

Magnetic Field Sensor

CI-6520A

Introduction

The Magnetic Field Sensor is used with a PASCO analog interface and data collection software. The sensor can connect directly to an analog channel on these interfaces, or connect through the included DIN plug-to-DIN plug cable if greater range or movement of the sensor is required. An Analog Adapter (PS-2158) can also be used to connect the sensor to a PASPORT interface.

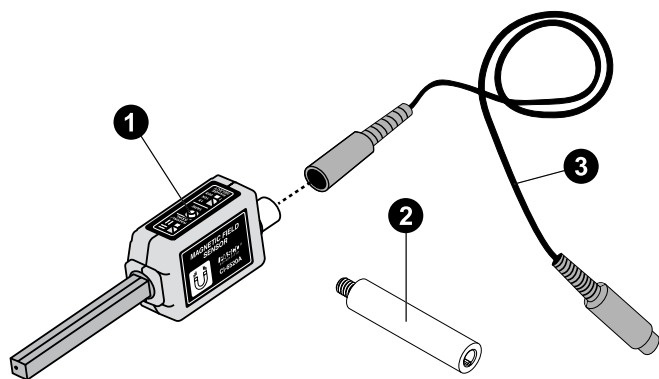
The sensor has three magnetic field ranges, selectable using the RANGE SELECT switch on top of the sensor. These ranges are labeled 1X (with a range of ± 1000 gauss), 10X (± 100 gauss), and 100X (± 10 gauss). These three ranges allow the sensor to be used for measuring small magnetic fields such as Earth's magnetic field, medium strength fields like those created by current-carrying wires, or stronger fields like those around permanent magnets.

The sensor uses Hall Effect devices as sensing elements. There are two of these devices oriented perpendicularly to one another located at the end of the probe. One device is sensitive to *axial* field lines that are parallel to the length of the probe, while the other device is sensitive to *radial* field lines perpendicular to the length of the probe. A small white dot on the probe end indicates the plane of each sensing device. The RADIAL/AXIAL switch on top of the sensor is used to select the orientation of measurement.

NOTE: It is not possible to measure magnetic fields in both directions simultaneously.

Equipment

Included equipment:



- 1 Magnetic Field Sensor
- 2 Sensor mounting stud
- 3 DIN plug cable

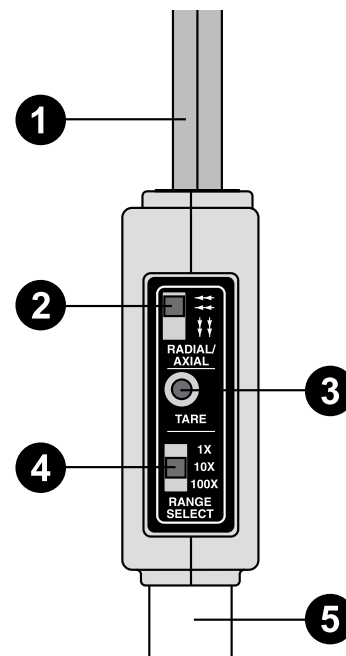
Required equipment:

- PASCO analog interface, such as the 850 Universal Interface (UI-5000) or 550 Universal Interface (UI-5001)
- PASCO Capstone or SPARKvue data collection software

Recommended equipment:

- Zero Gauss Chamber (EM-8652)

Features



- 1 **Probe**
Contains the Hall Effect devices used as sensing elements.
- 2 **RADIAL/AXIAL select switch**
Use to select the orientation in which the sensor measures magnetic field strength.
- 3 **TARE button**
Press to set the current value of the sensor to zero.
- 4 **RANGE SELECT button**
Use to switch between 1X, 10X, and 100X ranges.
- 5 **DIN connector**
Use to connect the sensor to an analog interface.

Get the software

You can use the sensor with SPARKvue or PASCO Capstone software. If you're not sure which to use, visit [pasco.com/products/guides/software-comparison](https://www.pasco.com/products/guides/software-comparison).

SPARKvue is available as a free app for Chromebook, iOS, and Android devices. We offer a free trial of SPARKvue and Capstone for Windows and Mac. To get the software, go to [pasco.com/downloads](https://www.pasco.com/downloads) or search for **SPARKvue** in your device's app store.

If you have installed the software previously, check that you have the latest update:

SPARKvue: Main Menu > Check for Updates

PASCO Capstone: Help > Check for Updates

Set up the software

SPARKvue

Connect the sensor to SPARKvue:

1. Start SPARKvue, then click **Sensor Data**.
2. Connect your chosen analog interface to SPARKvue. For more detailed information on this, see the manual for the interface and the SPARKvue online help.
3. Plug the sensor into an analog port on the interface.
4. In the **Select measurements for templates** column, click the **Properties**  icon next to the name of the analog channel to which the sensor is connected.
5. From the **Assign Analog Adapter** menu, select **Magnetic Field Sensor** and click **OK**.

Set up data collection:

1. On the sensor casing, move the RANGE SELECT switch to the range (1X, 10X, or 100X) you will be using for your experiment. (See **Select range** for more information on range options.)
2. In the **Select measurements for templates** column, check the box next to the **Magnetic Field Strength** measurement that matches the range you selected.
3. In the **Templates** column, click **Graph** to open the Experiment Screen. The Graph display will automatically be set to plot your selected measurement versus time.
4. Click **Start**  to begin collecting data.

PASCO Capstone

Connect the sensor to Capstone:

1. Start Capstone, then select **Hardware Setup** from the **Tools** palette.
2. Connect your chosen analog interface to Capstone. For more detailed information on this, see the manual for the interface and the Capstone online help.
3. Plug the sensor into an analog port on the interface.
4. Locate the diagram of the interface in the **Hardware Setup** tool. Click inside the yellow circle over the analog port to which the sensor is connected, then select **Magnetic Field Sensor** from the list.

Set up data collection:

1. On the sensor casing, move the RANGE SELECT switch to the range (1X, 10X, or 100X) you will be using for your experiment. (See **Select range** for more information on range options.)
2. Double-click the **Graph** icon in the **Displays** palettes to create a Graph display.
3. Click the **<Select Measurement>** box on the y-axis of the graph, then select the **Magnetic Field Strength** measurement matching your selected range from the list. The x-axis will automatically adjust to measure time.
4. Click **Record**  to begin collecting data.

Set up the hardware

Choose RADIAL or AXIAL

When setting up the sensor, move the RADIAL/AXIAL switch to measure either radial (perpendicular to length of probe) field strength or axial (parallel to length of probe) field strength. The axial sensor is located at the tip of the probe, and the radial sensor is on the side of the probe at a point very near the tip. These positions are indicated by the white dots on the probe.

Tare the sensor

The top of the sensor has a TARE button, which allows the output of the sensor to be set to zero. To zero the sensor, hold the sensor away from any magnetic source (other than Earth's magnetic field) and press the TARE button. If you will be using the 100X range to record very small magnetic fields, you may insert the sensor into a Zero Gauss Chamber (EM-8652) before pressing the TARE button to zero the sensor more completely.



NOTE: The sensor should be zeroed after every change of the RADIAL/AXIAL switch.

Achieve thermal equilibrium

The Hall Effect sensing elements used in the sensor are temperature compensated. However, when measuring very small magnetic fields with the 100X range, some temperature dependent variation (on the order of a few gauss) may appear in the sensor output. For best results with the 100X range, connect the sensor to the interface for five to fifteen minutes before you begin collecting data. This will allow the sensing elements to come to thermal equilibrium, giving you more stable results.

Select range

The sensor's three selectable ranges are 1X, 10X, and 100X. When measuring data, the software should always be set so that the displayed measurement matches the range to which the RANGE SELECT switch is set.

The following table compares the measurement range and resolution (in gauss) of the three settings, as well as some sample uses for each setting.

	Range	Resolution	Use to measure...
1X	±1000 G	0.5 G	Fields around strong permanent magnets
10X	±100 G	0.05 G	Fields around current-carrying solenoids or Helmholtz coils
100X	±10 G	0.05 G	Variations in Earth's magnetic field Small fields around power cords

Mount the sensor

The included sensor mounting stud can be screwed into the 1/4-20 threaded hole located on the bottom of the sensor, as shown below in Figure 1. Use the stud to mount the sensor to a support rod or other similar apparatus. Make sure to note the relative positions of the axial and radial sensing elements when mounting the sensor in a specific orientation.

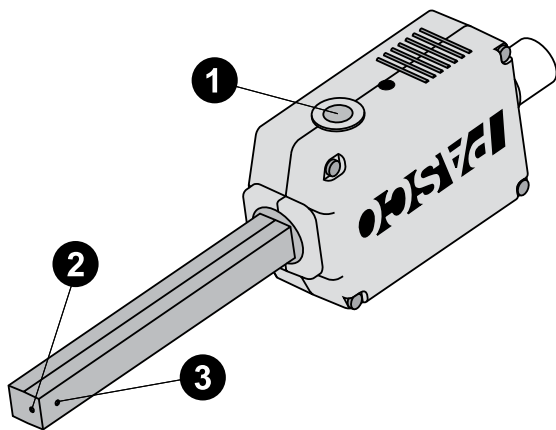


Figure 1. ①: 1/4-20 threaded hole. ②: Axial sensing element. ③: Radial sensing element.

Software help

The SPARKvue and PASCO Capstone Help provide information on how to use this product with the software. You can access the help within the software or online.

SPARKvue

Software: Main Menu > Help

Online: help.pasco.com/sparkvue

PASCO Capstone

Software: Help > PASCO Capstone Help

Online: help.pasco.com/capstone

Specifications and accessories

Visit the product page at pasco.com/product/CI-6520A to view the specifications and explore accessories. You can also download support documents from the product page.

Technical support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

Web	pasco.com/support
Chat	pasco.com
Email	support@pasco.com
Phone	1-800-772-8700 x1004 (USA) +1 916 462 8384 (outside USA)

Limited warranty

For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

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Product end-of-life disposal



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CE statement

This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.