

AN SERIES

CE

DIGITAL METER FOR USE WITH LOAD-CELL



MAGTROL

MODEL AN 1500 C

INSTRUCTIONS MANUAL

EDITION: May 21 2003
CODE: 30727213
Valid for panel meters #202 and so on

**AN 1500 C
English**

INTRODUCTION TO THE AN SERIES

The AN SERIES brings a new philosophy in digital panel instrumentation which is expressed by multipurpose, modular-concept devices providing a rich array of basic functions and advanced capabilities.

With a fully MODULAR DESIGN, it is possible to implement a wide variety of applications by only adding the adequate options.

Intelligence within allows the meter to recognize the options installed and ask for the necessary parameters to properly function within desired margins. The parameters related to non-installed options are removed from the program routines.

The instruments CALIBRATION is made at the factory eliminating the need for adjustment potentiometers. Any circuit or option liable to be adjusted incorporates a memory where calibration parameters are stored, making it possible the optional cards be totally interchangeable without need of any subsequent adjust.

Custom CONFIGURATION for specific applications can be made quickly and easily through five front panel keys, following structured choice menus aided by display prompts at each programming step.

Other features of the AN family include :

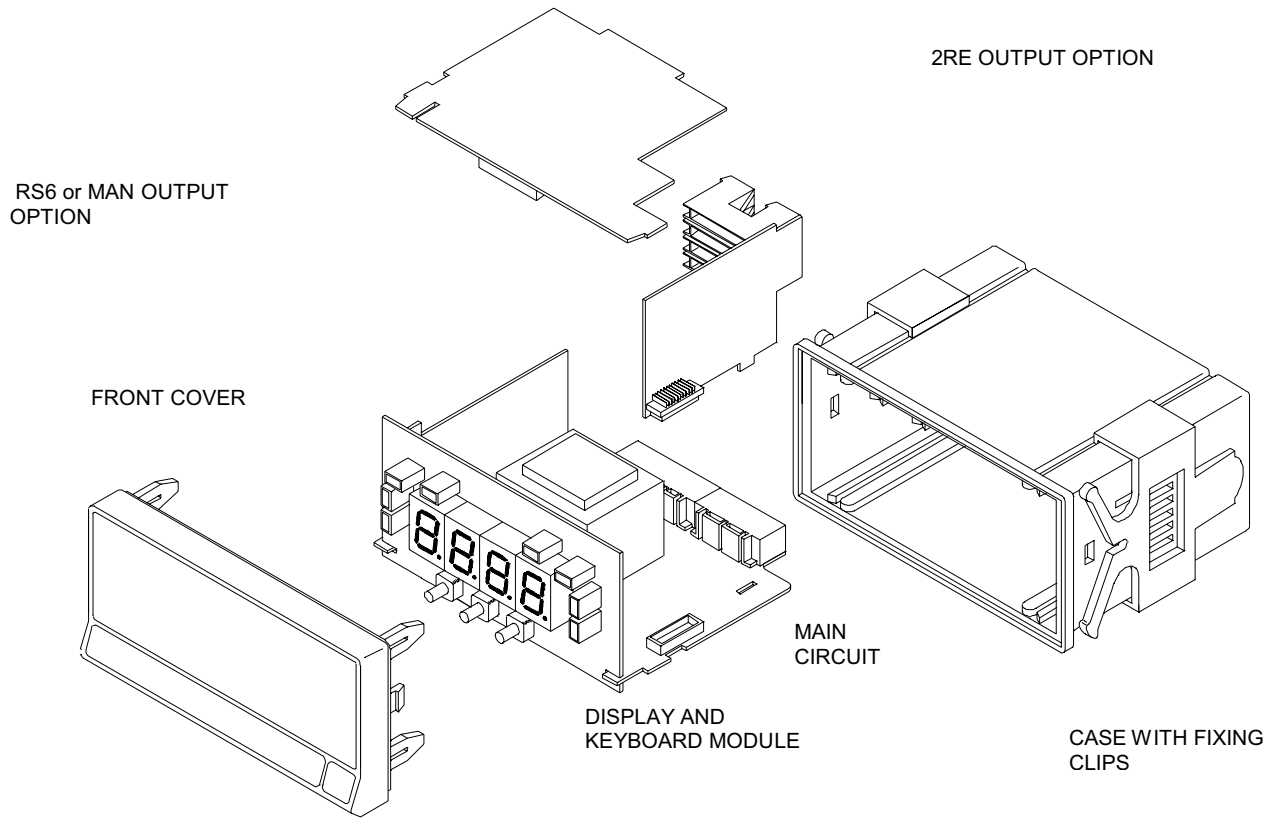
- CONNECTIONS via plug-in terminal blocks without screws and CLEMP-WAGO clips cable retention system.
- DIMENSIONS
Models AN 2000 96x48x120 mm DIN 43700
Models AN 1500 & AN 1000/1020 96x48x60 mm DIN 43700
- CASE MATERIAL UL-94 V0-rated polycarbonate.
- PANEL INSTALLATION without screws by means of
- single part fastening clips.

To guarantee the meter's technical specifications, it is recommended to recalibrate the meter at periodical intervals according to the ISO9001 standards for the particular application operating criteria. Calibration should be performed at the factory or in a qualified laboratory.

DIGITAL PANEL METER**AN SERIES****MODEL AN 1500 C**

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1. MODEL AN 1500 C

The AN 1500 C model is a four-digit, small format instrument that can be connected to a bridge type transducer such as load-cell for measurement of forces (weight, load, torque, pressure...).

Designed as simple, low-cost indicators but keeping the high performance qualities of the KOSMOS series, the AN 1500 models are well suited for applications of indication only with the possibility of incorporating communication outputs or analog output and setpoint control.

Fully configurable via software, the AN 1500 C model provides two software-selectable input ranges (30mV or 300mV) and two excitation voltages (10V or 5V) to accommodate different cell types and input sensitivities.

Two scaling methods (by keyboard or by input levels) and selectable display resolution makes it capable of measuring almost any process variable directly in engineering units.

Other standard features of the indicator are memory storage and display of the maximum (peak) and minimum (valley) readings as well as tare operation and reset of these memories.

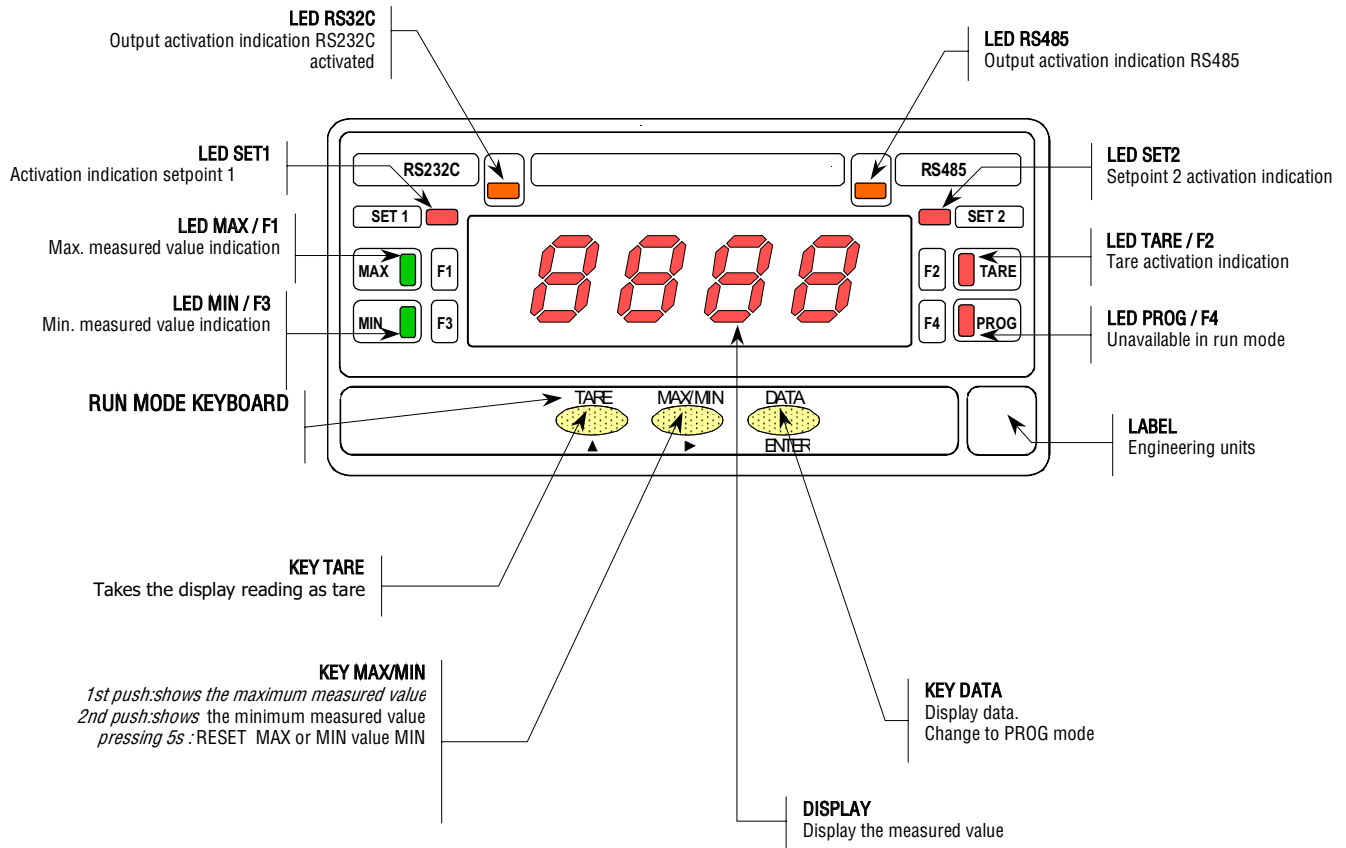
The basic instrument is a soldered assembly composed of the main board, the display and keyboard module and the input card

Extended capabilities are furnished by an optional output card that incorporates the RS232C and RS485 (RS6) communication protocols or output card analogue 4-20 mA (MAN) and a control card with 2 SPDT 8A relays (2RE).

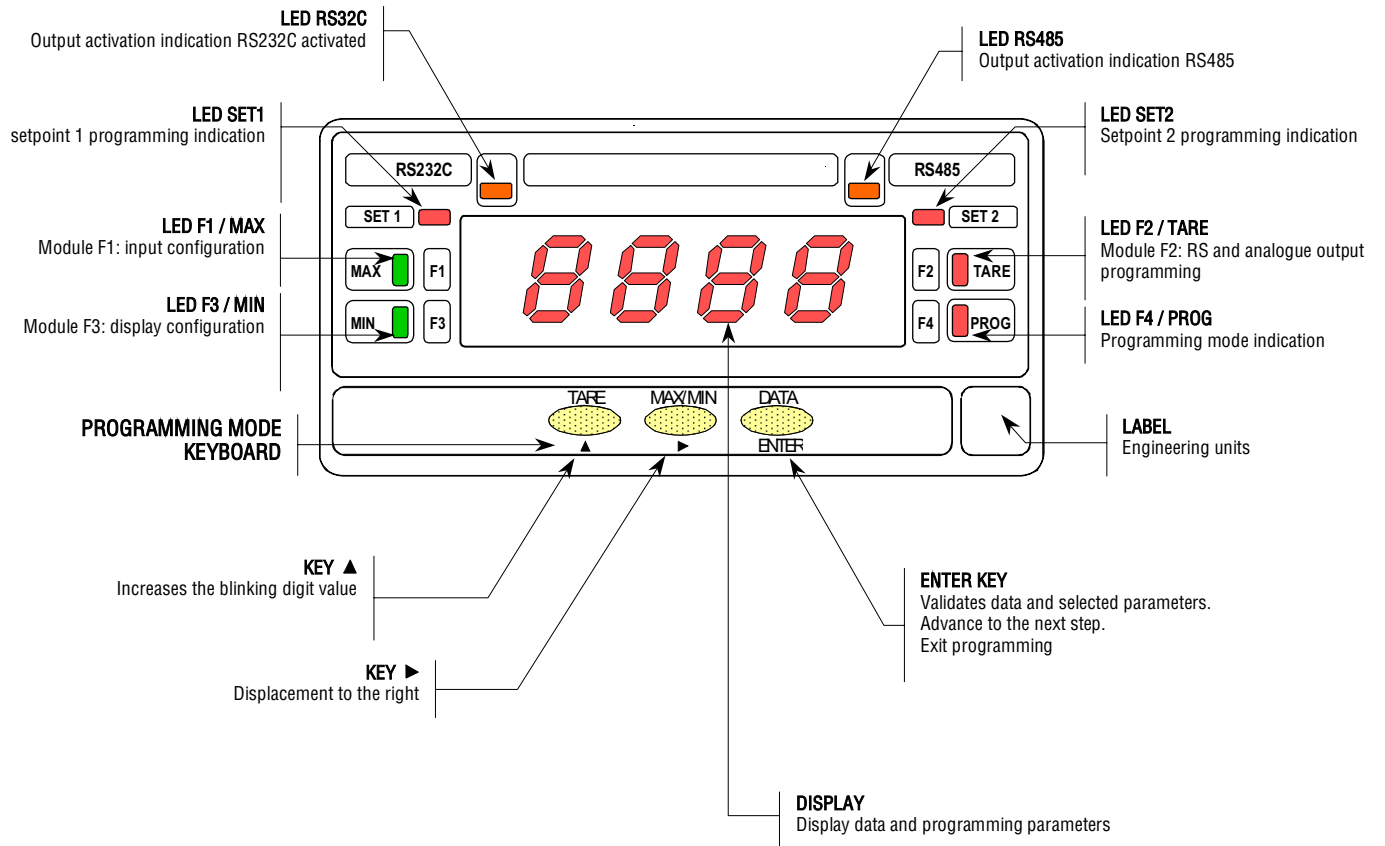
Each option provides independent connectors protruding out of the rear of the meter, status LED's visible from the front and a specific programming module which is automatically activated once the card is installed.

The outputs are opto-isolated with respect to the input signal, to the relays outputs and the power supply.

RUN MODE: FRONT PANEL FUNCTIONS



PROGRAMMING MODE: FRONT PANEL FUNCTIONS



2. INITIAL SETTINGS

PACKAGE CONTENTS

Instructions manual in English.

- ❑ Digital panel meter AN 1500 C.
- ❑ Accessories for panel mounting (sealing gasket and fastening clips).
- ❑ Accessories for wiring connections (removable plug-in connectors and fingertip).
- ❑ Wiring label stucked to the AN 1500 C
- ❑ Two sets of engineering units labels

✓ **Check the package contents.**

CONFIGURATION

Power supply (page. 9 y 10)

- ❑ Instruments supplied for 115/ 230 V AC power are factory set for 230 V AC (USA market 115 V AC).
- ❑ Instruments supplied for 24/ 48 V AC power are factory set for 24 V AC.
- ❑ If the instrument is supplied for 12V DC, 24V DC or 48V DC power supply, it is not necessary to make any change.

✓ **Check the wiring label before power connection.**

Programming instructions (page. 11)

- ❑ The software is divided into several independently accessible modules for configuration the input, the display, the setpoints, the analog output, the output communication and logic inputs.

✓ **Read carefully this section.**

Input type and excitation (page. 12-16)

- ❑ The instrument provides two excitation voltages to supply the transducer; 5 V or 10 V, are set up at fabrication for 10 V.
- ❑ The maximum voltage applicable to the instrument is 300 mV, there are two available input ranges, 30 mV or 300 mV.

✓ **Check transducer type and signal level.**

Programming Lock-out (page. 21)

- ❑ As shipped from the factory, the instrument allows full access to change programming parameters. To disable the possibility of making changes on the configuration, it is necessary to remove a plug-in jumper located on the solder side of the display board.

✓ **Check jumper position.**

2.1 – Supply and connections

To change the meter's physical configuration remove the case as shown in figure 9.1.

115/230 V AC: The instruments with 115/230 V AC power are set up at fabrication for 230 V AC (**USA market 115 V AC**), see figure 9.2. To change power supply configuration to 115 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

24/48 V AC: The instruments with 24/48 V AC power are set up at fabrication for 24 V AC, see figure 9.2. To change power supply configuration to 48 V AC, make the jumpers indicated in figure 9.3 and table 1. The wiring label should be modified to match the new configuration.

12, 24 or 48V DC: Instruments for DC power are set up for the supply voltage specified in the wiring label (12V, 24V or 48V according to the order reference).

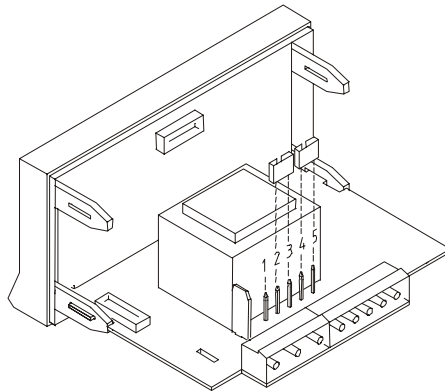


Fig. 9.2. Jumper settings for 230 V or 48 V AC

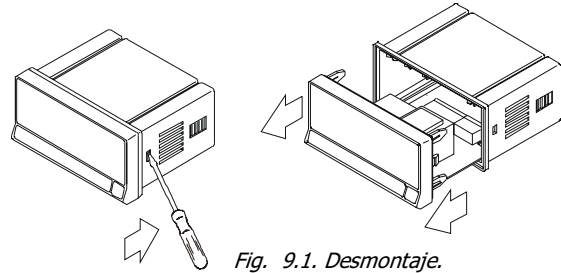


Fig. 9.1. Desmontaje.

Table 1. Jumper position.

Pin	1	2	3	4	5
230V AC	-	[Jumper]		[Jumper]	
115V AC	[Jumper]		[Jumper]		-
48V AC	-	[Jumper]		[Jumper]	
24V AC	[Jumper]		[Jumper]		-

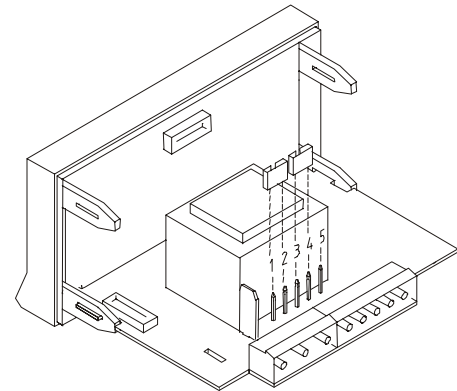
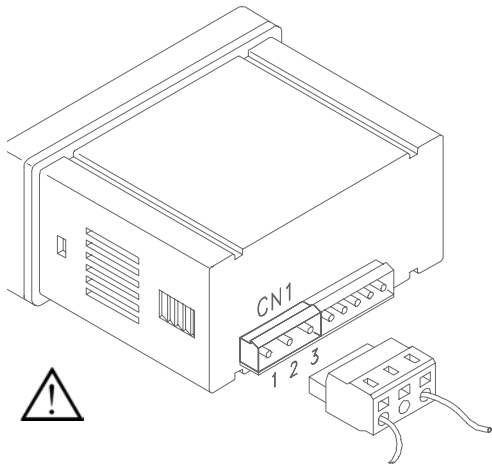


Fig. 9.3. Jumper settings for 115 V or 24 V AC

POWER CONNECTION



AC VERSIONS

- PIN 1 - AC PHASE
- PIN 2 - GND (GROUND)
- PIN 3 - AC NEUTRAL

DC VERSIONS

- PIN 1 - DC POSITIVE
- PIN 2 - NOT CONNECTED
- PIN 3 - DC NEGATIVE

WARNING

In order to guarantee electromagnetic compatibility, the following guidelines should be kept in mind:

- Power supply wires must be routed separated from signal wires. Never run power and signal wires in the same conduit.
- Use shielded cable for signal wiring and connect the shield to ground of the indicator (pin2 CN1).

INSTALLATION

To meet the requirements of the **directive EN61010-1**, where the unit is permanently connected to the mains supply it is obligatory to install a circuit breaking device near the equipment easy accessible to the operator. This dispositive should be marked as protection device.

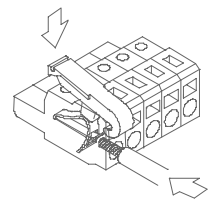
CONNECTORS

To perform wiring connections, remove the terminal block from the meter's connector, strip the wire leaving from 7 to 10mm exposed and insert it into the proper terminal while pushing the fingertip down to open the clip inside the connector as indicated in the figure.

Proceed in the same manner with all pins and plug the terminal block into the corresponding meter's connector.

Each terminal can admit cables of section comprised between 0.08mm and 2.5mm (AWG 26 ÷ 14).

The blocks are shipped with removable adaptors inserted in each terminal to provide proper fastening for cables of sections less than 0.5mm .



2.2 – Programming instructions

To enter in the programming mode

Connect the meter to the main supply, for approx. 1s a self-test routine automatically activates all the digits of the display. After, the instrument goes to the normal operating mode (RUN).

To enter in the programming mode press **ENTER**. On the display will appear **Pro** and F4 led activated. This led remains on as long as we are in programming mode.

To exit from the programming mode

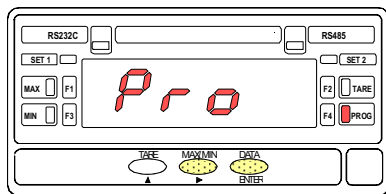
To return to the run mode, it is necessary to pass through the different menus with **▶**, until the led F4/ PROG is the only activated led. Then push **ENTER**. After, it automatically goes to the normal operating mode.

How to interpret the programming instructions

The programming software routine is composed by a series of hierarchically organized menus, each allowing the setting of a specific parameter. In general, the normal sequence at each step is to push the **▶** key a number of times to make changes and the **ENTER** key to store them into the memory and advance to the next step.

The elements used along the programming instructions are described following.

[11.1] Programming mode



The programming instructions for each menu step are accompanied by a figure representing the display indication for the corresponding parameter. Pay special attention to the LED indications and active keys and follow the procedure described on the text to introduce correctly the desired data.

When the display indication is represented with blank segments, it means that this is one of the possible options of this menu (normally the default one) depending on the previous selection.

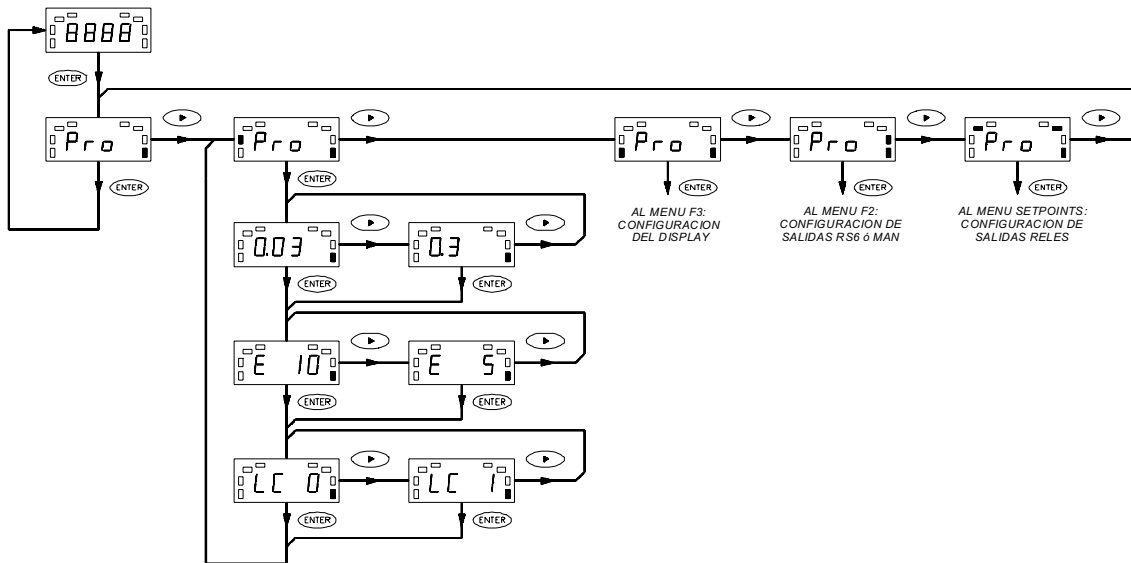
A series of blanked '8' represents any numerical value that can be changed by use of keys **▶** and **▲** (change digit) and **▲** (change value).

2.3 – Input configuration

The figure shows the diagram of the AN 1500 C programming routine where the MODULE 1 of input configuration has been developed. Before applying signal to the instrument's input, it will be necessary to enter into this module to make the following configurations:

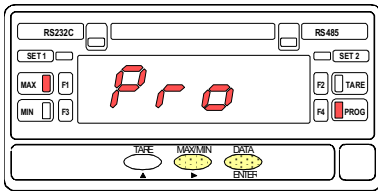
1. **Selection of the input level** (30mV or 300mV) that matches the transducer output range.
2. **Selection of the excitation voltage** (5V or 10V) that must supply the instrument to feed the transducer if necessary.
3. **Tare function lock-out.**

To access to the selection of the input parameters, press **ENTER** to move on from the run to the programming mode (**Pro** indication, **PROG** LED activated) and **▶**



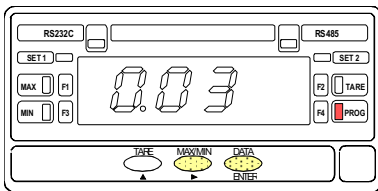
MENU F1 - INPUT CONFIGURATION

[13.1] Beginning



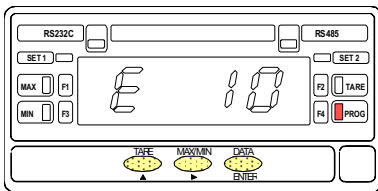
The entry level of the input configuration module is represented by the figure 13.1 (F1 and **PROG** LEDs activated). Press **ENTER** to get access to this module. Once completed the entire program sequence, the instrument returns to this stage. To return to the run mode, press **▶** key and, when only the **PROG** LED is activated, press **ENTER** to save changes in the memory and from the programming mode.

[13.2] Input range



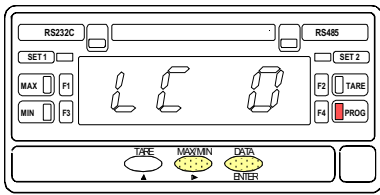
An **ENTER** made at previous step provides access to the selection of the input sensitivity. By pressing the **▶** key, the display toggles between the indications [**0.03** = 30 mV or **0.3** = 300 mV input range]. When the indication corresponding to the desired option appears on the display, press **ENTER** to validate the choice and so to the next program phase.

[13.3] Excitation



The figure 13.3 shows one of the two options that can be selected at this program step. The instrument can delivery two excitation voltage to feed the transducer. The **▶** key allows to change between [**E 10** = 10 V or **E 5** = 5V excitation] the option present on display, the **ENTER** key saves changes and advances to the next step.

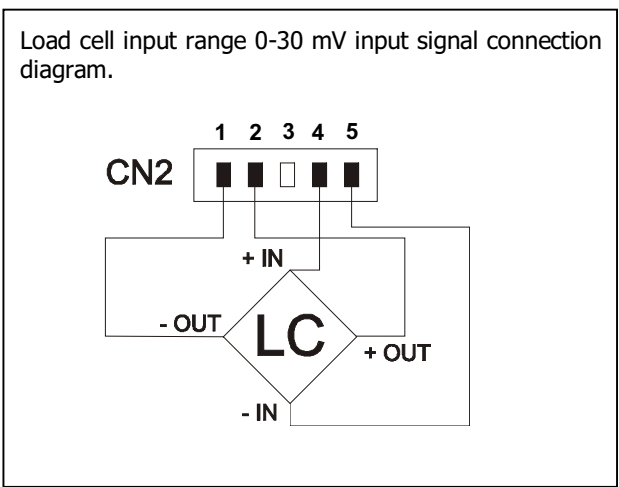
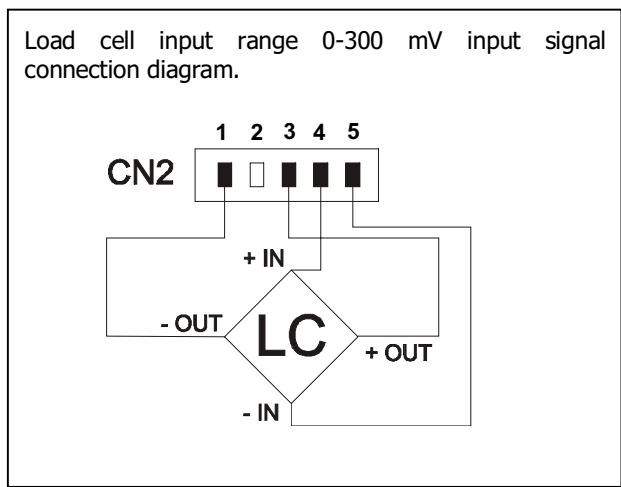
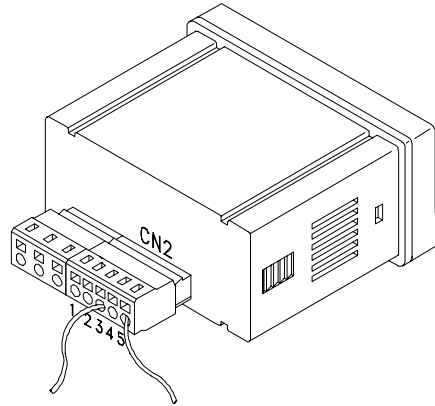
[14.1] Activate/Deactivate TARE



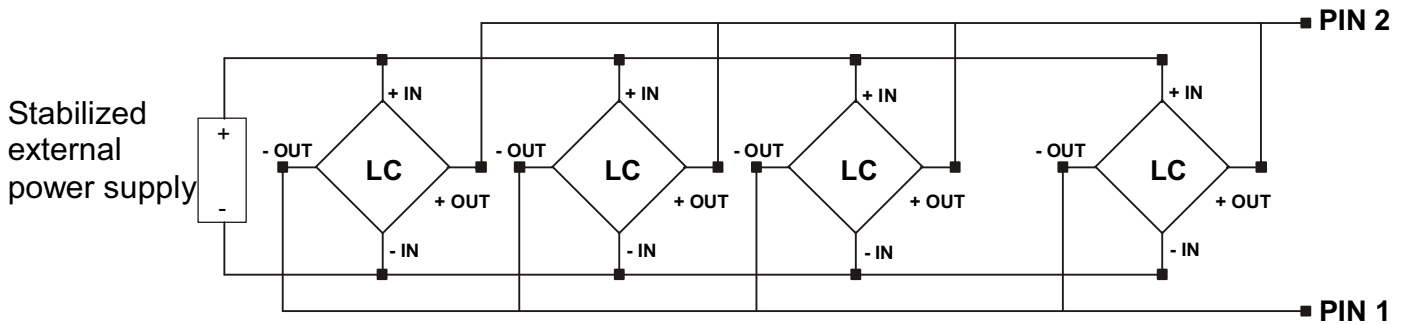
In this step it is possible to lock-out the **TARE** key so that the value stored in the memory can not be modified. The option **LC 0** enables the tare function and its reset to zero and the indication **LC 1** disables these function (locks out the TARE key).
 Press **▶** to change the option present on display and press **ENTER** to save changes and return to the level shown in fig. 13.1

3. / Input signal connection.
 Refer to the cell connection diagram and to the connection advices in page 10.

INPUT SIGNAL CONNECTION (CN2)
 PIN 1 = -IN (negative signal)
 PIN 2 = +IN 30 mV (positive signal 0-30 mV)
 PIN 3 = +IN 300 mV (positive signal 0-300 mV)
 PIN 4 = +EXC (positive excitation)
 PIN 5 = -EXC (negative excitation)



2 or more load cells input signal connection diagram. The cells must be connected in parallel and powered by an external stabilized power supply.



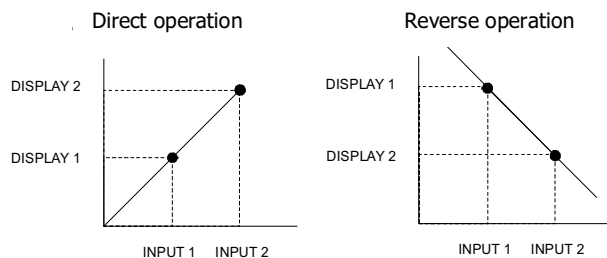
2.4 – Display configuration

After the input connection, it is necessary to program the display range to adapt the meter to the particular application in the desired units.

Scaling the display consist of programming two points by introducing two input values (INP1, INP2) and their corresponding display values (DSP1, DSP2). The decimal point position will complete the indication in the required engineering units. For the best possible accuracy, both points 1 and 2 should be approximately the process limits.

It is possible to set up the scale so that the display varies in reverse proportion to the input signal.

This is accomplished by programming the high display for the low input and the low display for the high input. The figure shows how to program points 1 and 2 for direct or reverse operation.



The diagram on page 18 represents the display configuration module. From the run mode, press **ENTER** to get access to the programming mode and twice **▶** to bring the meter to the access stage of the module (**Pro** indication, **F3** and **PROG** LED's activated). A new press of **ENTER** leads to the choice of one of the two available scaling methods.

The **SCA** mode consists of introducing via keyboard the display and the input values corresponding to points 1 and 2, and the decimal point position. During the programming, each of these parameters (except the decimal point) appear on the display after the symbol used in this manual to designate the 1 and 2 coordinates. The programming sequence is the following : INP1 - DSP1 - decimal point - INP2 - DSP2.

This method may be used preferently when the output of the transducer in the 1 and 2 conditions is well known.

The **INP** mode is identical but introduces a variant; After the symbols that call for the programming of the input values (INP1 and INP2), the actual input present at the connector appears on the display. A press of **ENTER** will be sufficient to take this value as the input parameter.

By using this method, it is not necessary to know which is the signal delivered by the transducer in the 1 and 2 conditions. If the transducer is connected to the process and its output applied to the meter, it will only be necessary to bring the variable under measure to the desired limits, take on the input by a touch of "ENTER" and program the corresponding display value via the keyboard.

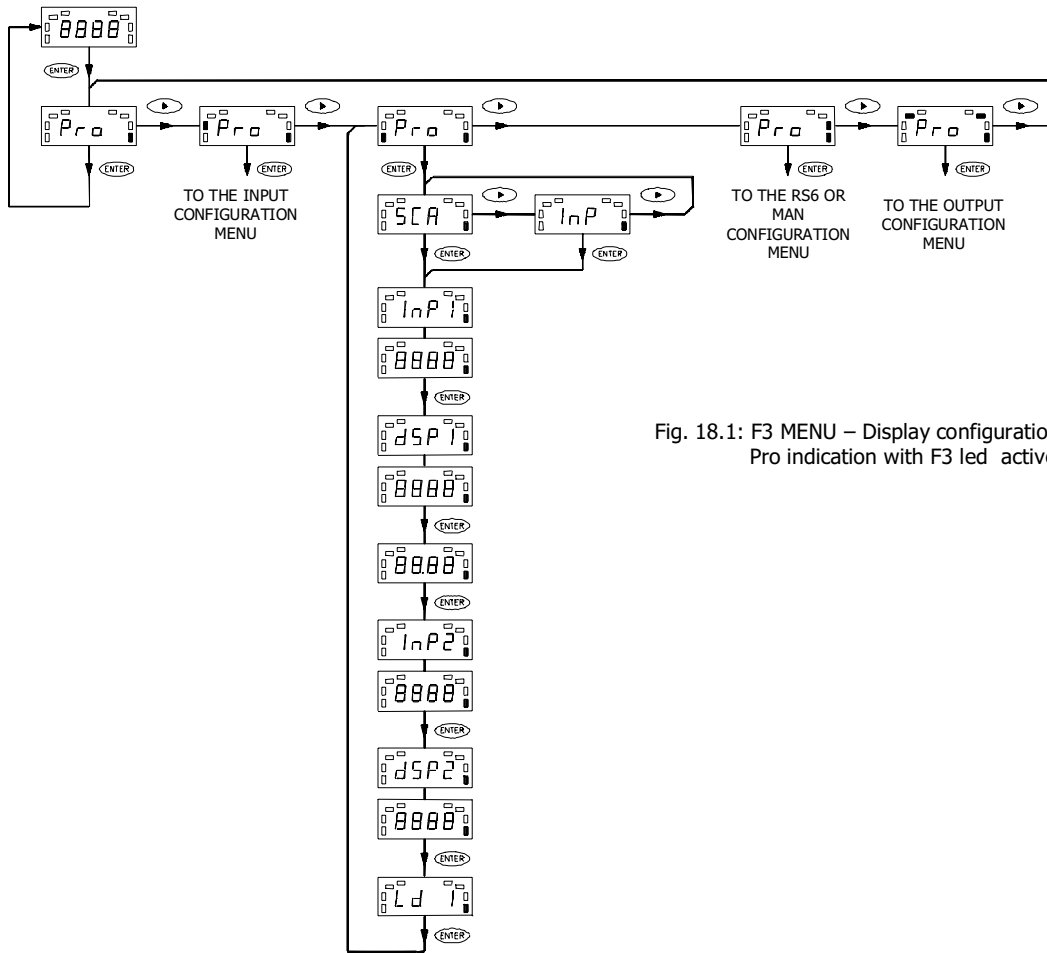
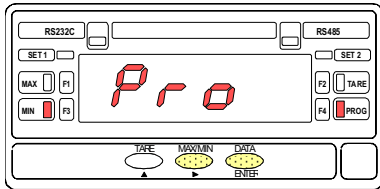


Fig. 18.1: F3 MENU – Display configuration.
Pro indication with F3 led active.

MENU F3 – DISPLAY CONFIGURATION

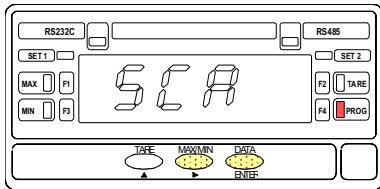
[19.1] Init



The figure 19.1 represents the entry level of the display configuration module (**F3** and **PROG** LEDs activated). Press **ENTER** to access this module.

After the programming has been completed, the instrument will return to this stage. From here, to go to the normal operation, press **▶** as many times as to deactivate all the functions LED's except the PROG one and press **ENTER** to store changes in the memory and exit from the program routines.

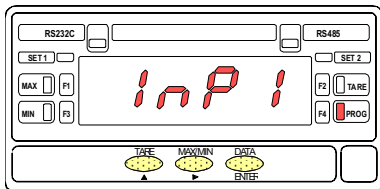
[19.2] Configuration method



A press of "ENTER" made at previous step gives access to the scaling mode selection stage. By pressing the **▶** key, the indications **SCA** and **INP** alternate on the display. **SCA** corresponds to the scaling method via keyboard and **INP** correspond to the method of validation of actual input values.

Leave the display indicating the desired method and press **ENTER** to access to the programming of the parameters via the chosen method.

[19.3] Input 1 value

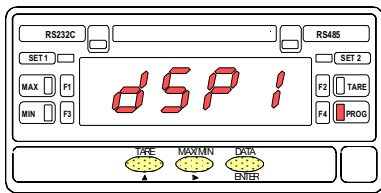


The indication shown in figure 19.3 is viewed for 2s before passing to the phase of programming the input value for the point 1 (INP1).

1./ If the "SCA" scaling method has been selected at previous step, after 2s or by pressing the key, the display will show any numerical value (depending on previous settings) with the first digit in flash. If desired to modify this item, press the **▲** key to vary the active digit from 0 to 9, and the **▶** key to advance to the next digit to be modified. Repeat these operations until the display reads the required value and press **ENTER**.

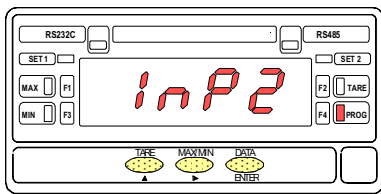
2./ If the "INP" scaling method has been selected at previous step, after the INP1 indication, the display reads the actual input signal present at the input connector. A press of **ENTER** takes this reading as the input value for the first point (INP1) and advances the meter to the next step.

[20.1] Display 1 value



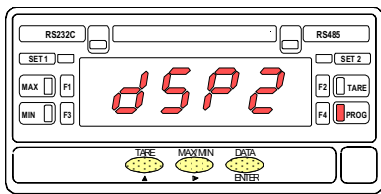
After programming the input value for the point 1, a press of "ENTER" provides access to the programming of the display value corresponding to this input (DSP1), preceded, for 2s, by the symbol shown in figure 20.1. Once the previously programmed numerical value appears on the display, to change it, press repeatedly the key to modify the value of the active digit and the key to advance to the next digit until the desired number is obtained. Press to store the data in the memory ; the decimal point then flashes to indicate that it is possible to change its position at this step. Press the key to shift the decimal point to the desired position. If no decimal point is required, it should be placed to the right extreme of the display. Press again to validate changes and pass to the next programming phase.

[20.2] Input 2 value



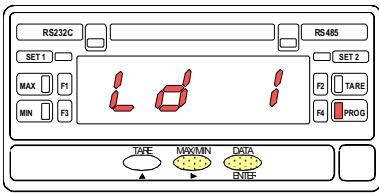
The figure at left shows the symbol that appears before the input value for the second point (INP2) is allowed to be programmed. After 2s, this symbol give way to the previously programmed number. Proceed as in the section 16.3 if wanted to change the current value : key to modify the value of the active digit and the advances one digit if the keyboard method (SCA) is being used, or press "ENTER" to accept the actual input value as the INP2 parameter if using the method of applying input levels (INP). Anyway, a press of validates the entry and advances to the next step.

[20.3] Display 2 value





After, the display shows the symbol corresponding to the programming of the display value for the second point (DSP2) followed by the previously programmed value with the first digit in flash. Proceed as indicated in the section 17.1 (and) to change the existing value and press to validate the entry and go to the next programming phase (fig. 20.1). If an option is installed, complete the device programming with the option's manual. If this is not your situation, you could exit the programming mode and ensure the correct function of you're an 1500 C.

[21.3] Last digit resolution



Once scaled the display, the last menu step offers the possibility of selecting the least significant digit resolution so that it may change in 1, or 10 counts steps.

The figure 21.3 shows the indication corresponding to this phase, where the previously programmed resolution is presented in the following format [**Ld 1** = variation in 1 count steps, **Ld 5** = variation in 5 counts steps **Ld 10** = variation in 10 counts steps].

To change the current configuration, press repeatedly the  key until the desired value appears on display and press  to save changes in memory and return to the **Pro** level represented in fig 19.1.

2.5 – Programming lock-out

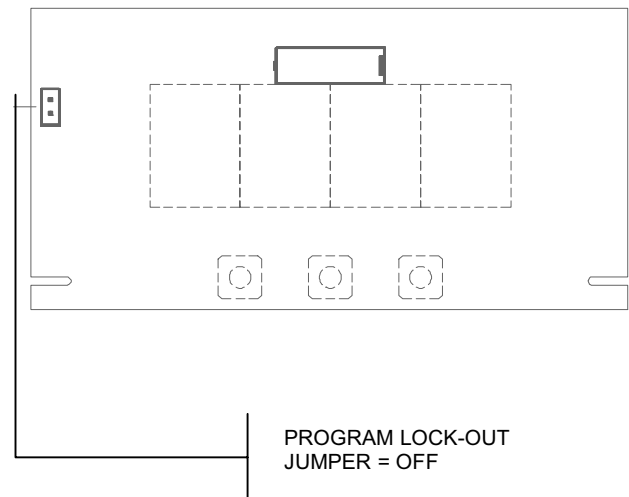
Once the instrument's programming has been completed, it is recommended to lockout the access to prevent from accidental or unauthorized modifications.

The locking is made by taking off a plug-in jumper located at the rear side of the display (see figure 10.1).

NOTE : Remove power before changing the jumper position.

While the instrument is locked out, it is however possible to access to the programming routines to check the current configuration, but it won't be possible to entry or modify data. In this case, the **Pro** indication is substituted by **dALA**.

Display circuit (solder side)

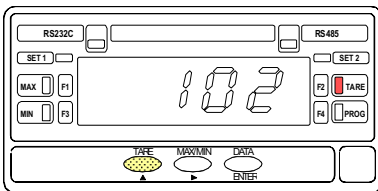


3. MEMORY FUNCTIONS

KEYBOARD FUNCTIONS

AN 1500 C provides three keys, all of them are operative in the programming mode while only "TARE" and "MAX/MIN" can be used in the run mode. It also provides four LED's for control functions and two for output status indication.

TARE. Each time this key is depressed, the current reading is removed from the display and stored in an internal memory. During the run mode, the "TARE" led indicates that the measure is being displayed with a false zero.



[22.1] Value stored as a TARE

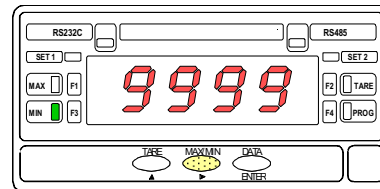
To erase the tare memory, press the TARE key and hold it for 5s at the end of which the display reads zero and the "TARE" LED deactivates ; the reset has been realized.

The tare function and its reset to zero can be disabled by software

MAX/MIN. The instrument detects and memorizes the maximum and minimum values (peak and valley) reached for the variable after the last reset.

The peak and valley values can be displayed at any moment during normal operation by pressing the "MAX/MIN" key. The first stroke calls up the peak value and illuminates the "MAX" LED. The second stroke recalls the valley value and activates the "MIN" LED. The third stroke deactivates the LED's and returns the meter to the normal reading.

To erase the peak and valley memories, press the **MAX/MIN** key to display the value wanted to be eliminated (the "MAX" and "MIN" LEDs indicate which one is present on the display). Press again **MAX/MIN** and hold it for 5 seconds after which the display shows -999 or 9999 indicating that the peak or valley memory respectively has been reset back to these values.



[22.2] MIN reset

4. OUTPUT OPTIONS

As an option, the AN 1500 C model can incorporate one or two of the following output cards (the RS6 and the MAN options are exclusive and can not be installed together in the same instrument) :

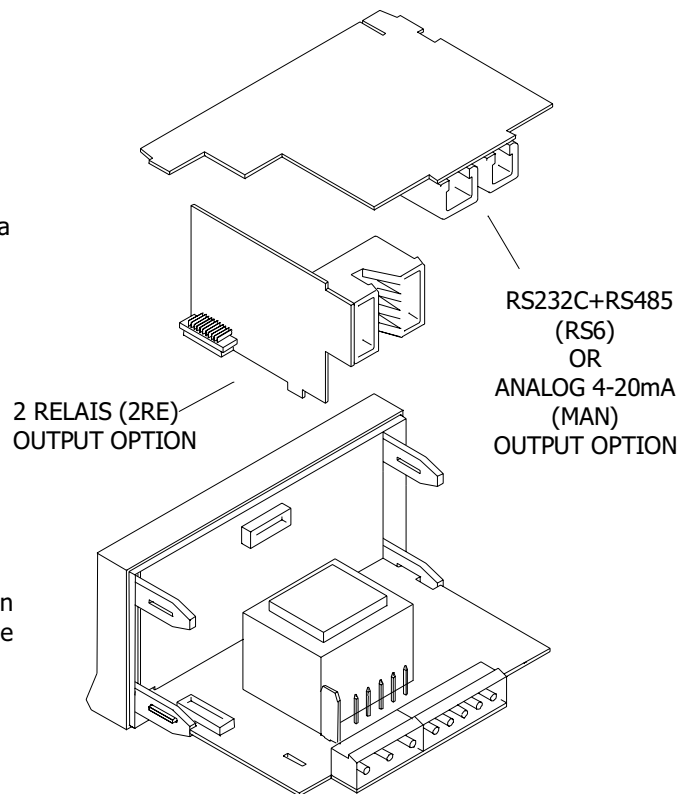
A serial outputs card with RS232C and RS485 communications protocol, 1200 to 9600 baud half-duplex. Both types are included in the option but only one of them can be operative as selected via software. Ref. **RS6**

An analog output card that drives out a 4 to 20 mA signal proportional to a user-defined display range. Ref. **MAN**

A control card with 2 SPST relay outputs rating 8A @ 250V AC / 150V DC. The outputs provide selectable HI/LO mode and programmable hysteresis or time delay. Ref. **2RE**

The output options consist of additional cards that are supplied with their specific instructions manual describing characteristics, installation, programming and operation.

Once installed in the meter's assembly by means of plug-in connectors, a program module is automatically included in the software routines.



5. TECHNICAL SPECIFICATIONS

INPUT SIGNAL

- Configuration differential asymmetrical
 - Maximum current ± 300 mV DC
 - Max. resolution $3 \mu\text{V}$
 - Input impedance 30 mV $100 \text{ M}\Omega$
 - Input impedance 300 mV $1 \text{ M}\Omega$
 - Excitation 5 V (30mA) or 10 V (30mA)

ACCURACY AT $23^\circ \pm 5^\circ \text{C}$

- Maximum error $\pm (0.1\% \text{ of the reading } +3 \text{ digits})$
- Temperature coefficient $100 \text{ ppm}/^\circ\text{C}$
- Warm up time 5 minutes

FUSES (DIN 41661)

- AN 1500 C (230/115V AC) F 0.1A / 250 V
- AN 1500 C2 (24/48V AC) F 2A / 250 V
- AN 1500 C3 (12 V DC) F 1A / 250 V
- AN 1500 C4 (24 V DC) F 0.5A / 250 V
- AN 1500 C5 (48 V DC) F 0.5A / 250 V

CONVERSION

- Technical dual slope
- Resolution (± 2000 points)
- Rate $12/ \text{s}$

DISPLAY

- Type -999/ 9999, 4 red digits 14 mm
- Decimal point programmable
- LEDs 4 functions and 4 outputs
- Display rate 330 ms
- Display overflow OvE
- Input overflow OvE

ENVIRONMENTAL

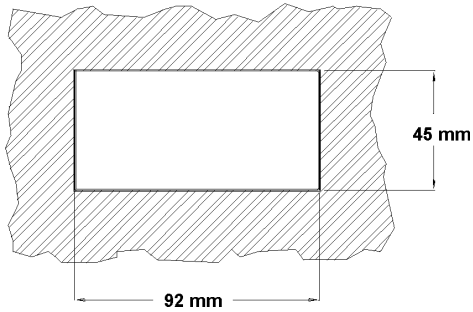
- Operating temperature -10°C to $+60^\circ\text{C}$
- Storage temperature -25°C to $+85^\circ\text{C}$
- Relative humidity $<95\%$ to 40°C
- Altitude 2000 meters

DIMENSIONS

- Dimensions $96 \times 48 \times 60$ mm
- Panel cutout 92×45 mm
- Weight 250 g
- Case material polycarbonate s/UL 94 V-0

5.1 - Dimensions and mounting

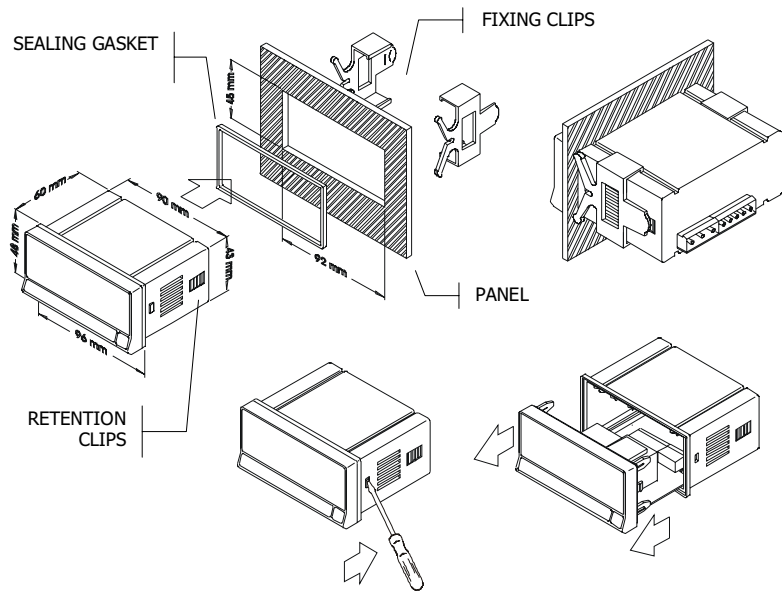
To install the instrument into the panel, make a 92x45mm cutout and insert the instrument into the panel from the front, placing the sealing gasket between this and the front bezel.



Place the fixing clips on both sides of the case and slide them over the guide tracks until they touch the panel at the rear side.

Press slightly to fasten the bezel to the panel and secure the clips.

To take the instrument out of the panel, pull outwards the rear tabs of the fixing clips to disengage and slide them back over the case.



CLEANING

The frontal cover should be cleaned only with a soft cloth soaked in neutral soap product. **DO NOT USE SOLVENTS**



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www.magtrol.com

MAGTROL INC

70 Gardenville Parkway
Buffalo, New York 14224 USA
Phone: +1 716 668 5555
Fax: +1 716 668 8705
E-mail: magtrol@magtrol.com

MAGTROL SA

Route de Moncor 4B
1701 Fribourg, Switzerland
Phone: +41 (0)26 407 3000
Fax: +41 (0)26 407 3001
E-mail: magtrol@magtrol.ch

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