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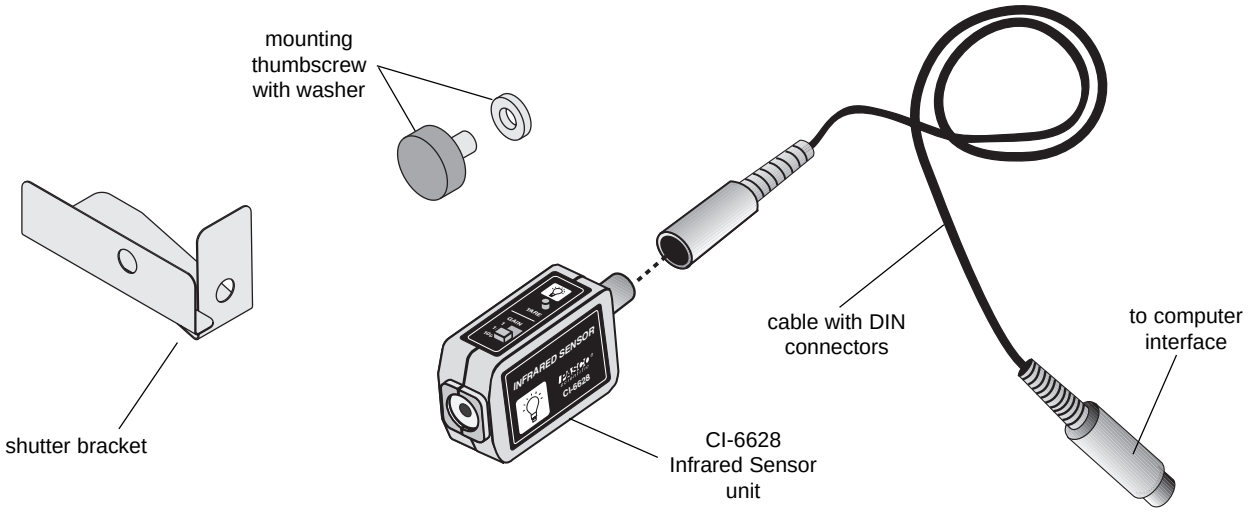
Instruction Sheet for the PASCO Model CI-6628

INFRARED SENSOR



Introduction

The sensing element used in the PASCO CI-6628 Infrared Sensor is a thermopile. Thermopile detectors are voltage-generating devices that can be thought of as a miniature array of thermocouples. The thermopile is a high output, thin film, silicon based device which has 48 thermopile junctions. The active or 'Hot' junctions are blackened to efficiently absorb radiation. The reference or 'Cold' junctions are maintained at the ambient temperature of the detector

The blackening material used on the 'Hot' junctions is capable of absorbing radiant energy from ultra violet to the far infrared. In order to limit the spectral sensitivity, optical filters and windows may be placed in front of the detector. The window installed in the detector is a ruby-based material which has a spectral response from visible light to the far infrared (about 40,000 nano-meters). The hermetically sealed detector is heat treated and filled with argon gas to improve long term stability.

The absorption of radiation by the blackened area causes a rise in temperature in the 'hot' junctions as compared to the 'cold' junctions of the thermopile. This difference in temperature across the thermocouple junction causes the detector to generate a positive voltage. If the active or 'hot' junction were to cool to a temperature less than the reference or 'cold' junction the voltage output would be negative.

The output of the thermopile detector is presented to a gain selectable amplifier. The GAIN switch located on the top of the sensor is used to adjust the output of the sensor to a level appropriate for the experiment being performed. Gain settings of 1X, 10X and 100X are provided. The gain settings on the sensor coupled with

PASCO scientific ®
10101 Foothills Blvd. • Roseville, CA 95747-7100
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the user selectable gain of the PASCO Computer Interface allow a very broad range of measurements to be made with the Infrared Sensor.

The TARE switch located on the top of the sensor allows the output of the sensor to be zeroed. This is particularly useful at high gain settings where small voltage offsets may interfere with measurements.

The shutter provided with the sensor has two functions. The tab on the front edge is used to give constant spacing between the sensing element and a hot object when performing comparative radiant energy measurements. The spring loaded shutter keeps unwanted radiated energy from heating the sensing element before a measurement is taken.

Equipment

INCLUDED

- Infrared Sensor unit
- 1/4-20 X .375” thumbscrew (washer included)
- shutter bracket
- cable with DIN connectors

ADDITIONAL REQUIRED

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

Spare parts are available as follows:

Item	Part Number
8-pin DIN cable	514-06329
.250” I.D. washer	615-011
1/4-20 X .375” thumbscrew	617-008
shutter bracket	648-06954

Operation

Note: This instruction sheet was written assuming that the user has a basic familiarity with *Science Workshop* and has access to the *User’s Guide for Science Workshop*. Users can gain basic skills by working through the tutorial within *Science Workshop*. Another useful resource is the *Quick Reference Card for Science Workshop*.

Setting up the Equipment

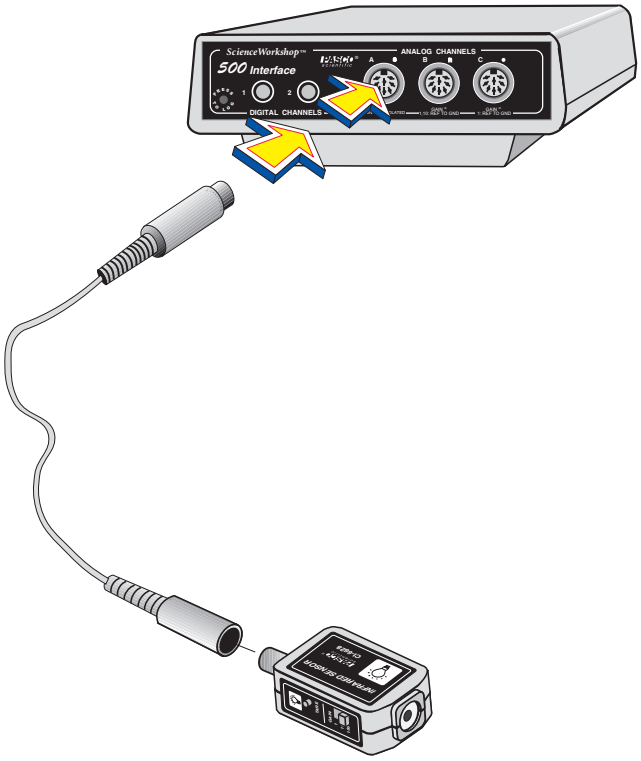


Figure 1
Connecting the amplifier box to the interface box

1. Connect the Infrared 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 without using the cable.
2. Select the appropriate gain setting on the sensor box for the light levels to be measured (Figure 2). 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.

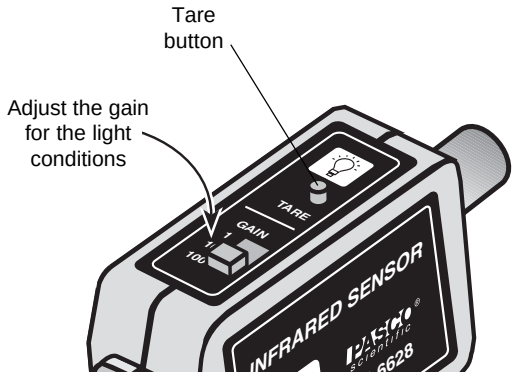


Figure 2
Setting the Gain On the Infrared Sensor

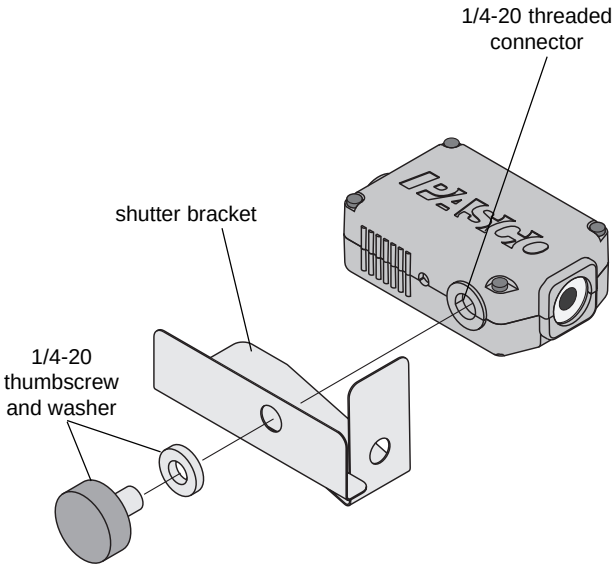


Figure 3
Installation of Shutter Bracket

Using the Shutter Bracket

Note the orientation of components as illustrated in Figure 3. Mount the shutter bracket to the Infrared Sensor unit, with the included hardware, as shown. Do not over tighten thumbscrew.

Mounting on an Experimental Apparatus

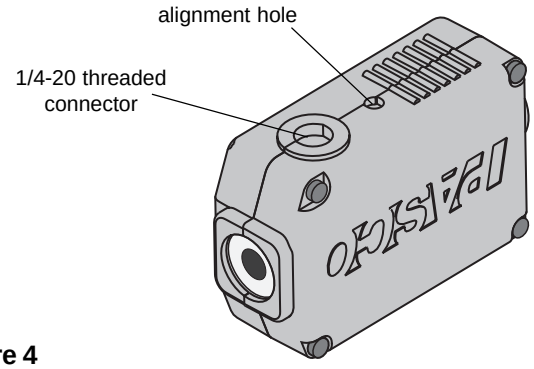
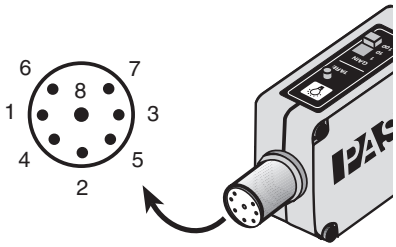


Figure 4
Mounting connector and alignment hole

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

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