

# Wireless Blood Pressure Sensor

PS-3218

Sensor:

## Introduction

The Wireless Blood Pressure Sensor is a digital sphygmomanometer that uses an electronic pressure sensor to measure the mean arterial pressure. Data collection software uses this measurement to calculate systolic and diastolic blood pressure, as well as heart rate. The blood pressure cuff consists of an inflatable bladder connected by one hose to a hand pump bulb and by a second hose to the pressure sensor box.

**NOTE:** This is NOT a medical device. The Wireless Blood Pressure Sensor is designed for educational use *only* and should not be used in any medical process such as life support or patient diagnosis. It is also not intended for use in graduate research or industry, including industrial control or any type of industrial testing.

## Equipment

### Included equipment:

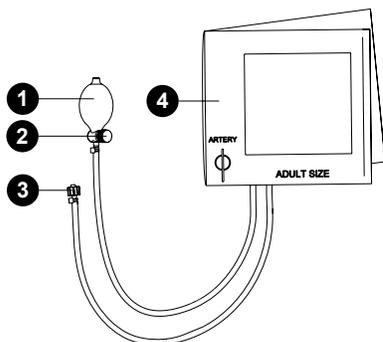
- Wireless Blood Pressure Sensor
- Blood Pressure Cuff, Standard
- Micro USB cable

### Required equipment:

- PASCO Capstone or SPARKvue data collection software

## Features

### Blood Pressure Cuff:



#### 1 Bulb

Squeeze the bulb rapidly to add pressure to the cuff.

#### 2 Release valve

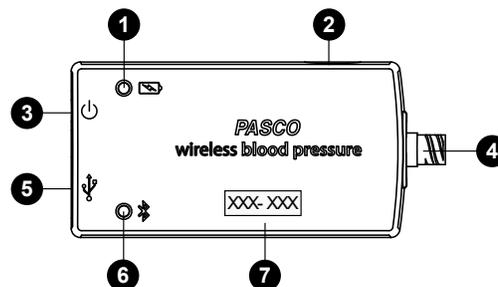
Press and hold the button to release pressure from the cuff. In the center of the button is a screw that can be tightened or loosened to adjust the pressure release rate.

#### 3 Luer connector

Connects to the luer connector on the sensor.

#### 4 Cuff

Wraps around the upper left arm. Align the white index line on the cuff over the main artery on the inside of the arm.



#### 1 Battery Status LED

Indicates the battery level and charging status.

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

#### 2 ¼-20 threaded hole

Use to mount the sensor, such as to a mounting rod.

#### 3 Power button

Press and briefly hold to turn the sensor on or off.

#### 4 Luer connector

Connects to the luer connector on the blood pressure cuff.

#### 5 USB port

Use with the USB cable to connect to a USB wall charger to charge the battery. You can also use the port to send measurement data to software when connected to the USB port of a computing device. (This connection method is not supported by iOS.)

#### 6 Bluetooth Status LED

Indicates the status of the Bluetooth connection.

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

For more information on remote data logging, see the SPARKvue or PASCO Capstone online help.

**NOTE:** The Bluetooth Status LED is disabled when the sensor is connected to the software via USB.

#### 7 Device ID

Use to identify the sensor when connecting via Bluetooth.

## Getting started

Complete these tasks before using the sensor in the classroom.

### Charge the battery

Charge the battery by connecting the micro USB port to any standard USB charger. 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 or PASCO Capstone software. If you're not sure which to use, visit [pasco.com/products/guides/software-comparison](https://www.pasco.com/products/guides/software-comparison).

SPARKvue is available as a free app for Chromebook, iOS, and Android devices. We offer a free trial of SPARKvue and Capstone for Windows and Mac. To get the software, go to [pasco.com/downloads](https://www.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. Press the power button until the LEDs turn on.
2. Open SPARKvue, then 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.

## Using the sensor

Using the sensor requires two people, as you can't measure your own blood pressure. You will need a partner to attach the cuff to your arm, inflate the cuff, and collect data.

### Set up the hardware

1. Insert the luer connector on the sensor into the connector on the blood pressure cuff. Turn the connector until it is finger-tight.
2. Press and hold the push-button release valve to release all air in the cuff.
3. Wrap the cuff snugly around the upper left arm above the elbow, as shown in Figure 1.

 **NOTE:** Remove any constrictive clothing or jewelry that may interfere with the cuff placement.

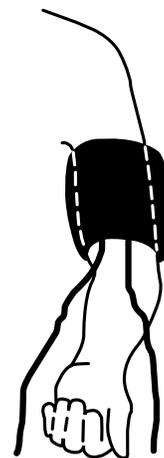


Figure 1. Cuff placement on the arm.

4. Position the cuff's bottom edge about 3 cm above the elbow pit. Rotate the cuff to position the white index line on the cuff over the main artery on the inside of your left arm.
5. Use the hook-and-loop material to hold the cuff in place.
6. Allow the two tubes to hang down, one on each side of the arm.

### Set up the software

#### SPARKvue:

1. Turn on the Wireless Blood Pressure Sensor.
2. Open SPARKvue, then click **Sensor Data**.
3. Connect the sensor to SPARKvue via Bluetooth or USB.
  - **Bluetooth:** From the list of available wireless devices, select the Wireless Blood Pressure Sensor with a device ID matching the one printed on your sensor.
  - **USB:** Using the included USB cable, connect the sensor's micro USB port to a USB port or powered USB hub on your computing device. SPARKvue will automatically detect and connect to the sensor.
4. In the list of Quick Start Experiments, select **Monitoring Blood Pressure**.

## PASCO Capstone:

1. Turn on the Wireless Blood Pressure Sensor.
2. Open Capstone, then click **Hardware Setup**.
3. Connect the sensor to Capstone via Bluetooth or USB.
  - **Bluetooth:** From the list of available wireless devices, select the Wireless Blood Pressure Sensor with a device ID matching the one printed on your sensor.
  - **USB:** Using the included USB cable, connect the sensor's micro USB port to a USB port or powered USB hub on your computing device. Capstone will automatically detect and connect to the sensor.
4. In the main experiment window, select the **Monitoring Blood Pressure** Quick Start Experiment.

## Collect data

1. Click **Start** (SPARKvue) or **Record** (PASCO Capstone) to begin data collection.
2. Have your partner rapidly pump air into the cuff until the pressure reaches approximately 170 mmHg.

**CAUTION:** Do not raise the pressure above 200 mmHg. If there is discomfort, press and hold the push-button on the release valve to deflate the cuff.

3. Remain as still as possible while data is collected. The cuff pressure automatically deflates at a rate between 2 and 5 mmHg per second.

**NOTE:** If the pressure is not deflating between 2 and 5 mmHg per second, adjust the release rate by turning the adjustment screw on the pressure release valve. Turn the screwdriver clockwise to decrease the rate, or turn counterclockwise to increase the rate.

4. Stop collecting data when the systolic and diastolic pressure measurements appear in the digits display (about 30-60 seconds after starting data collection).

**NOTE:** If the pressure measurements do not appear, try the following troubleshooting steps:

- Adjust the pressure release rate so that it is between 2 and 5 mmHg per second.
- Check the cuff placement on the arm (see Figure 1).
- Try inflating the cuff at a faster rate.
- Use a different cuff size (sold separately).

5. Release the remaining air in the cuff by pressing the push-button release valve on the bulb.

## Analyzing blood pressure

The Wireless Blood Pressure Sensor uses the oscillometric technique to estimate blood pressure. When the oscillations of pressure in a blood pressure cuff are recorded during gradual deflation, the point of maximal oscillation corresponds to the mean intra-arterial pressure. The oscillations begin at approximately systolic pressure and continue below diastolic, so the systolic and diastolic pressure can only be estimated indirectly according to an empirically derived algorithm.

Systolic pressure is the pressure of the blood on the artery walls when it leaves the ventricles at peak ventricular contraction, when the heart is emptying its chambers of blood. It is the "top number" of the blood pressure ratio. Normal systolic pressure is approximately 120 mmHg for a male and approximately 110 mmHg for a female.

Diastolic pressure is the pressure of the blood on the artery walls when the ventricles relax and the heart's chambers fill with blood. It is the "bottom number" of the blood pressure ratio. Normal diastolic pressure is approximately 80 mmHg for a male and approximately 70 mmHg for a female.

To find the systolic and diastolic blood pressure manually:

1. Zoom in on an area of the pressure measurement between 120 and 60 mmHg. (For information on how to zoom in on a section of data, see the PASCO Capstone or SPARKvue online help.)
2. Identify when your data *begins* to form small oscillations. This is your systolic pressure.
3. Identify when your data *stops* forming small oscillations. This is your diastolic pressure.

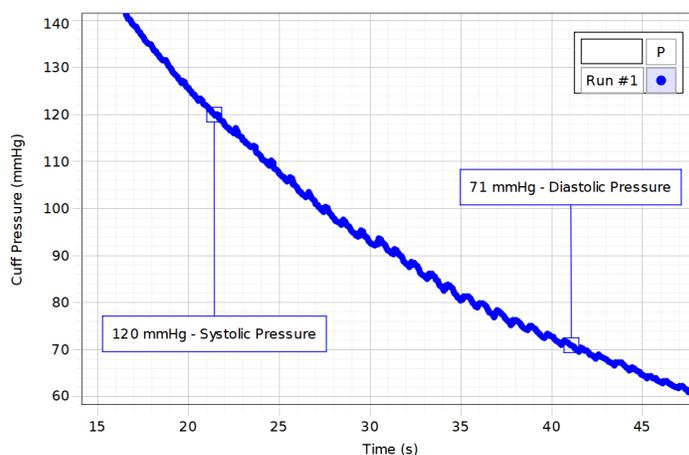


Figure 2. Example data showing how to find systolic pressure (left) and diastolic pressure (right) manually.

## 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](http://help.pasco.com/sparkvue)

### PASCO Capstone

**Software:** Help > PASCO Capstone Help

**Online:** [help.pasco.com/capstone](http://help.pasco.com/capstone)

## Specifications and accessories

Visit the product page at [pasco.com/product/PS-3218](http://pasco.com/product/PS-3218) 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-3218](http://pasco.com/freelabs/PS-3218).

## 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](http://pasco.com)

 Phone 1-800-772-8700 x1004 (USA)  
+1 916 462 8384 (outside USA)

 Email [support@pasco.com](mailto:support@pasco.com)

### Limited warranty

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