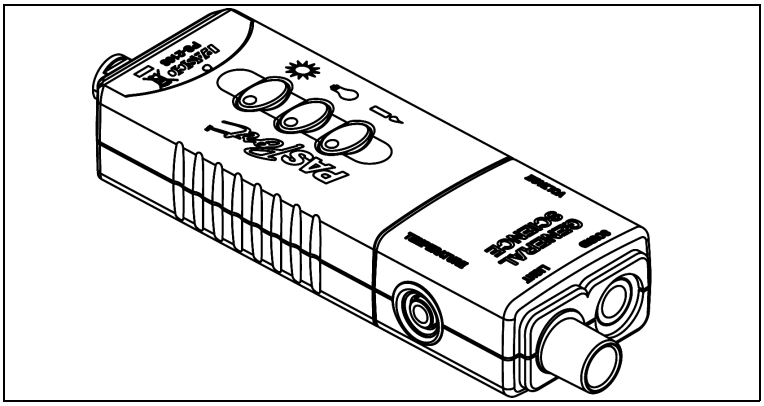
General Science MultiMeasure Sensor

PS-2168

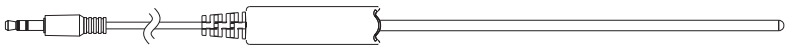


Included Equipment	Part Number
General Science MultiMeasure Sensor	PS-2168
Stainless Steel Temperature Probe	PS-2153 (not shown)
Voltage Probe	PS-2165 (not shown)
Required Equipment	
PASCO Interface PASCO Data Collection Software	See PASCO catalog or www.pasco.com
Optional Equipment	
Fast-response Temperature Probe	PS-2135 (3-pack)
Skin/surface Temperature Probe	PS-2131

Introduction

The PS-2168 General Science MultiMeasure Sensor combines four sensors in a single unit:

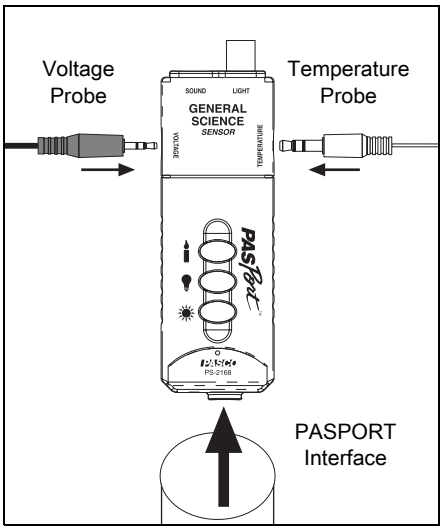
- Temperature
- Light
- Sound Level
- Voltage



Temperature Probe

Voltage Probe

When connected to a PASPORT interface, the multi-sensor collects data at up to 200 samples per second from each component sensor. You can use just one component sensor at a time or any combination simultaneously. If you have a PASPORT interface that supports multiple sensors, or if you have more than one interface connected to your computer, you can use the General Science MultiMeasure Sensor in combination with other PASPORT sensors.



Sensor Setup

Connect the multi-sensor to your PASPORT interface. Connect the included temperature and voltage probes to the ports on the sides of the multi-sensor. (You can leave any of the probes disconnected if you do not plan to use it.)

See the following pages for detailed information about each of the multi-sensor sensor's component sensors.

Software Help

See the SPARKvue Help or PASCO Capstone Help for information about collecting, displaying, and analyzing data.

- In SPARKvue, select the **HELP** button (?) in any screen including the Home Screen.
- In PASCO Capstone, select **PASCO Capstone Help** from the **Help** menu, or press **F1**.

Hardware Setup

Plug the General Science MultiMeasure Sensor into a PASPORT input ports on the PASCO Interface and turn on the device. The General Science MultiMeasure Sensor always collects sound-level, light, and voltage data, but collects temperature data only if a temperature probe is connected. The default sampling rate is 2 Hz. You can adjust the sampling rate in the data collection software.

SPARKvue

Collect Data

- In the SPARKvue **Home Screen**, select a measurement from the list under the sensor's name. A graph of the measurement versus time opens.
- In SPARKvue, select the **Start** button (▶) to begin collecting data.

PASCO Capstone

Collect Data

- In PASCO Capstone, select a display in the main window or from the **Display** palette. In the display, use the **<Select Measurement>** menu to pick a measurement to be shown.
- Select **Record** to begin collecting data.

If you have questions about using the data collection hardware or software, check the Online Help or contact Technical Support.

Temperature

Use this component of the multi-sensor to measure the temperature of a fluid or object. The measurement can be displayed in units of °C, °F, or K. You can use the included stainless steel probe or a different probe, such as the Fast-response Probe (PS-2135) or Skin/Surface Probe (PS-2131). PASCO physics apparatus containing an embedded 10 kΩ thermistor can also be connected to the multi-sensor. The multi-sensor automatically detects the presence of a temperature probe, and will only collect temperature data if a probe is connected.

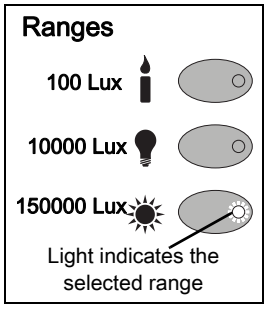
To measure temperature, immerse the tip of the probe in a fluid or place it in contact with an object. The included probe is suitable for temperatures between −35 °C and +135 °C. It can be used in both dry conditions and in liquids, such as water and other mild chemicals and solutions.

- Tip: Keep the connector of the probe and the body of the multi-sensor away from liquids.

The temperature measurement can be calibrated; however, for most applications calibration is not necessary. For instructions on calibrating, see the software Online Help. For instructions on calibrating on the Xplorer GLX, refer to the Xplorer GLX Users' Guide.

Light

The light component of the multi-sensor measures light intensity, or the power per unit area of light incident on the light-sensitive element. The element is located behind the black cylinder protruding from the multi-sensor. Though it measures light intensity, the sensor's output is calibrated to indicate illuminance in units of lux.



Point the sensor in the direction of a light source and start data collection. The light sensor has three ranges, which you select using the three buttons on the multi-sensor. To select a range, push one of the buttons: for 0 lux to 100 lux, for 0 lux to 10000 lux, or for 0 to 150000 lux. Lights on the buttons indicate which range is selected. To determine which range is appropriate, look at the data (on a Graph display, for instance) while it is being collected; if the measurement appears to be "railed" at the top of the selected range (100 lux or 10000 lux), select the next higher range. You can push a button to change the range without stopping data collection.

- Tip: If you anticipate that the measured value will increase during your experiment, select a higher range.

- Tip: Fluorescent lights flicker at a high rate (100 Hz or 120 Hz), which causes aliasing, or the illusion of a lower-frequency periodic signal, in data collected at relatively low sampling rates. For this reason, it is recommended that the General Science MultiMeasure Sensor be used to measure light from incandescent bulbs and natural light sources. To measure high-frequency light sources, use the PS-2106 Light Sensor, with a maximum sampling rate of 1000 Hz.

Sound Level

The sound component sensor measures sound level on the dbA weighting scale. This weighting scale is designed to match the frequency response of the human ear and is commonly used to measure environmental sound levels. The table (right) shows some typical sound levels.

Source	Sound Level (dBA)
Rustling leaves	20
Library	40
Normal conversation	60
Noisy office	80
Subway train	100
Rock concert	120

Voltage

Use the voltage component of the multi-sensor to measure electric potential difference between the terminals of a battery or power supply, or two points on a circuit. The voltage probe has two connectors: red and black. The sensor measures the voltage of the red connector in reference to the black connector. Its range is ±24 V.

Specifications

General	
Component Sensors	Temperature, Light, Sound Level, Voltage
Max. Sampling Rate	200 samples per second (for each component sensor)
Default Sampling Rate	2 samples per second
Temperature	
Range	−35 °C to +135 °C
Accuracy	±0.5 °C
Resolution	0.01 °C or better
Sensing Element	10 kΩ thermistor located in probe tip
Light	
Output	calibrated to indicate illuminance three user-selectable ranges: 100 lux, 10000 lux, 150000 lux
Spectral Response	320 nm to 1100 nm

Sound Level		Voltage	
Range	50 dbA to 100 dbA	**Range**	−24 V to + 24 V
Accuracy	±4 dBA	**Accuracy**	± 0.1 V
Resolution	0.1 dBA	**Resolution**	± 0.001 V
Repeatability	0.5 dBA	**Voltage Protection**	up to 240 V
		Input Resistance	1 MΩ

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100

Phone: +1 916-786-3800 (worldwide)
800-772-8700 (U.S.)

Web: www.pasco.com

Email: support@pasco.com

For the latest version of the instruction manual, see the website at

www.pasco.com/manuals

Limited Warranty
For a description of the product warranty, see the PASCO catalog or the PASCO website at www.pasco.com/legal.

Product End of Life Disposal Instructions:
This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle/disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (to the right) and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.