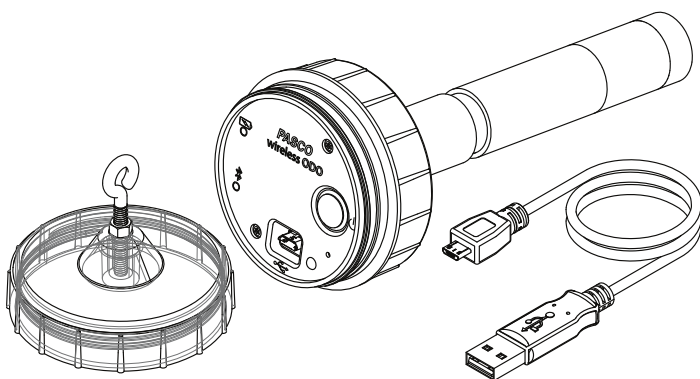


Wireless Optical Dissolved Oxygen Sensor

PS-3224

This device measures the concentration and saturation percentage of dissolved oxygen molecules in aqueous solutions. It also simultaneously measures temperature and oxygen gas concentration. When the protective cover is installed, the device is waterproof to a depth of 10 meters.

Items list



What's Included

- Wireless Optical Dissolved Oxygen Sensor
- Protective Cover
- USB Cable

Required Items

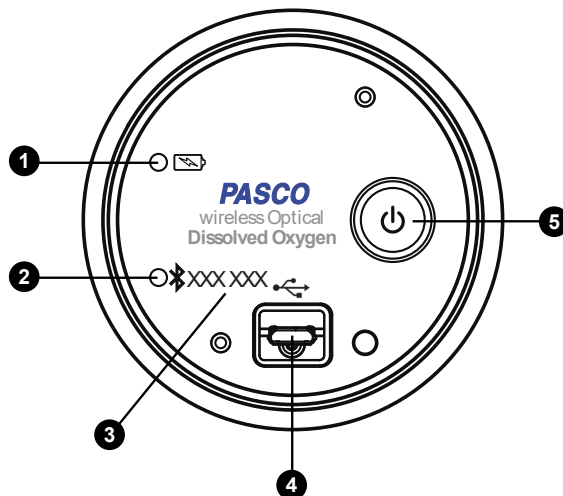
- **Data Collection Software**
This product requires PASCO software for data collection and analysis. Either SPARKvue or PASCO Capstone can be used.

Recommended Items

- **Metal Guard (PS-3604)**
Protects the sensing element of the Wireless Dissolved Oxygen Sensor when using the sensor in the field. The guard also helps weigh the sensor down when submerged.

Part descriptions

Top View



1 Battery Status Light

Indicates the battery level and charging status.

LIGHT	STATUS
Red (blink)	Low battery level
Green (solid)	Fully charged
Yellow (solid)	Charging

2 Bluetooth Status Light

Indicates the status of the Bluetooth connection.

LIGHT	STATUS
Red (blink)	Ready to pair
Green (blink)	Paired
Yellow (blink)	Remotely logging data

3 Device ID

Use to identify the sensor when connecting using Bluetooth.

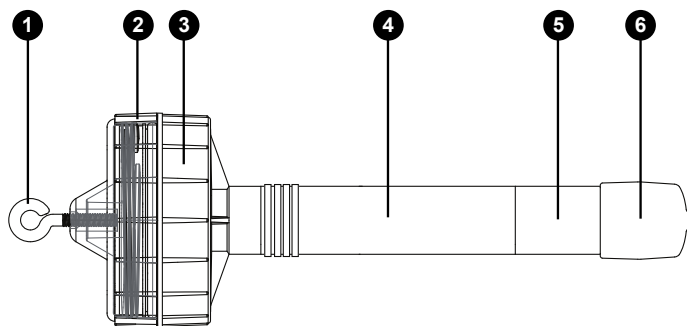
4 USB Port

Use with the USB cable to connect to a USB wall charger to charge the battery. Can also be used to send measurement data to software when connected to a USB port of a computer or mobile device (iOS devices not supported).

5 Power Button

Press and hold for one second to turn the sensor on or off.

Side View



1 Eye Hook

Use to connect a rope (such as the one included with the PS-3604 Metal Guard) when submerging the sensor in a deep body of water.

2 Protective Cover

Install the cover before submerging the sensor to protect the electronic components. With the cover installed, the sensor is waterproof up to a depth of 10 meters.

Note: When installing and removing the cover, handle the device by the sensor body. Do *not* handle the device by the probe as this could result in damaging the device.

3 Sensor Body

Handle the device by the sensor body when installing or removing accessories.

4 Probe

Avoid handling the device by the probe when installing or removing accessories to prevent damaging the device.

5 Metal Probe Body

The metal probe body must be fully inserted in a sample when taking measurements.

6 Rubber Boot

Protects the sensor cap. Remove the boot to uncover the sensor cap before taking measurements.

Note: The boot contains a sponge moistened with distilled water. Cover the sensor cap with the moistened sponge inserted when storing the device. The sensor cap should not be allowed to dry out. Avoid touching the sensor cap.

Getting started

Before using this device in the classroom, you need to charge the battery, install data collection software, and check for a firmware update.

Charge the battery

The Wireless Optical Dissolved Oxygen Sensor contains a rechargeable battery that lasts an entire school day when fully charged. Charge the battery before using the Wireless Optical Dissolved Oxygen Sensor for the first time since it is not shipped with a full charge.

To charge the battery, connect the sensor to a USB wall charger or powered USB port using the USB cable. The battery status light will be solid yellow while the battery is charging. The light will change to solid green when the battery is fully charged.


Install or update data collection software

The latest update of PASCO Capstone or SPARKvue is required to use the Wireless Optical Dissolved Oxygen Sensor. Download and install the software from the PASCO website. Check if an update is available if the software is already installed.

SPARKvue

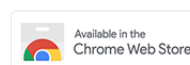
Windows and Mac Computers

Download: Go to [pasco.com/sparkvue](https://www.pasco.com/sparkvue) then click **Downloads**.

Update: Click  then select **Check for Updates**.

Mobile Devices and Chromebooks

Search for SPARKvue in your device's app store. SPARKvue will automatically install future updates.



PASCO Capstone

Windows and Mac Computers

Download: Go to [pasco.com/capstone](https://www.pasco.com/capstone) then click **Downloads**.

Update: Click **Help** then select **Check for updates**.

Check for a firmware update

Update the sensor firmware to access the latest features and bug fixes. Sensor firmware is installed using SPARKvue or PASCO Capstone. Connect the sensor to SPARKvue or PASCO Capstone to check for a firmware update.

SPARKvue

1. Turn on the Wireless Optical Dissolved Oxygen Sensor.
2. Open SPARKvue then click **Sensor Data**.
3. Select the sensor that matches the device ID.
4. If a notification appears, click **Yes** to update the firmware. If a notification does not appear, the firmware is up to date.



PASCO Capstone

1. Turn on the Wireless Optical Dissolved Oxygen Sensor.
2. Open Capstone then click **Hardware Setup**.
3. Select the sensor that matches the device ID.
4. If a notification appears, click **Yes** to update the firmware. If a notification does not appear, the firmware is up to date.




Using the sensor

Take measurements in the lab

SPARKvue


1. Turn on the sensor.
2. Open SPARKvue then click **Sensor Data** .
3. Select the **Optical DO** that matches the device ID.
4. Select **DO₂ Concentration**.
5. Select a **Template** to display the data.
6. Remove the rubber boot to uncover the sensor cap.
7. Place the sensor into a water sample with the metal probe body fully submerged.
8. Click **Start**  to begin data collection.

PASCO Capstone

1. Turn on the sensor.
2. Click **Sensor Data** .
3. Select the **Optical DO** that matches the device ID.
4. Click **Hardware Setup**  to close it.
5. Remove the rubber boot to uncover the sensor cap.
6. Place the sensor into a water sample with the metal probe body fully submerged.
7. Click **Record**  to begin data collection.


Take measurements in the field


Use the sensor to take measurements in a stream or pond. Remote logging is required when using the sensor in the field since the wireless signal cannot be transmitted under water.

 **Note:** The Metal Guard accessory (PS-3604) is required when taking field measurements to protect the sensor cap. The accessory includes a rope that attaches to the eye hook on the protective cover.

Step 1: Set up remote logging


SPARKvue


1. Turn on the sensor.
2. Open SPARKvue then click **Remote Logging** .
3. Select the **Optical DO** that matches the device ID.
4. Set the **Sample Rate** using the left and right arrows.

 **Tip:** Decrease the sample rate to increase the logging time.

5. Click **OK** and close SPARKvue.

PASCO Capstone

1. Turn on the sensor.
2. Open Capstone then click **Remote Logging** .
3. Select the **Optical DO** that matches the device ID.
4. Set the **Sample Rate** using the up and down arrows.

 **Tip:** Decrease the sample rate to increase the logging time.

5. Click **Start** and close Capstone.


Step 2: Collect the data

1. Remove the rubber boot to uncover the sensor cap.
2. Install the metal guard on the probe.
3. Install the protective cover on the sensor body.



4. Attach the rope to the eye hook.
5. Submerge the sensor in a body of water to take measurements.
6. Turn off the sensor to stop data logging.

Step 3: Download and display remotely logged data

SPARKvue

1. Turn on the sensor.
2. Open SPARKvue then click **Remote Logging** .
3. Select the **Optical DO** that matches the device ID.
4. Click **Download Data**.
5. Select a **Template** to display the data.


PASCO Capstone

1. Turn on the sensor.
2. Open Capstone then click **Remote Logging** .
3. Select the **Optical DO** that matches the device ID.
4. Click **Download Data**.
5. Select **Current experiment** then click **Download Data**.
6. Drag the **Graph**  display to the page.
7. Click **Select Measurement** on the y-axis then select **DO₂ Concentration** from the menu.

Measure oxygen gas concentration in air

The Wireless Optical Dissolved Oxygen Sensor was specifically designed to be used in water. However, reasonably good qualitative results may be obtained in air.

Oxygen gas concentration in air is calculated by taking the DO₂ Saturation value from the sensor and multiplying it by 20.9%. This is the assumed partial pressure contribution of O₂ in air. Best accuracy will be achieved in high humidity environments. Long term measurements in dry air are not recommended as this will dry out the probe sensor cap.

 **Note:** The probe should not be used in an environment with flammable, caustic, or corrosive gases.

Follow the same instructions as using the sensor in water, except select **O₂ Gas Concentration** as the measurement.

Calibration

The Wireless Optical Dissolved Oxygen Sensor is calibrated at the factory and does not need to be recalibrated under most circumstances. If needed, the sensor can be calibrated using one or two known standards.

Prepare the calibration standards



Prepare calibration standards that contain 0% and 100% dissolved oxygen saturation. Either water-saturated air (recommended) or air-saturated water can be used for the 100% dissolved oxygen saturation standard.

- **100% dissolved oxygen saturation standard (water-saturated air)**
Moisten the sponge inside the end of the rubber boot with water. Loosely cover the sensor cap with the rubber boot. Let the sensor acclimate for about 15 minutes. Leave the boot on during calibration.
- **100% dissolved oxygen saturation standard (air-saturated water)**
Connect an air stone to an air pump and put the air stone into a beaker of water. Let the air pump to run for about 10 minutes.
- **0% dissolved oxygen saturation standard**
Pour 150 milliliters of distilled water in a beaker. Dissolve sodium sulfite, sodium bisulfite, or potassium sulfite until a small amount remains undissolved in the bottom of a beaker.


Calibrate the sensor using one standard

Use a 100% dissolved oxygen saturation standard to calibrate the dissolved oxygen sensor.

SPARKvue

1. Click .
2. Click  for DO₂ Saturation.
3. Under **Calibration Type**, select **1 point (Adjust Slope Only)** then click **Continue**.
4. Put the sensor in a 100% dissolved oxygen saturation standard.
5. Under **Standard Value** enter **100** then click **Set Calibration**.
6. Click **OK**.



PASCO Capstone

1. In the Tools palette, click **Calibration** .
2. Select **Saturation** then click **Next**.
3. Select **One Standard (1 point slope)** then click **Next**.
4. Put the metal sensor body in a 100% dissolved oxygen saturation standard.
5. Under **Standard Value**, enter **100** then click **Set Current Value to Standard Value**.
6. Click **Finish**.


Calibrate the sensor using two standards

Use a 0% and 100% dissolved oxygen saturation standards to calibrate the dissolved oxygen sensor.

SPARKvue


1. Click .
2. Click  for DO₂ Saturation.
3. Under **Calibration Type**, select **2 point (Adjust Slope and Offset)** then click **Continue**.
4. Put the metal sensor body in a 0% dissolved oxygen saturation standard.
5. Under **Calibration Point 1**, enter **0** for the **Standard Value** then click **Set Calibration**.
6. Put the sensor in a 100% dissolved oxygen saturation standard.
7. Under **Standard Value** enter **100** then click **Set Calibration**.
8. Click **OK**.

PASCO Capstone



1. In the Tools palette, click **Calibration** .
2. Select **Saturation** then click **Next**.
3. Select **Two Standards** then click **Next**.
4. Put the metal sensor body in a 0% dissolved oxygen saturation standard.
5. Under **Standard Value**, enter **0** then click **Set Current Value to Standard Value**.
6. Put the metal sensor body in a 100% dissolved oxygen saturation standard.
7. Under **Standard Value**, enter **100** then click **Set Current Value to Standard Value**.
8. Click **Finish**.

Set the salinity constant



The salinity of water can have an effect on the dissolved oxygen measurement. A value can be entered for the salinity of the water sample to account for this effect.

 **Note:** It is recommended to use the PASPort Salinity Sensor (PS-2195) to obtain a precise salinity measurement.

SPARKvue

1. Click .
2. Click  for the Wireless Optical Dissolved Oxygen sensor.
3. Under **Salinity**, enter a value in ppt.

PASCO Capstone

1. Click **Hardware Setup** .
2. Click  for the Wireless Optical Dissolved Oxygen sensor.
3. Under **Salinity**, enter a value in ppt.

Care and maintenance

The sensor cap will degrade over time with use. The working life can be extended by keeping it clean and properly stored between uses.

Storage

The sensor cap should not be allowed to dry out. Moisten the sponge inside the rubber boot and cover the sensor cap with the rubber boot. Gently push the rubber boot against the end of the probe to make sure that the sponge is in contact with the sensor cap. Do not store the probe in water since that can encourage algae growth on the probe.

Cleaning

To clean the sensor cap, rinse it with clean water and dry it with a lint free cloth. A mild detergent may be used, if necessary. Do not use alcohols or other organic solvents that may deteriorate the sensing layer.

Sensor Cap Replacement

The sensor cap may need to be replaced if the sensor is no longer responsive. It should also be replaced if it is cracked, scratched, or damaged. A replacement cap can be purchased as item PS-3605. Contact Technical Support to determine whether a replacement sensor cap is needed.

Additional resources


Software help

Additional information on how to use the Wireless Optical Dissolved Oxygen Sensor with SPARKvue and Capstone can be found in the SPARKvue and PASCO Capstone Help. The help can be accessed within the software or online.

 **SPARKvue**

Software: Click  then select **Help**.

Online: pasco.com/help/sparkvue

 **PASCO Capstone**

Software: In the menu bar, click **Help** then select **PASCO Capstone Help**.

Online: pasco.com/help/capstone

Product information

Visit the product web page at pasco.com/product/PS-3224 for additional information including:

- Specifications
- Buying Guide
- Experiments
- Documents



Technical Support

Need more help? Our knowledgeable and friendly Technical Support staff is ready to provide assistance with this or any other PASCO product.

Phone (USA)	1-800-772-8700 (Option 4)
Phone (International)	+1 916 462 8384
Online	pasco.com/support

Regulatory information

Warranty, Copyright, and Trademarks

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 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 or disposal service, or the place where you purchased the product.

The European Union WEEE (Waste Electronic and Electrical Equipment) symbol 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 battery used in this product is marked with the International symbols to indicate the need for the separate collection and recycling of batteries.

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.

CE statement

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