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.

Collecting Data with the Vernier Energy Sensor
This sensor can be used with the following interfaces to collect data.
- Vernier LabQuest® 2 or original LabQuest as a standalone device or with a computer
- Vernier LabQuest Mini with a computer
- Vernier LabPro® with a computer or TI graphing calculator
- Vernier SensorDAQ®
- CBL 2™
- TI-Nspire™ Lab Cradle

The general procedure to follow when using the Vernier Energy Sensor includes
1. Connect the Energy Sensor to the interface.
2. Start the data-collection software.
3. The software will identify the Energy Sensor and load a default data-collection setup. You are now ready to collect data.

Data-Collection Software
This sensor can be used with an interface and the following data-collection software.
- **Logger *Pro* 3** This computer program is used with LabQuest 2, LabQuest, LabQuest Mini, LabPro, or Go!Link. Version 3.8.7 or newer is required.
- **Logger Lite** This computer program is used with LabQuest 2, LabQuest, LabQuest Mini, LabPro, or Go!Link. Version 1.7.0 or newer is required.
- **LabQuest 2 App** This program is used when LabQuest 2 is used as a standalone device. Version 2.3.1 or newer is required.
- **LabQuest App** This program is used when original LabQuest is used as a standalone device. Version 1.7.2 or newer is required.
- **LabVIEW™** National Instruments LabVIEW™ software is a graphical programming language sold by National Instruments. It is used with SensorDAQ and can be used with a number of other Vernier interfaces.
- **DataQuest™ Software for TI-Nspire™** This calculator application for the TI-Nspire can be used with TI-Nspire Lab Cradle.
- **EasyData App** This calculator application for the TI-83 Plus and TI-84 Plus can be used with CBL 2 and LabPro. Version 2.0 or newer is required.

NOTE: Vernier products are designed for educational use. Our products are not designed nor 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.

Tips for Using the Vernier Energy Sensor
Sensor Behavior
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 using one of the other software titles listed in the Data-Collection 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.

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 five-way 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.

Zeroing the Sensor
Both Current and Voltage should be zeroed in the data-collection software prior to collecting data. This should be done with the source and load connected to the Energy Sensor but with no current flowing and no voltage applied. **Note**: Any resistance value shown in the meter in the software is not meaningful when the current and voltage values are near zero.
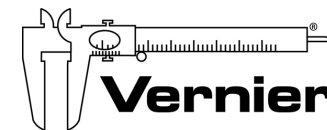
Specifications

Source input potential range		± 30 V
Source input current range		± 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 MΩ
Insertion resistance	Current Sensor	0.1 Ω
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
	Current Sensor	
	slope	−422.09 mA/V
	intercept	1055.25 mA

Related Products

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
KidWind 12V/500mA Solar Panel	KW-SP12V

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.