

# Differential Voltage Probe

(Order Code DVP-BTA)



The Differential Voltage Probe is designed for exploring the basic principles of electricity. Use this probe to measure voltages in low voltage AC and DC circuits. With a range  $\pm 6.0$  V, this system is ideal for use in “battery and bulb” circuits.

**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 and Interfaces

See [www.vernier.com/manuals/dvp-bta](http://www.vernier.com/manuals/dvp-bta) for a list of interfaces and software compatible with the Differential Voltage Probe.

## 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.

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 sensor or interface, please see the following link for up-to-date connection information:

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

## Using the Product

Connect the sensor following the steps in the Getting Started section of this user manual.

The Differential Voltage Probe is designed to be used like a voltmeter. The leads should be placed across a circuit element. The differential input range is  $-6$  volts to  $+6$  volts. Over-voltage protection is provided so that slightly higher voltages will not damage the sensor. You should NEVER use high voltages or household AC with this probe.

## Videos

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

## Calibration

You should not have to perform a new calibration when using the

Differential Voltage Probe in the classroom. We have set the sensor to match our stored calibration before shipping it. You can simply use the appropriate calibration file that is stored in the data-collection program from Vernier.

If you choose to calibrate the Differential Voltage Probe for increased accuracy, use the standard, two-point calibration procedure. Another option to consider instead of calibrating is “zeroing” the sensor. This is done by shorting out the leads of the sensor, then choosing the Zero option in the data-collection software. This option adjusts the calibration offset but does not adjust the calibration gain.

## Specifications

Differential Voltage Probe input voltage range	$\pm 6.0$ V
Maximum voltage on any input	$\pm 10$ V
Input impedance (to ground)	10 M $\Omega$
Linearity	0.01%
13-bit resolution	1.6 mV
12-bit resolution	3.1 mV
10-bit resolution	12.5 mV
Supply voltage	5 VDC
Supply current (typical)	9 mA
Output voltage range	0–5 V
Transfer function	$V_o = -0.4 (V_+ - V_-) + 2.5$
Default calibration values	slope: $-2.5$ V/V intercept: 6.25 V

## How the Sensor Works

The Differential Voltage Probe measures the potential difference between the  $V_+$  clip (red) and the  $V_-$  clip (black). The voltage probes have differential inputs. The voltage measured is with respect to the black clip and not circuit ground. This allows you to measure directly across circuit elements without the constraints of common grounding. The voltage probes can be used to measure negative potentials, as well as positive potentials.

The output of this system is linear with respect to the measurement it is making. A built-in amplifier allows you to measure positive and negative voltages on any of our interfaces. Since many lab interfaces can read voltages only in the range of 0 to 5 volts, the amplifier offsets and amplifies the incoming signal so that the output is always in the range of 0 to 5 volts. If an input is zero volts, for example, the amplifier will produce an output of 2.5 volts. The output varies from this 2.5 volt level, depending on the input.

## Troubleshooting

If the Differential Voltage Probe is not operating as expected, check the following:

- Are the leads properly and securely connected? The probe is designed to be used like voltmeter leads. It should be placed across a circuit element.
- Is the sensor voltage fluctuating? Try a DC power source, such as a battery. When measuring DC voltages with power supplies, some power supplies do not provide a steady DC signal. If the sensor reading is correct when using a battery, the problem may be the power supply.

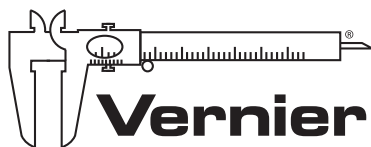
For additional troubleshooting and FAQs, see [www.vernier.com/til/1428](http://www.vernier.com/til/1428)

### Repair Information

If you have watched the related product video(s), followed the troubleshooting steps, and are still having trouble with your Differential Voltage Probe, 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 number will be issued and instructions will be communicated on how to return the unit for repair.

### 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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