

# Vernier Energy Sensor

## (Order Code VES-BTA)



The Vernier Energy Sensor allows students to easily measure current and voltage. Source terminals connect to energy output sources such as model wind turbines or solar panels, and Load terminals connect to loads such as LEDs, water pumps, resistors, or variable loads.

**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.

### What's Included

- Vernier Energy Sensor

### Compatible Software

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

### Getting Started

1. Connect the sensor to the interface (LabQuest Mini, LabQuest 2, etc.).
2. Start the appropriate data-collection software (Logger Pro, Logger Lite, LabQuest App) if not already running, and choose New from File menu.

See the following link for additional connection information:

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

**⚠ WARNING:** To avoid possible electric shock or personal injury, do not connect the red or black leads to household power. This product is designed to measure low-voltage sources such as classroom-scale wind turbines and small solar panels. It should never be connected to an electrical outlet.

### Using the Product

#### Zeroing the Sensor

Both Current and Voltage should be zeroed in the data-collection software prior to collecting data. To do this, disconnect the load and source and connect the two Load terminals with a wire. Zero the sensors in the software. **Note:** Any resistance value shown in the meter in the software is not meaningful when the current and voltage values are near zero.

#### Connecting Devices to the Energy Sensor

The Vernier Energy Sensor provides a pair of five-way binding posts, labeled Source, to connect the device that is generating power, such as a model wind

turbine, solar panel, battery, power supply, or function generator. Another pair of binding post terminals, labeled Load, connect to the load. The load can be any electrical device that is meant to run on DC electricity at a voltage that matches the power source. Examples include the Vernier Variable Load (order code VES-VL), the Vernier Resistor Board (order code VES-RB), single component resistors, motors, or LEDs.

These terminals will accept standard banana plugs, alligator clips, or bare wires and provide a solid electrical connection.

### Videos

View videos related to this product at [www.vernier.com/ves-bta](http://www.vernier.com/ves-bta)

### Specifications

Source input potential range	$\pm 30$ V
Source input current range	$\pm 1000$ mA
Linearity	Potential Sensor: 0.01% Current Sensor: 0.01%
13-bit resolution (using SensorDAQ)	Potential Sensor: 0.008 V Current Sensor: 0.26 mA
12-bit resolution (using LabPro, LabQuest 2, LabQuest, LabQuest Mini, TI-Nspire Lab Cradle)	Potential Sensor: 0.016 V Current Sensor: 0.52 mA
Input impedance	Potential Sensor: $> 2$ M $\Omega$
Insertion resistance	Current Sensor: 0.1 $\Omega$
Frequency response	Potential Sensor: $-3$ dB @ 160 Hz Current Sensor: $-3$ dB @ 160 Hz
Stored calibration (Potential Sensor)	slope: $-12.526$ V/V intercept: 31.315 V
Stored calibration (Current Sensor)	slope: $-422.09$ mA/V intercept: 1055.25 mA

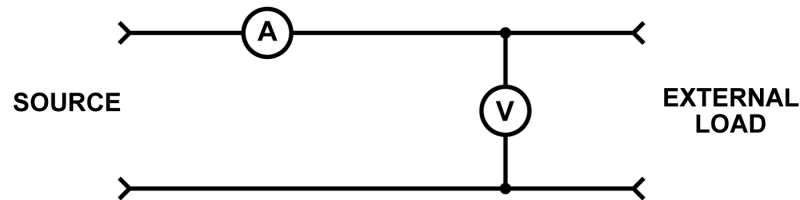
### How the Sensor Works

The Vernier Energy Sensor has two BTA connectors: a Voltage connector and a Current connector. When both connectors are connected to a Vernier interface, the data-collection software automatically identifies the sensor and loads a data-collection setup. If you are using the recommended versions of Logger Pro, Logger Lite, or LabQuest App for data collection, this data-collection setup is loaded when both connectors are used. Calculated columns and meters for power, resistance, and energy are created in the file. If you are not using one of

the other software titles listed in the Compatible Software section, the sensors will auto-ID as Current and Voltage (Potential) sensors. You will have to manually set up the calculated columns and meters for power, resistance, and energy.

If you connect only the Voltage connector or the Current connector, the Energy Sensor will function as a simple voltage or current sensor.

The Vernier Energy Sensor measures the potential across the load, as well as the current through the load.



*Circuit diagram of how the Vernier Energy Sensor is wired internally*

### 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.

### Troubleshooting

For troubleshooting and FAQs, see [www.vernier.com/til/3181](http://www.vernier.com/til/3181)

### Repair Information

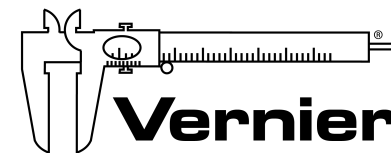
If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your Vernier Energy Sensor, contact Vernier Technical Support at [support@vernier.com](mailto:support@vernier.com) or call 888-837-6437. Support specialists will work with you to determine 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.

### Accessories/Replacements

Item	Order Code
Vernier Variable Load	VES-VL
Vernier Resistor Board	VES-RB
KidWind Advanced Wind Experiment Kit	KW-AWX
KidWind Basic Wind Experiment Kit	KW-BWX
KidWind MINI Wind Turbine	KW-MWT
KidWind 2V/400mA Solar Panel	KW-SP2V

### Warranty

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty does not cover damage to the product caused by abuse or improper use. This warranty covers educational institutions only.



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