

UV and Solar Radiation Sensors

For Vantage Pro[®] and Vantage Pro2[™] Weather Stations

The Davis Instruments UV Sensor is a precision instrument that detects ultraviolet (UV) radiation at wavelengths of 290 to 390 nanometers. The spectral response is closely matched to the Erythema Action Spectrum, defined by McKinlay and Diffey (1987) and internationally recognized as the radiation that is most responsible for causing redness of the human skin.

The Davis Instruments Solar Radiation Sensor is a precision instrument that detects radiation at wavelengths of 300 to 1100 nanometers. The spectral response of the silicon photodiode detector is a good match to the spectrum of solar irradiance.

Typically, users install both the Solar Radiation Sensor and the Davis UV Sensor. However, users may install only one of these sensors. Unless otherwise noted, instructions in this manual apply to both sensors.

Individual specifications for each sensor are listed on the Davis Website at <http://www.davisnet.com/support/weather/> under the spec sheets link.

Note: Sunburn is not the only consequence of exposure to UV radiation. Skin cancers, cataracts, and damage to the immune system are caused by UV radiation. Exposure to UV radiation should be minimized.

The UV Sensor is comprised of the following components:

Shield—The outer shell shields the sensor body from thermal radiation and provides a path for convection cooling of the body, minimizing heating of the sensor interior. It provides a cutoff ring for cosine response, a level indicator, and fins to aid in aligning the sensor with the sun's rays.

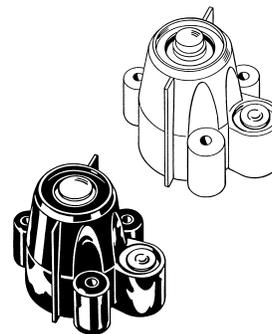
Sensor Body—Houses the following components:

- **Diffuser**—Provides, with gasket, a weather-tight seal and excellent cosine response.
- **Filter**—Provides the Erythema Action spectral response. Encased in multiple hard-oxide coatings, the filter is stable in the presence of heat and humidity.
- **Detector**—Contains a semiconductor diode that, with the filter, responds to radiation only in the specified wavelengths.
- **Amplifier**—Converts the detector current into a 0 to +2.5V signal.

The Solar Radiation Sensor is comprised of the following components:

Shield —Serves the same role as in the UV Sensor.

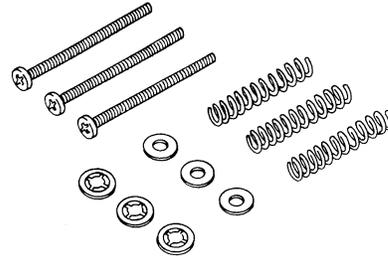
Sensor Body —Composed of a shield, the same as that in the UV Sensor; and a sensor body, which contains a precision machined diffuser giving excellent cosine response; a hermetically sealed silicon photodiode; and an amplifier.



Mounting Hardware

Please make sure you have all components listed below before continuing.

- Shield
- Body with cable attached
- Three #6-32 x 1-1/2" (38 mm) machine screws
- Three springs
- Three #6 flat washers
- Three #6 screw retainers



Tools and Materials Needed

To install your new sensor, you will need a medium Phillips screwdriver.

Mounting the Sensors

Installation on the Sensor Mounting Shelf

The Solar Radiation and UV Sensors are designed to be mounted on the Sensor Mounting Shelf (Davis Instruments Product Number 6672). The Sensor Mounting Shelf is a stand that attaches to your ISS and provides a mounting location for up to two sensors.

First mount the shelf on the ISS and then follow these instructions to mount a UV or Solar Radiation Sensor on the shelf. The shelf has two mounting locations, one to hold a UV sensor and a the other for a Solar Radiation Sensor. Because they are identical, it doesn't matter which location you use first.

Testing the Sensor

On the Integrated Sensor Suite (ISS), the connections for the Solar Radiation and UV sensors are inside the Sensor Interface Module (SIM) Box. Before permanently installing your new sensor, Davis Instruments recommends that you test it first. To do this, take your console with you out to your ISS, and follow the instructions below.

Accessing the SIM

To access the SIM on a Vantage Pro2 station, open the SIM Box. See *Opening the SIM Box* in the *Vantage Pro2 ISS Installation Manual* for more information. On earlier Vantage Pro stations, the SIM Box is located below the ISS Radiation Shield. For instructions on how to access the SIM Box on these stations, see *Opening the SIM Box* in the *Vantage Pro ISS Installation Instructions*. On Fan Aspirated Vantage Pro and Vantage Pro2 stations, the SIM is located in a separate housing. Again, consult your ISS instruction manual for detailed instructions on how to access your SIM.

1. Plug the sensor cable into the receptacle labeled "UV" on the SIM if it is a UV sensor or into the receptacle labeled "SUN" if it is a Solar Radiation Sensor.

Hold the sensor body with the white diffuser pointed upward. Do not touch the diffuser. If you do, clean it after mounting using a cotton swab and ethyl alcohol. Do not use rubbing alcohol.

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2. On a Vantage Pro console, press UV to see the UV sensor reading if you are installing a UV sensor. If you are installing a Solar Radiation Sensor, press 2ND then SOLAR to see the Solar Radiation reading.

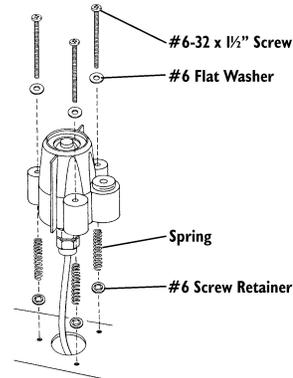
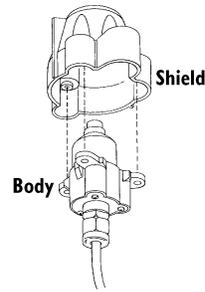
On a Vantage Pro2 console, press 2ND then UV to see the UV sensor reading and 2ND then SOLAR to see the Solar Radiation Reading.

3. Shade the sensor with your hand. The value should drop. A zero is a possible reading; however, if you see dashes, wait a minute for a reading to come in. If you still see no reading, reconnect the sensor cable to the ISS, ensuring it is in the proper receptacle. If you still see no reading, contact Davis Technical Support (see *Technical Support* at the back of this manual).
4. Unplug the sensor cable from the SIM.

For permanent mounting, unplug the cable from the ISS and follow the instructions below. The test procedure is complete.

Securing the Sensor on the Shelf

1. Remove the rain collector cone from the ISS: turn it counterclockwise until the latches allow you to lift it up and off.
2. Place the sensor shield onto the sensor body as shown here.
3. Route the sensor cable down through one of the large holes in the mounting shelf.
4. Place a flat washer over the end of each screw and insert it through the shield and body.
5. Place a spring over the end of each screw and hold the springs in place using a #6 screw retainer.
6. Secure the sensor to the mounting shelf by driving the screws into the appropriate holes as shown.
7. Using the bubble level on the sensor as a guide, adjust the sensor until it is level by tightening or loosening the screws.
8. Repeat the above process to install an additional sensor. Replace the rain collector cone when finished.



Note: Final leveling of the sensor(s) should be done with the ISS mounted in its operating location.

Routing the Sensor Cable

Route the sensor cable to the SIM Box and insert the cable jack into its appropriate receptacle, marked SUN for a Solar Radiation Sensor or UV for a UV Sensor. Ensure that the cables are free of crimps and are dressed so that they will not fray in the wind.

On Vantage Pro stations with a squared radiation shield, ensure that the cables run to the SIM Box following the same path through the radiation housing as the rest of the sensor cables. Consult your ISS Manual for instructions on how to do this.

On later Vantage Pro stations and Fan-Aspirated Vantage Pro stations, ensure that the sensor cables run down through the holes near the base of the sensor mounting shelf and through the grommet in the SIM Box that the other sensor cables run through.

On Vantage Pro2 stations, first run the cables down from the Sensor Mounting Shelf and down through the holes near the base of the Sensor Mounting Shelf. Next, run the cables through the space between the Rain Collector and the Radiation Shield, following the other sensor cables to the access port at the back of the SIM Box. Open the SIM Box, remove the Foam Insert, and guide the cable through the access port. Insert the cable jack into the proper receptacle and replace the Foam Insert, ensuring that the Foam Insert fills all large voids in the access port.

Maintaining the Sensor

For the most accurate readings, clean the diffuser after mounting, and then periodically. Use ethyl alcohol (not rubbing alcohol).

Due to the sensitivity of ultraviolet and solar radiation sensors, it is common practice for manufacturers to recommend recalibration after a period of time. Here at Davis Instruments, we have seen approximately 2% drift per year on the readings from these sensors. For applications demanding higher accuracy, the sensors should be calibrated once every year.

Sensor Troubleshooting

If encountering sensor problems, carefully check all cable connections from the sensor to the console. Cable connections account for a large portion of the potential problems. Connections should be firmly seated in the jacks and plugged in straight. Try jiggling the cable while looking at the display. If a reading appears intermittently on the display as you jiggle the cable, the connection is faulty.

Contacting Davis Technical Support

If you have any questions about the sensors or encounter problems installing the sensors, please contact Davis Technical support:

(510) 732-7814—Monday Through Friday, 7:00 a.m. to 5:30 p.m., Pacific Time.

(510) 670-0589—Fax to Technical Support.

Product Numbers: 6450 and 6490

UV and Solar Radiation Sensor Installation Manual

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