

AN SERIES

INDICATOR FOR PROCESS CONTROL



MODEL AN 1500 P

INSTRUCTION MANUAL

EDITION: May 21 2003
CODE: 30727214
Valid for panel meters #190 and so on

AN 1500 P
English

INTRODUCTION TO THE AN SERIES

This manual does not constitute a formal agreement. All information given in this manual is subject to change without notice.

MAGTROL brings a new philosophy in digital panel instrumentation by using 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 simply by adding the desired option(s).

Built-in intelligence allows the meter to recognize the options installed and implement the necessary parameters to properly function within desired parameters. The basic instrument without output options omits these data in the program routines.

CALIBRATION is performed 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 adjustments.

Custom CONFIGURATION for specific applications can be made quickly and easily through three or 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 1000/1020, & AN 1500 96x48x60 mm DIN 43700
- CASE MATERIAL UL-94 V0-rated poly-carbonate.
- PANEL INSTALLATION by means of single part fingertip without screws.

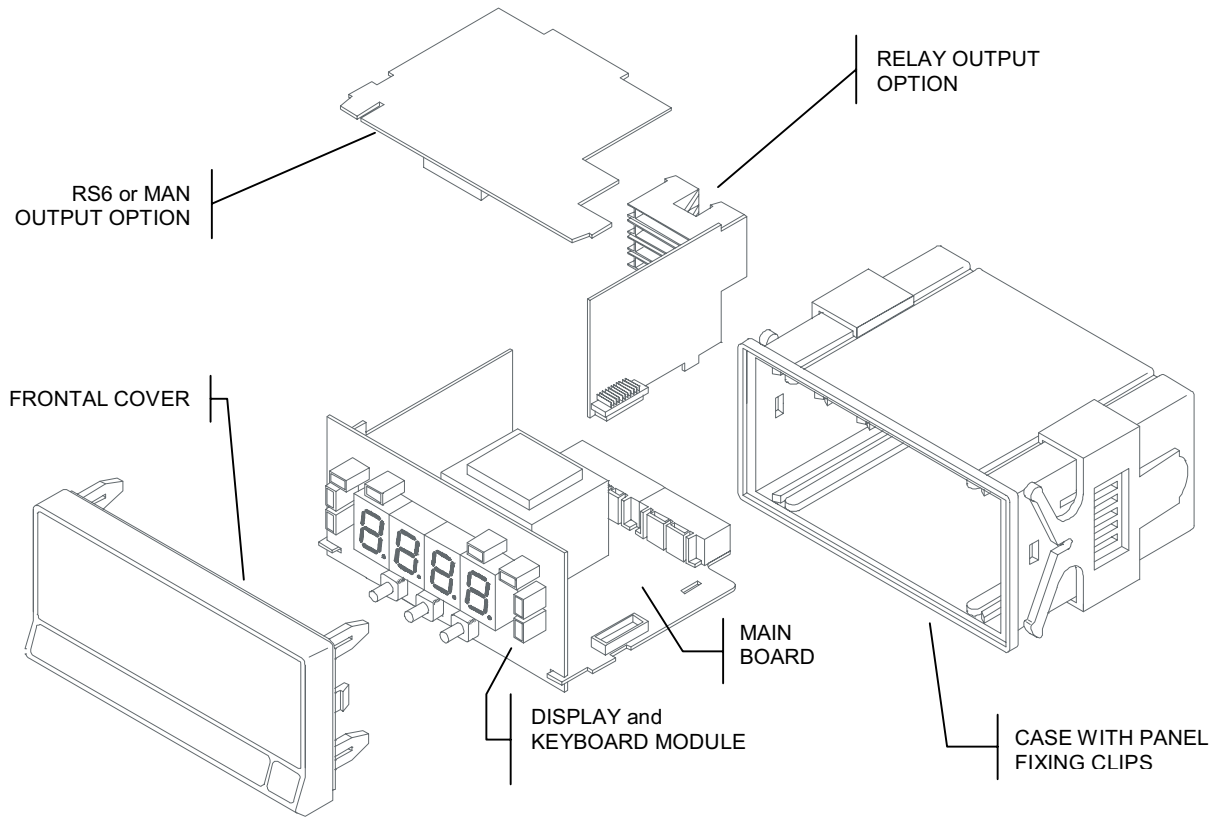
To guarantee the meter's technical specifications, it is advised to check calibration parameters at periodical intervals according to the ISO9001 standards for the particular application operating criteria.

Recalibration of the meter should be made at the factory or in a qualified laboratory.

DIGITAL PANEL METER**AN SERIES****AN 1500 P**

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1. MODEL AN 1500 P

The AN 1500 P model is a four-digit, small format instrument that accepts virtually any voltage or current process signal to measure process variables with direct indication in engineering units.

Designed as simple, low-cost indicators but keeping the high performance qualities of the Micra 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 software programmable, the AN 1500 P model provides selectable input type (voltage or current signals) and two excitation voltages (10V or 24V) to feed the transducer.

Two programming modes allow scaling the display to match desired 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 analogue 4-20 mA output card (MAN) and a control card with 2 SPDT 8A relays (2RE).

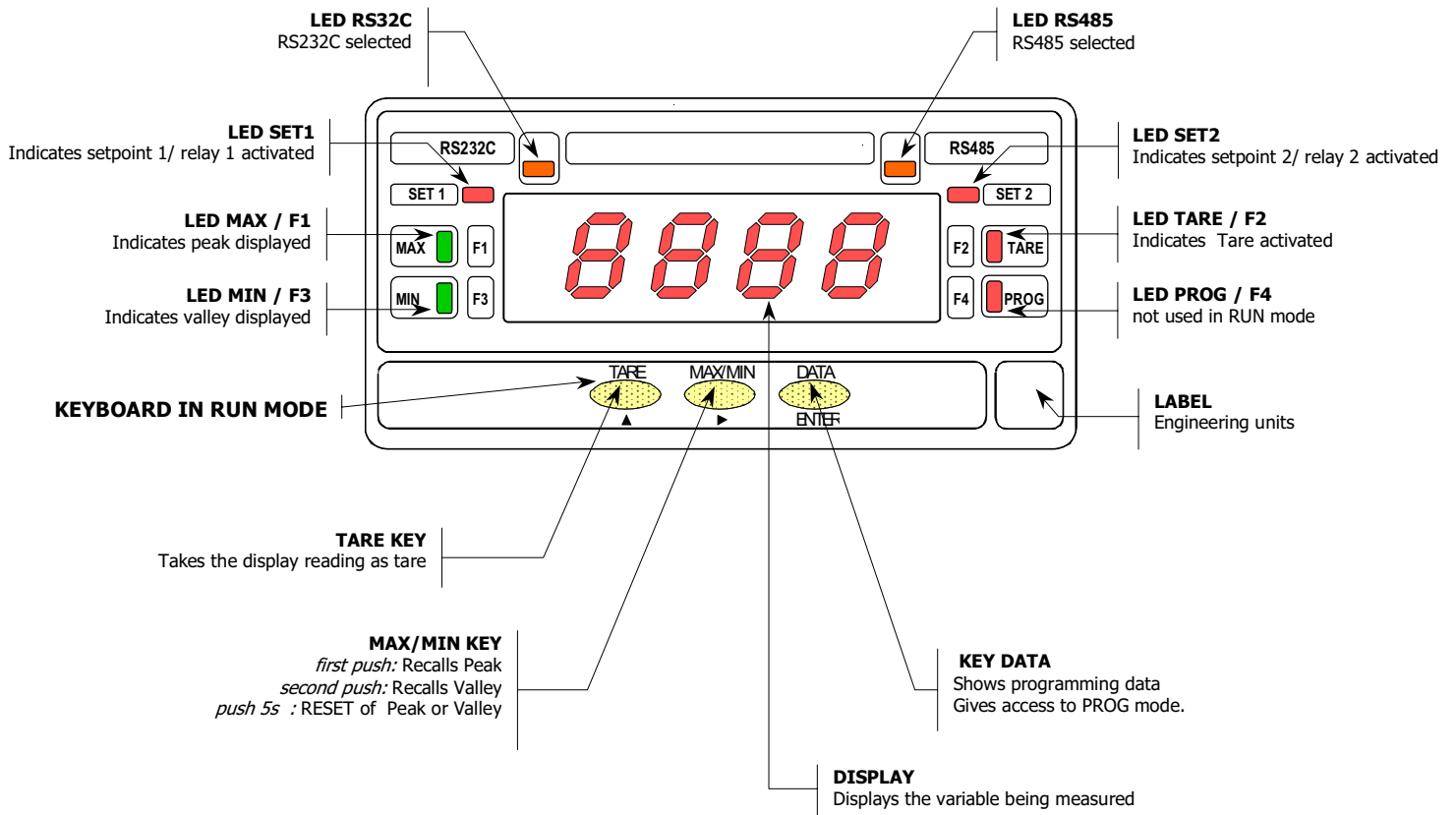
Each option provides independent connectors protruding out of the rear of the meter, status LED's visible from the front and a specific programming module which is automatically activated once the card is installed.

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

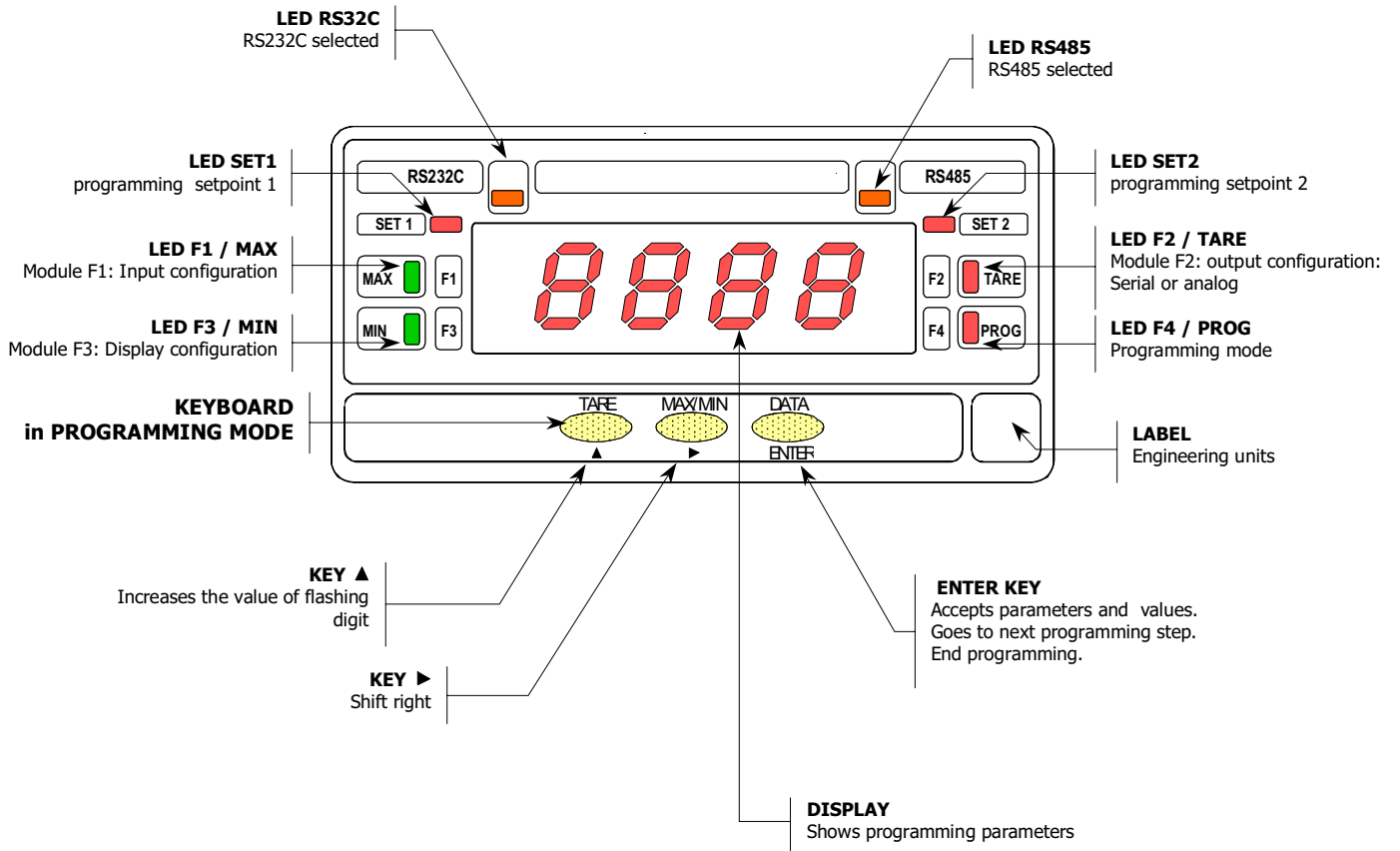


This instrument conforms the following community standards: 89/336/CEE and 73/23/CEE
WARNING: Refer to the instructions manual to preserve safety protections.

FRONT-PANEL FUNCTIONS DESCRIPTION (RUN MODE)



FRONT-PANEL FUNCTIONS DESCRIPTION (PROG MODE)



2. OPERATING INSTRUCTIONS

PACKING CONTENTS

- ❑ Instructions manual in English.
- ❑ The digital panel instrument AN 1500 P.
- ❑ Accessories for panel mounting (sealing gasket and fixing clips).
- ❑ Accessories for wiring connection (removable terminal block connectors and fingertip).
- ❑ Wiring label affixed to the instrument's case. Set of labels with different engineering units.
- ✓ ***Check packing contents.***

CONFIGURATION

Power supply (pages 9 & 10)

- ❑ The instruments for 115/230V AC power supply, are set up at the factory for 230V AC. **(USA market 115 V AC).**
- ❑ The instruments for 24/48V AC power supply, are set up at the factory for 24V 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 wiring label before connecting the instrument to the mains supply.***

Programming instructions (page. 11)

- ❑ The software inside the instrument allows configuring the input parameters. If a 2RE, RS6 or a MAN option is installed, the software detects it on power up enabling a specific routine for its configuration.

✓ ***Read carefully this paragraph.***

Input type (page 13-16)

- ❑ The instrument provides an input for process signals from transducers with output levels of $\pm 10V$ DC or $\pm 20mA$. In addition the instrument supply 24V DC for transducer excitation.

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

Programming lockout (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 – Power supply and connectors

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 (**US 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).

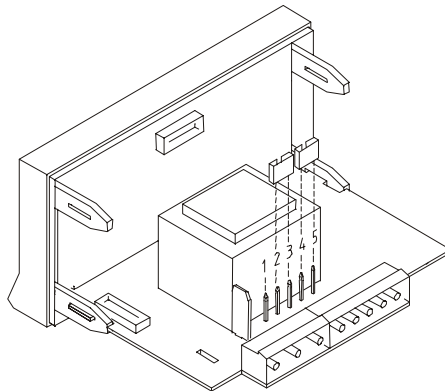


Fig. 9.2. Jumper settings for 230 V or 48 V AC

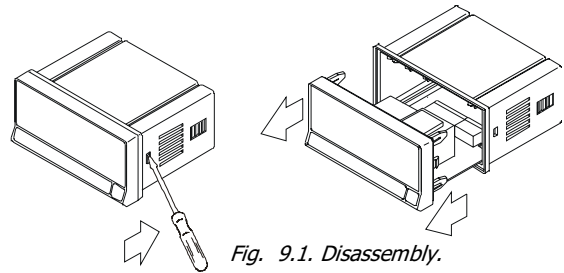


Fig. 9.1. Disassembly.

Table 1. Jumper settings.

Pin	1	2	3	4	5
230V AC	-	■	■	■	-
115V AC	■	■	■	■	-
48V AC	-	■	■	■	■
24V AC	■	■	■	■	-

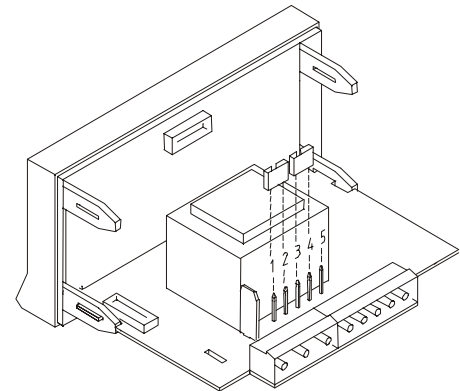
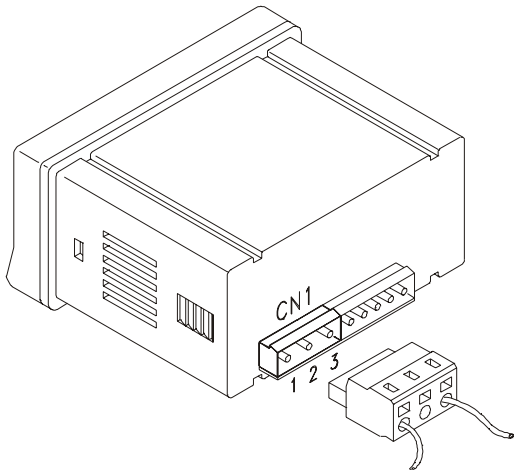


Fig. 9.3. Jumper settings for 115 V or 24 V AC

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

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 easy reachable to the operator and clearly marked as the disconnect device.

WARNING

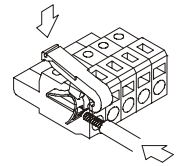
In order to guarantee the electromagnetic compatibility, the following guidelines should be kept in mind :

- Power supply wires may 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 the ground of the indicator (pin2 CN1).
- The cables section should be $\geq 0.25 \text{ mm}^2$

If not installed and used in accordance with these instructions, protection against hazards may be impaired.

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 shown in the figure.



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

Each terminal can admit wires of section between 0.08 mm^2 and 2.5 mm^2 (AWG 26 ÷ 14).

Some terminals have removable adaptors to provide proper fastening for wires of sections less than 0.5 mm^2 .

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

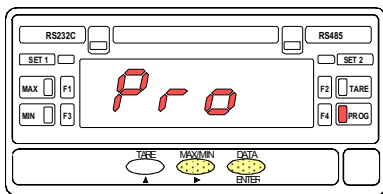
To return to the run mode, it is necessary to pass through the different menus with **▶**, until the led F4/ PROG is the only activated led. Then push **ENTER**. After, it automatically goes to the normal operating mode.

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).

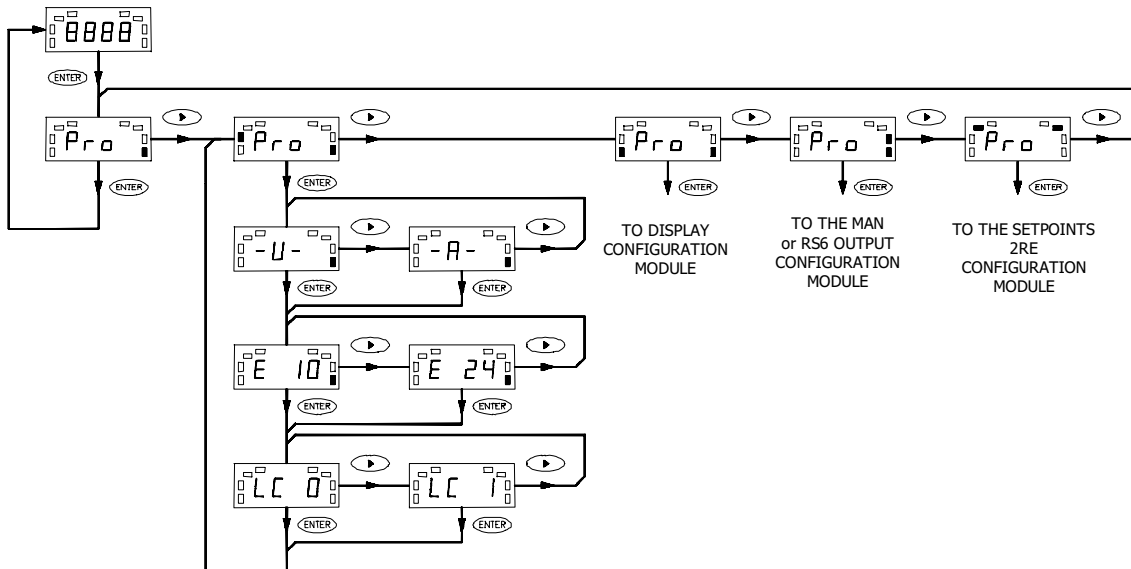
2.4 – Input configuration

Before input configuration: **Check the transducer sensitivity, for more detailed information, please consult the transducer specifications.**

The figure shows the diagram of input programming routine, before applying signal to the instrument's input, it will be necessary to enter into this module to make the following configurations:

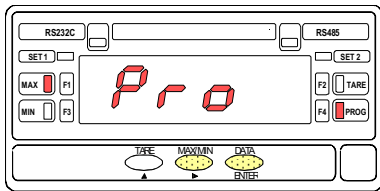
- **Selection of the input type.** (-U-) for transducers with voltage output or (-A-) for transducers with current output.
- **Selection of the excitation voltage** (24V or 10V) that must supply the instrument to feed the transducer if necessary.
- **Tare function lock-out.**

The next pages gives the step-by-step input programming instructions and the connection of the transducer.



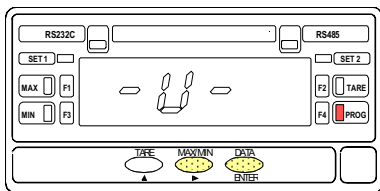
MENU F1 – INPUT CONFIGURATION

[13.1] Beginning



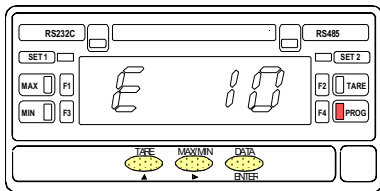
The entry level of the input configuration module is represented by the fig. 13.1 (leds F1 y PROG activated). Press **ENTER** to get access to this module. Once completed the entire program sequence, the instrument returns to this stage. To return to the run mode, press **▶** and, when only the PROG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

[13.2] Input type

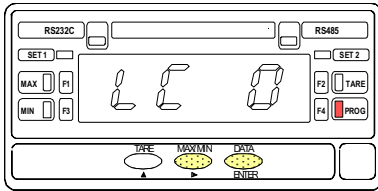


An **ENTER** made at previous step provides access to the selection of the input type. By pressing **▶**, the display toggles between the indicators [-U- =input voltage or -A- input milliamperes =]. When the indication corresponding to the desired option appears on display, press **ENTER** to validate the choice and go to the next programming step.

[13.3] Excitation selection



The fig. 13.3 shows one of the two options that can be selected at this program step. The instrument can deliver two excitation voltages to feed the transducer [E 10 = 10 V or E 24 = 24 V]. The **▶** allows to change the option present on display, after the **ENTER** goes 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).

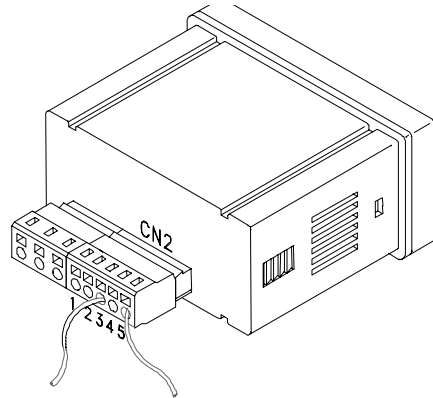
Press **▶** to change the option present on display and press **ENTER** to save changes and return to the level shown in fig. 13.1

2.4 – Input signal connection

Refer to the transducer's specifications and to the wiring advisements given in page 10.

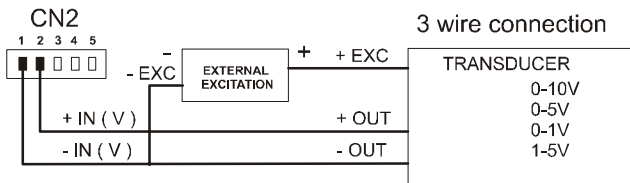
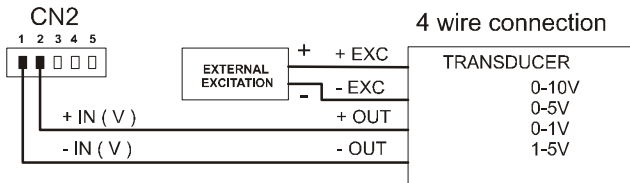
SIGNAL CONNECTION (CN2)

- PIN 1 = -IN (signal negative, V/mA)
- PIN 2 = +IN [V] (signal positive, V)
- PIN 3 = +IN [mA] (signal positive, mA)
- PIN 4 = +EXC (excitation positive)
- PIN 5 = -EXC (excitation negative)

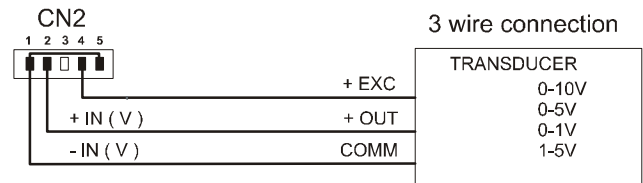
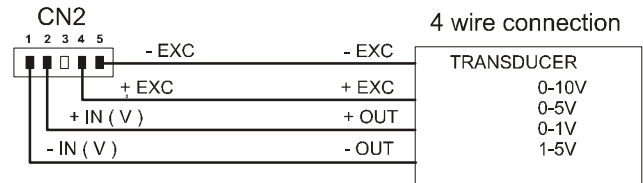


Signal wiring schematics for transducers with voltage output

CONNECTION WITH EXTERNAL EXCITATION

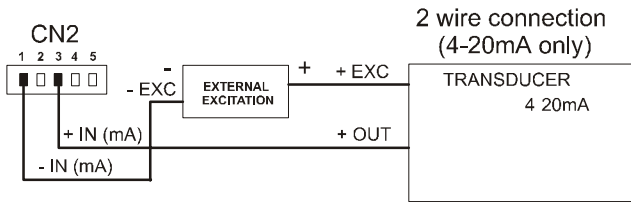
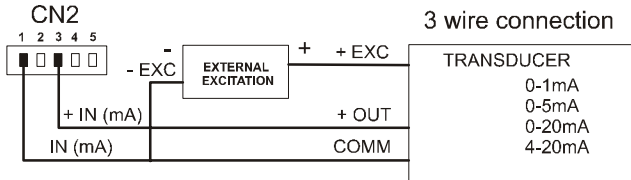
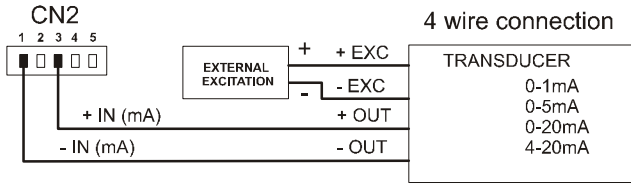


EXCITATION SUPPLIED BY AN 1500 P

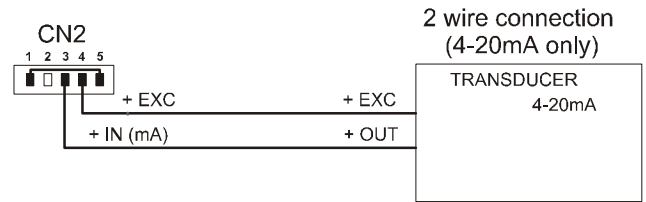
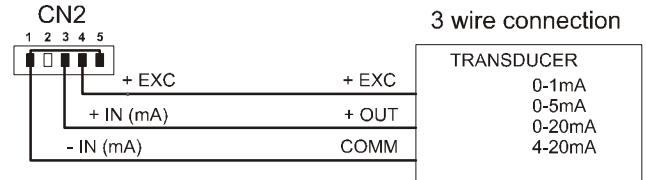
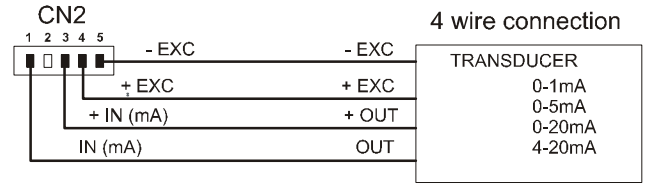


Signal wiring schematics for transducers with current output

CONNECTION WITH EXTERNAL EXCITATION



EXCITATION SUPPLIED BY AN 1500 P



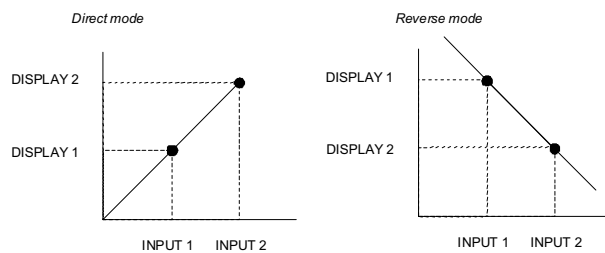
2.6 - Display Configuration

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

Scaling the display consist on 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 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 high input. The figure shows how to program points 1 and 2 direct or reverse operation.



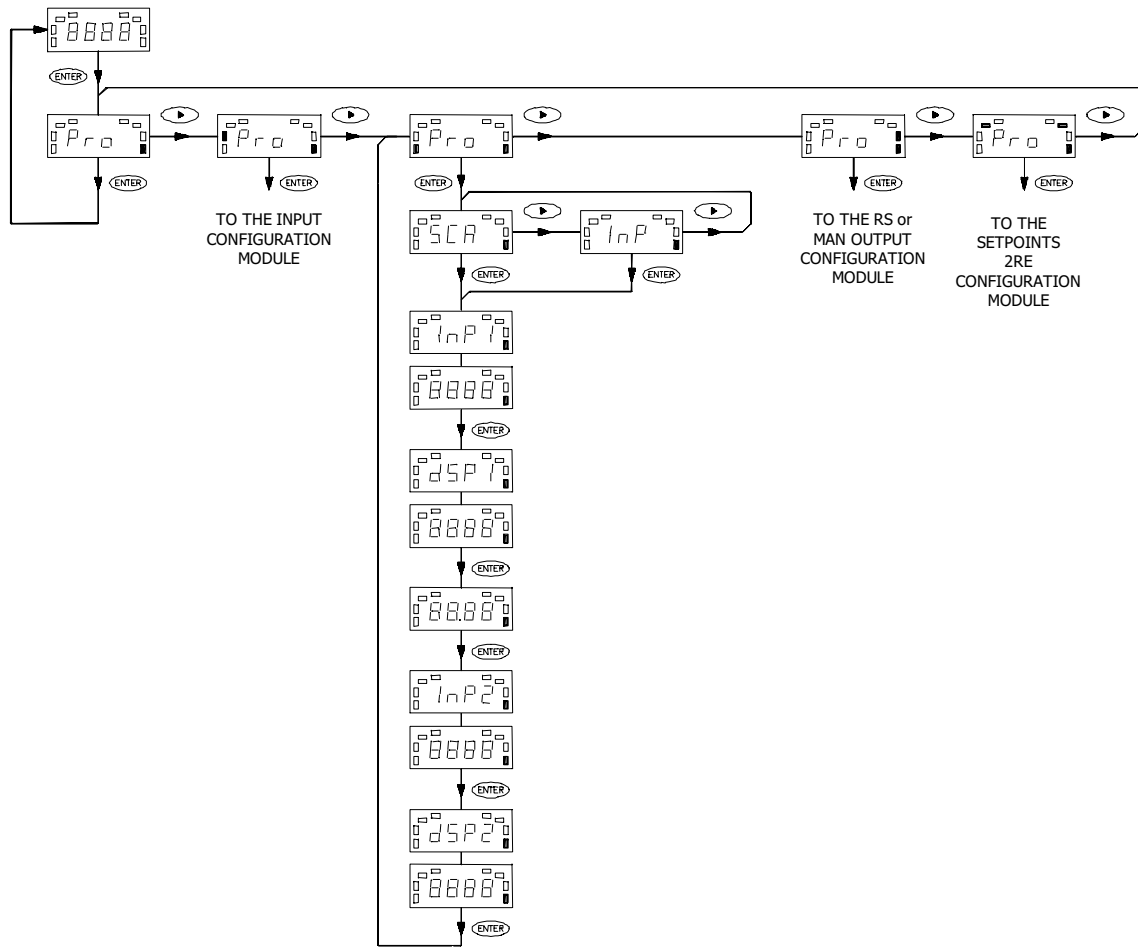
The diagram on page 18 shows the display configuration module (led F3 on). From the run mode, press **ENTER** to get access to the programming mode and twice **▶** to bring the meter to the access stage of the module (**Pro** indication, **F3** and **PROG** LED's activated). A new press of **ENTER**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

The **SCA** mode consists of introducing via keyboard the input and the display 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 preferably when the output of the transducer in the 1 and 2 conditions is well known.

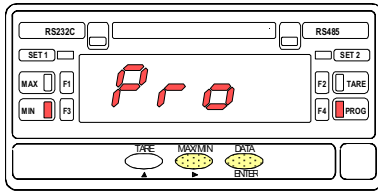
The **INP** mode is identical but introduces a variant; After the symbols that call for the programming of the input values (INP1 and INP2), the actual input present at the connector appears on the display. A press of **ENTER** will be sufficient to take this value as the input parameter.

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.



MENU F3 – DISPLAY CONFIGURATION

[19.1] Beginning

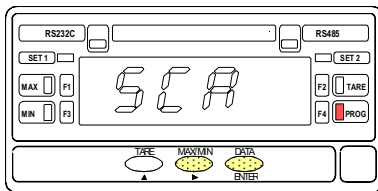


The figure 19.1 represents the entry level of the display configuration module (F3 and PROG LEDs activated). Press **ENTER** to access this module.

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.

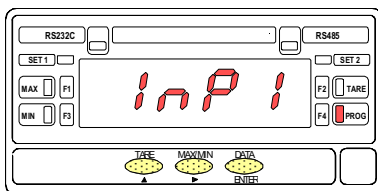
[19.2] Scaling method



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

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

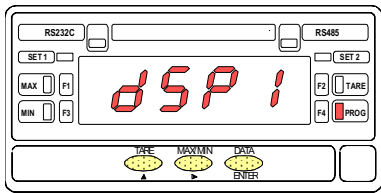


The indication "**InP1**" is viewed for 2s before passing to the phase of programming the input value for the point 1 (INP 1).

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

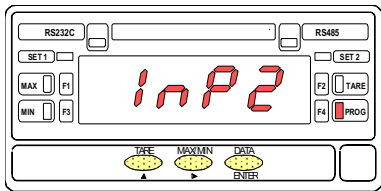
If the **INP** method has been selected, the display reads the actual input signal present at the input connector. A press of **ENTER** takes this reading as the input value for the first point (INP 1) and advances to the next step.

[20.1] Display 1



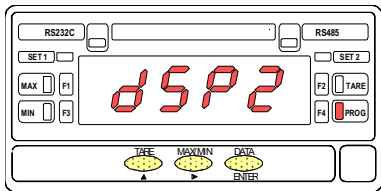
After programming INP 1 a press of **ENTER** provides access to the programming of the display value corresponding to this input, showing for 2 seconds the symbol **DSP 1**. Once the previously programmed numerical value appears on the display, to change it, press repeatedly **▲** to modify the value of the active digit and **▶** to advance to the next digit until the desired number is obtained. Press **ENTER** 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 **▶** to shift the decimal point to the desired position. If no decimal point is required, it should be placed to the most right place of the display. Press again **ENTER** to validate changes and pass to the next programming phase.

[20.2] Input 2



The symbol "InP2" will be shown during 2s before to give access to program (INP2). Proceed as in 19.3 if wanted to change the current value; **▲** modifies value, **▶** advances one digit if the keyboard (SCA) is being used, or press **ENTER** to accept the actual input value as the INP 2 parameter if using the method of applying input levels (INP). Anyway, a press of **ENTER** validates the entry and advances to the next step.

[20.3] Display 2



After, the display shows the symbol corresponding to the programming of the display value for the second point (DSP 2) followed by the previously programmed value with the first digit in flash. Proceed as indicated in the section 20.1 (**▲** and **▶** procedure) to change the existing value and press **ENTER** to validate the entry and return to the level shown in 19.1.

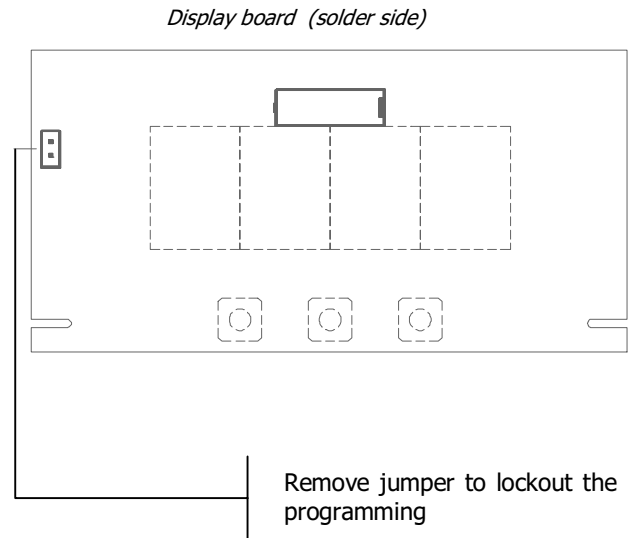
2.7 – Programming lockout

After completing the instrument's programming, it is recommended to lockout the access to the programming to prevent from accidental or unauthorized modifications.

This operation is made by taking off a plug-in jumper located on the solder side of display board circuit (see figure at right).

NOTE : Disconnect power before changing the jumper position.

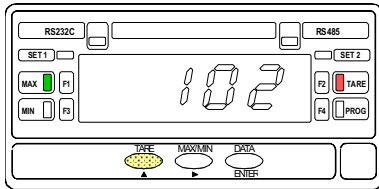
While the instrument is locked out it is however possible to access to the programming routines to check the current configuration, but it won't be possible to entry or modify data. In this case, a push of **ENTER** to access the programming routines will show the indication **dALA** instead of **Pro**.



3. MEMORY FUNCTIONS

AN 1500 P 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 , two for output status indication and two more for serial option.

TARE. Each time this key is depressed, the current reading is removed from the display and stored in an internal memory. (fig. 22.1).



[22.1] TARE in the memory

During the run mode, the TARE led indicates that the measure is being displayed with a **false zero**.

DON'T PROGRAM THE INSTRUMENT WITH LED TARE ACTIVATED.

To erase the tare memory, press **TARE** 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 (see pages 13-14).

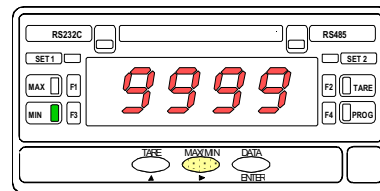
MAX/MIN.

The instrument detects and memorizes the maximum and minimum values (peak and valley) reached by the variable after the last reset.

The peak and valley values can be displayed at any moment during normal operation by pressing **MAX/MIN**.

The first stroke recalls 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 and returns the meter to the normal reading.

To erase the peak and valley memories, press **MAX/MIN** to display the value wanted to be eliminated ("MAX and MIN" leds indicate which one is present on display). Press again **MAX/MIN** and hold it for 5s 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] Reset of MIN value.

4. OUTPUT OPTIONS

As an option, the AN 1500 P model can incorporate one or two of the following output cards (The MAN and the RS6 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. **THIS OUTPUT SHOULD NEVER BE CONNECTED TO THE TELEPHONE LINES.** **Ref. RS6**

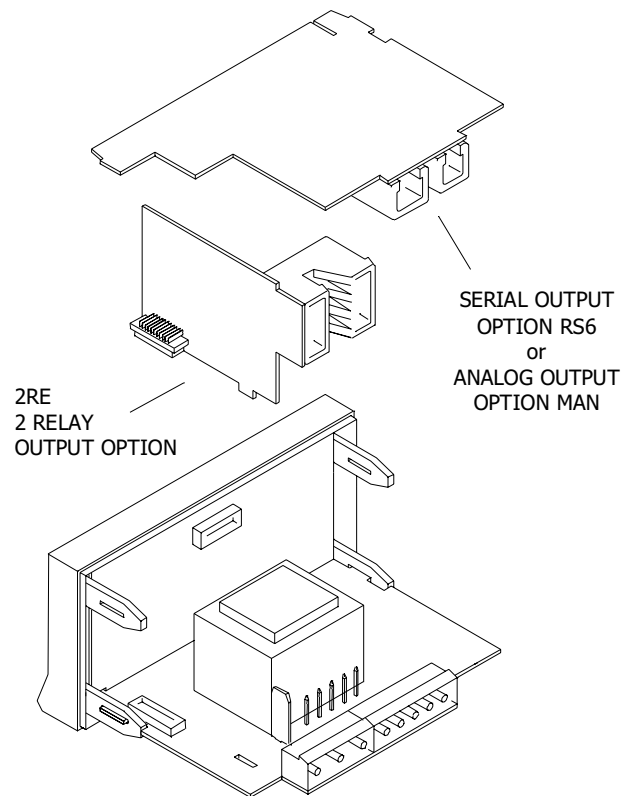
- An analog output card that drives out a 4-20 mA signal proportional to a user-defined display range. **Ref. MAN**

- A control card with 2 SPDT 8 A @ 250 V AC / 150 V 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.

For more detailed information on characteristics, applications, mounting and programming, please refer to the specific manual furnished with the option.



5. TECHNICAL SPECIFICATIONS

INPUT SIGNAL

- Configuration differential asymmetrical

INPUT	VOLTAGE	CURRENT
▪ Max. Input	± 10 V DC.....	± 20 mA DC
▪ Resolution	5 mV.....	10 μ A
▪ Input impedance	1 M Ω	9 Ω
▪ Excitation	10 ± 0.5 V (30mA) ó	20 ± 5 V (30mA)

ACCURACY to 23° \pm 5° C

- Max. Error \pm (0.1% of reading +3 digits)
- Temperature coefficient.....100 ppm/ °C
- Warm up time.....5 minutes

POWER SUPPLY

- AC Voltages 230/115 V, 24/48 V 50/60 Hz AC
- DC Voltages..... 12 V (10.5 to 16 V) DC, 24 V (21 to 32 V)
..... 48V (42 to 64 V) DC
- Consumption3 W

FUSES (DIN 41661)

- AN 1500 P (230/115V AC).....F 0.1A / 250 V
- AN 1500 P2 (24/48V AC)F 0.2A / 250 V
- AN 1500 P3 (12 V DC)..... F 1A / 250 V
- AN 1500 P4 (24 V DC).....F 0.5A / 250 V
- AN 1500 P5 (48 V DC).....F 0.5A / 250 V

A/D CONVERSION

- Technique dual slope
- Resolution (\pm 2000 counts)
- Rate 12/ s

DISPLAY

- Type-999/ 9999, 4 red 14 mm digits
- Decimal point programmable
- LED's 4 for control and 4 for output status
- Update time83 ms
- Over-range display OvE
- Over-range input OvE

ENVIRONMENTAL

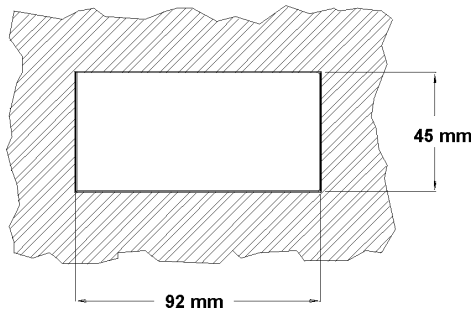
- Operating temperature -10 °C to +60 °C
- Storage temperature -25 °C to +85 °C
- Relative humidity(non condensing) <95 % to 40 °C
- Max altitude2000 meters

DIMENSIONS

- Dimensions 96x48x60 mm
- Panel cutout..... 92x45 mm
- Weight 250 g
- Case material polycarbonate s/UL 94 V-0

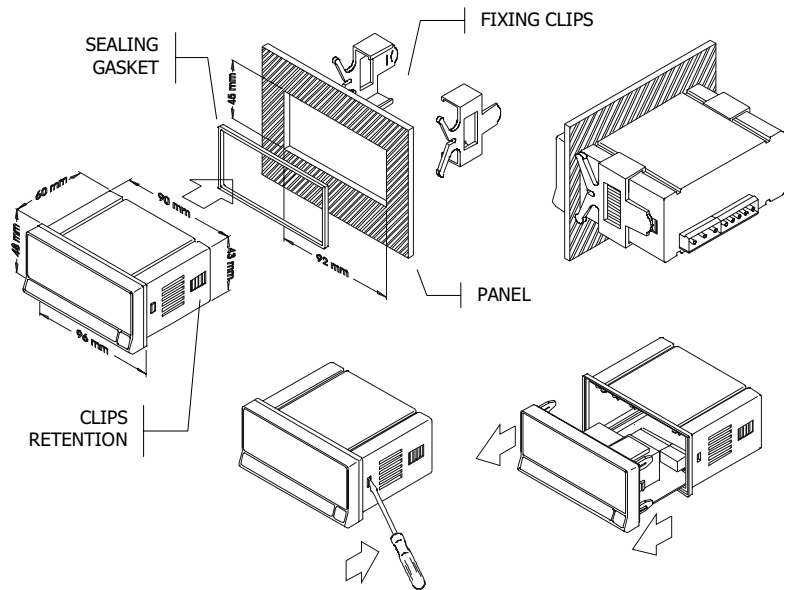
5.1 - Dimensions and mounting

To install the instrument into the panel, make a 92x45mm cutout and insert the instrument 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 remove the instrument from the panel, pull outwards the fixing clips rear tabs to disengage and slide them back over the case.



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



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