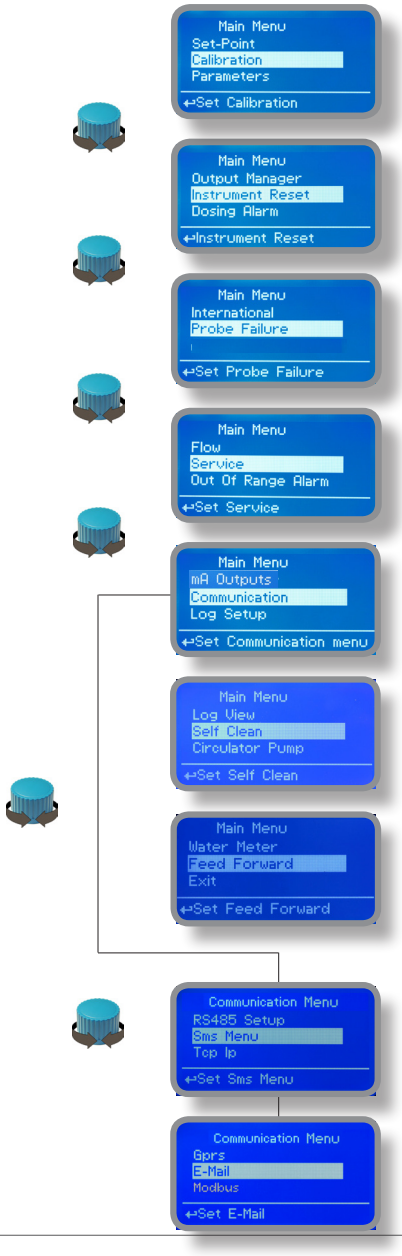

To set a new passcode choose "PARAMETERS" from "Main Menu" , move on "New Pcode", click on wheel and enter a four numbers code. Click on "EXIT" and choose "YES" to save request. The new passcode is now ready.


**Lost passcode ?**

Please dont' forget the passcode (if changed). In the unfortunate event, please call your local distributor for unlocking procedure. There is no way for you to recover lost passcode.

# 7. "Main Menu" list

To grant access into "Main Menu" enter the passcode (as described in previous chapter). Once into "Main Menu" rotate the wheel to scroll through all the options available.

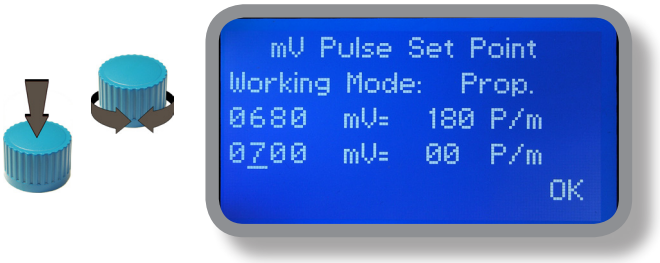


## 8.1 "Set-Point", ORP (On/Off)

**"mV pulse" and "mV pulse 2" outputs can be set to operate within: On/Off, Proportional (%) or disabled (OFF) modes.**
**"mV relay" and "mV relay 2" outputs can be set to operate within: On/Off, Proportional PWM, Fixed PWM or disabled (OFF) modes.**

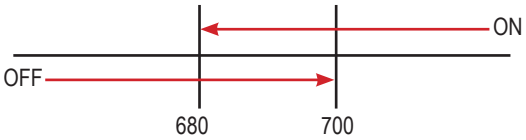

## 8.2 "Set-Point", ORP (on/off)

**All ORP outputs can be set to operate into this mode.**
**This mode enables ORP pump to operate between two On/Off values. Move wheel over "Working Mode" to select it.**




**ON/OFF mode**
Set ORP value at 680mV ON and 700mV OFF. The difference between the two ORP values is called HYSTERESIS.
Instrument will enable the ORP pump when reading value will decrease at 680mV
At 680mV the ORP pump will be enabled until reading value will increase at 700mV.

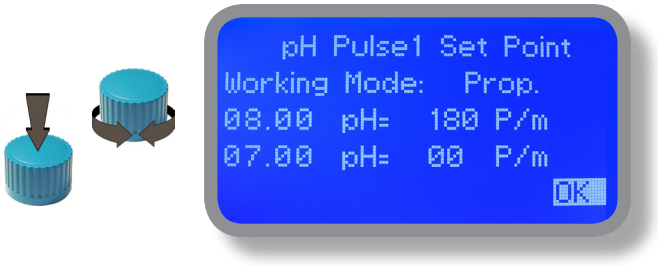
**Pulse Speed: pulses per minute setting.**



## 8.2 "Set-Point", mV proportional & proportional water meter (pulse)

**This mode is valid for "mV pulse" and "mV pulse 2" outputs only.**

**Proportional mode set the instrument to operate using a calculated percentage between two set values that enable or disable the Chlorine pump. To use this mode move cursor on "Working Mode". Press the wheel and select it.**




**PROPORTIONAL MODE between 700(0 P/m) and 680 (180 P/m). [P/m: pulses per minute]**
This mode operates ORP pump for a value lower that 680mV with maximum dosing capacity (180strokes) and it will stop ORP pump for a reading value higher than 700 mV.

A 690 mV reading value will operate ORP pump with a 90 strokes capacity calculated on strokes settings (see page 22). Pump will operare with 90 strokes dosing capacity. To end procedure move cursor on "OK" and press wheel. Choose "SAVE" to save setup or "NO" to discard changes.

## Proportional Water Meter

Proportional mode can also be set into PROP+WM mode. This option allows to regulate proportional input based on flow detected by water meter at set percentual values.

e.g.: reading at 9 will have an output of 90 P/m (50%). Adding the proportional flow from the water meter with parameters set between 20 % (at 0mc/h) and 100% (at 8mc/h) results will be that (as example):

At 4 mc/h will have a working period of 54 P/m (60% of 90P/m)

60% is the middle value between 20% and 100% for reading of 4mc/h

## 8.3 "PWM" proportional mV & proportional water meter (relay)

**"mV Relay" and "mV Relay 2" outputs can be set to operate into this mode.**

Pulse-width modulation (PWM) of a signal or power source involves the modulation of its duty cycle, to either convey information over a communications channel or control the amount of power sent to a load.

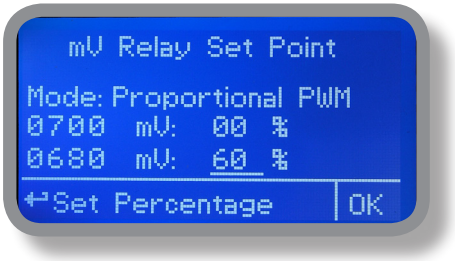
This mode works over a settable (0 to 100 seconds) time to switch on or off selected output.
Time resolution is 5 seconds, 5 steps. During this time if reading value will move towards a set value (on or off) the PWM will operate the output on timered basis. Reaching the set value the PWM will permanently leave on or off the output.

Parameters to set are:

**Unit Value + %:** (time activity towards set value. 0% means 0 seconds. 100% means 100 seconds.)

**mV range**: two pH value between PWM operates.

E.g: set first value at 700 = 00% and second value at 680=60%.
For reading values ≥ 700 output will always be OFF.
For reading values ≤ 680 output will be ON for 60 seconds and OFF for 40 seconds.
If reading value is 690 mV the ouput will be ON with a 30% of total set time. (ON for 30 seconds, OFF for 70 seconds).




## Proportional Water Meter

Proportional mode can also be set into PROP+WM mode. This option allows to regulate proportional input based on flow detected by water meter at set percentual values.

e.g.: reading at 9 will have an output of 50 seconds on and 50 seconds Off (50% on 100 seconds base). Adding the proportional flow from the water meter with parameters set between 20 % (at 0mc/h) and 100% (at 8mc/h) results will be that (as example):

At 4 mc/h will have a working period of 30 seconds ON and 70 seconds OFF (60% of 90P/m)

60% is the middle value between 20% and 100% for reading of 4mc/h

## 8.5 "PWM" (fixed), ORP

**"mV Relay" and "mV Relay 2" outputs can be set to operate into this mode.**

Pulse-width modulation (PWM) of a signal or power source involves the modulation of its duty cycle, to either convey information over a communications channel or control the amount of power sent to a load.

This mode works over a settable (0 to 100 seconds) time to switch on or off selected output.
Time resolution is 5 seconds, 5 steps. During this time if reading value will move towards a set value (on or off) the PWM will operate the output on timered basis. Reaching the set value the PWM will permanently leave on or off the output.

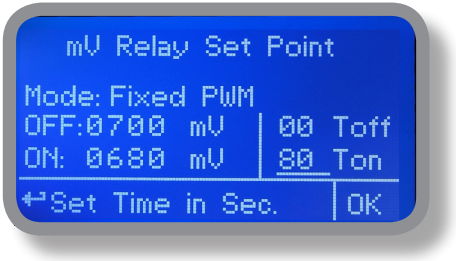
Parameters to set are:

**mV range:** two pH value between PWM operates.
**Ton: "**ON" time if output is active.
**Toff: "**OFF" time if output is active.

E.g.: set first mV value: (OFF) at 700 and second mV value: (ON) at 680.
Set "WORK-PAUSE" activity with Toff 0 seconds and Ton 80 seconds.

For reading values ≥ 700 output output will always be OFF.
For reading values ≤ 680 output will be ON within "WORK-PAUSE" mode based on Ton and Toff settings.

**Within 700mV and 680mV values output activity will operate on HYSTERESIS basis. Once 700mV reading value will be reached the output will always be OFF up to 680mV reading value.**



## 8.5 "PID", ORP

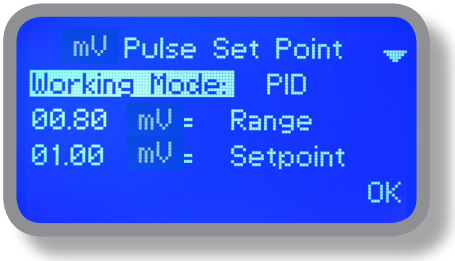
A proportional-integral-derivative controller (PID controller) is a control loop feedback mechanism (controller) widely used in industrial control systems. A PID controller calculates an error value as the difference between a measured process variable and a desired setpoint. The controller attempts to minimize the error by adjusting the process through use of a manipulated variable. The PID controller algorithm involves three separate constant parameters, and is accordingly sometimes called three-term control: the proportional, the integral and derivative values, denoted P, I, and D. Simply put, these values can be interpreted in terms of time: P depends on the present error, I on the accumulation of past errors, and D is a prediction of future errors, based on current rate of change.[1] The weighted sum of these three actions is used to adjust the process via a control element such as the position of a control valve, a damper, or the power supplied to a heating element.

To correctly setup PID as working mode configure the following parameters within two menus "SETPOINT MODE PID" and "PID PARAMETERS"

1) Choose related output to work into PID mode using Setpoint menu

2) Enter RANGE value. Range is the maximum PID value over or under which (depending on mV+ or mV-) the instrument will automatically switch into proportional mode

3) Enter SETPOINT which is the optimal value to achieve. Move the cursor to OK and save the data.



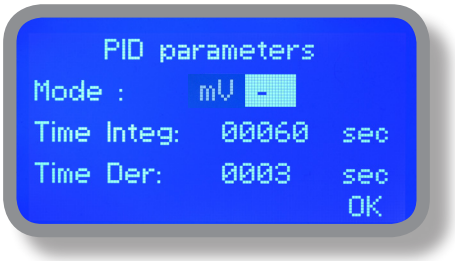

4) Select "PID PARAMETERS" within SETPOINT submenu

- Choose working mode (+ or -) baed on how setpoint must be reached: starting from lower or higher values.

- Enter INTEGRATIVE value (time needed to the instrument to activate a procedure as answer to a plant's change. E.G.: time needed for pump activation when reached a set value. ) Default value: 60 seconds.

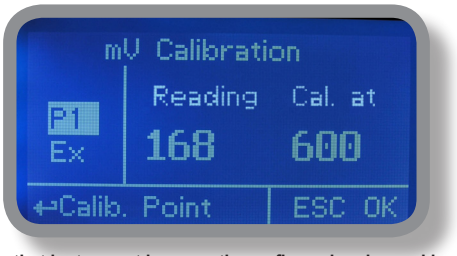
- Enter DERIVATIVE value ( time needed to the instrument to react to a plant's status change. E.G.: if mV value in water increase, the time integrative is the time needed to notify the change.) Default value: 3 seconds.

- Move curson on OK then click to save settings.



# 9. "Probe Calibration", ORP

ORP calibration procedure involves probe's selection with one point (P1) calibration. From "Menu Calibration" choose "ORP probe". Choose between "FAST CALIBTRATION" (one buffer solution required) or "FULL CALIBRATION" (two buffers solutions required for better calibration accuracy)

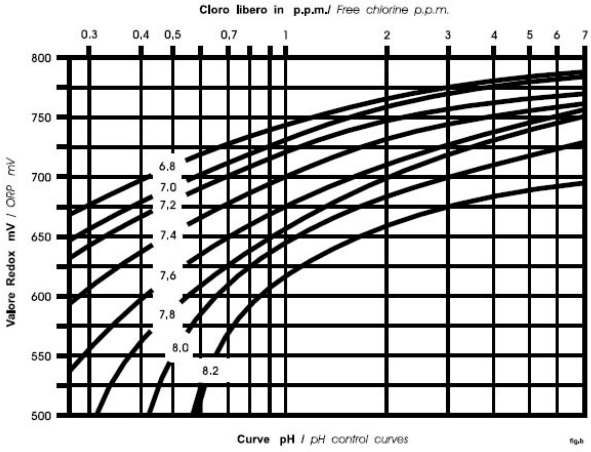



**Note: This procedure assumes that instrument is correctly configured and a working ORP probe connected and installed on system. Measurement must be performed using plant water. Otherwise unattended results may occurr.**

Calibration can be performed in two ways: the first by alignment with a buffer solution, the second by reading the residual ORP level of the pool with the DPD1, comparison with the attached graph followed by alignment of the pumps group. The choice of method is exclusively at the user's discretion. In both cases, to establish the set-point value, a check using the DPD1 or other analysis system is necessary. The enclosed graphs provide a reference between the mV value read by the pumps group and the quantity of residual ORP expressed in mg/litre, and are linked to the pH value.

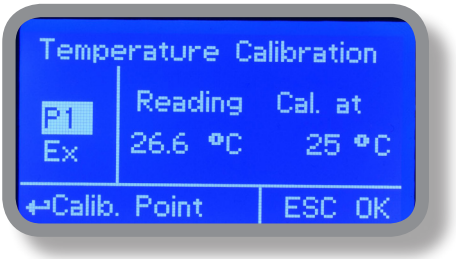
1) Measure buffer solution temperature and verify that it is the same printed on solution's label.
2) Remove protective cap from probe and wash probe's tip into water. Then dry it by shaking the probe in air.
3) Set "Cal. at" value to match buffer solution value then put probe's tip into buffer solution and wait until instrument shows a stable reading value (mV field).
4)Move cursor on "OK" and press wheel ton cofirm the new calibration value. If calibration process fails the instrment will show "CALIBRATION FAILED". Repeat procedure otherwise move on "ESC" and press wheel.

## REDOX - mg FREE CHLORINE - pH GRAPHIC TABLE



## 9.1 "Probe Calibration", °C - Temperature

A professioanl thermometer is required to obtain a reliable calibration. From "Menu Calibration" choose "Temp probe".



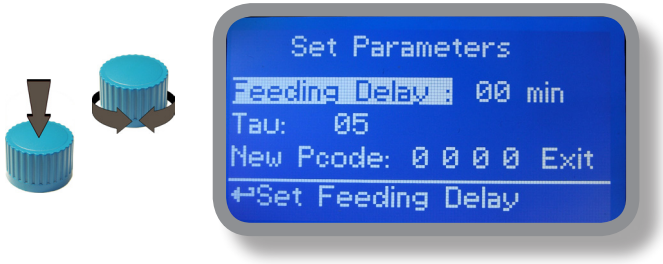

**Note: This procedure assumes that instrument is correctly installed and configured, connected to a working PT100.. Calibrate using plant's temperature otherwise unattended results may occur.**

Using an external thermometer read actual temperature and edit related field "Cal. at". Confirm by pressing wheel.


To end procedure move cursor on "OK" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes. If an error occurred during calibration procedure then the instrument will show an error message and will ask to proceed to a new calibration, cancel current operation or restore default settings.

# 10. “Parameters”

From “Menu Calibration” choose “Parameters”. This menu allows to set a delay (max 60 minutes) before pumps begin to feed. Furthermore use this menu to set pH pump startup priority and to change default passcode.

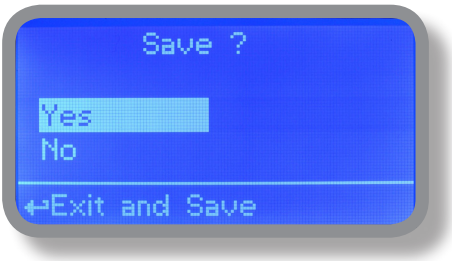



**Feeding Delay.**
Move on “Feeding Delay” then press wheel. Choose a value between 0 (disabled) and 60 minutes (maximum delay time). This feature can be used to accord a startup delay for the pumps. Delay occurs when instrument is powered.

**Mode.**
Move on “Mode” then press wheel. If both pumps need to operate, a startup priority can be set to allow the pH pump to begin to feed prior to Cl pump. Choose “pH priority” to enable this function. Cl pump will begin to dose when pH pump has stopped.

**Tau.**
If probes reading values are changing too fast increase TAU value to stabilize them. Default value is 05. Maximum value is 30.

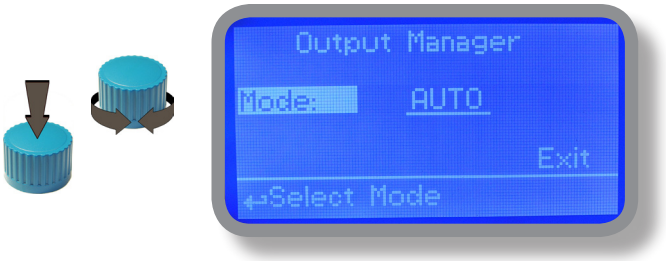
**New Pcode.**
See page 10.

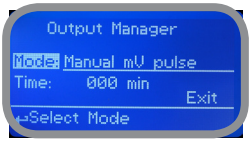



To end procedure move cursor on “OK” and press wheel to proceed to “Save” request screen. Move wheel on “YES” to save or “NO” to discard changes.

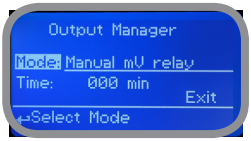
# 11. "Output Manager"

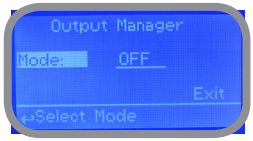
From "Menu Calibration" choose "Output Manager". This menu allows to manually operate all outputs for a settable time. Set to "AUTO" for normal operating mode. Set to "OFF" to permanently disable outputs.

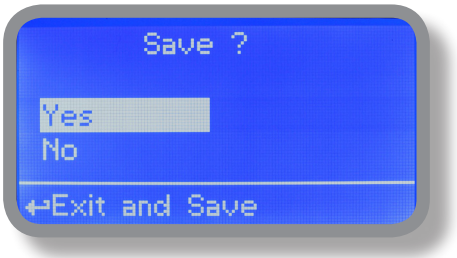



Press wheel to move cursor on "TIME" field. Once here, choose a working time between 0 (disabled) or 199 minutes. Move on "EXIT", then press wheel.




Choose "YES" to save changes. Exit from main menu. Main display will show a countdown for selected output. To stop this countdown go back to "Output Manager" menu and choose "AUTO" as working mode or wait until countdown ends. **This function can be used for priming purposes.**

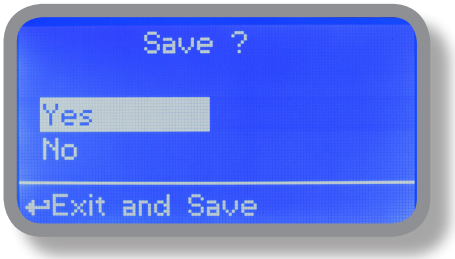
# 12. "Instrument Reset"

To restore instrument to its default values (including password) once into "Instrument Reset" menu, press wheel then change value to "ON", press wheel again, move on "OK" then finally press wheel. The instrument display will show "CHECKSUM ERROR". Press whell to return into "Main Menu". Move on "EXIT", then press wheel. The instrument is now restored to factory default. Please repeat all calibration procedures and programming parameters.

# 13. "Dosing Alarm"

Use this menu to assign a maximum time to the pumps for reaching the setpoint. If set time ends and the pumps are still dosing, within this menu is possible to STOP them or just to show an alarm message. Function can be disabled selecting "OFF" instead of a number (minutes). Dosing alarm can be set for both or just one pump.

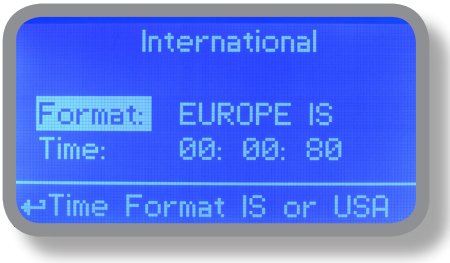

E.g. To set ORP pump to stop after time ends and setpoint isn't still reached press wheel, choose maximum time, press wheel move on next field and choose "STOP". Time can be set between 0 and 100 minutes. When satisfied with settings move on exit and press wheel.

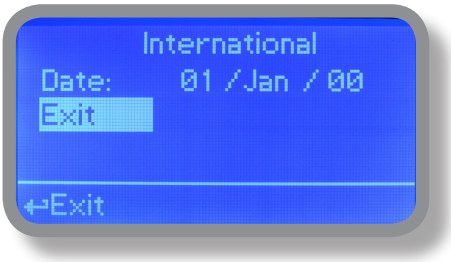



To end procedure move cursor on "OK" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes.

# 14. "International"

Use this menu to set international parameters as UNIT FORMAT (Europe IS or USA), Local Time and Date.




Format.

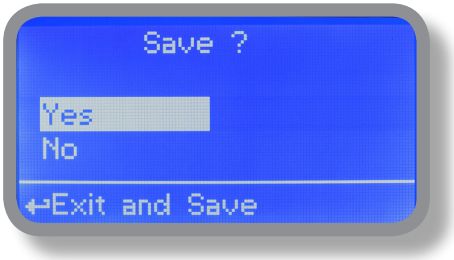
Use this option to use European or USA units format. See table for differencies.

| EUROPE IS (Internationl Standard) | USA |
|---|---|
| Date (DD/MMM/YY) | Date (MMM/DD/YY) |
| Time 24h | Time AM / PM |
| °C | °F |

**Time.**
Use this option to set local time.

**Date.**
Use this option to set date.

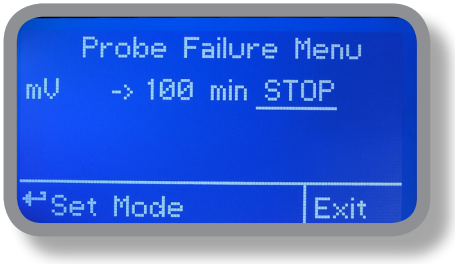
Move on exit to end changes.



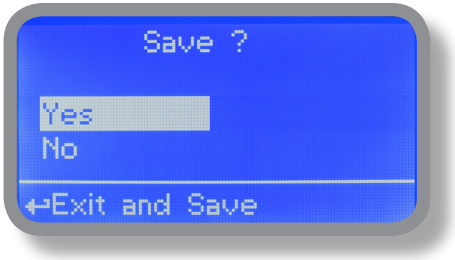

To end procedure move cursor on "OK" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes.

# 15. "Probe Failure"

Use this menu to assign a maximum time for connected probes to stay in "stuck" condition. A stuck probe (it remains on same reading value for some time) means that probably probe itself is damaged. Within this menu is possible to STOP pumps or just to show an alarm message (DOSE, probe failure) . Function can be disabled selecting "OFF" instead of a number (minutes). This function can be set for both or just one probe.




E.g. To set ORP pump to stop after time ends and probe doesn't change reading values press wheel, choose maximum time, press wheel move on next field and choose "STOP". Time can be set between 100 and 254 minutes. When satisfied with settings move on exit and press wheel.

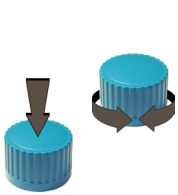


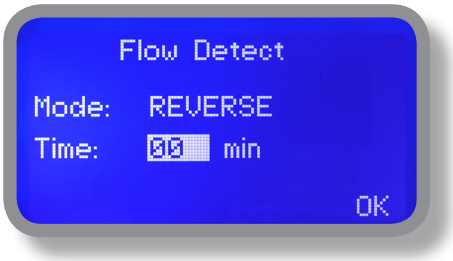

To end procedure move cursor on "OK" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes.

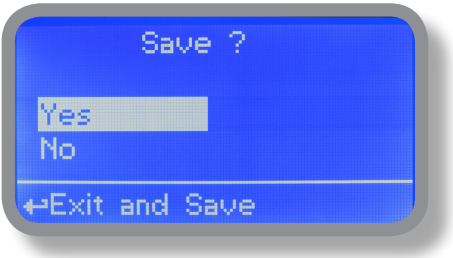
## 16. "Flow Contact"

Flow contact (see "SEPR" blocks on page 4) can be enabled to stop a dosing procedure using a N.O. contact mode (normally open) or N.C. contact mode (normally closed) when status on blocks changes. Rotate wheel to choose between: **"DISABLE"**, **"REVERSE"** (N.O. contact) or **"DIRECT"** (N.C. contact).

Furthermore "Flow contact" can starts after a specified time when contact status changes. To set it move wheel on "Time:00 min", click it and rotate to choose time (from 0 to 99 minutes). Confirm selection by clicking wheel.






To end procedure move cursor on "OK" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes.

## 17. "Service"

This "view only" menu shows probes reading live and instrument ID for USB LOG connection (if device's connected). Press "ESC" to exit.



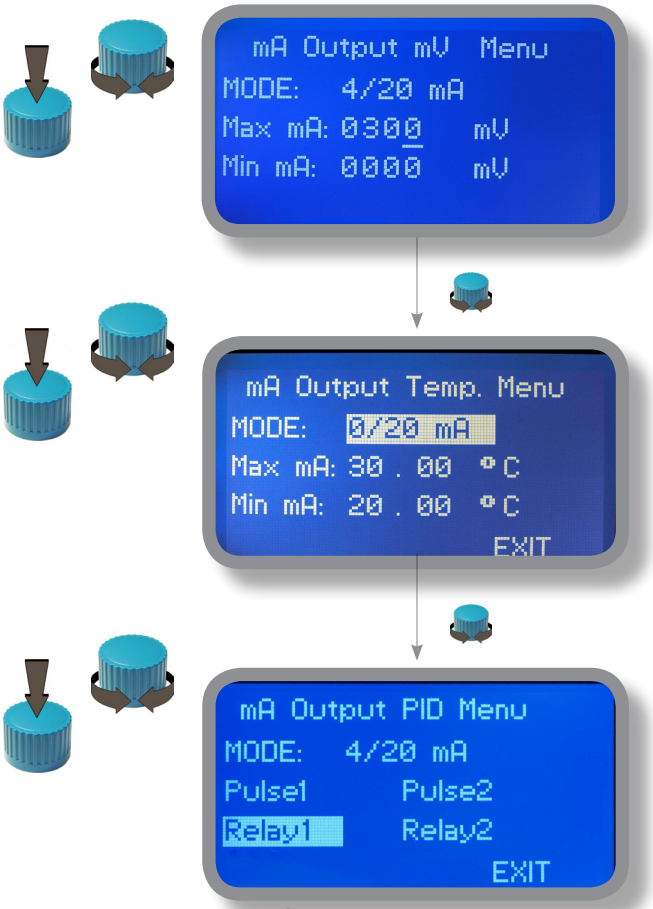
Connection Code for ERMES (through USB cable)

Connection Code for ERMES (through LAN cable)

# 18. "mA Outputs"

This menu allows to configure mA current otputs for ORP, Temperature channels and PID mA mode. Options to set are:

**MODE** (selectable between 0-20 or 4-20 mA current output)
**Max mA:** maximum probe's reading value at 20 mA current
**Min mA:** minimum probe's reading value at 0 or 4 mA current
**Disable / Enable on alarm:** enable or disable output on alarm condition (flow, level, probe failure, dosage, out of range)

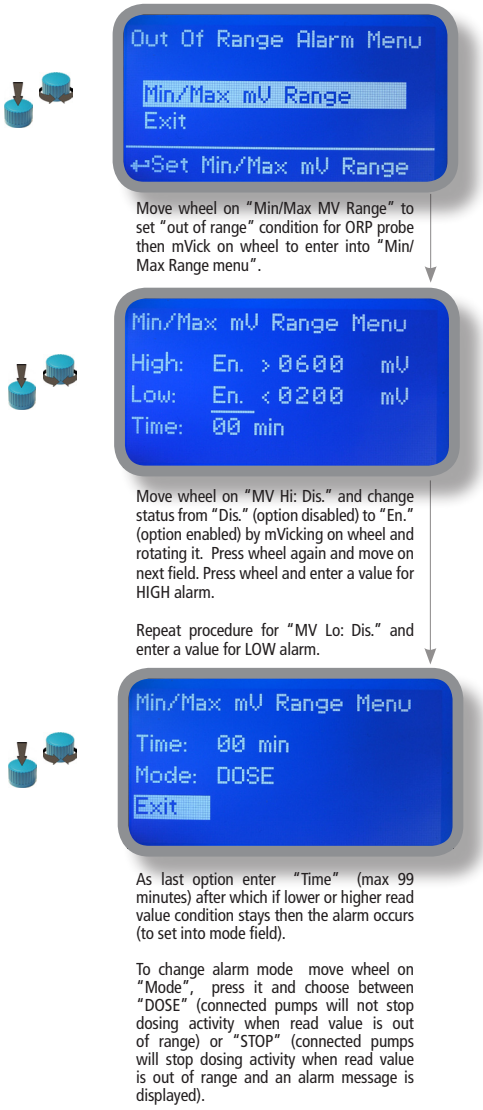



Note: The outputs available for the PID mA are those set in the menu SETPOINT.
**PID outputs will be always disbled during an alarm condition**

Rotate wheel to move within all 3 channels. Click wheel to selecte parameter and rotate wheel to change it. Click wheel again and rotate wheel to move cursor on next parameter.To end procedure move cursor on "EXIT" and press wheel to proceed to "Save" request screen. Move wheel on "YES" to save or "NO" to discard changes.

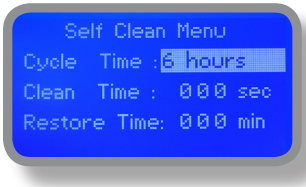
# 19. "Out of range alarm"

"Out of range alarm" menu defines the minimum and maximum pH and pH probe read value before to stop dosing activity and to show an alarm message.



# 20. "Self Clean"

To obtain reliable results, the instrument can be connected to a cleaning apparatus (eg .: Probe Cleaning). This menu enables the functionality to blocks 4-E-N (see page 8).






Options are:

**Cycle Time:** time between cleaning procedure and next procedure (adjustable from 6 hours to 10 days)

**Clean Time:** time required to complete probe cleaning procedure (adjustable from 0 to 999 seconds)

**Restore Time:** time to wait after cleaning to restore probe reading functionalities (adjustable from 0 to 999 minutes)

**Clean on Alarm:** Threshold alarm before to start procedure (out of range alarm)

To find optimal values refers to probe manufacturer.

# 21. "Circulator Pump"

This feature allows you to power a pump for water circulation inside the intake pipeline, increasing the pressure.


To activate the circulation pump connected to terminals 5-E-N (see terminal) set option to "ENABLED" To disable set the tool to "DISABLED".

# 22. Technical information.

Power supply: 85÷264 VAC
ORP range: 0 ÷999mV
Environment Temperature: -10 ÷ 45°C (14 ÷ 113°F)
Chemical Temperature: 0 ÷ 50°C (32 ÷ 122°F)
Installation Class: II
Pollution Level: 2
Packaging and Transporting Temperature: -10 ÷ 50°C (14 ÷ 122°F)
Protection degree: IP 65

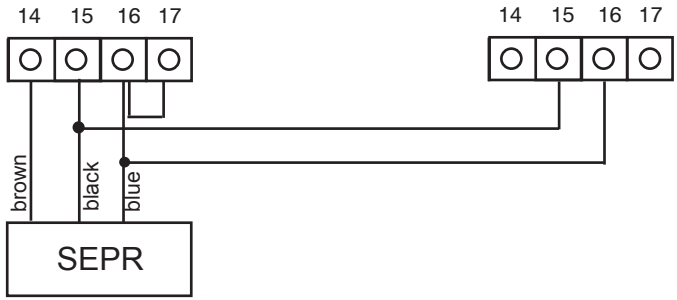
| Product | Formula | Ceram. | PVDF | PP | PVC | SS 316 | PMMA | Hastel. | PTFE | FPM | EPDM | NBR | PE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetic Acid, Max 75% | CH3COOH | 2 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 |
| Hydrochloric Acid, Concentrate | HCl | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 1 |
| Hydrofluoric Acid 40% | H2F2 | 3 | 1 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 3 | 3 | 1 |
| Phosphoric Acid, 50% | H3PO4 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 |
| Nitric Acid, 65% | HNO3 | 1 | 1 | 2 | 3 | 2 | 3 | 1 | 1 | 1 | 3 | 3 | 2 |
| Sulphuric Acid, 85% | H2SO4 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 3 | 3 | 1 |
| Sulphuric Acid, 98.5% | H2SO4 | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 3 |
| Amines | R-NH2 | 1 | 2 | 1 | 3 | 1 | - | 1 | 1 | 3 | 2 | 3 | 1 |
| Sodium Bisulphite | NaHSO3 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sodium Carbonate (Soda) | Na2CO3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Ferric Chloride | FeCl3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Calcium Hydroxide (Slaked Lime) | Ca(OH)2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Sodium Hydroxide (Caustic Soda) | NaOH | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| Calcium Hypochlor.(Chlor.ted Lime) | Ca(OCl)2 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 |
| Sodium Hypochlorite, 12.5% | NaOCl + NaCl | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Potassium Permanganate, 10% | KMnO4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 |
| Hydrogen Peroxide, 30% (Perydrol) | H2O2 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 2 | 3 | 1 |
| Aluminium Sulphate | Al2(SO4)3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Copper-II-Sulphate (Roman Vitriol) | CuSO4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

**Resistance rating:** (1: Resistant) ; (2: Fairly resistant) ; (3: Not resistant)

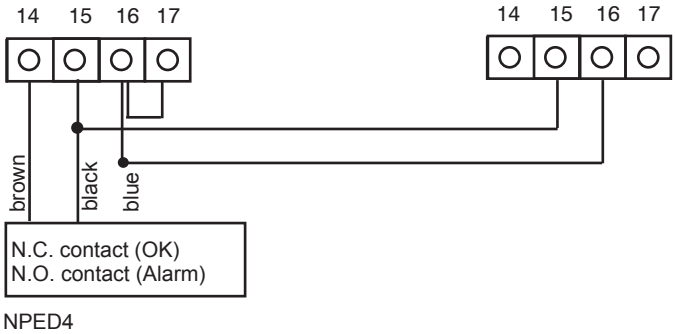
**Polyvinyldene fluoride (PVDF)** Pump Heads, valves, fitting, tubing
**Polypropylene (PP)** Pump Heads, valves, fitting, level floater
**PVC** Pump Heads
**Stainless steel (SS 316)** Pump Heads, valves
**Polymethyl Metacrilate (Acrylic)** PMMA Pump Heads
**Hastelloy C-276** Injection valve spring
**Polytetrafluoroethylene (PTFE)** Diaphragm
**Fluorocarbon (Viton® B)** Sealings
**Ethylene propylene (EPDM)** Sealings
**Nitrile (NBR)** Sealings
**Polyethylene (PE)** Tubing

# 23. SEPR configuration

**SEPR "Flow Sensor" configuration for two instruments**

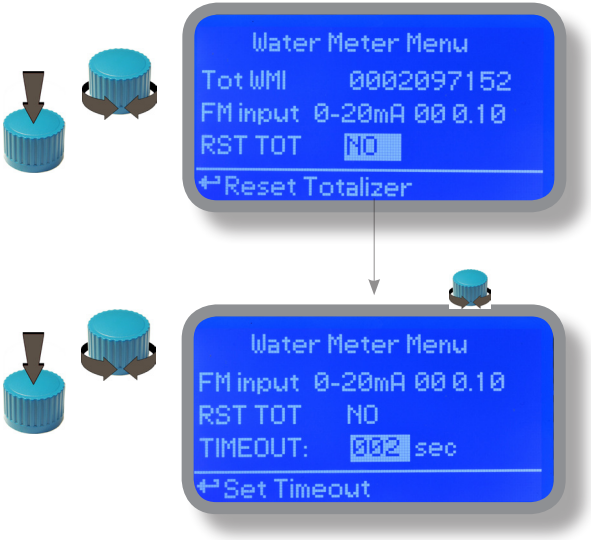



**Configuration of a Flow Switch with a voltage free contact and two instruments**



# 24. "Water Meter"

Enter into "Water Meter" menu to setup Flow Meter configuration type, see total amount of liters passed through water meter, reset totalizer and setup a timeout alarm for no water flow. The alarm will be notified into main screen and water meter status (see page 6).



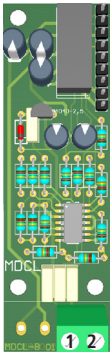

**Tot WMI:** water passed through water meter

**FM Input:** Water Meter Working Mode

RST TOT: reset totalizer

**Timeout:** countdown to "no water flow alarm"

FM Input can be set to operate Water Meter as 0-20mA or 4-20mA input, P/L (pulses per liter) or L/P (liters per pulse).

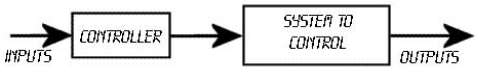



Connect as follows if mA working mode is enabled:

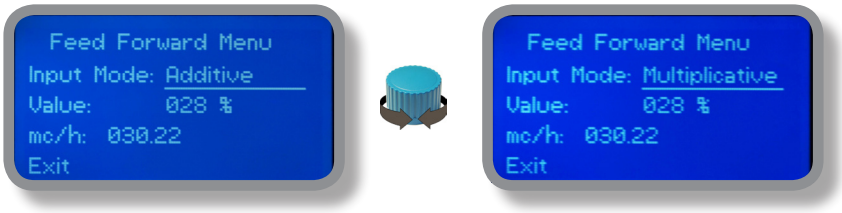
Block 1 : red wire (+)
Block 2 : black wire (-)

# 25 “Feed Forward”, PID loop

The PID controller algorithm involves three separate constant parameters, and is accordingly sometimes called three-term control: the proportional, the integral and derivative values, denoted P, I, and D. Simply put, these values can be interpreted in terms of time: P depends on the present error, I on the accumulation of past errors, and D is a prediction of future errors, based on current rate of change. The weighted sum of these three actions is used to adjust the process via a control element such as the position of a control valve, a damper, or the power supplied to a heating element.




This function manages all instrument outputs based on changes read by mA input and multiply value referring to % and mc/h read by the module.




| % | Perturbative set to 0-20mA Read value (mA) | Actual output reading Read value (p/m) | New Value Flow value (mA) | Flow changes Value (%) | Output changes Value (p/m) | Output value Value (p/m) |
|---|---|---|---|---|---|---|
| | | | | | | |
| 0 | 10 | 50 | 15 | 50 | 0 | 50 |
| 25 | 10 | 50 | 15 | 50 | 6,25 | 56,25 |
| 50 | 10 | 50 | 15 | 50 | 12,5 | 62,5 |
| 75 | 10 | 50 | 15 | 50 | 18,75 | 68,75 |
| 100 | 10 | 50 | 15 | 50 | 25 | 75 |
| | | | | | | |
| | | | | | | |
| 0 | 10 | 50 | 8 | -20 | 0 | 50 |
| 25 | 10 | 50 | 8 | -20 | -2,5 | 47,5 |
| 50 | 10 | 50 | 8 | -20 | -5 | 45 |
| 75 | 10 | 50 | 8 | -20 | -7,5 | 42,5 |
| 100 | 10 | 50 | 8 | -20 | -10 | 40 |

# 26. NOTES

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# 27. NOTES

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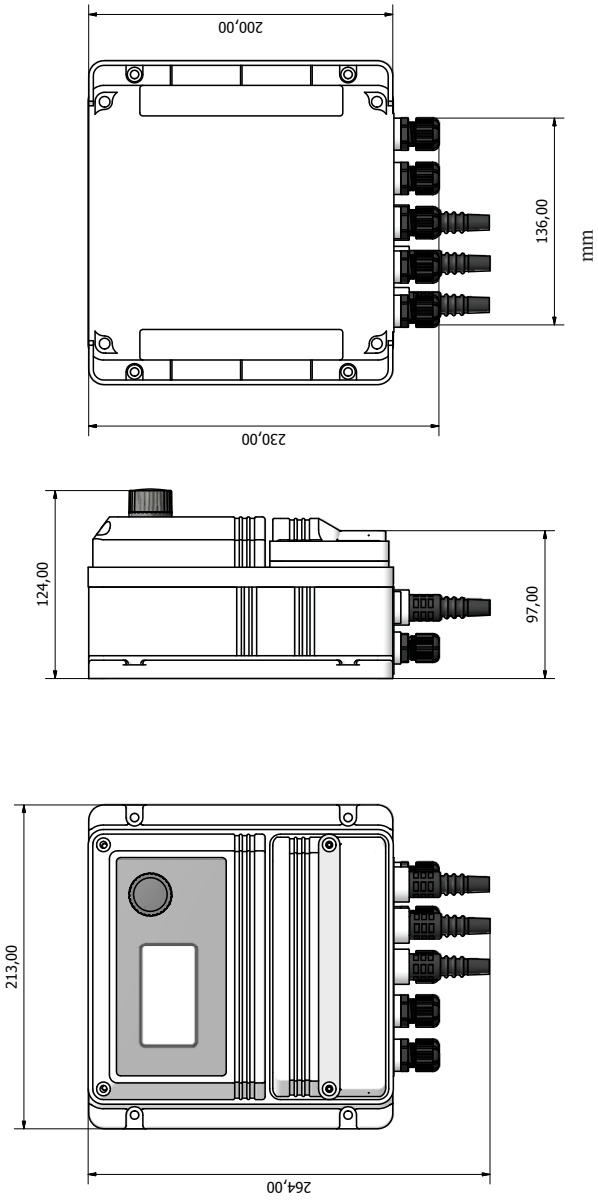
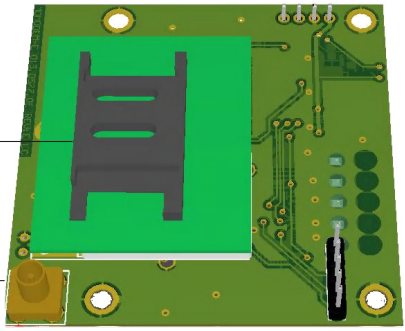
# Appendix - Dimensions



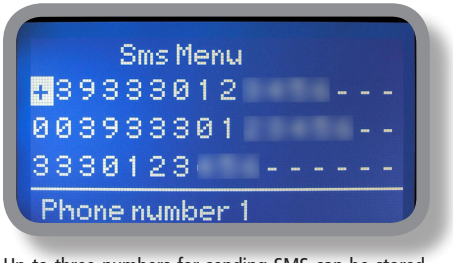
# Appendix Communication HARDWARE - "SMS/GSM" Module

Located under mainboard cover there is a four pins connector that can be used to install USB, ETHERNET or MODEM modules. Modules come pre-installed upon request and may appear different as shown (different configurations).
**"SMS/GMS module" can be configured to send SMS messages containing critical instrument information.**




**To obtain reliable results with this feature please check the following list:**
- Make certain the antenna location is not shielded by metal objects or near sources of electrical 'noise'.
- Do not route the cable where it could be pinched in doors, windows etc.
- Secure the antenna cable
- Ensure that SIM into "SMS/GSM modeule" is properly inserted, activated and within operator range.
- Set instrument ID / NAME from "RS485 Setup" menu and configure "Out of Range Alarm" menu.

Within "Main menu" select "SMS MENU" to enable SMS service and enter SMS receiver phone numbers.




Up to three numbers for sending SMS can be stored into LDSRH memory. SMS recipient will receive an SMS containing instrument ID, NAME and status. Number formats can be stored using international prefix "+", international prefix "00" or local.

WARNING: THIS FUNCTION COULD NOT BE FREE OF CHARGE. DEPENDING ON YOUR OPERATOR CONTRACT IT COULD GENERATE PAYING SMS TRAFFIC !

To enable warning message for related alarm condition choose "YES", to disable choose "NO". Then move wheel on Exit and SAVE configuration. **SMS will be sent when one or more ("YES") fields will change.**

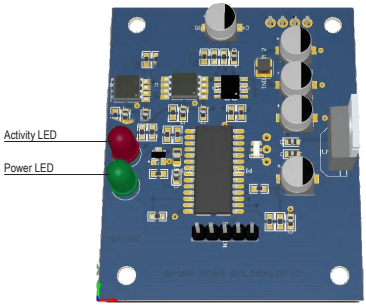
I.E.:
LRH1 or 2 : level alarm for ORP1 or ORP2 levels
LRH: level alarm for ORP
FLOW: flow alarm
ALRH: out of reading range for ORP probe

WARNING: TO AVOID UNDESIRED MESSAGES USE CAREFULLY THIS SETUP!

# Appendix Communication HARDWARE - "LOG USB" Module

Located under mainboard cover there is a four pins connector that can be used to install "USB data log module" or "SMS module". Modules come pre-installed upon request and may appear different as shown (different configurations).

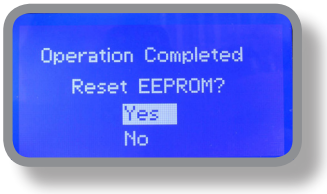
"USB data log module" records instrument activities. These information can be permanently stored into a standard USB pendrive. Pendrive can be connected to a PC using "ERMES" web **www.ermes-server.com** to review and print instrument's activities. **To obtain reliable results with this feature please set instrument ID and NAME from "RS485 Setup" menu and activate log recording from "LOG SETUP" menu.**




Standard USB pendrive
(not included)

Insert USB pendrive here
(right side of instrument)
After usage put back USB cap

**HOW TO RECORD INSTRUMENT'S ACTIVITIES INTO USB PENDRIVE ?**
Insert USB pendrive into USB connector (located on the right side of instrument). Instrument will save data log on USB pendrive. After succeded in saving data it will ask if delete instrument's log or not (anyway USB pendrive will not be formatted). Move wheel on "YES" to delete log info from instrument and return to main screen or "NO" to leave log info on instrument and return to main screen. **Wait about 30 seconds to safety remove the USB pendrive.**


**HOW TO REVIEW INSTRUMENT'S ACTIVITIES RECORDED INTO USB PENDRIVE ?**
It's necessary to connect to web "ERMES" **www.ermes-server.com** to review USB pendrive info on a PC.

# Appendix Communication - Software

## “RS485” menu.

Prior to install the instrument into an RS485 local system a unique ID NUMBER (from 1 to 30) and ID NAME (station name) must be set. Rotate wheel and edit fields. If ID number has already assigned an error message will follow after ID Check (move cursor on CHECK and press wheel). In this event try using another number.


## “SMS” menu.

Instrument may remotely send SMS alarm messages using its own modem (sold as option). It can be configured as follows:

**SMS1 / SMS2 /SMS3.**
Using the wheel enter a mobile phone that will receive alert SMS messages if something wrong occurrs. SMS number must be set using local number format. For example : 3391349134 will send an SMS message to mobile phone.
Log level (and SMS frequency alert) may be set using options in “ACTIVE MSG” within “GSM menu”.


**- TO AVOID UNDESIRED MESSAGES USE CAREFULLY LOG SETUP -**

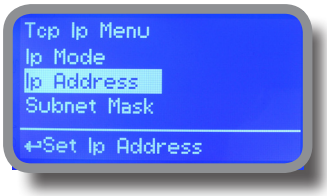
**- WARNING: THIS FUNCTION COULD NOT BE FREE OF CHARGE. DEPENDING ON YOUR OPERATOR CONTRACT IT COULD GENERATE PAYING SMS TRAFFIC !**

# Appendix Communication - Software

## “TCP/IP” menu.

The instrument may be remotely operated using a standard ethernet connection (sold as option). A static or dynamic IP address and a CAT5 ethernet cable is required. According to your network capacity connection speed is 10/100Mbps. To obtain a valid IP address and subnet mask contact your net administrator. Enter parameters and move cursor on “SAVE” to store parameters then move on “OK” and press wheel to save and activate configuration.

Based on your network configuration choose to obtain network parameters automatically (DYNAMIC) or manually (STATIC).





**See “ERMES Communication Software” manual for proper PC software configuration.**

---

**What is a static IP address/dynamic IP address?**

A static IP address is a number (in the form of a dotted quad) that is assigned to a computer by an Internet service provider (ISP) to be its permanent address on the Internet. Computers use IP addresses to locate and talk to each other on the Internet, much the same way people use phone numbers to locate and talk to one another on the telephone. When you want to visit whatis.com, your computer asks a domain name system (DNS) server (think telephone information operator) for the correct dotted quad number (think phone number) for whatis.com and your computer uses the answer it receives to connect to the whatis.com server.
It would be simple if every computer that connects to the Internet could have its own static IP number, but when the Internet was first conceived, the architects didn’t foresee the need for an unlimited number of IP addresses. Consequently, there are not enough IP numbers to go around. To get around that problem, many Internet service providers limit the number of static IP addresses they allocate, and economize on the remaining number of IP addresses they possess by temporarily assigning an IP address to a requesting Dynamic Host Configuration Protocol (DHCP) computer from a pool of IP addresses. The temporary IP address is called a dynamic IP address.

Requesting DHCP computers receive a dynamic IP address (think temporary phone number) for the duration of that Internet session or for some other specified amount of time. Once the user disconnects from the Internet, their dynamic IP address goes back into the IP address pool so it can be assigned to another user. Even if the user reconnects immediately, odds are they will not be assigned the same IP address from the pool. To keep our telephone telephone analogy going, using a dynamic IP address is similar to using a pay phone. Unless there is a reason to receive a call, the user does not care what number he or she is calling from.

There are times, however, when users who connect to the Internet using dynamic IP wish to allow other computers to locate them. Perhaps they want to use CU-SeeMe or use a VoIP application to make long distance phone calls using their IP connection. In that case, they would need a static IP address. The user has two choices; they can contact their ISP and request a static IP address, or they can use a dynamic DNS service. Either choice will probably involve an additional monthly fee.

Using a dynamic DNS service works as if there was an old-fashioned telephone message service at your computer’s disposal. When a user registers with a DNS service and connects to the Internet with a dynamic IP address, the user’s computer contacts the DNS service and lets them know what IP address it has been assigned from the pool; the service works with the DNS server to forward the correct address to the requesting DHCP computer. (Think of calling the message service and saying “Hi. I can be reached at 435.44.32.111 right now. Please tell anyone who tries to reach me to call that number.) Using a dynamic DNS service to arrange for computers to find you even though you are using a dynamic IP address is the next-best thing to having a static IP.

# Appendix Communication - Software

## “GPRS” menu.

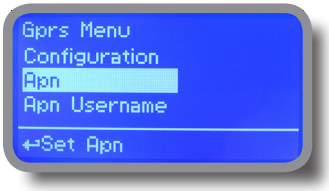
Instrument may be remotely operated using an embedded standard GPRS modem (sold as option). In order to activate this service please ensure that the following steps are correctly completed:

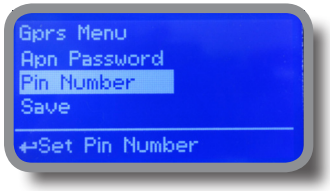
- Make certain the antenna location is not shielded by metal objects or near sources of electrical ‘noise’.

- Make certain the distance from the antenna to the “Instrument” unit is within cable length.

- Do not route the cable where it could be pinched in doors, windows etc.

- Ensure that SIM into “Instrument” modem is correctly inserted, activated and within operator range.




Instrument can be set for ERMES services enabled (Configuration option set to “ERMES YES”) or messages only (Configuration option set to “ERMES NO”) based on your SIM data access parameters. For manual configuration option enter APN (access point name) and SIM phone number. Move wheel on “OK” to save and move on “ESC” to go back to main menu.

**Don’t forget to enter SIM CODE into PIN NUMBER menu to unlock SIM.**

**WARNING: THIS FUNCTION COULD NOT BE FREE OF CHARGE. DEPENDING ON YOUR OPERATOR CONTRACT IT COULD GENERATE PAYING DATA TRAFFIC !**

## “Email” menu.

If Ethernet module or GPRS module is installed (sold as option) the instrument can be configured to send email alarm messages up to two recipients. Click on “Email 1” or “Email 2” and enter email address.


Access point name (APN) identifies an IP packet data network (PDN), that a mobile data user wants to communicate with. In addition to identifying a PDN, an APN may also be used to define the type of service, (eg connection to wireless application protocol (WAP) server, multimedia messaging service (MMS)), that is provided by the PDN. APN is used in 3GPP data access networks, eg general packet radio service (GPRS), evolved packet core (EPC).

# Appendix Communication - Software

## “LOG” menu.

This function records instrument acitvity (date, hour, temperature, uS, totalizer I/O, alarms, outputs). It starts for selected frequency period (every) at requested time (time). SET DATE & TIME BEFORE TO ENABLE LOG. IF NOT POWERED FOR ABOUT 30 DAYS THE INSTRUMENT WILL LOOSE DATE/TIME


Set ACTIVE to “enabled” to activate log recording.

TIME: recording start time (time format 23h e 59min)

EVERY: recording frequency (time format 23h e 59min)

Note: advanced log control (graph, printing, comparison tables, event filtering, etc) is available through “ERMES Communication Software” for PC.

**See “ERMES Communication Software” manual for proper PC software configuration.**

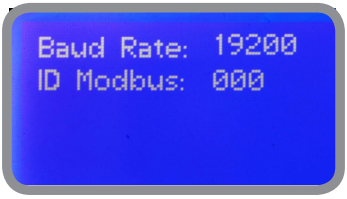
## “LOG VIEW” menu.

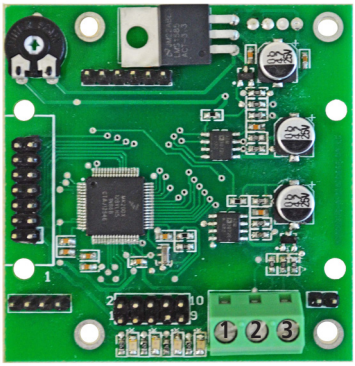
To see alarrm log entries as set on log menu choose “log view” on main menu.

# Appendix - MODBUS

Modbus is a serial communications protocol originally published by Modicon (now Schneider Electric) in 1979 for use with its programmable logic controllers (PLCs). Simple and robust, it has since become a de facto standard communication protocol, and it is now a commonly available means of connecting industrial electronic devices.

From main menu select COMMUNICATION then MODBUS to access the options. Set the communication speed according to the PLC system available. Set the ID assigning an UNIQUE address to avoid conflicts.




**1: GND**
**2: A-RS485 (+)**
**3: B-RS485 (-)**

**To access the module MODBUS open the instrument only after power is switched off!**

**Never make connections with the instrument powered!**

**WARNING**

# Index


When dismantling this instrument please separate material types and send them according to local recycling disposal requirements.
We appreciate your efforts in supporting your local Recycle Environmental Program.
Working together we'll form an active union to assure the world's invaluable resources are conserved.