# SIGNAL MEASURING & RECORDING UNIT
# 0...5 V,  0...10 V AND 4 - 20 mA

C ←BUS

## UML 318  Eng.
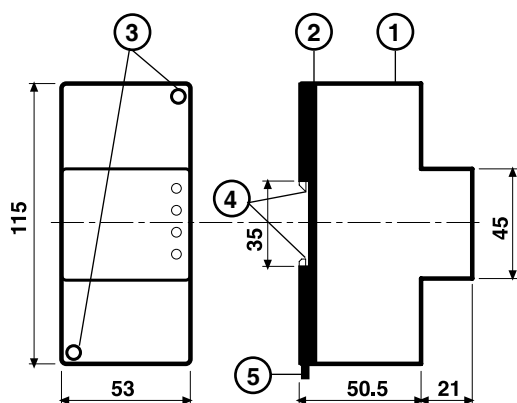
- **Complete processing of an analogue signal in the 0…5 V, 0…10 V & 4…20 mA ranges**
- **Setting input signals directly as physical magnitudes**
- **Alarms with relay outputs for minimum & maximum values**
- **Data Logger with ample space for measurements**
- **Complete telemanagement compatibility with automatic transmission of alarms**
- **Power supply: 230 V~; DIN 3 rail mounting**

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## 1. APPLICATION

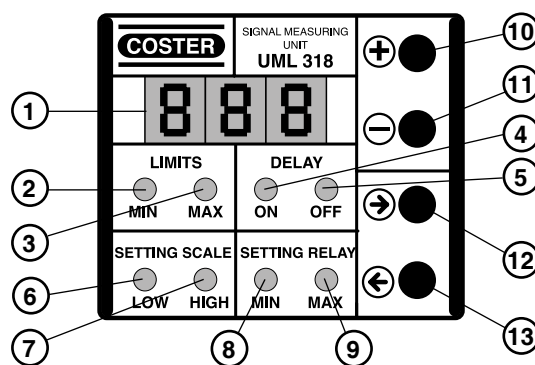The UML 318 unit is designed for the readout and processing of any type of physical magnitude expressed in values in the ranges 0…5V, 0…10 V or 4…20mA

## 2. OVERALL DIMENSIONS

1 – Protective cover for electronic components
2 – Base with transformer and terminal block
3 – Screws for securing base and cover
4 – DIN rail securing elements
5 – DIN rail release lever

## 3. FACIA

1 - Three-digit numerical display
2 - Measurement below MIN limit
3 - Measurement above MAX limit
4 - Delay relay on reaching  limits
5 - Delay relay on re-entry within limits
6 - Setting bottom of scale
7 - Setting top of scale
8 - Choice of MIN relay status (energised or de-energised)
9 - Choice of MAX relay status (energised or de-energised)
10-11 - Keys for entering values
12-13 - Keys for choice of functions

## 4. EXAMPLES OF SUITABLE DETECTORS

| Code | Description | Measurement range | Accuracy | Data sheet |
|---|---|---|---|---|
| **LGP 250** | Detector for measuring pressure (water or other liquid level) | 0...0.25 bar | ± 1% top of scale | N 515 |
| **LGP 500** | Detector for measuring pressure (water or other liquid level) | 0...0.5 bar | ± 1% top of scale | N 515 |
| - - - - - - | Any type of detector with 0...5 V, 0...10 V or 4 - 20 mA output | – | – | – |

## 5. TECHNICAL DATA

| | |
|---|---|
| Power supply | 230 V~ ± 10% |
| Frequency | 50 ... 60 Hz |
| Consumption | 2 VA |
| Protection | IP40 |
| Radio disturbances | VDE0875/0871 |
| Vibration test | with 2g (DIN 40 046) |
| Construction standard | Italian Electrotech. Committee (CEI) |
| Enclosure | DIN 3E module |
| Mounting | on DIN 35 rail |
| Materials: | |
| Base | NYLON |
| Cover | ABS |
| Ambient temperature: | |
| Operating | 0 ... 45 °C |
| Storage | – 25 ... + 60 °C |
| Ambient humidity | Class F DIN 40040 |
| Weight | 0.27 kg |

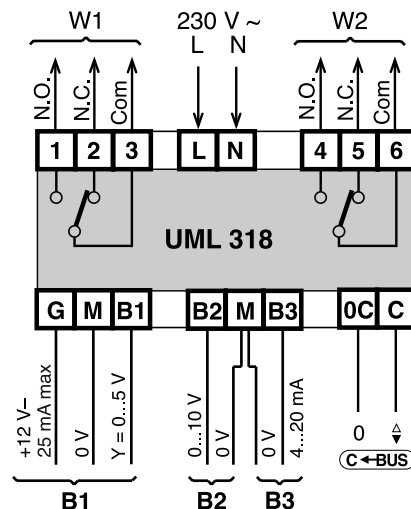| | |
|---|---|
| Choice of measurement ranges | 0…5 V, 0...10 V, 4 - 20 mA |
| Setting physical unit | any |
| Setting range MIN limit | 0.0…**10.0**…99.9% |
| Setting range MAX level | 0.0…**90.0**…99.9% |
| Hysterisis alarm Min and Max | twice the least significant figure |
| Direction of the hysterisis | Max down, Min up |
| Normal state of Min and Max level relays | Energised or **De-energised** |
| Delay On and Off switching by relays | 0...**3**...999 seconds |
| Number of recordings (max.) | 400 |
| Settings by PC : | |
| Interval between recordings | 5…**60** min....24 h |
| Delay acquiring alarms | 0…**1**…255 min. |
| Attempts send alarms | 2…**5**…200 |
| Interval between alarm calls | 2…**10**…210 min. |
| Output to powering any detector : | |
| Voltage | +12 V– |
| Maximum current | 25 mA max |

**COSTER**

## 6. SITING

UML 318 must be installed in a dry location that respects the ambient conditions given under 5.Technical Data. If sited in an ambience classified as Hazardous it must be installed in a cabinet for electrical equipment constructed according to the current regulations for the class of danger involved.

The controller can be mounted on a DIN rail and housed in a standard DIN enclosure.

## 7. WIRING DIAGRAM

B1 – Detector with 0…5 V output (as alternative to B2 and B3)
B2 – Detector with 0…10 V output (as alternative to B1and B3)
B3 – Detector with 4…20 mA output (as alternative to B1and B2)
C-Bus – Telemanagement data transmission
W1 – Output for minimum level limit
W2 – Output for maximum level limit
L – 230 V~
N – Neutral

**WARNING: the detectors B2 and B3 can, if necessary, be powered by the + 12 V– supply (max current 25 mA) from the UML 318 unit, as indicated for detector B1.**



## 8. ELECTRICAL CONNECTIONS

Proceed as follows :
• Separate base from cover (loosen the securing screws)
• Mount the base on the DIN rail and check that it is firmly anchored by the securing elements (2.4)
• Carry out the wiring according to the diagram and in compliance with current electrical regulations and using :
  – 1.5 mm$^2$ cables for power supply
  – 1 mm$^2$ cables for detectors and alarm.
  – 1 mm$^2$ for C-Bus. For length limits see data sheet T 021.
• Apply power (230 V~) and check its presence across terminals L and N.
• Remove power, replace cover on base/terminal block and secure it with the two screws supplied (2.3) .
You are advised not to insert more than two cables in a single terminal of UML 318 and, if necessary, to use an external junction box.

## 9. OPERATION

The input can originate from any detector with analogue output 0…5V, 0…10V or 4…20mA (a typical example: LGU 250 or LGU 500 probes for measuring liquid levels with 0…5 V output).

The UML 318 unit can process this signal in order to have:
  – readout of the measurement directly in physical units: for example, if the unit is combined with a probe for measuring liquid levels (LGP 250 or LGP 500) the display will show the level in meters, decimetres and centimetres
  – option of pre-setting a value for the maximum and minimum levels of magnitude.
  – two switches for minimum level (W1) and maximum level (W2), from which it is possible to program the intervention level, the delay times for On and Off and the delay in sending a telematic alarm.
  – program for the two relays to be normally energised or normally de-energised: this function serves to establish the "Fail to Safe" condition.
  – availability of a + 12V- (25 mA max) output for powering the detector if required.
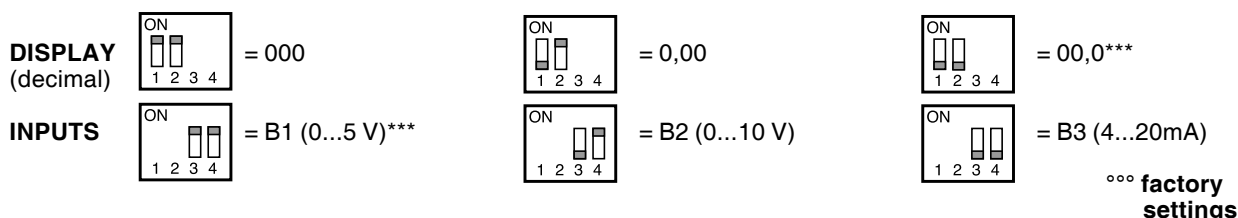  – recording measurement values in a powerful and capacious Data Logger
The Data Logger permits examining the trend of the values measured over a period of time: if the interval between two recordings is set to five minutes the Data Logger can record more than one day; after this period the oldest measurements are discarded (FIFO). If the interval between two recordings is set at one day (every 24 hours) the Data Logger can record for about one year; after this period it discards the oldest measurements (FIFO).
A period of one year permits, for example, seeing the trend in filling and emptying a gasoil tank over the entire heating season.

## 10. CONFIGURATION

It is essential to configure UML 318, by means of the dipswitches on the base, according to the type of input (0…5V, 0…10V, 4…20mA) and to the units you wish to read on the display, so as to adapt this readout to the chosen physical magnitude you wish to display.
The position of the dipswitch is shown in black (white on the actual unit).



DISPLAY (decimal)    = 000    = 0,00    = 00,0***

INPUTS    = B1 (0...5 V)***    = B2 (0...10 V)    = B3 (4...20mA)

°°° **factory settings**

We reserve the right to make changes witout notice

## 11. READOUT OF MEASUREMENTS & SETTINGS

### 11.1 READOUT OF MEASUREMENT AND WARNING SIGNALS

* **Readout of physical magnitude measured**: under normal operating conditions, the display shows, in real time, the value of the physical magnitude measured by the detector (B1, B2 or B3).

* **Signalling of level below minimum pre-set limit**: LED LIMITS – MIN  ashes.

* **Signalling of level above maximum pre-set limit**: LED LIMITS – MAX  ashes.

* **Press** ⊕ LIMITS – MIN LED lit.  Display shows the **minimum historic value** reached by  the physical magnitude measured (if you want to reset this value press ⊕ and ⊖ keys together).

* **Press** ⊕ LIMITS – MAX LED lit.  Display shows the **maximum historic value** reached by the physical magnitude measured (if you want to reset this value press ⊕ and ⊖ keys together).

* If for sixty seconds no key is pressed, the display, whatever it may be showing displays the measurement in real time of the physical magnitude.

* To return to the factory settings, switch off power to UML 318, wait a few seconds, and  then switch on power again whilst pressing the ⊖ and ⊕ keys until, in sequence, "ini" appears, followed by the program version, and then the physical magnitude measured.  At  this point release the keys.

* Using the same procedure, but keeping pressed the ⊕ and ⊕ keys at the same time, the sign "dic" appears, and the telemanagement keynumber is disabled.

### 11.2 SETTING PARAMETERS

The setting parameters must be entered after having configured the dipswitches (**see section 10**).

* The ⊕ and ⊕ keys permit selecting and displaying the setting parameters.

* The ⊕ and ⊖ keys permit adjusting the parameters seen on the display.

**Setting minimum level value**

* **Keep pressed** ⊕ until the display shows – – – , then release the key:

LED LIMIT – MIN **lit and display  ashing**:

Adjust with ⊕ or ⊖ until you read minimum desired level.

**Setting maximum level value the display shows – – – , then release the k**

* **Press** ⊕ LED LIMIT – MAX **lit and display  ashing**

Adjust with ⊕ or ⊖ until you read maximum desired level.

**Setting delay at ON of relay trip at minimum level**

* **Press** ⊕ LED LIMITS – MIN and LED DELAYS – ON **lit and display  ashing:**

Adjust with ⊕ or ⊖ (resolution 1 second, maximum value 999 seconds).

**Setting delay at OFF of relay trip at minimum level**

* **Press** ⊕ LED LIMITS – MIN and LED DELAYS – OFF **lit and display  ashing**:

Adjust with ⊕ or ⊖ (resolution 1 second, maximum value 999 seconds).

**Setting delay at ON of relay trip at minimum level**

* **Press** ⊕ LED LIMITS – MAX and LED DELAYS – ON **lit and display  ashing**:

Adjust with ⊕ or ⊖ (resolution 1 second, maximum value 999 seconds).

**Setting delay at OFF of relay trip at minimum level**

* **Press** ⊕ LED LIMITS – MAX and LED DELAYS – OFF **lit and display  ashing:**

Adjust with ⊕ or ⊖ (resolution 1 second, maximum value 999 seconds

**Choice of direct or indirect setting mode**

* **Press** ⊕ LED SETTING SCALE – LOW and SETTING SCALE – HIGH **lit and display  ashing**: with ⊕ or ⊖ choose between **"dir"** and **"ind"** :

 **"dir"** = direct setting method, carried out with measurements taken directly on site.

**"ind"** = indirect setting method, carried out by assigning two physical values corresponding to input 0 V or 4 mA and at input 5 V, 10V or 20 mA.

Later it will be explained how to check or adjust this setting.

**By default, UML 318 is programmed by the "ind" indirect method.**

### 11.3 SETTING PARAMETERS BY DIRECT METHOD ("dir")

**Setting of the "lower level" on the measurement scale**

* **Press** ⊕ LED SETTING SCALE – LOW **lit and display  ashing**

The setting of "INF" level can be carried out in several ways, according to the practical situation:

* **CASE No. 1**: it is easy to move the detector so that it gives an output corresponding to the "Zero" value of the physical magnitude to be measured.  The setting is carried out as follows: set the detector in the "Zero" measurement condition and, using ⊕ or ⊖ keys bring to zero the value indicated on the display.

For a pressure detector for measuring liquid levels, LGU 250 or LGU 500, either the tank is completely empty or the probe itself can be withdrawn from the liquid.

* **Keep pressing** ➤ until the display shows the sign **"cAL"** : in this manner the "Zero" calibration has been communicated to the unit..
  * **CASE No. 2** : the level is not "ZERO" but is sufficiently low (not more than 10% of the maximum) and so you can make a calibration of the lower level that is sufficiently accurate.
    Leave the detector in the normal measurement conditions, take the actual measurement and bring it to the display using ⊕ and ⊖ keys.
    For the pressure probes for measuring liquid levels, LGP 250 or LGP 500, you can measure the liquid level with a dipstick touching the bottom of the tank and then subtract the 7 centimetres that represent the height of the foot of the probe (see data sheet).

* **Keep pressing** ➤ until the display shows the sign "**cAL**"
  * **CASE No. 3** : it is impossible or very difficult to position the detector so that it measures "Zero", or the level measurement is more than 10% of the maximum level of the tank (level low but not too much). Under these circumstances it is better not to make the "Zero" setting and to postpone this setting until later when the level will be equal to zero, or very low, using the method described in CASE No. 1 or CASE No.2..

**Setting of "Higher level" of the measurement scale**

* **Press** ➤ **LED** SETTING SCALE – HIGH **lit and display ashing**
    Leave the detector in the normal measurement conditions, if it is equal to at least 30% of the scale, note the actual measurement (e.g. using a dipstick) and display it using ⊕ and ⊖ keys. The nearer the measurement is to the value of the Top of Scale of the system, the more accurate it will be.
    Again referring to the pressure probe for measuring liquid levels (LGU 250 or LGU 500),you can measure the level of liquid present in the tank and, accordingly, subtract the 7 centimetres that represent the height of the foot of the probe (see data sheet).

* **Keep pressing** ➤ until the display shows the sign "**cAL**"

## 11.4 SETTING BY INDIRECT METHOD ("ind")

**Setting of the "Lower level" on the measurement scale**

* **Press** ➤ **LED** SETTING SCALE – LOW **lit and display ashing** :
    using ⊕ or ⊖ move the value shown on the display to the value of physical magnitude corresponding to the value of the electrical input equal to 0 Volt (or 4 mA).

* **Keep pressing** ➤ until the display shows the sign "**cAL**"

**Setting of the "Higher level" on the measurement scale**

* **Press** ➤ **LED** SETTING SCALE – UPP **lit and display ashing**
    using ⊕ or ⊖ bring the value shown on the display to the value of physical magnitude corresponding to the Low Scale of the electrical input (5 V, 10 V or 20 mA).

* **Keep pressing** ➤ until the display shows the sign "**cAL**"

## 11.5 SETTING STATUS OF RELAYS (normally energised or normally de-energised)

**Setting normal status of minimum level relays**

* **Press** ➤ **LED** SETTING RELAY – MIN l**it and display ashing** :
    using ⊕ and ⊖ choose "ON" (relay normally energised) or "OFF" (relay normally de-energised)

**Setting normal status of maximum level relays**

* **Press** ➤ **LED** SETTING RELAY – MAX l**it and display ashing** :
    using ⊕ and ⊖ choose "ON" (relay normally energised) or "OFF" (relay normally de-energised)

**Telemanagement address**

* **Press** ➤ all the LEDs and the display (default: address "1") ashing.
    To adjust use ⊕ or ⊖

**Return to measurement of actual physical magnitude measured**

* **Press** ➤ display shows value of physical magnitude measured in real time by the detector.

**NB. : from any point on the display you can go back by using ⬅ arrow**.

AM 19.03.04 Rev. : AM 17.06.04; AM 21.09.04