

DC/AC milligauss magnetometer

PRECISION

MILLI GAUSS METER

Model : GU-3001



Your purchase of this PRECISION MILLIGAUSS 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

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1. FEATURES

- * DC/AC milligauss Magnetometer.
- * Using exclusive high sensitivity sensor (better performance than the traditional Hall element sensor), available for high precision magnetic field measurement.
- * Wide application for industrial, mechanical, material, electrical, laboratory field to check the material contains magnetic field value.
- * DC and AC magnetic field measurement
- * Wide measure range : $\pm 3,000$ milligauss.
- * The meter can detect the magnetic fields as small as 0.1 milligauss.
- * N pole/S pole indicator.
- * Separate probe, easy operation and convenient for remote measurement.
- * High precision magnetometer, even can measure the absolute environment Earth's magnetic field as reference.
- * Zero adjustment button for relative measurement.
- * Large S-TN type LCD, high contrast, easy readout.
- * 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.

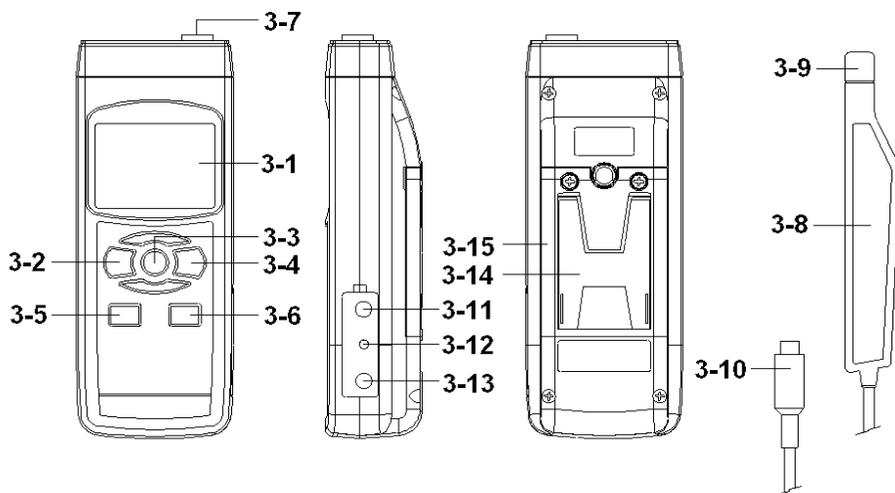
2. SPECIFICATIONS

Circuit	Custom one-chip of microprocessor LSI circuit.	
Display	LCD size : 52 mm x 38 mm dual function LCD display.	
Measurement Unit	mG : milligauss uT : micro Tesla	
Measurement Range	- 3,000 mG to 3,000 mG. - 300 uT to 300 uT.	
Resolution	0.1 mG	- 199.9 mG to 199.9 mG.
	1 mG	≥ 200 mG, ≤ -200 mG
	0.01 uT	- 19.99 uT to 19.99 uT.
	0. 1 uT	≥ 20.0 uT, ≤ -20.0 uT.
Accuracy	$\pm (2 \% + 2 \text{ mG })$ <i>* -1,000 mG to 1,000 mG</i> <i>* -100.0 uT to 100.0 uT</i>	
Frequency Response	DC AC : 40 Hz to 10 KHz	
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.	
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>	

Operating Temperature	0 to 50 °C .
Operating Humidity	Less than 85% R.H.
Power Supply	DC 1.5 V battery (UM4, AAA) x 6 PCs, Alkaline/heavy duty type or equivalent.
Power Current	Approx. DC 20.5 mA .
Weight	Main instrument : 350 g/0.77 LB. <i>@ Battery is included.</i>
	Probe : 78 g/0.17 LB.
Dimension	Main instrument : 173 x 68 x 42 mm (7.9 x 2.7x 1.2 inch)
	Probe : 177 x 29 x 17 mm
Accessories Included	Instruction manual.....1 PC Probe..... 1 PC Hard Carrying case, CA-06.....1 PC
Optional Accessories	RS232 cable, UPCB-02 USB cable, USB-01 Data Acquisition software, SW-U801-WIN

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

3. FRONT PANEL DESCRIPTION



- 3-1 Display
- 3-2 Power Button
- 3-3 Hold Button
- 3-4 REC Button
- 3-5 UNIT/ZERO Button (Relative Button)
- 3-6 AC/DC Button
- 3-7 Input socket
- 3-8 Probe Handle
- 3-9 Probe Sensing Head
- 3-10 Probe Plug
- 3-11 RS-232 Output Terminal
- 3-12 Reset button
- 3-13 DC 9V Power Adapter Input Socket
- 3-14 Stand
- 3-15 Battery Compartment/Cover

4. MEASURING PROCEDURE

4-1 Measurement Consideration

1) Display direction :

DC magnetic field measurement

Display values (+)

S pole | N pole



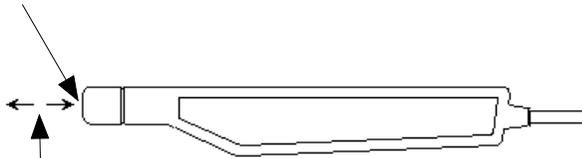
- * North pole : Display will show " N "
- * South pole : Display will show " S " along with the " - " indicator.

AC magnetic field measurement

- * Display will show " AC " indicator.

2) Probe head sensing area and the sensing direction :

magnetic sensing area



magnetic sensing direction

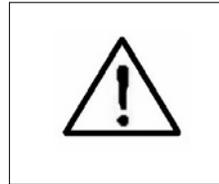
Fig. 2

3) When the measurement value is over than $\pm 3,500$ mG, the display will show " ---- " ($\geq 3,500$ mG) or " ---- " ($\leq -3,500$ mG).

3) Environment Earth's magnetic field, not zero
 When power ON the meter, the display will show certain values (not zero value, for example 195 mG...), it is normal due to the instruments is the high precision magnetometer, it can measure the absolute environment Earth's magnetic field as reference. For the material precision DC magnetic measurement, it should deduct those " not zero value (environment earth's magnetic field value) at first, details please refer to the following section " 4-2 DC Measurement "

4-2 DC magnetic filed measurement

1) As the device has extremely high sensitivity, the LCD display will vary greatly even a slight movement the probe. It is recommended to firmly fix the probe before measurement.



2) Power ON the meter by pressing the " Power Button " (3-2, Fig. 1) once.

3) Select the unit (mG, uT) by pressing the " UNIT button " (3-5, Fig. 1) once.

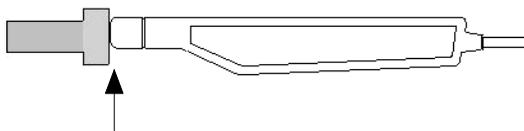
4) Relative measurement :

a. General, before the measurement the display will not show zero value due to it will present the environment earth's magnetic field value, it is normal.

b. For precision DC magnetic filed measurement it should deduct those " not zero " value (existing environment earth's magnetic field value) at first. Before the measurement, fix the probe at the exact position, press the " ZERO Button " (3-5, Fig. 1) continuously at least two seconds until the display show " 0 " value, in the same time the Display will show the " 0 " indicator then release the finger from the button.

* *Press the " ZERO Button " (3-5, Fig. 1) continuously at least two seconds again, the " 0 " indicator will be disappeared and the Display will return to the " no zero " value (show the environment magnetic field value).*

- 5) Contact and close the testing material to the probe head (refer to Fig. 2, page 5) , the Display will show the magnetic field value along with the unit (mG, uT).



*testing material contact (close) to
probe head*

4-3 AC magnetic field measurement

The measurement procedures are similar as section

4-2 DC magnetic field measurement

but should select the function to " AC ", the procedures are :

- 1) Power ON the meter by pressing the " Power Button " (3-2, Fig. 1) once.
- 2) Press the " AC/DC Button " (3-6, Fig. 1) once, the " Display " (3-1, Fig. 1) will show " AC " indicator, now the meter is ready for AC magnetic field measurement.

4-4 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.

4-5 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.

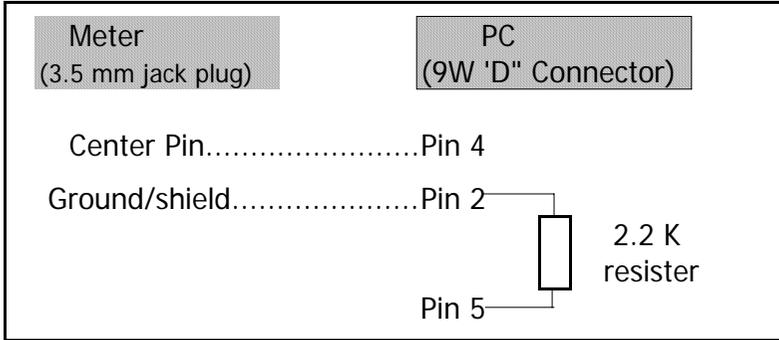
- * With the " REC. " symbol on the display :
- a) Press the " REC Button " (3-4, Fig. 1) once, the " REC. MAX. " symbol along with the maximum value will appear on the display.
If intend to delete the maximum value, just press the " Hold Button " (3-3, Fig. 1) once, then the display will show the " 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 :

The Max. (Min.) value is to present the value of the absolute measurement value (forget the negative mark) , for example if the measurement value is -19,03 uT, -19. 02 uT, -17.31 uT, then the Max. value is -19,03 uT due to the negative label is just the to show the direction of " South pole " only.

5. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal (3-11, 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	When send the upper display data = 1 When send the lower display data = 2		
D12 & D11	Annunciator for Display		
	mG = B3	uT = B2	
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

6. POWER MANAGEMENT (manual power off/auto power off)

The power management is defaulted to " manual power off ", however the meter can default to " auto power off disable ", the procedures are :

- 1) Press the " AC/DC Button " (3-6, Fig. 1) continuously at least 2 seconds, Display will show " P OFF ".
- 2) * Press the following buttons :
 - UNIT Button, 3-5, Fig. 1*
 - AC/DC Button, 3-6, Fig. 1*the Display will change to " 0 " or " 1 " .
 - 1 = auto power enable*
 - 0 = manual power (auto power disable)*
- * After select the above " 0 " or " 1 " , , press " REC Button " (3-4, Fig. 1) will save the data and exit.
- * During make the power management setting, if press " Hold Button " (3-3, Fig. 1) will exit and without saving the data.

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) Slide the " Battery Cover " (3-15, Fig. 1) away from the instrument and remove the battery.
- 3) Replace with DC 1.5 V battery (UM4, AAA, Alkaline/heavy duty) x 6 PCs, and reinstate the cover.
- 4) 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 " (3-12, Fig. 1) once a while will rest the circuit system, After execute the " System reset " the setting value of : Advanced Setting " will be cleared and return to default value.