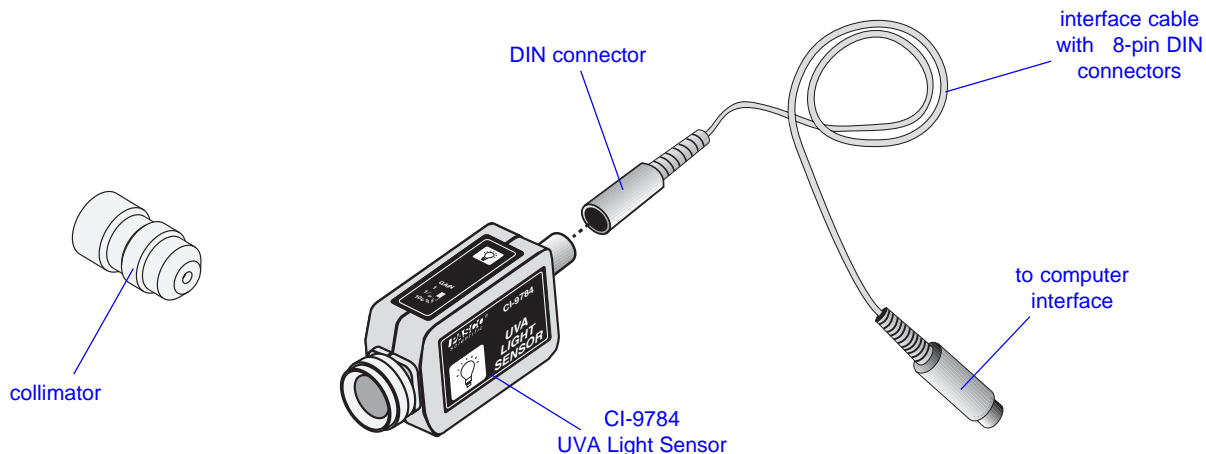


**Instruction Sheet
for the PASCO
Model CI-9784**

UVA LIGHT SENSOR



Introduction

The PASCO CI-9784 UVA Light Sensor is designed to be used with a PASCO computer interface to make measurements of relative intensity of electromagnetic radiation in the UVA band.

The UVA Light Sensor uses a fairly broad band Si Photodiode for a sensing element. It is sensitive to electromagnetic energy ranging from visible light to above the UVA band. Since the radiation to be measured by this sensor is the UVA band, the sensor is furnished with a UVA filter. This filter can be removed if broader band measurements are to be made.

The Ultraviolet (UV) radiation band in the electromagnetic spectrum extends from very short wavelengths of 100 nm, just below the X-ray band, to 400 nm, which is just above violet light in the visible region of the spectrum. This can be observed in Table 1.

Table 1
Ultraviolet Spectrum

← Ultraviolet Band ($\lambda = 100 - 400\text{nm}$) →			
vacuum UV	UVC	UVB	UVA
100-200nm	200-280nm	280-315nm	315-400nm
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. This is because oxygen and other gas molecules in air absorb radiation in this 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 can reach the surface of the earth.

Vacuum UV, UVC and UVB radiation has harmful, high photon energies and can initiate chemical processes including changes in biological tissue called photo-biological reactions.

Reaction-causing UV is also called actinic ultraviolet. It is characterised by photon energies above about 4 electron volts (eV). To compute the photon energy in eV from the wavelength in nanometers (nm) the following formula can be used:

$$E(eV) = \frac{1240}{\lambda(nm)}$$

For example 315 nm radiation has a photon energy:

$$E = \frac{1240}{315} \approx 3.9 eV$$

UVA is the least hazardous ultraviolet radiation and its band extends from 315-400 nm.

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

In addition to the CI-9784 UVA Light Sensor, an appropriate UV light source is required in order to perform some experiments and demonstrations. The use of a source which radiates in the UVA band is recommended because it is the least hazardous UV radiation to work with. A small fluorescent “black” light makes a suitable UVA source.

Other good 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

Equipment

INCLUDED

- UVA Light Sensor
- UVA filter and retaining cap
- collimator
- 6-foot cable with 8-pin DIN connectors

ADDITIONAL REQUIRED

- computer (PC or Macintosh)
- *Science Workshop*® computer interface
- *Science Workshop*® software version 2.2 or higher

ADDITIONAL RECOMMENDED

- UVA Light Sensor Accessory Kit (PASCO part no. CI-9792)
- 365nm Filter Accessory (PASCO part no. CI-9841)

Operation

Setting up the Equipment

Connect the UVA Light Sensor unit to analog channel A, B, or C of the *Science Workshop* computer interface box using the cable with the DIN connectors (Figure 1). Alternatively, the unit can be plugged directly into the analog channel jack.

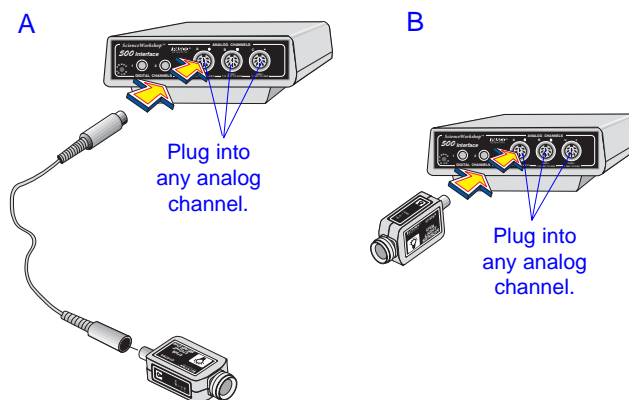


Figure 1
Connecting the Light Sensor and the computer interface
Using the Filter With Retaining Cap

The UVA Light Sensor is shipped with the filter installed in the retaining cap. When the filter is removed from the retaining cap, light from a wider source can be detected. Simply unscrew the retaining cap from the photodiode assembly as needed to remove the filter. See Figure 2. Be careful not to damage the filter.

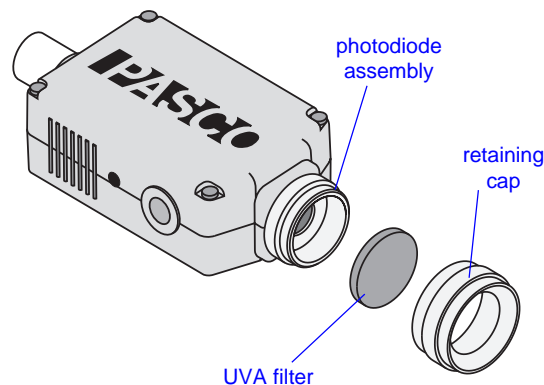


Figure 2
Assembly of the Filter and Retaining Cap

Using the Filter With the Collimator

Light sources from a much more directed area can be detected using the filter with the included collimator. See Figure 3.

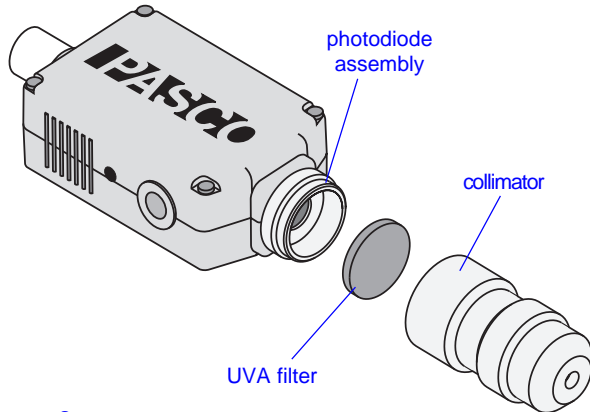


Figure 3
Assembly of the Filter and Collimator

Adjusting the Gain Setting for Varying Light Conditions

Select the appropriate gain setting on the sensor box for the light levels to be measured (Figure 4). The correct gain setting is the one for which the intensity levels on the display vary appropriately for measuring the relative light intensity changes in your experiment.

Adjust the gain
for the light
conditions.

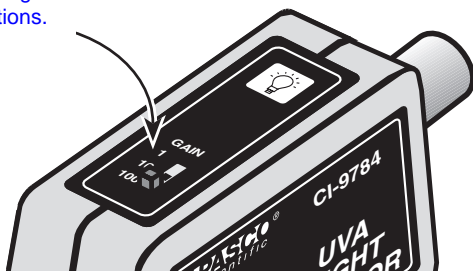


Figure 4
Setting the gain on the Light Sensor

Mounting on an Experimental Apparatus

Use the 1/4-20 threaded connector located on the bottom of the sensor box to secure the Pressure Sensor to an experimental apparatus (Figure 5). The alignment hole fits over an alignment pin included on some PASCO apparatuses.

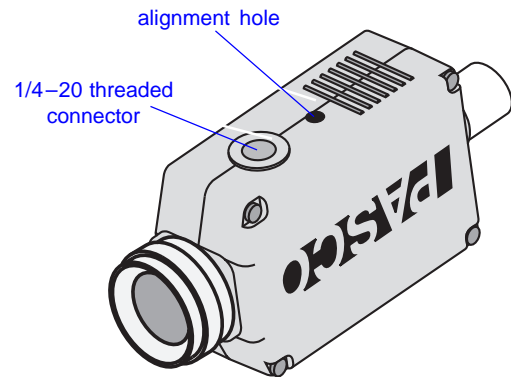


Figure 5
Mounting connector and alignment hole

CI-9784 Specifications

sensing element: photodiode

spectral response: 315 - 400nm with UVA filter

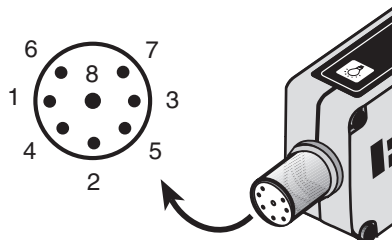
gain levels: 100X, 10X, and 1X, switch selectable

output voltage: 10V maximum

pin configuration: 8-pin Din

8-pin DIN Connector Specifications

- 1: analog output (+), -10 to +10 V
- 2: analog output (-), signal ground
- 3: (no connection)
- 4: + 5 V DC power
- 5: power ground
- 6: +12 VDC power
- 7: -12 VDC power
- 8: (no connection)



Limited Warranty

PASCO scientific warrants the product to be free from defects in materials and workmanship for a period of one year from the date of shipment to the customer. PASCO will repair or replace, at its option, any part of the product which is deemed to be defective in material or workmanship. The warranty does not cover damage to the product caused by abuse or improper use. Determination of whether a product failure is the result of a manufacturing defect or improper use by the customer shall be made solely by PASCO scientific. Responsibility for the return of equipment for warranty repair belongs to the customer. Equipment must be properly packed to prevent damage and shipped postage or freight prepaid. (Damage caused by improper packing of the equipment for return shipment will not be covered by the warranty.) Shipping costs for returning the equipment after repair will be paid by PASCO scientific.

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

Phone: (916) 786-3800
 FAX: (916) 786-8905
 email: techsupp@pasco.com
 web: www.pasco.com