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 magneto resistive 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 $\pm 30,000$ that correspond to a $\pm 2$ gauss full scale applied field (Ha). Sample rates can be set from 10–154 readings/second.

### Product Features

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

- Measurement range, $\pm 2$ Gauss with less than 1% error
- Resolution of $70 \mu$G/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

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.

ORDERING INFORMATION
Customer Service Representative
(612) 954-2888 fax: (612) 954-2582
Email: clr@mn14.ssec.honeywell.com

Honeywell reserves the right to make changes to any products or technology herein to improve reliability, function or design. Honeywell does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights nor the rights of others.