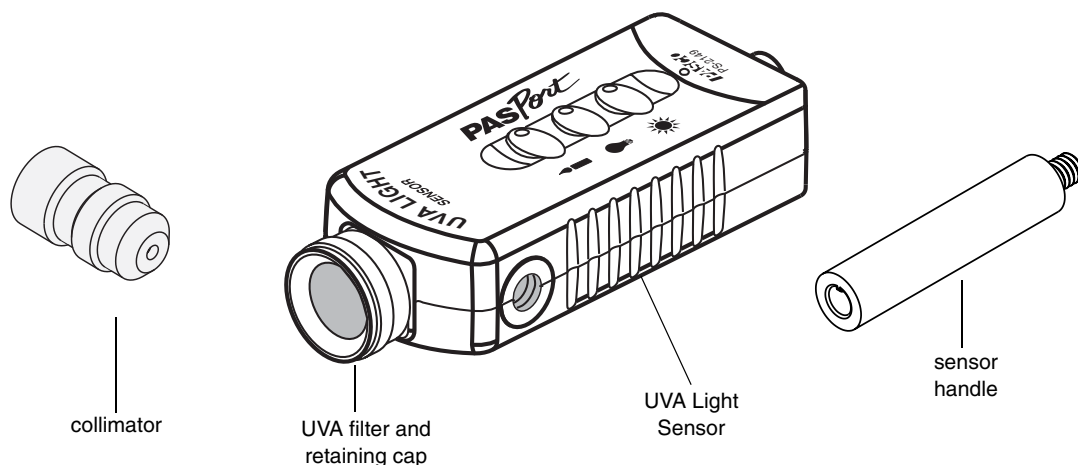


UVA Light Sensor

Model PS-2149



Equipment Included	Replacement Part
UVA Light Sensor	(Contact Tech Support)
UVA Filter and retaining cap	(Contact Tech Support)
Collimator	(Contact Tech Support)
Sensor Handle	CI-9874 (4-pack)

Additional Equipment Required	Model Number
PASPORT interface	(See PASCO catalog)
DataStudio version 1.9 or higher	(See PASCO catalog)

Optional Accessories	Model Number
UVA Light Sensor Accessory Kit	CI-9792
365nm Filter Accessory	CI-9841
PASPORT Extension Cable	PS-2500

Introduction

The PASCO PS-2149 UVA Light Sensor is designed for use with a PASCO PASPORT interface to make measurements of relative electromagnetic radiation intensity in the UVA band.

The sensing element of the UVA Light Sensor is a fairly broad-band Si photodiode. It is sensitive to electromagnetic energy ranging from visible light to above the UVA band. Since the radiation typically measured by the sensor is in the UVA band, the sensor is furnished with a UVA filter (UG-1 glass) that blocks light in the visible spectrum. You can remove the filter to make broader band measurements.

The Ultraviolet (UV) radiation band extends from very short wavelengths of 100 nm, just below the x-ray band, to 400 nm, which is just above visible violet light. This can be observed in the table below.

← Ultraviolet Band ($\lambda = 100\text{--}400\text{ nm}$) →			
vacuum UV	UVC	UVB	UVA
100–200 nm	200–280 nm	280–315 nm	315–400 nm
far UV			near UV

The UV band is divided into four smaller bands according to the nature of the radiation. The shortest wavelengths are designated as the vacuum UV band ($\lambda = 100\text{--}200\text{ nm}$), so called because energy in this band can only be studied in a vacuum. Oxygen and other gas molecules in air absorb radiation in the vacuum UV band.

The UVC band ranges from 200–280 nm. Essentially all UVC radiation from the sun is absorbed or scattered by ozone in the earth's upper atmosphere and does not reach the surface.

UVB radiation ($\lambda = 280\text{--}315\text{ nm}$) from the sun is also absorbed or scattered by the upper atmosphere but under some conditions it can reach the surface of the earth.

Vacuum UV, UVC and UVB radiation have harmful, high-energy photons and can initiate chemical processes including changes in biological tissue called photo-biological reactions. Reaction-causing UV is also called actinic ultraviolet. It is characterized by photon energies above about 4 electron volts (eV). To compute the photon energy in eV from the wavelength in nanometers (nm), use this formula:

$$E = \frac{1240 \text{ eV} \cdot \text{nm}}{\lambda}$$

For example radiation with a wavelength of 315 nm has a photon energy of

$$E = \frac{1240 \text{ eV} \cdot \text{nm}}{315 \text{ nm}} \approx 3.9 \text{ eV}.$$

UVA is the least hazardous ultraviolet radiation. Its band extends from 315–400 nm.

It is worth noting that ordinary glass cuts off UV radiation with wavelengths of less than about 300 nm. Thus UVA and some UVB can pass through glass.

A UV light source is required to perform certain experiments and demonstrations with the UVA Light Sensor. The use of a source that radiates only in the UVA band is recommended because it is the least hazardous UV radiation. A small fluorescent “black” light makes a suitable UVA source.

Other sources of UVA radiation are:

- the sun (best on clear days - but some UV when overcast)
- sun lamps for tanning
- halogen lamps which are not “UV-protected”
- fluorescent lamps

Operation

Setting up the Sensor

Connect the UVA Light Sensor to the PASPORT interface. If you will use a computer, connect the PASPORT interface to the computer and launch DataStudio.

Selecting the Gain Setting

The sensor has three gain settings depicted by Candle, Lamp and Sun symbols. These symbols correspond to three ranges, which cover over 7 orders of relative magnitude. The ranges, in relative units, and the approximate maximum (without filter) for each range are:

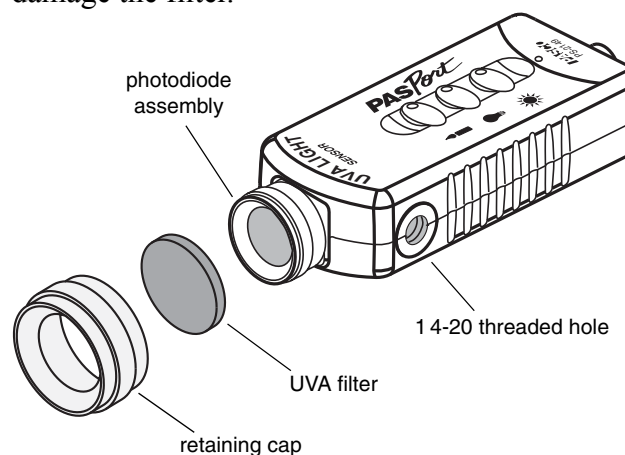
	Range	Approx. Max.
Candle	0–1	70 mW/m ²
Lamp	0–100	7 W/m ²
Sun	0–10 000	700 W/m ²

The ranges are scaled so that a reading of 50 in the Lamp range will also be read as 50 in the Sun range. To ensure the maximum resolution, select

the range that will cover the expected measurements without topping out.

Using the Filter With Retaining Cap

The UVA Light Sensor is shipped with the filter installed in the retaining cap. When the filter is removed from the retaining cap, the sensor can detect light in a wider range of wavelengths. To remove the filter, unscrew the retaining cap from the photodiode assembly. Be careful not to damage the filter.



Using the Filter With the Collimator

With the collimator installed, the sensor detects light only from sources in a narrow angle. Remove the retaining cap and replace it with the collimator.

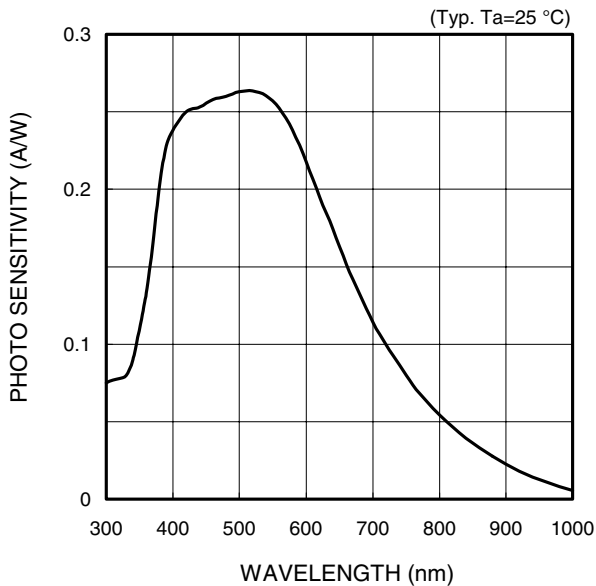
The filter is designed for use under conditions where there is not a significant amount of infrared radiation present; for instance, as part of a spectrometer. If it is necessary to filter out IR radiation, use the 365nm Filter Accessory (CI-9841).

Mounting on an Experimental Apparatus

The sensor handle screws into the 1/4-20 threaded hole on the bottom of the sensor enclosure. You can use the sensor handle or any 1/4-20 screw to secure the sensor to an experimental apparatus.

Specifications

sensing element	Si photodiode
filter	Schott UG-1 glass
spectral response	315–400 nm with UVA filter
gain levels	1x, 100x, 10 000x



Spectral Response of Sensor (without filter)

Technical Support

For assistance with any PASCO product, contact PASCO at:

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

Phone: (916) 786-3800
(800) 772-8700

Fax: (916) 786-3292

Web: www.pasco.com

Email: techsupp@pasco.com

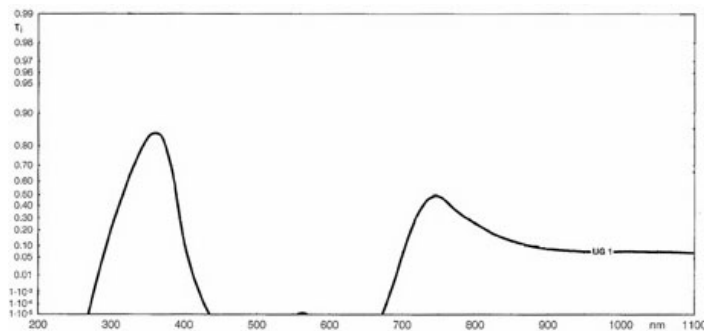
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Limited Warranty

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



UG-1 Filter Transmittance