High Sensitivity Light Sensor
PS-2176

Introduction

The PASCO High Sensitivity Light Sensor has a high resolution and wide range, allowing it to measure visible light intensity in a variety of applications. The table below gives examples of experiments that can be done using the three range settings.

<table>
<thead>
<tr>
<th>Range</th>
<th>Typical Experiment</th>
<th>Recommended Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1000</td>
<td>Inverse Square Law: Measure light intensity as a function of distance.</td>
<td>Flash light, Meter stick</td>
</tr>
<tr>
<td>0 to 100</td>
<td>Diffraction and Interference: Measure the intensity of a diffraction pattern formed by a diode laser and a single or double slit.</td>
<td>Diffraction Optics Kit OS-8531, Optics Bench (120 cm) OS-8508, Linear Translator OS-8535, Aperture Bracket OS-8534, Rotary Motion Sensor PS-2120</td>
</tr>
<tr>
<td>0 to 1</td>
<td>Spectrophotometry: Analyze the Balmer series in the emission spectrum of hydrogen.</td>
<td>Educational Spectrophotometer Kit OS-8537, Optics Bench (60 cm) OS-8541, Aperture Bracket OS-8534, Rotary Motion Sensor PS-2120, Spectral Tube Power Supply SE-9460, Hydrogen Spectral Tube SE-9461</td>
</tr>
</tbody>
</table>

The range buttons are marked with their approximate lux ranges; however, the sensor does not measure illuminance in lux because it does not have a filter.

Quick Start

1. Connect the sensor to your PASPORT interface.
2. If you are using a computer, connect the PASPORT interface to it and start DataStudio.
3. Press a button on the sensor to select a range.
4. Press or click the start button (on the interface or in DataStudio) to begin recording data.
Set-up

Connect Sensor to Interface

Plug the sensor into any port of you PASPORT interface, either directly or using the included extension cable. The interface or software detects the sensor and automatically prepares itself for data collection.

Select a Range

Press one of the range buttons on the sensor. The button of the selected range is illuminated. Select a lower range to measure lower light levels with higher resolution. Select a higher range to measure brighter light.

Sensor Positioning and Mounting

- Point the aperture of the sensor at the source to be measured.

  ![Figure 1: Aperture](image)

- Attach the included Sensor Handle or other 1/4-20 thread screw to the mounting hole.

  ![Figure 2: Sensor Handle](image)

- To use the sensor with a Basic Optics bench or Educational Spectrometer (OS-8537), mount it on an Aperture Bracket (OS-8534).

About the measurements

Measurements and Units

The sensor make two measurements: Light Intensity and Relative Intensity.

The Light Intensity measurement is the percentage of full scale, where 100% represents the maximum measurement possible at the selected range. Thus, a reading of 50% taken at the medium-range setting is equal to a reading of 0.5% at the high-range setting.

The Relative Intensity measurement is scaled according to the range setting; a reading of 50 at the medium-range setting would also be 50 at the high-range setting. The Relative Intensity ranges are 0–1, 0–100, and 0–10000.

Resolution

The resolution of the measurement depends on two factors: the selected range and the sampling rate.

The resolution of each range setting is 100 times better than the next higher setting. For the highest resolution, use the lowest range.

The sensor uses different amounts of oversampling at different sample rates. Oversampling reduces noise, produces smoother data, and improves the resolution. To increase oversampling, set the sample rate lower. Maximum oversampling occurs at a sample rate of 1 Hz or slower.

To Select a Measurement

The default measurement is Light Intensity (percentage of maximum for the selected range). To use the Relative Intensity measurement, do one of the following:

DataStudio

1. Click Setup to open the Experiment Setup window.

2. Select the Relative Intensity check box.

GLX (Standalone Mode)

1. In the Graph screen (or any other display screen), press twice to open a data source menu.

2. Select More to expand the menu

3. Select Relative Intensity.
Spectral Response

The sensor's Si PIN photodiode is responsive across a spectrum ranging from 320 nm to 1100 nm. The response curve is shown in Figure 3.

![Figure 3: Spectral Response](image)

Specifications

<table>
<thead>
<tr>
<th>Sensing Element</th>
<th>Si PIN photodiode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral Response</td>
<td>320 nm to 1100 nm</td>
</tr>
<tr>
<td>Gain Levels</td>
<td>10000×, 100×, and 1×; switch selectable</td>
</tr>
<tr>
<td>Approximate Lux Ranges</td>
<td>0 to 1, 0 to 100, 0 to 10000</td>
</tr>
<tr>
<td>Maximum Sample Rate</td>
<td>1000 Hz</td>
</tr>
<tr>
<td>Resolution (relative intensity units)</td>
<td>±0.01 at 1000 Hz on 0 to 100 scale</td>
</tr>
<tr>
<td></td>
<td>±0.0005 at 5 Hz on 0 to 100 scale</td>
</tr>
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</table>

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
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Fax: (916) 786-7565

Web: www.pasco.com

Email: support@pasco.com

Limited Warranty For a description of the product warranty, see the PASCO catalog.

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