

Thank you for purchasing our product! Please read this manual before installation and operation in order to ensure the safety and effectiveness of our product.



**SMAGALL**

**MEASURING EQUIPMENT CO.,LTD**

Three-Axis Fluxgate Magnetometer

# Manual

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**Xi'an Huashun Measuring Equipment Co.,Ltd.**

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## General Description

The three axis fluxgate magnetometer consists of a fluxgate sensor, a data acquisition module, a host computer, and host computer software. The portable power supply or voltage-stabilized power supply provides power to data acquisition module and sensor. Analog signal, output by the magnetic sensor, is acquired by acquisition module in real time and converted by high speed AD converter. After conversion, the signal is transmitted to host computer through cable or TCP /IP protocol and can be displayed in two ways with the assistance of software: dimensional waveform or data. Another advantage of the system is that it allows the user to save generated data for later use.

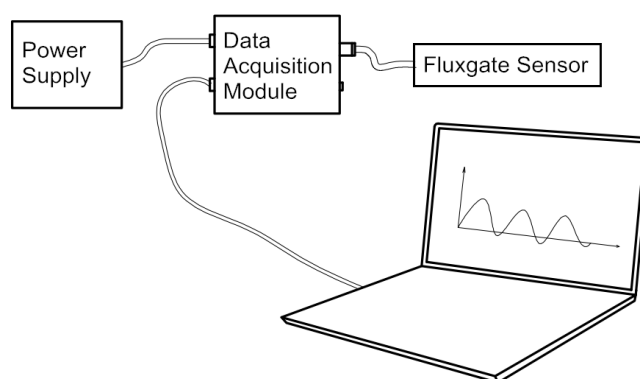


Figure 1

## 1. Key System Specifications

### 1.1 Performance

Measuring Range	$\pm 100000\text{nT}$
Linearity	0.01% FS
Precision	0.01%+Reading
Measuring Precision	0.1nT
Sampling Frequency	200Hz



## 1.2 Electrical Parameter

Operation Voltage		+5VDC
Power Supply	Portable Power Supply	Work for 9.5 hours after full charge
	Regulated Power Supply	Work continuously
Working Current		≤700mA
Power consumption		≤4W(excluding host computer)
Water proof Grade	Probe	IP68
	Power Supply	Non water proof
	Data Acquisition Module	Non water proof
	Computer	Non water proof
Applicable Operation Temperature		-25°C~80°C(-13°F~176°F)

## 1.3 Mechanical Parameter

Size	Sensor	30*30*120mm
	Data Acquisition Module	35*76*100mm
	Computer	14"
Weight	Sensor	≤155g
	Data Acquisition Module	≤252g

## 1.4 Function and Mode

Unit	nT/Gs/Oe
Measuring Mode	Absolute value measurement
	Relative value measurement
Data Transmitting	Data Transmitting by Cable(TCP/IP protocol)
Data Saving	Text format
	Binary format
Display	Numerical display
	Two dimensional waveform display
Zero Setting	If sensor is working in zero magnetic environment, magnetic shield is recommended.

## 2. Application Domain

- Spacial magnetic field Measurement
- Environmental magnetic field monitoring
- Shielding effect testing
- Magnetic field characteristics identification
- Multidimensional magnetic field description
- Alternating-current magnetic field measurement
- Airborne magnetic inspection
- Remanence detection

## 3. Main Hardware

### 3.1 Data Acquisition Module

- 1) Size: 35mm×76mm×100mm
- 2) Functional Interface: Ethernet interface, USB-B interface, Mini0-USB interface, Magnetic sensor interface
- 3) Light: Power indication, Status indication
- 4) Switch setting: Reset switch



Figure 2. Data Acquisition Module

### 3.2 Magnetic sensor

- 1) Name: Three-Axis Low-Noise Fluxgate Sensor
- 2) Model: HS-MS-FG3LN-100
- 3) Parameters

Measuring range	$\pm 100000\text{nT}$
Bandwidth	DC~1KHz(0.3dB)
Linearity	$\leq 0.01\% \text{ FS}$
Orthogonality	$\leq \pm 0.2^\circ$
Frequency Domain Noise	$\leq 6\text{pT/rms}\sqrt{\text{Hz}}@1\text{Hz}$
Time Domain Noise	$\leq 0.1\text{nT RMS @ 10 times per second}$



Figure 3. Fluxgate Sensor

## 4. Operation

### 4.1 System Connection

- 1) Connect cable joint of fluxgate sensor to the sensor port of data acquisition module.
- 2) Connect internet access ( or LAN port of Router connecting with host computer)of host computer via standard internet cable with Ethernet Interface of data acquisition module.
- 3) Connect portable power supply or regulated power supply with Mini-USB or USB-B port of data acquisition module to supply power for the system.

### 4.2 Testing

- 1) Change the following settings on the router LAN port (if data acquisition module is connected with the same LAN port that host computer is connected to) or the host computer

IP: 192.168.1.17

Gateway: 192.168.1.1

Subnet Mask: 255.255.255.0

- 2) Open host computer software. If power is turned on before the software is opened, reset key needs to be pressed. When power is connected, the power light of data acquisition module should be on.

Wait until data acquisition module connects with host computer automatically. After connecting, data acquisition module starts recording data automatically and the light of data acquisition module should be on. At this time, the number of connected magnetometer should be displayed on the host computer and the notification area at the bottom will display *A client connected*. Afterwards, all notices will be shown in the *notification area*. The magnetic field data is displayed in the manner of X axis, Y axis and Z

axis on the right side of a text box, where M is the module of the magnetic field. The check box on right side of text box is used to confirm if oscillogram of components should be displayed. The scroll-down selection menu is for the selection of different magnetic field strength unit. After connecting successfully, the function of selecting measuring mode will be activated. Users can choose between *Absolute Value Measurement* or *Relative Value Measurement* according to their own condition. When users select *Relative Value Measurement*, the program will save local magnetic field value and display.



Figure 4. Software Interface in Host Computer

### 4.3 Magnetic Field Value Storage

If users need to save the magnetic field value, click **Save To...**

After selecting storage path, choose file type between binary and textfile.

Click **Save**, and the magnetic field data starts being recorded. The *Time* on the upper right shows the duration of data recording.

The **Stop Saving** button will stop the data recording. If the saved file is in txt, the file can be opened with notepad; if the saved file is in binary (dat file), you need to open it with matlab software.





#### 4.4 Calibration of Null Offset

Put sensor in the shield barrel and measure the output of sensor. The value of null offset of sensor should be displayed. Press **Zero Setting** to calibrate. The program will save the null offset value for later use. In addition, if users need to calibrate sensor again, just press **Reset** and repeat the above process.

Note: It takes 30 minutes for sensor to warm up. So for calibration, please press **Zero Setting** 30 minutes after switching on, otherwise it will result in fault.

## 5. Precautions

Users should notice 4 indicating lights of portable power supply, which indicate the remaining power. Always make sure that there is enough power. If low battery is indicated, please charge it.

If users intend to use a different power supply, please contact our after-sale service personnel in advance to ensure normal operation of magnetometer.

## Contact

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