

200 mbar, differential input

MANOMETER

Model : PM-9102



Your purchase of this MANOMETER marks a step forward for you into the field of precision measurement. Although this MANOMETER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.



OPERATION MANUAL

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1. FEATURES

- * Dual & differential input, 200 mbar max. range.
- * Application : Industrial, laboratory, heating, ventilation, medical hospital, used for air or not corrosive and not ionized gas & liquid.
- * Sensor is built inside the housing.
- * Single lugs for pipe connection.
- * 8 kind display units (mbar, psi, **Kg/cm²**, mm Hg, inch Hg, meter H₂O, inch H₂O, Atmosphere) select by push button on the front panel
- * Auto shut off saves battery life.
- * Zero button on the front panel, easy to offset the zero value.
- * Microprocessor circuit assures maximum possible accuracy, provides special functions and features,
- * Super large LCD display with contrast adjustment for best viewing angle.
- * Records maximum & minimum readings with recall.
- * Data Hold function for stored the desired value on display.
- * Built-in low battery indicator.
- * RS232 PC serial interface, can match the personal computer used as the Data Logger, Recorder.... & other modern pressure measuring system.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Microprocessor LSI circuit.
Display	61 mm x 34 mm supper large LCD display. 15 mm (0.6") digit size.

Display units	mbar, psi, Kg/cm² , mm Hg, inch Hg, meter H ₂ O , inch H ₂ O , Atmosphere.
Function	Dual & differential input, data hold, zero/relative, memory.
Zero adjust	Push button on the front panel.
Sensor	* Sensor is built inside the housing.
	* Piezoelectric sensor.
	 <p>* Used for dry, non-corrosive and non-ionic air and gas only. Liquid is prohibited.</p>
Data hold	By push button.
Data record	Record maximum & minimum readings.
Data output	RS 232 PC serial interface.
Sampling time	Approx. 0.8 second.
Power off	Auto shut off, saves battery life or manual off by push button.
Operating temperature	0 to 50 °C (32 to 122 °F).
Operating humidity	Less than 80% R.H.
Power supply	006P DC 9V battery (heavy duty).
Power current	Approx. DC 6.0 mA.
Weight	345 g/0.76 LB .
Dimension	180 x 72 x 32 mm (7.1 x 2.8 x 1.3 inch).
Accessories included	* Instruction manual..... 1 PC. * Hard carrying case..... 1 PC. * Plug for quick coupler..... 2 PCs.
Optional accessories	* Data acquisition software (Windows version)..... SW-U801-WIN * USB cable.....USB-01 * RS232 cable..... UPCB-01

2-2 Electrical Specifications

<i>Unit</i>	<i>Max. range</i>		<i>Resolution</i>	
mbar	± 200	mbar	0.1	mbar
psi	± 2.9	psi	0.001	psi
Kg/cm²	± 0.204	Kg/cm²	0.001	Kg/cm²
mm Hg	± 150	mm Hg	0.1	mm Hg
inch Hg	± 5.906	inch Hg	0.002	inch Hg
meter H ₂ O	± 2.040	meter H ₂ O	0.001	meter H ₂ O
inch H ₂ O	± 80.2	inch H ₂ O	0.05	inch H ₂ O
Atmosphere	± 0.197	Atmosphere	0.001	Atmosphere

<i>Unit</i>	<i>Max. range</i>		<i>Accuracy</i>
mbar	± 200	mbar	± 2 % F. S. <i>Note :</i> * 23± 5 °C. * F.S. : full scale * Included linearity, hysteresis and repeatability
psi	± 2.9	psi	
Kg/cm²	± 0.204	Kg/cm²	
mm Hg	± 150	mm Hg	
inch Hg	± 5.905	inch Hg	
meter H ₂ O	± 2.040	meter H ₂ O	
inch H ₂ O	± 80.2	inch H ₂ O	
Atmosphere	± 0.197	Atmosphere	

Remark :

Measuring unit	Display unit
mbar	m Bar
psi	Psi
Kg/cm²	Kg/cm²
mm Hg	mm /Hg
inch Hg	in/Hg
meter H ₂ O	m H₂O
inch H ₂ O	inch H₂O
Atmosphere	ATP

3. FRONT PANEL DESCRIPTION

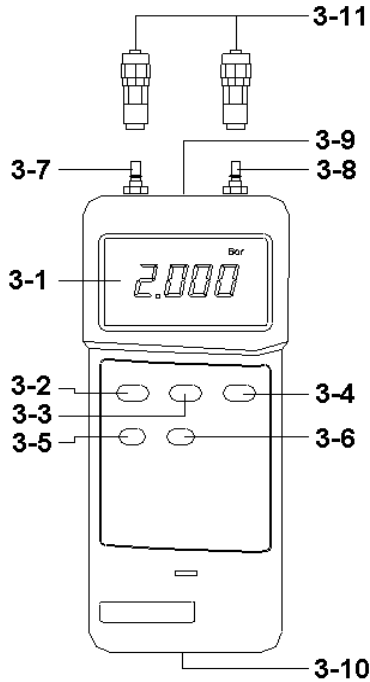


Fig. 1

- | | | | |
|-----|----------------------|------|----------------------------|
| 3-1 | Display | 3-7 | P1 input socket |
| 3-2 | Power Off/On Button | 3-8 | P2 input socket |
| 3-3 | Hold Button | 3-9 | RS-232 Output Terminal |
| 3-4 | Zero Button | 3-10 | Battery Compartment /Cover |
| 3-5 | " MAX./MIN. " Button | 3-11 | Plug/ quick coupler |
| 3-6 | Unit Button | | |

4. MEASURING PROCEDURE

- 1) Power on the meter by pressing the " Power Off/On Button " (3-2, Fig. 1).
- 2) Select the desired temperature units (mbar, psi, Kg/cm^2 mm Hg, inch Hg, meter H_2O inch H_2O Atmosphere) by pushing the " Unit Button " (3-6, Fig. 1).
- 3) **Zero adjusting**
Adjust the display reading to zero value by pushing the " Zero Button " (3-4, Fig. 1)
- 4) Install the measuring pipe to " Plug/quick coupler " (3-11, Fig. 1).
- 5) The meter is build the two input socket (P1 input socket, P2 input socket) for accepting the differential pressure input.
Connecting the pipe along the " Plug " (3-11, Fig. 1) to
 - a. " P1 input socket " (3-7, Fig. 1) only
 - b. " P2 input socket " (3-8, Fig. 1) only
 - c. Both P1 & P2 input socketThe LCD will show the measuring pressure value.

Note :

- * *If the P1 pressure > P2 pressure, the display will get positive reading.*
- * *If the P1 pressure < P2 pressure, the display will get negative reading.*

6) **Data Hold**

- * During the measurement, pressing the " Hold Button " (3-3, Fig. 1) will freeze the measured value & the LCD will show " HOLD " symbol.
- * Press the " Hold Button " again to cancel the data hold function.

7) Data Record (Maximum, Minimum reading)

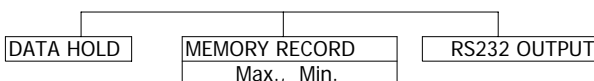
- * The DATA RECORD function displays the maximum and minimum readings. To start the DATA RECORD function, press the " MAX./MIN. Button " (3-5, Fig. 1) once. " REC " symbol will appear on the LCD display.
- * With the " REC " symbol on the display :
 - (a) Press the " MAX./MIN. Button " (3-5, Fig. 1) once, the " Max " symbol along with the maximum value will appear on the display.
 - (b) Press the " MAX./MIN. Button " again, the " Min " symbol along with the minimum value will appear on the display.
 - (c) To exit the memory record function, press the " MAX./MIN. Button " continuously for at least 2 seconds. The display will revert to the current reading.

8) **For quick measurement, follow the procedures shown below :**

Main procedures :

POWER ON	ZERO ADJUST
	DETERMINE UNIT

Optional measuring procedures :



Power management

AUTO POWER OFF or MANUAL POWER OFF
(Not activated during Memory Record Selection)

5. AUTO POWER OFF DISABLE

The instrument has built-in " Auto Power Shut-off " in order to prolong battery life. The meter will switch off automatically if none of the buttons are pressed within 10 min.

To de-activate this feature, Select the memory record function during measurement, by pressing the " MAX./MIN. Button " (3-5, Fig. 1).

6. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-9, Fig. 1).

The connector output is a 16 digit data stream which can be utilized to the user's specific application.

An RS232 lead with the following connection will be required to link the instrument with the PC serial input.

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)
Center Pin.....	Pin 2
Ground/shield.....	Pin 5

The 16 digit data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicate the following status :

D15	Start Word		
D14	4		
D13	1		
D12 & D11	Annunciator for Upper Display		
	mbar = 86	psi = 23	
	mm Hg = 78	inch Hg = 80	
	inch H2O = 25	Kg/cm ² = 77	
	Atmosphere = 26	meter H2O= 79	
D10	Polarity	0 = Positive	1 = Negative
D9	Decimal Point (DP) for Upper display. 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP		
D1 to D8	Display reading, D1=LSD, D8=MSD <i>For example : If the display reading is 1234, then D8 to D1 is 00001234</i>		
D0	End Word		

RS232 FORMAT : 9600, N, 8, 1

Baud rate	9600
Parity	No parity
Data bit no.	8 Data bits
Stop bit	1 Stop bit

7. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show " LBT ", it is necessary to replace the battery. However, in-spec measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Slide the Battery Cover (3-10, Fig. 1) away from the instrument and remove the battery.
- 3) Install a 9 V battery (PP3 type) and replace the cover.