Release number: 110_EN_LC_5_3_6X
The last three digits of file name identify the software version which the manual refers to; it is visualized at the instrument start up, or by specific function on DIAGNOSTIC menu.
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INTRODUCTION

This manual is an integral part of the product. Read carefully the instructions contained, they give important indications for its safe use and maintenance. Technical information and related products in this manual may undergo modifications without prior notice.

The flow meter must be used within the specified limits. The improper use, possible tampering, or substitutions of one or any of the original components renders the manufacturers warranty void with immediate effect. The manufacturer accepts responsibility only if the instrument it’s used within the published or prior agreed specification. 

Reproduction of this manual and any software supplied with this converter is strictly forbidden.

SYMBOLS USED IN THIS MANUAL

ATTENTION

DANGER ELECTRIC SHOCK

WARNING

PRECAUTIONS
ELECTRICAL CHARACTERISTICS

Classification of the converter: class I, IP 65, category of installation II

<table>
<thead>
<tr>
<th>Power supply versions</th>
<th>Power supply voltage</th>
<th>Power supply frequency</th>
<th>Pmax</th>
<th>current max</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV</td>
<td>90-265 Vac</td>
<td>44 - 66 Hz</td>
<td>3W/5VA</td>
<td>35 mA</td>
</tr>
<tr>
<td>LV</td>
<td>12-60 Vdc 18-45 Vac</td>
<td>0 - 44 - 66 Hz</td>
<td>3W/5VA</td>
<td>300 mA</td>
</tr>
</tbody>
</table>

The converter can be installed internally or externally with the following specification

- Altitude: from -200 to 6000 m (from -656 to 19685 feet)
- Humidity range: 0 - 98%
- Line voltage range: (see table of Electrical Characteristics above)

ENVIRONMENTAL CONDITIONS OF USE

The converter can be installed internally or externally with in the following specification

- Altitude: from -200 to 6000 m (from -656 to 19685 feet)
- Humidity range: 0 - 98%
- Line voltage range: (see table of Electrical Characteristics above)

OPERATING TEMPERATURE

<table>
<thead>
<tr>
<th>CONVERTER Ambient Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
</tr>
<tr>
<td>°C</td>
</tr>
<tr>
<td>-10*</td>
</tr>
</tbody>
</table>

* In situations of discontinuous use in cold ambient temperatures, the installation of an additional heat source may be necessary.
DIMENSIONS (HOUSING IN NYLON)

COMPACT VERSION

SEPARATE VERSION
DIAMENSIONS ( HOUSING IN ALUMINUM )

COMPACT VERSION

SEPARATE VERSION
ELECTRICAL CONNECTIONS

GROUNDING INSTRUCTIONS

ALWAYS ensure that the Converter and the Sensor are grounded (earthed) correctly. The grounding of the sensor and converter ensures that the equipment and liquid are equipotential.

CONVERTER POWER SUPPLY

- Before connecting the power supply, verify that the mains voltage falls between the limits indicated on the tag plate.
- **ATTENTION:** Converters on a dc power supply line are not protected against the inversions of polarity.
- When wiring the converter and sensor equipment use only approved conductors, with fire-proof properties.
- The power supply line must be equipped with an external protection for current overload (fuse or automatic line breaker, limiting current to less than 10 A).
- Provide in close proximity to the converter a circuit breaker that must be easily accessible to the operator and clearly identified.

**NOTE:** For characteristics of the converter’s power supply, see page 4

The sensor, hardwired inputs and outputs are connected to the converter through a terminal block locate inside the converter.

To locate the terminal block loosen the 4 screws on the front cover. Lift the front panel. With the front cover lifted, the terminal block is visible. The terminal block is the hardwire connection of the converter to external equipment, including the sensor.

The following pages give information on the terminal block numbering, and the respective connecting of the sensor cables, and input/outputs.
INTERNAL VIEW OF CONVERTER

- Power supply
- IF2 socket
- Signalling LED: See interpretation notes page 12
- Dangerous voltage on block 12-13:
  - 60 Vdc Max
  - 250 V Max on commutation coils (switching)
- Keyboard

CONVERTER TO SENSOR ELECTRICAL CONNECTIONS

SEPARATE VERSION

C018 CABLE

- Sudden movements to the electrodes cable can cause noise during measurement.
- Max length of electrodes cable: 20 m

TERMINAL BLOCK

- RS 485*: Optional
- 4-20mA

10 9 8 7 6 5 4 3 2 1

- SC
- B2
- B1
- E2
- E1

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

+ -

OUT2 OUT1 24V

- E C E C +

B2 B1 SC

RS 485*

INPUT

ELECTRODES

24V COILS
INTERNAL VIEW OF THE ALUMINIUM CONVERTER

Power supply

IF2 socket

Signalling LED:
See interpretation notes page 10

Dangerous voltage on block 12-13:
- 60 Vdc Max
- 250 V Max on commutation coils (switching)

Keyboard

Shield

C018 cable

Power supply

>HV<
90...265VAC

>LV<
15...45VAC
10...63VDC

ALUMINIUM CONVERTER TO SENSOR, ELECTRICAL CONNECTIONS

SEPARATE VERSION

TERMINAL BLOCK M1

Sudden movements to the electrodes cable can cause noise during measurement Max length of electrodes cable: 20 m

RS 485*: OPTIONAL

RS 485*: OPTIONAL
**DIGITAL INPUT**

**External power supply**

- **Auto-calibration**
  - $0-1.5\,V$
  - $3-40\,V$
  - $T_{min} = 100\,ms$

**Internal power supply**

- **Auto-calibration**
  - $T_{min} < T < 1\,sec.$ = autocalibration
  - $T > 1\,sec.$ = Auto zero
  - Necessary conditions for enabling the function
  - POS. 5.7 ENABLED (Autozero calibration external command)

**Operation on input ON/OFF**

### Auto-calibration

- $0-1.5\,V$
- $3-40\,V$
- $T_{min} = 100\,ms$
- Necessary conditions for enabling the function
- POS. 5.7 ENABLED (Autozero calibration external command)

### Reset totalizes

- $0-1.5\,V$
- $3-40\,V$
- $T_{min} = 100\,ms$
- Necessary conditions for enabling the function
- POS. 5.1 to 5.4 ENABLED (partial positive or reverse flow totalise reset enable).

### Block totalizes

- $0-1.5\,V$
- $3-40\,V$
- **Totalizers active**
- Necessary conditions for enabling the function
- POS. 5.6 ENABLED (totalise counting lock command)

### Range change

- $0-1.5\,V$
- **Scale 2**
- **Scale 1**
- Necessary conditions for enabling the function
- POS. 5.8 ENABLED (range change)

<table>
<thead>
<tr>
<th>SAMPLE RATE</th>
<th>$T_{min}$</th>
<th>SAMPLE RATE</th>
<th>$T_{min}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz</td>
<td>220 ms</td>
<td>80 Hz</td>
<td>30 ms</td>
</tr>
<tr>
<td>20 Hz</td>
<td>110 ms</td>
<td>150 Hz</td>
<td>15 ms</td>
</tr>
<tr>
<td>50 Hz</td>
<td>45 ms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: $T$ must be $> T_{min}$*
OUTPUTS WIRING

**Output on/off 1250**

- Opto-insulated output with floating collector and emitter terminals freely connectable
- Maximum switching voltage: 40 Vdc
- Maximum switching current: 100mA
- Maximum saturation voltage between collector and emitter @100mA: 1.2V
- Maximum switching frequency (load on the collector or emitter, RL=470Ω, VOUT=24Vdc): 1250Hz
- Maximum reverse current bearable on the input during and accidental polarity reversion (VEC): 100mA
- Insulation from other secondary circuits: 500 Vdc

**Output 0/4-20mA**

- Opto-insulated output
- Maximum load: 1000 ohm
- Maximum voltage without load: 27 Vdc
- Refresh frequency is the same of the sample frequency of the connected sensor
- Protected against persistent over voltages to maximum 30 Vdc

There is a Converter load CHECK on the 4 - 20mA output; to disable this function set the value “mA Val. Fault” to 0 (Pos. 4.5, see page 15)

CONVERTER START UP AND MAINTENANCE INSTRUCTIONS

Before starting up the equipment please verify the following:
- Power supply voltage must correspond to that specified on the data plate
- Electric connections must be completed as described at page 7-8
- Ground (earthed) connections must be completed as specified on page 7

Verify periodically:

- The integrity of the power supply cables, wiring and other connected electrical parts
- The integrity of the converter’s housing (this must not have dents or other damage that may compromises it’s hermetical sealing)
- The tightening of the sealing elements (cable glands, covers, etc.)
- The integrity of the front panel (display and keyboard), any damage may compromise the equipment sealing
- The mechanical fixing of the converter to the pipe or wall stand
DISPLAY FLAGS AND LED WARNING INTERPRETATION

At ‘Power on’ of the converter, the user will see the following display screen. In the top right hand corner there may be a range of symbols. The symbols can be interpreted from the table below. Interpretation of the flashing LED can be made from the LED Interpretation table at the bottom of this page.

<table>
<thead>
<tr>
<th>FLAG</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Alarm max activated</td>
</tr>
<tr>
<td>m</td>
<td>Alarm min activated</td>
</tr>
</tbody>
</table>
| !    | - Interruption coils circuit  
|      | - Segnal error  
|      | - Empty pipe |
| C    | Calibration running |
| S    | Simulation |
|      | Pulse output saturation (reduce TIME PULSE ) |

LED INTERPRETATION

- PERMANENT LIGHT: initialisation
- FLASHING LIGHT (1 sec.): normal function
- FLASHING LIGHT (<1 SEC.): alarm on

The LED signals the alarm status only if the display shows one of the suitable visualisation screens as shown on page 14.
The keypad is accessible by loosening the 4 cover screws, and opening the front cover of the converter. Three keys are set aside of the M1 terminal block allowing the user to change screen display visualizations and select functions.

**Key pad function**

**SHORT PRESSING (< 1 SECOND):**
- Increases the numeric figure or the parameter selected by the cursor
- Accesses the previous subject when in the Quick start or Main menus
- Batch start/stop (when enabled)

**LONG PRESSING (> 1 SECOND):**
- Decreases the numeric figure or the parameter selected by the cursor
- Accesses the next subject in the Quick start or Main menus

**SHORT PRESSING (< 1 SECOND):**
- Moves the cursor rightwards on the input field
- Accesses to the following subject in the Quick start or Main menus
- Changes the display of the process data

**LONG PRESSING (> 1 SECOND):**
- Moves the cursor leftwards on the input field
- Accesses the previous subject in the Quick start or Main menus

**SHORT PRESSING (< 1 SECOND):**
- Enters/leaves the selected function
- Enables the main menu for the converter configuration
- Cancels the selected function under progress

**LONG PRESSING (> 1 SECOND):**
- Leaves the current function, in the Quick start or Main menus.
- Enables the 'EXECUTE?' prompt in the Main menu functions, and total reset request (when enabled) from the required function
- Confirms the selected function

**Blind converters**

For converters without a keyboard (blind version), functions are programmed utilizing the IF2 device:
**ACCESSING THE CONVERT FUNCTIONS AT START-UP (Power On)**

**Example of visualized display pages at start-up**

The direct exposure of the converter to the solar rays, could damage the liquid crystals display.

---

**Active scale**

**Alarm on**

**Flow rate visualization**

**Note:** The user will see the screen displayed (left) at power on of the converter. Use the keys on the keypad as indicated centrally on this page to move between the screens shown (not all shown).

---

**Alternate visualization**

If the user dwells on this screen the converter will automatically scroll through the rest of the initial visualization pages. If the user presses the lower key on the keypad they will access the Quick start menu. Pressing the middle key will move to the next initial visualization screen.

---

**Currency function enable**

* The maximum number shown on the totalizer is 999999999 regardless of the number of user selected decimals (see page 19 Pos 2.3). Beyond this value the totalizers are reset to zero.

---

**Flow rate visualization**

**Note:** if the converter is not connected to the sensor then an ‘Excitation Fail’ will be shown.
The ML110 allow showing 5 digit character display for flow rate units. This means the maximum flow rate value that can be represent on the display is **19999** (no matter the positioning of the decimal point) and the minimum is **0.025**.

The converter’s calculation are based on the following formula:

\[- \text{DN} \times \text{DN} \times 0.008\]

The results of above calculation give the maximum flow rate at **10 m/s of speed** according to sensor’s diameter; the permitted units for the display are the unit measure that, in reference to this calculated value, do not exceed the number **19999** (higher limit) and **0.25** (lower limit).

**Example for DN 100:**

- Full scale value: \(100 \times 100 \times 0.008 = 80 \text{ l/s}\)
- **PERMITTED** unit of measure (example): \(\text{l/s} \ (80.00) ; \text{mc/h} \ (288.0) \ldots\)
- **NOT PERMITTED** unit of measure (example): \(\text{cm3/s} \ (0.08) \ldots\)

The not permitted example has a unit of measure greater than 5 character digits in length including the ‘/’, cm3/s.
CONVERTER FUNCTION SETTING ACCESS CODES

**Factory preset access**

The converter is delivered with the default L2 (level 2) access code. The code if required for accessing ‘Main menu’ functions from the ‘Quick start menu’.

11111

The first level configuration "Quick start menu" can be automatically accessed without the access code by pressing the key from one of the visualization pages at start up (power on) of the converter. See page 14 to see the screens from which the Quick start menu can be accessed.

**User defined access codes**

Functions in the converter’s ‘Main menu’ are enabled by the access codes. The information of this manual is related to all the functions available with in the L2 level. All higher level functions are reserved for servicing and not available.

**Description of the L2 access code**

(menu “11 Internal data” pos. 11.1, see page 21)

- **with code L2 = 00000** (with this code only) you can disable the request of code L2
- **with L2 customized** (freely chosen by the user) you can program all the functions up to L2 security level, entering this code whenever you enter the Main menu.

*ATTENTION:* take careful note of the customized code you have chosen, there is no way for the user to retrieve or reset it if lost.

**ACCESS TO THE CONFIGURATION MENUES**

The converter’s configuration menus can be accessed in two different modes:

- Through the **“Quick start menu”** it is possible to access directly a range of principal functions for setting the scale reading and display characteristics of the sensor (see function explanations pages 18-19)
- Through the **“Main menu”** it is possible to access functions with an access code ≤ 2, which control more of the sensor’s monitoring, data processing and output, as well further display options.

The following example (page 17) illustrates how to change some of the values in the Fs1 display field of the Quick Start menu. The second example (page 18) illustrates how to change a function parameter in the ‘Main menu’.
EXAMPLE: “Quick start menu” function modification. Full scale value 1 (Fs1) from 4dm³/s to 5dm³/s.

1. dm³/s +0.000 1
   m³/s 0.00———

Enter in the “Quick start menu” The keypad button to be pressed at each step is indicated by the icon symbol place on one of the three keys of the keypad (here lower key)

2. 0-QUICK START
   Fs1=dm³/s 04.000

Access the function “Fs1” by pressing the button indicated for less than 1 second

3. 0-QUICK START
   Fs1= m³/s 04.000

Push the key repeatedly and rapidly to move the cursor to the value to modify

4. 0-QUICK START
   Fs1=dm³/s 05.000

To increase the value press the upper key for short periods of less than 1 second, to reduce the value press the upper key for more than 1 second repeatedly

5. 0-QUICK START
   Fs1= dm³/s 05.000

Confirm the new value with a short press of the key (less than 1 second)

6. 0-QUICK START
   Fs1= dm³/s 05.000

Long push to leave the quick start menu and return to the initial visualization page

7. dm³/s +0.000 1
   m³/s 0.00———

Initial visualization page
EXAMPLE: “Main menu” function modification. Full scale value 1 (Fs1) from 4dm³/s to 5dm³/s. (Quick start menu enabled)

1. Enter in the “Quick start menu” from any of the start-up (power on) screens
2. Press the button indicated to enter the Main menu page screen from the Quick menu page
3. Access to the “Main Menu” by pressing the key indicated
4. To enter the main menu input the key code (11111 as default) by increasing the ‘0’ to ‘1’ and moving to the next ‘0’ until the key code is entered
5. To enter the key code press the lower key
6. To move between main menu function groups press the arrow key indicated
7. Access the “Scale” menu with a short key press.
8. Access the function “Fs1” with a short key press
9. Move between the modifiable options by short pressing the key indicated on the key pad
10. Change the value by pushing the button rapidly as many times as required
11. Confirm the new value with a short press of the key indicated on the keypad
12. Long push to return to the main menu groups
13. Long push to return to the initialization pages
14. Initialization page
MAIN MENU GROUPS AND FUNCTION DESCRIPTIONS.
The main menu is selected from the Quick Start Menu by pressing the key and entering the factory code(11111). Functions denoted in grey are displayed only with other active functions, or with optional modules. (for details of the functions with the symbol “*” refer to pages 22-27). Not all the functions displayed on the converter are shown below are reserved for serving purposes only and not configurable.

MAIN MENU
1-Sensor

1.1 Nominal Diameter (ND) of sensor, (enter input value 0-3000 mm)
1.2 Sensor calibration data (Enter value as specified on sensor label)
1.3 Type of sensor: Enter the first two characters of the sensor serial number
1.4 Position of insertion sensor: 0=1/8DN, 1=1/2DN, 2=7/8DN
1.5 Factory parameters
1.6 Enables the empty pipe detection feature
1.7 Value of empty pipe sensibility detection
1.8 Enables the automatic calibration procedure of zero calibration

MAIN MENU
2-Scales

2.1* Full scale value set for range N.1 (function info & modification page 22)
2.2* Full scale value set for range N.2
2.3* Unit of measure and number of decimal place (Info & modification page 23)
2.4* Pulse value on channel 1 (Function Info & modification page 23)
2.5* Pulse value on channel 2 (Function Info & modification page 23)
2.6* Duration of the pulse generated on channel 1 (Info & modification page 23)
2.7* Duration of the pulse generated on channel 2 (Info & modification page 23)
2.8 Full scale frequency for channel 1 (0.1Hz-1000.0Hz)
2.9 Full scale frequency for channel 2 (0.1Hz-1000.0Hz)

MAIN MENU
3-Measure

3.1* Time constant (function info & modification page 23)
3.2* Acceleration threshold (function info & modification page 23)
3.3* Anomalous signal peak cut off threshold (Info & modification page 23)
3.4 Low flow zero threshold: 0-25% of full scale value
3.5 Filter on the power supply: 0.1s="ready" measure; 0.5s=filter of noise on the liquid
3.6 Enable automatic hourly internal calibration cycle. Measurement stopped for 8-15s.
3.7* Automatic change of scale (function info & modification page 24)
3.8* Energy saving function (function info & modification page 24)

MAIN MENU
4-Alarms

4.1 Maximum flow rate value alarm setting
4.2 Minimum flow rate value alarm setting
4.3 Hysteresis threshold setting for the minimum and maximum flow rate alarms
4.4 Empty pipe detection threshold. Automatically set by the function 1.9
4.5*Current output value in case of failure (function info & modification page 24)
4.6* Frequency output value in case of failure (function info & modification page 25)
**MAIN MENU**

**5-INPUTS**

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T+ reset</td>
<td>OFF</td>
</tr>
<tr>
<td>P+ reset</td>
<td>OFF</td>
</tr>
<tr>
<td>T- reset</td>
<td>OFF</td>
</tr>
<tr>
<td>P- reset</td>
<td>OFF</td>
</tr>
<tr>
<td>Count lock</td>
<td>OFF</td>
</tr>
<tr>
<td>Calibration</td>
<td>OFF</td>
</tr>
<tr>
<td>Range change</td>
<td>OFF</td>
</tr>
</tbody>
</table>

5.1* Total direct (positive) flow totalise reset enable
5.2* Partial direct (positive) flow totalise reset enable
5.3* Total reverse (negative) flow totalise reset enable
5.4* Partial reverse (negative) flow totalise reset enable
5.6 Totalise counting lock command (see page 10)
5.7* Autozero calibration external command
5.9 Range change external command

**6-OUTPUTS**

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out1</td>
<td>#1 FREQ</td>
</tr>
<tr>
<td>Out2</td>
<td>#2 FREQ+</td>
</tr>
<tr>
<td>Duty cycle1</td>
<td>50</td>
</tr>
<tr>
<td>Duty cycle2</td>
<td>50</td>
</tr>
<tr>
<td>Out nAl1</td>
<td>4.22</td>
</tr>
</tbody>
</table>

6.1* Output 1 functions (function info & modification page 25)
6.2* Output 2 functions (function info & modification page 25)
6.3* Duty cycle value for pulses/frequency output (Info & modification page 26)
6.4* Choice of function the range of current output n.1 (Info & modification page 26)

**7-COMMUNICATION**

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF2 proto.</td>
<td>OPP</td>
</tr>
<tr>
<td>Address</td>
<td>000</td>
</tr>
<tr>
<td>RS485 bps</td>
<td>4800</td>
</tr>
<tr>
<td>A. delay</td>
<td>ms 0</td>
</tr>
</tbody>
</table>

7.1 Choice of the communication protocol for the IF2 device
7.2 Address value of converter (range 0 - 255)
7.3 Speed of the RS485 output (possible choices: 2400, 9600, 19200, 38400 bps)
7.4 ****************************

**8-DISPLAY**

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>EN</td>
</tr>
<tr>
<td>D. rate Hz</td>
<td>1</td>
</tr>
<tr>
<td>Contrast</td>
<td>7</td>
</tr>
<tr>
<td>Quick start</td>
<td>OFF</td>
</tr>
<tr>
<td>Tot. modif.</td>
<td>OFF</td>
</tr>
<tr>
<td>Net total.</td>
<td>OFF</td>
</tr>
<tr>
<td>T+ reset</td>
<td></td>
</tr>
<tr>
<td>P+ reset</td>
<td></td>
</tr>
<tr>
<td>T- reset</td>
<td></td>
</tr>
<tr>
<td>P- reset</td>
<td></td>
</tr>
<tr>
<td>Currency</td>
<td>ON</td>
</tr>
<tr>
<td>Curr. decim.</td>
<td>2</td>
</tr>
<tr>
<td>EUR/dm³+</td>
<td>01.0000</td>
</tr>
<tr>
<td>EUR/dm³-</td>
<td>01.0000</td>
</tr>
</tbody>
</table>

8.1 Choice of the language: EN= English, IT=Italian, FR= French, SP= Spanish
8.2 Display update frequency: 1-2-5-10 Hz
8.3 Display contrast
8.4 Quick start menu visualization
8.5* Enable the change value of the totalises (info & modification page 27)
8.6 Enable the page of net totalizer
8.7* Total direct (positive) flow totalise reset (info & modification page 27)
8.8* Partial direct (positive) flow totalise reset (info & modification page 27)
8.9* Total reverse (negative) flow totalise reset (info & modification page 27)
8.10*Partial reverse (negative) flow totalise reset (info & modification page 27)
8.11 Visualizes the values of the partial totalise in the unit of selected currency
8.12 Choice of the numbers of decimals for the visualization currency value: From 0 to 3
8.13*Value of conversion/currency for direct totalizer (info & modification page 27)
8.14*Value of conversion/currency for reverse totalizer (info & modification page 27)
10.1* Calibration of the converter (single occurrence each time function is selected)
10.2* Converter auto test (single occurrence each time function is selected)
10.3* Flow rate simulation enabling

11.1 Level 2 access code enter (user choice and setting of access code if required)
11.2 Load factory data pre-set
11.3 Load user data saved
11.4 Save user data
11.5 Visualisation of the total operation hours of the converter (function not editable)
11.6 Ignore the calibration error during the switch on test (enable/disable)
11.7 KS Coefficient
The following pages give a description of the most important functions and how they can be changed or enabled/disabled by the user.

**MENU 1 - SENSOR**

**POS. 1.7) “Autozero” calibration**

This function allows to zeroing the meter. To perform the zero calibration, it is necessary for the sensor to be full of liquid, and the liquid be perfectly still. Even very small movement of the liquid may affect the result, and, consequently, the accuracy of the system.

Once you are sure the above conditions have been fulfilled (and the percentage flow rate value is stable) press the key for one second or more. Check the percentage flow rate value goes to zero. If this does not occur repeat the operation again. When the value is stable at zero, then press the key.

**POS. 1.7) “Empty pipe” threshold**

Value of empty pipe threshold detection. The span of this function is 0-255. Since the sensibility of empty pipe detection could be change by the liquid conductivity, ground connections, type of lining, in case of needed it’s possible to adjust manually the preset threshold. It's recommended to check periodically its proper functioning.

**MENU 2 - SCALES**

**POS. 2.1-2.2) Full scale N. 1-2**

The Full scale range N.1.-2 is the corresponding output signal (20mA) to the meters maximum flow rate (max 10m/s). There are four fields to fill in order to set this parameter, from left to right: 1) volume unit of measure, 2) type of unit, 3) time unit of measure and 4) numeric value. The selection is made by positioning the cursor on the field to modify. To change the type of unit of measure (metric, British or American, mass or volume) the cursor has to be positioned on the symbol “/” (field N. 2). When the nominal diameter is set to zero it is possible to modify only the numeric field, since the unit of measure stays at m/sec.

The following tables show the units of measure available and the conversion factor by comparison with 1 dm³ and 1 kg. The converter accepts any kind of combination of units of measure satisfying both the following conditions:

- Numeric field value \( \leq 9999 \)
- \( \frac{1}{25} fs_{\text{max}} \leq \text{numeric field value} \leq fs_{\text{max}} \)

where \( fs_{\text{max}} \) is the maximum full scale value corresponding to the sensor, equal to a 10 m/sec liquid speed. The units of measure are shown as appear on the display. The British and American units are diversified by using capital and small characters.
When a mass unit of measure is set, the specific gravity function is automatically enabled by the system. Please, note that the mass measure is heavily affected by the temperature. With certain liquids this may cause significant measurement errors. The following measure of time units can be selected: s = second, \( m = \) minute, \( h = \) hour, \( d = \) day.

(POS. 2.3) Unit of measure and number of decimal places  
[Total MU = \( \text{dm}^3 \times XXX \)]

Setting the unit of measure and number of decimals places displayed for the volumes. To set the unit of measure, position the cursor on field of the unit of measure. To set the type of unit, position the cursor on the blank space between the unit of measure and the numeric value; The number of decimal places can be selected by placing the cursor on numeric field and choosing one of the possible combinations: 1000-01.00-001.0-00001.

(POS. 2.4-2.5) Pulse value channel 1-2 and unit of total measure.  
[Pls1-2 = \( \text{dm}^3 \times XXXXX \)]

Setting of a flow volume by which a corresponding pulse will be emitted on channel 1-2. (units must be identical to ‘Full scale’(POS 2.1 and 8) and ‘Totalizer’ functions. To set the parameter, complete the three fields, from left to right: 1) unit of measure, 2) unit type and 3) numeric value. The selection is performed by positioning the cursor in the field to be modified. To change the unit type (metric, British or American, mass or volume) position the cursor on the blank space between the measure unit and the numeric value. When the nominal diameter is set to zero it is possible to modify only the numeric field since the measure unit stays at meters(m) or feet(ft). Only those units described above are available to be selected. This function is active only if the pulse emission on channel 1 is enabled.

(POS. 2.6-2.7) Pulse duration channel 1-2  
[Tpls1-2 = ms XXXXX.XX]

Setting of the duration of the pulse generated on channel 1-2 as set in (POS 2.4-2.5). This value is expressed in milliseconds and has to be between 0,4 and 9999,99. When the high frequency output is present, then the minimum value can be set to a minimum of 0,04 milliseconds. ATTENTION: since the converter cannot detect which type of device is connected to the converter, the user must verify that the set pulse duration is compatible with the external device processing such pulses. If, for example, an electro-mechanical pulse counter is connected, one of two problems may occur; firstly, if the pulse is too long the coils may burn out, secondly, if the pulse is too short, the counter may not be able to function, with the possibility of causing damage of the output.

(POS. 3.1) Time constant  
[Time constant = s XXXXX.X]

This parameter affects the integrating filter, setting a quicker or slower response time, according to the value set. A higher value corresponds to a more stable but slower measure, a smaller gives and faster measure but is more unstable. The most common values are from 1 to 5 seconds. The value of this parameter has to be within the range from 0 (integral filter disabled) to 6000.0 seconds. The following diagram shows the response of the instrument for a flow rate variation from 0 to 100% within the T time constant period.

(POS. 3.2) Acceleration threshold  
[Skip thr = % XXX]

Acceleration threshold set. The acceleration threshold is the limit beyond which a flow rate variation gives an immediate response at the output, without being filtered by the time constant. This function allows the converter to have an immediate response in cases of big flow rate variations, while filtering (and delaying) the response to small variations, resulting in a very stable measure. The set value is a percentage of the full scale value (from 0 to 125%). If such a value is set to zero any flow rate variation bigger than 0.5% of the full scale value will immediately activate an output response. The following graphs show the instrument response in two cases: Firstly, a flow rate variation from 0 to 10% completely absorbed by the time constant effect
Secondly a variation from 10% to 100%, exceeding the acceleration threshold and then immediately sent to the output. In reality there is always a minimum time between the measure acquisition and the outputs update.

(POS. 3.3) Peak cut off threshold
Anomalous signal peak cut off threshold set. This parameter allows for setting the maximum value of deviation of the measured sample in comparison to the average. If a successive value is higher than the set limit, than such a value is "cut" to the limiting value. This function is used to make the meter less sensitive to big perturbations of the flow rate measure. This may happen when there are solids suspended in the liquid in contact with the electrodes resulting in higher electrical noise. The permitted values of this function range from 0 to 125 % in reference to the full scale value. If this parameter is set to zero the peak detection function is disabled and any subsequent measured sample will be accepted and processed by the converter.

(POS. 3.7) Automatic scale change enable
Enables/disables the automatic change of scale. The meter may have two different working ranges in order to suit variable process conditions. In order to get the best results out of this function it is important that range N.2 is greater than N.1. When the flow rate increases and reaches the 100% of the scale N.1, the meter automatically switches to scale N.2. When the flow rate subsequently decreases to an equivalent value on scale N.2 (equal to the 90% of full scale N.1), scale N.1 will assume the active scale. Allowed values for this parameter: ON / OFF.

(POS. 3.8) Energy saving enable
Automatic energy saving function enables. This function is used when the instrument is powered by a battery or solar cells, allowing an energy saving up the 60-80%. The energy saving function controls the powering cycles ratio of the coils while the measuring cycling remain unaffected. When the energy saving function is enabled and the flow rate is stable the number of "off" cycles is greater than the "on" cycles, reducing the average power consumption. If the flow rate suddenly changes, the meter switches to a higher number of measuring cycles, achieving a higher response time. Once the flow rate resumes stability the number of powering cycles is reduced. If the flow rate varies below the “acceleration threshold” percentage value, the meter assumes the “off” cycles. When the flow rate exceeds such a threshold, the meter increases the measuring cycles. The speed at which the meter will switch between the increased and reduced powering cycles are different. From a constant to a variable flow rate is a very fast process, while from variable to a stable flow rate is much slower. The allowed values for this parameter: ON/OFF. N.B.: to optimize this function, a value for the acceleration threshold between 10 - 15 is recommended.

MENU 4 - ALARMS

(POS. 4.5) Current output value in case of failure
Setting of the value of the 0/4...20 mA current output in one or more of the following cases; empty pipe, ADC error, and coils interrupted.

The permitted range is from 0 to 120% of the 0 - 20 mA scales, 120% corresponds to 24 mA and does not depend on the selected range (0...20 / 4...20 mA).
The NAMUR NE43 recommendations requires alarms signaling value for a current output lower than 3.6 mA (<18%) or greater than 21 mA (>105%). It is preferable to set the value of this function at 10%, so that the current value in cases of a.m. would be 2 mA, allowing the following diagnostics:

- current < 2 mA - 5%: line interrupted, power supply failure or faulty converter;
- 2 mA - 5% ≤ current ≤ 2 mA + 5%: hardware alarm;
- 4 mA ≤ current ≤ 20 mA: normal working range;
- 20 mA < current ≤ 22 mA: out of range, measure above 100% full scale (f.s.).

(POS. 4.6) Frequency output value in case of failure [Hz v.fault=% XXX]

To set the frequency value assigned to the on/off output in one or more of the following cases:

- Empty pipe; Coils interrupted; ADC error

Allowable range from 0 to 125% of the frequency full scale value. Although there are no specific rules regulating cases such as these, it would be convenient to use the failure information as follows:

- 0% Hz ≤ frequency ≤ 100% f.s.: normal working range;
- 100% f.s. < frequency ≤ 110% f.s.: overflow, measure above the 100% of the f.s.;
- 115% f.s. ≤ frequency ≤ 125% f.s.: hardware alarm condition.

**MENU 5. INPUT**

(POS. 5.1-5.2-5.3-5.4) Enable reset partial/total totalizers [T+/P+- reset= ON/OFF]

When this function is active, the totalizers may be reset applying a voltage on the on/off input or from keyboard.

(POS.5.7) Autozero” calibration external command enable [Calibration=ON/OFF]

This function enables/disables the automatic zero calibration system. When this function is active, applying a voltage on the meter’s on/off input terminals performs an autozero calibration cycle. ATTENTION: if the voltage pulse is less 1 sec., the meter performs an Auto calibration cycle to compensate for possible thermal drifts. If the voltage pulse is more 1 sec, the meter performs an Autozero calibration of measure.

**MENU 6 - OUTPUTS**

(POS. 6.1) Choice of the function corresponding to on/off output 1 [Out1=XXXXX]

Function choice corresponding to Digital Output 1. The functions are listed in the table below.

(POS. 6.2) Choice of the function corresponding to on/off output 2 [Out2=XXXXX]

Function choice corresponding to Digital Output 2. The functions are listed in the table below.

**FUNCTION FOR OUTPUT 1, 2.**

- OFF: DISABLED
- #1PULS+: PULSE ON CHANNEL 1 FOR POSITIVE FLOW RATE
- #1PULS-: PULSE ON CHANNEL 1 FOR NEGATIVE FLOW RATE
- #1PULS±: PULSE ON CHANNEL 1 FOR POSITIVE AND NEGATIVE FLOW RATE
- #2PULS+: PULSE ON CHANNEL 2 FOR POSITIVE FLOW RATE
- #2PULS-: PULSE ON CHANNEL 2 FOR NEGATIVE FLOW RATE
- #2PULS±: PULSE ON CHANNEL 2 FOR POSITIVE AND NEGATIVE FLOW RATE
- #1FREQ+: FREQUENCY CHANNEL 1 FOR POSITIVE FLOW RATE
- #1FREQ-: FREQUENCY CHANNEL 1 FOR NEGATIVE FLOW RATE
- #1FREQ±: FREQUENCY CHANNEL 1 FOR POSITIVE AND NEGATIVE FLOW RATE
- #2FREQ+: FREQUENCY CHANNEL 2 FOR POSITIVE FLOW RATE
- #2FREQ-: FREQUENCY CHANNEL 2 FOR NEGATIVE FLOW RATE
- #2FREQ±: FREQUENCY CHANNEL 2 FOR POSITIVE AND NEGATIVE FLOW RATE
- SIGN: FLOW DIRECTION OUTPUT (ENERGISED = -)
- RANGE: RANGE INDICATION OUTPUT (ENERGISED = SCALE 2)
- MAX AL: MAX FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MIN AL: MIN FLOW RATE OUTPUT(ENERGISED = AL. OFF)
- MAX+MIN: MAX AND MIN FLOW RATE ALARM OUTPUT (ENERGISED = AL. OFF)
- EMPTY PIPE: EMPTY PIPE ALARM OUTPUT (ENERGISED = FULL PIPE)
- OVERFLOW.: OUT OF RANGE ALARM OUTPUT (ENERGISED = FLOW RATE OK)
- HW ALARM: CUMULATIVE ALARM OUT interrupt coils, empty pipe, measure error (ENERGISED=NO ALARMS)
(POS. 6.3) Duty cycle value for pulses/ frequency output

The duty cycle function defines the time ratio between ON and OFF state when frequency output is used: 50% means that the ON phase will equal that of the OFF phase, 60% means that the ON phase will be 60% and the OFF phase will be 40% of the total cycle time. When the pulse outputs are used, the duty cycle defines the OFF phase, this is because the ON phase is already set with the "PULSE DURATION" function (see Main menu “2 - SCALE”). In this case, for example, the duty cycle is set at 50% and the pulse duration at 50ms, the OFF phase will be the same of the ON phase. The formula to calculate the minimum time of the OFF phase and the time of total cycle is the following:

T. total cycle = 100 x (pulse duration in ms) / (duty cycle)
T. OFF phase = T. total cycle - pulse duration

N.B.: When using the function in frequency mode, DO NOT set the duty cycle to 0. If the value of the function is set to 0 the emission of the pulses occurs in synchronous mode with the flow rate. The function is active only if one of the outputs is set on pulse and/or frequency function.

(POS. 6.4) Current output option and range

This function sets the current output N.1. This function is optional and will not appear unless the option has been requested. There are three fields to modify for this function:

- Scale zero: 4 or 0 mA
- Full scale: 20 or 22 mA
- Field: + = positive, - = negative, ± = both, -0+ = central zero scale

The values corresponding to the scale points are shown in the following chart:

<table>
<thead>
<tr>
<th>POSSIBLE FIELD</th>
<th>REVERSE FLOW VALUE</th>
<th>ZERO</th>
<th>DIRECT FLOW VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤-110%</td>
<td>-100%</td>
<td>0%</td>
</tr>
<tr>
<td>OutmA = 0 - 20 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 0 - 22 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 4 - 20 +</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>* OutmA = 4 - 22 +</td>
<td>4</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 0 - 20 -</td>
<td>20</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 0 - 22 -</td>
<td>22</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>OutmA = 4 - 20 -</td>
<td>20</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>OutmA = 4 - 22 -</td>
<td>22</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 0 - 22 ±</td>
<td>22</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>OutmA = 4 - 20 ±</td>
<td>20</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>OutmA = 4 - 22 ±</td>
<td>22</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>OutmA = 0 - 20 -0+</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>OutmA = 0 - 22 -0+</td>
<td>0</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>** OutmA = 4 - 20 -0+</td>
<td>4</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>OutmA = 4 - 22 -0+</td>
<td>4</td>
<td>4.8</td>
<td>12.8</td>
</tr>
</tbody>
</table>

In hardware alarm conditions “HW ALARM” (interrupted coils, empty pipe, measure error) the current value is programmed by the function “mA v.fault” (pos. 4.5) and it is expressed as percentage of a fixed current range, where: 0% = 0 mA and 110% = 22 mA.

* Example 1: out 4-22 +

<table>
<thead>
<tr>
<th>mA</th>
<th>+100% F.S.</th>
<th>+100% F.S.</th>
<th>±100% F.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>+4 mA</td>
<td>±4 mA</td>
<td>±0 + 4mA</td>
</tr>
<tr>
<td>22</td>
<td>±41.2 mA</td>
<td>±41.2 mA</td>
<td>±100.2 mA</td>
</tr>
<tr>
<td>20</td>
<td>±28.6 mA</td>
<td>±28.6 mA</td>
<td>±92.8 mA</td>
</tr>
</tbody>
</table>

** Example 2: out 4-20 -0+

<table>
<thead>
<tr>
<th>mA</th>
<th>+100% F.S.</th>
<th>+100% F.S.</th>
<th>±100% F.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>+4 mA</td>
<td>±4 mA</td>
<td>±0 + 4mA</td>
</tr>
<tr>
<td>20</td>
<td>±20 mA</td>
<td>±20 mA</td>
<td>±50 mA</td>
</tr>
<tr>
<td>12</td>
<td>±6 mA</td>
<td>±6 mA</td>
<td>±30 mA</td>
</tr>
</tbody>
</table>
(POS. 8.5) Totalizer modify enable

Enable this function to modify the totalizer. From visualization pages, proceed in the following mode:
1) Push the key \(\Rightarrow\). Set the L2 CODE if required (otherwise go to step 2) and then push the key \(\Rightarrow\).
2) Positioning by the key \(\Rightarrow\) to modify the numerical value push the key \(\Rightarrow\) to access and then to confirm the modified value.
3) Positioning the cursor on “RESET TOTALIZ.?” Push the key \(\Rightarrow\) and then the key \(\Rightarrow\) to confirm or any other key to cancel this operation.

With the function 8.5 disabled it’s possible reset the totalizer by pushing the key \(\Rightarrow\) from visualization page, at the required “RESET TOTALIZ.?” Push the key \(\Rightarrow\) and then the key \(\Rightarrow\) to confirm or any other key to cancel this operation.

(POS. 8.7-8.8-8.9-8.10) Total/ Partial - totalizer reset enable

Activates the reset of Total and partial flow totalizer.

Functions 8.7-8.8-8.9-8.10 are activated by pressing the key \(\Rightarrow\) during the visualization of the function itself. When "EXECUTE?" is required, press the key \(\Rightarrow\) to proceed. Press any other key to delete the operation.

N.B.: The PARTIAL totalizers reset can also be achieved in the following way:
- From one of the visualization page press the key \(\Rightarrow\).
- Set the L2 code and press the key \(\Rightarrow\). The following prompt will be visualized: "EXECUTE?" Press the key \(\Rightarrow\) to proceed. Press any other key to delete the operation.

(POS. 8.13-8.14) Conversion factor for direct flow rate totalizers

Setting of the conversion/currency value for direct flow totalizers (positive). There are three setting fields for this parameter, from left to right: 1) monetary symbol, 2) default/personalized monetary symbol, 3) conversion coefficient. To select, set the cursor over the field to be modified. Setting the monetary symbol can be achieved in two ways:
1. Choosing one of the 7 predetermined monetary symbols (standard ISO 4217-REV81): EUR=Euro; USD=USA dollar; CAD=Canadian dollar; AUD=Australian dollar; GPB=English pound; CHF=Swiss franc; JPY=Japanese yen.
2. Entering a three character (numbers or letters) personalized currency. To change the characters, the cursor must be set on the symbol “/” (second field).

(POS. 10.1) Meter “calibration”

Enables the calibration function of the meter. The activation of this function happens by pressing the key \(\Rightarrow\) during the visualization of the function. The following question will be visualized: "EXECUTE?". Press the key \(\Rightarrow\) to proceed. Press any other key to delete the operation.

(POS. 10.2) “Self test” function

Meter auto test function. This function stops the normal functions of the meter and performs a complete test cycle on the measuring input circuits and the excitation generator. To activate this function, selecting it, by pressing the key \(\Rightarrow\), at the prompt: “EXECUTE?” press the key \(\Rightarrow\) to start the test, any other key will delete the operation. The result of the test is shown on the display, the display will return to one of the visualization pages at the test end. The function is automatically performed when the device is switched on. For any errors see page 28 for corrective actions.

(POS. 10.3) Flow rate simulation

Flow rate simulation enabling. This function allows for the possible generation of an internal signal that simulates the flow rate, allowing the outputs and all the connected instruments to be tested.
After enabling it, the flow rate simulation can be:
- set: by pushing the key \(\Rightarrow\) from one of the four visualization pages
- started: by pushing the key \(\Rightarrow\) after setting it
- finished: by pushing the key \(\Rightarrow\) from the visualization pages and then by pushing the key \(\Rightarrow\).

(see page 12 for description of key symbols)
### ALARM MESSAGES, CAUSES AND CORRECTIVE ACTIONS

<table>
<thead>
<tr>
<th>Messages</th>
<th>Anomalies</th>
<th>Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO ALARMS</td>
<td>All works regularly</td>
<td>.....</td>
</tr>
<tr>
<td>MAX ALARM</td>
<td>The flow rate is higher than the maximum threshold set</td>
<td>Check the maximum flow rate threshold set and the process conditions</td>
</tr>
<tr>
<td>MIN ALARM</td>
<td>The flow rate is lower than the minimum threshold set</td>
<td>Check the minimum flow rate threshold set and the process conditions</td>
</tr>
<tr>
<td>FLOW RATE &gt;FS</td>
<td>The flow rate is higher than the full scale value set on the instrument</td>
<td>Check the full scale value set on the instrument and the process conditions</td>
</tr>
<tr>
<td>PULSE/ FREQ&gt;FS</td>
<td>The pulse generation output of the device is saturated and cannot generate the sufficient number of impulses</td>
<td>Set a bigger unit of volume or, if the connected counting device allows it, reduce the pulse duration value</td>
</tr>
<tr>
<td>EMPTY PIPE</td>
<td>The measuring pipe is empty or the detection system has not been properly calibrated</td>
<td>Check whether the pipe is empty, or repeat the empty pipe calibration procedure</td>
</tr>
<tr>
<td>INPUT NOISY</td>
<td>The measure is strongly effected by external noise or the connecting cable from converter to the sensor may be broken</td>
<td>Check the status of the cables connecting the sensor, the grounding connections of the devices or the possible presence of noise sources</td>
</tr>
<tr>
<td>EXCITATION FAIL</td>
<td>The coils or the cable connecting the sensor are interrupted</td>
<td>Check the connecting cables to the sensor</td>
</tr>
<tr>
<td>CURR. LOOP OPEN</td>
<td>The 0/4...20mA output on board or the optional one are not correctly closed on a valid load</td>
<td>Verify the load is applied to the output (max 1000 ohm). To disable the alarm, set the “mA VAL.FAULT” value (menu alarm) to 0.</td>
</tr>
<tr>
<td>P.SUPPLY FAIL</td>
<td>Power supply different from that indicated on the label.</td>
<td>Verify that the power supply is as indicated on the label</td>
</tr>
</tbody>
</table>

### ANOMALY CODES

<table>
<thead>
<tr>
<th>Codes</th>
<th>Anomaly Description</th>
<th>Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001</td>
<td>problem with watch-dog circuit</td>
<td>Address to Service</td>
</tr>
<tr>
<td>0002</td>
<td>wrong configuration work data in eeprom</td>
<td></td>
</tr>
<tr>
<td>0004</td>
<td>wrong configuration safety data in eeprom</td>
<td></td>
</tr>
<tr>
<td>0008</td>
<td>defective eeprom</td>
<td></td>
</tr>
<tr>
<td>0010</td>
<td>defective keyboard (one or more key are pushed during the test)</td>
<td></td>
</tr>
<tr>
<td>0020</td>
<td>Power supply voltage (+3.3) is out of range</td>
<td>Check the status of the cables connecting the sensor to the converter, the grounding connections or the possible presence of strong and anomalous noise sources</td>
</tr>
<tr>
<td>0040</td>
<td>Power supply voltage (+13) is too low (&lt;10V)</td>
<td>Check the status of the cables connecting the sensor to the converter</td>
</tr>
<tr>
<td>0080</td>
<td>Power supply voltage (+13) it’s too high (&gt;14V)</td>
<td></td>
</tr>
<tr>
<td>0200</td>
<td>timeout calibration input (input circuit is broken)</td>
<td></td>
</tr>
<tr>
<td>0400</td>
<td>Input stage gaining is out of range</td>
<td></td>
</tr>
<tr>
<td>0800</td>
<td>Interruption on the coils circuit</td>
<td></td>
</tr>
<tr>
<td>0C00</td>
<td>Cumulative alarm 0800 + 0400</td>
<td>see single code</td>
</tr>
</tbody>
</table>
DECLARATION OF CONFORMITY

it declares under the own responsibility that the product:

Model converters

HML110

Model sensors

MS 500 - MS 501 - MS 600 - MS 1000 - MS 2410 - MS 2500 - MS 3700
MS 3770 - MS 5000

to which this declaration refers, is in compliance with the following Harmonized European Norms:

- CEI EN 61010-1(2001)
- CEI EN 61326-1 (2007)

and therefore answering to essential requirement of CE directives:

- 2006/95/CE (Low voltage directive - LVD)

25/11/2007