

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

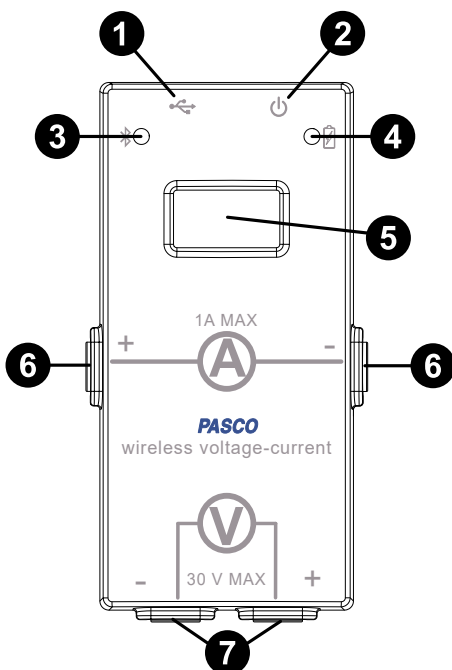
Included additional components:

- 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
Red 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.

Get started

Follow these steps when using the sensor for the first time.

Step 1: 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 red while charging. When fully charged, the LED changes to solid green.

Step 2: Get the software

PASCO software is needed to collect data with the sensor. The sensor can be used with Sparkvue, PASCO Capstone, or Chemvue.

 **Sparkvue:** Open the software in a web browser at sparkvue.pasco.com. You can also install Sparkvue by visiting your device's app store.



 **PASCO Capstone** or  **Chemvue:** Additional purchase required. Go to pasco.com/downloads for details.

Step 3: Check for a firmware update

The sensor may have a firmware update available, providing feature improvements and bug fixes. To minimize disruptions, update the firmware before using the sensor with students.

1. Turn on the sensor. Check to make sure the Bluetooth Status LED is blinking red.
2. Open Sparkvue, then select  **Sensor Data**.
3. Select  **Bluetooth Devices**. If you are using the web app version of Sparkvue, also select  **Connect a Wireless Device**.
4. From the list of available wireless devices, select the device which matches the device ID printed on your sensor.
5. A notification will appear if a critical firmware update is available. Select **Update** to download the firmware update.

For instructions on updating the software with PASCO Capstone or Chemvue instead of Sparkvue, see the software help.

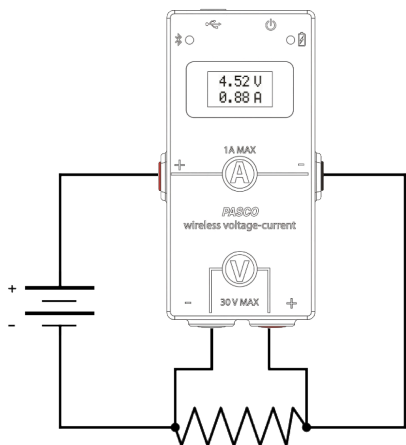


Figure 1: Wiring diagram for the sensor during data collection.

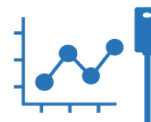
Use the sensor with software

Follow the steps below to connect the sensor to Sparkvue using Bluetooth and begin collecting data. For instructions on using the sensor with PASCO Capstone or Chemvue, or connecting the sensor using USB-C, see the software help.

1. Connect the sensor's current ports in series with a circuit, as shown in Figure 1. 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.

 **IMPORTANT:** Do *not* connect the current sensor directly across a voltage source without a resistive load. This can damage the sensor.

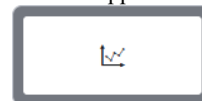
2. Connect the sensor's voltage ports in parallel with a circuit element, as shown in Figure 1. The red port should be connected to a point closer to the high potential source, and the black port should be connected to a point closer to ground.
3. Turn on the sensor. Check to make sure the Bluetooth Status LED is blinking red.
4. Open Sparkvue, then select **Sensor Data**.



5. Select **Bluetooth Devices**. If you are using the web app version of Sparkvue, also select  **Connect a Wireless Device**.



6. From the list of available wireless devices, select the device which matches the device ID printed on your sensor.
7. Select **Done**.
8. In the **Measurements for Templates** column, select the ☒ check boxes next to **Voltage** and **Current**.
9. Select the graph display in the **Templates** column. A graph of voltage and current versus time appears.



10. Select  **Start** to begin collecting data.



Use the sensor without software

You can use the OLED display on the sensor to perform measurements without connecting to the software. By default, while the sensor is on, the OLED display shows the measurements of voltage in volts and current in amps. 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 or alternating current. If the sensor detects an AC signal from the voltage or current ports, a tilde (~) will appear next to the measurement. The displayed measurement is approximately equal to the root mean square value of the signal. (RMS assumes a pure 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.

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.

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 access the measurement range controls:

- **Sparkvue:** Select  **Configure Devices** at the top of the Experiment Screen, then select  **Properties** next to **Wireless Voltage-Current Sensor**.
- **PASCO Capstone:** Select  **Hardware Setup** tool, then select the  **Properties** icon next to **Wireless Voltage-Current Sensor**.
- **Chemvue:** Select  **Hardware Setup**, then select  **Sensor Properties** for the Wireless Voltage-Current Sensor.

About the sample rate

The measurements of voltage and current are synchronized to always display at the same rate. The sample rates for voltage and current cannot be adjusted separately. When connected to the software using Bluetooth and sampling data continuously, the sensor has a maximum sample rate of 10 kHz. When the sensor is connected to Sparkvue or Capstone using USB-C, the maximum rate increases to 50 kHz. This sample rate is only available when using the Scope display in Sparkvue or Fast Monitor Mode in Capstone. High-speed sampling is not supported in Chemvue.

Replace the battery

The battery compartment is located on the back of the sensor. The battery can be replaced with 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 2), 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.

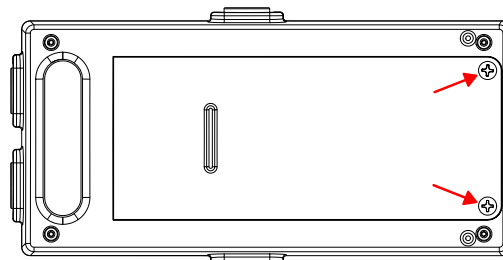


Figure 2: Position of battery door screws.

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/software/sparkvue

PASCO Capstone

Software: Help > PASCO Capstone Help

Online: help.pasco.com/software/pasco-capstone

Chemvue

Software:  Main Menu > Help

Online: help.pasco.com/software/chemvue

Specifications and accessories

Visit the product page at [pasco.com/product/PS-4254](https://www.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](https://www.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](https://www.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.

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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.