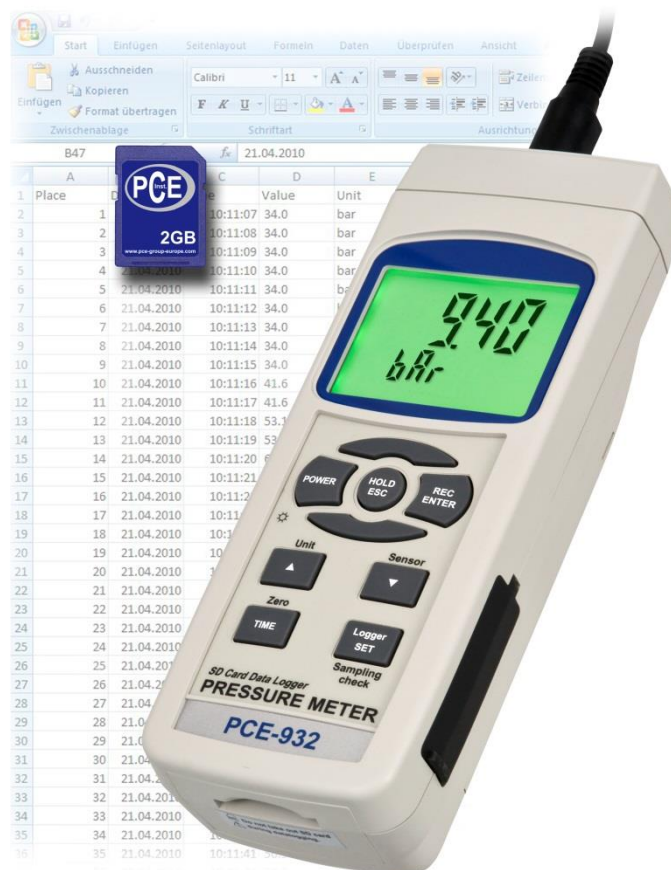


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Manual HVAC Meter PCE-932



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1 Introduction

Thank you for purchasing a PCE-932 from PCE Instruments.

- * Meter can cooperate optional pressure sensor with 2, 5, 10, 20, 50, 100, 200, 400 Bar, 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.
- * 10 kinds pressure units (Bar, Psi, Kg/cm², mm Hg, inch Hg, meter H2O, inch H2O, Atmosphere, hPA, kPA), unit select by push button on the front panel.
- * Full line optional pressure sensors are available.
- * 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.
- * Separate pressure sensor, easy for remote measurement.
- * Microprocessor circuit assures maximum possible accuracy, provides special functions and features.
- * Real time SD memory card Datalogger, built-in Clock and Calendar, sampling time can set from 1 sec to 8 hour 59 min. 59 sec.
- * Manual datalogger is available, during execute the manual datalogger function, it can set the different location no. (position 1 to position 99).
- * Innovation and easy operation, computer is not need to setup extra software, after execute datalogger, just take away the SD card from the meter and plug in the SD card into the computer, it can down load the all the measured value with the time information (year/month/date/hour/minute/second) to the Excel directly, the user can make the further data or graphic analysis by themselves.
- * SD card capacity : 1 GB to 16 GB.
- * LCD with green light backlight, easy reading.
- * It can default auto power off or manual power off.
- * Data hold, record max. and min. reading.
- * Microcomputer circuit, high accuracy.
- * Power by UM3/AA (1.5 V) x 6 batteries or DC 9V adapter.
- * RS232/USB PC computer interface.
- * Wide applications : Measure pneumatic pressures, measure automobile engine pressures, pressure for super heat measurements, hydraulic servo controls, refrigeration, air conditioning, food processing.

2 Safety notes

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. There is no warranty of damages or injuries caused by non-observance of the manual.

- The device may only be used in the approved temperature range.
- The case should only be opened by qualified personnel of the PCE Instruments.
- The instrument should never be placed with the user interface facing an object (e.g. keyboard side on a table).
- You should not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth / use only pH-neutral cleaner

This user's handbook is published by PCE Instruments without any guarantee.

We expressly point to our general guarantee terms which can be found in our general terms of business.

If you have any questions please contact PCE Instruments.

3 Specifications

3.1 General

Measurement range	0 to 400 bar (depending on the sensor)
Selectable units	bar, psi, kg/cm ² , mm/Hg, inch/Hg, meter/H ₂ O, inch/H ₂ O, atmosphere
Pressure connector	optional, 5V DC, maximum output of sensor is 100 mV DC (see ranges below)
Zero reset	by way of keypad
Auto shut-off	yes (this function can be disabled)
Functions	measurement of pressure, Min and Max HOLD, data transfer to a computer via RS-232 interface
Auto shut-off	to conserve battery power (can be disabled)
Rate of measurement	approx. every 0.8 seconds
Display	LCD display: 52 x 38 mm
Memory	SD card up to 16 GB (a 2 GB card is included)
Enclosure	ABS plastic
Software	optional (only for real time data transference)
Low battery indication	indicated on the display
Power supply	6 x 1,5 V AA batteries mains cable (option)
Dimensions	177 x 68 x 45 mm
Peso	350 g
Operating temperature	0 to 50°C
Operating humidity	0 to 80% r.h.

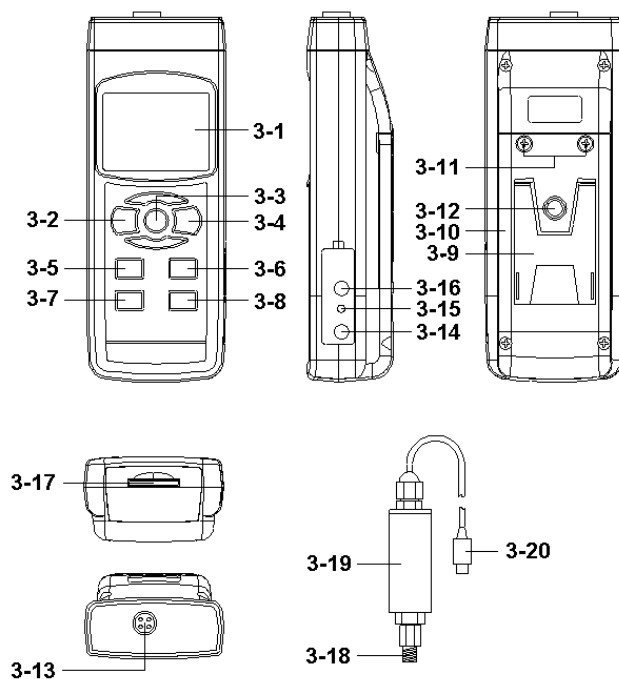
3.2 Electrical (23 ± 5 °C)

Sensor type	2 bar		5 bar		10 bar	
	Max. range	Resolution	Max. range	Resolution	Max. range	Resolution
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	0.002	9.87	0.01
hPA	2000	2	5000	5	10000	10
kPA	200.0	0.2	500.0	0.5	1000	1

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
hPA	20000	20	50000	50	10000	100
kPA	2000	2	5000	5	1000	10

Sensor type	200bar		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 H2O	2040	2	4075	5
inch H2O	80200	100	160600	200
Atmosphere	197.4	0.2	394.5	0.5
hPA	200000	200	400000	500
kPA	20000	20	40000	50

4 System description



- 3-1 Display
- 3-2 Power Button (Backlight Button)
- 3-3 Hold Button (ESC Button)
- 3-4 REC Button (Enter Button)
- 3-5 Unit Button (▲ Button)
- 3-6 Sensor type Button (▼ Button)
- 3-7 Zero Button (Time Button)
- 3-8 Logger Button (SET Button, Sampling check)
- 3-9 Stand
- 3-10 Battery Compartment/Cover
- 3-11 Battery Cover Screw
- 3-12 Tripod Fix Nut
- 3-13 Probe Socket
- 3-14 DC 9V Power Adapter Input Socket
- 3-15 Reset Button
- 3-16 RS-232 Output Terminal
- 3-17 SD card socket
- 3-18 Port Connector of Pressure Sensor
- 3-19 Pressure Sensor Main body
- 3-20 Plug of Pressure Sensor

5 Sensor type selection

The meter can cooperate with optional 2, 5, 10, 20, 50, 100, 200, 400 bar sensor, new calibration is not necessary when changing the new sensor.

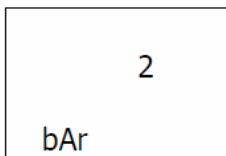
Those different optional pressure sensor are :

- * 5 bar pressure sensor, Model : PS100-5
- * 20 bar pressure sensor, Model : PS100-20
- * 50 bar pressure sensor, Model : PS100-50
- * 100 bar pressure sensor, Model : PS100-100
- * 400 bar pressure sensor, Model : PS100-400

Thread	1/4"
Maximum temperature	80 °C
Dimensions	30 mm diameter x 85 mm long
Weight	160 g
Connecting cable	1.2 m

After already select the convenient pressure sensor type, press Sensor type Button (3-6) once, the Display will show the sensor type to confirm.

For example, if the pressure type already select 2 bar pressure sensor (Model : PS100-2BAR), then if press Sensor type Button (3-6) once, the Display will show :



6 Measuring procedure

- 1) Plug in the " Plug of Pressure Sensor " (3-20) to meter's " Probe Input Socket " (3-13)
- 2) Power on the meter by pushing the " Power Button " (3-2) once.
- 3) Press the " Sensor Type Button " (3-6) once to check if the meter's sensor type is same as the external pressure sensor.
- 4) Press the " Unit Button " (3-5) once in sequence to select the measuring unit as : Bar, Psi, Kg/cm², mm Hg, inch Hg, meter H₂O, inch H₂O, Atmosphere, hPA, kPA.

Unit	Display indication
Psi	PSI
Inch Hg	In Hg
Inch H ₂ O	In H ₂ O
hPA	hPA
KPA	_PA
Bar	bAr
Kg/cm ²	_g C2
Mm Hg	-- Hg
Meter H ₂ O	-t H ₂ O
Atmosphere	AtP

Note:

After select the desired unit, power off the meter then power on again, the meter circuit memory will save the selected unit with default.

- 5) Zero adjustment: If the Display is not show zero value, push the " Zero Button " (3-7), > 10 seconds continuously, the Display value will change to zero value.
- 6) Connect the " Port Connector of Pressure Sensor "(3-18) to the installation that intend to measure the pressure value.
- 7) Apply the pressure, meter will show the pressure value.

7 Other functions

7.1 Data Hold

During the measurement, press the " Hold Button " (3-3) once will hold the measured value & the LCD will display a " HOLD " symbol. Press the " Hold Button " once again will release the data hold function.

7.2 Data Record (Max., Min. reading)

1) The data record function records the maximum and minimum readings. Press the " REC Button " (3-4) once to start the Data Record function and there will be a " REC " symbol on the display.

2) With the " REC " symbol on the display :

- a) Press the " REC Button " (3-4) once, the " REC MAX " symbol along with the maximum value will appear on the display. If intend to delete the maximum value, just press the " Hold Button " (3-3) once, then the display will show the " REC " symbol only & execute the memory function continuously.
- b) Press the " REC Button " (3-4) again, the " REC MIN " symbol along with the minimum value will appear on the display. If intend to delete the minimum value, just press the " Hold Button " (3-3) once, then the display will show the " REC " symbol only & execute the memory function continuously.
- c) To exit the memory record function, just press the " REC Button " for 2 seconds at least. The display will revert to the current reading.

7.3 LCD Backlight ON/OFF

After power ON, the " LCD Backlight " will light automatically. During the measurement, press the " Backlight Button " (3-2) once will turn OFF the " LCD Backlight ". Press the " Backlight Button " once again will turn ON the " LCD Backlight " again.

8 Datalogger

8.1 Preparation before using the datalogger function

a. Insert the SD card

* It is recommended to use memory card ≤ 4 GB.

Prepare a " SD memory card " (1 GB to 16 GB, optional), insert the SD card into the " SD card socket " (3-17). The front panel of the SD card should face against the down case.

b. SD card Format

If SD card just the first time use into the meter, it is recommended to make the " SD card Format " first, see further down.

* It recommend strongly, do not use memory cards that have been formatted by other meter or by a computer. Reformat the memory card with your meter.

c. Time setting

If the meter is used at first time, it should to adjust the clock time exactly, see further down.

d. Decimal format setting



The numerical data structure of SD card is default used the " . " as the decimal, for example "20.6" "1000.53" . But in certain countries (Europe ...) is used the " , " as the decimal point, for example " 20, 6 " , "1000,53" . Under such situation, it should change the Decimal character at first, details of setting the Decimal point can be found further down.

8.2 Auto Datalogger (Set sampling time ≥ 1 second)

a. Start the datalogger

Press the " REC Button (3-4) once , the LCD will show the text " REC " , then press the " Logger Button "(3-8), the bottom text " DATALOGGER " will flashing, at the same time the measuring data along the time information will be saved into the memory circuit.

Note:

You can find some more information on how to set the sampling time and the beeper sound further down.

b. Pause the datalogger

During execute the Datalogger function , if press the " Logger Button " (3-8) once will pause the Datalogger function (stop to save the measuring data into the memory circuit temporally). In the same time the text of " DATALOGGER " will be no flashing.

Note:

If press the " Logger Button " (3-8) once again will execute the Datalogger again, the bottom text of "DATALOGGER " will flash.

c. Finish the datalogger

During pause the Datalogger, press the " REC Button " (3-4) continuously at least two seconds, the "REC " indication will be disappeared and finish the Datalogger.

8.3 Manual Datalogger (Set sampling time = 0 second)

a. Set sampling time to 0 second

Press the " REC Button (3-4) once , the LCD will show the text " REC " , then press the " Logger Button" (3-8) once, the bottom text " DATALOGGER " will flashing once and Beeper will sound once, at the same time the measuring data along the time information will be saved into the memory circuit. The lower Display will show the Position (Location) no. and saved into the SD card too.

Note:

During execute the Manual Datalogger, press the " ▲ Button " (3-5) the lower no. (position no.) will flashing. It can use the " Button " (▲ 3-5,) or "▼ Button " (3-6) to set the measuring Location no. (1 to 99, for example room 1 to room 99) to identify the measurement location , the lower Display will show P x (x = 1 to 99).

b. Finish the datalogger

Press the " REC Button " (3-4) continuously at least two seconds, the " REC " indication will be disappeared and finish the Datalogger.

8.4 How to check the time information

During the normal measurement screen (not execute the Datalogger),

- 1) If press " Time Button " (3-7) once , the lower LCD display will present the time information of Hour/Minute/Second (h.m.s) in the lower Display.
- 2) If press " Time Button " (3-7) once again , the lower LCD display will present the time information of Year/Month/Date (yy.mm.dd) in the lower Display.
- 3) If press " Time Button " (3-7) once again, the LCD will return to normal screen.

8.5 How to check the sampling time information

During the normal measurement screen (not execute the Datalogger), If press " Sampling Button " (3-8) once , the lower LCD display will present the Sampling time information in second unit.

8.6 SD card data structure

1) When the SD card is used into the meter, the SD card will generate a route:

PSA01

2) If the first time to execute the Datalogger, under the route PSA01\, will generate a new file name PSA01001.XLS. After exist the Datalogger, then execute again, the data will save to the PSA01001.XLS until Data column reach to 30,000 columns, then will generate a new file, for example PSA01002.XLS

3) Under the folder PSA01\, if the total files more than 99 files, will generate anew route, such as PSA02\.....

4) The file's route structure :

```
PSA01\
PSA01001.XLS
PSA01002.XLS
.....
PSA01099.XLS
PSA02\
PSA02001.XLS
PSA02002.XLS
.....
PSA02099.XLS
PSAXX\
.....
.....
```

Note:

XX : Max. value is 10.

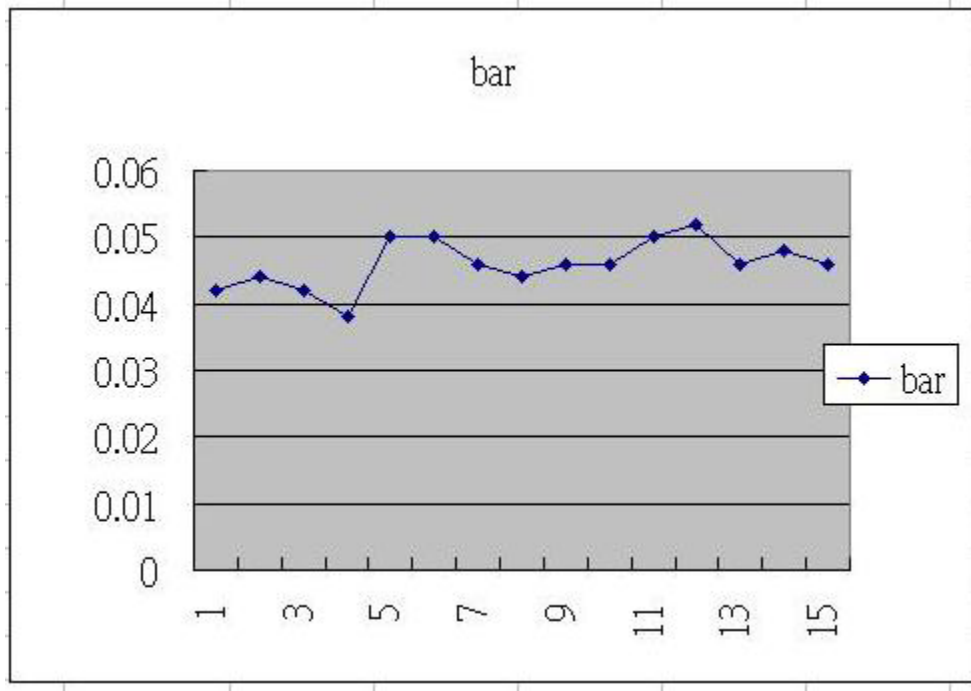
9 Saving data from the SD card to the computer (EXCEL software)

- 1) After execute the Data Logger function, take away the SD card out from the " SD card socket " (3-17).
- 2) Plug in the SD card into the Computer's SD card slot (if your computer build in this installation) or insert the SD card into the " SD card adapter ". then connect the " SD card adapter " into the computer.
- 3) Power ON the computer and run the " EXCEL software ". Down load the saving data file (for example the file name : PSA01001.XLS, PSA01002.XLS) from the SD card to the computer. The saving data will present into the EXCEL software screen (for example as following EXCEL data screens) , then user can use those EXCEL data to make the further Data or Graphic analysis usefully.

Example EXCEL data screen

	A	B	C	D	E
1	Position	Date	Time	Ch1_Value	Ch1_Unit
2	1	2009/10/19	10:18:58	0.042	Bar
3	2	2009/10/19	10:19:00	0.044	Bar
4	3	2009/10/19	10:19:02	0.042	Bar
5	4	2009/10/19	10:19:04	0.038	Bar
6	5	2009/10/19	10:19:06	0.05	Bar
7	6	2009/10/19	10:19:08	0.05	Bar
8	7	2009/10/19	10:19:10	0.046	Bar
9	8	2009/10/19	10:19:12	0.044	Bar
10	9	2009/10/19	10:19:14	0.046	Bar
11	10	2009/10/19	10:19:16	0.046	Bar
12	11	2009/10/19	10:19:18	0.05	Bar
13	12	2009/10/19	10:19:20	0.052	Bar
14	13	2009/10/19	10:19:22	0.046	Bar
15	14	2009/10/19	10:19:24	0.048	Bar
16	15	2009/10/19	10:19:26	0.046	Bar

Example EXCEL graphics screen



10 Advanced settings

Under do not execute the Datalogger function, press the " SET Button " (3-8) continuously at least two seconds will enter the " Advanced Setting " mode. Then press the " SET Button " (3-8) once a while in sequence to select the eight main function, the display will show :

Sd F..... SD memory card Format
dAtE..... Set clock time (Year/Month/Date, Hour/Minute/Second)
SP-t.....Set sampling time (Hour/Minute/Second)
PoFF..... Auto power OFF management
bEEP.....Set beeper sound ON/OFF
dEC.....Set SD card Decimal character
tyPE..... Set the external optional sensor type
ESC..... Escape from the advanced setting

Note:

During execute the " Advanced Setting " function, if press " ESC Button " (3-3) will exit the " Advanced Setting " function, the LCD will return to normal screen.

10.1 SD memory card format

When the lower display shows " Sd F "

1) Use the " ▲ Button " (3-5,) or " ▼ Button " (3-6) to select the upper value to " yES " or " no ".

yES - Intend to format the SD memory card
no - Not execute the SD memory card format

2) If select the upper to " yES ", press the " Enter Button" (3-4) once again, the Display will show text " yES Enter " to confirm again, if make sure to do the SD memory card format, then press " Enter Button " once will format the SD memory clear all the existing data that already saving into the SD card.

10.2 Set clock time (Year/Month/Date, Hour/Minute/Second)

When the upper display shows " dAtE "

- 1) Use the " ▲ Button " (3-5) or " ▼ Button "(3-6) to adjust the value (Setting start from Year value).
After the desired value is set, press the " Enter Button " (3-4) once will going to next value adjustment (for example, first setting value is Year then next to adjust Month, Date, Hour, Minute, Second value).

Note:

The adjusted value will flash.

- 2) After set all the time value (Year, Month, Date, Hour, Minute, Second), press the " SET Button " (3-8) once will save the time value, then the screen will jump to Sampling time " setting screen (see further down).

Note:

After the time value is setting, the internal clock will run precisely even Power off if the battery is under normal condition (No low battery power).

10.3 Set sampling time (Hour/Minute/Second)

When the upper display shows " SP-t "

- 1) Use the " ▲ Button " (3-5) or " ▼ Button " (3-6) to adjust the value (Setting start from Hour value).
After the desired value is set, press the " Enter Button " (3-4) once will going to next value adjustment (for example, first setting value is Hour then next to adjust Minute, Second value).

Remark :

The adjusted value will be flashed.

- 2) After set all the sampling time value (Hour, Minute,Second), press the " SET Button " (3-8) once will save the sampling value with default then the screen will jump to " Auto power OFF " setting screen (see further down).

10.4 Auto Power Off

When the lower display shows " PoFF "

- 1) Use the " ▲ Button " (3-5) or " ▼ Button "(3-6) to select the upper value to " yES " or " no ".

yES - Auto Power Off management will enable.

no - Auto Power Off management will disable.

- 2) After select the upper text to " yES " or " no ", press the " Enter Button " (3-4) will save the setting function with default.

10.5 Enable / disable beeper sound

When the lower display shows " bBEEP "

- 1) Use the " ▲ Button " (3-5) or " ▼ Button " (3-6) to select the upper value to " yES " or " no ".

yES - Meter's beep sound will be ON with default.

no - Meter's beep sound will be OFF with default.

- 2) After select the upper text to " yES " or " no ", press the " Enter Button " (3-4) will save the setting function with default.

10.6 Decimal point of SD card setting

The numerical data structure of SD card is default used the "." as the decimal, for example "20.6" "1000.53". But in certain countries (Europe ...) is used the ",", as the decimal point, for example "20,6" "1000,53". Under such situation, it should change the Decimal character at first.

When the lower display shows " dEC "

1) Use the " ▲ Button " (3-5) or " ▼ Button " (3-6) to select the upper text to " bASIC " or " Euro ".

bASIC - Use "." as the Decimal point with default.

Euro - Use ",", as the Decimal point with default.

2) After select the upper text to " bASIC " or " Euro ", press the " Enter Button " (3-4) will save the setting function with default.

10.7 Set the desired type of optional external pressure sensor

When the lower display show " tyPE "

1) Use the " ▲ Button " (3-5) or " ▼ Button " (3-6) to select the upper Display no. to 2, 5, 10 20. 50, 100, 200 or 400.

Selecting no. via the optional pressure sensor type :

If the selected no. is " 5 ". The meter will cooperate :

5 bar pressure sensor, Model : PS100-5

If the selected no. is " 20 ". The meter will cooperate :

20 bar pressure sensor, Model : PS100-20

If the selected no. is " 50 ". The meter will cooperate :

50 bar pressure sensor, Model : PS100-50

If the selected no. is " 100 ". The meter will cooperate :

100 bar pressure sensor, Model : PS100-100

If the selected no. is " 400 ". The meter will cooperate :

400 bar pressure sensor, Model : PS100-400

2) After Display the convenient pressure sensor type is selected to , press the " Enter Button " (3-4) will save the setting function with default.

10.8 ESC

When the display shows " ESC "

When the Display show the text " ESC ", then press the " SET Button " (3-8) or " ESC Button " (3-3) will finish the Advanced Setting procedures.


Note:

During execute the " Advanced Setting " function, if press " ESC Button " (3-3) will exit the " Advanced Setting " function, the LCD will return to normal screen.

11 Power supply by optional mains adaptor

The meter also can supply the power supply from the DC 9V Power Adapter (optional). Insert the plug of Power Adapter into " DC 9V Power Adapter Input Socket" (3-14). The meter will permanent power ON when use the DC ADAPTER power supply (The power Button function is disabled).

12 Battery replacement

1) When the left corner of LCD display shows "", 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) Loose the screws of the " Battery Cover " (3-11) and take away the " Battery Cover " from the Instrument and remove the battery.

3) Replace with DC 1.5 V battery (UM3, AA, Alkaline/heavy duty) x 6 PCs, and reinstate the cover.

4) Make sure the battery cover is secured after changing batteries.

13 System reset

If the troubles such as the following arise:

CPU system is hold (for example, the key button cannot be operated...).

Then make the system RESET will fix the problem. The system RESET procedures will be either following method:

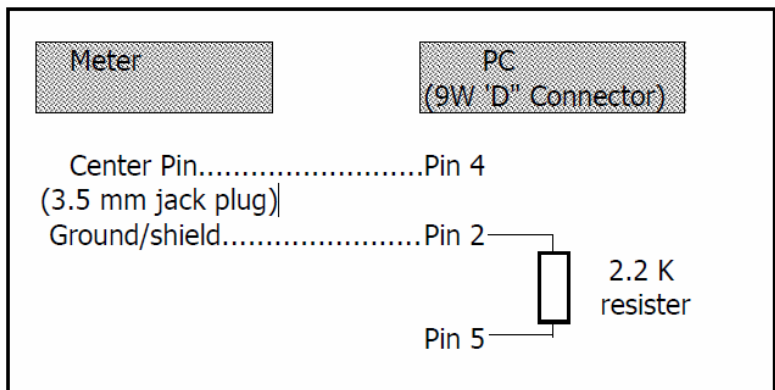
During the power on, use a pin to press the " Reset Button " (3-15) once a while will reset the circuit system.

14 RS-232 serial PC interface

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-16).

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

An RS-232 lead with the following connection will be required to link the instrument with the PC serial port.



The 16 digits 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 indicates the following status:

D15	Start Word
D14	4
D13	When send the upper display data = 1 When send the lower display data = 2
D12, D11	Annunciator for display
	Bar = 22 Mm Hg = 78 Inch H2O = 25
	Psi = 23 Inch Hg = 80 ATP = 26
	Kg/cm ² = 77 Meter H2O = 79
	hPA = 91 kPA = 88
D10	Polarity 0 = Positive 1 = Negative
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D8 to D1	Display reading, D1 = LSD, D8 = MSD For example: If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word

RS-232 format: 9600, N, 8, 1

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

15 Disposal

For the disposal of batteries, the 2006/66/EC directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose.

In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law.

If you have any questions, please contact PCE Instruments.



16 Contact

If you have any questions about our range of products or measuring instruments please contact PCE Instruments.

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