

USER MANUAL



PROSENSE DPM1-P SERIES

DIGITAL PANEL METER FREQUENCY / TACHOMETER / RATE MODES

Models:

DPM1-P-A2R-H

DPM1-P-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-P 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 2012/19/UE 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.

www.AutomationDirect.com

Agency Certifications

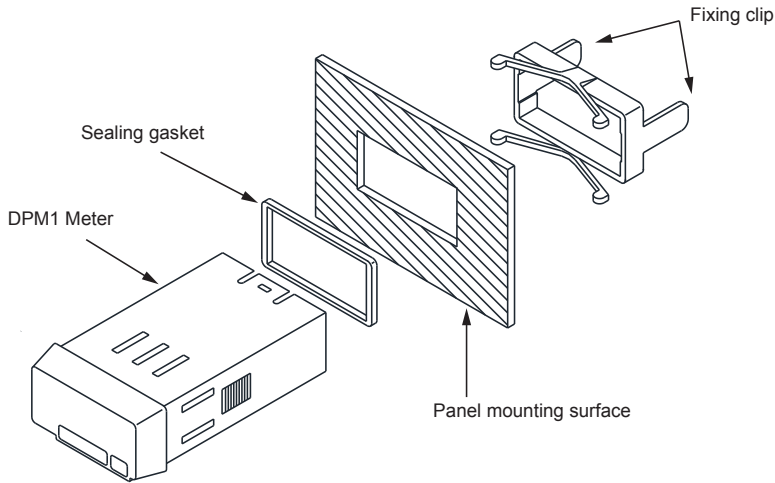


Device Description

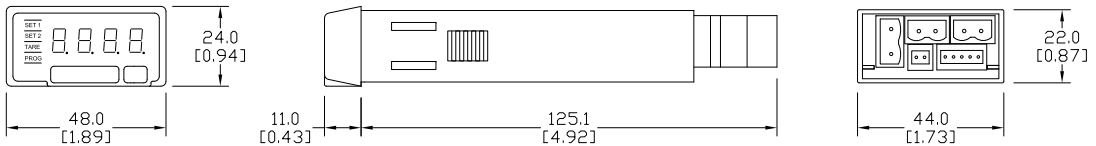
These models in the ProSense DPM1-P series offer a simple, low cost digital display for frequency, tachometer, and rate applications. The DPM1-P has a 4-digit 10mm character height red LED display, accepts input from AC voltage, magnetic sensors, NPN/PNP sensors, NAMUR sensors, TTL/24V encoders, or switched contacts, and provides selectable sensor excitation voltages. The meter is powered from an external AC or DC power supply. The 1/32 DIN housing takes up minimal panel space and the meter face has an IP65 rating. Configuration parameters can be locked out to prevent unauthorized or accidental changes to the meter's operation. ProSense digital panel meters are backed by a 3 year warranty.

- 48 x 24mm 1/32 DIN
- 4 digit (0 to 9999) red LED display
- Frequency/Tachometer/Rate Modes
 - AC voltage
 - Magnetic sensor
 - NAMUR sensor
 - NPN/PNP sensor
 - TTL/24V encoder
 - Switched contact
- Selectable decimal point
- AC or DC powered
- Sensor excitation voltage
- Direct or reverse scaling in Rate mode
- Total configuration lock out

Dimensions and Mounting



Dimensions mm [in]



Installation

To install the meter, 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.

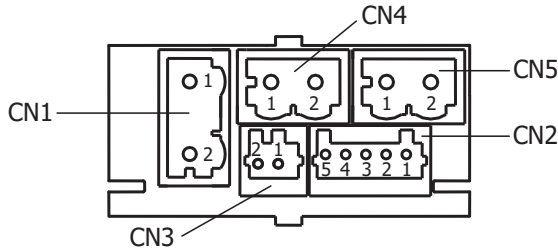
While holding the unit in place, put the fixing clip around the case and slide it until it reaches the panel at the rear side.

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 meter 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	
Signal Input	
1	10 - 600 VAC
2	Not used
3	+ Input pulses
4	Common
5	+ Excitation (5, 8, 12V) @ 60mA

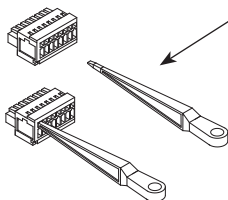
CN3	
Analog Output	
1	-0/4-20mA
2	+0/4-20mA

CN4	
Relay 1	
1	N.O. Contact
2	

CN5	
Relay 2	
1	N.O. Contact
2	

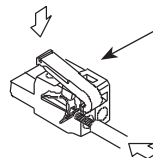
Terminals					
Connector	CN1	CN2	CN3	CN4	CN5
Wire cross section	0.08 to 2.5mm ² (28 to 12 AWG)	0.08 to 0.5mm ² (28 to 20 AWG)	0.08 to 0.5mm ² (28 to 20 AWG)	0.08 to 2.5mm ² (28 to 12 AWG)	0.08 to 2.5mm ² (28 to 12 AWG)
Strip length	8 to 9mm	5 to 6mm	5 to 6mm	8 to 9mm	8 to 9mm
Manufacturer	Wago 231-202/026-000	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.

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.

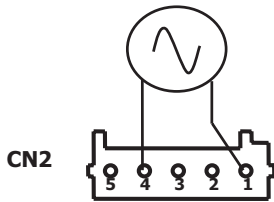
To guarantee electromagnetic compatibility, the following guidelines should be kept in mind:

- 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 $\geq 0.25 \text{ mm}^2$.

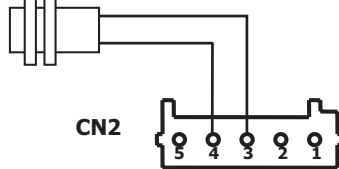
Before connecting signal wires, signal type and input range should be verified to be within the right limits. Do not connect simultaneously more than one input signal to the meter.

Input Wiring Diagrams

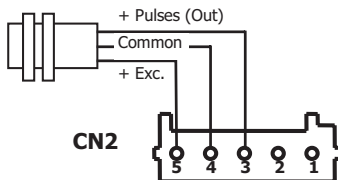
10-600V AC Input



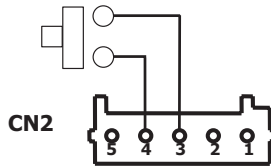
Magnetic sensor



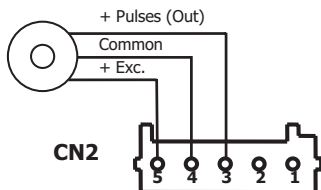
NPN / PNP / PWM sensors



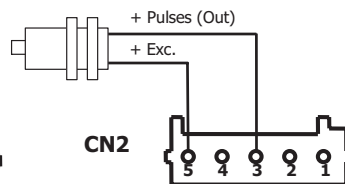
Switched contact



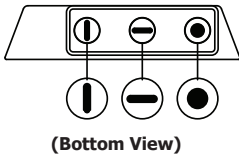
TTL/24V DC Encoder input



NAMUR sensor



Programming Keys



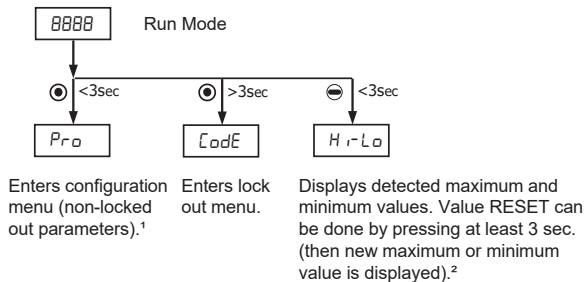
- **ENTER:** Enters configuration and validates data and parameters.
- **SHIFT:** Selects mode or shifts blinking digit in configuration.
- ⓪ **UP:** Increases value of blinking digit in configuration mode.

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.

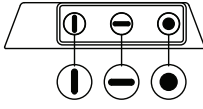
The minus sign is programmed depending on the variable type. A variable that represents the value of an input will be able to take a value in the range 0 to 9999, without taking into account the decimal point. When a digit is selected it shows values from (0) to (9), and then (-1), (-), and comes back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

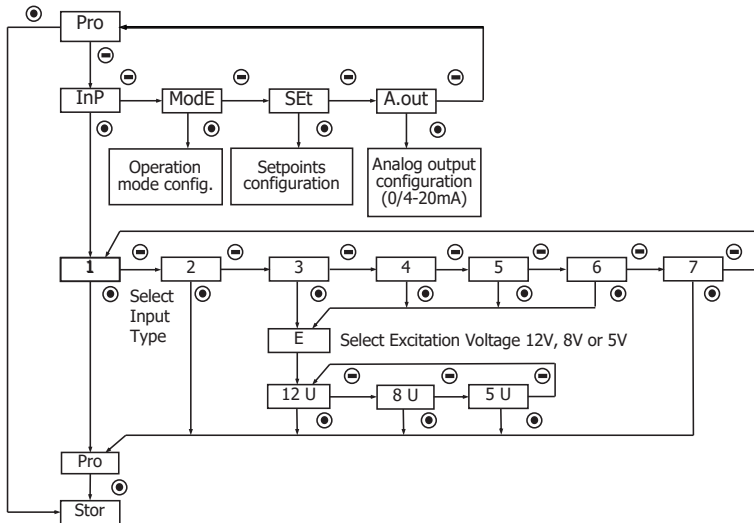
The figure below shows the input configuration menu.

Programming Keys (Bottom View)



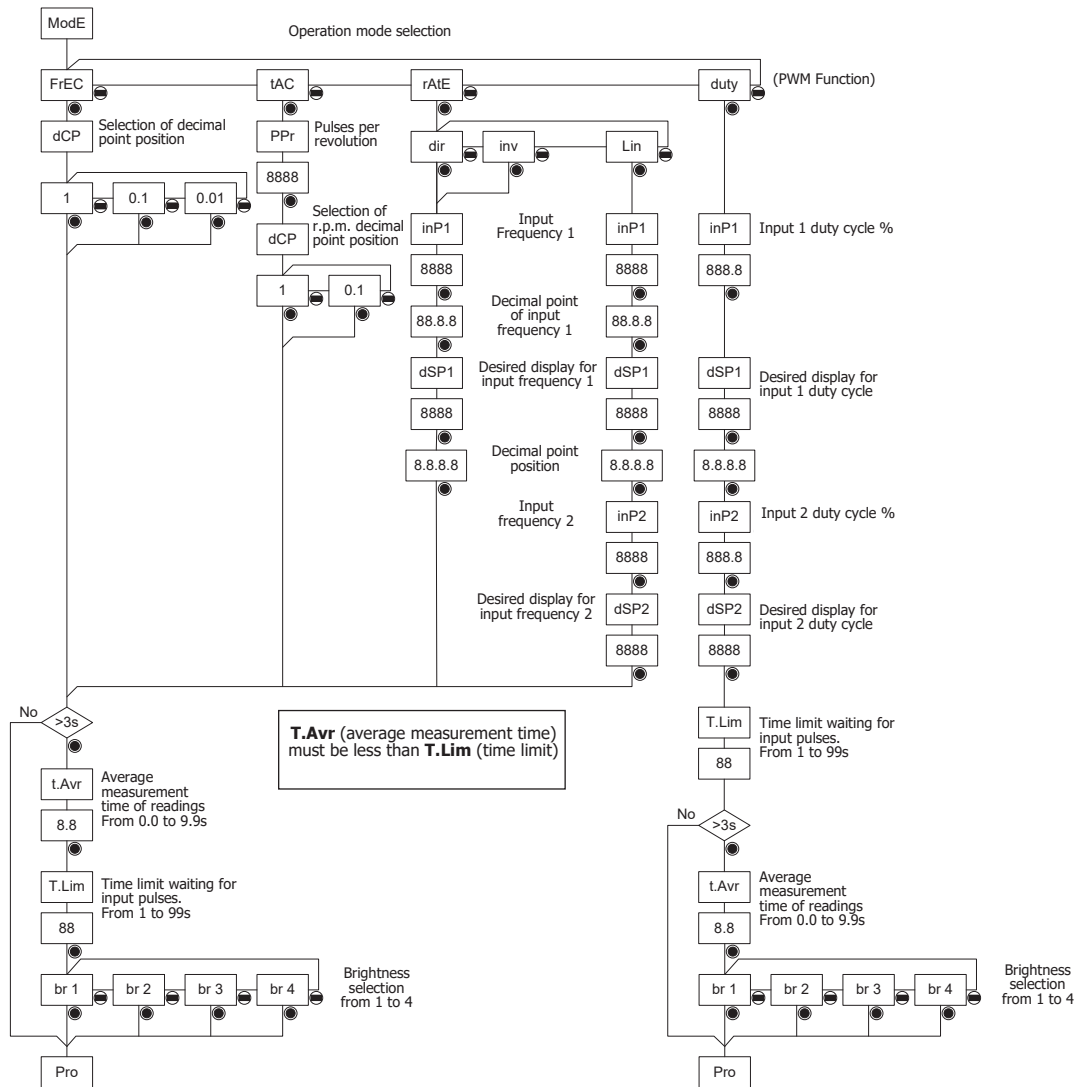
(Bottom View)

- **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	
1	10-600 V
2	Magnetic sensor
3	NAMUR
4	PNP / PWM
5	NPN / PWM
6	TTL/24 V DC / Encoder
7	Switched contact

Operation Mode Configuration



To use the meter to display frequency select the “FrEC” operation mode.

In **tachometer** mode “tAC” speed is always displayed in rpm based on the specified number of pulses per revolution from the sensor.

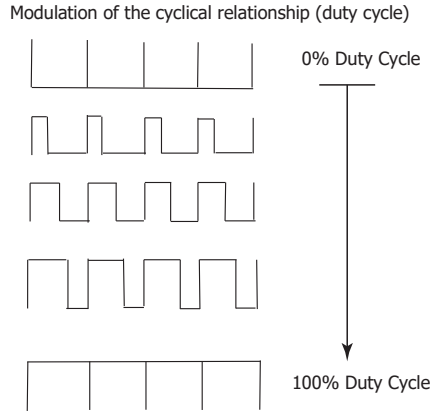
In **rate** mode “rAtE” display scaling is possible from an input value given in pulses per second (input frequency) to configure a display-frequency ratio reading in engineering units. If increasing frequency must result in an increasing display then “**dir**” (direct proportional variation) must be selected. Select “**inV**” (reverse proportional variation) if increasing frequency must result in a decreasing display.

In the “**duty**” configuration, the meter is able to present a display proportional to the cyclic relationship of the input signal (t on / t off).

The programming sequence is similar to that of any analog input, introducing a pair of values for the input (InP1 and InP2) to which correspond a pair of display values (dSP1 and dSP2).

InP1 = Ton / toff value in point 1
(programmable from 0 to 100.0%) dSP1 =
Display value for point 1 (programmable from 0 to 9999 plus decimal point position)

InP2 = Value of ton / toff in point 2
(programmable from 0 to 100.0%) dSP2 =
Display value for point 2 (programmable from 0 to 9999)



Additional Functions

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 meter 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 meter back to **RUN** mode.

Reset MAX/MIN

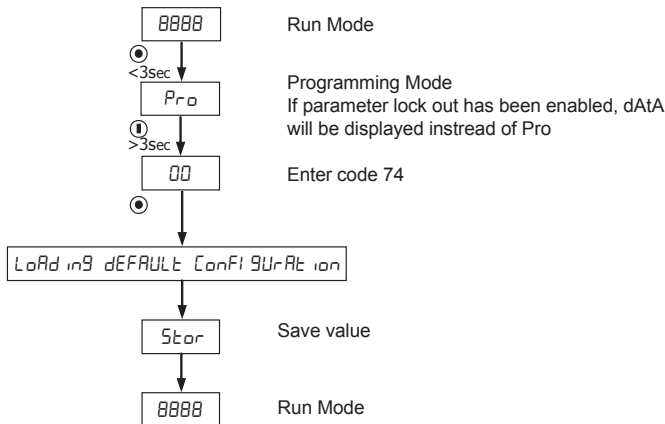
While the meter shows the peak value (**MAX**), pressing the **SHIFT** key for 3 seconds will produce a reset of the value. Pressing **SHIFT** key for 3 seconds while the meter shows the valley value (**MIN**) will produce a reset of the value.

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.

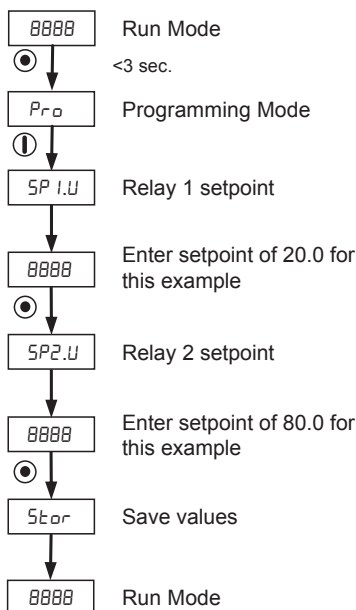
Return to Factory Configuration

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 in9 dEFault ConfI gURAt ion*, 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. If the code set at factory is changed, be sure 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:

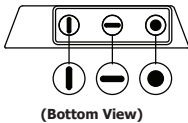
- Relay 1 Configuration (C.SP.1).
- Relay 2 Configuration (C.SP.2).
- Relay 1 Setpoint Value (V.SP.1).
- Relay 2 Setpoint Value (V.SP.2).
- Input configuration (InP).
- Display (dSP).
- Analog output configuration (A.Out). If present in meter.
- Programming of the key TARE (tArE).

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 meter 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.

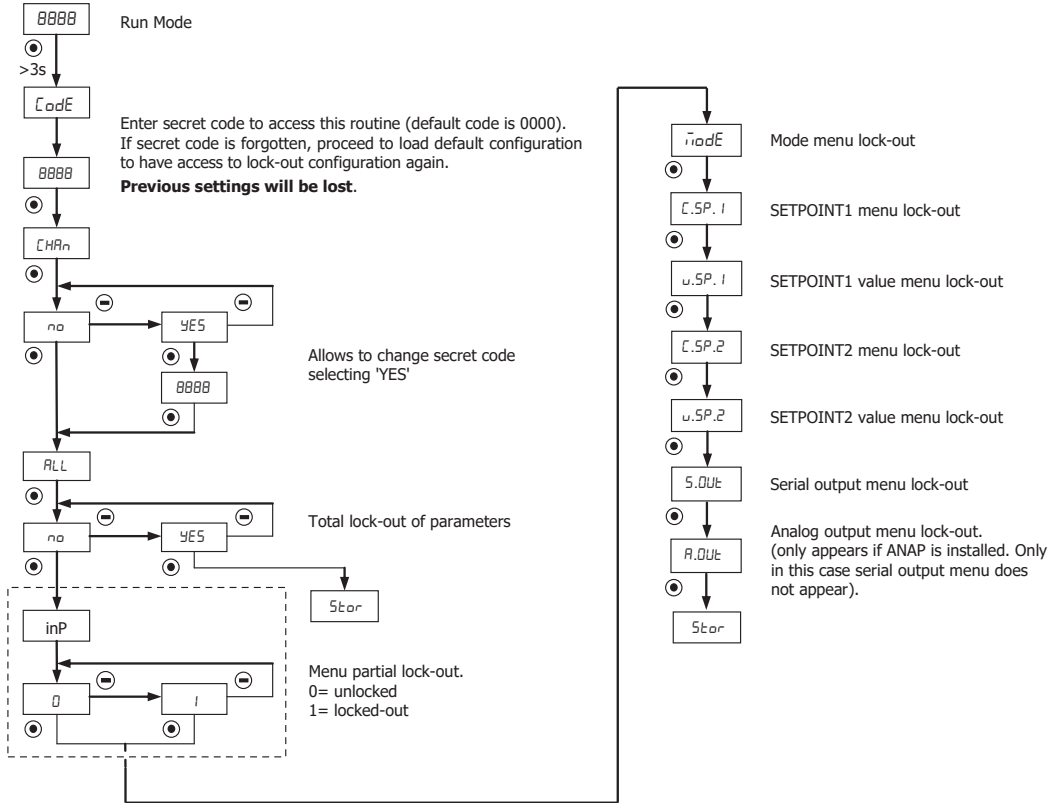
If an incorrect code is entered, the meter will return automatically to the run mode. Total lockout programming is achieved by changing ALL to Yes. Changing ALL to No will lead to the selective lockout of the programming variables. Programming each one of the parameters to 1 will active the lockout,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

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



(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.



Output Options

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

Relay Configuration

Introduction

All DPM1-P models 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:

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

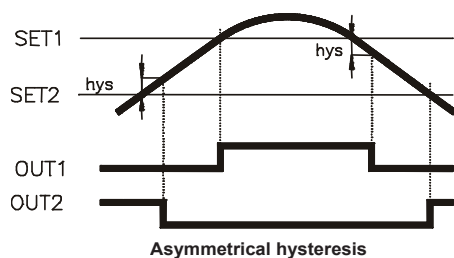
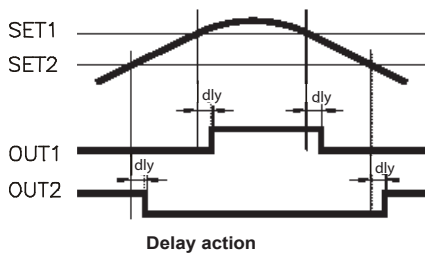
PROGRAMMABLE TIME DELAY or HYSTERESIS.

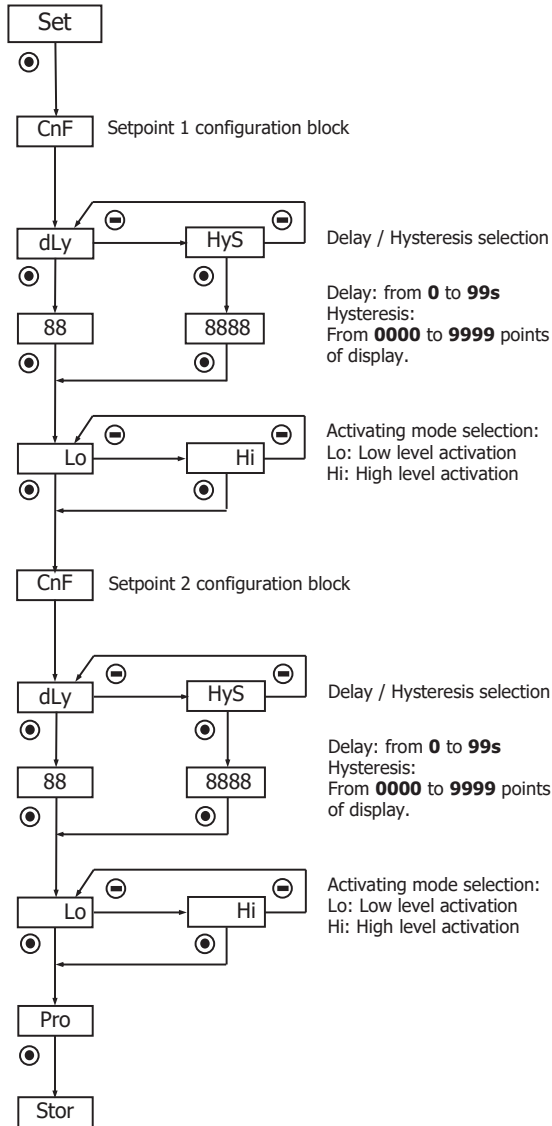
Each output action can be deferred by a programmable time delay or hysteresis level.

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.

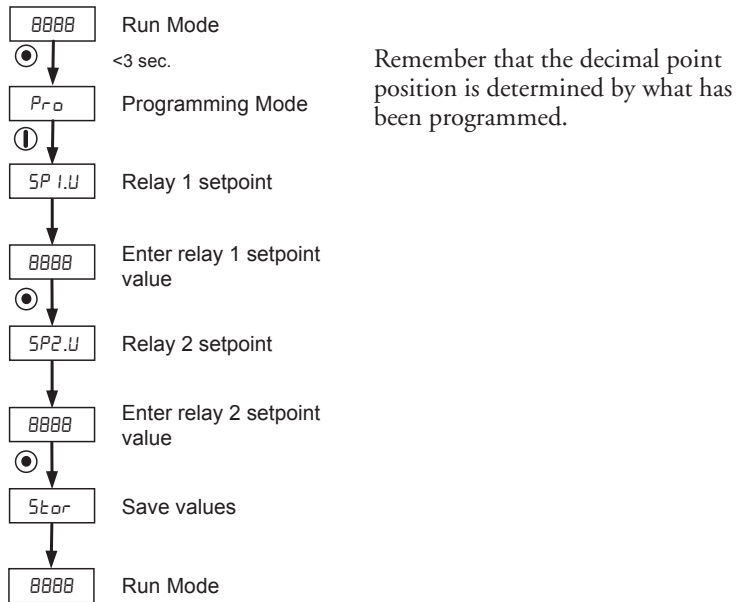
The figures 1 and 2 show the time delay action (dly) and the hysteresis action (hys) of two alarms (SET1 and SET2) programmed to activate in HI mode (OUT1) and LO mode (OUT2)





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.



Analog output

Introduction

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

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

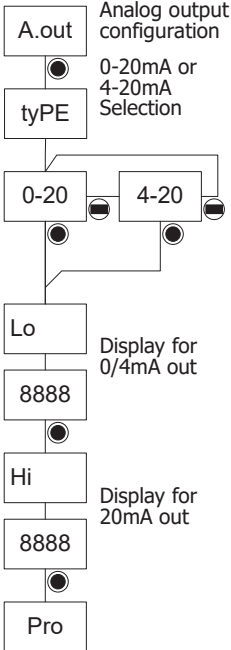
The meter provides a two terminal connector [(+) and (-)] that drives out a signal variation from 0-20mA or 4-20mA proportional to a user-defined display range.

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		
Signal Input	Maximum Frequency	12kHz (tachometer rpm or rate modes) 9999Hz (frequency mode) 100Hz (duty/PWM mode)
	Minimum Frequency (all modes)	0.01Hz
AC Voltage Input	Range	10 to 600 VAC
Magnetic Sensor Input	Sensitivity	V _{in} min. ≥ 30mV for f ≤ 60Hz V _{in} min. > 300mV for f ≥ 6kHz
NAMUR Sensor Input	R _C	1.5kΩ
	I _{ON}	< 1mA DC
	I _{OFF}	> 3mA DC
NPN/PNP/PWM Sensors Input	R _C	3.9kΩ (NPN) ; 1.5kΩ (PNP)
	Logic level "0"	< 2.4 VDC
	Logic level "1"	> 2.6 VDC
TTL/24V Encoder Input	Logic level "0"	< 2.4 VDC
	Logic level "1"	> 2.6 VDC
Switched Contact Input	V _C	5V (internal)
	R _C	3.9kΩ
	F _C	20Hz (Ton, Toff > 25ms)
Accuracy at 23°C ±5°C	Maximum error	± (0.01% of reading +1digit)
	Temperature coefficient	50ppm / °C
	Warm-up time	5 minutes
Power Supply and Fuses	DPM1-P-A2R-H	85-265VAC 50/60Hz or 100-300VDC (Recommended fusing, 0.2A/250V, 5mm x 20mm glass miniature or DIN 41661 equivalent)
	DPM1-P-A2R-L	21-53VAC 50/60Hz or 13.5-70VDC (Recommended fusing, 1A/250V, 5mm x 20mm glass miniature or DIN 41661 equivalent)
Power Consumption	5W	
Stabilized Excitations	5V@60mA ; 8V@60mA and 12V@60mA (Menu selectable)	

Technical Specifications Continued

Display	Range	0 to 9999
	Type	4-digit 8mm (0.31"), red
	Decimal point	Configurable
	LEDs	4, for functions and outputs
	Display refresh rate	4 times per second
	Input overrange indication	"OuE" or "0" flashing
	Display overrange indication	"OuE"
	Relays, maximum and minimum value refresh	10 times per second
Relays	2 Relays (Form A) SPST normally open	5A @ 250VAC / 30VDC
Analog Output (0/4-20mA)	Resolution	5.5 μ A
	Accuracy	\pm (0.3% of reading +40 μ A)
	EMI Max. influence	\pm 0.25mA
	Temperature coefficient	3 μ A/°C
	Maximum load	\leq 500 Ω
Environmental Conditions	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
Environmental Air	No corrosive gases permitted	
Agency Approvals	CE	