Wireless Pressure Sensor
PS-3203

Hardware

<table>
<thead>
<tr>
<th>Included Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless Pressure Sensor (PS-3203)</td>
<td>1</td>
</tr>
<tr>
<td>Micro USB Cable (1 meter)</td>
<td>1</td>
</tr>
<tr>
<td>A. In-line Connector</td>
<td>1</td>
</tr>
<tr>
<td>B. Male Luer Connector</td>
<td>2</td>
</tr>
<tr>
<td>C. Female Luer Connector</td>
<td>1</td>
</tr>
<tr>
<td>D. Polyurethane Tubing (1/8&quot; ID)</td>
<td>2 feet (60 cm)</td>
</tr>
<tr>
<td>E. Syringe, 60 cubic centimeter</td>
<td>1</td>
</tr>
</tbody>
</table>

Introduction

The Wireless Pressure Sensor is a combination wireless and USB sensor that connects to a computer or tablet device through Bluetooth® and can also connect to a computer with a USB cable (included). The sensor measures pressure in the range between 0 kilopascals (kPa) and 400 kPa (approximately four atmospheres).

The Wireless Pressure Sensor includes connectors, plastic tubing, and a 60 cubic centimeter (cc) syringe. The sensor can be connected to the syringe or other items such as a stopper with the connectors and tubing.
Data Collection Software

PASCO Capstone    SPARKvue

- Mac OS X
- Windows
- iOS
- Android
- Chromebook

See the PASCO web site at

www.pasco.com/software

for help in selecting the right PASCO software and to check the latest versions.

Software Help

See the SPARKvue Help or PASCO Capstone Help for information about collecting, displaying, and analyzing data.

- In SPARKvue, select the HELP button ( ) in any screen including the Home Screen.
- In PASCO Capstone, select PASCO Capstone Help from the Help menu, or press F1.

Bluetooth® Compatibility

For more information about wireless compatibility, see the PASCO website at:

www.pasco.com/compatibility

<table>
<thead>
<tr>
<th>Platform</th>
<th>Bluetooth SMART Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>iOS</td>
<td>iPad 3 and later&lt;br&gt;iPhone 4S and later&lt;br&gt;iPod touch 5 and later</td>
</tr>
<tr>
<td>SPARK Element</td>
<td>All models</td>
</tr>
<tr>
<td>Android</td>
<td>Android 4.3 and later</td>
</tr>
<tr>
<td>Chromebook</td>
<td>Chrome OS (requires PS-3500 Adapter*)</td>
</tr>
<tr>
<td>Mac OS X</td>
<td>Models introduced July 2011 or later*</td>
</tr>
<tr>
<td>Windows</td>
<td>Windows 7 and later (requires PS-3500 Adapter*)</td>
</tr>
</tbody>
</table>

See Appendix A for more information about the PS-3500 Adapter and Mac OS X models.

Initial Step: Charge the Battery

Connect the Cable: Use the Micro USB Cable to connect the micro USB port on the sensor to a USB port or USB charger such as the PASCO PS-3501 USB Charging Station. Charging begins automatically. The charger circuit inside the sensor turns itself off when the unit is fully charged. The battery status LED will shine yellow as the battery is charging, and will shine green when the battery is charged. The battery is partially charged at the factory. Initial charging time may be three hours or longer depending on the power source and the condition of the battery.

LED Information

The Bluetooth and the Battery Status LEDs operate as follows:

For a wireless Bluetooth connection:

<table>
<thead>
<tr>
<th>Bluetooth LED</th>
<th>Status</th>
<th>Battery LED</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blink</td>
<td>Ready to pair</td>
<td>Red blink</td>
<td>Low power</td>
</tr>
<tr>
<td>Green blink</td>
<td>Connected</td>
<td>Yellow ON</td>
<td>Charging</td>
</tr>
<tr>
<td>Yellow blink</td>
<td>Logging*</td>
<td>Green ON</td>
<td>Charged</td>
</tr>
</tbody>
</table>

For a micro USB cable connection to a USB port:

<table>
<thead>
<tr>
<th>Bluetooth LED</th>
<th>Status</th>
<th>Battery LED</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>--</td>
<td>Yellow ON</td>
<td>Charging</td>
</tr>
<tr>
<td>Yellow blink</td>
<td>Logging*</td>
<td>Green ON</td>
<td>Charged</td>
</tr>
</tbody>
</table>

For a micro USB cable connection to a USB charger:

<table>
<thead>
<tr>
<th>Bluetooth LED</th>
<th>Status</th>
<th>Battery LED</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red blink</td>
<td>Ready to pair</td>
<td>Yellow ON</td>
<td>Charging</td>
</tr>
<tr>
<td>Green blink</td>
<td>Connected</td>
<td>Green ON</td>
<td>Charged</td>
</tr>
<tr>
<td>Yellow blink</td>
<td>Logging*</td>
<td>Yellow ON</td>
<td>Charging</td>
</tr>
</tbody>
</table>

*Logging: PASCO wireless sensors can either stream live data to a compatible device or log data (save it to the sensor’s memory). The data can then be uploaded to the device for display and analysis at a later time. Logging capability supports long-term or remote data collection while not connected to the device.
Set Up the Software

Note: Versions of SPARKvue and PASCO Capstone available in 2016 will support logging. Check the PASCO Web page at:

www.pasco.com/software

for the latest software version.

ON/OFF Information

To turn the sensor off, press and hold the ON button for a moment until the status LEDs stop blinking. The Wireless Pressure Sensor puts itself to sleep after 1 hour of inactivity if connected, and after several minutes if not connected.

Set Up the Software

SPARKvue

Connecting the Wireless Sensor to a Tablet or a Computer via Bluetooth

• For SPARKvue, select the Bluetooth icon ( ). In the Wireless Devices list. The sensors are ordered by proximity to the device. Select the correct address that matches the Device ID XXX-XXX number found on the sensor. Select Done.

Connecting the Wireless Sensor to a Computer with the Micro USB Cable

• Connect the micro end of the included Micro USB Cable into the micro USB port on the end of the sensor. Connect the other end of the Micro USB Cable to a USB port on the computer, or into a powered USB hub connected to the computer.

• In the SPARKvue Home Screen, select a measurement from the list under the sensor’s name. A graph of the measurement versus time opens.

Collecting Data

• Select the Start button to begin collecting data.

PASCO Capstone

Connecting the Wireless Sensor to a Tablet or a Computer via Bluetooth

• For PASCO Capstone, select Hardware Setup in the Tools palette. In Hardware Setup the sensors are ordered by proximity to the device. Select the address that matches the Device ID XXX-XXX number on the sensor.

Connecting the Wireless Sensor to a Computer with the Micro USB Cable

• Connect the micro end of the included Micro USB Cable into the micro USB port on the end of the sensor. Connect the other end of the Micro USB Cable to a USB port on the computer, or into a powered USB hub connected to the computer.

• In PASCO Capstone, select a display in the main window or from the Displays palette. In the display, use the <Select Measurement> menus to pick the measurement to be shown.

Collecting Data

• Select Record to begin recording data.

Troubleshooting the Wireless Pressure Sensor

• If the Wireless Pressure Sensor loses Bluetooth connection and will not reconnect, try cycling the ON button. Press and briefly hold the button until the status LEDs blink in sequence, and 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 remains, press and hold the ON button for 10 seconds and then release. Start the sensor in the usual way.

• Turn Bluetooth off and then back on. Retry.

Set Up the Hardware

Connecting the Syringe or Other Device

CAUTION: To avoid breaking the sensor or the syringe, do not screw the end of the syringe directly onto the Luer connector on the end of the Wireless Pressure Sensor.

To connect the sensor and syringe with a piece of plastic tubing between them, carefully cut the plastic tubing to the desired length. Put the end of a male Luer connector into one end of the tubing and the female Luer connector into the other end of the tubing. NOTE: Use a small drop of glycerin on the small end of each Luer connector so that the plastic tubing slides on more easily. Connect the male Luer end of the tubing to the sensor. Connect the syringe to the female Luer end of the tubing.
**Stopper**

To connect the sensor to a one-hole rubber stopper with a piece of plastic tubing between them, cut the plastic tubing to the desired length. Put a male Luer connector into one end of the tubing, and the small end of the in-line connector into the other end of the tubing. Insert the in-line connector into the one-hole stopper.

**Other Luer-compatible Device**

To connect the sensor to another device that has a female Luer connector with a piece of plastic tubing between them, cut the plastic tubing to the desired length. Put a male Luer connector into each end of the piece of tubing. Put the male Luer connector on one end of the tubing onto the sensor and the other end of the tubing onto the female Luer connector on the other device.

**Mounting the Sensor**

The Wireless Pressure Sensor housing includes a threaded hole (1/4-20) on one side. Screw a PASCO Mounting Rod (ME-9483 10 pack) into the threaded hole, and use clamps and support rods to hold the sensor in place.

**About the Battery**

The Wireless Pressure Sensor’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 a USB charger.

**Battery Usage**

Battery life is very important to making the sensor simple and always ready to use, so all of the PASCO wireless products are designed for long battery life. For example, the sensor turns itself off after a few minutes of inactivity.

The battery life between charges for the Pressure Sensor varies depending on the sampling rate. The battery life ranges between 11 hours for high sample rates to more than 70 hours for low sample rates.

In typical classroom/lab use, this would translate to a battery life between charges ranging from one to four weeks or more, because full-day continuous sampling would be unusual. Even in the most extreme case with a high sample rate, the Pressure Sensor battery would support a full day of use before needing to recharge.

**Maximizing Battery Life**

One factor that affects battery life is the storage temperature and the number of charge cycles. Therefore, avoid storing the sensor in very cold or very hot environments.

**Related Products**

The PS-3503 Pressure Sensor Accessories Kit is designed to work with the PS-3203 Wireless Pressure Sensor. The kit includes the following:

- Storage box (nine compartment)
- Polyurethane tubing, 1/8” ID (6 feet)
- Plastic “Tees” for 1/8” tubing (6)
- Tubing connectors, 1/8” to 3/16” (12)
- Male Luer locks (6)
- Stopcocks, one-way (6)
- Non-valved coupling inserts (6)
Suggested Experiments
Practically any experiment that uses a pressure measurement can be done with the PS-3203 Wireless Pressure Sensor. See the PASCO Web site at www.pasco.com/products/lab-manuals for more information about experiments.

Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0-400 kPa</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 kPa</td>
</tr>
<tr>
<td>Accuracy</td>
<td>±2 kPa</td>
</tr>
</tbody>
</table>

Technical Support
For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100
Phone: +1 916 462 8384 (worldwide)
8700-772-8700 (U.S.)
Web: www.pasco.com
Email: support@pasco.com

The Reference Guide will be updated periodically. For the latest revision of this Reference Guide, visit the PASCO Web site at www.pasco.com/manuals and enter the product number, PS-3203, in the text window.

Replacement Parts
For information about possible replacement parts, contact Technical Support:

USB Cable, Micro-to-USB A
In-line Connector
Male Luer Connector
Female Luer Connector
Plastic Tubing
Syringe, 60 cc

Limited Warranty
For a description of the product warranty, see the PASCO catalog. For more information visit www.pasco.com/legal.

Copyright
This PASCO scientific Reference Guide is copyrighted with all rights reserved. Permission is granted to non-profit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited.

Trademarks
PASCO, PASCO scientific, PASCO Capstone, PASPORT, and SPARKvue are trademarks or registered trademarks of PASCO scientific, in the United States and/or in other countries. All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of their respective owners. For more information visit www.pasco.com/legal.

FCC Statement
This Class A digital 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.

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

Product End of Life Disposal Instructions:
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/disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol (to the right) and on the product or its packaging indicates that this product must not be disposed of in a standard waste container.

Battery Disposal Instructions:
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 Lithium Polymer (Li-Poly) rechargeable battery used in this product is marked with the International symbols to indicate the need for the separate collection and recycling of batteries.
Appendix: Bluetooth® Compatibility

Check the PASCO Web page at www.pasco.com/compatibility for the latest information on Bluetooth SMART compatibility.

*The PS-3500 USB Bluetooth 4.0 Adapter, when connected to a USB port, allows up to three Bluetooth SMART devices, such as this PASCO wireless device, to connect to Windows computers, Chromebooks, and older Macintosh computers.

Note: The PS-3500 USB Bluetooth 4.0 Adapter is the only adapter we can currently recommend. Many other Bluetooth 4.0 adapters are available but this adapter has a specific design that enables in-app pairing of Bluetooth SMART sensors.

To check the Mac computer’s Bluetooth compatibility, do the following:

- Click the (Apple) Menu.
- Select About This Mac
- Click the More Info… button.
- Click the System Report… button.
- Select Bluetooth from the sidebar on the left, underneath Hardware.
- Scan down the list of information until you find “LMP Version”.
- If your Mac is equipped with Bluetooth SMART, the LMP Version will show 0x6. (Anything lower than 0x6 means an older version of Bluetooth. Your device will need the PS-3500 USB Bluetooth 4.0 Adapter.)

1The Mac Mini and MacBook Air were updated with Bluetooth SMART support in 2011. The MacBook Pro was updated in 2012. The Mac Pro that debuted in December 2013 has Bluetooth SMART support.

Exception: Before you upgrade to El Capitan (Mac OS X 10.11.x), if you have a Macintosh with LMP version “0x4” that requires the PS-3500 USB Bluetooth 4.0 Adapter, please contact PASCO Technical Support for further instructions.

What is Bluetooth SMART®?

Bluetooth SMART (also known as Bluetooth Low Energy or Version 4.0 of the Bluetooth specification) is the latest protocol of the proprietary open wireless technology standard created by telecoms vendor Ericsson in 1994. It is the power- and application-friendly version of Bluetooth that was built for the Internet of Things (IoT).

---

<table>
<thead>
<tr>
<th>Platform</th>
<th>Bluetooth SMART Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>iOS</td>
<td>iPad 3 and later, iPhone 4S and later, iPod touch 5 and later</td>
</tr>
<tr>
<td>SPARK Element</td>
<td>All models</td>
</tr>
<tr>
<td>Android</td>
<td>Android 4.3 and later</td>
</tr>
<tr>
<td>Chromebook</td>
<td>Chrome OS (requires PS-3500 Adapter*)</td>
</tr>
<tr>
<td>Mac OS X¹</td>
<td>Models introduced July 2011 or later</td>
</tr>
<tr>
<td>Windows</td>
<td>Windows 7 and later (requires PS-3500 Adapter*)</td>
</tr>
</tbody>
</table>

¹The Mac Mini and MacBook Air were updated with Bluetooth SMART support in 2011. The MacBook Pro was updated in 2012. The Mac Pro that debuted in December 2013 has Bluetooth SMART support.