

## **PCE-MFM 3000**

***G ( Gauss), mT ( milli Tesla ), USB/RS232***

# **MAGNETIC FIELD METER**



Your purchase of this AC/DC MAGNETIC METER marks a step forward for you into the field of precision measurement. Although this METER 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**

# TABLE OF CONTENTS

1. FEATURES.....	1
2. SPECIFICATIONS.....	2
3. FRONT PANEL DESCRIPTION.....	4
3-1 Display.....	4
3-2 Power Button.....	4
3-3 Hold Button.....	4
3-4 REC Button.....	4
3-5 ZERO Button .....	4
3-6 Mode Button ( DC, AC Button ), SET Button.....	4
3-7 Input socket.....	4
3-8 Probe Handle.....	4
3-9 Probe Sensing Head.....	4
3-10 Probe Plug.....	4
3-11 Probe Head Cover.....	4
3-12 RS-232 Output Terminal.....	4
3-13 Reset button.....	4
3-14 DC 9V Power Adapter Input Socket.....	4
3-15 Stand.....	4
3-16 Tripod Fix Nut.....	4
3-17 Battery Compartment/Cover.....	4
3-18 Battery Cover Screw.....	4
4. MEASURING PROCEDURE.....	5
4-1 AC/DC magnetic field measurement.....	5
4-2 Data Hold.....	7
4-3 Data Record.....	7
5. ADVANCED SETTING.....	8
5-1 Auto power OFF management.....	9
5-2 Change the unit ( mT, G ).....	9
5-3 For the further calibration usage, not available for the user.....	10
6. RS232 PC SERIAL INTERFACE.....	10
7. BATTERY REPLACEMENT.....	11
8. SYSTEM RESET.....	12

# 1. FEATURES

- \* Wide range, general purpose magnetic measurement for industrial, mechanical, material, electrical, laboratory field usage
- \* Unit : G ( Gauss ), mT ( milli Tesla )
- \* DC and AC magnetic field measurement
- \* DC Range : 300.00 mT/3000.0 mT  
AC Range : 150.00 mT/1500.0 mT
- \* Resolution : 0.01/0.1 mT, 0.1/1 G
- \* N pole/S pole indicator
- \* Use Hall sensor with automatic Temp. compensation
- \* Zero button for DC, AC magnetic function
- \* Separate probe, easy operation and convenient for remote measurement
- \* Data hold function for freezing the desired value on display
- \* Records Maximum and Minimum readings with Recall
- \* RS232/USB computer interface
- \* Microprocessor circuit assures maximum possible accuracy, provides special functions and features
- \* Heavy duty & compact housing with hard carrying case, designed for easy carry out & operation
- \* Auto shut off is available to save battery life
- \* Power supply from batteries or DC 9V adapter in

## 2. SPECIFICATIONS

Circuit	Custom one-chip of microprocessor LSI circuit.		
Display	LCD size : 52 mm x 38 mm dual function LCD display.		
Measurement Unit	mT	milli Tesla	
	G	Gauss	
Measurement Range, DC	mT	Range 1	300.00 mT x 0.01 mT
		Range 2	3,000.0 mT x 0.1 mT
	G	Range 1	3,000.0 G x 0.1 G
		Range 2	30,000 G x 1 G
Measurement Range, AC	mT	Range 1	150.00 mT x 0.01 mT
		Range 2	1,500.0 mT x 0.1 mT
	G	Range 1	1,500.0 G x 0.1 G
		Range 2	15,000 G x 1 G
Accuracy (at 23± 5 °C)	DC	± ( 5 % rdg. + 10 digit )	
	AC	± ( 5 % rdg. + 20 digit )	
Frequency Response	AC measurement : 50 Hz / 60 Hz		
Sensor	Hall sensor.		
Temp. Compensation for hall sensor	Probe head build the Temp. sensor for using the ATC ( automatic Temp. compensation ).		
Field Direction	Uniaxial.		
Data Hold	Freeze the display reading.		
Memory Recall	Maximum & Minimum value.		
Display Sampling Time	Approx. 1 second.		
Power off	Manual off by push button or Auto shut off to save battery life.		
Operating Temperature	0 to 50 °C.		
Operating Humidity	Less than 85% R.H.		

Data Output	RS 232/USB PC serial interface. * <i>Connect the optional RS232 cable UPCB-02 will get the RS232 plug.</i> * <i>Connect the optional USB cable USB-01 will get the USB plug.</i>
Power Supply	006P DC 9V battery ( Alkaline or Heavy duty type ).
	DC 9V adapter input. * <i>AC/DC power adapter is optional.</i>
Power Current	Approx. DC 15 mA .
Weight	Approx. 275 g/0.61 LB. ( include probe )
Dimension	Main instrument : 198 x 68 x 30 mm ( 7.8 x 2.7 x 1.2 inch )
	Probe : 195 x 25 x 19 mm ( 7.7 x 1.0 x 0.7 inch ).
Accessories Included	Instruction manual..... 1 PC Magnetic Probe..... 1 PC Carrying case..... 1 PC

\* Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.

## 3. FRONT PANEL DESCRIPTION

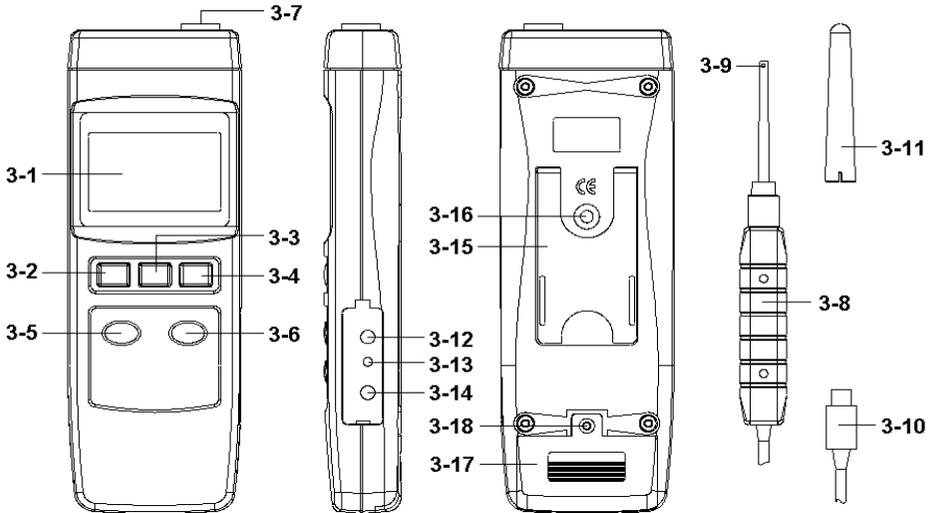


Fig. 1

- 3-1 Display
- 3-2 Power Button
- 3-3 Hold Button
- 3-4 REC Button ( Enter Button )
- 3-5 ZERO Button
- 3-6 Mode Button ( DC, AC Button ), SET Button
- 3-7 Input socket
- 3-8 Probe Handle
- 3-9 Probe Sensing Head
- 3-10 Probe Plug
- 3-11 Probe Head Cover
- 3-12 RS-232 Output Terminal
- 3-13 Reset button
- 3-14 DC 9V Power Adapter Input Socket
- 3-15 Stand
- 3-16 Tripod Fix Nut
- 3-17 Battery Compartment/Cover
- 3-18 Battery Cover Screw

## 4. MEASURING PROCEDURE

### 4-1 AC/DC magnetic field measurement

- 1) Power ON the meter by pressing the " Power Button " ( 3-2, Fig. 1 ) once.
- 2) Press the " Mode Button " ( 3-6, Fig. 1 ) once , the Display will show the following screen in sequence :

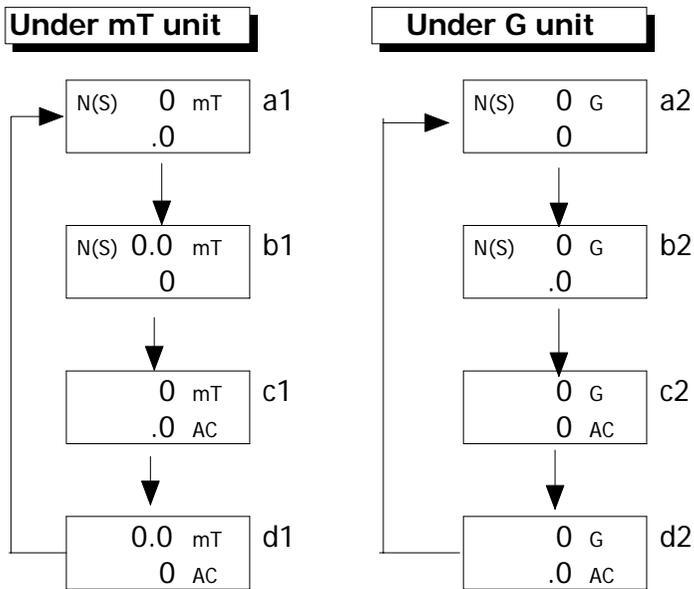


Fig. 2

**Note :**

a1 screen is ready for DC 0.1 mT resolution measurement.  
b1 screen is ready for DC 0.01 mT resolution measurement.  
c1 screen is ready for AC 0.1 mT resolution measurement.  
d1 screen is ready for AC 0.01 mT resolution measurement.

a2 screen is ready for DC 1 G resolution measurement.  
b2 screen is ready for DC 0.1 G resolution measurement.  
c2 screen is ready for AC 1 G resolution measurement.  
d2 screen is ready for AC 0.1 G resolution measurement.

### 3) Display indicator

#### **DC magnetic field measurement**

- \* **The Display will show " N " or " S " indicator**
- \* **North pole : Display will show " N " indicator**
- \* **South pole : Display will show " S " indicator**

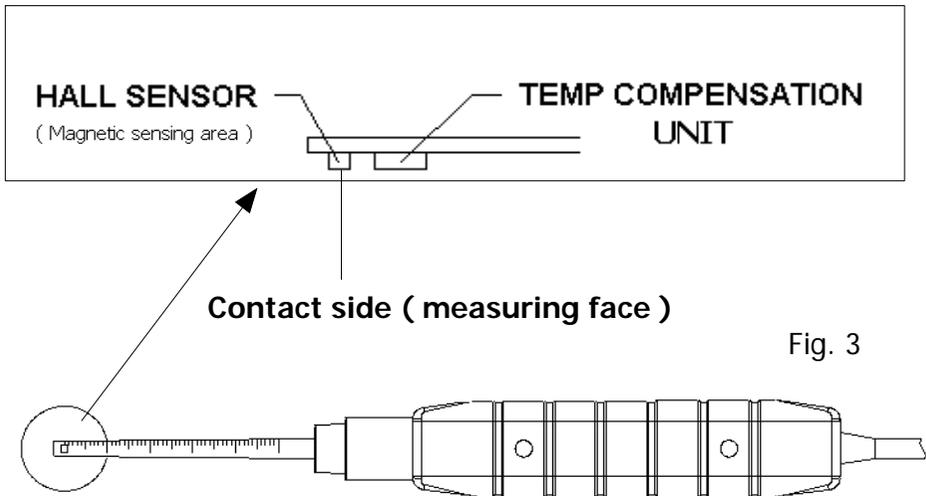
#### **AC magnetic field measurement**

- \* **Display will show " AC " indicator.**
- \* **Display will not show " N (S ) indicator.**

### 4) unit selection :

How to select the unit ( mT, G ), the procedures please refer to chapter 5-2 " Change the unit ( mT, G ) ", page 9.

- 5) Contact and close the testing material to the probe head ( refer to Fig. 3 ) , the Display will show the magnetic field value along with the unit ( mT, G ).



#### 6) Zero adjustment :

When power ON the meter, due to the environment interference, the display may show certain values ( not zero value), it is normal.

- \* Before the measurement, fix the probe at the exact position, press the " ZERO Button " ( 3-5, Fig. 1 ), in the same time the display will show the " 0 " indicator.

#### **4-2 Data Hold**

During the measurement, press the " Hold Button " ( 3-3, Fig. 1 ) 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.

#### **4-3 Data Record ( Max., Min. reading )**

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

- \* With the " REC " symbol on the display :

a) Press the " REC Button " ( 3-4, Fig. 1 ) 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, Fig. 1 ) once, then the display will show the " REC " symbol only & execute the memory function continuously.

- b) Press the " REC Button " ( 3-4, Fig. 1 ) 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, Fig. 1 ) 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.

**Remark :**

***When make the DC magnetic field measurement and execute the " RECORD " function, it can not change from the " North pole " to " South pole " or from the " South pole " to " North pole " during the measurement. It can make the measurement under the same pole ( S pole or N pole ) only, otherwise the Max., Min. value will be no sense.***

## **5. ADVANCED SETTING**

Press the " SET Button " ( 3-6, Fig. 1 ) continuously at least two seconds will enter the " Advanced Setting " mode, then press the " SET Button " ( 3-6, Fig. 1 ) once a while in sequence to select the three function, the lower Display will show :

**PoFF**.....Auto power OFF management

**unit**.....Select the measurement unit to mT or G

**CLr**..... For the further calibration usage, not available for the end user

### ***5-1 Auto power OFF management***

When the lower display show " PoFF "

- 1) Use the " REC Button " ( 3-4, Fig. 1 ) to enter will enter into the setting of " Auto power off management ".  
Press the " Mode Button " ( 3-6, Fig. 1 ) once in sequence to select upper text to " yES " or " no ".

**yES - Auto Power Off management will enable.**

**no - Auto Power Off management will disable.**

- 2) After select the desiring function ( YES or no ), press the " REC Button " ( 3-4, Fig. 1 ) to save the function with default.

### ***5-2 Select the measurement unit to mT or G***

When the lower display show " unit "

- 1) Use the " REC Button " ( 3-4, Fig. 1 ) to enter will enter into the setting of " Select the measurement unit of mT or G "  
Press the " Mode Button " ( 3-6, Fig. 1 ) once in sequence to select the Display text to " t " or " g ".

**t - milli Tesla ( mT )**

**g - Gauss ( G )**

- 2) After Display unit is selected to " mT " or " G ", press the " REC Button " ( 3-4, Fig. 1 ) will save the setting function with default.

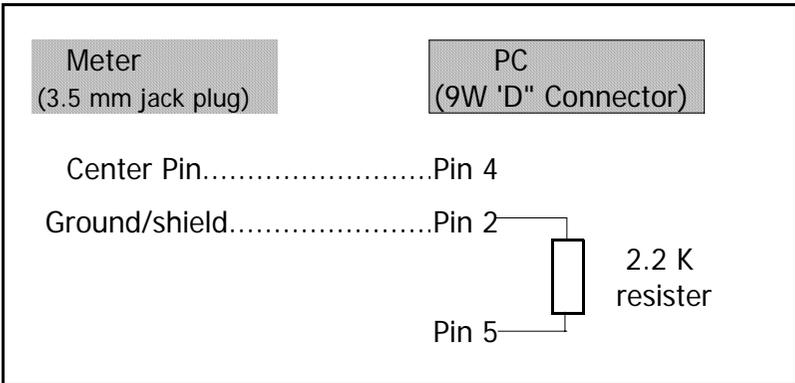
**5-3 For the further calibration usage, not available for the user**

When the lower display show " CLr "

This setting just for the further calibration usage, not available for the end user.

**6. RS232 PC SERIAL INTERFACE**

The instrument has RS232 PC serial interface via a 3.5 mm terminal ( 3-12, Fig. 1 ). The data output is a 16 digit stream which can be utilized for user's specific application. A RS232 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 = 02
D14	4
D13	1
D12 & D11	Annunciator for Display m tesla = E3      gauss = B5
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, D8 = MSD, D1 = LSD For example : If the display reading is 1234, then D8 to D1 is : 00001234
D0	End Word = 0D

### **RS232 setting**

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 "  , 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 " Battery Cover Screw " ( 3-18, Fig. 1 ), slide the " Battery Cover " ( 3-17, Fig. 1 ) away from the instrument and remove the battery. Replace with DC 9 V battery ( 006P Alkaline/heavy duty ), and reinstate the cover.
- 3)Make sure the battery cover is secured after changing the battery.

## 8. SYSTEM RESET

If the meter happen the troubles such as :

*CPU system is hold ( for example, the key button can not 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 " ( 3-13, Fig. 1 ) once a while will rest the circuit system.