

# UVB Sensor

## (Order Code UVB-BTA)



The UVB Sensor is an ultraviolet light sensor that responds primarily to UVB radiation (approx. 265 to 322 nm). The UVB sensor is recommended for experiments involving sunlight.

**Note:** Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind.

### Compatible Software

See [www.vernier.com/manuals/uvb-bta](http://www.vernier.com/manuals/uvb-bta) for a list of software compatible with the UVB Sensor.

### Getting Started

1. Connect the sensor to the interface (LabQuest Mini, LabQuest 3, etc.).
2. Start the appropriate data-collection software (Vernier Graphical Analysis®, LabQuest® App, or Logger Pro™) if not already running, and choose New from File menu. The software will identify the sensor and load a default data-collection setup. You are now ready to collect data.

If you are collecting data using a Chromebook™, mobile device such as iPad® or Android™ tablet, or a Vernier wireless interface, please see the following link for up-to-date connection information:

[www.vernier.com/start/uvb-bta](http://www.vernier.com/start/uvb-bta)

### Calibrating the Sensor

You do not have to perform a new calibration when using the UVB sensor. You can use the calibration that is stored on the sensor itself.

It is quite difficult to calibrate a UV sensor to read in absolute units, since you must have a source of known UV intensity and spectral distribution. More often you will simply want to calibrate the sensor in terms of a relative intensity. In that case, you will point the sensor at a UV source (most often the sun) and define that intensity as 100%. To perform this kind of calibration, complete the following steps for a two-point calibration. One of the points is your zero, with no light striking the sensor. Cover the tip of the UVB sensor with a clean opaque object. Select the calibration option of the program you are using. Enter **0** (zero) as the first known intensity. Now allow full UV intensity to strike the sensor. Since the orientation of the sensor affects the reading, it is best to hold the sensor in place with a clamp on a ring stand. To point the sensor directly at the sun, make the shadow of the sensor tube as small as possible. Enter **100** as the next known intensity. Subsequent measurements will be relative to this second intensity.

Note that you cannot calibrate a light sensor using a broadband light source (such as a lamp or the sun) against another light sensor of known calibration unless the spectral response of the two sensors is exactly the same. Similarly, any intensity measurements of a broadband source using two sensors with different spectral response cannot be directly compared. For example, a reading from another manufacturer's UVB sensor would not correspond to the readings from the Vernier UVB Sensor. In all these cases a direct comparison is not appropriate, since the reading from any light sensor is a convolution of the spectral distribution of the incident light and the spectral response of the sensor.

### Specifications

|  |  |
|--|--|
| UV peak sensitivity                        | one volt per 204 mW/m <sup>2</sup> at 300 nm                       |
| Wavelength sensitivity region, approximate | 265 to 322 nm, 10% sensitivity points. See graphs for more detail. |
| 12-bit resolution                          | 0.25 mW/m <sup>2</sup>   |
| Dimensions                                 | 21 cm by 2 cm diameter   |
| Time response                              | approximately 2 seconds to reach 95% of final reading              |
| Stored calibration                         | slope (gain): 204 mW/(m <sup>2</sup> V)<br>intercept (offset): 0   |
| Irradiance                                 | V <sub>out</sub> * 204 mW/(m <sup>2</sup> V)                       |

### Care and Maintenance

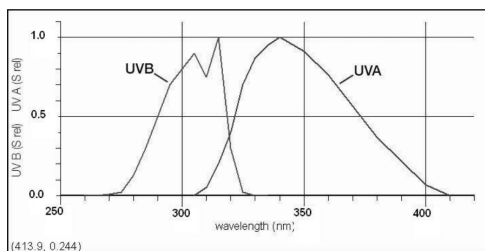
Do not wrap the cable tightly around the sensor for storage. Repeatedly doing so can irreparably damage the wires and is not covered under warranty.

### How the Sensor Works

The Vernier UVB sensor is built around a broadband UV sensitive silicon photodiode. The diode produces a current proportional to the UV intensity. A wavelength selective filter limits light striking the diode to only the UVB region. The signal from the diode is amplified and sent to the output.

#### UV Terminology

The Vernier UVB and UVA (order code UVA-BTA) Sensors respond to specific regions of the electromagnetic spectrum. The wavelength region from 320 to 400 nm is commonly called UVA radiation, and 280 to 320 nm is called UVB radiation. Wavelengths shorter than 280 nm fall into the UVC spectrum. Neither Vernier sensor is sensitive to UVC radiation.



Plants and animals respond differently to the three types of UV radiation. Although very harmful to plants and animals, UVC radiation is nearly completely absorbed by the ozone in the Earth's atmosphere. Some UVB radiation makes it through the atmosphere, although the degree of absorption depends critically on the angle of the sun and the amount of ozone along the light path. UVB radiation is thought to be responsible for reddening of the skin (erythema), cataracts, and skin cancers. UVA can also cause these effects on human skin, but to a lesser extent. It is generally agreed that UVB radiation is the primary danger to humans, but increasingly UVA is being shown to cause delayed, but significant, damage to skin and eyes. The standard erythemal (or sunburning) action spectrum (McKinlay and Diffey, 1987) represents a combined estimate of the relative sensitivity of skin as a function of wavelength. Since knowledge of how UV light affects skin improves with time, the erythemal spectrum may not represent the latest thinking of UV danger.

There are several ways of measuring UV light intensity and exposure. The usual irradiance unit of measurement is  $\text{mW}/\text{cm}^2$ , but a simplified UV Index system is also in use. The UV Index is actually a forecast, not a measurement. For comparison with the forecast, some UV sensors can be calibrated in terms of UV Index. However, since the UV Index includes a wavelength weighting corresponding to the erythemal action spectrum, only sensors matching the erythemal spectrum can logically be calibrated in terms of UV Index. The UVB sensor therefore cannot report UV index.

## Troubleshooting

For troubleshooting and FAQs, see [www.vernier.com/til/1442](http://www.vernier.com/til/1442)

## Repair Information

If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your UVB Sensor, contact Vernier Technical Support at [support@vernier.com](mailto:support@vernier.com) or call 888-837-6437. Support specialists will work with you to determine if the unit needs to be sent in for repair. At that time, a Return Merchandise Authorization (RMA) number will be issued and instructions will be communicated on how to return the unit for repair.

## Warranty

Warranty information for this product can be found on the Support tab at [www.vernier.com/uvb-bta](http://www.vernier.com/uvb-bta)

General warranty information can be found at [www.vernier.com/warranty](http://www.vernier.com/warranty)

## Disposal

When disposing of this electronic product, do not treat it as household waste. Its disposal is subject to regulations that vary by country and region. This item should be given to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring that this product is disposed of correctly, you help prevent potential negative consequences on human health or on the environment. The recycling of materials will help to conserve natural resources. For more detailed information about recycling this product, contact your local city office or your disposal service.



Vernier Science Education

13979 SW Millikan Way • Beaverton, OR 97005-2886

Toll Free (888) 837-6437 • (503) 277-2299 • Fax (503) 277-2440

[info@vernier.com](mailto:info@vernier.com) • [www.vernier.com](http://www.vernier.com)

Rev. 2/26/2024

Vernier Graphical Analysis, LabQuest, LabQuest Mini, Logger Pro, and other marks shown are our trademarks or registered trademarks in the United States.

iPad is a trademark of Apple Inc., registered in the U.S. and other countries.

All other marks not owned by us that appear herein are the property of their respective owners, who may or may not be affiliated with, connected to, or sponsored by us.

