Wireless Voltage-Current Sensor

PS-4254

Introduction

The Wireless Voltage-Current Sensor can be used to measure voltage and current simultaneously in various electricity and magnetism experiments. The sensor also measures power and energy using the voltage and current values. The sensor is compatible with PASCO data collection software and can be connected via Bluetooth or the included USB-C cable. The sensor also features a built-in OLED display that displays the measurements without needing to connect the sensor to a computing device.

Components

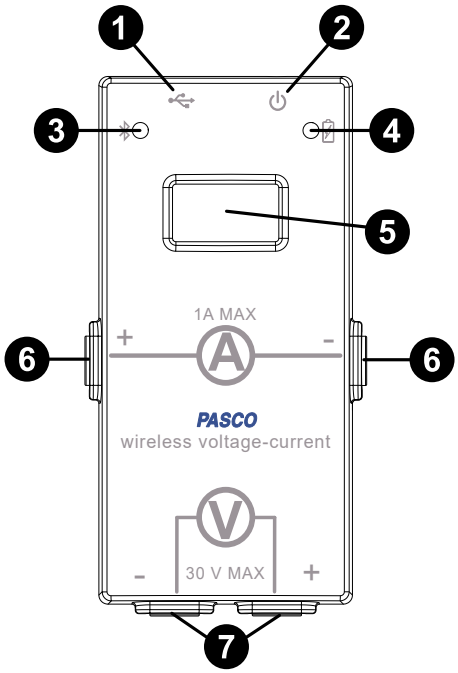
Included additional components:

- 4× banana plug cables (2× red, 2× black)
- USB-C cable

Required software:

- PASCO Capstone, SPARKvue, or Chemvue

Features



1 USB-C port

Use to connect the sensor to a standard USB charger via the included cable. You can also use the port and cable to connect the sensor to the data collection software without Bluetooth. (This connection method is not supported by iOS.)

2 Power button

Press and hold to turn the sensor on or off. Press once to zero the sensor measurements. Press twice in quick succession to toggle the measurements shown on the OLED display.

3 Bluetooth Status LED

Indicates the status of the sensor's Bluetooth connection.

Bluetooth LED	Status
Red blink	Ready to pair
Green blink	Connected
Yellow blink	Remotely logging data

For more information on remote data logging, see the online help for SPARKvue or Capstone. (Remote data logging is not supported by Chemvue.)

4 Battery Status LED

Indicates the charge status of the sensor's rechargeable battery.

Battery LED	Status
Red blink	Low battery
Yellow ON	Charging
Green ON	Fully charged

5 OLED display

Displays the value of two measurements. When the sensor is turned on, voltage and current are displayed. Press the power button twice in quick succession to display power and energy.

6 Current ports

Connect the included banana plug cables here when measuring the current in a circuit. The sensor must be connected in series with a circuit element to measure the current. To protect the sensor from damage, the current sensor has a built-in alarm which will sound if the current is too high.

7 Voltage ports

Connect the included banana plug cables here when measuring the voltage across a circuit element. The voltage sensor must be connected in parallel with the circuit element being measured.

Initial step: Charge the battery

Charge the battery by connecting the USB-C port to any standard USB charger via the included cable. The Battery Status LED is solid yellow while charging. When fully charged, the LED changes to solid green.

Get the software

You can use the sensor with SPARKvue, PASCO Capstone, or Chemvue software. If you're not sure which to use, visit pasco.com/products/guides/software-comparison.

A browser-based version of SPARKvue is available for free on all platforms. We offer a free trial of SPARKvue and Capstone for Windows and Mac. To get the software, go to pasco.com/downloads or search for **SPARKvue** or **chemvue** in your device's app store.

If you have installed the software previously, check that you have the latest update:

SPARKvue: Main Menu > Check for Updates

PASCO Capstone: Help > Check for Updates

Chemvue: See the download page.

Check for a firmware update

SPARKvue

1. Press the power button until the LEDs turn on.
2. Open SPARKvue. Select **Sensor Data** on the Welcome Screen.
3. From the list of available devices, select the sensor that matches your sensor's device ID.
4. A notification will appear if a firmware update is available. Click **Yes** to update the firmware.
5. Close SPARKvue once the update is complete.

PASCO Capstone

1. Press the power button until the LEDs turn on.
2. Open PASCO Capstone and click **Hardware Setup** from the Tools palette.
3. From the list of available wireless devices, select the sensor that matches your sensor's device ID.
4. A notification will appear if a firmware update is available. Click **Yes** to update the firmware.
5. Close Capstone once the update is complete.

Chemvue

1. Press the power button until the LEDs turn on.
2. Open Chemvue, then select the **Bluetooth** button.
3. From the list of available devices, select the sensor that matches your sensor's device ID.
4. A notification will appear if a firmware update is available. Click **Yes** to update the firmware.
5. Close Chemvue once the update is complete.

Hardware setup

Before turning on the sensor, you will need to connect it to the system to be measured. To measure current through a circuit, use the included banana plug cables to connect the sensor in series with the circuit using the current ports on opposite sides of the sensor. To measure voltage across elements of a circuit, use the banana plug cables to connect the sensor in parallel with those elements using the voltage ports. In both cases, the red port should be connected to a point closer to the high potential source, and the black port should be connected to a point closer to ground.

NOTE: Do NOT connect the current sensor directly across a battery or other voltage source without a resistive load! The sensor has a very low resistance, and connecting it in this way can damage the sensor.

Use the sensor without software

The OLED display on the sensor can be used to perform measurements without connecting to the software. By default, while the sensor is powered on, the OLED display shows the measurements of voltage in volts and current in amps. You can press the power button twice in quick succession to toggle the display measurements to power in watts and total energy in joules. Press the power button twice again to return to the voltage and current measurements.

The sensor can detect whether the signals being measured are direct current or alternating current. If the sensor detects an AC signal from the voltage ports or current ports, a tilde (~) will appear next to the relevant measurement. While a high frequency AC signal is being measured, the displayed measurement is approximately equal to the root mean square value of the signal. This value will be most accurate when the signal is a sine wave.

NOTE: The OLED display is primarily useful for measuring voltage and current in a system being driven by a DC signal. For AC signals, using the software to record data is preferable.

Use the sensor with software

SPARKvue

Connecting the sensor to a tablet or computer via Bluetooth:

1. Turn on the Wireless Voltage-Current Sensor. Check to make sure the Bluetooth Status LED is blinking red.
2. Open SPARKvue, then click **Sensor Data**.
3. From the list of available wireless devices on the left, select the device which matches the device ID printed on your sensor.

Connecting the sensor to a computer via USB-C cable:

1. Open SPARKvue, then click **Sensor Data**.
2. Connect the provided USB-C cable from the USB-C port on the sensor to a USB port or powered USB hub connected to the computer. The sensor should automatically connect to SPARKvue.

Collecting data using SPARKvue:

1. Select the measurement you intend to record from the **Select measurements for templates** column by clicking the check box next to the relevant measurement's name.
2. Click **Graph** in the **Templates** column to open the Experiment Screen. The graph's axes will auto-populate with the selected measurement versus time.
3. Click **Start** to begin collecting data.

PASCO Capstone

Connecting the sensor to a computer via Bluetooth:

1. Turn on the Wireless Voltage-Current Sensor. Check to make sure the Bluetooth Status LED is blinking red.
2. Open PASCO Capstone, then click **Hardware Setup** in the **Tools** palette.
3. From the list of **Available Wireless Devices**, click the device which matches the device ID printed on your sensor.

Connecting the sensor to a computer via USB-C cable:

1. Open PASCO Capstone. If desired, click **Hardware Setup** to check the connection status of the sensor.
2. Connect the provided USB-C cable from the USB-C port on the sensor to a USB port or powered USB hub connected to the computer. The sensor should automatically connect to Capstone.

Collecting data using Capstone:

1. Double-click the **Graph** icon in the **Displays** palette to create a new blank graph display.
2. In the graph display, click the **<Select Measurement>** box on the y-axis and select an appropriate measurement from the list. The x-axis will automatically adjust to measure time.
3. Click **Record** to begin collecting data.

Chemvue

Connecting the sensor to a computer via Bluetooth:

1. Turn on the Wireless Voltage-Current Sensor. Check to make sure the Bluetooth Status LED is blinking red.
2. Open Chemvue, then click the **Bluetooth** button at the top of the screen.
3. From the list of available wireless devices, click the device which matches the device ID printed on your sensor.

Connecting the sensor to a computer via USB-C cable:

1. Open Chemvue. If desired, click the **Bluetooth** button to check the connection status of the sensor.
2. Connect the provided USB-C cable from the USB-C port on the sensor to a USB port or powered USB hub connected to the computer. The sensor should automatically connect to Chemvue.

Collecting data using Chemvue:

1. Open the **Graph** display by selecting its icon from the navigation bar at the top of the page.
2. The display will automatically be set to plot voltage versus time. If a different measurement is desired for either axis, click the box containing the default measurement's name and select the new measurement from the list.
3. Click **Start** to begin collecting data.

Zero the measurements

You can zero the sensor's measurements in two different ways, depending on how you are using the sensor:

- If you are using the sensor without software, press the power button once.
- If you are using the sensor with software, press the zero button within the software.

Note that the power button cannot be used to zero the sensor while the sensor is connected to the software.

About the sample rate

The measurements of voltage and current are synchronized to always display at the same rate. As such, the sample rates for voltage and current cannot be adjusted separately. When connected to the software via Bluetooth and sampling data continuously, the sensor has a maximum sample rate of 10 kHz. However, if the sensor is connected via the included USB-C cable and Fast Monitor Mode (in Capstone) or a scope display (in SPARKvue) is enabled, the maximum rate increases to 50 kHz. (For more information on these sampling modes, see the SPARKvue or Capstone online help. Note that high-speed sampling is not supported in Chemvue.)

Set the measurement range

By default, the sensor can measure voltages in the range of ±30 V and currents in the range of ±1 A. However, it is possible to adjust the measurable ranges for these measurements to ±5 V and ±0.1 A respectively. This will allow you to measure the values with greater precision, which is useful when performing experiments that require a fine resolution. The sensor also includes a built-in alarm which will sound when the selected current limit is exceeded. If this alarm sounds, immediately disengage the current to prevent the sensor from becoming damaged.

To adjust the measurement range:

- **SPARKvue:** In the Experiment Screen, select the reading for your sensor in the Live Data Bar, then select **Configure Sensor**. Select the boxes next to **Current Range Settings** and **Voltage Range Settings** and choose the desired options.
- **PASCO Capstone:** In the **Hardware Setup** tool, select the **Properties** icon next to the sensor's name, locate the entries labeled **Current Range Settings** and **Voltage Range Settings** in the Properties menu, and select the desired options from the dropdown boxes.
- **Chemvue:** Select **Hardware Setup**, select **Sensor Properties** for the Wireless Voltage-Current Sensor, and select the desired options from the dropdown boxes labeled **Current Range Settings** and **Voltage Range Settings**.

Replace the battery

The battery compartment is located on the back of the sensor, as shown in Figure 1. If the battery needs to be replaced, you can do so using the 3.7V 1000 mAh Lithium Replacement Battery (PS-3290). To install the new battery in the sensor:

1. Use a Phillips screwdriver to remove the screws from the battery door (see Figure 1), then remove the door.
2. Unplug the old battery from the battery connector and remove the battery from the compartment.
3. Plug the replacement battery into the connector. Make sure the battery is properly positioned inside the compartment.
4. Place the battery door back in place and secure it with the screw.

After replacing the battery, make sure to dispose of the old battery properly per your local laws and regulations.

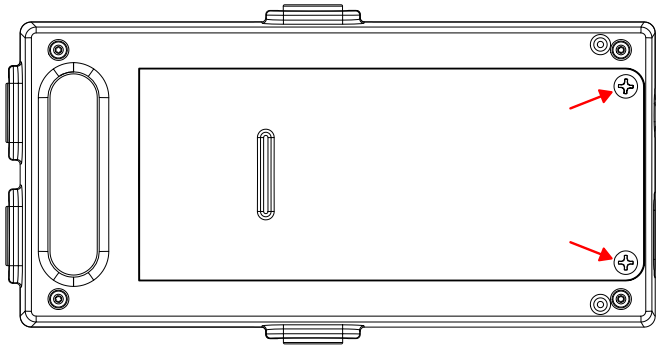


Figure 1: Position of battery door screws.

Software help

The SPARKvue, PASCO Capstone, and Chemvue Help provide information on how to use this product with the software. You can access the help from within the software or online.

SPARKvue

Software: Main Menu > Help

Online: help.pasco.com/sparkvue

PASCO Capstone

Software: Help > PASCO Capstone Help

Online: help.pasco.com/capstone

Chemvue

Software: Main Menu > Help

Online: help.pasco.com/chemvue

Specifications and accessories

Visit the product page at pasco.com/product/PS-4254 to view the specifications and explore accessories. You can also download experiment files and support documents from the product page.

Experiment files

Download one of several student-ready activities from the PASCO Experiment Library. Experiments include student handouts and teacher notes. Visit pasco.com/freelabs/PS-4254.

Technical support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to answer your questions or walk you through any issues.

Chat	pasco.com
Phone	1-800-772-8700 x1004 (USA) +1 916 462 8384 (outside USA)
Email	support@pasco.com

Limited warranty

For a description of the product warranty, see the Warranty and Returns page at www.pasco.com/legal.

Copyright

Trademarks

Product end-of-life disposal

This electronic product is subject to disposal and recycling regulations that vary by country and region. It is your responsibility to recycle your electronic equipment per your local environmental laws and regulations to ensure that it will be recycled in a manner that protects human health and the environment. To find out where you can drop off your waste equipment for recycling, please contact your local waste recycle or disposal service, or the place where you purchased the product. The European Union WEEE (Waste Electronic and Electrical Equipment) symbol on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

CE statement

This device has been tested and found to comply with the essential requirements and other relevant provisions of the applicable EU Directives.

FCC statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Battery disposal

Batteries contain chemicals that, if released, may affect the environment and human health. Batteries should be collected separately for recycling and recycled at a local hazardous material disposal location adhering to your country and local government regulations. To find out where you can drop off your waste battery for recycling, please contact your local waste disposal service, or the product representative. The battery used in this product is marked with the European Union symbol for waste batteries to indicate the need for the separate collection and recycling of batteries.