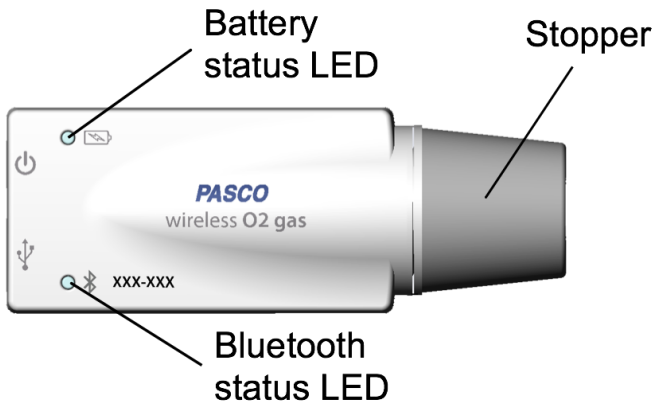
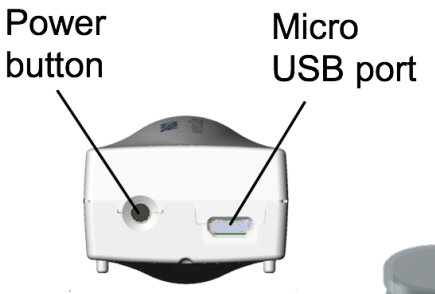
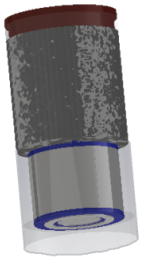
Wireless Oxygen Gas Sensor

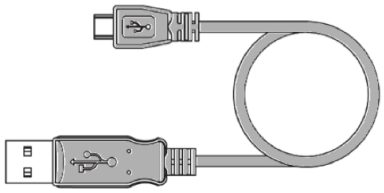
PS-3217







Sensing element (in storage bottle)



Micro USB cable

250 mL Sample bottle

Included Equipment	Part Number
Wireless Oxygen Gas Sensor	
Oxygen Gas Sensing Element	PS-3606
250 mL Sample Bottle	SE-6938
Micro USB Cable	PS-3584

Required Equipment

SPARKvue or PASCO Capstone software

Introduction

The Wireless Oxygen Gas Sensor measures oxygen gas concentration in percent (%) and parts per million (ppm) oxygen. The sensor also measures temperature, relative humidity, and absolute humidity. It can be used to study cellular respiration, photosynthesis, air quality, oxygen cycling, and the rate of oxygen production in chemical reactions.

Using the sensor for the first time

Perform the steps below when using the sensor for the first time. Detailed steps of each procedure are found in separate sections of the instruction sheet.

1. Install the sensing element.
2. Charge the battery.
3. Connect the sensor to software.
4. Calibrate the sensor.

To install the sensing element

1. Remove the stopper from the sensor by turning the stopper counterclockwise. Keep the gasket on the sensor. See Figure 1.

2. Remove the sensing element from the storage bottle, then connect it to the sensor. Do not touch the membrane on the top of the sensing element.

   NOTE: Make sure that the temperature and humidity sensor does not get wedged under the sensing element.

3. Attach the stopper back on the sensor.

The sensing element only needs to be installed when using the sensor for the first time. The sensing element will not need to be removed until replacement is necessary (at least two years).

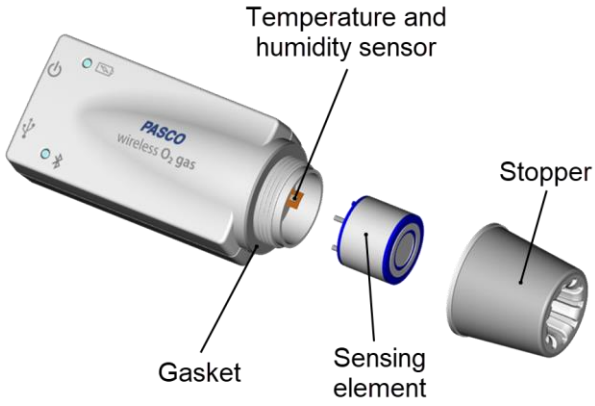


Figure 1. *Installation of the sensing element.*

To charge the battery

1. Connect the micro USB cable to the micro USB port on the sensor then connect the other end of the cable to a USB charger.

2. Allow the battery to charge for at least three hours. The battery status LED will turn green when fully charged.

NOTE: The sensor can remain connected to a power source when fully charged without damaging the battery. The sensor automatically stops charging the battery when fully charged.

To connect the sensor to software

The sensor automatically connects with the software when connected to a device via USB. Use the procedures below to connect the sensor to the software via Bluetooth.

SPARKvue

1. Press and hold the power button until the Bluetooth status LED starts flashing red.

2. Open SPARKvue and select Sensor Data.

3. Under Connected Devices, select the sensor that matches your device ID.

PASCO Capstone

1. Press and hold the power button until the Bluetooth status LED starts flashing red.

2. Open Capstone and click Hardware Setup.

3. Select the sensor that matches your device ID.

To calibrate the sensor

The sensor should be calibrated before using the sensor for the first time. It is not necessary to calibrate the sensor each time the sensor is used. Calibration is recommended if the O_2 Concertation reading for an atmospheric sample is greater than ±1% from 20.9%.

SPARKvue

1. Collect an atmospheric air sample (see the Collecting Samples procedure).

2. Connect the sensor to SPARKvue and set up data collection.

3. Select the Hardware Setup icon. 

4. Select the Calibration icon. 

5. Select Calibrate.

6. Select OK to confirm calibration.

PASCO Capstone

1. Collect an atmospheric air sample (see the Collecting Samples procedure).
2. Connect the sensor to Capstone.
3. In the Tools palette, click Calibration.
4. Select Concentration then click Next.
5. Select One Standard (1 point slope) then click Next.
6. Click Set Current Value to Standard Value.
7. Review the calibration then click Finish.

Collecting Samples

The sensing element will measure stable readings under constant temperature and pressure. It is recommended to not charge the sensor while collecting data due to heat generated during the charging process.

Before collecting data, do the following to acquire the best results:

- Charge the sensor until full.
- Turn on the sensor and wait three minutes for it to come to equilibrium.

NOTE:
- Do not allow the sensor to contact liquids.
- Do not clean the sampling bottle in a dishwasher or autoclave.

To collect an atmospheric air sample

NOTE: It is recommended to perform this procedure outside of a building to collect a fresh sample.

1. Hold the sample bottle upright and open to the air.
2. Insert the stopper of the sensor into the bottle to seal the bottle.

To collect expired air or other gas samples

1. Place the sensor inside a plastic bag.
2. Press any atmospheric air out of the bag.
3. Use a tube to fill the bag with the gas sample.
4. Secure the bag closed round the tube to contain the gas sample and exclude atmospheric air.

LED Status

The status LEDs operate as follows:

Bluetooth LED	Status
Red blink	Ready to be connected to software
Green blink	Connected to software
Yellow blink	Remotely logging data

Battery LED	Status
Red blink	Battery needs to be replaced soon
Green solid	Battery is fully charged
Yellow solid	Battery is charging

Storage

Under 20.9% ambient O_2, the lifetime of the sensing element is estimated to be 2 years or longer. The lifetime of the sensing element will be affected by several factors, including storage temperature, pressure, and availability of oxygen. It is recommended to cover the stopper with the included sample bottle or sensing element storage bottle when not in use. This will limit its exposure to oxygen and maximize the lifetime of the sensing element.

How the sensor works

The oxygen sensing element is a galvanic fuel cell with a gas permeable membrane at one end. The fuel cell contains an electrolyte, anode, and cathode. When oxygen enters the fuel cell through the membrane, a chemical reaction between the metallic cathode and anode and the electrolyte occurs. This chemical reaction produces a voltage. The voltage produced is proportional to the concentration of oxygen present.

Suggested Experiments

- Photosynthesis
- Cellular Respiration
- Oxygen cycling
- Enzyme Activity
- Fermentation
- Monitoring Air Quality

Specifications

Range	0 to 100 % O_2 concentration 0 to 1,000,000 ppm
Resolution	0.01 % oxygen
Repeatability	±0.5% oxygen
Accuracy	±1% O_2 (constant temperature and pressure) ±5% O_2 (when outside operating temperature range)
Operating temperature	0 to 40 °C
Relative humidity range	0 to 100%, non-condensing
Sensing element life	2+ years
Sensing element warranty	1 year
Battery warranty	1 year

Technical Support

For assistance with PASCO products, contact PASCO at:

Address:	PASCO scientific 10101 Foothills Blvd. Roseville, CA 95747-7100
Phone:	916-462-8384
Web:	www.pasco.com
Email:	support@pasco.com

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.

Warranty, Copyright, and Trademarks

Limited Warranty For a description of the product warranty, see the PASCO catalog.