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Manual PCE 932



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1. FEATURES

- * Meter can cooperate with 2, 5, 10, 20, 50, 100, 200, 400 Bar sensor, new calibration procedures are not necessary when change the new sensor .
- * When change the new pressure sensor, just select pressure type (2, 5, 10, 20, 50, 100, 200, 400 bar) on the front panel button. The sensor type will memorize into the circuit permanently.
- * 8 kind pressure units (Bar, Psi, Kg/cm², mm/Hg, inch/Hg, meter/H₂O, inch/H₂O, Atmosphere), unit select by push button on the front panel.
- * Full line optional pressure sensors are available.
- * Auto power off function, saves battery life.
- * Cooperate the external pressure sensor that its output signal is 100 mV for full scale.
- * Zero button on the front panel, easy adjust the zero value of pressure sensor.
- * Available push button gain adjustment, usage for calibration precisely if necessary.
- * Separate pressure sensor, easy for remote measurement.
- * Microprocessor circuit assures maximum possible accuracy, provides special functions and features,
- * Super large LCD display, easy readout.
- * Records maximum & minimum readings with recall.
- * Data Hold function, store the desired value on display.
- * Built-in low battery indicator.
- * RS 232 PC serial interface, can cooperate the personal computer used as the Data Logger, Pressure Recorder.... & other modern pressure measuring system.

2. TYPICAL APPLICATION

- * Measure pneumatic pressures.
- * Measure automobile engine pressures.
- * Pressure for super heat measurements.
- * Hydraulic servo controls.
- * Refrigeration.
- * Air conditioning.
- * Food processing.

3. SPECIFICATIONS

3-1 General Specifications

Circuit	Microprocessor LSI circuit.
Display	61 mm x 34 mm supper large LCD display. 15 mm (0.6") digit size.
Sensor type	Can cooperate with optional 2, 5, 10, 20, 50, 100, 200, 400 bar sensor, new calibration are not necessary when change the new sensor .
Display units	Bar, Psi, Kg/cm ² , mm/Hg, inch/Hg, meter/H ₂ O, inch/H ₂ O, Atmosphere.
Accuracy	± (0.5% + 1 d) * <i>Under the signal from the sensor is at full scale (100 mV).</i> * <i>Meter only.</i> * <i>Within 23 °C ± 5 °C</i>
Pressure sensor	Cooperate the external pressure sensor that its output signal is 100 mV for full scale. <i>ref. page 16</i>
Zero adjust	Push button on the front panel.
Span adjust	Push button gain adjustment, usage for calibration precisely if necessary.
Input signal from sensor	DC 100 mV for full Scale.

Data hold	By push button.
Data record	Record maximum & minimum readings.
Data output	RS 232 PC serial interface.
Power off	Auto shut off, saves battery life. Manual off by push button.
Sampling time	Approx. 0.8 second.
Operating temperature	0 to 50 °C (32 to 122 °F)
Operating humidity	Less than 80% R.H.
Power supply	Alkaline or heavy duty type DC 9V battery, 006P, MN1604 (PP3) or equivalent.
Power current	Approx. DC 7.0 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
Optional accessories	* Pressure sensor, PS100–xxBAR, * Hard carrying case (CA–06) * Data acquisition software (Windows version), SW–U801–WIN * RS232 cable, UPCB–01
<i>ref. page 16, 17</i>	

3–2 Electrical Specifications

Sensor type	2 bar		5 bar		10 bar	
	Max. range	Reso- lution	Max. range	Reso- lution	Max. range	Reso- lution
bar	2	0.002	5	0.005	10	0.01
Psi	29	0.02	72.5	0.1	145	0.2
Kg/cm ²	2.040	0.002	5.095	0.005	10.19	0.01
mm/Hg	1500	2	3750	5	7500	10
inch/Hg	59.05	0.05	147.6	0.1	295.2	0.2
meter/H ₂ O	20.40	0.02	50.95	0.05	101.9	0.1
inch/H ₂ O	802	1	2006	2	4010	5
Atmosphere	1.974	0.002	4.935	0.005	9.87	0.01

Sensor type	20 bar		50 bar		100 bar	
	Max. range	Resolution	Max. range	Resolution	Max. range	Resolution
bar	20	0.02	50	0.05	100	0.1
Psi	290	0.2	725	1	1450	2
Kg/cm ²	20.40	0.02	50.95	0.05	101.9	0.1
mm/Hg	15000	20	37500	50	75000	100
inch/Hg	590.5	0.5	1476	1	2952	2
meter/H ₂ O	204.0	0.2	509.5	0.5	1019	1
inch/H ₂ O	8020	10	20050	20	40100	50
Atmosphere	19.74	0.02	49.35	0.05	98.7	0.1

Sensor type	200 bar		400 bar	
	Max. range	Resolution	Max. range	Resolution
bar	200	0.2	400	0.5
Psi	2900	2	5800	5
Kg/cm ²	204.0	0.2	408.0	0.5
mm/Hg	150000	200	300000	500
inch/Hg	5905	5	11810	10
meter/H ₂ O	2040	2	4075	5
inch/H ₂ O	80200	100	160600	200
Atmosphere	197.4	0.2	394.5	0.5

4. FRONT PANEL DESCRIPTION

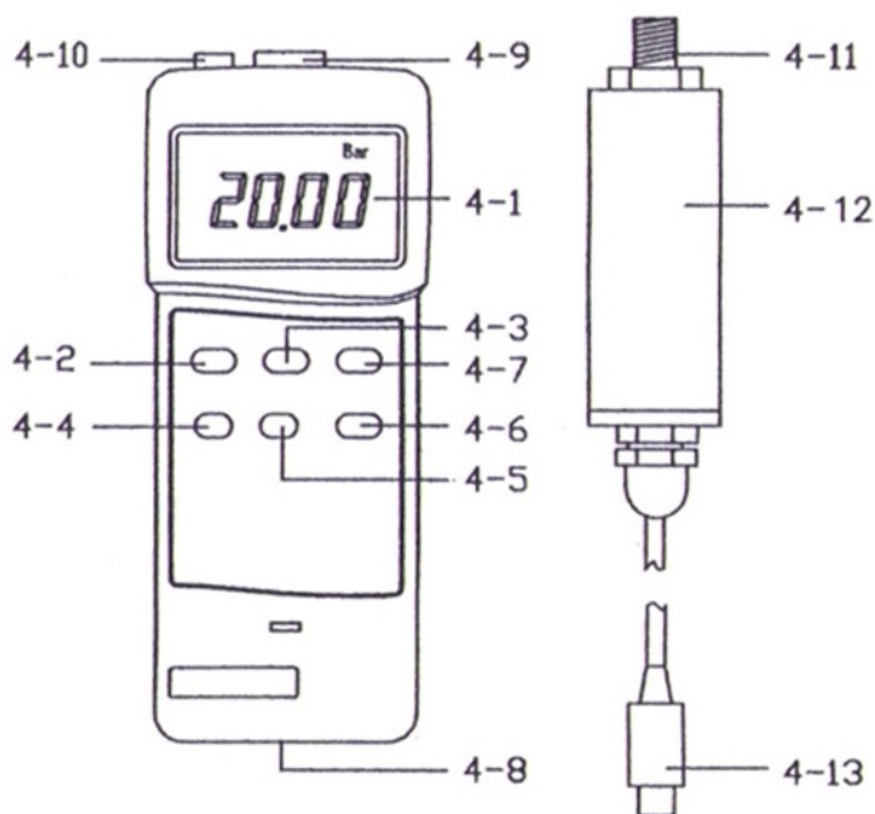


Fig. 1

- | | | | |
|-----|----------------------------|------|-----------------------------------|
| 4-1 | Display | 4-9 | Sensor Input Socket |
| 4-2 | Power Button | 4-10 | RS-232 Output Terminal |
| 4-3 | Data Hold Button | 4-11 | Port Connector of Pressure Sensor |
| 4-4 | " Max./Min. " Button | 4-12 | Pressure Sensor Main body |
| 4-5 | Unit Button | 4-13 | Plug of Pressure Sensor |
| 4-6 | Zero Button | | |
| 4-7 | Sensor Type Button | | |
| 4-8 | Battery Compartment/ Cover | | |

5. SENSOR TYPE SELECTION

The meter can cooperate with optional 2, 5, 10, 20, 50, 100, 200 bar sensor, new calibration are not necessary when change the new sensor .

Those different optional pressure sensor are :

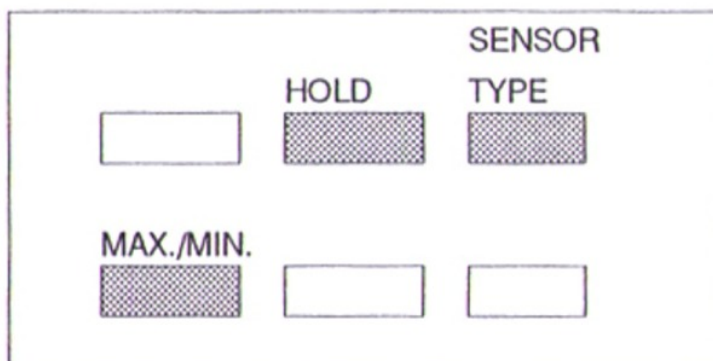
- * 2 bar pressure sensor, Model : PS100–2BAR
- * 5 bar pressure sensor, Model : PS100–5BAR
- * 10 bar pressure sensor, Model : PS100–10BAR
- * 20 bar pressure sensor, Model : PS100–20BAR
- * 50 bar pressure sensor, Model : PS100–50BAR
- * 100 bar pressure sensor, Model : PS100–100BAR
- * 200 bar pressure sensor, Model : PS100–200BAR
- * 400 bar pressure sensor, Model : PS100–400BAR

When change the different sensor (2 Bar, 5 Bar, 10 Bar, 20 Bar, 50 Bar.....) should according procedures as follow :

- 1) Power off the meter.
- 2) Use the finger to push the following 3 buttons at the same time continuously, those buttons are :

- * Data Hold Button (4–3 Fig. 1)
- * " Max./Min. " Button (4–4 Fig. 1)
- * Sensor Type Button (4–7 Fig. 1)

Font panel



- 3) Not release the above 3 keys, , push the " Power Button " (4-2 , Fig. 1) once a while. all the LCD segment will lit. Release the 3 buttons, the display will show the memorized sensor type.



- 4) Push the " Sensor Type Button " (4-7, Fig. 1) can select the different sensor type (2, 5, 10, 20, 50, 100, 200 Bar). Until the display show the desired sensor type, push the the " Zero button " (4-6, Fig. 1) to enter the desired sensor type. The new setting sensor type will memorize into the circuit even power off.
- 5) Power off the meter, the sensor type selecting procedures are finished.

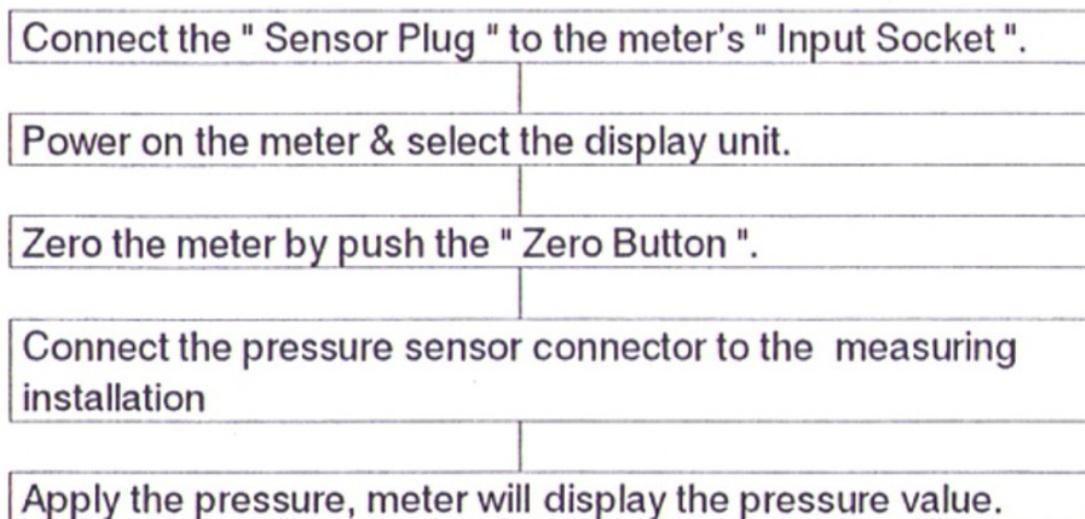
6. MEASURING PROCEDURE

- 1) Plug in the " Plug of Pressure Sensor " (4–13, Fig. 1) to meter's " Sensor Input Socket " (4–9, Fig. 1)
- 2) Power on the meter by push the " Power Button " (4–2, Fig. 1)
- 3) Push the " Sensor Type Button " (4–7, Fig 1) to check if the meter's sensor type is same as the external pressure sensor.
- 4) Push the " Unit Button " (4–5, Fig. 1) to select the unit (Bar, Psi, Kg/cm², mm/Hg, inch/Hg, meter/H₂O, inch/H₂O, Atmosphere).
- 5) Zero the meter by push the " Zero Button " (4–6, Fig. 1), the display reading will change to zero value.
- 6) Connect the " Port Connector of Pressure Sensor " (4–11, Fig. 1) to the installation that intend to measure the pressure value that into the sensor.
- 7) Apply the pressure, pressure meter will show the pressure value.
- 8) Data Hold
During the measurement, pushing the " Data Hold Button " (4–3, Fig. 1) will freeze the measured value & display will indicate " HOLD " symbol.
* Push the "Data Hold Button" again to release the data hold function.
- 9) 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 " (4–4, Fig. 1) once. " REC " symbol will appear on the LCD display.

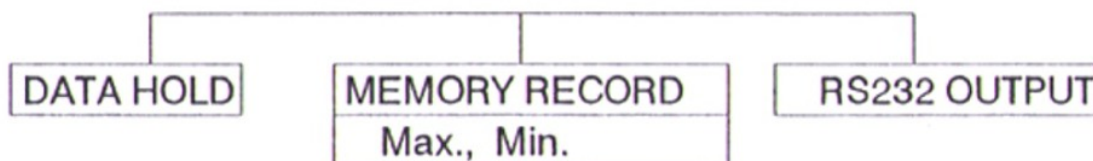
- * With the " REC " symbol on the display :
 - (a) Push the " Max./Min. Button " (4-4, Fig. 1) once, the " Max " symbol along with the maximum value will appear on the display.
 - (b) Push the " Max./Min. Button " again, the " Min " symbol along with the minimum value will appear on the display.
 - (c) To exit the memory record function, push the " Max./Min. " button continuously at least 2 seconds. The display will revert back to the current reading.

10) For quick measurement, follow the procedures shown below :

Main procedures :



Optional measuring procedures :



Power management :

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

11) Measuring considerations :

- * *The sensor diaphragm can be damaged by solid or sharp objects. Never insert any object into the inlet port.*
- * *The pressure sensor is compatible with industrial gases & liquid that are compatible with the 316 stainless steel or ceramic material. To determine the compatibility of a liquid or gas, refer to manufacture's specification.*

7. AUTO POWER 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 (4-4, fig. 1).

8. CALIBRATION

Each meter already adjust & calibrate according the condition for the 100 mV signal input to let the display reading full scale & 0 mV input signal to let the meter reading zero value.

Each optional pressure sensor (PS100–XXBAR) are designed to meet the 100 mV output to let meter show the full scale value & the 0 mV output signal for the meter to read zero value.

General speaking it is not necessary to make any new calibration procedures both of pressure meter & the the external pressure sensor due to those two units already done the well calibration typically.

Due to the environment temperature may drift seriously or after a long time operation....., the meter's zero & gain (span) value may drift. If intend to make the measurement precisely, it can make the new calibration as :

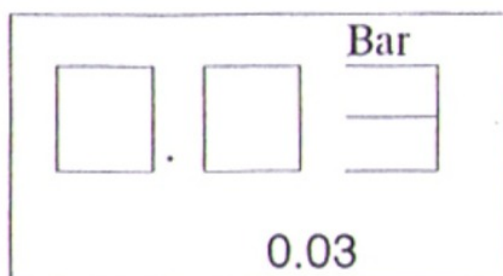
8–1 Zero calibration

- 1) Connect the meter with the pressure sensor, power on the meter. No pressure signal into the sensor.
- 2) At the same time hold the following two button continuously .

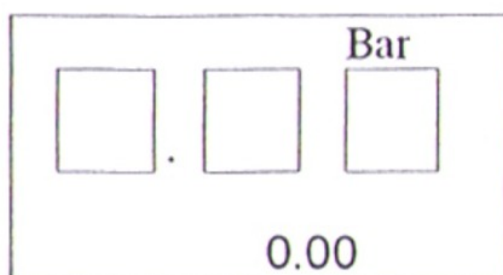
" Hold Button " (4–3, Fig. 1)

" Max./Min. Button " (4–4, Fig. 1)

The LCD will show the zero value on both up & down display.
For example :



- 3) Still hold the " Hold Button " & the " Max./Min. Button ", at same time push the " Zero Button " (4–6, Fig. 1) once a while, the display will flash one time & return to zero as :



- 4) Release both of the " Hold Button " & the " Max./Min. Button ", then power off. Now the new zero value will memorize to the circuit automatically.

8–2 Gain calibration (Span adjust)

- 1) Set up the whole meter system are ready measurement, refer the above " 6. MEASURING PROCEDURES ". Turn on the meter and allow it to warm up for two minutes. Should zero the meter by push the " Zero Button ".

- 2) Connect the pressure regulator to the nitrogen bottle and the reference gauge to the pressure regulator. The pressure regulator should can generate the full scale pressure value.
For example, input a standard 9.00 pressure value to the the sensor, the display show 8.98 Bar.

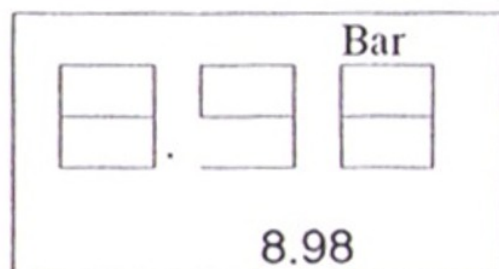
- 3) At the same time hold the following two button continuously .

" Hold Button " (4-3, Fig. 1)

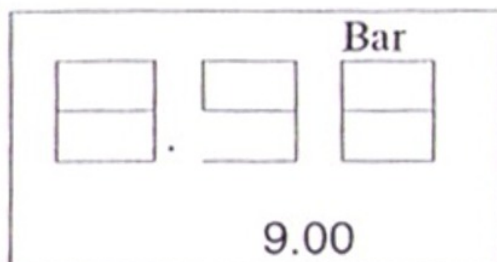
" Max./Min. Button " (4-4, Fig. 1)

The display show the measuring value on both up & down display.

For example :



- 4) Still hold the " Hold Button " & the " Max./Min. Button ", at same time.
- * *Push the " Sensor Type Button " (4-7, Fig. 1) once will add one count to the down display value.*
 - * *Push the " Unit Button " (4-5, Fig. 1) once will decrease one count to the down display value.*



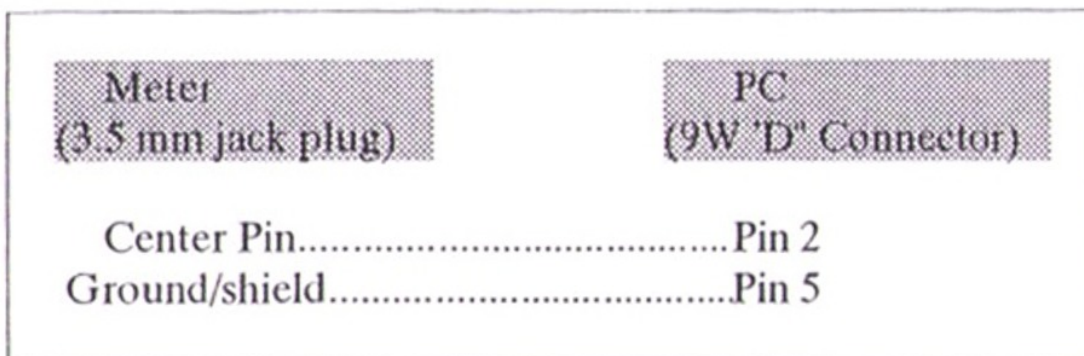
- 5) Until the desired regulating value (for example 9.00) be adjusted, release both of the " Hold Button " & the " Max./Min. Button " at same time.
 Now the display flash, within 5 second should push the " Sensor Type Button " (4–7, Fig. 1). Now the new gain value will memorize into the circuit.

9. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (4–10, 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.



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 :

D0	End Word									
D1 & D8	Display reading, D1 = LSD, D8 = MSD For example : <i>If the display reading is 1234, then D8 to D1 is : 00001234</i>									
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP									
D10	Polarity 0 = Positive 1 = Negative									
D11 & D12	Annunciator for Display <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Bar = 22</td> <td>mm/Hg = 78</td> <td>inch/H₂O = 25</td> </tr> <tr> <td>Psi = 23</td> <td>inch/Hg = 80</td> <td>ATP = 26</td> </tr> <tr> <td>Kg/cm² = 77</td> <td>meter/H₂O = 79</td> <td></td> </tr> </table>	Bar = 22	mm/Hg = 78	inch/H ₂ O = 25	Psi = 23	inch/Hg = 80	ATP = 26	Kg/cm ² = 77	meter/H ₂ O = 79	
Bar = 22	mm/Hg = 78	inch/H ₂ O = 25								
Psi = 23	inch/Hg = 80	ATP = 26								
Kg/cm ² = 77	meter/H ₂ O = 79									
D13	1									
D14	4									
D15	Start Word									

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10. BATTERY REPLACEMENT

- 1) When the left corner of LCD display show "LBT", it indicate a normal battery output of less than 6.5 V – 7.5 V. 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(4–8, Fig. 1) away from the instrument and remove the battery.
- 3) Install a 9 V battery (heavy duty) and replace the cover.

11. OPTIONAL PRESSURE SENSOR

Description	<ul style="list-style-type: none"> * Optional, pressure sensor that cooperate with PS–9302. * Out put : 100 mV DC for full scale. * 4 pin DIN plug, 2 pins to accept DC 5 V exciting voltage(power supply) for pressure transducer, another two pins for output signal of 100 mV full scale. * Size : 30 mm dia. x 85 mm. Weight : 160 g.
Model	2 bar sensor..... PS100–2BAR 5 Bar sensor..... PS100–5BAR 10 Bar sensor.....PS100–10BAR 20 Bar sensor.....PS100–20BAR 50 Bar sensor.....PS100–50BAR 100 Bar sensor.....PS100–100BAR 400 Bar sensor.....PS100–400BAR
Accuracy (23 °C ± 5 °C)	PS100–2BAR.....± (2 % + 0.02 bar) PS100–5BAR.....± (2 % + 0.05 bar) PS100–10BAR.....± (2 % + 0.1 bar) PS100–20BAR.....± (2 % + 0.2 bar) PS100–50BAR ± (2 % + 0.5 bar) PS100–100BAR ± (2 % + 1 bar) PS100–400BAR ± (2 % + 4 bar)

12. OTHER OPTIONAL ACCESSORIES

Carrying case	Hard carrying case, CA-06.
RS-232 cable, Model : UPCB-01	RS-232 cable, used for connecting the pressure meter & the computer.
Application Software (Window version) SW-U801-WIN	<p>After setup whole hardware</p> <p><i>Pressure meter + RS-232 cable + Computer + software (SW-U801-WIN)</i></p> <p>whole system can execute as a data logger, data recorder.... record data can be retrieved for EXCELL, LOTUS-123.....</p>



In this direction will find a vision of the measurement technique:
<http://www.industrial-needs.com/measuring-instruments.htm>

NOTE: "This instrument doesn't have ATEX protection, so it should not be used in potentially explosive atmospheres (powder, flammable gases)."