User Manual

Temp Photo

ProSense DPM4 Advanced Process Panel Meter
DPM4-AT-H

AUTOMATIONDIRECT.com

ProSense DPM4-AT-H - User Manual

General Information

Package Contents

- DPM4 Series digital panel meter
- Mounting panel accessories (a sealing gasket and 2 fixing clips)
- Wiring accessories (plug-in terminal block connectors and key tool for wire insertion)
- 4 adhesive engineering unit label sheets

Power supply

Instruments supplied for 115 / 230 VAC power are factory set for 115 VAC.

Note: Check the wiring label before power connection

Programming instructions

The software is divided into several independently accessible modules to configure the input, the display, the setpoints, the analogical output, the output communication and logic inputs.

Input type

Note: Check the correct configuration of the expected signal before connecting the input.

Programming lock

The instrument is supplied with unlocked programming, giving access to all programming levels. The blocking is carried out by software through a security code that can be personalized.

Output Options

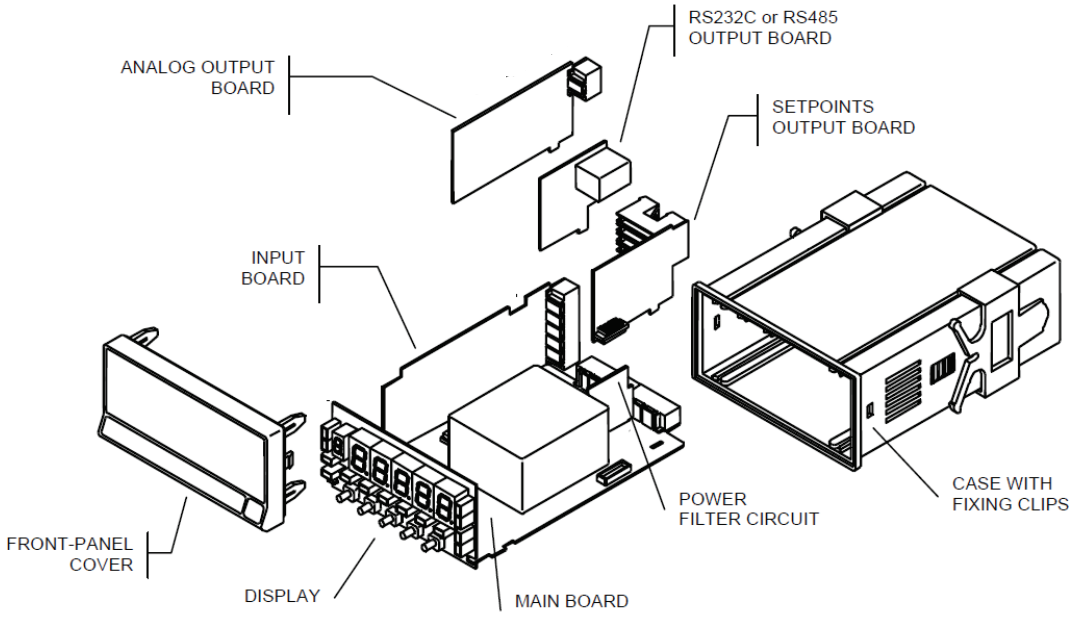
Up to 3 output options can be present and operate simultaneously:

DPM-ANALOG (ANALOG OUTPUT 4-20mA / 0-10V)

DPM-RS232 or DPM-RS485 (select one)

DPM-RELAY, DPM-NPN, or DPM-PNP (select one)

For more information on characteristics, applications, assembly and programming, refer to the specific manual supplied with each option.



Recycling Instructions

This electronic instrument is covered by the 2002/96/CE European Directive so, it is properly marked with the crossed-out wheeled bin symbol that makes reference to the selective collection for electrical and electronic equipment which indicates that at the end of its lifetime, the final user cannot dispose of it as unsorted municipal waste.

In order to protect the environment and in agreement with the European legislation regarding waste of electrical and electronic equipment from products put on the market after August 13, 2005, the user can give it back, without any cost, to the place where it was acquired to proceed to its controlled treatment and recycling.

General Safety Considerations

All instructions and guidelines for the installation and manipulation that are present in this manual must be considered to ensure personal safety and to prevent damage to either the instrument or any equipment connected to it.

Safety of any equipment incorporated to this instrument is the responsibility of the system installer.

If this electronic indicator is used in a manner not specified by the manufacturer in this manual, the protection provided by the instrument may be impaired.

Symbols Identification

Warning: Potential risk of danger.

Read complete instructions when this symbol appears in order to know the potential risk and know how to avoid it.

Warning: Risk of electric shock.

Instrument protected by double isolation or reinforced isolation.

Maintenance

To ensure instrument accuracy, it is recommended to check its performance according to the technical specifications listed in this manual.

For front cover cleaning, just wipe with a damp cloth and neutral soap product. DO NOT USE SOLVENTS!

Technical Support

We strive to make our manuals the best in the industry. We rely on your feedback to let us know if we are reaching our goal. If you cannot find the solution to your particular application, or, if for any reason you need technical assistance, please call us at:

1-800-633-0405

Our technical support group will work with you to answer your questions. They are available Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Time. We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company.

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Agency Approvals

CE

Device Description

The ProSense DPM4 series offers a simple, feature packed digital display of analog process signals, temperature in either Fahrenheit or Celsius from RTD or Thermocouple temperature sensors, load cell, or potentiometer inputs. The 5-digit tri-color red, green or amber LED display is easily scaled into any engineering units from -99999 to +99999 with a selectable decimal point location. Two point direct or reverse acting linear scaling values can be entered manually or by introducing actual sensed process values in Teach mode. Additionally non-linear processes can be scaled by entering up to 11 scaling points. Models are available with two SPDT or four SPST relay outputs that can be set to activate on an increasing or decreasing input signal with hysteresis or time delay operation. Additionally the display color can be set to change on relay operation. Models are also available with a 4-20mA analog output. The meter is powered from an external AC or DC power supply and provides both 24VDC and 10VDC for external sensor excitation. The 1/8 DIN housing is easy to install in a panel and the meter face has an IP65 rating. Configuration parameters can be totally or selectively locked out to prevent unauthorized or accidental changes to the meter's operation. Other features include memory and reset of minimum and maximum display values, three tare functions, display hold function, filtering to minimize display bounce, and display brightness adjustment. ProSense digital panel meters are backed by a 3 year warranty.

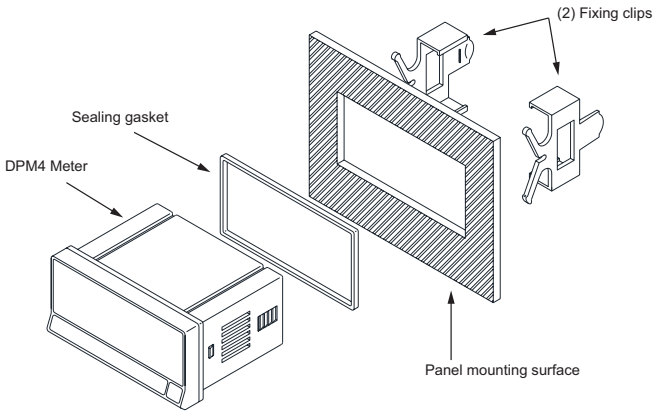
- 96 x 48mm 1/8 DIN
- Simple menu driven pushbutton configuration
- 6 digit -99999 to +99999 LED display J,K,T,R,S,E
- Selectable decimal point
- Process (±10V, ±20mA)
- Temperature (RTD: Pt100, TC: J, K, T, R, S, E, Resolution: 1°F, 0.1°F, 1°C, 0.1°C)
- Potentiometer
- Load cell ±15mV, ±30mV, ±60mV and ±300mV
- Sensor excitation voltage 24V, 10V or 5V
- Display scaling or process teaching modes
- Optional 4-20mA or 0-10VDC analog outputs with DPM-ANALOG
- Optional (4) Form A SPST relays with DPM-RELAY
  - Activation on increasing or decreasing input signal
  - Hysteresis or time delay operation
  - Display color change on relay operation
- Optional 4-point discrete outputs with DPM-NPN or DPM-PNP modules
- Configuration for direct or reverse acting linear processes and up to 11 point non-linear processes
- Total or selective configuration lock out
- Programmable functions include:
  - Minimum and maximum value memory
  - Minimum and maximum value reset
  - Tare
  - Hold
- Filtering to minimize display bounce
- Display brightness adjustment
- 3 year warranty

Mounting

To install the instrument, prepare a 92mm x 45mm panel cut-out and slide the unit inwards making sure to place the sealing gasket between the front side panel and the front bezel.

While holding the unit in place, put the fixing clips on both sides of the case and slide them through the guide tracks until they reach the panel at the rear side.

Press slightly to fasten the clips to the latching slots on the case and get the unit fully assembled and close fitted to achieve a good seal.



CLEANING: The frontal cover should be cleaned only with a soft cloth soaked in neutral soap product.

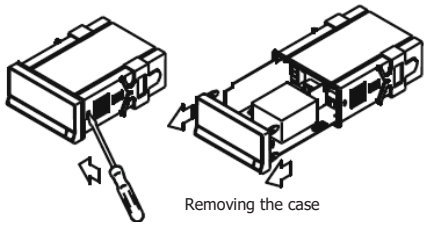
DO NOT USE SOLVENTS

Power Supply and Wiring

Should any hardware modification be performed, remove the electronics from the case as shown below.

To disassemble first remove all of the terminals from the back of the panel meter. Using a flat head screw driver release the two clips one either side directly behind the front display. Pull the front display and/or press on the back terminal plugs to remove the electronics from the case. When reinstalling the electronics into the case ensure the main electronics board and add on boards slide in the tracks molded into the case. Ensure that the two clips released during dissasembly are engaged. The clips should make an audible click when engaged and some force may be required to ensure they engage. Placing the back part of the case on the edge of a table, being sure to avoid the terminals, and pressing the front of the case directly above can help with assembly. Reinstall the terminal plugs.

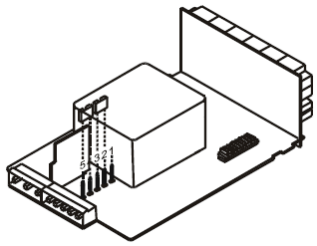
115/230 VAC: The instruments with 115/230 VAC power, are shipped from the factory for 115 VAC. To change supply voltage to 230 VAC, set jumpers as indicated in table 1. The wiring label should be modified to match new setups.



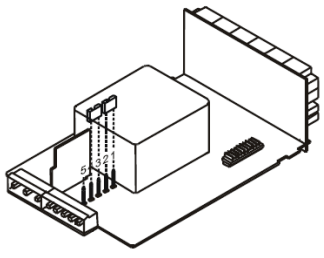
Removing the case

Pin	1	2	3	4	5
230V AC	-				
115V AC					-

Table 1. Jumper settings.

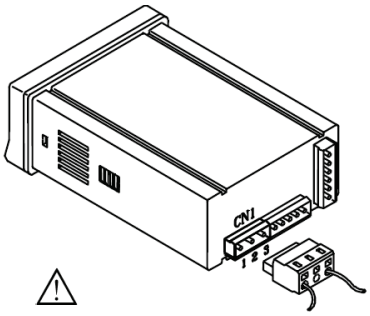


Supply voltage 230VAC (DPM4-AT-H)

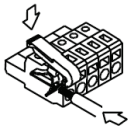


Supply voltage 115VAC (DPM4-AT-H)

Power Supply Wiring



AC VERSIONS
PIN 1 - AC HI
PIN 2 - GND (GROUND)
PIN 3 - AC LO



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 easily reachable by the operator and clearly marked as the disconnect device.

WARNING

In order to guarantee electromagnetic compatibility, the following guidelines for cable wiring must be followed:

- 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).
- The cable section must be ≥ 0.25 mm²

If not installed and used according to these instructions, protection against hazards may be impaired.

Connectors:

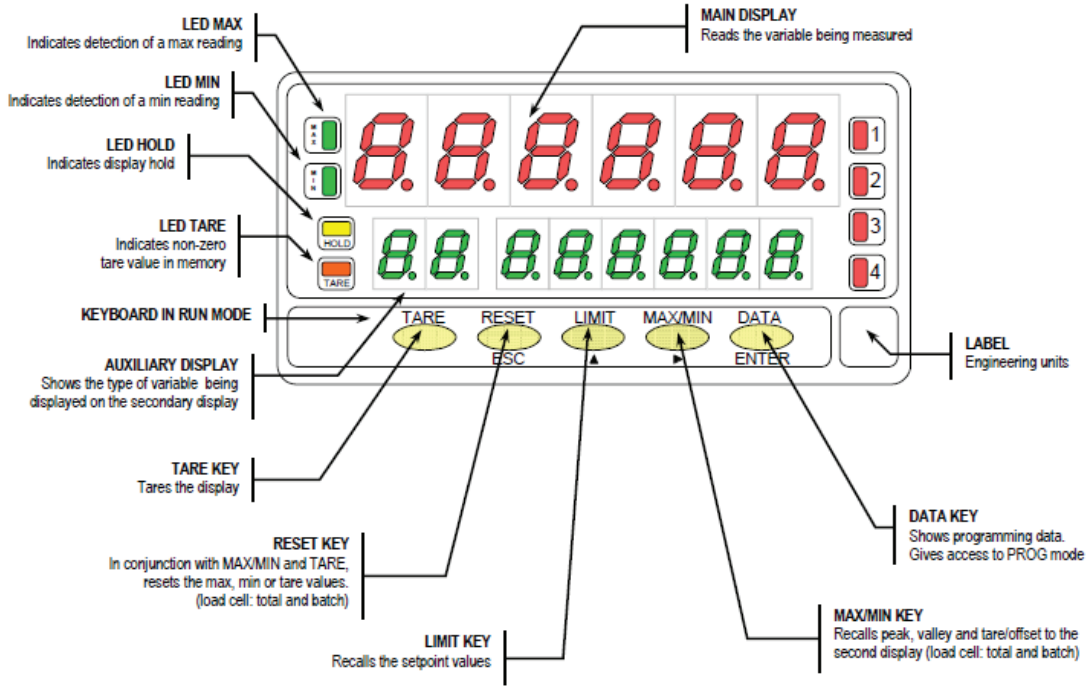
To perform wiring connections, remove the terminal block from the meter's connector, strip the wire leaving from 7 to 10 mm exposed and insert it into the proper terminal while pushing the fingertip down to open the clip inside the connector as indicated in the figure.

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

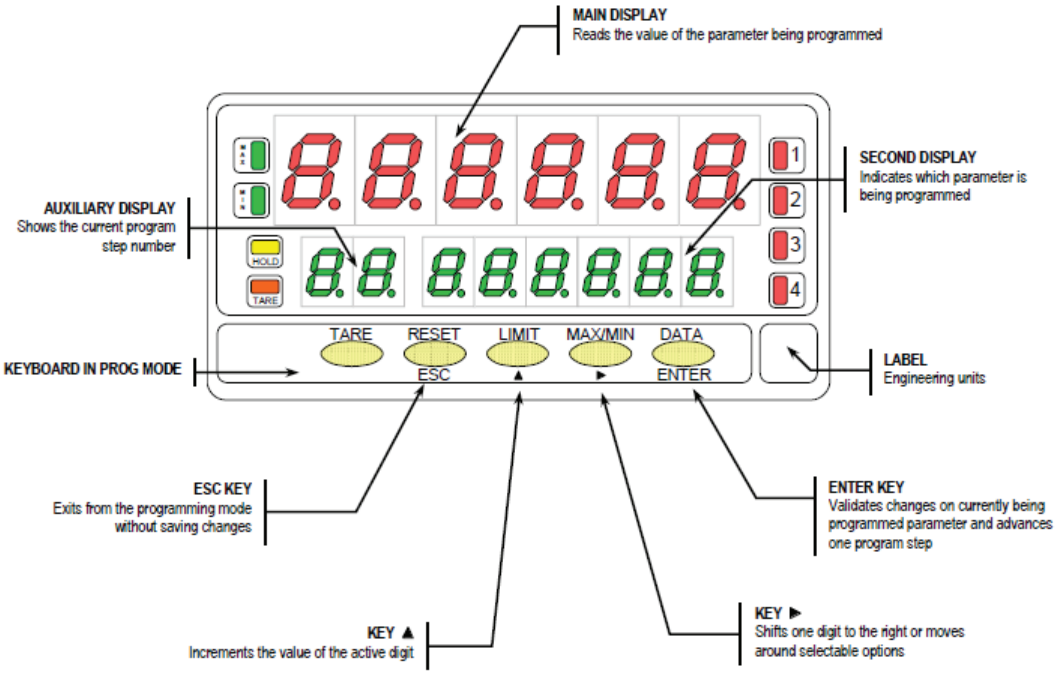
Each terminal can admit cables of section comprised between 0.08 mm² and 2.5 mm² (AWG 26-14).

The blocks provide removable adaptors into each terminal to allow proper fastening for cable sections of <0.5 mm².

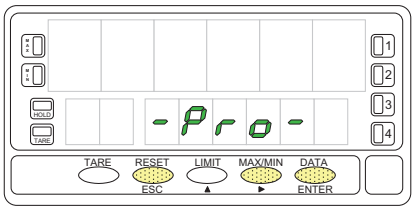
Front-Panel Functions in Run Mode



Front-Panel Functions in Prog Mode



Programming Instructions



Access to the programming mode

When power is applied to the instrument, the display briefly illuminates all segments and LED's then shows the software version and finally enters in the normal mode. Press ENTER to enter in the programming mode. The second display shows the indication "-Pro-"

Exit from the programming mode without saving data

From any step of the program routines, a push of ESC ESC shows momentarily the indication "qUIt" on the second display, the meter exits from the programming mode, restores the previous configuration and returns to the normal operation. Any parameter change made before exiting in this mode is discarded.

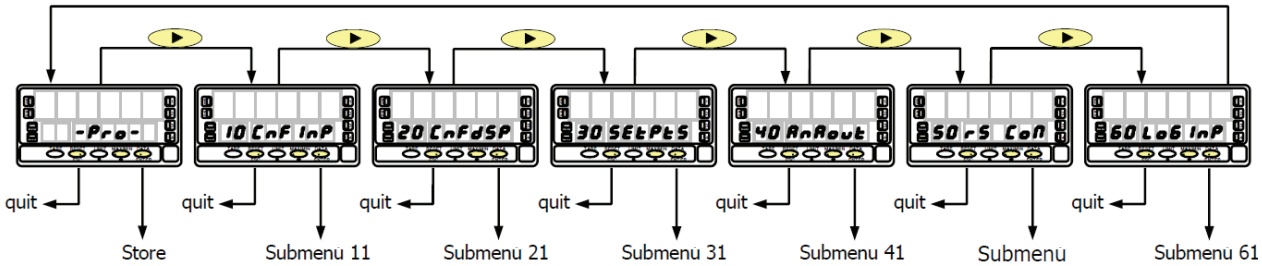
Save changes in the configuration

In the programming mode, the instrument returns to the -Pro- stage at the end of each program menu. The data changes are not saved at this point, to keep changes in the configuration parameters press ENTER, the second display shows momentarily the indication "StorE" while the new configuration is saved in the memory. After, the instrument returns to the run mode.

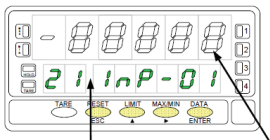
Guidelines on programming instructions

The programming software is divided into 6 modules. Each module is organized in several independently accessible menus and each menu contains a list of parameters necessary to configure a specific function of the meter.

From the -Pro- stage, press repeatedly ▶ to cycle around the existing modules: module 10 = Input configuration, module 20 = display configuration, module 30 (if option is installed) = setpoints, module 40 (if option is installed) = analog output, module 50 (if option is installed) = serial outputs and module 60 = logic functions. Press ENTER to get access to the selected module.



In general, when entering a programming menu, the normal sequence will be, at each step, press ▶ a certain number of times to make changes and ENTER to store them in memory and continue programming. In this sense of normal progress of the program the figures have been arranged, that is to say; each time the ENTER key is pressed, it goes to the phase represented by the following figure. At the end of a complete sequence, the ENTER key returns the instrument to working mode while the STORE led lights up, which means that the programmed parameters are entered into memory.



The auxiliary display shows the indentification of the current menu.

The second display shows the parameter being programmed.

With respect to the figures in the step-by-step instructions, the display indications may have the following meanings:

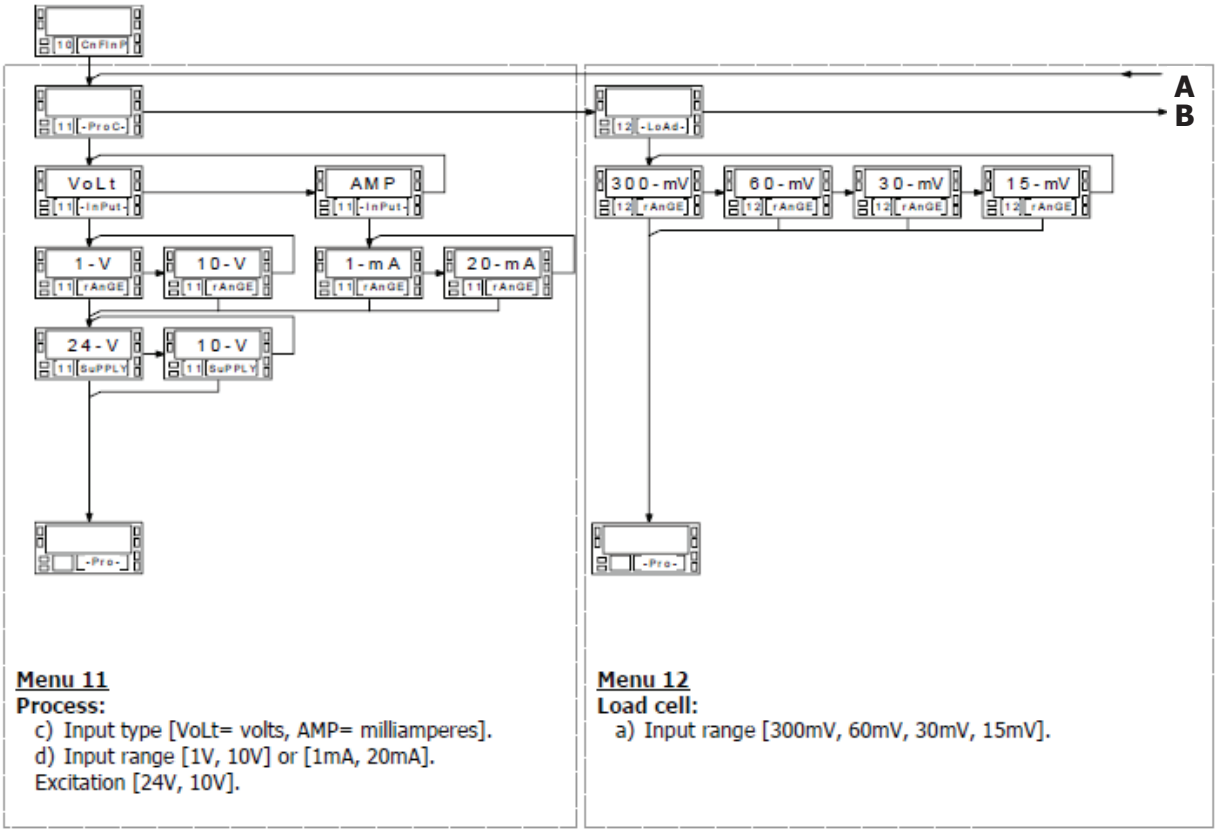
1. / The first display shows one of the available options with filled-out segments. That means that the display shows the choice made previously. The use of ▶ allows to select from available options.

2. / A series of black "8" also represents the display indication of a previous choice, with the difference that it cannot be changed in the current step. If it is already the desired parameter, you may exit from the menu by a push of ESC without making changes or, if wanted to modify it, a push of ENTER advances the meter to the next step where changes are allowed.

3. / A series of white "8" represents any numerical value that is programmed by the ▶ and ▲ buttons.

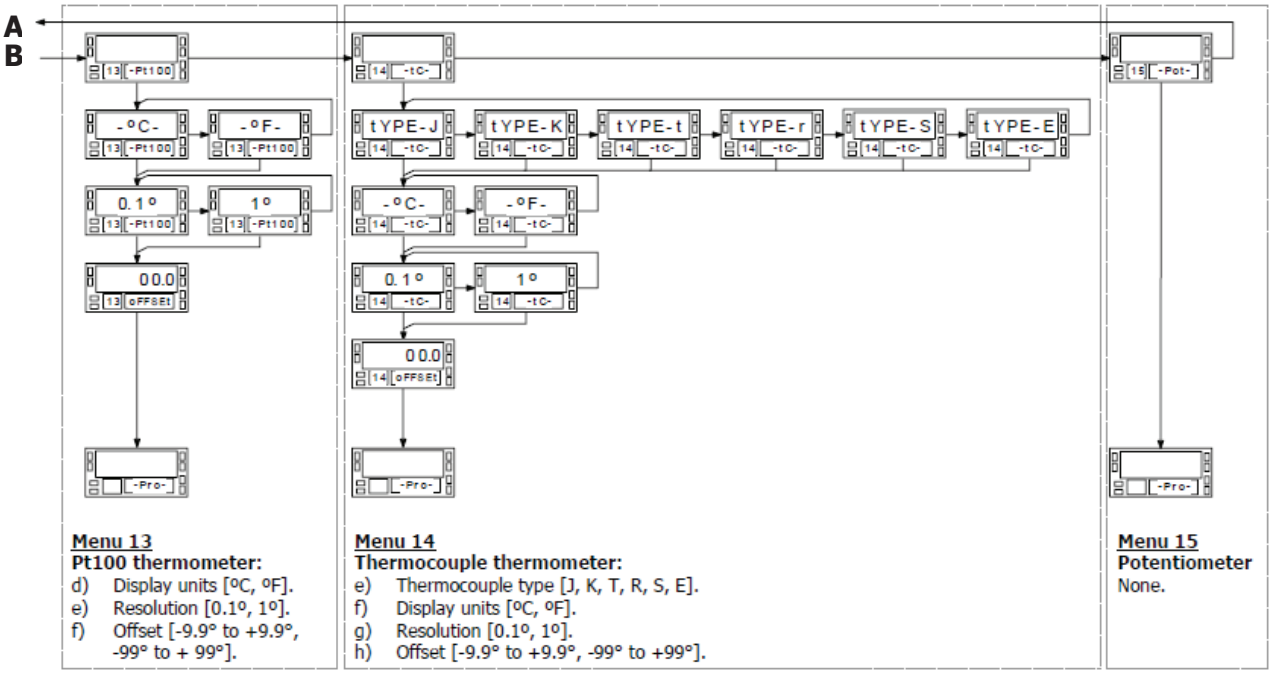
Input Configuration

The figure shows the complete input configuration module which is divided into five menus. Each menu corresponds to a specific configuration of the meter. You may only need to program the parameters of the desired configuration (process, load cell, thermocouple, Pt100 or potentiometer).



Menu 11
Process:
c) Input type [VoLt= volts, AMP= milliamperes].
d) Input range [1V, 10V] or [1mA, 20mA].
Excitation [24V, 10V].

Menu 12
Load cell:
a) Input range [300mV, 60mV, 30mV, 15mV].



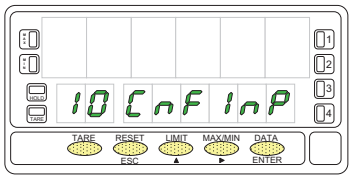
Menu 13
Pt100 thermometer:
d) Display units [°C, °F].
e) Resolution [0.1°, 1°].
f) Offset [-9.9° to +9.9°, -99° to + 99°].

Menu 14
Thermocouple thermometer:
e) Thermocouple type [J, K, T, R, S, E].
f) Display units [°C, °F].
g) Resolution [0.1°, 1°].
h) Offset [-9.9° to +9.9°, -99° to +99°].

Menu 15
Potentiometer
None.

Process Input Range Programming

To have access to the input configuration module, press ENTER to pass from the run mode to the programming mode and press ▶ to make the lower displays show the indication "10 CnFInP"



Program process input

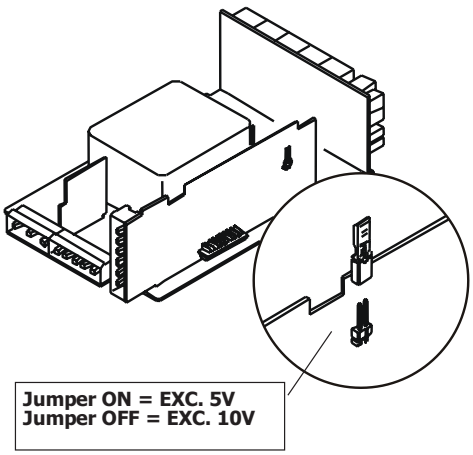
The process indicator accepts inputs in volts or milliamperes and provides three selectable transducer excitation voltages.

Configurable parameters:
Type of input : volts or milliamperes

Input range in volts or milliamperes :
"1V", range -1V to +1V,
"10V", range -10V to +10V,

"1mA", range -1mA to +1mA,
"20mA", range -20mA to +20mA,

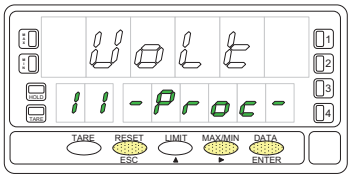
Sensor excitation. Available excitation voltages are 24V, 10V or 5V.
The 5V supply is set by selecting 10V in the software routines then placing a jumper in the position shown in figure



Jumper ON = EXC. 5V
Jumper OFF = EXC. 10V

Menu 11 - PROCESS

The figure shows the indication corresponding to the access stage to process input configuration. The following actions are available at this stage :

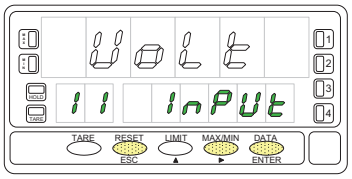


ENTER Access to the process input parameters.

▶ Skip this menu and pass to the load cell configuration.

ESC Exit from this routine and return to the -Pro- stage.

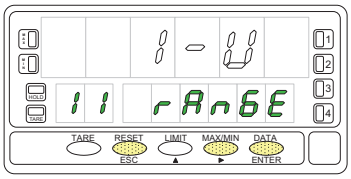
Menu 11 Input. Select input type.
The display shows the previous configuration [**VoLt** = voltage input, **AMP** = current input]. Press ▶ to change this parameter if desired.



ENTER Validate the choice and advance to the next programming step.

ESC Exit from this routine and return to the -Pro- stage.

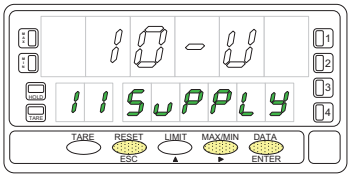
Menu 11 rAnGE. Select input range.
There are two ranges for each input type [**1-V** / **10-V** if input type is 'VoLt' and **1mA** / **20mA** if input type is 'AMP']. Press ▶ to change this parameter if desired.



ENTER Validate changes and advance to the next programming step.

ESC Exit from this routine and return to the -Pro- stage.

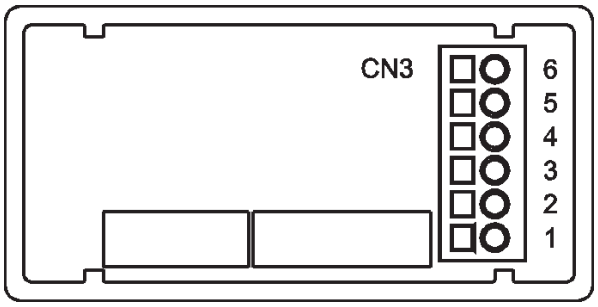
Menu 11 SuPPLY. Select excitation voltage.
The meter provides two software selectable excitation voltages [**10-V** and **24-V**] that alternate on the display by pressing the ▶ key. To set the excitation supply to 5V DC, select the option '10-V' and place the jumper shown in figure.



ENTER Validate changes, exit from this menu and return to the -Pro- stage.

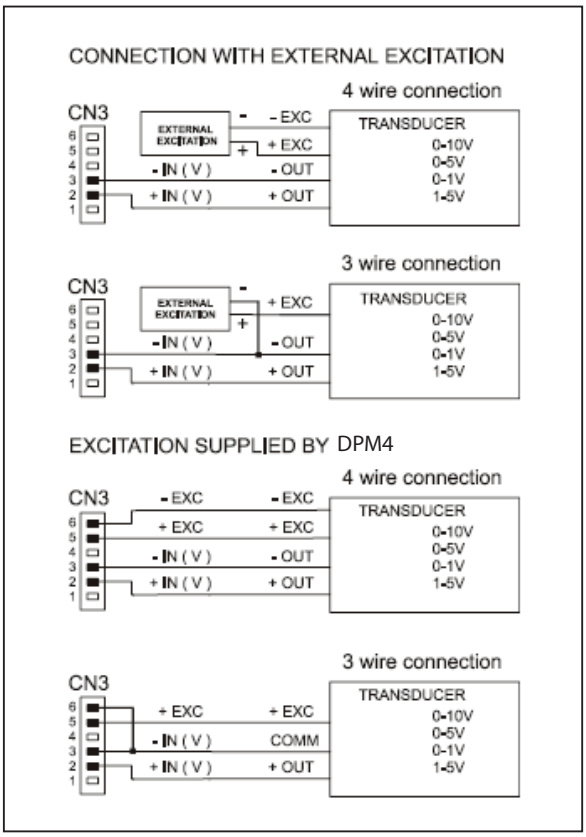
ESC Exit from this routine and return to the -Pro- stage.

Process Input Wiring

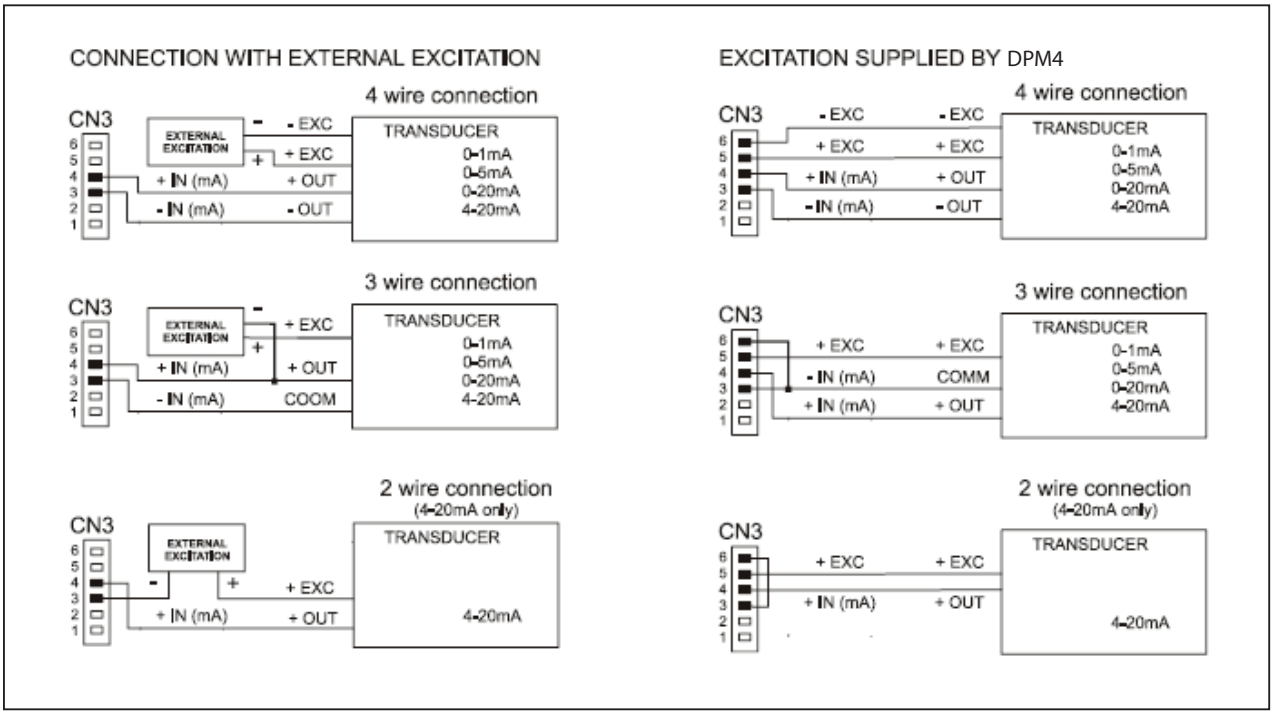


PIN 6 = -EXC [excitation supply (-)]
PIN 5 = +EXC [excitation supply (+)]
PIN 4 = +IN [input mA (+)]
PIN 3 = -IN [input V (-) or mA (-)]
PIN 2 = +IN [input V (+)]
PIN 1 = N/C [not connected]

Transducer Wiring (V, mA)



Transducer Wiring (V, mA)



Load Cell Programming

Program load cell input

Refer to the cell manufacturer's documentation, particularly with respect to the cell sensitivity and supply voltage specifications.

As load cell indicator the meter's function is to measure forces (weight, pressure, torque...) which are converted to a millivolts signal by a bridge type transducer such as load cell and applied to the input of the meter.
The instrument supplies 10V or 5V to feed the transducer as selected by jumper. These voltages can feed up to 4 cells connected in parallel with 10V or up to 8 cells connected in parallel with 5V without need for an external source.

Example:

4 cells with 2mV/V sensitivity are connected to the meter input in parallel. With an excitation voltage of 10V, the max. voltage generated by the cells is 20mV. In the same case but with an excitation of 5V, the max. voltage generated by the cells is 10mV.

Software configuration requires selection of the input range which may be selected high enough for the maximum input signal to avoid overloads.
There are four ranges: ±15mV, ±30mV, ±60mV and ±300mV

Example:
If a weighing process gives 20mV to the meter input with maximum load, the best range would be 30mV.

BATCH FUNCTION

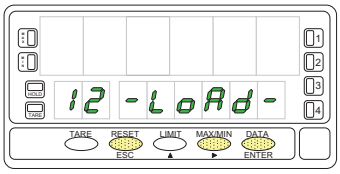
Operation by logic input
Function nº 30 -BATCH- is designed to be used in batch weighing applications where it is required to read the accumulated total of a product quantity per cycle, or day and to keep count of the number of weighing operations.

A sensor connected to a logic input with function 30 detects the presence of a weight and pulls low the logic input which makes the instrument add the measured value to the totalizer and increment the batch counter in one unit.

The meter keeps in memory the totalizer and the batch count in a power failure or disconnection from the power source.
These parameters can be displayed permanently on the second display as selected by the user.

Menu 12 - LOAD CELL

Thr figure shows the indication corresponding to the input level **to load cell input** configuration. The following actions are available at this stage:

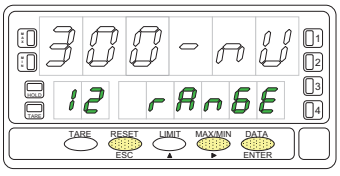


ENTER Access to the load cell input parameters.

▶ Skip this menu and pass to the Pt100 configuration.

ESC Exit from this routine and return to the -Pro- stage.

Menu 12 rAnGE. Select input range.

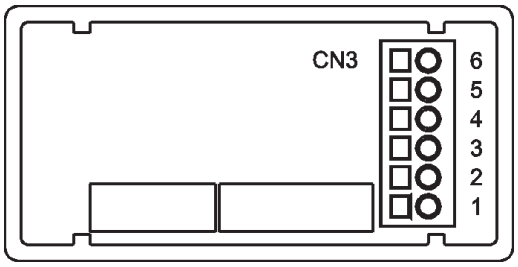


Press repeatedly the ▶ key to cycle around available options [**300mV**, **60mV**, **30mV** and **15mV**].

ENTER Validate changes, exit from this menu and return to the -Pro- stage.

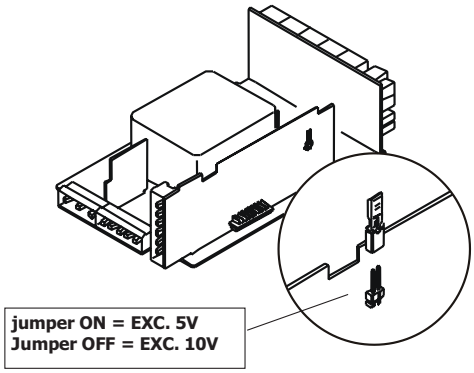
ESC Exit from this routine and return to the -Pro- stage.

Load Cell Input Wiring

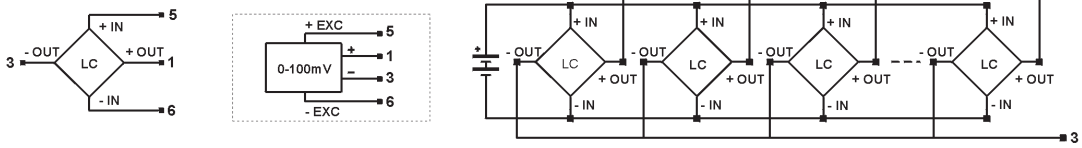


PIN 6 =-EXC [excitation supply (-)]
PIN 5 =+EXC [excitation supply (+)]
PIN 4 =Not connected
PIN 3 =-mV [input signal mV (-)]
PIN 2 =Not connected
PIN 1 =+mV [input signal mV (+)]

Excitation Jumper 5V / 10V



Load Cell Wiring (mV/ V)



PT100 and Thermocouple Programming

Program Pt100 input

Please refer to your sensor documentation.

When configuring the meter for Pt100 input, the temperature ranges are set automatically depending on temperature units and resolution:

Input	Range (0.1 º)	Range (1º)
Pt100	-100.0 to +800.0 ºC	-100 to +800 ºC
	-148.0 to +1472.0 ºF	-148 to +1472 ºF

The Pt100 software menu allows selection of temperature units (Celsius or Fahrenheit), resolution (degrees or tenths of degree) and a display offset. The offset may be used to compensate for a difference that may exist between the temperature under measurement and the temperature read by the sensor.
The offset is programmable from -9.9 to +9.9 with 0.1º resolution and from -99 to +99 whith 1º resolution.

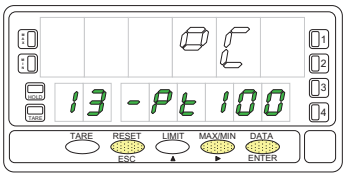
Example:
The instrument is used to control the temperature of a baking oven, but the sensor is located at a distance from the oven where the temperature is 2 degrees below. To correct from this deviation, the offset should be programmed to +2 counts (with 1º resolution).

Configurable parameters for this input are:
Reading units in Celsius "ºC" or Fahrenheit "ºF".
Resolution to units "1º" or tenths "0.1º".
Offset. Programmable ±99º counts.

After entering these parameters, the display range and linearization are adjusted automatically.

Menu 13 - THERMOMETER FOR Pt100 SENSOR

The figure shows the indication corresponding to the **access level to Pt100** input configuration. The following actions are available at this stage:

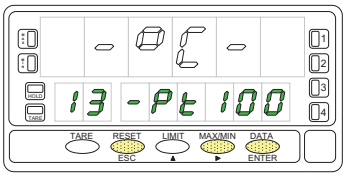


ENTER Access to the Pt100 input parameters.

▶ Skip this menu and pass to the Pot input menu.

ESC Exit from this routine and return to the -Pro- stage.

Menu 13 -Pt100. Select temperature units.

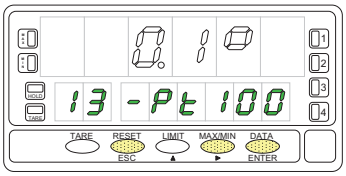


Use ▶ to select desired units ["**ºC**" = Celsius, "**ºF**" = Fahrenheit].

ENTER Validate changes and pass to the next program step.

ESC Exit from this routine and return to the "-Pro-" stage.

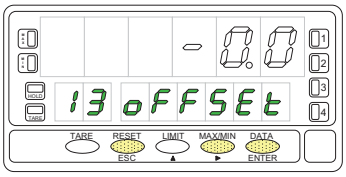
Menu 13 -Pt100. Select resolution.



Press ▶ to switch between the indications "**0.1º**" (resolution to tenths of degree) and "**1º**" (resolution to degrees).

ENTER Validate changes and pass to the next program step.

Menu 13 oFFSEt. Program the display offset.



The previously programmed offset appears on the display with the first digit in flash.

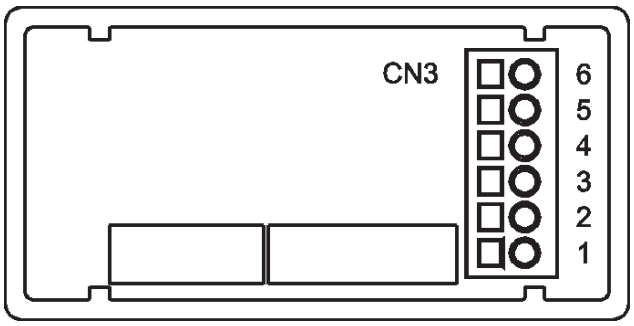
To change the value, press ▲ to increment the active digit value (the first digit can only be '0' or a minus sign). Press ▶ to shift to the next digit to be modified and repeat these operations until desired offset is completed on the display (max values are ±99° with 1° resolution and ±9.9° with 0.1° resolution).
The TARE LED lights whenever the offset has been set to a value other than zero.

Resolution 0.1°: ... Offset ±9,9°
Resolution 1°: ..... Offset ±99°

ENTER Validate changes and return to the -Pro- stage.

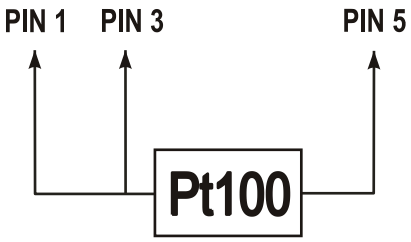
ESC Exit from this routine and return to the "-Pro-" stage.

PT100 Input Wiring



PIN 6 = Not connected
PIN 5 = Pt100 COMM
PIN 4 = Not connected
PIN 3 = Pt100
PIN 2 = Not connected
PIN 1 = Pt100

Input wiring schematic for **Pt100 sensor** with 3 wires.



Program thermocouple input

When configuring the meter for thermocouple input, the temperature ranges are set automatically according to sensor type, temperature units and resolution:

Input	Range (res. 0.1 º)	Range (res. 1º)
TC "J"	-200.0 to +1100.0 ºC	-200 to +1100 ºC
	-328.0 to +2012.0 ºF	-328 to +2012 ºF
TC "K"	-200.0 to +1200.0 ºC	-200 to +1200 ºC
	-328.0 to +2192.0 ºF	-328 to +2192 ºF
TC "T"	-150.0 to +400.0 ºC	-150 to +400 ºC
	-238.0 to +752.0 ºF	-238 to +752 ºF
TC "R"	-50.0 to +1750.0 ºC	-50 toa +1750 ºC
	-58.0 to +3182.0 ºF	-58 to +3182 ºF
TC "S"	-50.0 to +1750.0 ºC	-50 to +1750 ºC
	-58.0 to +3182.0 ºF	-58 to +3182 ºF
TC "E"	-200.0 to +1000.0 ºC	-200 to +1000 ºC
	-328.0 to +1832.0 ºF	-328 to +1832 ºF

The thermocouple software menu allows selection among several types of thermocouple, temperature units (Celsius or Fahrenheit), resolution (degrees or tenths of degree) and a display offset. The offset may be used to compensate for a difference that may exist between the temperature under measurement and the temperature read by the sensor.

The offset is programmable from -9.9 to +9.9 with 0.1º resolution and from -99 to +99 whith 1º resolution.

Example:

The instrument is used to control the temperature of a baking oven, but the sensor is located at a distance from the oven where the temperature is 2 degrees below. To correct from this deviation, the offset should be programmed to –2 counts (with resolution of 1º).

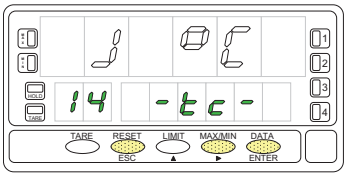
Configurable parameters for this input are:

- Thermocouple type [J, K, T, R, S, E].
- Reading units in Celsius "ºC" or Fahrenheit "ºF".
- Resolution to units "1º" or tenths "0.1º".
- Offset. Programmable ±99º counts.

After entering these parameters, the display range and linearization for the selected thermocouple input are adjusted automatically.

Menu 14 - THERMOCOUPLE METER

The figure shows the indication "-tc-" corresponding to the **thermocouple input** selection.
Press one of the following keys:

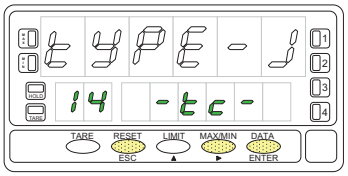


ENTER — Access to the thermocouple input configuration menu.

▶ — Pass to the menu 15 - Potentiometer.

ESC — Exit from this menu and go to the "-Pro-" stage.

Menu 14 -tc-. Select thermocouple type.

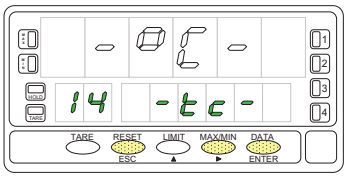


Press ▶ to shift around available inputs ['tYPE-**J**', '**tYPE-K**', '**tYPE-t**', '**tYPE-r**', '**tYPE-S**' or '**tYPE-E**'].

ENTER — Validate changes and advance to the next program step.

ESC — Exit this routine and return to the "-Pro-" stage.

Menu 14 -tc-. Select temperature units.

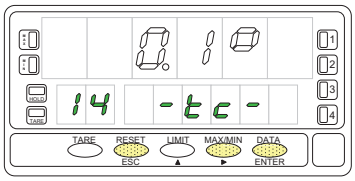


Use ▶ to select desired units ["**ºC**" = Celsius, "**ºF**" = Fahrenheit].

ENTER — Validate changes and pass to the next program step.

ESC — Exit from this routine and return to the "-Pro-" stage.

Menu 14 -tc-. Select resolution.

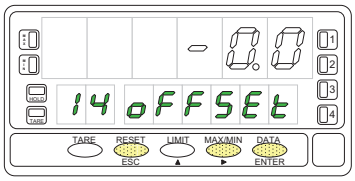


Press ▶ to switch between the indications "**0.1º**" (resolution to tenths of degree) and "**1º**" (resolution to degrees).

ENTER Validate changes and advance to the next program step.

ESC Exit from this routine and return to the "-Pro-" stage.

M**enu 14 oFFSEt. Program the display offset.**
The previously programmed offset appears on the display with the first digit in flash.

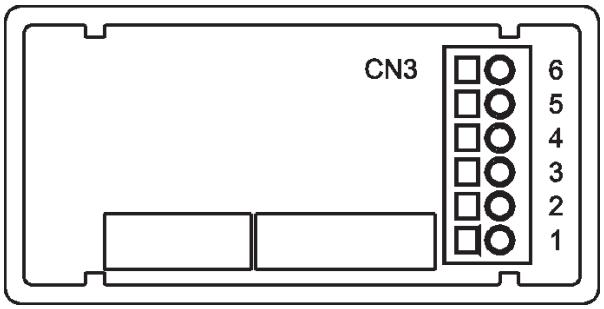


To change the value, press ▲ to increment the active digit value (the first digit can only be '0' or a minus sign). Press ▶ to shift to the next digit to be modified and repeat these operations until desired offset is completed on the display (max values are ±99° with 1° resolution and ±9.9° with 0.1 ° resolutions.
The TARE LED lights whenever the offset has been set to a value other than zero.

ENTER Validate changes and return to the "-Pro-" stage.

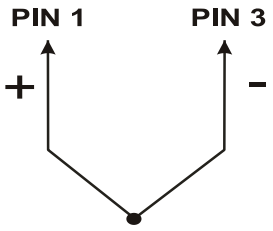
ESC Exit from this routine and return to the "-Pro-" stage.

Thermocouple Sensor Wiring



PIN 6 = Not connected
PIN 5 = Not connected
PIN 4 = Not connected
PIN 3 = - TC
PIN 2 = Not connected
PIN 1 = + TC

Signal wiring schematic for
Thermocouples J, K, T, R, S and E with 2 wires

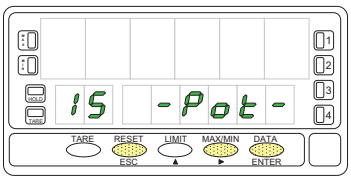


Potentiometer Input Programming

When the instrument is configured as a displacement indicator, it is not necessary to enter any parameters. The excitation is automatically selected, being able to be 10V or 5V, depending on the position of the internal excitation jumper (see page 12).
This voltage is used to drive the potentiometer so that the level of the input signal varies according to the position of the cursor.

Menu 15 - POTENTIOMETER

The figure shows the indication **"-Pot-"** corresponding to the configuration of the potentiometer input. Press one of the following keys:

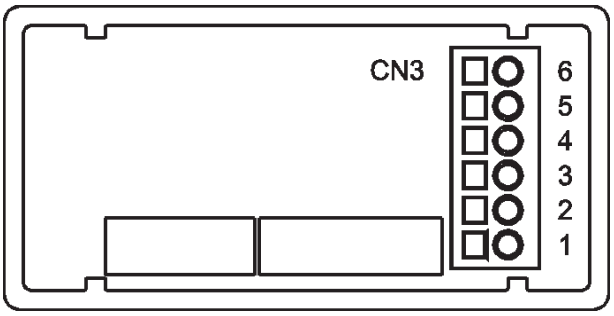


ENTER Validate the configuration of the potentiometer input and exit at the beginning of the programming "-Pro-".

▶ Go to Submenu 11 - Process

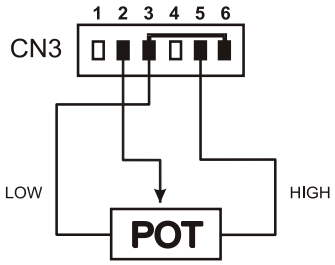
ESC Cancel the programming and return to the "-Pro-" stage.

Potentiometer Wiring



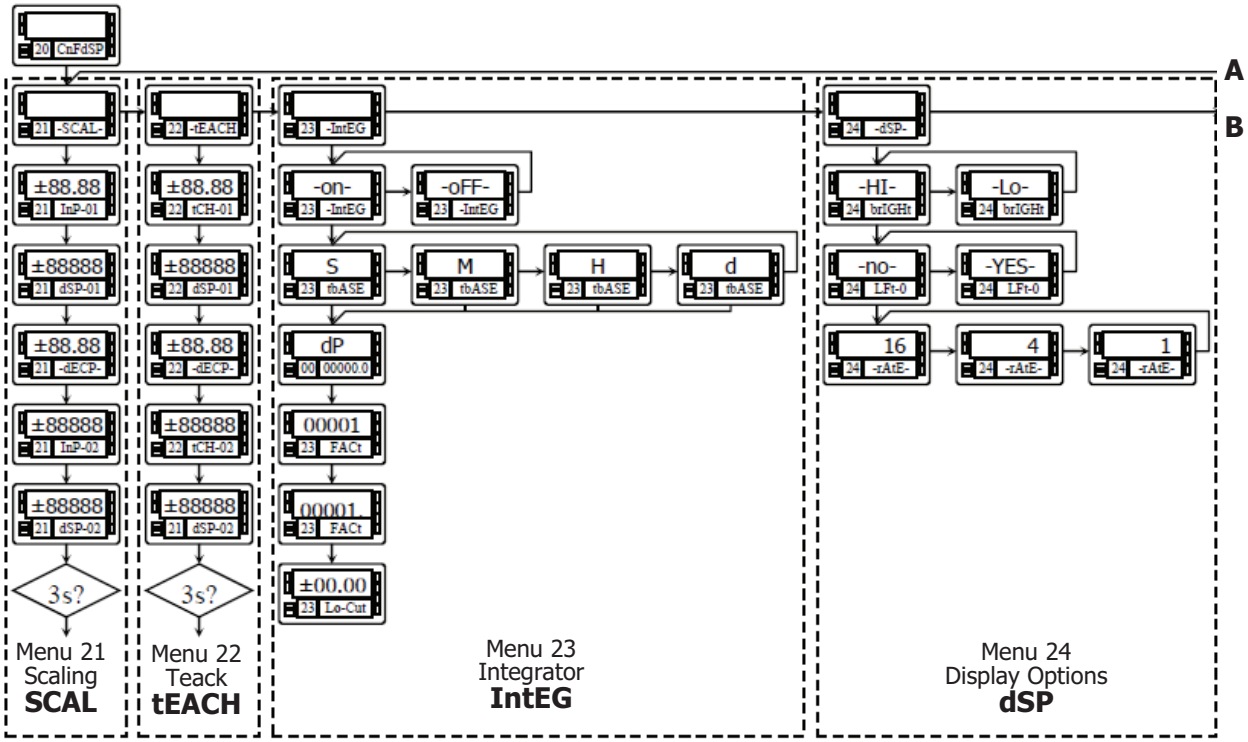
PIN 6 = - EXC
PIN 5 = POT HI
PIN 4 = Not connected
PIN 3 = POT LO (COMM)
PIN 2 = POT CENTRAL
PIN 1 = Not connected

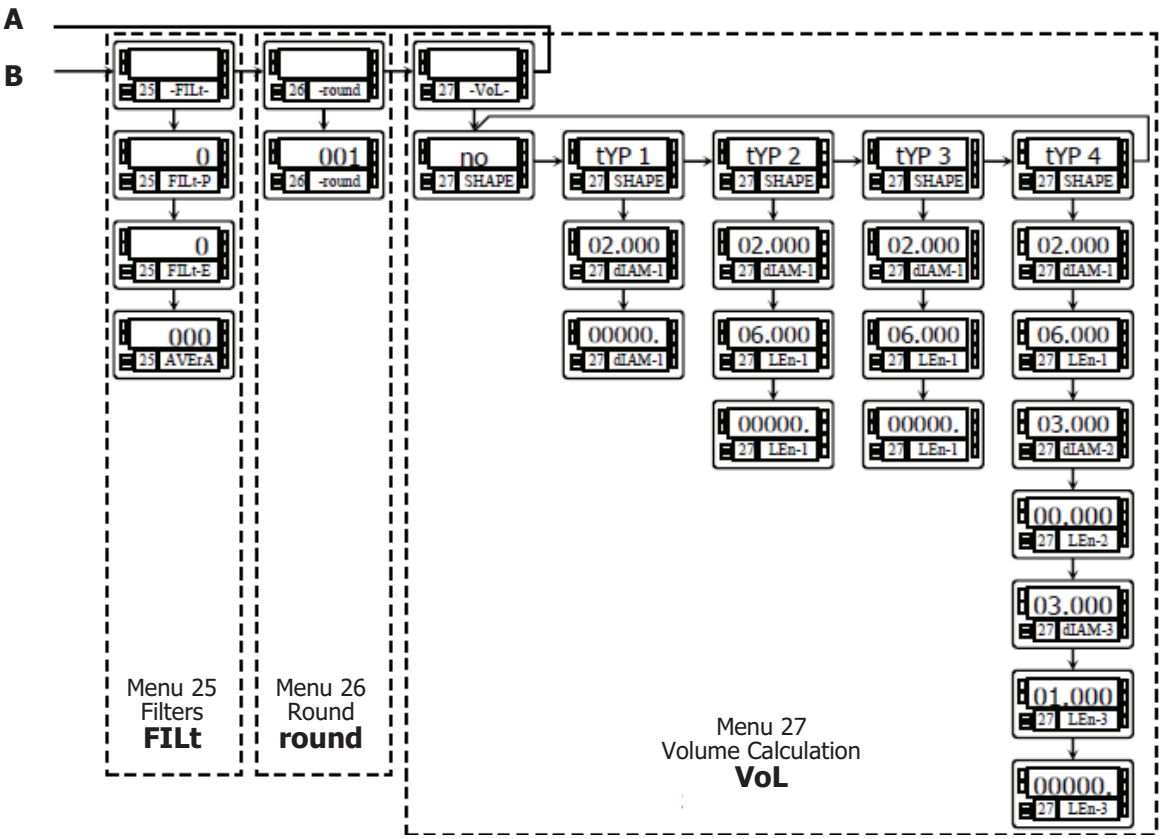
Signal wiring schematic for **potentiometer** with 3 wires



Note: A jumper wire from pin 6 to pin 3 needs to be installed when wiring a potentiometer. The low potentiometer wire and jumper wire will both terminate in pin 3 of CN3.

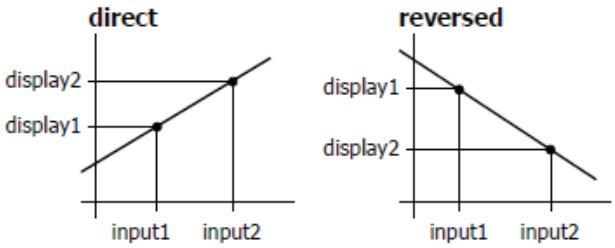
Display Programming





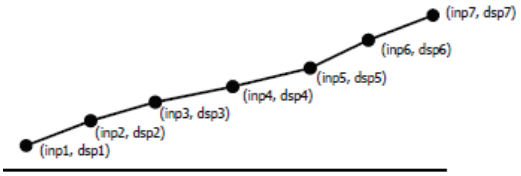
Scaling

When the instrument is configured as a process, load cell or potentiometer indicator, the display must be scaled to fit a particular application. Scaling the display consists of assigning a display value to every input value.
For linear processes this is accomplished by programming two points -(input1,display1) and (input2,display2)-.
The line plotted between these points establishes a linear relationship in which any input value produces a unique display value.
Reverse operation is accomplished by reversing the display values or the input values (see figure).



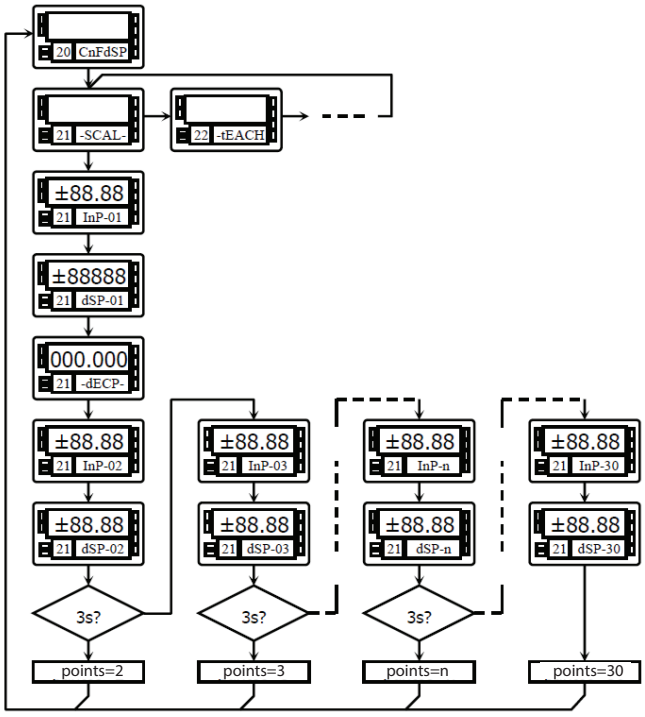
The two points should be located near the process limits for the best possible accuracy.

For non-linear processes it is possible to set up to 30 pairs input-display.
Each two consecutive points are linked by a straigh segment forming all together a curve that represents a non-linear relationship between input and display.



The greater the number of points used, the more accurate the measurement will be.
The input values must be programmed in always increasing or always decreasing order. Two different display values should not be assigned to the same input value.
The display values can be programmed in any order. The same display value can be assigned to different input values.
For input values below the first programmed point, the display follows the slope calculated between points 1 and 2 of the scale. For input values over the last programmed point, the display follows the slope calculated between the last two points of the scale.

The meter offers two methods to scale the display; **SCAL** (menu 21) and **tEACH** (menu 22). The diagram represents the program routine for the SCAL menu, but both routines are the same except that in the tEACH menu, the input values are denoted by tCH in the second display.



SCAL method
The input and display values are programmed manually by the front-panel keys. This method can be used when the transducer gives accurate calibrated known signals for each point of the process.

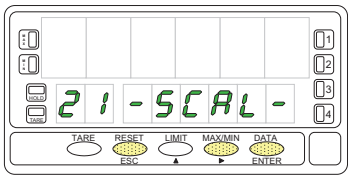
tEACH method
The input values are taken from the actual input signal present at the input connector at each point and the corresponding display values are programmed manually.
This method is suitable when the transducer is connected to the process and the process can be brought to the desired conditions while programming.

Linearization points
The first two scaling points are accessible by entering in the proper scaling menu with the ENTER key.
Accessing scaling above 2 is achieved by pressing the ENTER key for 3 seconds after programming the parameter 'dSP-02' in the SCAL or tEACH menus.
The subsequent input-display pairs follow one another by successive pressings of ENTER. When sufficient numbers of points have been programmed, the user can exit from the routine and save the programmed data by pressing ENTER for 3 seconds from the display value of the last point. In normal operation, the non-programmed pairs are missed out from the display calculation.

Menu 21 - SCAL (process, load cell and potentiometer)

This menu allows entering the input values and corresponding display values necessary to scale the meter. The decimal point location helps to read the indication in the desired units.

The figure shows the indication corresponding to the access level to the **SCAL** menu.
Press one of the following keys:



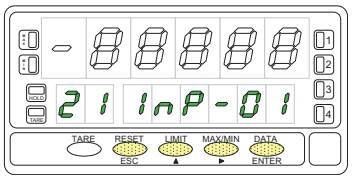
ENTER — Access to the programming of the first menu parameter.

▶ — Skip this menu and pass to menu 22 - Teach.

ESC — Exit this menu and return to the -Pro- stage.

Menu 21 InP-01. Program input value for point 1.

The previously programmed value appears on the display with the first digit blinking.

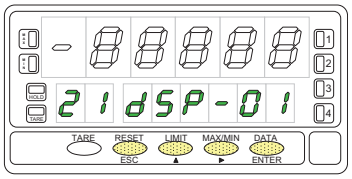


Press repeatedly the ▲ key to increment the active digit until it takes desired value (first digit can only be '0' or a minus sign). Press ▶ to move to the next digit to be modified and repeat these operations until desired value is completed on the display.

ENTER — Validate changes and go to the next step.

ESC — Cancel this routine and return to the -Pro- stage.

Menu 21 dSP-01. Program display value for point 1.

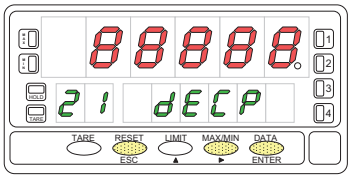


Use the procedure described on previous step (▲ changes value, ▶ changes digit) to program the display value for point 1.

ENTER — Validate changes and go to the next step.

ESC — Cancel this routine and return to the -Pro- stage.

Menu 21 dECP. Decimal point position.

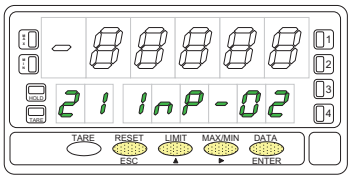


At this step, the decimal point goes flashes. Press the ▶ key to rotate it to the right until it gets desired position. If no decimal point is required, it must be located to the rightmost digit.

ENTER — Validate selection and go to the next step.

ESC — Cancel this routine and return to the -Pro- stage.

Menu 21 InP-02. Program input value for point 2.

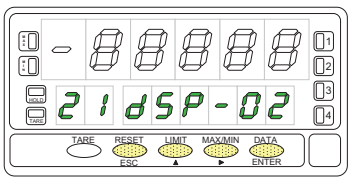


Use the ▲ (change value) and ▶ (change digit) procedure to program the desired value of input 2 with sign.

ENTER — Validate the entry and proceeed to the next phase.

ESC — Cancel this routine and return to the -Pro- stage.

Menu 21 dSP-02. Program display value for point 2.



Use the ▲ (change value) and ▶ (change digit) procedure to program the desired value of display 2 with sign.
If you want to accept your changes and exit from the scaling routine with 2 points, press ENTER.

If you want to enter in the linearization routine press and hold ENTER for 3 seconds.

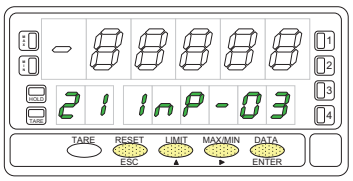
ESC — Cancel this routine and return to the -Pro- stage.

From the programming phase of the display 2, press and hold ENTER for 3 seconds to get access to the linearization routine. From the point nº3, the progress through the routine is made by pressing the ENTER key after programming each value.

At any program step, a press of ESC reverts to the previous point except for the programming phase of point 3, where the ESC key returns the meter to the -Pro- stage.

To terminate the routine for a number of points less than 30, press and hold ENTER for 3 seconds from the last desired point display.

Menu 21 InP-03. Program input value for point 3.

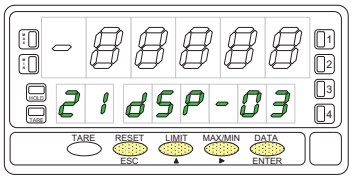


Use the ▲ (change value) and ▶ (change digit) procedure to program the desired value of input 2 with sign.

ENTER Validate the entry and proceeed to the next phase.

ESC Cancel this routine and return to the "-Pro-" stage.

Menu 21 dSP-03. Program display value for point 3.



Press repeatedly the ▲ key to increment the active digit value and press the ▶ key to move to the next digit until the display reads the desired value with sign. The sign is programmed in the most significant digit ["0" = positive, "-" = negative].

1. If you want to validate the data and advance to the next program, press ENTER .
2. If you want to validate the data and terminate the programming routine with three scaling points, press and hold ENTER for 3 seconds. The meter goes to the "-Pro-" stage.

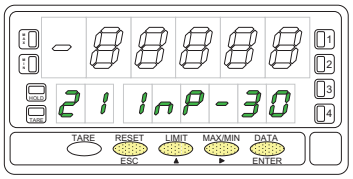
Press ESC if you want to cancel the programming and return to the "-Pro-" stage.

The same procedure is used to program the rest of the input-display points except that the ESC key does not return to the "-Pro-" stage, but to the previous point.

A push of ENTER from the programming of the display nº29 gives access to the programming of the scaling point nº30 and last of the routine. The ESC key reverts to the previous point.

The programming routine is terminated by a press of ENTER after programming the display 30.

"InP-30". Programming the input of point 30.

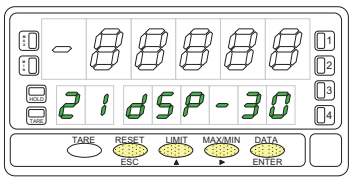


Press repeatedly the ▲ key to increment the active digit value and press the ▶ key to move to the next digit until the display reads the desired value with sign. The sign is programmed in the most significant digit ["0" = positive, "-" = negative].

ENTER Validate the entry and advance to the next program step.

ESC Return to the programming of the previous point.

"dSP-30". Programming the display of point 30.



Use the ▲ (increment digit) and ▶ (move to next digit) procedure to set the value of the display 30 with sign. The most significant digit is used to set the sign ["0" = positive, "-" = negative].

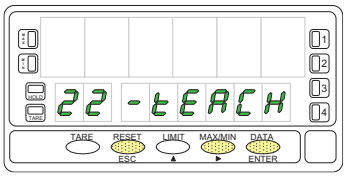
ENTER Validate the entry, exit from this routine and go to the "-Pro-" stage.

ESC Return to the previous point.

Menu 22 - TEACH (process, load cell and potentiometer)

This menu allows scaling the display by applying input signal values and keying-in corresponding display values. The decimal point location completes the scaling sequence in the desired units.

The figure shows the indication corresponding to the access level to the **tEACH** menu. Press one of the following keys:



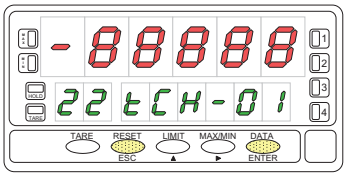
ENTER Access to the programming of the first menu parameter.

▶ Skip this menu and pass to menu 23 - Display options.

ESC Exit this menu and return to the -Pro- stage.

Menu 22 tCH-01. Apply input for point 1.

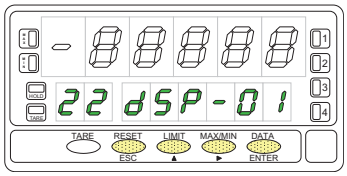
The main display reads the actual input signal present at the input connector. Bring the process to the conditions of the first point and press ENTER to take the displayed input value as the input 1 parameter and go to the programming of the corresponding display.



ESC Cancel this routine and return to the -Pro- stage.

Menu 22 dSP-01. Program display value for point 1.

Use the key-in procedure to set the display corresponding to point 1 (▲ changes the active digit value, ▶ moves to the next digit to be modified). The sign is programmed in the leftmost digit ["0" = positive, "-" = negative].

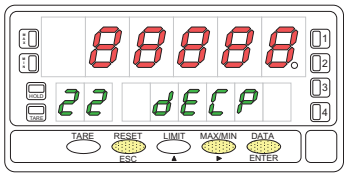


ENTER Validate changes and go to the next programming phase.

ESC Cancel this routine and return to the -Pro- stage.

Menu 22 dECP. Decimal point position.

At this step, the decimal point goes in flash. Press the ▶ key to move it to the right until it gets desired position. If no decimal point is required, it must be located to the rightmost digit as shown in figure.

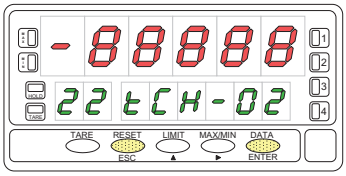


ENTER Validate the entry and go to the next step.

ESC Cancel this routine and return to the -Pro- stage.

Menu 22 tCH-02. Set input value for point 2.

Bring the process to the conditions of the second scaling point. The main display reads the actual input signal present at the input connector. Press ENTER to take the displayed input value as the input 2 parameter and go to the programming of the corresponding display.

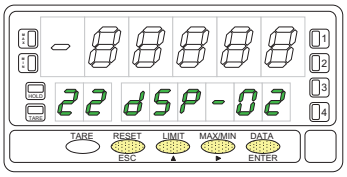


ESC Cancel this routine and return to the -Pro- stage.

Menu 22 dSP-02. Program display value for point 2.

Use the ▲ (change value) and ▶ (change digit) procedure to program the desired value of display 2 with sign.
If you want to accept your changes and exit from the scaling routine with 2 points, press ENTER .

If you want to enter the linearization routine press and hold ENTER for 3 seconds.



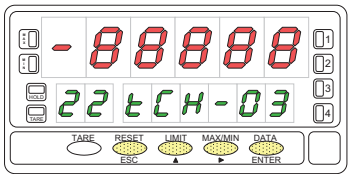
ESC Cancel this routine and return to the -Pro- stage.

From the programming phase of the display 2, press and hold ENTER for 3 seconds to get access to the linearization routine. From the point nº3, the progress through the routine is made by pressing the ENTER key after programming each value.

At any program step, a press of ESC reverts to the previous point except for the programming phase of point 3, where the ESC key returns the meter to the -Pro- stage.

To terminate the routine for a number of points less than 30, press and hold ENTER for 3 seconds from the last desired point display.

Menu 22 tCH-03. Apply input for point 3.

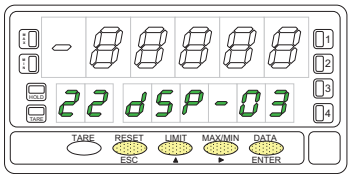


The main display reads the actual input signal present at the input connector.

Press ENTER to take the displayed input value as the input 3 parameter and go to the programming of the corresponding display.

ESC Cancel this routine and return to the -Pro- stage.

Menu 22 dSP-03. Program display value for point 3.



Press repeatedly the ▲ key to increment the active digit value and press the ▶ key to move to the next digit until the display reads the desired value with sign. The sign is programmed in the most significant digit ["0" = positive, "-" = negative].

1. If you want to validate the data and advance to the next point, press ENTER .
2. If you want to validate the data and terminate the programming routine with three scaling points, press and hold ENTER for 3 seconds.
The meter goes to the "-Pro-" stage.

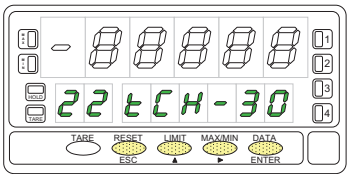
Press ESC if you want to cancel the programming and return to the "-Pro-" stage.

The same procedure is used to program the rest of the input-display points except that the ESC key does not return to the "-Pro-" stage, but to the previous point.

A push of ENTER from the programming of the display nº29 gives access to the programming of the scaling point nº30 and last of the routine. The ESC key reverts to the previous point.

The programming routine is terminated by a push of ENTER after programming the display 30.

Menu 22 tCH-30. Set input value for point 30.

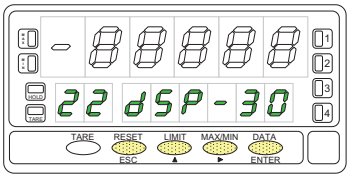


Bring the process to the conditions of the second scaling point. The main display reads the actual input signal present at the input connector.

Press ENTER to take the displayed input value as the input 3 parameter and go to the programming of the corresponding display.

ESC Cancel this routine and return to the -Pro- stage.

"dSP-30". Programming the display of point 30.

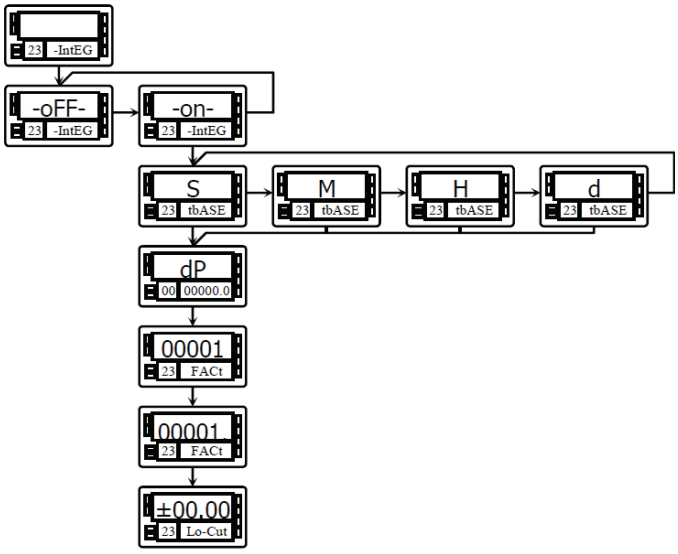


Use the ▲ (increment digit) and ▶ (move to next digit) procedure to set the value of the display 30 with sign. The most significant digit is used to set the sign ["0" = positive, "-" = negative].

ENTER Validate the entry, exit from this routine and go to the "-Pro-" stage.

ESC Return to the previous point.

Integrator



The instrument provides an 8 digit counter (or 7 digits with negative sign) that can be used to accumulate readings in totalizing+batch applications (logic function nº 30 at the rear connector) or to integrate the instantaneous reading using a time-base.

The counter is shown on the second display.

The integrator is enabled by setting the option **-on-** in the menu **23 IntEG**. When activated, the logic function nº 30 is inhibited.

(NOTE: It is not possible to activate the integrator when the automatic volume calculation option is programmed.

The value of the integrator appears on the auxiliary display permanently. This allows the instantaneous measurement and the accumulated total be read at the same time. The second display may show any other variable or be blanked if desired.
The integrator accumulates the reading of the display using a timebase in the following format:

$$\text{Total}(n) = \text{Total}(n-1) + \frac{\text{Display Reading x Scale Factor}}{\text{Time Base}}$$

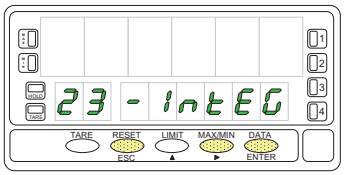
As an application example, it is required to show the total fluid quantity that pours out from a drain at a rate of 10 liters per minute. If the instantaneous value is 10.00 and is expressed in lit/min, we must select the timebase in minutes, so the totalizer may show 10.00 lit after one minute, 20.00 lit in two minutes, 600.00 lit in one hour, etc.

To read the daily consumption in m^3, for instance, we should program a scale factor of 0,001 (1 lit=0,001 m^3).

Menu 23 - INTEGRATOR (for process and potentiometer)

This menu allows enabling the integrator option and configuring the function parameters; time base, decimal point, scaling factor and low-cut display.
This menu appears only in process and potentiometer configurations.

The figure shows the indication **"-IntEG**" corresponding to the input stage of the integrator configuration menu.

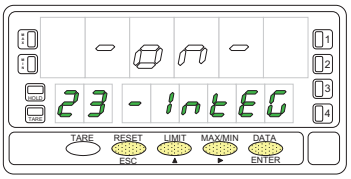


ENTER To access the integrator configuration.

▶ To skip this menu and pass to the next menu.

ESC To cancel this routine and return to the "-Pro-" stage.

The first level of this menu offers two choices **-on-** and **-oFF-** to enable or disable the integrator respectively. Press the ▶ key to switch the display between the two options to set the desired one.
If the "automatic volume calculation" option is enabled (menu 27 -VoL-) it is not possible to activate the integrator.

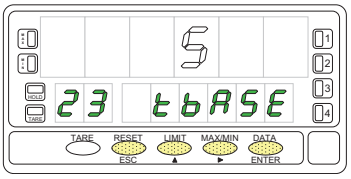


ENTER Validate the choice and go to the next program phase.

ESC Cancel this routine and return to the "-Pro-" stage.

23 tbASE. Programming the time base.
There are four time bases: **-S-** seconds, **-M-** minutes, **-H-** hours and **-d-** days.

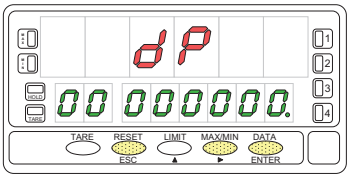
Use ▶ to shift around the available options until the display shows the indication corresponding to the desired time base.



ENTER Validate the choice and go to the next program phase.

ESC Cancel this routine and return to the "-Pro-" stage.

The **totalizer decimal point** is programmed in the second display and can be located in any of its 8 digits. In this step, the main display shows the indication "dP" and the second display shows the decimal point in flash. Press repeatedly the ▶ key to move it to the desired location. If no decimal point is required, it must be placed to the right of the least significant digit.

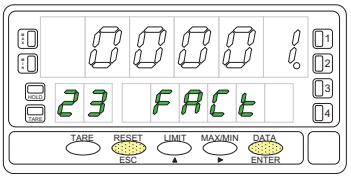


ENTER Validate the choice and go to the next program phase.

ESC Cancel this routine and return to the "-Pro-" stage.

"23 FACt". Programming the scale factor.

Press repeatedly the ▲ key to increment the active digit and press the ▶ key to move to the next digit to the right until the desired scale factor value is completed on the display. A press of ENTER to validate the entry makes the decimal point go in flash. The factor decimal point position is independent from the one of the display, so it is possible to program any value within the range 0.0001 to 09999. It is not possible to set the scale factor to 0.

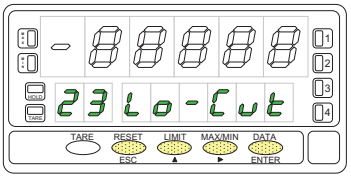


ENTER Validate the entry and go to the next program phase.

ESC Cancel this routine and return to the "-Pro-" stage.

"Low-Cut" is the value below which the display is not added to the totalizer.

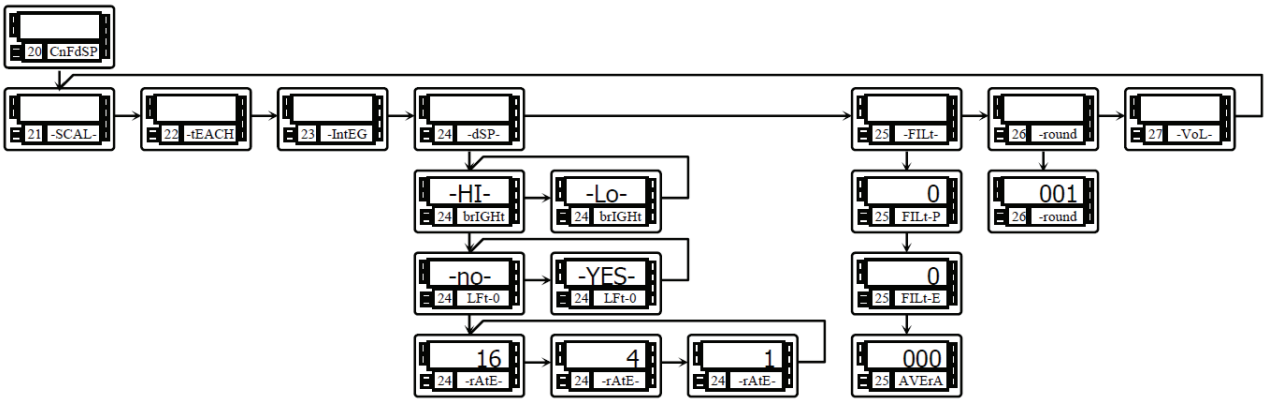
Press repeatedly the ▲ key to increment the active digit and press the ▶ key to move to the next digit to be modified until desired value is completed on the display. The leftmost digit is used to set the sign ["0" = positive, "-" = negative].



ENTER Validate the entry, exit from this routine and go to the "-Pro-" stage.

ESC Cancel this routine and return to the "-Pro-" stage.

Display Options



The instrument has several types of digital filtering to provide stable readings according to the nature of the input.

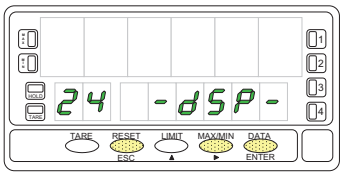
The **P filter** is a programmable low pass filter that smooths the response of the display to input variations.
The **E filter** cuts off the signal variations exceeding from the limits of a band. When the input stabilizes, the band moves to the new value.
The **Average filter** averages the reading over a programmable number of conversions to be displayed at the selected rate.
The **round filtern** allows eliminating display jitter by rounding off the meter display by increments of 1, 2, 5, 10, 20, 50 or 100 counts.

In addition, the instrument offers various options so that the user can adjust the reading of the display to meet the system environment conditions, such as selection of two display intensity levels, non-significant zeros (left zeros) and three display update rates.

This menu allows configuring various options related to the display visualization; the digit brightness, left zeros and display update rate.

Menu 24 - DISPLAY OPTIONS

The figure shows the indication **"-dSP-"** corresponding to the entry level to display options menu. The following actions are available at this stage:



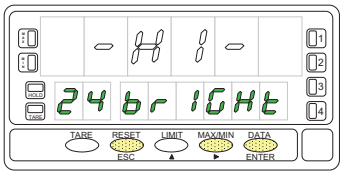
ENTER — Access to the display options parameters.

▶ — Skip this menu and pass to the filtering setup menu.

ESC — Exit from this routine and return to the -Pro- stage.

Menu 23 brIGHt. Select digit brightness.

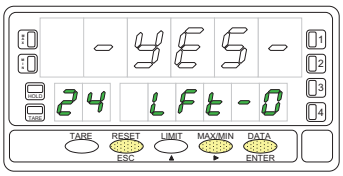
Use the ▶ key to change the display brightness (current choice is noticed each time it is changed). Select "**-HI-**" or "**-LO-**" as desired and:



ENTER — Validate the choice and go to the next step.

ESC — Cancel this routine and return to the -Pro- stage.

Menu 23 LFt-0. Select non-significant zeros.
There are two options. Select "**-YES-**" to read the measured value with all the digits of the display by adding left zeros or select "**-NO-**" to blank non-significant digits.

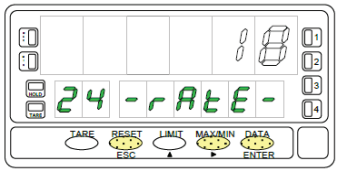


Use the ▶ key to set desired option and:

ENTER Validate the choice and go to the next step.

ESC Cancel this routine and return to the -Pro- stage.

Menu 23 -rAtE-. Select reading rate.
The reading rate determines the rate at which the display is updated. This parameter affects the display, the setpoints, the analog output and the BCD output.



Available values are 18, 4 and 1 per second. Press ▶ to select desired rate. Lower levels produce slower display responses to signal changes. The 16 readings/s option will update the display at the rythm of the signal conversion.
For temperature configurations the effective rate is half the selected number of readings/s.

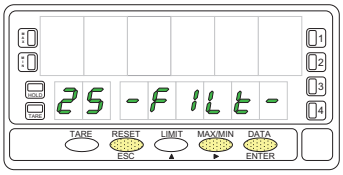
ENTER Validate the choice and return to the "-Pro-" stage.

ESC Cancel the programming and go to the "-Pro-" stage.

Menu 25 - FILTERS

If the display reading is unstable due to small signal variations or noise, the use of digital filters may help to reduce these effects and eliminate display jittering.
The **filter-E** parameter only appears for process, load cell or potentiometer inputs.

The figure represents the access level to menu **25 -FIL**t-.
At this stage, you can use one of the following keys:

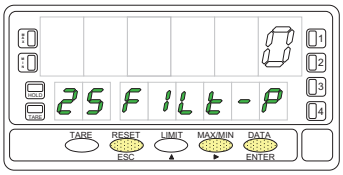


ENTER To enter the first step of the menu.

▶ To skip this menu and pass to the menu 26 -round.

ESC To cancel this routine and return to the "-Pro-" stage.

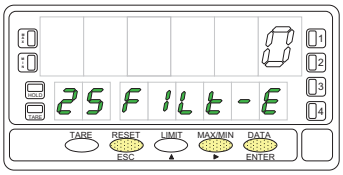
Menu 24 FILt-P. Set filter P level.
The P filter acts as a delay on the display response to signal variations produced at the input. The effect of incrementing this filter level results in a softer response of the display to the input variations. Select filter level from 0 (filter disabled) to 9 using the ▶ key.



ENTER Validate changes and advance to the next step.

ESC Cancel this routine and return to the "-Pro-" stage.

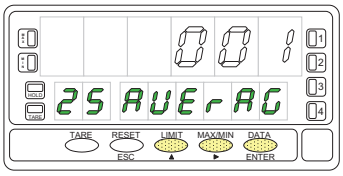
Menu 24 FILt-E. Set filter E level.
The E filter cuts off input variations exceeding from the limits of a moving band. This band becomes more selective as the filter level is increased. Select filter level from 0 (filter disabled) to 9 using the ▶ key.



ENTER Validate changes and advance to the next step.

ESC Cancel this routine and return to the "-Pro-" stage.

Menu 24 AVErAG. Program number of readings to average.
This value represents the number of readings that are summed up together and averaged before the display is updated.



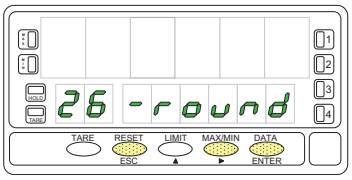
Use the ▲ (change value) and ▶ (change digit) keys to program the desired value from 1 to 200.

ENTER Validate all changes in this menu and return to the -Pro- stage.

ESC Exit this step and return to the -Pro- stage.

This menu allows selection among six levels of display rounding. When resolution is not critical, a rounding increment other than 1 may help stabilize the display.

The figure shows the indication **"-round-"** corresponding to the access to the round menu.
Press one of the following keys:

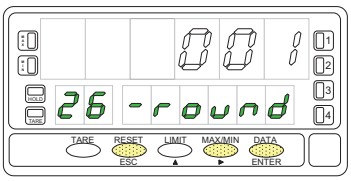


ENTER To get access to this menu.

▶ To skip this menu and pass to the menu 27 -VoL.

ESC To cancel this menu and return to the "-Pro-" stage.

Menu 26 -round. Select rounding increment.



Press repeatedly the ▶ key to scroll through available options for the round filter ["**001**" = no rounding, "**005**" = round to 5 counts, "**010**" = round to 10 counts, "**020**" = round to 20 counts, "**050**" = round to 50 counts or "**100**" = round to 100 counts].

ENTER Validate changes and return to the "-Pro-" stage.

ESC Exit this step and return to the "-Pro-" stage.

Volume Calculations

Display Volume based on Pressure or Linear Level

There are several methods to calculate the volume of a fluid in a tank.
If a pressure sensor is placed in the bottom of the tank, the display may be scaled to convert the sensor's pressures into liquid height. Other linear level signals can also be used.

The DPM4-AT-H provides different approaches to calculate liquid volume.

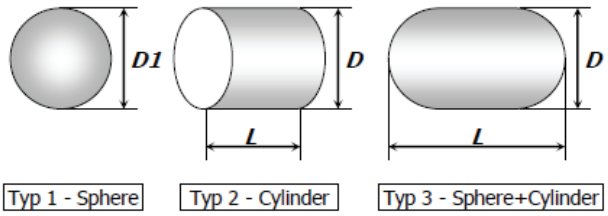
1. For some special regular tank shapes, if you know the mathematical relationship between pressure and volume, it will only be necessary to scale the display by two points. For example, for a cylindric vertical tank, volume is the product of the cylinder base area and the liquid height.

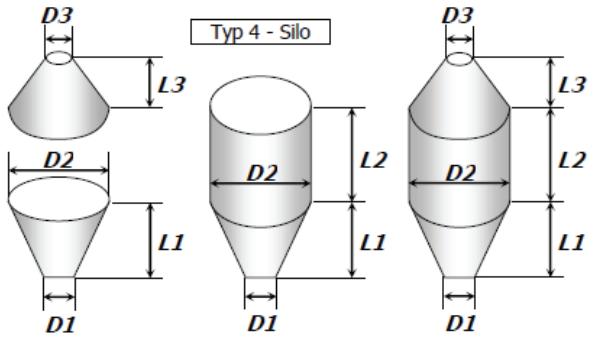
2. If the tank is irregularly shaped, you can use the linearization feature to readout volume using the teach method and piecewise linearization.
The method consists of filling the tank with known amounts of liquid, teach the input and enter the volume at each of the selected points over the height of the tank. The more the number of points used, the more accurate the measurement will be.

3. A third method that offers the instrument to extract volume is to set the automatic volume calculation function. This function can be used when the tank's shape correspond to one of the figures represented at right.

Automatic Volume Calculation

The instrument has most common tank geometry functions pre-programmed to calculate volume; spherical, horizontal cylinder, horizontal cylinder with spherical ends and conical bottom vertical cylinder. The user only has to enter the tank dimensions as requested in the program routine.





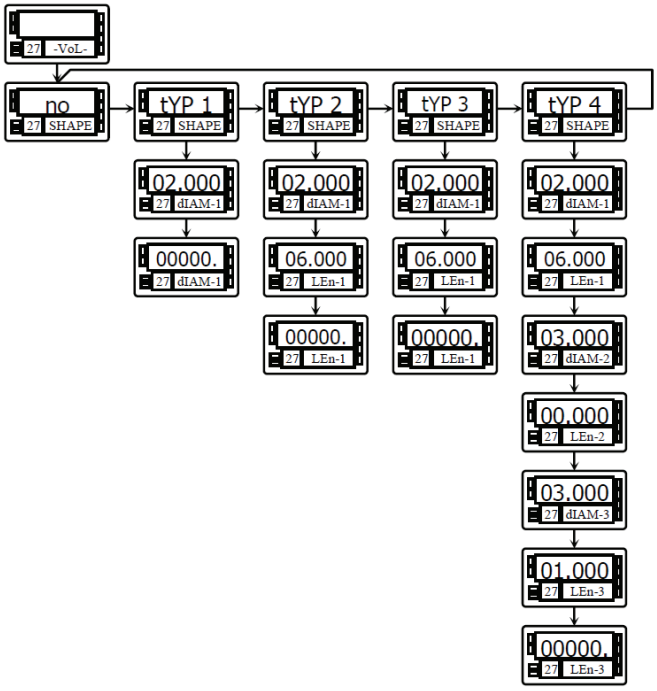
Programming Procedure to Readout Volume

When using this method to display volume, a pressure sensor must be placed at the bottom of the tank to drive a signal proportional to fluid level.

The first scaling phase is to convert the input signal to display height in meters. The height measurement is subsequently used to calculate volume.

The relation between pressure and height is linear, so two scaling points are enough to define the scale. The decimal point position must be chosen so that the display values are expressed in meters, for example, if the fluid level on top scale is 1.5m, suitable programmings would be 0001.5, 001.50, 01.500 or 1.5000 depending on desired resolution.

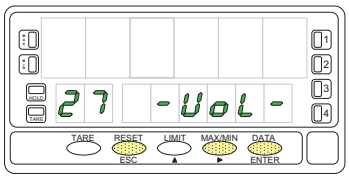
Once the signal is scaled to measure level in meters, the second phase is to activate the option 'VOL' to display volume. This option is enabled by selecting one of the available tanks shapes (see figure). After this, you must enter the diameter and length of the tank in meters, and finally set the decimal point of the display, which is independent from the decimal point programmed in the scaling procedure. Volume is expressed in whole liters despite of the point position.



Menu 27 - VOLUME CALCULATION

This menu appears exclusively for process and potentiometer configurations. **It is not possible to enable this option if the integrator is active (menu 23).** The automatic volume calculation facility can be only used when the tank's shape is one of the pre-programmed shapes shown

The figure shows the indication **"27 -VoL-"** corresponding to the input stage of the automatic volume calculation menu.
Use one of the following keys:



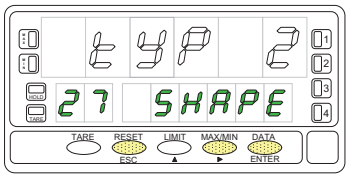
ENTER — To get acces to this menu.

▶ — To pass to the Menu 21 - SCAL.

ESC — To cancel the programming and return to the "-Pro-" stage.

Selection of the tank's shape. There are 5 options: -**no**- to disable this facility, -**tYP 1**- for sphererical shape, -**tYP 2**- for horizontal cylinder, -**tYP 3**- for horizontal cylinder with end caps and -**tYP 4**- for conical bottom vertical cylinder.

Press ▶ to choose the most appropriate shape from the list (or set the option -no- to disable volume calculation).

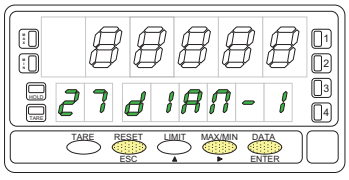


ENTER — Validate the choice and advance to the next programming phase.

ESC — Cancel this routine and return to the "-Pro-" stage.

After selecting the tank's shape, it is necessary to enter the **dimensions of the tank**.
The figure shows the phase corresponding to the programming of the diameter D1.

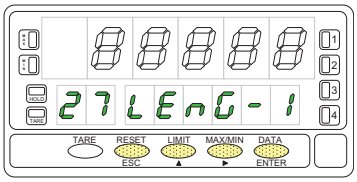
Press repeatedly the ▲ key to set the active digit to the desired value and ▶ to move one digit to the right until the value for the diameter D1, in meters is completed on the display (the digits to the right of the decimal point are fractions of meter).



ENTER — Validate the entry and advance to the next programming phase.

ESC — Cancel this routine and return to the "-Pro-" stage.

If you selected the **spherical shape (tYP 1)**, **this item does not appear**.
In this case, go directly to the programming of the decimal point.



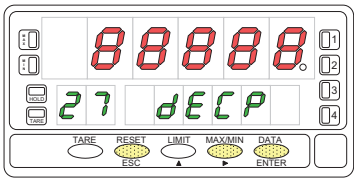
For the other shapes program the length L1 by using ▲ to increment digit value and ▶ to move to next digit until completing the desired value in meters (the decimal point notation marks the position of whole meters).

ENTER Validate the entry and advance to the next programming phase.

ESC Cancel the programming and return to the "-Pro-" stage.

SILO: The silo shape (tYP 4) is a combination of three parts and requires **three diameters and three lengths** to be programmed. You may have a tank that is composed of only one or two of the parts in which this shape is divided, to overcome this situation, the length of the missing parts should be programmed to zero.
The last phase of this routine is to set the decimal point of the display.

After programming the tank dimensions, the display goes to all zeros with the **decimal point** in flash. This is the decimal point of the volume display, which is independent of that programmed in the scaling routine.



Shift the decimal point to the desired position using ▶. If no decimal point is required, locate it to the rightmost digit.

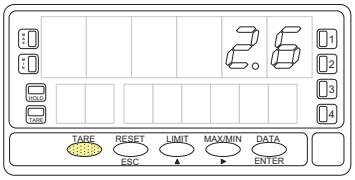
ENTER Validate the entry and go to the "-Pro-" stage.

ESC Cancel the programming and return to the "-Pro-" stage.

Keyboard Functions

The meter provides the following function keys: TARE, RESET, LIMIT and MAX/MIN. The functionality of each one in the "RUN" mode is described below.

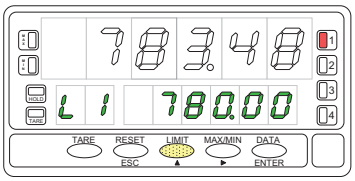
TARE Key



A push of the TARE key causes the current display to be stored in the tare memory.
The TARE LED denotes that a tare value other than zero is contained in the memory. The tare value (or offset for a temperature meter) can be displayed on the second display by pressing the MAX/MIN key.

To clear the tare memory, **press and hold** the RESET key, then press TARE.
Release the pressure of the keys in the reverse order
If a tare or tare reset operation is impossible from the front-panel, check the tare key lock settings

LIMIT key

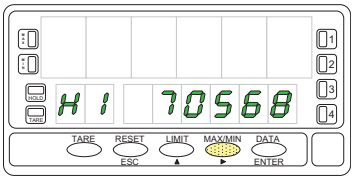


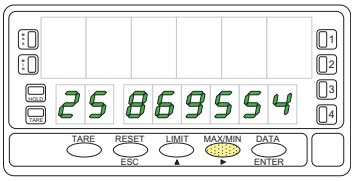
During the RUN mode, this key is only operative in case that one of the following output options is installed: 4 relays (ref. DPM-RELAY), 4 NPN transistors (ref. DPM-NPN) or 4 PNP transistors (ref. DPM-PNP).

The setpoint programmed values appear on the second display at each push of the LIMIT key independently of whether they are enabled or inhibited.
The auxiliary display shows L1, L2, L3 or L4 depending of which value is being read.

During the setpoints routine, the functionnality of the rest of the keys remains active.

MAX/MIN key





Recalls the following parameters to the second display : first push recalls peak, second push recalls valley, third push recalls tare (or offset). If the integrator option is enabled, the fourth push recalls total and, if not enabled but the logic function nº30 (totalizer+batch) is programmed to one of the user inputs a new push shows the number of batch operations. The last push after this sequence blanks the lower displays.

The auxiliary display indicates which variable is being read in the second display : "HI" = peak, "Lo" = valley, "tA" = tare, "oF" = offset, "bA" = nº of batches. The total value needs all 8 digits to be displayed.

Any selected parameter is permanently displayed and continuously updated if no action is taken.

RESET key

Press MAX/MIN until desired parameter appears on the second display. This parameter may be peak ('HI'), valley ('Lo'), total or number of batch operations ('bA').

When desired variable is being read on the lower displays, **hold the RESET key** and press MAX/MIN. Release first MAX/MIN, then RESET.
A tare or tare reset operation updates automatically the peak and valley readings to the current display value.

ENTER key (3s)

A long press (3s) gives access to the programming blocking routines.

RESET + ENTER (3s)

A press of 3s of both RESET and ENTER restores the factory settings to the memory of the instrument.
Press RESET first, then ENTER and hold both until the indication "StorE" appears on the second display.

Remote Functions

The rear connector CN2 provides 4 user programmable optocoupled inputs that can be operated from external contacts or logic levels supplied by an electronic system. Four different functions may be then added to the functions available from the front-panel keys. Each function is associated to one of the CN2 connector pins (PIN 1, PIN 2, PIN 4 and PIN 5) and is activated by applying a falling edge or a low level pulse to the corresponding pin with respect to common (PIN 3). Each pin can be assigned one of the 36 functions listed on the following pages.

Factory default
As shipped from the factory, the CN2 connector allows the TARE, MAX/MIN and RESET operations be made in the same way as from the front-panel keyboard and incorporates one more function: the display HOLD.
The HOLD state, which is acknowledged by the LED "HOLD", freezes the display, the BCD and the analog outputs but does not halt the meter's internal operation nor the alarm outputs.
The HOLD state is maintained as long as pin2 is kept to a low level with respect to pin 3.

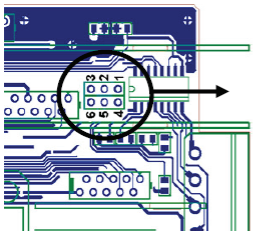
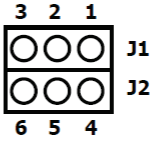
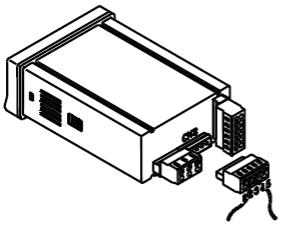
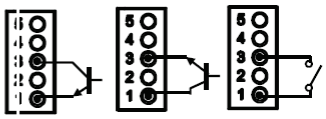


Fig. 74.1
Logic Change CN2
CN2 Input
PNP J1 (2-3) & J2 (5-6)
NPN J1 (1-2) & J2 (5-6)



PIN (INPUT)	Function	Number
PIN 1 (INP-1)	RESET	Function nº 7
PIN 2 (INP-2)	HOLD	Function nº 9
PIN 3	COMMON	
PIN 4 (INP-4)	TARE	Function nº 1
PIN 5 (INP-5)	PEAK/VALLEY	Function nº 6





Terminals with respect to COMMON.

Table of Programmable Functions

- Nº: Function number.
- Function: Function name
- Description: Description and characteristics of the function.
- Activation:
  - Falling edge: The operation is performed on a falling edge applied to the pin with respect to COMMON.
  - Low level: The function remains activated while the corresponding pin is held at a low level with respect to COMMON. (*)

0 to 9: DISPLAY / MEMORY FUNCTIONS

Nº	Function	Description	Activation
0	None	Deactivated. He pin has no function	None
1	TARE (*)	Adds the current display value to the tare memory. The display goes to zero	Falling edge
2	RESET TARE	Adds the tare memory contents to the display value and clears the tare memory	Falling edge
3	PEAK	Recalls peak value. A new falling edge returns to normal reading	Falling edge
4	VALLEY	Recalls valley value. A new falling edge returns to normal reading	Falling edge
5	RESET PEAK/VALLEY	Clears the peak or valley memory (if the values are on display).	Falling edge
6	PEAK/VALLEY (*)	1st push recalls peak, 2nd push recalls valley, 3rd push brings the meter to the indication of the variable being measured	Falling edge
7	RESET (*)	Combined with (1) clears the tare memory Combined with (6) clears the peak or valley memories	Falling edge combined with (1) or (6)
8	HOLD1	Holds the display while the outputs remain active display	Low level
9	HOLD2 (*)	Holds the display and the analog outputs	Low level

10 to 12: FUNCTIONS ASSOCIATED WITH THE DISPLAY OF THE INPUT VARIABLE

Nº	Function	Description	Activation
10	INPUT	Displays the actual value of the input signal, in mV (blinking).	Low level
11	GROSS	Displays measured value + tare value = gross value	Low level
12	TARE	Shows the accumulated tare in memory.	Low level

13 to 16: FUNCTIONS ASSOCIATED WITH THE ANALOG OUTPUT

Nº	Function	Description	Activation
13	ANA GROSS	Makes the analog output follow the gross value (measured value + tare).	Low level
14	ZERO ANA	Puts the analog output to the zero state (0 V for 0-10 V, 4 mA for 4-20 mA)	Low level
15	ANA PEAK	Makes the analog output follow the peak value	Low level
16	ANA VALLEY	Makes the analog output follow the valley value	Low level

17 to 23: FUNCTIONS FOR USE WITH A PRINTER VIA THE RS OUTPUTS

Nº	Function	Description	Activation
17	PRINT NET	Prints the net value.	Falling edge
18	PRINT GROSS	Prints the gross value.	Falling edge
19	PRINT TARE	Prints the tare value.	Falling edge
20	PRINT SET1	Prints the setpoint 1 value and its output status.	Falling edge
21	PRINT SET2	Prints the setpoint 2 value and its output status.	Falling edge
22	PRINT SET3	Prints the setpoint 3 value and its output status.	Falling edge
23	PRINT SET4	Prints the setpoint 4 value and its output status.	Falling edge

24 to 25: FUNCTIONS ASSOCIATED WITH THE SETPOINTS AND RS OUTPUTS

Nº	Function	Description	Activation
24	FALSE SETPOINTS	Exclusively for instruments WITHOUT relays/transistors control outputs card. Allows programming and operation of 4 setpoints.	Low level
25	RESET SETPOINTS	Exclusively for instruments with 1 or more setpoints programmed as "latched setpoints". Deactivates the setpoints output.	Falling edge

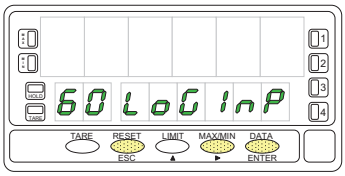
26 to 36: SPECIAL FUNCTIONS

Nº	Function	Description	Activation
26	ROUND RS	The display value as sent via the RS output, includes no filtering or rounding	Low level
28	SEND ASCII	Transmission of the last 4 digits of the display to a remote serial indicator. By holding the pin to a low level, the display is continuously sent at a rate of 1/s.	Low level or Falling edge
29	Deactivate Setpoints	Deactivates the activity of the setpoints and leaves the outputs at still	Low level
30	Batch	Adds the present value of the display to the totalizer and increments the batch counter once.	Falling edge
31	Visualize Total	The value of the totalizer appears in the display, alternating its high part and low part of four digits each. The auxiliary display shows "H" or "L", depending of which part we are looking to.	Low level
32	Visualize Batch	The display shows the value of the batch counter. The auxiliary display indicates "b".	Low level
33	Reset Total & Batch	Reset Totalizer and Batch counter.	Falling edge
35	Print Total & Batch	Print Total and Batch.	Falling edge
36	Hold & Print the Max.	When activated it resets the value of the Max. Then it saves the maximal value while the function is still activated. Finally it prints it when the function is deactivated	Low level

Remote Functions Programming

If we have already decided which functions we are going to program for the connector, we can access module 6 for configuring the logic inputs. This consists of four configurable menus, one for each PIN of connector CN2.

Press ENTER to enter in the programming mode (-Pro- level) and press repeatedly ▶ until the indication **"LoGInP"** appears on the display. From this stage press ENTER to access the logic inputs configuration. The ▶ key rotates around the four logic inputs to view the function number assigned to each pin.
The ▲ key changes the number if desired.



Consult the tables , for the description and activation of each of these functions.
Next, the programming of Pin 1 is explained, the rest of the pins are configured in the same way.

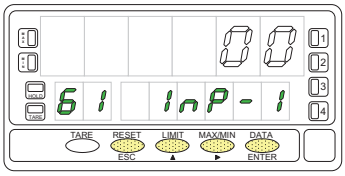
MENU 61 - PIN 1 Programming

Assign logic function to **PIN 1**.
The main display shows the function number assigned to logic input 1. Refer to the table to select function and use the ▲ key to change the number if desired.

▶ Pass to the programming of the following logic input.

ENTER Validate changes and return to the -Pro- stage.

ESC Exit from this menu and go to the -Pro- stage.



Lock Out Programming

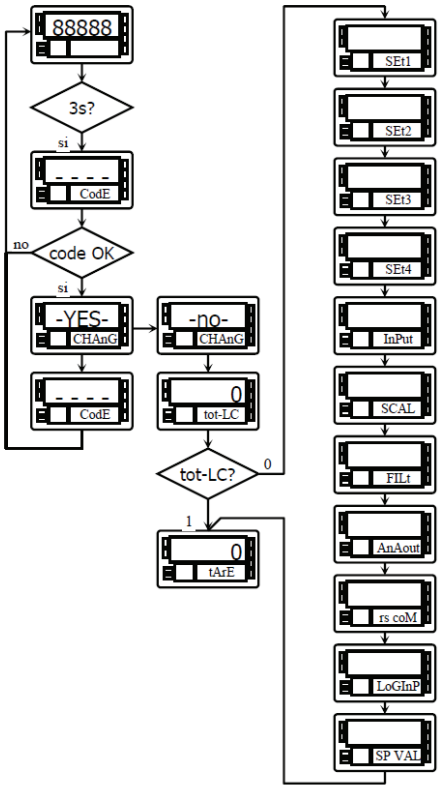
Security Menu Diagram

The attached figure shows the special security menu. It configures the blocking of the programming (total or partial). Access to this menu is done from the run mode, by pressing the ENTER key for 3 seconds, until the indication "Code" appears.

The instrument is supplied from the factory with a default code, "0000". Once this is entered, we will find the indication "CHAnGE" that will allow us to enter a personal code, which we must write down and save properly (do not trust your memory). After entering a personal code, the factory code becomes useless.
If we enter a wrong code, the instrument will automatically exit to run mode.

The total blocking of the programming, indication "tot-LC", is done by changing the value to "1". While the partial blocking of the programming is done by changing the value to "0". Next, the menus and submenus whose programming can be blocked will appear.

The "StorE" display indicates that the changes made have been successfully saved.



The instrument is supplied with unlocked programming, giving access to all programming levels. Once the programming of the instrument is complete, we recommend taking the following security measures:

Block access to programming, preventing modifications to the programmed parameters.

Lock keyboard functions that may occur accidentally.

There are two blocking modes: partial and total. If programming parameters are to be readjusted frequently, perform a partial lockout. If you don't plan to make adjustments, perform a full lockout. Locking of keyboard functions is always possible.

The blocking is done by software with the previous introduction of a customizable code. Change the factory code as soon as possible, writing down and keeping your personalized code in a safe place.

TOTAL LOCKOUT

With the instrument fully locked, it will be possible to access all programming levels to check the current configuration, although it will **not be possible to enter or modify data**. In this case, when programming is entered, the indication **"-dAtA-"** will appear on the secondary display.

SELECTIVE LOCKOUT

With the instrument partially locked, it will be possible to access all the programming levels to check the current configuration, **being able to enter or modify data in those menus or submenus that are not locked**.
In this case, when entering the programming menus, the indication **"-Pro-"** will appear on the secondary display.

The menus or submenus that can be locked are:

- Setpoint 1 programming (menu 31).
- Setpoint 2 programming (menu 32).
- Setpoint 3 programming (menu 33).
- Setpoint 4 programming (menu 34).
- Programming (module 10).
- Scale (menus 21/22, 23 and 27).
- Display options and filters (menus 24, 25 and 26).
- Analog output programming (module 40).
- Serial output configuration (module 50).
- Programming of logic inputs (module 60).
- Direct access to the programming of the Setpoints.

In addition to the menus corresponding to the options that are installed
("SEt1", "SEt2", "SEt3", "SEt4", "AnAout" or "rS CoM").

New Functions of the Relay Module

Use setpoint 2 to detect max reading

The 'MAX' option is for unfiltered peak detection, the 'MAX-F' option is for filtered peak values.

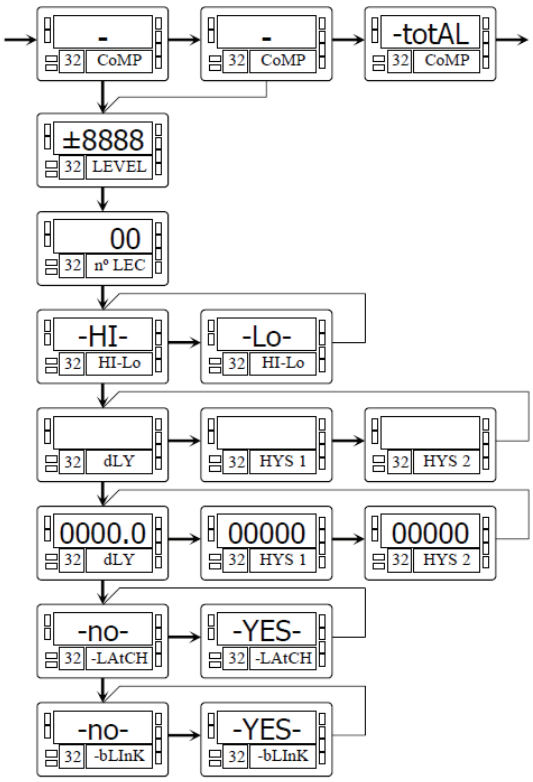
In this case, all the options programmed for the setpoint are taken into account (Latch, HI-LO, RET-HYS, Blink).

The value to be programmed in the setpoint value parameter will be the display value from which the peak begins to be evaluated; below this value it does not act.

The value to be programmed in the delay / hysteresis value parameter will be the time that the relay / opto will remain activated once the peak is reached (except if it is latch).

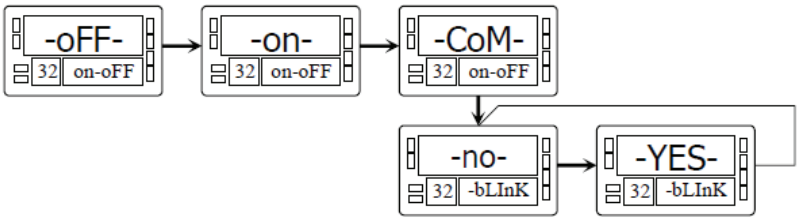
The output is activated when the display value stops increasing (once the setpoint2 value has been exceeded) for a number of readings programmable by the user from 0 to 99.

The programming of the number of readings is presented after the programming of the setpoint2 mode when this option has been selected.



Activate and deactivate setpoint by command by rs232C or rs485

This function is programmed by selecting the 'CoM' option in the setpoint activation selection level. The rest of the options do not appear in the programming routine except for the flashing of the display. Once the outputs are activated, they are not deactivated in overflow or when going through programming.



Comparison of the setpoints with the value of the totalizer

In this case, the setpoint value is programmed on the secondary display. The rest of the options are identical to those of a normal setpoint.

Using the ▶ key we select the way in which the instrument will treat the taring process. Whenever this menu is accessed, the tare value stored in the instrument's memory will be set to zero, and as always when the instrument is in this state, the TARE led will appear off. Once the operating mode has been selected, we exit to the "RUN" mode, from which the taring process will be carried out.

tArE1

On **tArE1** mode at one press of the TARE key, the instrument stores the value shown on display at this moment, if it is not on overflow, the TARE LED lights and from this moment the shown value is **net** value (the measured minus the stored). If the instrument already has a TARE and you press once again the TARE key ht value shown at this moment will be added to the previous TARE value, being the sum of both the resulting TARE.

tArE2

In this mode, the **TARE** key has no effect if the instrument is in run mode. The tare value now is entered manually, being the instrument run like in the previos mode. To the edit menu we will access from the run mode, by pressing the **ENTER** key going to the **–Pro-** mode and by pressing **TARE** key more than 3 seconds we can enter the tare value to memory using the ▶ and ▲ keys and pressing **ENTER** key we return ti the run mode with the TARE LED turned on, not allowing do more tares from the keyboard. It has to be reprogrammed to reset the tare.

tArE3

In this mode we have to program the "net" value, from RUN mode press more than 3 seconds the TARE key and according the diagram, program the net value (usually indicated in the container). Action TARE, as in the tArE2 case will not take effect until a press of TARE key, being the instrument in RUN mode, also the TARE LED will light. The value stored now on TARE is the difference between the measured value at the moment of TARE was made and th "net" value programmed. Being the display shown, the difference between the measured and calculated tare. You will need to enter the programming menu and go through "CndSP" > "ModtA" to delete the TARE, the TARE key is inactive until reprogrammed.

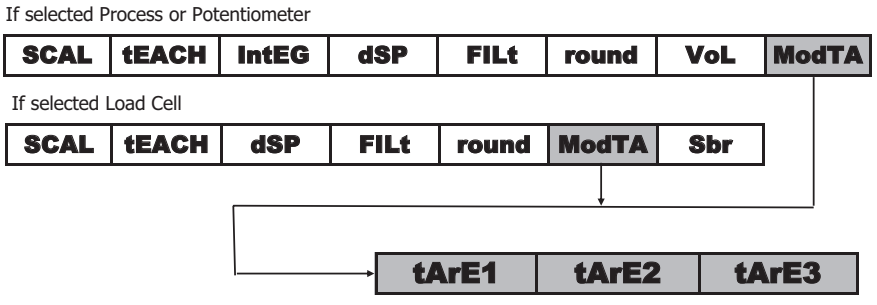
Example:

A process using the liquid in a container that is known as the manufacture's gross weight 100Kg and 75Kg net. It is used in the process of weighing a load cell connected to an instrument and need to know the net weight of liquid at every moment of the process. Selecting this mode of tare, net value would be introduced by editing. When the instrument is measuring the weight of the drum, now completely filed with liquid, which would be 100Kg, tare the instrument and the measure now shows 75Kg and measuring from this value to 0 during the emptying of it

Programming:

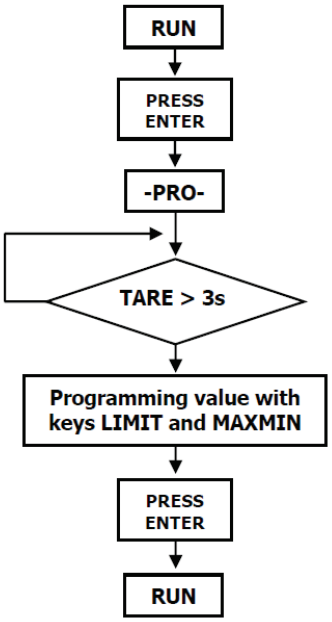
If have selected input Process or Potentiometer, on the menu 20 "CndSP" after submenu 27 "–VoL-" and with another push of ▶ key you get the submenu **ModTA**.

If have selected input "Load Cell" on the menu 20 "CndSP" after the submenu 26 and pushing ▶ key you get the submenu **ModTA**.



Programming Net Value in Tare Mode 3

To edit the net value, with the instrument in RUN mode, press the ENTER key to get the indication –Pro- then press the TARE key more than 3 seconds, showing the display the last TARE value programmed and the most left red digit blinking with ▶ key and ▲ key program the NET value, usually indicated on the container, validate with ENTER key and the instrument goes back to normal working, **at this moment with the container over the platform should be pressed ENTER key** , passing the instrument to show the programmed net weight and activating the TARE led, from this moment on the TARE key has no effect on the weight indication.

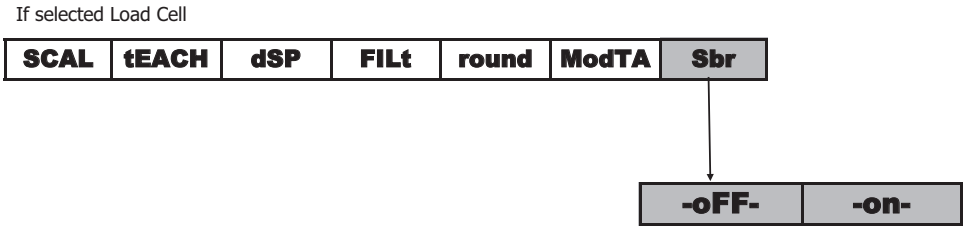


Menu 2 - Sensor Break

This function allows detecting any broken wire that connect the sensor "Load Cell" to the instrument. The analysis to detect the broken wires is done every 1,5 seconds and the response of Relays and ANA options (if used) will be the same if it were a overflow (**oVFLo**) situation, input signal greater than allowed.

NOTE: This detection system works only if the sensor is supplied with the excitation voltage from the instrument.

If the input "Load Cell" has been programmed, on the menu 20 "CndSP" after the submenu 28 with an other press of ▶ key we got the submenu 29 **-Sbr- Sensor Break** and pressing ENTER key is possible to select –on- to activate or –oFF- to deactivate.



Fail Safe

Function that allows detecting the power supply fault or an instrument fault and in this way can inform the PLC or another general system of supervision using the relay option programmed in this way.

This function can be programmed on any of the activated relay, in the submenu 31, 32, 33, 34 after the programming parameter **"–Hi-Lo-"** will show **"–no nc-"** (no=normally open), (nc=normally closed)

-nc- is the FAIL SAFE mode

r.o.C. Function / (rate of Change)

The function **r.o.C** is useful to detect the changing speed of display value, depending on programmed setpoint polarity we detect the increasing or decreasing.

In mode **r.o.C**., if the setpoint values is, for example = 1000, that means that the alarm will be activated when the display value increase more than 1000 points per second.
If the setpoint value were, for example = -1000, the alarm would be activated when the display value decrease with a speed greater than 1000 points per second.

The **r.o.C**. alarms have the same programmable options than the rest of alarms, namely, you can choose the mode of action, HI-LO, NO-NC, Latch, delay-histeresys, LED-LED+blink. The only difference is if delay is selected, on the **r.o.C**. alarms not apply to the activation and deactivation, but only to the deactivation of the alarm. This function is applicable separately to activate each of setpoints.

Programming:
If has been programmed input: Process, Potentiometer, Load Cell in the submenu 31 CoMP after the "–VAL-" pressing the  key gets the function **r.o.C.,** or in the submenu 32 gets after the MaxF or totAL (if activated).
If has been programmed input : Temp, in the submenus 31, 32, 33, 34 gets after the –VAL-

Note: The **ovflo** situation (be by sensor break, or excess of input signal, or incorrect programming) leads to the relays to the rest situation that corresponds according to the program established.

PROCESS, POTENTIOMETER and LOAD CELL

nEt	GroS	PEAK	VAL	MAX(*)	MAXF(*)	totAL(**)	roC

(*) OnlySetpoint 2
(**) Only if the totalizer or integrator is activated

THERMOCOUPLE and PT100

nEt	PEAK	VAL	roC

doSE / (Dosage)

If the input has been programmed as "Load Cell, Potentiometer or Process", **it is only possible in submenu 31** to select the function **"doSE"**

WAY of WORKING of SETPOINT1 in MODE "doSE"

When the function "doSE" is selected on the setpoint 1 menu, can not choose the comparison value, since it will be on the net value of the display.
Nor can choose HI or LO mode as this will depend on whether the setpoint is positive (HI) or negative (LO) and the numerical value of setpoint will have to be mandatory to program on the direct programming of setpoint values routine (keys ENTER and LIMIT).

When exit from menu 31 with "doSE" option selected, the setpoint is locked and it doesn't work.
To start working have to enter on direct programming routine and gives it a value.
When you press ENTER, the set value is added to the net internal value of display (if positive, "and is automatically HI-mode) or subtracted (if negative," and is put in LO-mode). At this time, enables the operation of the setpoint 1.

Each time the display increases (HI) or decrease (LO) in a number of points equal to the programmed setpoint 1 value will activate the output relay.

Likewise, if the logical function nº 30 has been programmed, the setpoint value will be added to the totalizer and increase the batch number in one unit.

If you also enable pin which is scheduled this logic function, two parameters are displayed in the main and secondary displays.

Activation of the relay output last time has been programmed on parameter "dLY" Setpoint1 menu or, if selected mode "LATCH", will be permanently activated until a reset is made of setpoints LATCH (logical function No. 25).

(*) It's not possible to program "trAC" if on the menu 31 has been programmed "doSE"

oFF	on	CoM	doSE

Technical Specifications

INPUT
Configuration .....asymmetric differential

Process Input	Voltage ±10Vdc	Current ±20mAdc
Max. Resolution	0.1mV	1µA
Input Impedance	1MΩ	15Ω

Excitation .....24V@30mA, 10/5V@120mA)
Max. error ..... ±(0.1% reading + 3 dig)
Temperature coefficient ..... 100ppm / ºC

Load Cell Input
Voltage ..... ±300mVdc
Max. Resolution ..... 0.15 µV
Input Impedance 100MΩ
Excitation .....10/5V @ 120mA
Max. error ..... ±(0.1% reading + 6 dig)
Temperature coefficient ..... 100ppm / ºC

Potentiometer Input
Voltage ..... ±10Vdc
Input Impedance ..... 10 MΩ
Display resolution 0.001%
Max. error ..... ±(0.1% reading + 3 dig)
Temperature coefficient ..... 100ppm / ºC

Temperature Input
Cold Junction compensation .....-10 ºCtoa +60 ºC
Cold Junction .....±(0.05 ºC/ ºC +0.1 ºC)
Pt100 excitation current .....< 1 mA dc
Max. cable resistance .....40 Ω/cable (balanced)
Temperature coefficient .....100 ppm/ ºC

Input	Range (res. 0.1 º)	Accuracy (res. 0.1º)	Range (res. 1º)	Accuracy (res. 1º)
TC "J"	-200.0 to +1100.0 ºC	0.4% L ±0.6 ºC	-200 to +1100 ºC	0.4% L ±1 º C
	-328.0 to +2012.0 ºF	0.4% L ±1 ºF	-328 to +1472 ºF	0.4% L ±2 º F
TC "K"	-200.0 to +1200.0 ºC	0.4% L ±0.6 ºC	-200 to +1200 ºC	0.4% L ±1 º C
	-328.0 to +2192.0 ºF	0.4% L ±1 ºF	-328 to +2192 ºF	0.4% L ±2 º F
TC "T"	-150.0 to +400.0 ºC	0.4% L ±0.6 ºC	-150 to +400 ºC	0.4% L ±1 º C
	-302.0 to +752.0 ºF	0.4% L ±1 ºF	-302 to +752 ºF	0.4% L ±2 º F
TC "R"	-50.0 to 1700.0 ºC	0.5% L ±2 ºC	-50 to 1700 ºC	0.5% L ±4 º C
	-58.0 to +3092.0 ºF	0.5% L ±4 ºF	-58 to +3092 ºF	0.5% L ±7 º F
TC "S"	-50,0 to 1700,0 ºC	0.5% L ±2 ºC	-50 to 1700 ºC	0.5% L ±4 º C
	-58.0 to +3092.0 ºF	0.5% L ±4 ºF	-58 to +3092 ºF	0.5% L ±7 º F
TC "E"	-200.0 to 1000.0 ºC	0.4% L ±1 ºC	-200 to 1000 ºC	0.4% L ±2 ºC
	-328.0 to +1832.0 ºF	0.4% L ±2 ºF	-328 to +1832 ºF	0.4% L ±4 ºF
Pt100	-100.0 to +800.0 ºC	0.2% L ±0.6 ºC	-100 to +800 ºC	0.2% L ±1 ºC
	-148.0 to +1472.0 ºF	0.2% L ±1 ºF	-148 to +1472 ºF	0.2% L ±2 ºF

FUSES (DIN 41661) (Not supplied)
DPM4-AT-H (230/115 V AC) .....F 0.2 A/ 250 V

CONVERSION
Technique .....ΣΔ
Resolution .....24 bits
Rate .....18/ s
Warm up time ..... 10 min.

FILTERS
Filter P
Frequence (- 3 dB) .....from 4Hz to 0.05Hz
Slope .....from 14 to 37dB/10
Filter E
Programmable .....10 levels

DISPLAY
Main .....–99999/+99999, 6 red digits 14 mm
Secondary .....2+6 green digits 8 mm
Decimal Point .....programmable
LEDs ..... 4 (functions + 4 outputs)
Reading Rate ..... 55.5 ms/ 250 ms/ 1 s

ERROR INDICATIONS
Negative Overflow .....- oUFLo
Positive Overflow .....+ oUFLo
Sensor Break .....- - - - -

POWER SUPPLY
DPM4-AT-H ..115/ 230 V, (±10%) 50/60 Hz AC

Consumption .....5 W (without options), 10 W (max.)

ENVIRONMENTAL
Indoor use
Operating temperature .....-10ºC to 60ºC
Storage temperatura .....-25 ºC to +85 ºC
Relative humidity (non condensed).....<95 % to 40 ºC
Altitude .....2000 m

DIMENSIONS
Dimensions .....96x48x120 mm
Panel Cut-Out .....92x45 mm
Weight .....600 g
Case material .....polycarbonate s/UL 94 V-0
Front sealing IP65

List of Commands ASCII/ISO/MODBUS

Request of data

ASCII	ISO	Information
I	0I	Logic inputs status
P	0P	Peak value
V	0V	Valley value
T	0T	Tare/Offset value
D	0D	Display value
Z	0Z	Totalizer value
X	0X	Batch Counter value
L1	L1	Setpoint 1 value
L2	L2	Setpoint 2 value
L3	L3	Setpoint 3 value
L4	L4	Setpoint 4 value
E	0E	bit 0 = input overflow, bit 1= scalae overflow, bit 2 = Sensor break

Modification of data

ASCII	ISO	Parameter
M1	M1	Change the Setpoint 1 value in the memory
M2	M2	Change the Setpoint 2 value in the memory
M3	M3	Change the Setpoint 3 value in the memory
M4	M4	Change the Setpoint 4 value in the memory
S1	S1	Change the Setpoint 1 value (not stored in memory)
S2	S2	Change the Setpoint 2 value (not stored in memory)
S3	S3	Change the Setpoint 3 value (not stored in memory)
S4	S4	Change the Setpoint 4 value (not stored in memory)

Commands

ASCII	ISO	MODBUS	Command
n	0n	n	Reset latched outputs
p	0p	p	Reset peak
v	0v	v	Reset valley
r	0r	r	Reset tare
t	0t	t	Tare the display
d	0d	d	Reset counter
z	0z	z	Reset totalizer
x	0x	x	Reset batch counter
a1	a1	a1	Activate setpoint 1
a2	a2	a2	Activate setpoint 2
a3	a3	a3	Activate setpoint 3
a4	a4	a4	Activate setpoint 4
d1	d1	d1	Deactivate setpoint 1
d2	d2	d2	Deactivate setpoint 2
d3	d3	d3	Deactivate setpoint 3
d4	d4	d4	Deactivate setpoint 4

Address of the Variables in the Memory

PROGRAMMING DATA (READ/WRITE)

ISO	MODBUS	Variable	Description
0	0	INPUT POINT 1	Sign 0=+,A=-
1			digit 4
2	1		digit 3
3			digit 2
4	2		digit 1
5			digit 0
6	3	INPUT POINT 2	sign
7			digit 4
8	4		digit 3
9			digit 2
10	5		digit 1
11			digit 0
12	6	INPUT POINT 3	sign
13			digit 4
14	7		digit 3
15			digit 2
16	8		digit 1
17			digit 0
18	9	INPUT POINT 4	sign
19			digit 4
20	10		digit 3
21			digit 2
22	11		digit 1
23			digit 0
24	12	INPUT POINT 5	sign
25			digit 4
26	13		digit 3
27			digit 2
28	14		digit 1
29			digit 0

30	15	INPUT POINT 6	sign
31			digit 4
32	16		digit 3
33			digit 2
34	17		digit 1
35			digit 0
36	18	INPUT POINT 7	sign
37			digit 4
38	19		digit 3
39			digit 2
40	20		digit 1
41			digit 0
42	21	INPUT POINT 8	sign
43			digit 4
44	22		digit 3
45			digit 2
46	23		digit 1
47			digit 0
48	24	INPUT POINT 9	sign
49			digit 4
50	25		digit 3
51			digit 2
52	26		digit 1
53			digit 0
54	27	INPUT POINT 10	sign
55			digit 4
56	28		digit 3
57			digit 2
58	29		digit 1
59			digit 0
60	30	INPUT POINT 11	sign
61			digit 4
62	31		digit 3
63			digit 2
64	32		digit 1
65			digit 0

66	33	INPUT POINT 12	sign
67			digit 4
68	34		digit 3
69			digit 2
70	35		digit 1
71			digit 0
72	36	INPUT POINT 13	sign
73			digit 4
74	37		digit 3
75			digit 2
76	38		digit 1
77			digit 0
78	39	INPUT POINT 14	sign
79			digit 4
80	40		digit 3
81			digit 2
82	41		digit 1
83			digit 0
84	42	INPUT POINT 15	sign
85			digit 4
86	43		digit 3
87			digit 2
88	44		digit 1
89			digit 0
90	45	INPUT POINT 16	sign
91			digit 4
92	46		digit 3
93			digit 2
94	47		digit 1
95			digit 0
96	48	INPUT POINT 17	sign
97			digit 4
98	49		digit 3
99			digit 2
100	50		digit 1
101			digit 0

102	51	INPUT POINT 18	sign
103			digit 4
104	52		digit 3
105			digit 2
106	53		digit 1
107			digit 0
108	54	INPUT POINT 19	sign
109			digit 4
110	55		digit 3
111			digit 2
112	56		digit 1
113			digit 0
114	57	INPUT POINT 20	sign
115			digit 4
116	58		digit 3
117			digit 2
118	59		digit 1
119			digit 0
120	60	INPUT POINT 21	sign
121			digit 4
122	61		digit 3
123			digit 2
124	62		digit 1
125			digit 0
126	63	INPUT POINT 22	sign
127			digit 4
128	64		digit 3
129			digit 2
130	65		digit 1
131			digit 0
132	66	INPUT POINT 23	sign
133			digit 4
134	67		digit 3
135			digit 2
136	68		digit 1
137			digit 0

138	69	INPUT POINT 24	sign
139			digit 4
140	70		digit 3
141			digit 2
142	71		digit 1
143			digit 0
144	72	INPUT POINT 25	sign
145			digit 4
146	73		digit 3
147			digit 2
148	74		digit 1
149			digit 0
150	75	INPUT POINT 26	sign
151			digit 4
152	76		digit 3
153			digit 2
154	77		digit 1
155			digit 0
156	78	INPUT POINT 27	sign
157			digit 4
158	79		digit 3
159			digit 2
160	80		digit 1
161			digit 0
162	81	INPUT POINT 28	sign
163			digit 4
164	82		digit 3
165			digit 2
166	83		digit 1
167			digit 0
168	84	INPUT POINT 29	sign
169			digit 4
170	85		digit 3
171			digit 2
172	86		digit 1
173			digit 0

174	87	INPUT POINT 30	sign
175			digit 4
176	88		digit 3
177			digit 2
178	89		digit 1
179			digit 0
180	90	DISPLAY POINT 1	sign
181			digit 4
182	91		digit 3
183			digit 2
184	92		digit 1
185			digit 0
186	93	DISPLAY POINT 2	sign
187			digit 4
188	94		digit 3
189			digit 2
190	95		digit 1
191			digit 0
192	96	DISPLAY POINT 3	sign
193			digit 4
194	97		digit 3
195			digit 2
196	98		digit 1
197			digit 0
198	99	DISPLAY POINT 4	sign
199			digit 4
200	100		digit 3
201			digit 2
202	101		digit 1
203			digit 0
204	102	DISPLAY POINT 5	sign
205			digit 4
206	103		digit 3
207			digit 2
208	104		digit 1
209			digit 0

210	105	DISPLAY POINT 6	sign
211			digit 4
212	106		digit 3
213			digit 2
214	107		digit 1
215			digit 0
216	108	DISPLAY POINT 7	sign
217			digit 4
218	109		digit 3
219			digit 2
220	110		digit 1
221			digit 0
222	111	DISPLAY POINT 8	sign
223			digit 4
224	112		digit 3
225			digit 2
226	113		digit 1
227			digit 0
228	114	DISPLAY POINT 9	sign
229			digit 4
230	115		digit 3
231			digit 2
232	116		digit 1
233			digit 0
234	117	DISPLAY POINT 10	sign
235			digit 4
236	118		digit 3
237			digit 2
238	119		digit 1
239			digit 0
240	120	DISPLAY POINT 11	sign
241			digit 4
242	121		digit 3
243			digit 2
244	122		digit 1
245			digit 0

246	123	DISPLAY POINT 12	sign
247			digit 4
248	124		digit 3
249			digit 2
250	125		digit 1
251			digit 0
252	126	DISPLAY POINT 13	sign
253			digit 4
254	127		digit 3
255			digit 2
256	128		digit 1
257			digit 0
258	129	DISPLAY POINT 14	sign
259			digit 4
260	130		digit 3
261			digit 2
262	131		digit 1
263			digit 0
264	132	DISPLAY POINT 15	sign
265			digit 4
266	133		digit 3
267			digit 2
268	134		digit 1
269			digit 0
270	135	DISPLAY POINT 16	sign
271			digit 4
272	136		digit 3
273			digit 2
274	137		digit 1
275			digit 0
276	138	DISPLAY POINT 17	sign
277			digit 4
278	139		digit 3
279			digit 2
280	140		digit 1
281			digit 0

282	141	DISPLAY POINT 18	sign
283			digit 4
284	142		digit 3
285			digit 2
286	143		digit 1
287			digit 0
288	144	DISPLAY POINT 19	sign
289			digit 4
290	145		digit 3
291			digit 2
292	146		digit 1
293			digit 0
294	147	DISPLAY POINT 20	sign
295			digit 4
296	148		digit 3
297			digit 2
298	149		digit 1
299			digit 0
300	150	DISPLAY POINT 21	sign
301			digit 4
302	151		digit 3
303			digit 2
304	152		digit 1
305			digit 0
306	153	DISPLAY POINT 22	sign
307			digit 4
308	154		digit 3
309			digit 2
310	155		digit 1
311			digit 0
312	156	DISPLAY POINT 23	sign
313			digit 4
314	157		digit 3
315			digit 2
316	158		digit 1
317			digit 0

318	159	DISPLAY POINT 24	sign
319			digit 4
320	160		digit 3
321			digit 2
322	161		digit 1
323			digit 0
324	162	DISPLAY POINT 25	sign
325			digit 4
326	163		digit 3
327			digit 2
328	164		digit 1
329			digit 0
330	165	DISPLAY POINT 26	sign
331			digit 4
332	166		digit 3
333			digit 2
334	167		digit 1
335			digit 0
336	168	DISPLAY POINT 27	sign
337			digit 4
338	169		digit 3
339			digit 2
340	170		digit 1
341			digit 0
342	171	DISPLAY POINT 28	sign
343			digit 4
344	172		digit 3
345			digit 2
346	173		digit 1
347			digit 0
348	174	DISPLAY POINT 29	sign
349			digit 4
350	175		digit 3
351			digit 2
352	176		digit 1
353			digit 0

354	177	DISPLAY POINT 30	sign
355			digit 4
356	178		digit 3
357			digit 2
358	179		digit 1
359			digit 0
360	180	SETPOINT 1	digit 7 / sign
361			digit 6
362	181		digit 5
363			digit 4
364	182		digit 3
365			digit 2
366	183		digit 1
367			digit 0
368	184	SETPOINT 2	digit 7 / sign
369			digit 6
370	185		digit 5
371			digit 4
372	186		digit 3
373			digit 2
374	187		digit 1
375			digit 0
376	188	SETPOINT 3	digit 7 / sign
377			digit 6
378	189		digit 5
379			digit 4
380	190		digit 3
381			digit 2
382	191		digit 1
383			digit 0
384	192	SETPOINT 4	digit 7 / sign
385			digit 6
386	193		digit 5
387			digit 4
388	194		digit 3
389			digit 2

390	195		digit 1
391			digit 0
392	196	DELAY / HYSTERESIS SETPOINT 1	digit 4
393			digit 3
394	197		digit 2
395			digit 1
396	198		digit 0
397		DELAY / HYSTERESIS SETPOINT 2	digit 4
398	199		digit 3
399			digit 2
400	200		digit 1
401			digit 0
402	201	DELAY / HYSTERESIS SETPOINT 3	digit 4
403			digit 3
404	202		digit 2
405			digit 1
406	203		digit 0
407		DELAY / HYSTERESIS SETPOINT 4	digit 4
408	204		digit 3
409			digit 2
410	205		digit 1
411			digit 0
412	206	ON-OFF SETPOINT 1	0=off, 1=on, 2=track, 3=rscom
413		ON-OFF SETPOINT 2	0=off, 1=on, 2=track, 3=rscom
414	207	ON-OFF SETPOINT 3	0=off, 1=on, 2=track, 3=rscom
415		ON-OFF SETPOINT 4	0=off, 1=on, 2=track, 3=rscom
416	208	COMP SETPOINT 1	0=net, 1=gross, 2=peak, 3=valley, 6=total
417		COMP SETPOINT 2	0=net, 1=gross, 2=peak, 3=valley, 4=max, 5=max filter, 6=total
418	209	COMP SETPOINT 3	0=net, 1=gross, 2=peak, 3=valley, 6=total
419		COMP SETPOINT 4	0=net, 1=gross, 2=peak, 3=valley, 6=total
420	210	HI-LO SETPOINT 1	0=hi, 1=lo
421		HI-LO SETPOINT 2	0=hi, 1=lo
422	211	HI-LO SETPOINT 3	0=hi, 1=lo
423		HI-LO SETPOINT 4	0=hi, 1=lo
424	212	DELAY-HYST SETPONT 1	0=delay, 1=hysteresis-1, 2=hysteresis-2
425		DELAY-HYST SETPONT 2	0=delay, 1=hysteresis-1, 2=hysteresis-2

426	213	DELAY-HYST SETPONT 3	0=delay, 1=hysteresis-1, 2=hysteresis-2
427		DELAY-HYST SETPONT 4	0=delay, 1=hysteresis-1, 2=hysteresis-2
428	214	LATCH SETPOINT 1	0=no, 1=yes
429		LATCH SETPOINT 2	0=no, 1=yes
430	215	LATCH SETPOINT 3	0=no, 1=yes
431		LATCH SETPOINT 4	0=no, 1=yes
432	216	BLINK SETPOINT 1	0=LED, 1=LED+blink
433		BLINK SETPOINT 2	0=LED, 1=LED+blink
434	217	BLINK SETPOINT 3	0=LED, 1=LED+blink
435		BLINK SETPOINT 4	0=LED, 1=LED+blink
436	218	TRACK AUTO	0=no, 1=yes
437		Nº LINEARIZATION POINTS	2 to 30
438	219	Nº READINGS SETPOINT MAX	digit 1
439			digit 0
440	220	ANALOG OUTPUT HI DISPLAY	sign
441			digit 4
442	221		digit 3
443			digit 2
444	222		digit 1
445			digit 0
446	223	ANALOG OUTPUT LO DISPLAY	sign
447			digit 4
448	224		digit 3
449			digit 2
450	225		digit 1
451			digit 0
452	226	ANALOG OUTPUT TYPE	0=Vdc, 1=Idc
453		ANALOG OUTPUT FILTER	0=off, 1=on
454	227	DIAMETER 1 (VOLUME)	digit 4
455			digit 3
456	228		digit 2
457			digit 1
458	229		digit 0
459		LENGTH 1 (VOLUME)	digit 4
460	230		digit 3
461			digit 2

462	231		digit 1
463			digit 0
464	232	DIAMETER 2 (VOLUME)	digit 4
465			digit 3
466	233		digit 2
467			digit 1
468	234		digit 0
469		LENGTH 2 (VOLUME)	digit 4
470	235		digit 3
471			digit 2
472	236		digit 1
473			digit 0
474	237	DIAMETER 3 (VOLUME)	digit 4
475			digit 3
476	238		digit 2
477			digit 1
478	239		digit 0
479		LENGTH 3 (VOLUME)	digit 4
480	240		digit 3
481			digit 2
482	241		digit 1
483			digit 0
484	242	TANK'S SHAPE	0=no, 1=sphere, 2=cyinder, 3=cylinder+sphere, 4=silo
485		DECIMAL POINT (VOLUME)	0=88888, 1=8888.8, 2=888.88, 3=88.888, 4=8.8888
486	243	EXCITATION	0=24V, 1=10V
487		INPUT TYPE	0=process, 1=load cell, 2=Pt100, 3=thermocouple, 4=potentiometer
488	244	PROCESS TYPE	0=volts, 1=amperes
489		THERMOCOUPLE TYPE	0=TCJ, 1=TCK, 2=TCT, 3=TCR, 4=TCS, 5=TCE
490	245	PROCESS RANGE	0=1V/1mA, 1=10V/20mA
491		LOAD CELL RANGE	3=15mV, 2=30mV, 1=60mV, 0=300mV
492	246	TEMPERATURE SCALE	0=ºC, 1=ºF
493		TEMPERATURE RESOLUTION	0=0.1º, 1=1º
494	247	TEMPERATURE OFFSET	sign
495			digit 1
496	248		digit 0
497		DISPLAY DECIMAL POINT	0=88888, 1=8888.8, 2=888.88, 3=88.888, 4=8.8888

498	249	FILTER P	0 to 9
499		FILTER E	0 to 9
500	250	READINGS AVERAGE	digit 2
501			digit 1
502	251		digit 0
503		BRIGHT	0=HI, 1=LO
504	252	LEFT ZEROS	0=no, 1=yes
505		RATE	0=16/s, 1=4/s, 2=1/s
506	253	ROUND	0=001, 1=002, 2=005, 3=010, 4=020, 5=050, 6=100
507		PRINT DATE AND TIME	0=off, 1=on
508	254	INTEGRATOR	0=no, 1=yes
509		TIME BASE	0=second, 1=minute, 2=hour, 3=day
510	255	INTEGRAtOR FACTOR	digit 3
511			digit 2
512	256		digit 1
513			digit 0
514	257	FACTOR DECIMAL POINT	0=88888, 1=8888.8, 2=888.88, 3=88.888
515		TOTALIZER DECIMAL POINT	0=88888888, 1=8888888.8, 2=888888.88, 3=88888.888, 4=8888.8888, 5=888.88888, 6=88.888888, 7=8.8888888
516	258	LO-CUT	sign
517			digit 4
518	259		digit 3
519			digit 2
520	260		digit 1
521			digit 0
522	261	SECURITY CODE	digit 3
523			digit 2
524	262		digit 1
525			digit 0
526	263	SOFT LOCK 1	bit 0 =setpoint 1 bit 1 =setpoint 2 bit 2 =setpoint 3 bit 3 =setpoint 4

527		SOFT LOCK 2	bit 0 = input bit 1 = scaling+integrator+volume bit 2 = filters+display+round bit 3 = -
528	264	SOFT LOCK 3	bit 0 = analog output bit 1 = serial communication output bit 2 = logic inputs bit 3 = direct programming of setpoint values
529		SOFT LOCK 4	bit 0 = tare key function bit 1 = - bit 2 = - bit 3 = total lock
530	265	LOGIC FUNCTION CN2.1	0 to 36
531		LOGIC FUNCTION CN2.2	0 to 36
532	266	LOGIC FUNCTION CN2.3	0 to 36
533		LOGIC FUNCTION CN2.4	0 to 36
534	267	-	-
535		-	-
536	268	PROTOCOL	1=ASCII, 2=iso1745, 3=modbus
537		BAUD RATE	1=1200, 2=2400, 3=4800, 4=9600, 5=19200
538	269	ADDRESS TENS	0 to 9
539		ADDRESS UNITS	0 to 9
540	270	TRANSMISSION TO DPM4	0=no, 1=yes
541		DELAY RS485	1=30ms, 2=60ms, 3=100ms, 4=300ms, 5=no delay

DINAMIC VARIABLES (READ ONLY)

MODBUS	Variable	Description	Format
276	Peak Value	Internal peak value	Long
278	Valley value	Internal valley value	Long
280	Tare value	Internal tare value	Long
282	Batch counter	Internal batch counter	Integer (1 word)
285	Totalizer/Integrator	Internal totalizer/integrator counter	Float
287	Net value	Net value on display (with filters, round and hold)	Long
289	Gross value	Gross value on display (with filters, round and hold)	Long
291	Input signal value	Input signal value on display (with filters and hold)	Float
293	Setpoint1	Setpoint 1 value	Long
295	Setpoint2	Setpoint 2 value	Long
297	Setpoint3	Setpoint 3 value	Long
299	Setpoint4	Setpoint 4 value	Long
301	Batch	Batch Value on display (with filters and hold)	Integer (1 word)
302	Totalizer/Integrator	Total Value on display (with filters and hold)	Float
304	Peak	Peak Value on display (with filters and hold)	Long
306	Valley	Valley Value on display (with filters and hold)	Long
308	Net	Internal net value	Float
310	Gross	Internal gross value	Float
312	Input signal value	Input signal value	Long
314	Net round	Net value (with filters and round)	Long
316	Gross round	Gross value (with filters and round)	Long
318	State of the setpoints and the logic inputs (0=deactivated, 1=activated)	bit 0 = setpoint 1 status bit 1 = setpoint 2 status bit 2 = setpoint 3 status bit 3 = setpoint 4 status bit 4 = logic input 1 status bit 5 = logic input 2 status bit 6 = logic input 4 status bit 7 = logic input 5 status	Byte (High)

DINAMIC VARIABLES (READ ONLY)

MODBUS	Variable	Description	Format
318	Options installed (0=not installed, 1=installed)	bit 0 = - bit 1 = 4RE bit 2 = RS2 bit 3 = RS4 bit 4 = - bit 5 = - bit 6 = ANA bit 7 = -	Byte (Low)
319	Digits of the main display	digit 0 (LSB)	Byte
		digit 1	Byte
320		digit 2	Byte
		digit 3	Byte
321		digit 4	Byte
		digit 5 (MSB)	Byte
322		LED's	Byte
		-	Byte
323	Digits of the auxiliary display	digit 0 (LSB)	Byte
		digit 1	Byte
324		digit 2	Byte
		digit 3	Byte
325		digit 4	Byte
		digit 5	Byte
326		digit 6	Byte
		digit 7 (MSB)	Byte
327	Version	units	Byte
		tens	Byte
328		hundreds	Byte
		'M'	Byte
329		'B'	Byte
	Sensor Break	0=OK, 1=Broken	Byte
330	Display overflow (internal)	0=no, 1=yes	Byte
	Input overflow	0=no, 1=yes	Byte
331	Display overflow	0=no, 1=yes	Byte
	Totalizer / Integrator overflow	0=no, 1=yes	Byte