Magnetic Products

SMART DIGITAL MAGNETOMETER IN THE LABORATORY AN-200

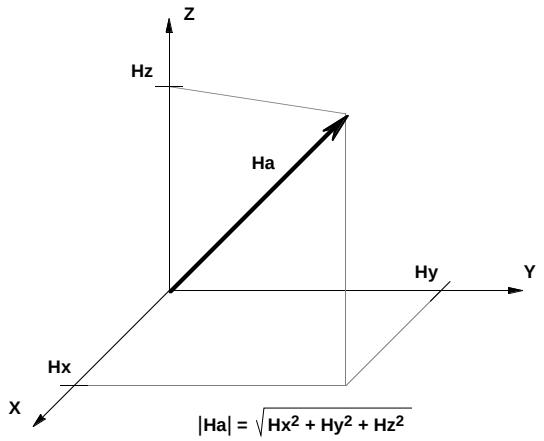
Honeywell's Smart Digital Magnetometer (HMR) has three independent transducers which are oriented to provide x, y, and z axis outputs. The key features of the HMR are:

- Easy to use
  - Complete unit, plug and play
  - Microcontroller based
- Linear and repeatable for precise measurements
- High sensitivity for detection of small magnetic masses
- Offset and gain calibrated for greater accuracy.

The above qualities make the HMR an ideal and effective device for measuring magnetic fields in a laboratory environment.

The HMR series of magnetometers is based on transducers made of NiFe thin films deposited onto a silicon substrate forming a Wheatstone resistor bridge. In the presence of an external magnetic field (Ha), the magnetoresistive characteristics of the Permalloy cause a change in the bridge resistance. The change in output of the transducer is converted to a 16-bit digital value using an internal A/D converter and microprocessor.

The output of the HMR is a digital serial stream of ASCII format or binary data. The data is organized as three 16-bit values representing the x, y, and z components of the magnetic field (see below). These are actually 15-bit signed numbers ranging from ±30,000 that correspond to a ±2 gauss full scale applied field (Ha). Sample rates can be set from 10–154 readings/second.



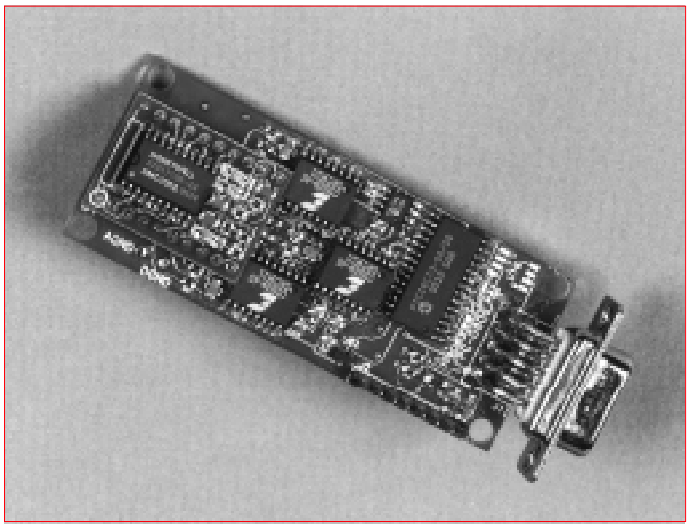
X, Y, Z Components of a Magnetic Field (Ha)

Product Features

The HMR has many features, making it versatile enough for use in both commercial and laboratory environments.

- Measurement range, +2 Gauss with less than 1% error
- Resolution of 70µG/LSB
- Fast response time
- High sensitivity
- Data output serially using the RS-485 or RS-232 standard for serial input to most personal computers.

The device is easy to use and has a user-selectable range of 9600 or 19200 baud.



How To Access Data

Connect the HMR2300 RS232 version to a serial connection port of a computer. Evaluate data using either a terminal emulator program or the software provided with the unit.

Using Terminal Emulator
- Included with most windows applications
- Found under “accessories”

Set-up for Terminal Emulator
- Under settings—choose communications
- Make the following settings:
  - Baud Rate 9600
  - Data Bits 1
  - Flow Control ..... xon/xoff
  - Connector ..... Select one HMR unit to connect

Also check terminal preferences. Use all the standard defaults except select CR>CR/LF inbound and outbound.

The standard settings are: linewrap, local echo, sound, column–80, cursor, block & blink.

Follow the command inputs found in Table 1, page 3 of the HMR2300 data sheet. For a continuous flow of data, use input ddP. (We use 99P.)

Using HMR-Demo Software supplied with the part
- Load HMR–Demo to your hard disk.
- DOS is the preferred software over Windows
- Data can be evaluated using:
  - Plot—see spikes or a 60Hz cycle
  - Compass—notice flickers or subtle changes in overall field
  - Show—same as terminal mode

ORDERING INFORMATION

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Laboratory Applications

The HMR can have a variety of applications in a laboratory environment such as a three-axis gauss meter to simultaneously measure the strength and direction of magnetic fields in the x, y, and z axis.

Uses include:

- Sensing magnetic fields on a small localized area—Magnetic fields acting on a small area can be detected and measured accurately. For example, magnetic fields acting on the center of a silicon wafer-chuck can be measured by this device.
- Measuring low levels of magnetic field noise
- Proximity Detector—The HMR measures field strength and direction. The change in the strength and shape of the magnetic field can be used to approximate the distance from the source of a magnetic field or anomaly.
- Detection of ferromagnetic properties in a substance—The distortion in the three-axis output of the HMR suggests the presence of ferromagnetic material.

Application Idea

Characterize the magnetic field of your laboratory environment over a period of time.

This is done to understand and identify areas of improvement to make the laboratory a magnetically quiet area and to improve the accuracy of magnetic field measurements.

- In software, write a short program (such as HP basic) using polled commands to poll data from the HMR unit (example once/minute).
- Store the data in Excel format.
- Plot versus time.

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