**PASPort®**

# Sound Level Sensor

## PS-2109



Sound Level Sensor

Connector

Range Selection Buttons

Microphone

1/4-20 threaded hole

Sensor Mounting Stud

.
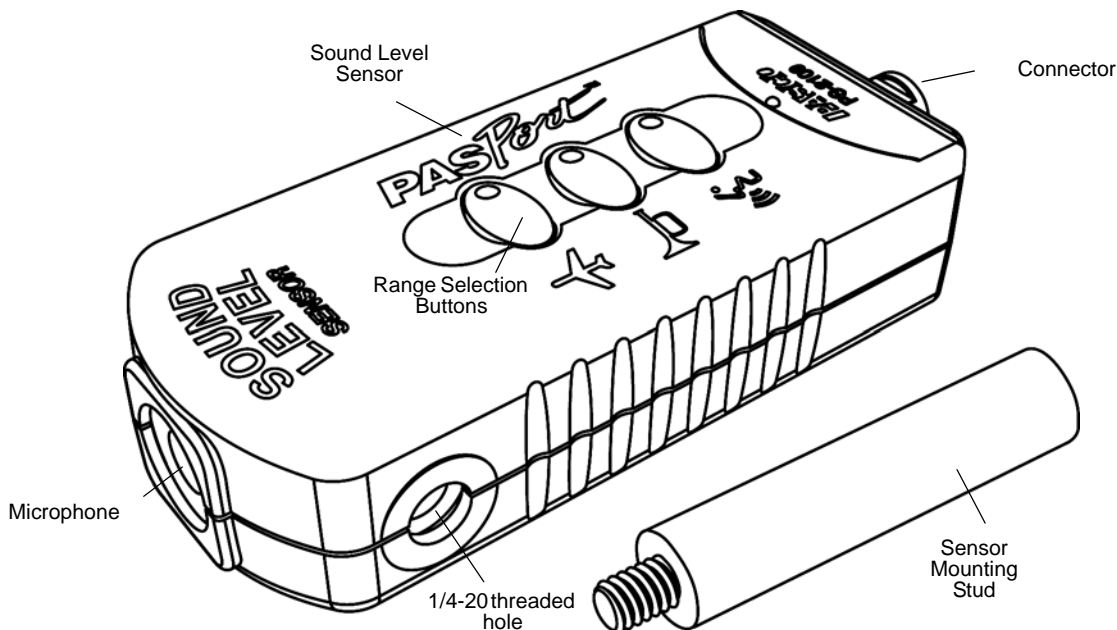
| Included Items |
| --- |
| Sound Level Sensor |
| Sensor Mounting Stud (CI-9874, four pack) |

| Required Items* |
| --- |
| PASCO Interface |
| PASCO Data Acquisition Software |

*See the PASCO catalog or the PASCO web site at www.pasco.com for more information.*

| Other Item* |
| --- |
| PASPORT Sensor Extension Cable PS-2500 |

## Introduction

The PS-2109 Sound Level Sensor measures both sound level in decibels and sound intensity in microwatts per square meter. The sensor measures sound level in both the dBA weighting scale (matching the sensitivity of the ear) and the dBC weighting scale (equal response to all frequencies). The sensor has three selectable sound level ranges. The sensor is designed to measure sound levels of sources within 10 feet (3.04 m).

The sensor includes a Sensor Mounting Stud that can serve as a handle or mounting rod when it is screwed into the 1/4-20 threaded hole on the side of the sensor box. The non-threaded end of the stud fits on the shaft of a PASCO Rotary Motion Sensor.

The sensor is designed to work with a PASPORT-compatible interface (such as the UI-5100 850 Universal Interface) and PASCO data acquisition software (such as PASCO Capstone or SPARKvue) to measure sound level and sound intensity.

## Sensor Setup

- Plug the sensor into a PASPORT input port of a PASCO interface.

NOTE: If more distance is needed between the sensor and the interface, plug the sensor into a Sensor Extension Cable (PS-2500), and then plug the cable into the interface.

Interface

PASPORT
Input Port

Sensor
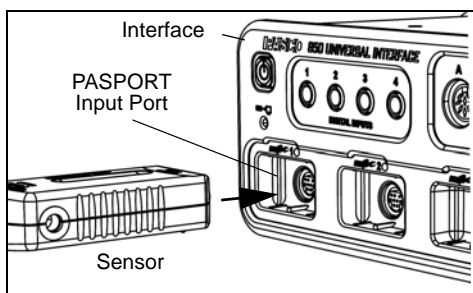
- Start the PASCO data acquisition software. Set up a data display in the software.

## Using PASCO Capstone Software

- Click the "Data Summary" icon in the Tools palette to open the "Data Summary" panel. Click the "Visibility" icon to see the list of measurements that are visible by default.



Visibility icon
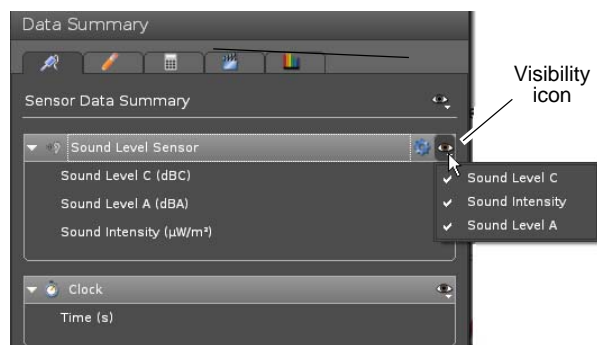
- Click one of the display templates in the Capstone workbook page, or double-click an icon in the "Displays" palette to select a specific data display.

## Using SPARKvue Software

- Connect the sensor to a SPARK Science device and start the software. In SPARKvue, the sensor parameter screen opens and shows the list of measurements for the sensor.

- In the sensor parameter screen, touch a measurement to highlight it, and then touch 'Show' to open a graph display.



Touch a measurement

Touch "Show"
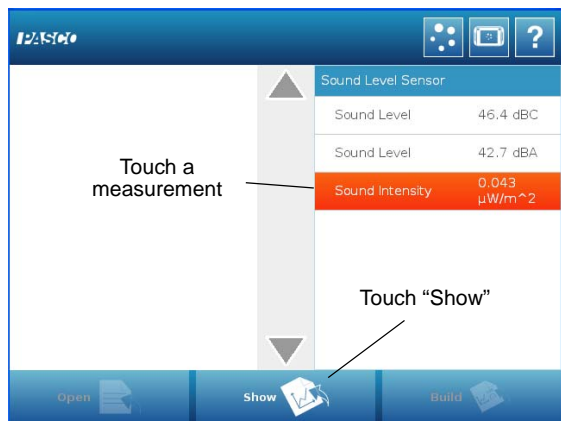
## Using Xplorer GLX Datalogger

- When you connect the sensor to the Xplorer GLX Datalogger, a Digits display of Sound Level (dBC) and Sound Intensity automatically opens.
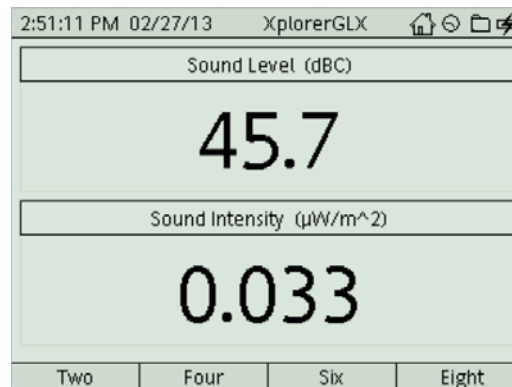


## Select the Range

Press one of the buttons (Voice, Horn, Plane) on the top of the sensor to select the Sound Level and Sound Intensity Range. A green light emitting diode (LED) in the button will illuminate.

## Record Data

- Click "Record", touch 'Start', or press the 'Record' button to begin recording data.

# Specifications

| Item | Value |
|---|---|
| Sound Level Range: (dBC and dBA) | Voice: 30 to 70 decibels<br>Horn: 50 to 90 decibels<br>Plane: 70 to 110 decibels |
| Sound Intensity Range: | Voice: 0.001 to 10 $\mu$W/m$^2$<br>Horn: 1 to 1000 $\mu$W/m$^2$<br>Plane: 10 to 10,000 $\mu$W/m$^2$ |
| Accuracy: | ±2 dB at 94 dB (or dBC) at 1 kHz |
| Resolution: | 0.1 dB |
| Repeatability: | 0.1 dB |

## Sound Scales

**Sound Level dBC**: The dBC weighting scale corresponds to the total sound level generated by a diffracted sound emission, such s from machinery, a motor, or a plane at take off. The dBC displays a wider frequency spectrum than the dBA weighting scale because, unlike the dBA scale, the noise is not filtered.

**Sound Level dBA**: The dBA weighting scale filters some of the sound frequencies from a sound source to more closely match the frequency response of the human ear. The dBA scale is commonly used in the workplace to determine the sound level and employee will experience in typical working conditions.

PASCO®

**Sound Intensity** ($\mu$**W/m$^2$**): The sound intensity measurement is calculated from the dBC measurement of sound level.

## Common Sound Levels and Sound Intensities

| Sound Source | Sound Level (dB) | Sound Intensity ($\mu$W/m$^2$) |
|---|---|---|
| Rustling leaves | 20 | $10^{-4}$ |
| Library | 40 | $10^{-2}$ |
| Conversation | 60 | 1 |
| Noisy office | 80 | $10^2$ |
| Subway train | 100 | $10^4$ |
| Rock concert | 120 | $10^6$ |

## Suggested Activity

Use the Sound Level Sensor, a speaker, and a function generator to record sound level and sound intensity from the speaker.

• Connect the speaker to the function generator and set the speaker to a relatively low volume sine wave at 440 Hz.

• Place the sensor about 0.2 m from the speaker and start recording data. After a few moments, stop recording data.

• Increase the volume and repeat the process. Make measurements for five different volumes.

• Plot sound level versus sound intensity.

What relationship is there between sound level and sound intensity?

## More Information

For the latest information about the Sound Level Sensor, visit the PASCO web site at www.pasco.com and enter "PS-2109" in the Search window.

# 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.)

E-mail:  support@pasco.com

Web  www.pasco.com

**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.