AC/DC Smart Power Supply

PI-9525

Introduction

The AC/DC Smart Power Supply provides high power DC and AC signals, capable of powering motors, wave drivers, and circuits. The device is controlled via PASCO Capstone or SPARKvue software, to which it can be connected via Bluetooth or USB, making it possible for Chromebook, Android, and Apple iOS device users to perform experiments with wireless sensors that require a power source. The device can output up to 10 V at 1 A of current at a maximum output frequency of 100 kHz. The device features a frequency resolution of 0.001 Hz.

Components

Included components:

- AC/DC Smart Power Supply
- Power adapter (15 V @ 2.67 A)
- USB-C-to-USB-A cable

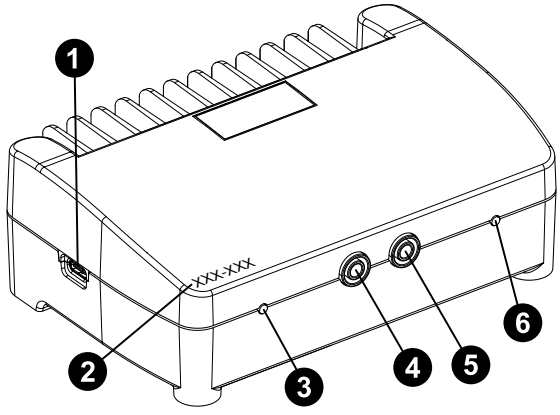
Required equipment and software:

- PASCO Capstone or SPARKvue software
- Banana plug patch cords, such as the 30 cm Banana Plug Cord Sets (SE-7123)

Compatible equipment:

- Mechanical Oscillator/Driver (ME-8750)
- Wave Driver (WA-9855)
- Energy Transfer - Calorimeter (ET-8499)
- String Vibrator (WA-9857A)

Features



1 USB-C port

Plug the included USB-C-to-USB-A cable in here when connecting the Smart Power Supply to the program via the cable.

2 Device ID

Use to identify the Smart Power Supply when connecting to the program via Bluetooth.

3 Bluetooth Status LED

Blinks red when the AC/DC Smart Power Supply is ready to pair. Blinks green when the device successfully pairs with PASCO Capstone or SPARKvue. This LED is disabled while the sensor is connected to a program via USB.

4 Ground output

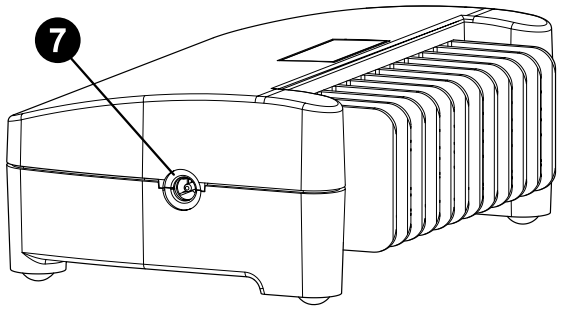
Connect the low potential end of a circuit to this port.

5 Voltage output

Connect the high potential end of a circuit to this port.

6 Power LED

Lights up red when the device is first connected to a power supply, then turns green to indicate that the device is powered. During use, the LED will turn red to indicate that the current limit has been reached.



7 Power jack

Connect the power adapter here to power the device. The device has no power button, and output is disabled until activated through software.

Get the software

You can use the Smart Power Supply with SPARKvue or PASCO Capstone 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** 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

Check for a firmware update

SPARKvue

1. Connect the Smart Power Supply to a standard wall outlet.
2. Open SPARKvue, then select **Sensor Data** on the Welcome Screen.

3. From the list of available devices, select the device that matches your power supply'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. Connect the Smart Power Supply to a standard wall outlet.
2. Open PASCO Capstone and click **Hardware Setup** from the Tools palette.
3. From the list of available devices, select the device that matches your power supply'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.

Usage

Software setup

SPARKvue:

1. Using the included power adapter, connect the AC/DC Smart Power Supply to a standard wall outlet. The device will automatically turn on.
2. Start SPARKvue, then select **Sensor Data** on the main menu.
3. Use one of the following options to connect the AC/DC Smart Power Supply to the program:
    - From the list of available Bluetooth devices, select the device with a device ID matching the one printed on your Smart Power Supply.
    - Connect one end of the included cable to the USB-C port on the Smart Power Supply, then connect the other end of the cable to a USB-A port or powered USB hub on your computer.
4. Select "**Signal Generator and Scope**" in the Quick Start Experiments column.

PASCO Capstone:

1. Using the included power adapter, connect the AC/DC Smart Power Supply to a standard wall outlet. The device will automatically turn on.
2. Start Capstone, then select **Hardware Setup** in the **Tools** palette on the left.
3. Use one of the following options to connect the AC/DC Smart Power Supply to the program:
    - From the list of available Bluetooth devices, select the device with a device ID matching the one printed on your Smart Power Supply.
    - Connect one end of the included cable to the USB-C port on the Smart Power Supply, then connect the other end of the cable to a USB-A port or powered USB hub on your computer.
4. If desired, set up a display to monitor the output voltage or frequency of the Smart Power Supply.
5. Select **Signal Generator** in the **Tools** palette.

Output a signal

Once you have connected the Smart Power Supply to SPARKvue or Capstone, you can use the program to output an AC signal or DC current from the device. The following parameters of the signal can be adjusted within the program:

- **Waveform:** Controls the overall shape of the wave. The possible output options are a sine wave (**Sine**), a square wave (**Square**), a square wave with only a positive component (**Positive Square Wave**), a triangle wave (**Triangle**), and DC current (**DC**).
- **Frequency:** Controls the frequency of the AC signal.
- **Duty Cycle:** Controls the percentage of the wavelength a square wave or positive square wave spends at its maximum voltage. This setting is not accessible if Waveform is set to "Sine" or "Triangle".
- **Amplitude:** Controls the absolute value of maximum and minimum voltage for the AC signal.
- **Voltage Limit:** Limits the maximum amount of voltage which can be output by the Smart Power Supply.
- **DC Voltage:** Controls the voltage of the DC output. This option will only appear if "DC" is selected for Waveform and is the only option accessible in this mode.

Once you have set the parameters as desired, you can enable or disable the Smart Power Supply's output by pressing the **On** and **Off** buttons at the bottom of the tool. You can also check the **Auto** box to make the Smart Power Supply begin outputting the signal when data collection begins and stop when data collection ends. For more information on using these tools, see the PASCO Capstone or SPARKvue online help.

Measurements

The output of the Smart Power Supply can be measured using two internal sensors, which report the output voltage and output frequency from the device. The voltage and frequency measurements can be used in calculations or plotted on displays within the software. The frequency measurement has a maximum sample rate of 100 Hz, and the voltage measurement has a maximum sample rate of 20 kHz when recording, or 100 kHz when the program is in oscilloscope monitoring mode.

> **NOTE:** The voltage measurement's maximum sample rate is comparable to the maximum frequency which can be output by the Smart Power Supply. Therefore, if outputting a signal with a frequency near this limit, you will need an external voltage sensor capable of a sample rate much higher than 100 kHz in order to collect accurate voltage data.

Current limit

The AC/DC Smart Power Supply is designed with a current limit that prevents the output current from exceeding 1 A. If this limit is reached, the voltage will be capped at the value that produces a 1 A current. (Note that this may cause the shape of the measured output signal to be distorted from what is expected.) If this happens, the Power LED on the device will turn red and the signal generator controls in the software will display the message "Current Limited".

Code with Blockly

The AC/DC Smart Power Supply can also be controlled using Blockly, the visual coding language accessible in the **Code** tool in both PASCO Capstone and SPARKvue. The device is compatible with the signal generator outputs in the **Hardware** section, which includes blocks for automatically changing the output frequency and enabling or disabling output. The measurements of voltage and frequency can also be accessed in Blockly. The Code Library also contains preconstructed programs which allow the device to step through the resonant frequencies of a string vibrator or output a voltage ramp. For more information on using Blockly, see the PASCO Capstone or SPARKvue online help.

Software help

The SPARKvue and PASCO Capstone 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

Specifications and accessories

Visit the product page at pasco.com/product/PI-9525 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/PI-9525.

Technical support

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

Have questions?

Ask from PASCO's Global Science Education Partner in Estonia - DIFI.NET OÜ

ask@ste.education

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https://ste.education/

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.