PASCO PS-3216 Wireless Load Cell and Accelerometer User Guide

Product Guide | 012-15734B

Contents

Wireless Load Cell (PS-3216)

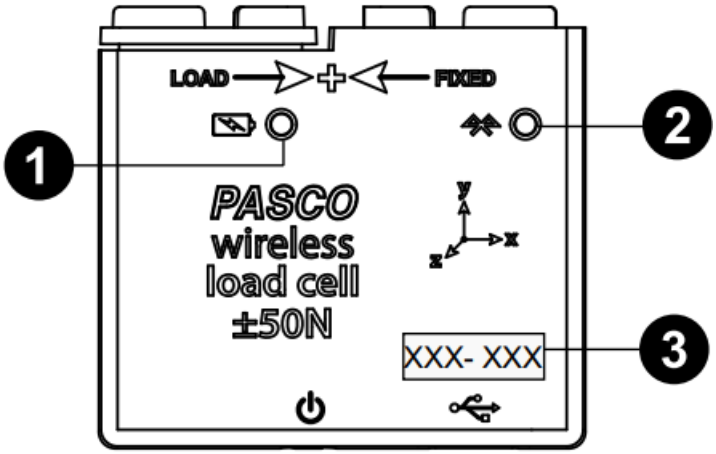
Introduction

The Wireless Load Cell is a combination wireless and USB sensor that connects to a computer or tablet device through Bluetooth, and can also connect to a computer via the included micro USB cable. The sensor measures force up to ±50 newtons (N) and acceleration up to ±16 g (where g is the gravitation acceleration and 1 g = 9.8 m/s2). The sensor measures compression and tension forces in any component of the PASCO Structures System as a push or pull along its x-axis and measures acceleration in three dimensions (x, y, and z). PASCO Capstone or SPARKvue data collection software can display the compression or tension forces, the acceleration in any of the three dimensions, and the resultant acceleration. The sensor uses a micro-electromechanical system (MEMS) device.

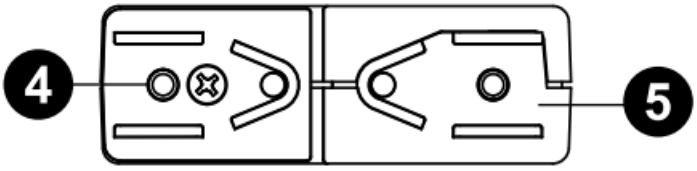
The sensor is designed to optimize the battery usage time. Since each sensor has a unique device ID number, more than one can be connected to a single computer or tablet at the same time.

Features

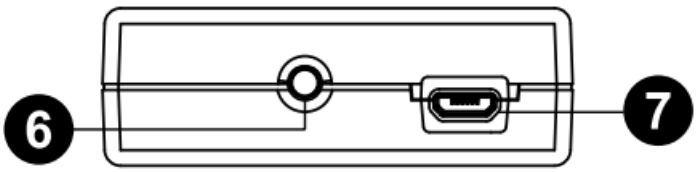
Front view



Top view



Bottom view



1 Battery Status LED
Indicates the status and charge level of the sensor's battery.

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

2 Bluetooth Status LED
Indicates the status of the sensor's Bluetooth connection.

Battery LED	Status
Red blink	Ready to pair
Green blink	Connected
Yellow blink	Logging data

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

NOTE: The Bluetooth Status LED is disabled when the sensor is connected to a computer via the micro USB cable.

3 Device ID
Use this to identify the sensor when connecting to it via Bluetooth.

4 LOAD side
This side is connected to the internal load cell and is used to attach to the component which is expected to move or shift.

5 FIXED side
This side is fixed in place and is used to attach to the component which is expected to remain stationary.

6 ON/OFF button
Press to turn the sensor on. Press and briefly hold to turn the sensor off. To preserve battery, the sensor automatically turns itself off after several minutes of inactivity if not connected.

7 Micro USB port
Use this with the included micro USB cable (not pictured) to connect the sensor to a USB charger. The port and cable can also be used to directly connect the sensor to a computer without the use of Bluetooth. This connection method is not supported by iOS.

Included hardware:

- Wireless Load Cell (PS-3216)
- Micro USB cable

Initial step: 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.

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 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

Go to Main Menu **> Check for Updates**

PASCO Capstone
Go to **Help > Check for Updates.**

Check for a firmware update

SPARKvue

1. Press the power button until the LEDs turn on.
2. Open SPARKvue.
3. Select **Sensor Data** on the Welcome Screen.

4. From the list of available devices, select the sensor that matches your sensor's device ID. A notification appears if a firmware update is available. Click **Yes** to update the firmware.
5. Close SPARKvue once the update is complete.

PASCO Capstone

1. Press and hold the power button until the LEDs turn on.
2. Open PASCO Capstone.
3. Click **Hardware Setup**.

4. From the list of available devices, select the sensor that matches your sensor's device ID. A notification appears if a firmware update is available. Click **Yes** to update the firmware.
5. Close Capstone once the update is complete.

Set up the software

SPARKvue

Connecting the sensor to a tablet or computer via Bluetooth:

1. Turn on the Wireless Load Cell. 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 Wireless Load Cell.

Connecting the sensor to a computer via micro USB cable:

1. Open SPARKvue, then click **Sensor Data**.
2. Connect the provided micro USB cable from the micro USB 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. From the **Quick Start Experiments** list, select **Load Cell Force.** This will automatically open an Experiment Screen containing a Graph display, a Digits display, and a Meter display, all measuring **Force.**
2. Click **Start** to begin recording data.

PASCO Capstone

Connecting the sensor to a computer via Bluetooth:

1. Turn on the Wireless Load Cell. Check to make sure the Bluetooth Status LED is blinking red.
2. Open 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 Wireless Load Cell.

Connecting the sensor to a computer via micro USB cable:

1. Open Capstone. If desired, open **Hardware Setup** to check the connection status of the sensor.
2. Connect the provided micro USB cable from the micro USB 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. To assign measurements to the graph's axes, click each **<Select Measurement>** box and select an appropriate measurement from the list.
3. Click **Record** to begin collecting data.

Set up the hardware

Connecting structure members

The Wireless Load Cell is designed to work with the PASCO Structures Systems, such as the Building Better Bridges Kit (ME-3581). The sensor can measure compression and tension forces in any member of the PASCO Structures Systems. Use thumbscrews to mount I-beams or other items from the Structures Systems to the Wireless Load Cell, as shown below.

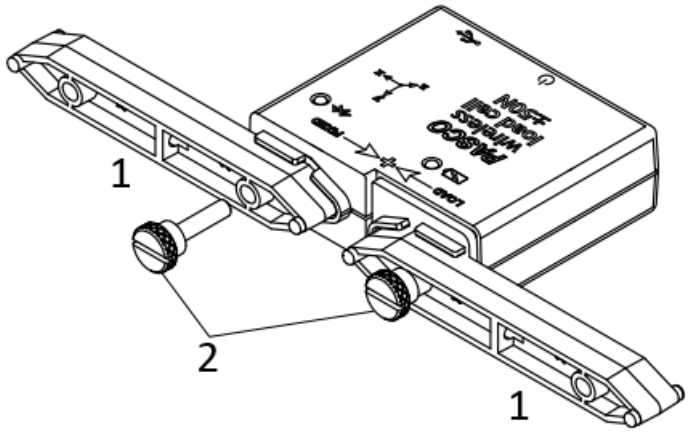
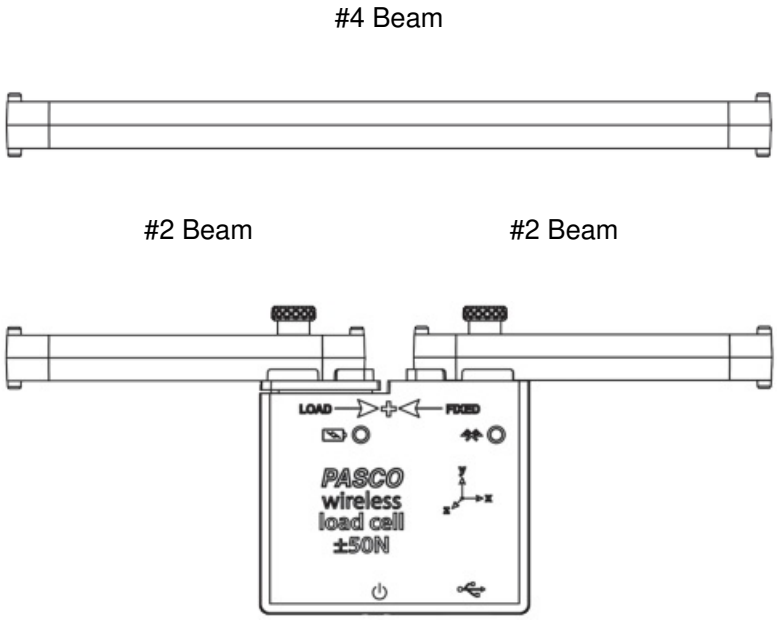


Figure 1. A pair of #2 I-beams being connected to the Wireless Load Cell.

1. #2 Beam
2. Thumbscrews

Adding Load Cells

To measure the tension and compression forces in individual members of a PASCO Structure, replace a beam with two shorter beams and a Wireless Load Cell, as shown below.



A Wireless Load Cell with two identical I-beams can be substituted into the Structure as follows:

- #5 beam = Load Cell + two #3 beams
- #4 beam = Load Cell + two #2 beams
- #3 beam = Load Cell + two #1 beams

TIP: When using Wireless Load Cells, leave the screws on the attached beams slightly loose. This will simplify the analysis by ensuring that the relevant members experience only tension and compression, without moments.

The picture below shows an example of a Wireless Load Cell connected into a PASCO Structures System.

Calibration

The Wireless Load Cell is calibrated at the factory and generally does not need to be recalibrated. However, it is possible to calibrate the force sensor using PASCO Capstone or SPARKvue if needed. For instructions on calibrating the sensor, see the PASCO Capstone or SPARKvue online help.

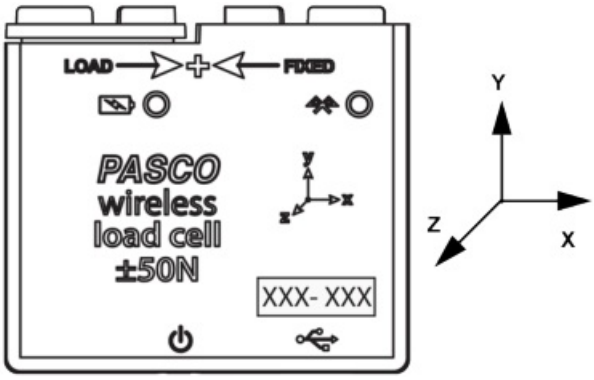
Direction of acceleration sensitivity

The acceleration sensing units inside the sensor are oriented so that the lines of greatest sensitivity follow the x, y, and z arrows indicating the direction of acceleration. Note that the software calculates the magnitude of the resulting acceleration $\mathbf{a_R}$ based on the individual values $\mathbf{a_x}$, $\mathbf{a_y}$, and $\mathbf{a_z}$ using the following equation:

$$a_R = \sqrt{a_x^2 + a_y^2 + a_z^2}$$

As seen in the image below, when the sensor is held with the LOAD and FIXED sides pointing upward, the x-axis direction is horizontal, the y-axis direction is vertical, and the z-axis direction is perpendicular to the label on the front of the sensor.

Note that a compression force (LOAD side pushed toward FIXED side) is measured as being positive, and a tension force (LOAD side pulled away from FIXED side) is measured as being negative.



Zero (tare) the sensor

At the beginning of an experiment, the measurement from the sensor may not read as zero when the load (force) is actually zero. This is a normal behavior that is corrected when you zero (or tare) the sensor using PASCO Capstone or SPARKvue. For information on the procedure to zero the sensor, see the Capstone or SPARKvue online help and search for "**Zero sensor data**".

IMPORTANT: Zeroing of the acceleration sensor should only be done if you are measuring acceleration in only a single direction, as zeroing this sensor will cause the other two acceleration measurements to no longer report accurate values.

Troubleshooting

- If the sensor loses Bluetooth connection and will not reconnect, try cycling the ON button. Press and briefly **hold** the button until the LEDs blink in sequence, then release the button. Start the sensor in the usual way.
- If the sensor stops communicating with the computer software or tablet application, try restarting the software or application. If the problem persists, press and **hold** the ON button for 10 seconds, then release the button and start the sensor in the usual way.
- If the previous steps do not fix a connection problem, turn Bluetooth off and then back on for your computer or tablet, then retry.

About the battery

The Wireless Load Cell's battery is partially charged at the factory. If the battery status LED blinks red, use the micro USB cable to connect the sensor to a USB port or USB charger.

Maximizing battery life

One factor that affects battery life is the storage temperature. Therefore, to maximize battery life, avoid storing the sensor in very cold or very hot environments.

Specifications and accessories

Visit the product page at **pasco.com/product/PS-3216** 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 editable student handouts and teacher notes. Visit **pasco.com/freelabs/PS-3216**.

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

Regulatory information

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.

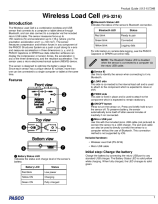
FCC statement
This device complies with part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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.

PASCO

Documents / Resources

	PASCO PS-3216 Wireless Load Cell and Accelerometer [pdf] User Guide PS-3216, Wireless Load Cell and Accelerometer, PS-3216 Wireless Load Cell and Accelerometer, PS-3216 Wireless Load Cell, PS-3216 Accelerometer, Accelerometer

References

- PASCO scientific | Science Lab Equipment and Teacher Resources
- Popular Downloads | PASCO
- Lab Experiment Library - Resources | PASCO
- Wireless Load Cell and Accelerometer - PS-3216 - Products | PASCO
- Software Comparison: SPARKvue or Capstone? | PASCO
- Privacy Policies | PASCO
- Wireless Load Cell and Accelerometer - PS-3216 - Products | PASCO
- Privacy Policies | PASCO