

USER MANUAL



PROSENSE DPM1 SERIES

DIGITAL PANEL METER FOR PROCESS INPUT SIGNALS

Models:

**DPM1-A-2R-H
DPM1-A-A2R-H**

**DPM1-A-2R-L
DPM1-A-A2R-L**

Scan or click the QR code for a series of Configuration and Programming videos for the ProSense DMP Series Panel Meters



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General Information

Package Contents

- DPM1 Series digital panel meter
- Quick start guide
- Mounting panel accessories (a sealing gasket and fixing clip)
- Wiring accessories (plug-in terminal block connectors and 2 key tools for wire insertion)
- Adhesive engineering unit label sheet

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

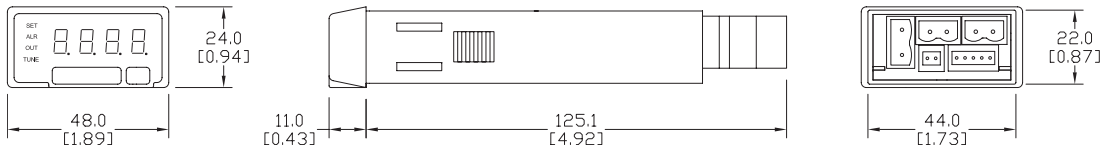
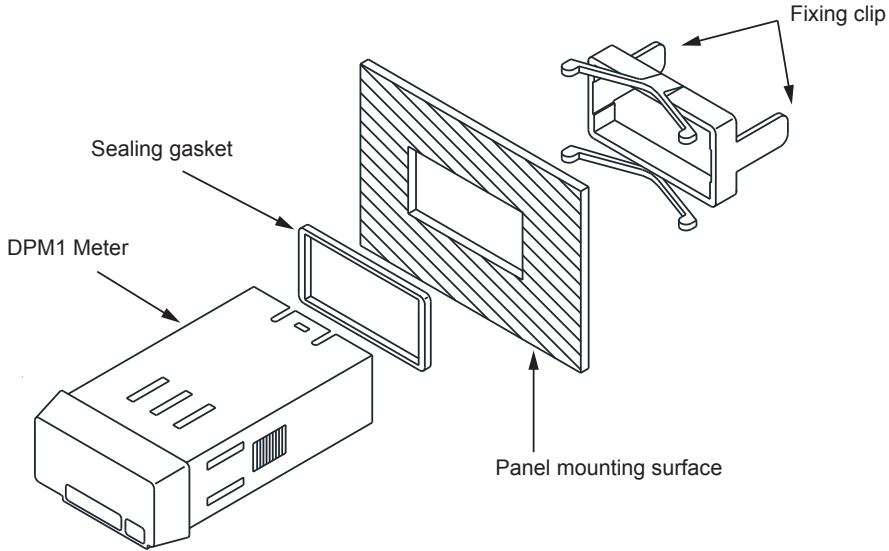


Device Description

These models in the ProSense DPM1 series offers a simple, low cost digital display of analog process signals. The 4-digit red LED display is easily scaled into any engineering units from -1999 to 9999 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 16 scaling points. Two SPST relay outputs are included that can be set to activate on an increasing or decreasing input signal with hysteresis or time delay operation. Models are also available with a 0-20mA or 4-20mA analog output. The meter is powered from an external AC or DC power supply and provides 20VDC for external sensor excitation. The 1/32 DIN housing takes up minimal panel space 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, a tare function, filtering to minimize display bounce, and display brightness adjustment. ProSense digital panel meters are backed by a 3 year warranty.

- 48 x 24mm 1/32 DIN
- Simple menu driven pushbutton configuration
- 4 digit (-1999 to 9999) red LED display
- Selectable decimal point
- Process ($\pm 10V$, $\pm 60V$, $\pm 100mV$, $\pm 20mA$)
- AC or DC powered
- Sensor excitation voltage 20V
- (2) Form A SPST normally open relays
 - Activation on increasing or decreasing input signal
 - Hysteresis or time delay operation
- Optional 0/4-20mA analog output
- Total or selective configuration lock out
- Display scaling or process teaching modes
- Configuration for direct or reverse acting linear processes and up to 16 point non-linear processes
- Minimum and maximum value memory
- Tare function
- Filtering to minimize display bounce
- Display brightness adjustment
- 3 year warranty

Dimensions and Mounting



Installation

To install the instrument, prepare a 45mm x 22mm panel cut-out and slide the unit inwards making sure to place the sealing gasket between the front side panel and the front bezel.

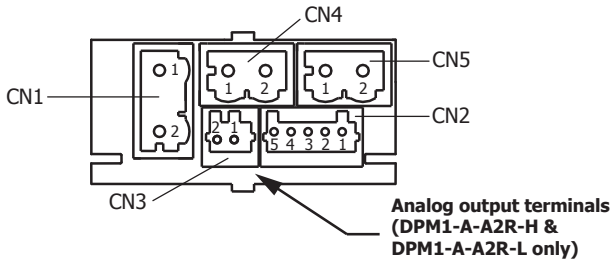
While holding the unit in place, put the fixing clip around the case and slide it until it reaches the panel at the rear side.

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.

To remove the instrument from the panel, pull the rear fixing clips latching tabs outwards until they are disengaged, then slide the fixing clips back over the case.

Installation	
Dimensions	48 x 24 x 125.1mm (1/32 DIN)
Panel Cutout	45 x 22mm (Max. panel thickness 7mm)
Case Material	Polycarbonate UL 94 V-0

Wiring Terminals



CN1	
AC Supply	DC Supply
1 Line	1 -VDC
2 Neutral	2 +VDC

CN2	
1	+60V / +10VDC
2	+20mA DC
3	+100mV
4	-IN / - Excitation
5	+Excitation (20V±5VDC @ 30mA)

CN3*	
1	-0/4-20mA
2	+0/4-20mA

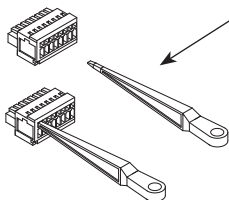
CN4	
Relay 1	
1	N.O. Contact
2	

CN5	
Relay 2	
1	N.O. Contact
2	

* Analog output terminals
(DPM1-A-A2R-H & DPM1-A-A2R-L
only)

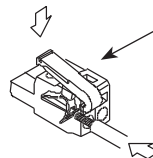
Terminals					
Connector	CN1	CN2	CN3	CN4	CN5
Wire cross section	0.08 to 2.5mm ² (28 to 12 AWG)	0.08 to 0.5mm ² (28 to 20 AWG)	0.08 to 0.5mm ² (28 to 20 AWG)	0.08 to 2.5mm ² (28 to 12 AWG)	0.08 to 2.5mm ² (28 to 12 AWG)
Strip length	8 to 9mm	5 to 6mm	5 to 6mm	8 to 9mm	8 to 9mm
Manufacturer	Wago 231-202/026-000	Wago 733-105	Wago 733-102	Wago 231-102/026-000	Wago 231-302/026-000
Cage clamp connection	Insertion tool or screwdriver with 0.5 mm x 3.0 mm blade	Insertion tool or screwdriver with 0.3 mm x 1.8 mm blade	Insertion tool or screwdriver with 0.3 mm x 1.8 mm blade	Insertion tool or screwdriver with 0.5 mm x 3.0 mm blade	Insertion tool or screwdriver with 0.5 mm x 3.0 mm blade

CN2 and CN3 Terminals



Insertion Tool (included with meter)
Insert wires into the proper terminal while using the insertion tool to open the clip inside the connector. Release the insertion tool to fix wire to the terminal.

CN1, CN4 and CN5 Terminals



Insertion Tool (included with meter)
Insert wires into the proper terminal while using the insertion tool to open the clip inside the connector. Release the insertion tool to fix wire to the terminal.

This instrument conforms with the following community directives: EMC 2004/108/CE and LVD 2006/95/CE.

Refer to the instructions in this manual to preserve safety protections.

⚠ WARNING: If this instrument is not installed and used in accordance with these instructions, the protection provided against hazards may be impaired.

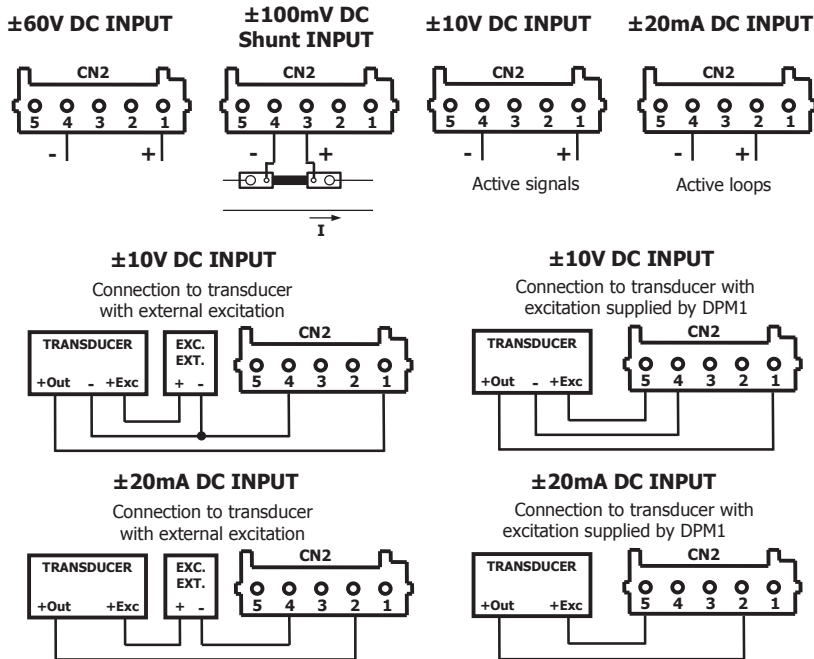
To meet the requirements of EN 61010-1 standard, where the unit is permanently connected to main supply, it is obligatory to install a circuit breaking device easily reachable by the operator and clearly marked as the disconnecting device.

To guarantee electromagnetic compatibility, the following guidelines should be kept in mind:

- Power supply wires should be separately routed from signal wires and never run in the same conduit.
- Use shielded cable for signal wiring.
- Cables section should be $\geq 0.25 \text{ mm}^2$.

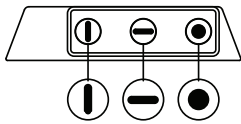
Before connecting signal wires, signal type and input range should be verified to be within the right limits. Do not connect simultaneously more than one input signal to the meter.

Wiring Examples



For other transducer connection types, do not forget to also join indicator common (CN2, pin 4) to the negative terminal from the external excitation if it is needed.

Programming Keys



(Bottom View)

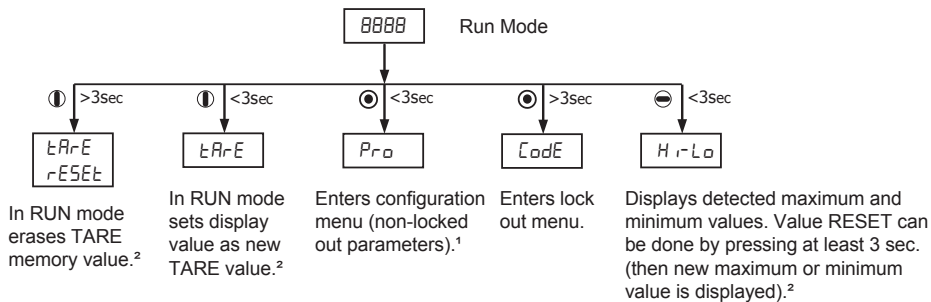
- **ENTER:** Enters configuration and validates data and parameters.
- ⊖ **SHIFT:** Selects mode or shifts blinking digit in configuration.
- Ⓜ **UP:** Increases value of blinking digit in configuration mode.

Configuration

When the power is applied to the meter, a display test begins automatically to check the function of the LED's and digits. Once this test is finished the display shows the internal software version and then the unit goes to **RUN** mode.

Configuration follows a structure composed of a number of menus and submenus. By pressing the **ENTER** key for <3 seconds, the main menu level is entered and the display will show “**Pro**”. Pressing the **SHIFT** key provides access to the programming menu level which includes menus for input configuration (**InP**), display configuration (**dSP**), relay configuration if present (**SEt**), analog output configuration if present (**A.out**). Press **ENTER** to access the submenus under each programming menu.

If configuration has been totally locked-out, when pressing **ENTER** to access the main menu level, the display shows **dAtA** instead of **Pro**. This indicates that it is only possible to see programmed information and that it is not allowed to modify any parameter from the entire configuration. In this visualization mode, the meter automatically switches back to **RUN** mode after 15 seconds from the last key press.



(¹) If parameter lock out has been enabled, dAtA will be displayed instead of Pro

(²) Additional information provided later in this User Manual

The progress through the programming routines is done by pressing **ENTER** key. In general, push **SHIFT** key a certain number of times to select an option and push **ENTER** key to validate the change and move forward to the next step of the program.

Programming numerical values

When the parameter is a numerical value, the display will show the first of the digit to be programmed blinking.

Digit selecting: Press repeatedly the **SHIFT** key to shift from left to right over all the display digits.

Changing the digit value: Press repeatedly the **UP** key to increase the value of blinking digit until it has the desired value.

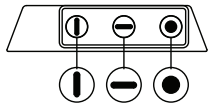
The minus sign is programmed depending on the variable type. A variable that represents the value of an input will be able to take a value in the range -1999 to 9999, without taking into account the decimal point. When a digit is selected it shows values from (0) to (9), and then (-1), (-), and comes back to show values from 0 to 9. A variable that represents a display value will be able to take a value in the range -1999 to 9999, without taking into account the decimal point.

Completion of each submenu routine returns the meter to **Pro** mode. To save data entered or changed during configuration press the **ENTER** key while in **Pro** mode. **Stor** will be displayed for a few seconds while all of the configuration data is stored in memory. The meter will then return to **RUN** mode.

Input Configuration

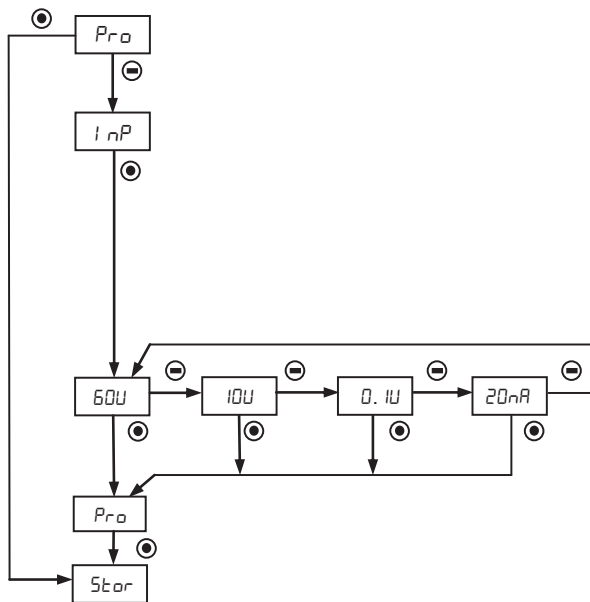
The figure below shows the input configuration menu.

Programming Keys (Bottom View)



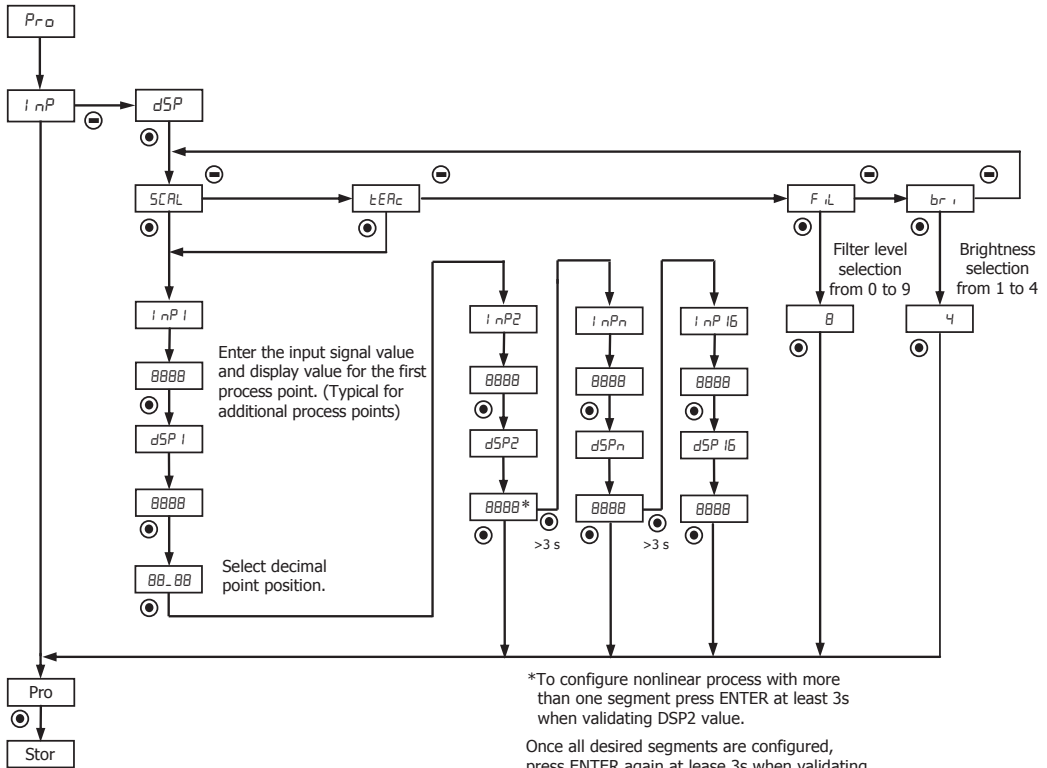
(Bottom View)

- **ENTER:** Enters configuration and validates data and parameters.
- ▬ **SHIFT:** Selects mode or shifts blinking digit in configuration.
- Ⓜ **UP:** Increases value of blinking digit in configuration mode.



Input Types	
60U	±60VDC
10U	±10VDC
0.1U	±100mV DC
20nA	±20mA DC

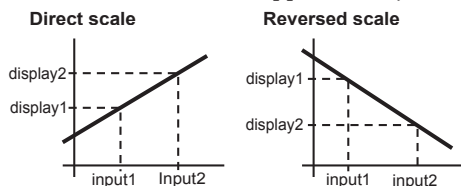
Display Configuration



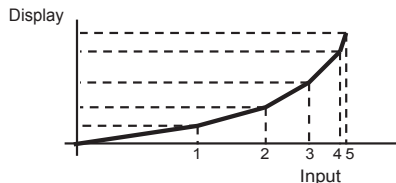
Scaling

Scaling consists of assigning a display value to each input signal value.

In linear processes it is achieved by programming two coordinates (InP1, dSP1) and (InP2, dSP2), between which is established a linear relation where each input signal value corresponds to a display value. The relationship can be direct or reversed. In order to obtain more accuracy, points 1 and 2 should be located approximately at both extremes of the process.



In nonlinear processes it is possible to program up to 16 input to display points. Each two points are connected by a straight line and the whole is a curve that represents the relationship between the input value and the display value.



In order to obtain more accuracy it is recommended to program the highest possible number of points and reduce the segment length. **Input values must always be programmed in an increasing or decreasing order. Avoid assigning two different display values to two equal input values.** Display values can be entered in any order and even be repeated for different inputs.

Below the first point programmed, the relationship established between the two first points of the scale is followed. Above the last point programmed, the relationship established between the two last points of the scale is followed.

Programming of the scale

There are two methods for programming the scale, the **SCAL** method and the **tEACH** method.

SCAL method

The input and display values are programmed manually. This method can be used when the value of the signal supplied by the transducer at each point of the process is known.

tEACH method

The input values are introduced directly from actual process values. The input signal device must be connected to the meter and operational when each point is programmed. The display values are programmed manually. This method can be used when it is possible to bring the process to the conditions of each one of the points to be programmed.

Programming of a nonlinear process

Access the first two input-display points by pressing the **ENTER** key. To access the programming of the rest of the points, press **ENTER** key for 3s after entering the display value of point 2. From here the progression is achieved by pressing **ENTER** key. When enough points have been programmed to define the process, press **ENTER** for 3s after entering of the last DSP n value, to get out of the scale programming routine. The rest of the points, up to 16, that have not been programmed are omitted from the display calculation.

Input Points

- 1999 to 9999

Display Points

- 1999 to 9999

Display decimal point

0 0.0 0.00 0.000

Accessible from the **SCAL** or **tEACH** menu, following the first display point. Once accessed, it will start to blink in its present position. Use the **SHIFT** key to shift to another position.

The selected decimal point location will be applied to all display points and if present relay setpoints and analog output scale.

Weighted Average Filter P

0 to 9 (0.4 Hz to 0.004 Hz)

Sets low-pass filter cutoff frequency (Fc) which allows the meter to smooth out undesirable display reading fluctuations. The value can be modified through the **SHIFT** key. This parameter will set in reverse order the cut-off frequency of the low pass filter, getting the filter deactivated for 0 value.

Brightness

1 2 3 4

Display brightness level selection.

4: high brightness

1: low brightness

Additional Functions

Several functions can be controlled via the Key Pad that will produce different actions depending on the instrument operating mode:

TARE and Reset TARE functions

To configure the meter for Tare mode, press the **UP** key while in **RUN** mode and the meter will store the currently displayed value as the tare value (unless it is over scaled) and the **TARE** Led will light. From this point the value displayed on the meter is the net value, i.e., the measured value minus the stored tare value. If a tare value has been stored, pressing the **UP** key again will add the currently displayed value to the previously stored tare value resulting in a new stored tare value. To reset the tare value to zero, press the **UP** key for 3 seconds while in **RUN** mode. The **TARE** Led will turn off and the displayed value will be the gross value (without the tare).

MAX/MIN function

With the meter in **RUN** mode: Activated after pressing the **SHIFT** key for less than 3 seconds. From **RUN** mode, a press shows the maximum value read by the instrument since the last time it has been switched on, unless a **RESET MAX/MIN** is done, the display will alternate between “**Hi**” and the maximum stored value. With a second press the display will alternate between “**Lo**” and the minimum stored value. A third press brings the instrument back to **RUN** mode.

Reset MAX/MIN

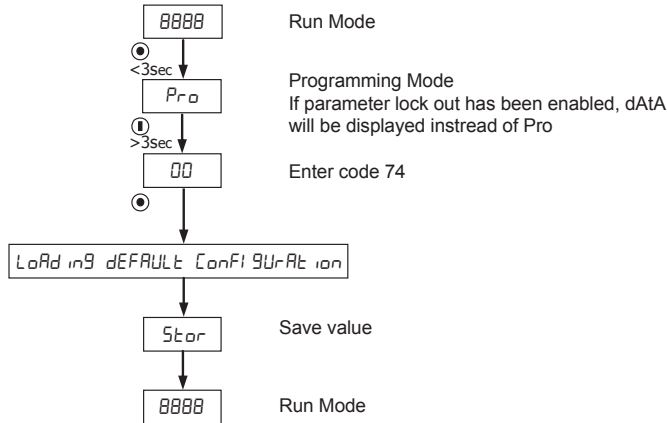
While the meter shows the peak value (**MAX**), pressing the **SHIFT** key for 3 seconds will produce a reset of the value. Pressing **SHIFT** key for 3 seconds while the meter shows the valley value (**MIN**) will produce a reset of the value.

Configuration Lockout

In mode **RUN** if the **ENTER** key is pressed for 3 seconds, the meter will show the indication **Code**, and following **0000**, allowing the user to introduce the security code. If the code that has been introduced is wrong, the meter will go back to **RUN** mode, if it is correct, it will allow the access to the security menu. See section detailing Configuration Lockout.

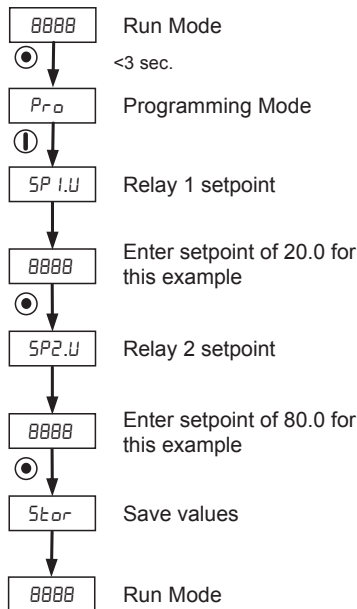
Return to Factory Configuration

From **RUN** mode press the **ENTER** key for less than 3 seconds to access **Pro** programming mode. Now press the **UP** key for more than 3 seconds to allow entering the numeric code to reset the meter to factory configuration parameters. This code is 74. When entering this code the meter shows the *Load is default Conf State on*, and then *Store*, which means that they have been stored in the non volatile memory of the meter.



Direct Access to Relay Setpoints

The meter allows direct access to the programming of the relay setpoint values. After accessing programming mode, **Pro**, pressing the **UP** key provides access to each relay setpoint value.



Configuration Lock Out

The meter is delivered with the programming not locked out, giving access to all the programming levels. Once completed the meter programming the following security measures are recommended:

1. Lock out the programming access to prevent from programmed parameters modifications.
2. Lock out Key Pad functions to prevent from accidental modifications.
3. There are two lockout modes: selective and total. If the parameters are going to be readjusted frequently, make a selective lockout. If no adjustment is going to be made, make a total lockout. Key Pad functions lockout is always possible.
4. The access to the lockout routine is allowed by entering a personalized code. We recommend changing the code set at factory and to write down your personalized code and keep it in a safe place.

TOTAL LOCKOUT

The access to the programming routines to read data is allowed even if all parameters are locked out ALL=Yes, but **it will not be possible to enter or modify data**. In this case, when entering in the programming mode, the display shows the indication “-dAtA-”.

PARTIAL LOCKOUT

When only some parameters are locked out, all configuration data can be read but **only non protected parameters can be modified**. In such case, when entering in the programming mode, the display shows the indication -Pro- “.

Menus or submenus that can be locked out are:

- Relay 1 Configuration (C.SP.1).
- Relay 2 Configuration (C.SP.2).
- Relay 1 Setpoint Value (V.SP.1).
- Relay 2 Setpoint Value (V.SP.2).
- Input configuration (InP).
- Display (dSP).
- Analog output configuration (A.Out). If present in meter.
- Programming of the key TARE (tArE).

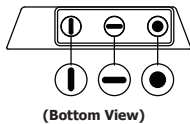
Lock-out menu diagram

The following figure shows the lock-out menu. The access to this menu is accomplished from the run mode by pressing the **ENTER** key for 3 seconds, until the “**CodE**” indication appears. The instrument is shipped from factory with the following default code: “**0000**”. Once this code is entered, the “**CHAn**” menu is available to change to a personal code. Write down and

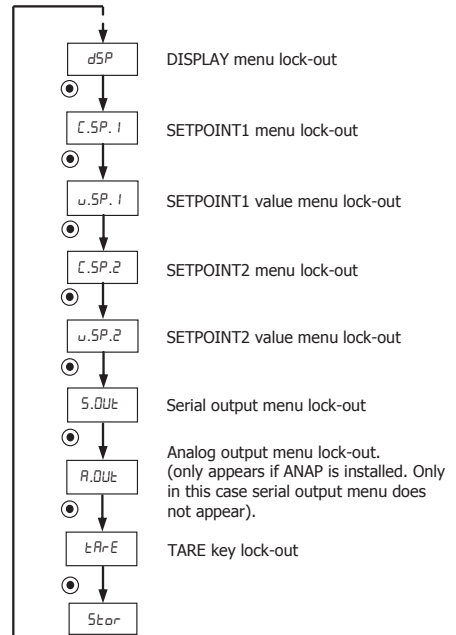
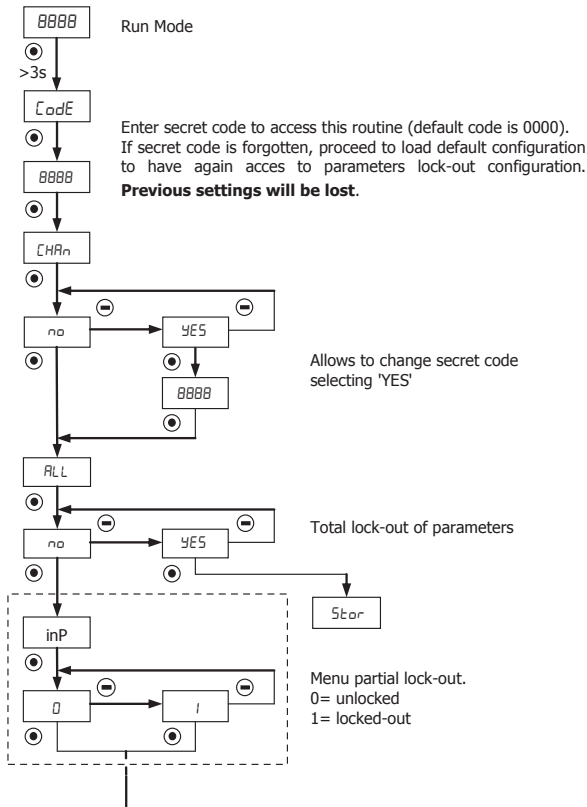
keep this code in a safe place (**Do not count on your memory**). This personal code makes the default code useless.

If an incorrect code is entered, the meter will return automatically to the run mode. Total lockout programming is achieved by changing ALL to Yes. Changing ALL to No will lead to the selective lockout of the programming variables. Programming each one of the parameters to 1 will activate the lockout, if they are set to 0 programming will be accessible. Though the programming is locked out, it remains possible to visualise the current programming.

The “**Stor**” indication informs that the modifications effectuated have been stored correctly.



- **ENTER:** Enters configuration and validates data and parameters.
- ▬ **SHIFT:** Selects mode or shifts blinking digit in configuration.
- ⏏ **UP:** Increases value of blinking digit in configuration mode.



Output Options

All output are optoisolated with respect to input signal and power supply.

Relay Configuration

Introduction

All DPM1 models with -2R option are equipped with 2 relays that can provide individual alarm and control capabilities. Each relay can be configured to function based on independent setpoint values within the full configured display range, time delay (in seconds), hysteresis (in counts of display) and selectable HI/LO acting.

Description of Operation

The relay outputs activate when the display value reaches the corresponding programmed relay setpoint value. The following relay operational parameters must also be set:

a. HI/ LO ACTING MODE.

In HI mode, the output activates when the display value exceeds the setpoint level and in LO mode, the output activates when the display value falls below the setpoint

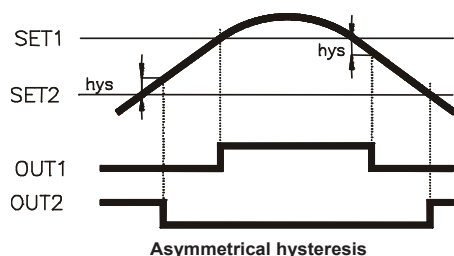
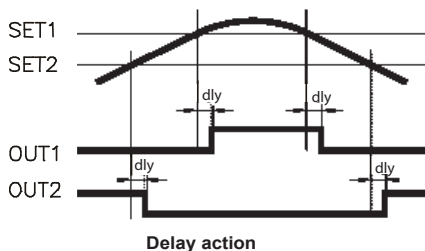
b. PROGRAMMABLE TIME DELAY or HYSTERESIS.

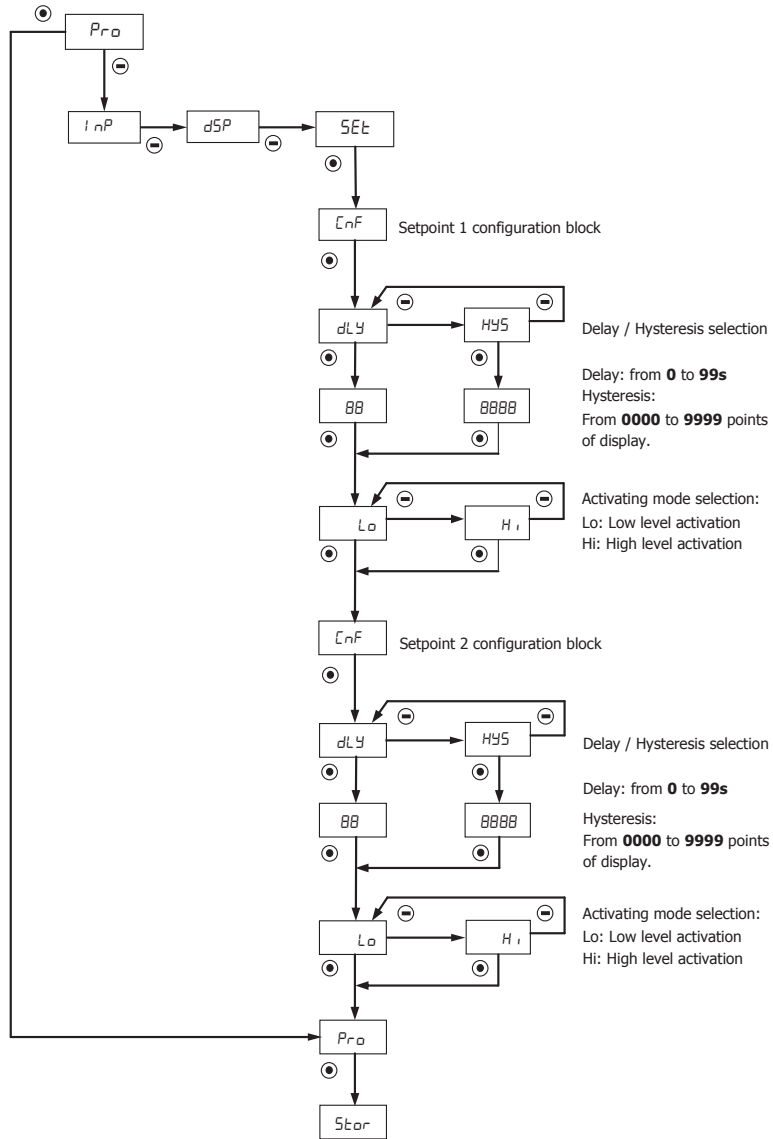
Each output action can be deferred by a programmable time delay or hysteresis level.

The time delay is the time that takes the output to activate after passing through the setpoint in the up or down direction, while the hysteresis band will be selected asymmetrical i.e. only acts on the output deactivation edge. The delay is programmable in seconds, from 0 to 99.

The hysteresis can be programmed, in counts, within the full display range. The decimal point appears in the same position as programmed in the display configuration module.

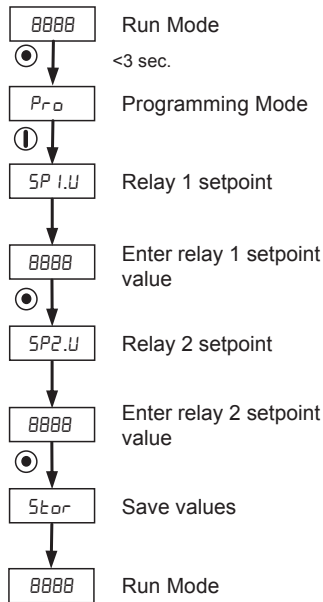
The figures 1 and 2 show the time delay action (dly) and the hysteresis action (hys) of two alarms (SET1 and SET2) programmed to activate in HI mode (OUT1) and LO mode (OUT2)





Direct access to the relay setpoints value programming

It is possible to directly access the relay setpoint values without the need to go through the programming menu just by pressing the **UP** key in **Pro** mode, as shown in diagram below.



Remember that the decimal point position is determined by what has been programmed in the SCAL menu.

Analog output

Introduction

Some DPM1 models include an analog output (0/4-20 mA).

The output is opto-isolated with respect to the signal input and the power supply.

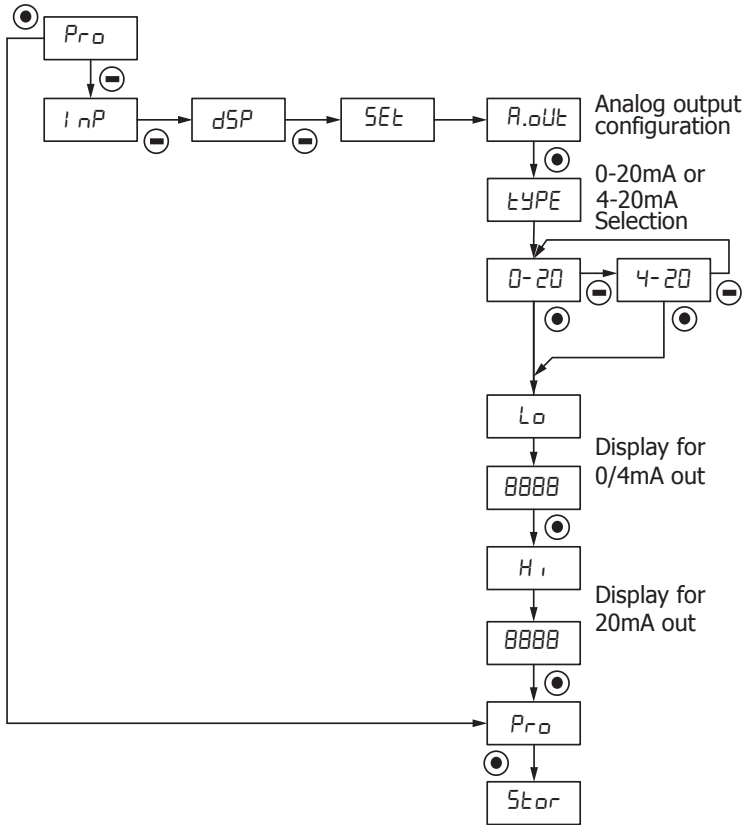
The meter provides a two terminal connector [(+) and (-)] that drives out a signal variation from 0-20mA or 4-20mA proportional to a user-defined display range.

The signal can be used to transmit display information to a variety of terminal equipment such as graphic recorders, controllers, remote displays or other devices that accept input data in analog form.

The display values producing the full scale output (**HI** and **LO**) are introduced via front-panel buttons in the same programming module. The analog output then follows the display variation between the **HI** and **LO** programmed points.

The output signal can be set up for reverse action by programming the low display for the high output (**HI**) and the high display for the low output (**LO**).

Analog output menu diagram



Technical Specifications

Technical Specifications				
	<i>Range</i>	<i>Resolution</i>	<i>Input Impedance</i>	<i>Accuracy</i>
<i>Input</i>	±10V	1mV	1MΩ	±(0.1% rdg+3mV)
	±60V	3mV	1MΩ	±(0.1% rdg+18mV)
	±100mV	10μV	100MΩ	±(0.1% rdg+30μV)
	±20mA	1μA	12.1Ω	±(0.1% rdg+6μA)
<i>Sensor Excitation</i>	20V±5VDC @ 30mA			
<i>Accuracy Conditions</i>	Temperature coefficient	100ppm/°C		
	Warm-up time	15 minutes		
	Temperature	23°C±5°C		
<i>Conversion</i>	Technique	Sigma-Delta		
	Resolution	±15 bits		
	Conversion rate	25 times per second		
<i>Display</i>	Range	-1999 to +9999, selectable decimal point position		
	Type	4 digit 8mm (0.31), red		
	LEDs	Relay 1, Relay 2, Tare, Programming Mode		
	Display refresh rate	5 times per second		
	Display / Input overrange indication	"-OuE", "OuE"		
	Relays refresh, maximum and minimum value	10 times per second		
<i>Relays</i>	2 Relays (Form A) SPST normally open	5A@250VAC / 30VDC		
<i>Analog Output (0/4-20mA Sourcing) (Models DPM1-A-A2R-H & DPM1-A-A2R-L only)</i>	Resolution	5.5μA		
	Accuracy	±(0.3% rdg+40μA)		
	Temperature coefficient	3μA/°C		
	Maximum load	≤500Ω		
<i>Power Supply and Fuses</i>	DPM1-A-2R-H, DPM1-A-A2R-H	85-265VAC 50/60Hz or 100-300VDC (Recommended fusing 0.2A/250V, DIN 41661)		
	DPM1-A-2R-L, DPM1-A-A2R-L	21-53VAC 50/60Hz or 13.5-70VDC (Recommended fusing 1.0A/250V, DIN 41661)		
<i>Filter</i>	Cutoff frequency	0.4Hz to 0.004Hz		
	Slope	20dB/Dec.		
<i>Environmental Conditions</i>	Operating temperature	-10°C to +60°C (14°F to 140°F)		
	Storage temperature	-25°C to +85°C (-13°F to 185°F)		
	Relative humidity (non condensing)	<95% @ 40°C (104°F)		
	Maximum altitude	2000m		
	Frontal protection degree	IP65		
<i>Environmental Air</i>	No corrosive gases permitted			
<i>Agency Approvals</i>	CE			

Notes: