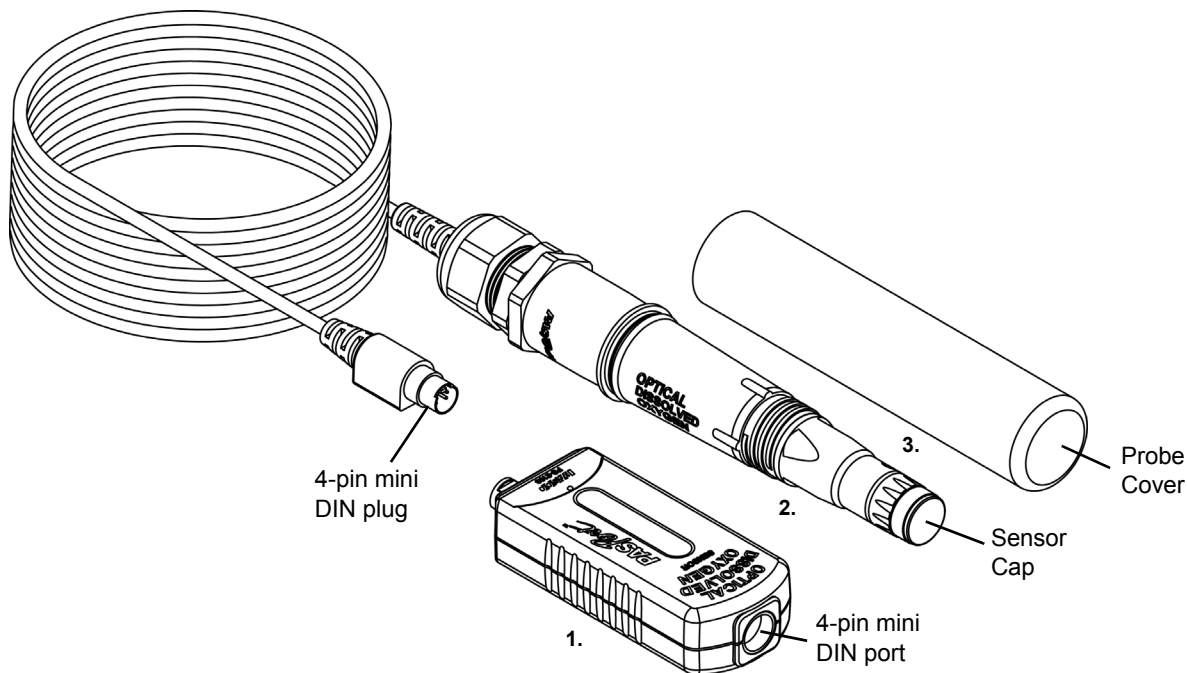


Optical Dissolved Oxygen Sensor

PS-2196



Included Equipment

Model Number

- | | |
|------------------------------------|----------------------|
| 1. Optical Dissolved Oxygen Sensor | PS-2196 |
| 2. Optical Dissolved Oxygen Probe | included with sensor |
| 3. Probe Cover with Sponge | included with sensor |

Required Equipment

PASCO Interface

See PASCO catalog or www.pasco.com

PASCO Data Acquisition Software

Replacement Item

Model Number

Optical Dissolved Oxygen Probe Sensor Cap	PS-2587
---	---------

Accessory

Model Number

Optical Dissolved Oxygen Metal Guard	PS-2588
--------------------------------------	---------

Introduction

The PS-2196 Optical Dissolved Oxygen Sensor is designed to measure the concentration and the saturation percentage of dissolved oxygen molecules (O₂) in aqueous solutions. The sensor also simultaneously measures temperature and barometric pressure. The sensor is particularly useful in applications related to ecological studies of water environments. The sensor is specifically designed for use with a PASPORT-compatible PASCO interface, and software such as SPARKvue or

PASCO Capstone. The SPARKvue software allows the sensor to work with a mobile device such as a tablet or smart phone when the sensor is connected to a PASCO AirLink2 or SPARKlink Air wireless interface. The sensor will also work with a hand-held data-logger such as the SPARK Science Learning System (SPARK SLS) or the Xplorer GLX.

In the laboratory, students can explore the effects of temperature, water movements, inorganic chemicals, organic matter, and living organisms on levels of dissolved oxygen. In the field, students can monitor dissolved oxygen as a part of ecological surveys of aqueous habitats, including Biological Oxygen Demand (BOD) studies.

The Optical Dissolved Oxygen Sensor has several advantages when compared to a galvanic (electrochemical) dissolved oxygen sensor. The advantages include:

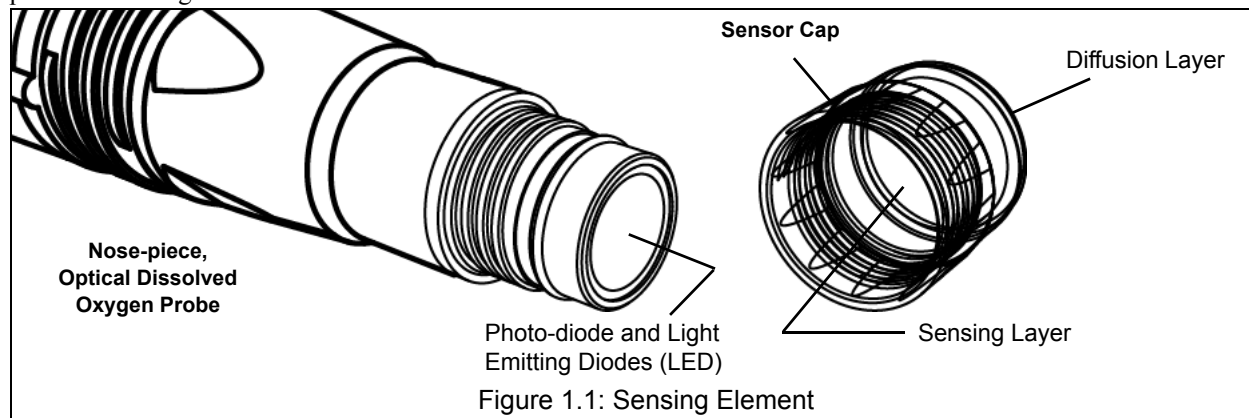
- no warm up time
- no calibration required
- no filling solution or electrode polishing
- no flow dependency
- built-in temperature and barometric pressure compensation

The Optical Dissolved Oxygen Sensor can be used in combination with other PASCO sensors if the PASCO interface supports multiple sensors, or if more than one interface is connected to the computer. (NOTE: Only one AirLink2 or SPARKlink Air wireless interface can be connected to a mobile device.)

Theory of Sensor Operation

Optical measurement methods that detect dissolved oxygen are based on the principle that dissolved oxygen quenches both the lifetime and the intensity of the luminescence associated with certain chemical dyes. When there is no dissolved oxygen present, the lifetime and intensity of the luminescence are at their maximum. The luminescence of the dye and the amount of oxygen present have an approximately inverse proportionality.

The sensing element of the Optical Dissolved Oxygen Probe is called the Sensor Cap. The sensing element has two layers, The outer layer is a paint that acts as an oxygen permeable diffusion layer which allows oxygen molecules to pass through while protecting the dye layer. The sensing layer is an immobilized polystyrene dye layer that luminesces when excited with light of the correct wavelength. The probe measures dissolved oxygen by emitting a blue light of the proper wavelength that causes the dye in the sensing layer to luminesce (glow) a red color. Oxygen dissolved in the sample being tested continually passes through the diffusion layer to the dye layer, affecting the luminescence lifetime and intensity of the dye. The sensor measures the lifetime of the luminescence as it is affected by the oxygen with a photo-diode and compares the reading to a reference.



The reference is a beam of red light emitted by the probe that reflects from the dye layer back to the photo-diode. The lifetime of the luminescence from excitation by the blue light is compared to that of the reference value (red light) and a dissolved oxygen concentration is calculated by the sensor.

Optical and electrochemical dissolved oxygen probes determine the partial pressure of oxygen dissolved in the sample being tested. The dissolved oxygen partial pressure is converted to concentration (mg/l) or saturation percentage. The conversion from dissolved oxygen pressure to saturation percentage is done by dividing the reading by 160, the pressure of oxygen in air at 760 millimeters (mm) of mercury (Hg) and then multiplying by 100%. For example, a measured dissolved oxygen pressure reading of 150 mm Hg would be converted to 93.8% saturation ($150/160 \times 100\%$).

Factors that Affect Dissolved Oxygen Measurement

Factors that affect dissolved oxygen measurement include temperature, barometric pressure, and salinity.

Temperature: The rate of diffusion of oxygen through the Sensor Cap changes with temperature (approximately 1.5% per degree celsius). The Optical Dissolved Oxygen Probe has a built-in thermistor, and the temperature changes are compensated for by proprietary algorithms that use readings from the thermistor.

Barometric Pressure: The partial pressure of oxygen in a sample of air or water is not affected by barometric pressure, but dissolved oxygen concentration in milligrams per liter is affected. The Optical Dissolved Oxygen Probe has a built-in barometer, and the reading from that device is used to determine the oxygen pressure during calibration.

Salinity: As the salinity of water increases, its ability to dissolve oxygen decreases. (Note: The user will be able to enter a value for the “salinity constant” in the data acquisition software.) For precise measurement of salinity, the PS-2195 Salinity Sensor is recommended (see the web site at www.pasco.com).

Water Type	Average Salinity
Fresh water	<0.5 ppt*
Brackish water	0.5 to 30 ppt
Sea water	33 to 47 ppt
Saline water	30 to 50 ppt
Brine	>50 ppt

*Salinity is a unitless measurement determined from conductivity and temperature readings according to the Practical Salinity Scale. Historically, salinity values determined with the Practical Salinity Scale were given the designation “ppt” because these values were very close to those determined by the previously used method where the mass of dissolved salts in a given mass of water (parts per thousand) were reported.

Probe Care and Maintenance

The sensing layer in the Sensor Cap degrades over time due to bleaching caused by exposure to light, so the Sensor Cap must be replaced periodically. It should also be replaced if it is cracked, scratched, or damaged. The Sensor Cap is warranted for one year and may last much longer. The working life of a Sensor Cap may be extended by keeping it clean and properly stored between uses. The replacement for the Optical Dissolved Oxygen Probe Sensor Cap is model number PS-2587 (see www.pasco.com for more information).

NOTE: Do not remove the Sensor Cap except to replace it with a new cap.

To clean the Sensor Cap, rinse it with clean water and dry it with a lint free cloth. If necessary, use a mild detergent. **Do not use alcohols or other organic solvents** that may deteriorate the sensing layer. When changing the Sensor Cap, rinse the clear front surface of the nose-piece of the probe with clean water and then dry the surface with a lint free cloth or lens tissue.

Optical Dissolved Oxygen Probe Attacking Liquids

Alcohols will remove the paint layer of the Sensor Cap.

The following will remove the paint and dye layers of the Sensor Cap and will attack the probe housing as well:

Toluene	Benzene	Carbon tetrachloride	Chloroform
Methylene chloride	Acetone	Methyl ethyl ketone	Organic solvents

Storage

The Optical Dissolved Oxygen Probe should not be allowed to dry out. For storage, keep the Sensor Cap installed on the probe. Moisten the sponge that is in the end of the Probe Cover, and place the probe in the cover so that the Sensor Cap is next to the moist sponge.

Do *not* store the probe directly in water since that would encourage algae growth on the probe.

Sensor, Interface, and Software Setup

Connect the Optical Dissolved Oxygen Sensor to your PASPORT-compatible interface. Connect the included Optical Dissolved Oxygen Probe to the 4-pin DIN port on the end of the sensor.

Follow the instructions below to set up the sensor with PASCO data acquisition software (such as Capstone or SPARKvue if you are using a computer or the SPARK Science Learning System) or the Xplorer GLX (if you are using it standalone without a computer).

For detailed information about the sensor's specifications, see page 5.

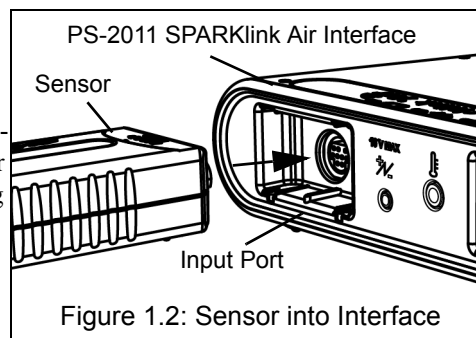


Figure 1.2: Sensor into Interface

PASCO Capstone Setup

If you are using a computer and a PASCO interface, connect the interface to the computer and start Capstone. (Refer to the documentation that came with your PASCO interface for instructions on connecting it to your computer.) In Capstone, click the Record button (●) to begin data collection; Click the Stop button (■) to stop data collection.

Note that the sensor may collect data for parameters that are not needed. Hide or ignore these measurements. To hide measurements that you do not need, click the Data Summary icon in the Tools palette to open the Data Summary panel. In the panel, click the Visibility icon (👁) to see the menu of data parameters for the sensor. Uncheck the parameters that need to be hidden.

For more instructions on using Capstone, press F1 to open Capstone's on-line help.

SPARKvue Setup

If you are using a PASPORT-compatible interface and SPARKvue software, connect the sensor to the interface and start the SPARKvue software. Touch or click one of the measurements and then touch/click "Show" to open a Graph display. In the Graph display, touch/click "Start" (▶) to begin recording data. Touch or click "Stop" (▶) to stop recording data.

SPARK SLS Setup

If you are using the SPARK Science Learning System (SPARK SLS), turn on the interface and connect the sensor to one of the input ports on the top of the SPARK SLS. Touch one of the measurements and then touch "Show" to open a Graph display. In the Graph display, touch "Start" (▶) to begin recording data. Touch "Stop" (▶) to stop recording data.

Xplorer GLX Setup

If you are using an Xplorer GLX in standalone mode, press (▶) to start data collection.

Note that the sensor may collect data for parameters that are not needed. Hide or ignore these measurements. To hide measurements that you do not need, open the Sensors screen (from the Home screen, press (F4)). In the Sensors screen you can also change the sampling rate and open the calibration dialog box. For more instructions on using the Xplorer GLX, refer to the GLX Users' Guide.

Experiments

These are some of the experiments that can be done using the Optical Dissolved Oxygen Sensor.

- Photosynthesis, Respiration and Fermentation labs
- Monitoring Water Quality
- Measuring Net Primary Productivity
- Modeling Ecosystems
- Biochemical Oxygen Demand

Specifications

General	
Cable Length	3 meters
Response Time	90% in 35 seconds
Operating Temperature	0 to 50 °C
Operating Pressure	375 to 825 mm Hg
Range	0 to 20 mg per liter or 0 to 300% saturation
Resolution	0.01 °C or better
Accuracy	±0.6 mg per liter or ±3.0% right out of the box ±0.1 mg per liter or ±1.0%, whichever is greater, after calibration above 200% saturation, ±10%

Using the Dissolved Oxygen Sensor in Air

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

The optical dissolved oxygen probes are generally calibrated in 100% air-saturated water or in 'wet' air that is in a 100% relative humidity environment. In either case, the oxygen contribution to the partial pressure of the gas in 'wet' air or in solution is taken to be 20.9%. Given this, it is reasonable to use the probe in a gaseous environment to measure the oxygen present. The sensor outputs a value labeled "O2 Gas Concentration".

This value is calculated by taking the DO2 Saturation value from the sensor (100% in air-saturated water or 'wet' air) and multiplying it by 0.209(20.9%), the assumed partial pressure contribution of O2 in air. For example, if the DO2 Saturation value from the sensor is 80%, the calculated partial pressure contribution of O2 in air is $80\% \times 0.209 = 16.7\% \text{ O}_2$.

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 and may affect future measurements with the probe.

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

Accessory: Optical Dissolved Oxygen Metal Guard

The Optical Dissolved Oxygen Metal Guard (PS-2588) is designed to thread onto the end of the probe to protect the Sensor Cap. It also enables the probe to sink more rapidly when the probe is immersed in water.

NOTE: Do not use any tool to thread the Optical Dissolved Oxygen Guard onto the probe. Avoid touching the end of the Sensor Cap at all times.

Calibration

The Optical Dissolved Oxygen Probe is calibrated at the factory and does not need to be re-calibrated under most circumstances. (See Appendices A through D.) However, if the Sensor Cap is replaced with a new Sensor Cap (PS-2587), then the Sensor Cap Calibration Code Coefficients (included with the new Sensor Cap) will need to be entered into the sensor using the PASCO data acquisition software. The sensor will then need to be re-calibrated. (See Appendix E.)

For a one-point calibration, you will need one "known standard" with 100% dissolved oxygen saturation.

For a two-point calibration, you will need two "known standards"; one with 100% dissolved oxygen saturation, and one with 0% dissolved oxygen saturation.

Known Standards

One method for a known standard with 100% dissolved oxygen saturation is to use water-saturated air. Moisten the sponge inside the end of the Probe Cover with water, and then put the probe into the Probe Cover for about fifteen minutes.

A second method for a known standard with 100% dissolved oxygen saturation is to use air-saturated water. Connect an air-stone to an air pump, and put the air-stone into water. Allow the air-stone and air pump to run for 10 minutes to make sure that the water is completely saturated.

For a known standard with 0% dissolved oxygen saturation, dissolve enough sodium sulfite in 150 milliliters of distilled water such that a small amount of sodium sulfite remains undissolved in the bottom of the beaker.

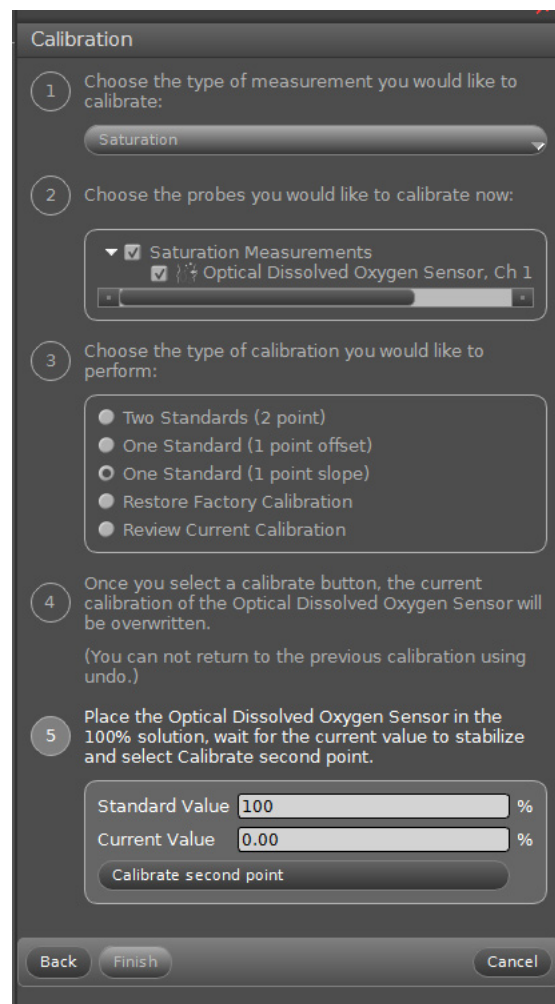
Appendix A: PASCO Capstone Calibration

Calibration Steps

Place the Optical Dissolved Oxygen Probe into your known standard for 100% dissolved oxygen saturation. In PASCO Capstone, click the Calibration icon (🔧) in the Tools palette to open the Calibration panel.

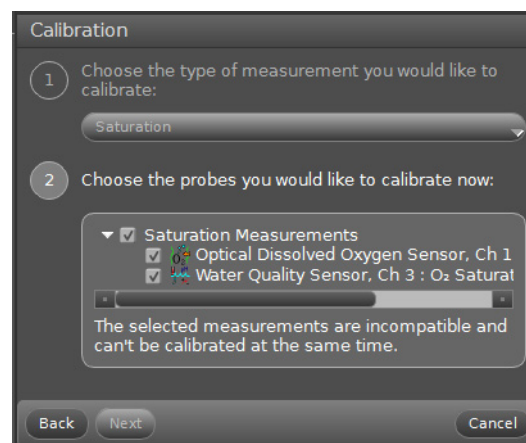
1. The first step in the Calibration panel is to choose the type of measurement you would like to calibrate. The default for the sensor is “Saturation”. Click “Next”.
2. In the second step, the Optical Dissolved Oxygen Sensor probe is automatically selected (if the default measurement is kept). Move to the third step.
3. The third step in the panel is to choose the type of calibration. Select “One Standard (1 point slope)”. Click “Next”.
4. The fourth step cautions that the current calibration of the Optical Dissolved Oxygen Sensor will be overwritten, and that you can not return to the previous calibration using the Undo tool (↶). However, if a calibration procedure is interrupted or can't be completed, you can return to Step 3 and select “Restore Factory Calibration”.
5. The fifth step in the panel is to calibrate the sensor with the “known standard” for 100% dissolved oxygen saturation (for example, the Probe Cover with Sponge). Wait a few moments for the readings in “Current Value” to stabilize, and then click “Calibrate second point”. Click “Finish”.

Click the Calibration icon in the Tools palette to close the Calibration panel.



Notes About Calibration Using Capstone

- Do not calibrate the Optical Dissolved Oxygen Sensor while another different type of sensor is connected to the interface. If you are using two or more different sensors, calibrate the Optical Dissolved Oxygen Sensor by itself first, and then connect and calibrate the other sensor(s) if necessary.
- During the calibration process, if you click “Calibrate first point” or “Calibrate second point” and then click “Cancel”, the sensor will be restored to the factory calibration.
- The “Standard Value” text areas cannot be edited because the Optical Dissolved Oxygen Sensor is being calibrated for Saturation.

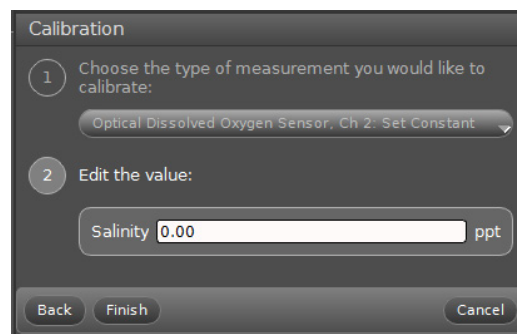


Capstone Salinity Constant

Because salinity is one of the factors that can affect dissolved oxygen measurement, a value for salinity can be entered in the Calibration panel.

In Capstone, click the Calibration icon (🔧) in the Tools palette to open the Calibration panel.

1. In the first step, select “Optical Dissolved Oxygen Sensor: Set Constant” as the type of measurement. Click “Next”.
2. In the second step, edit the value of the “Salinity” constant. (Refer to the table of salinity values shown previously.) Click “Finish”.



Appendix B: SPARK SLS Calibration

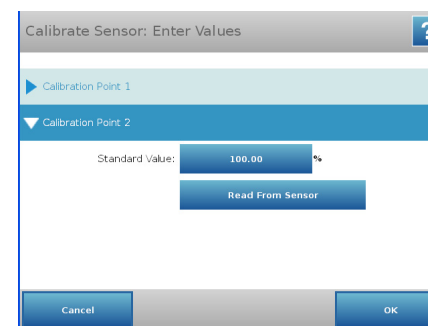
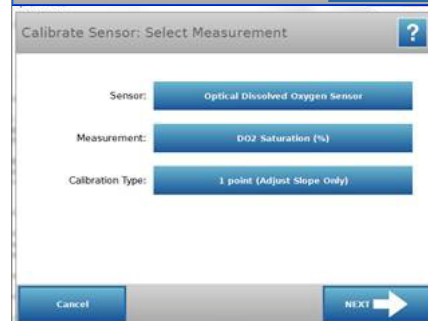
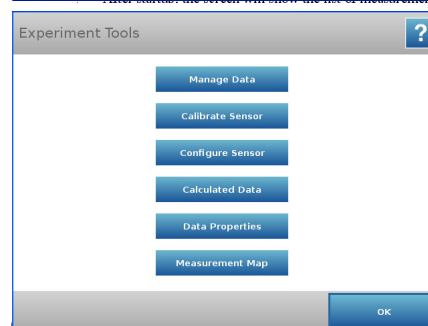
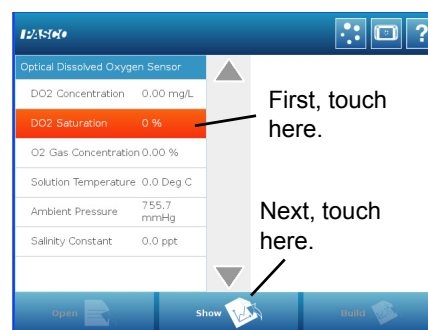
Place the Optical Dissolved Oxygen Probe into your known standard for 100% dissolved oxygen saturation.

If you are using the Optical Dissolved Oxygen Sensor with a SPARK SLS interface connected to a computer, you can use either SPARKvue software or PASCO Capstone (See Appendix C).

If the sensor is connected to a SPARK SLS interface used as a standalone data-logger, start the interface.

After startup, the SPARK SLS screen will show the list of measurements for the Optical Dissolved Oxygen Sensor.


1. Touch “DO2 Saturation” and then touch “Show”.
 - The screen will show a Graph display of DO2 Saturation (%) and Time.
2. Touch “Experiment Tools” (🔧) to open the Experiment Tools screen.
3. In the Experiment Tools screen, touch “Calibrate Sensor” to open the Calibrate Sensor screen. The screen shows the Sensor (Optical Dissolved Oxygen Sensor), the Measurement (DO2 Saturation (%)), and the Calibration Type (1 point Adjust Slope Only). Touch “Next” to open the “Calibrate Sensor: Enter Values” screen.
4. Place the sensor’s probe into the known standard with 100% dissolved oxygen saturation (for example, the Probe Cover with Sponge). Wait a few moments and then touch “Read From Sensor”.
5. Touch “OK” until the screen of the Graph display returns.

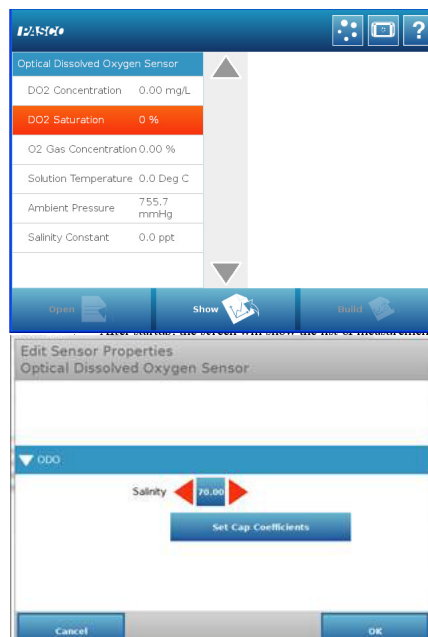


SPARK SLS Salinity Constant

Because salinity is one of the factors that can affect dissolved oxygen measurement, a value for salinity can be entered in the Edit Sensor Properties screen.

After startup, the SPARK SLS screen will show the list of measurements for the Optical Dissolved Oxygen Sensor.

1. Use the same procedure as described above to open a screen with a Graph display.
2. In the Graph display screen, touch “Experiment Tools” () to open the Experiment Tools screen.
3. In the Experiment Tools screen, touch “Configure Sensor” to open the Sensor Configuration screen. In the Sensor Configuration screen, touch “Edit Sensor Properties”. A menu showing the Optical Dissolved Oxygen Sensor drops down. Touch “Optical Dissolved Oxygen Sensor” to open the Edit Sensor Properties screen.
4. The screen shows “Salinity” and “Set Cap Coefficients”. Touch the cursor buttons on either side of the Salinity window to change the value (refer to the table of salinity values shown previously.) When done, touch “OK”.

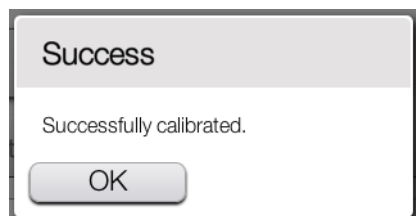


Appendix C: SPARKvue Calibration

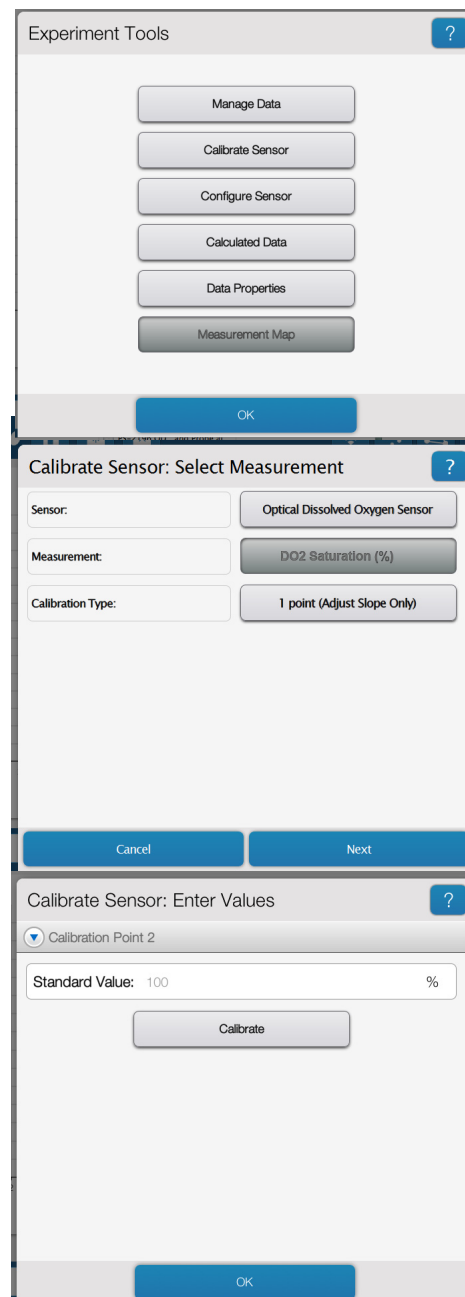
Place the Optical Dissolved Oxygen Probe into your known standard for 100% dissolved oxygen saturation.

SPARKvue works with any PASPORT-compatible interface including the AirLink2 and the SPARKlink Air, which are designed to connect wirelessly via Bluetooth with mobile devices such as smart phones and tablets.

1. In SPARKvue, touch or click the “DO2 Saturation” measurement and then touch/click “Show” to open a Graph display screen.
2. In the Graph display, touch/click the “Experiment Tools” icon (✕) to open the Experiment Tools menu.
3. In the Experiment Tools menu, touch/click “Calibrate Sensor” and then touch/click “OK” to open the Calibrate Sensor: Select Measurement screen. The screen shows the Sensor (Optical Dissolved Oxygen Sensor), the Measurement (DO2 Saturation (%)), and the Calibration Type (1 point (Adjust Slope Only)).
4. Touch or click “Next” to open the Calibrate Sensor: Enter Values screen. The screen shows “Calibration Point 2” and “Standard Value: 100%”. Place the sensor’s probe into the known standard for 100% dissolved oxygen saturation (for example, the Probe Cover with Sponge). Wait a few moments and then touch/click “Calibrate”. A small window opens to confirm that the calibration was successful.



5. Touch or click “OK” to return to the Graph display screen.

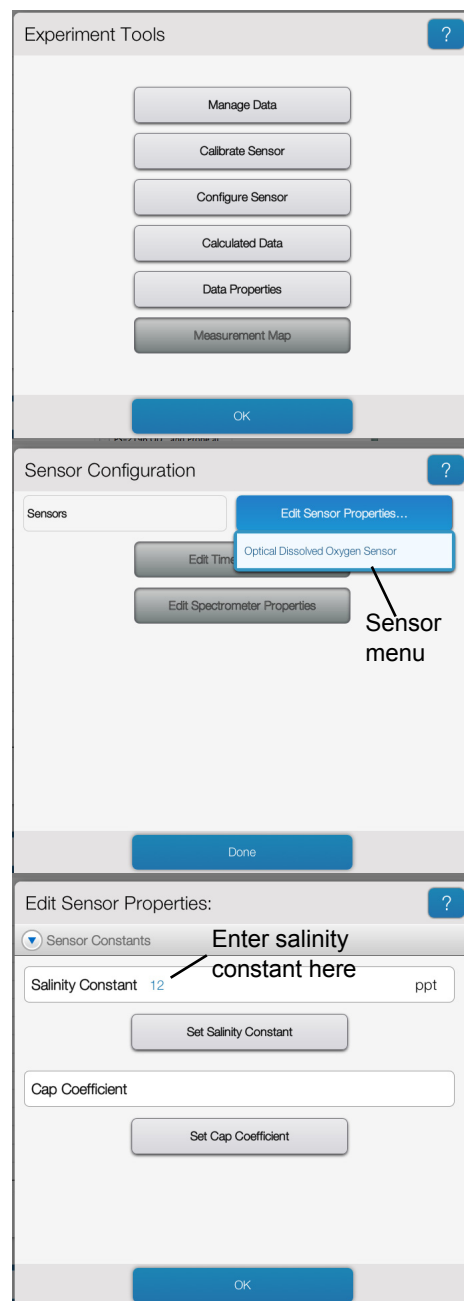


SPARKvue Salinity Constant

Because salinity is one of the factors that can affect dissolved oxygen measurement, a value for salinity can be entered in the Edit Sensor Properties screen.

After startup, the SPARKvue screen will show the list of measurements for the Optical Dissolved Oxygen Sensor.

1. In SPARKvue, touch or click the “DO2 Saturation” measurement and then touch/click “Show” to open a Graph display screen.
2. In the Graph display, touch/click the “Experiment Tools” icon (⊗) to open the Experiment Tools menu.
3. In the Experiment Tools menu, touch/click “Configure Sensor” and then touch/click “OK” to open the Sensor Configuration screen.
4. The screen shows three selections: “Edit Sensor Properties”, “Edit Timer Properties” and “Edit Spectrometer Properties”. Touch or click Edit Sensor Properties to show the sensor menu, and then touch/click “Optical Dissolved Oxygen Sensor”. The Edit Sensor Properties screen changes to show “Salinity Constant” and “Cap Coefficient”.
5. Highlight the value next to Salinity Constant and enter a new value (refer to the table of salinity constants shown previously). Touch or click “OK” to return to the Graph display screen.

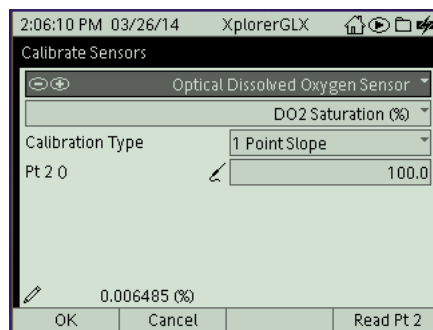
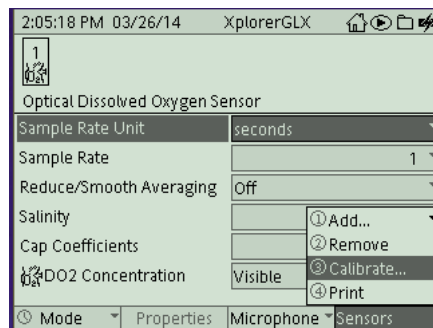


Appendix D: Xplorer GLX Calibration

Place the Optical Dissolved Oxygen Probe into your known standard for 100% dissolved oxygen saturation such as the Probe Cover with Sponge.

If you are using the Optical Dissolved Oxygen Sensor with the Xplorer GLX in standalone mode, connect the sensor to one of the ports on the top of the Xplorer GLX and turn the interface on.

1. Go to the Home Screen (⏠), Press F4 (F4) to go to the Sensors screen. Press F4 (F4) again to open the Sensors menu. Use the down arrow (⏵) to select “Calibrate” and press “Check” (✓).
2. The Calibrate Sensors screen shows the sensor (Optical Dissolved Oxygen Sensor) and the Measurement (DO2 Saturation (%)). The Calibration Type should be “1 Point Slope”. (If not, use the down arrow to highlight “Calibration Type” and press “Check” (✓) to select “1 Point” from the menu.
3. Put the Optical Dissolved Oxygen Probe into the 100% “known standard” solution (for example, the Probe Cover with Sponge). Wait a few moments and then press F4 (F4) to “Read Pt 2”.
4. Press F1 (F1). “OK”, to return to the Sensors screen. Press (⏠) to return to the Home Screen.

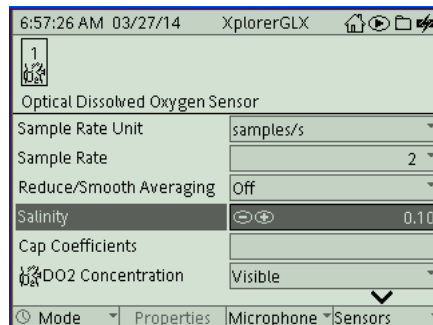
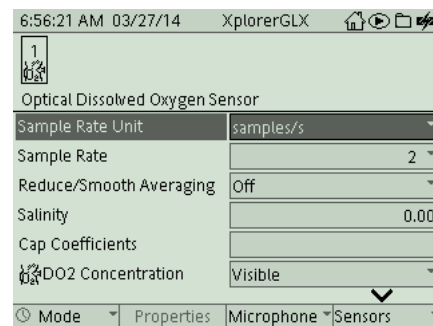


SPARK SLS Salinity Constant

Because salinity is one of the factors that can affect dissolved oxygen measurement, a value for salinity can be entered in the Sensor Properties screen.

If you are using the Optical Dissolved Oxygen Sensor with the Xplorer GLX in standalone mode, connect the sensor to one of the ports on the top of the Xplorer GLX and turn the interface on.

1. Go to the Home Screen (⏠), Press F4 (F4) to go to the Sensors screen. The screen shows “Salinity” as one of the properties.
2. Use the down arrow (⏵) to select “Salinity” and press the minus (⊖) and plus (⊕) keys to adjust the salinity value (refer to the table of salinity constants shown previously).
3. Return to the Home Screen (press ⏠).





Appendix E: Replacement Sensor Cap Calibration

After a new replacement Sensor Cap (PS-2587) is placed on the Optical Dissolved Oxygen probe, there are two parts to the sensor calibration process.

1. With the probe connected to the sensor and the sensor connected to the PASCO Interface, use the data acquisition software to enter the Calibration Code coefficients (six groups of numbers labeled K1 to K5 and KC) for the replacement Sensor Cap into the sensor.
2. Perform a one-point calibration using a “known standard” such as air-saturated water. Alternatively, a two-point calibration could be performed using two calibration standard solutions as described previously.

Capstone: Calibration Code Coefficients

The replacement Sensor Cap comes with a Calibration Code Label (see the example).

1. In Capstone, click the Hardware Setup icon () in the Tools palette to open the Hardware Setup panel.
2. In the Hardware Setup panel, click the “Properties” icon () in the lower right corner to open the Sensor Properties window.
3. Click “Cap Coefficient” and then enter the Calibration Code characters (K1 to K5 and KC) consecutively without spaces.
4. Click “OK” to close the Properties window.
5. Perform a one-point or a two-point calibration. (Refer to Appendix A.)

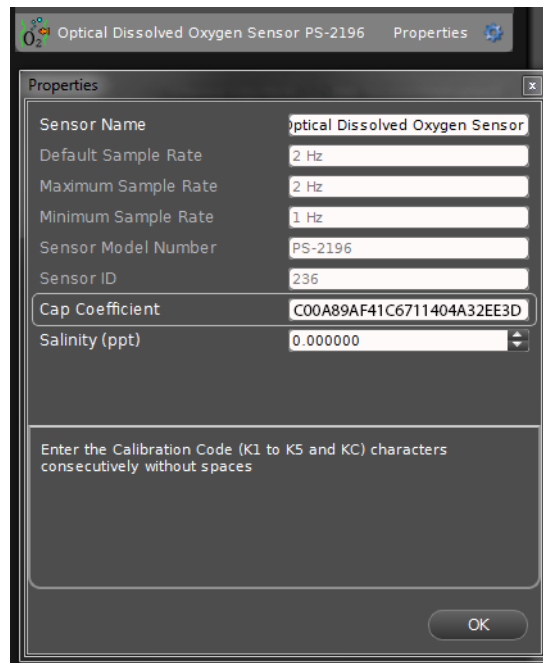
Example: Calibration Code Label

Calibration Code

K1: C00A89AF K2: 41C6C711

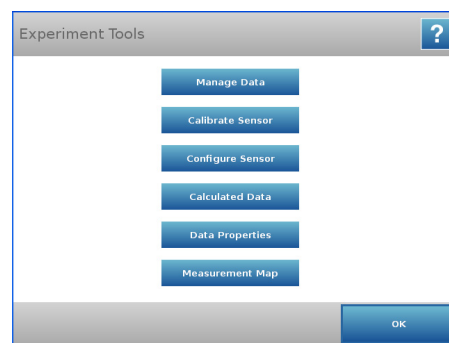
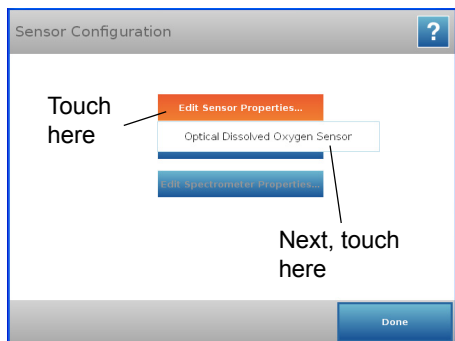
K3: 404A32EE K4: 3DC6FD4D

K5: 90D187B5 KC: 8B

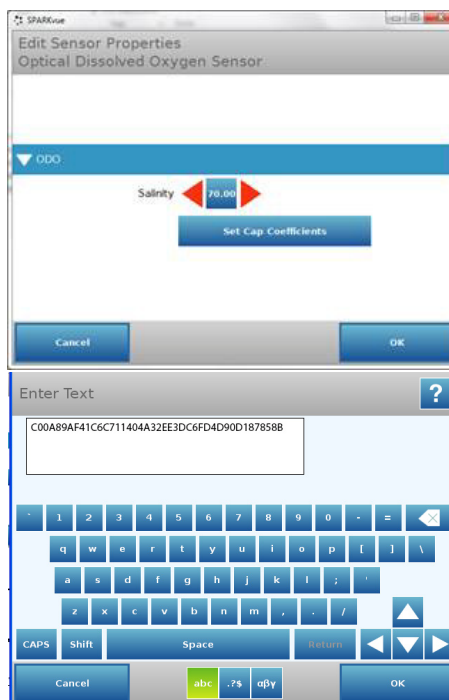


SPARK SLS: Calibration Code Coefficients

1. As in the calibration process, touch “Experiment Tools” in a display to open the “Experiment Tools” screen.
2. In the Experiment Tools screen, touch “Configure Sensor” to open the Sensor Configuration screen.
3. In the Sensor Configuration screen, touch “Edit Sensor Properties”. On the drop down menu, touch “Optical Dissolved Oxygen Sensor”.

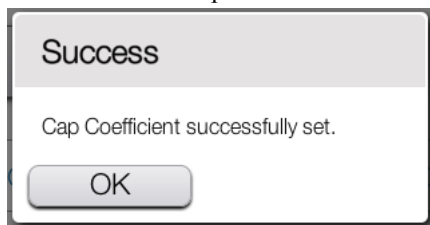


4. The the “Edit Sensor Properties: Optical Dissolved Oxygen Sensor” screen opens. Touch “Set Cap Coefficients” to open the Enter Text screen.
5. Use the keyboard in the Enter Text screen to enter the Calibration Code Coefficients (K1 to K5 and KC). Enter the coefficients consecutively and without spaces. After the Calibration Code Coefficients have been entered, touch “OK”.
 - NOTE: An error message screen will appear if the sensor is not connected to the interface, or the Calibration Code Coefficients were not entered properly. Press “OK”. Check the sensor connection or re-enter the Calibration Code Coefficients.
6. Perform a one point or two point calibration with “known standard” solutions. (Refer to Appendix B.)

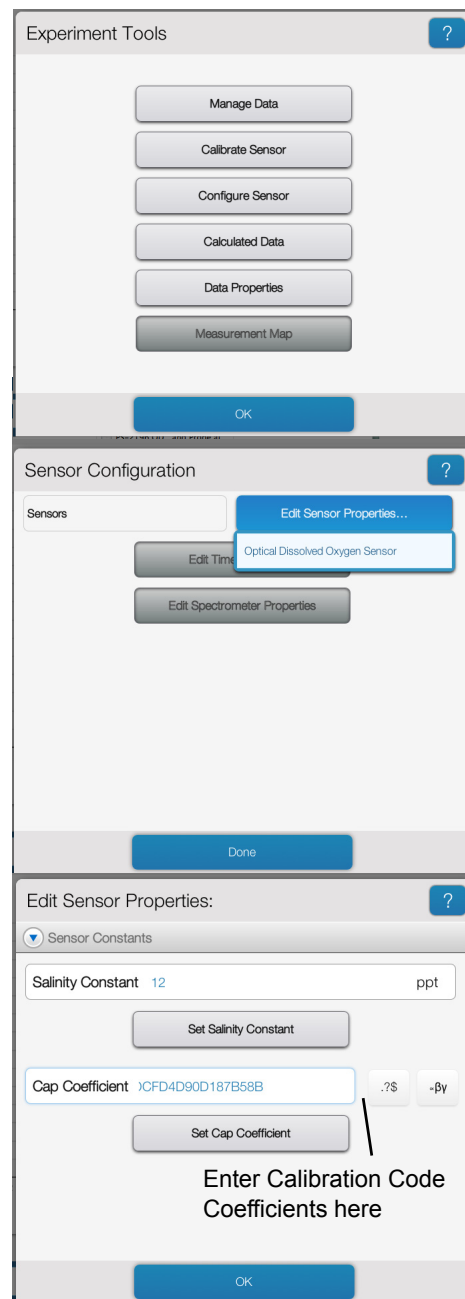


SPARKvue: Calibration Code Coefficients

1. In SPARKvue, touch or click the “DO2 Saturation” measurement and then touch/click “Show” to open a Graph display screen.
2. In the Graph display, touch/click the “Experiment Tools” icon (✕) to open the Experiment Tools menu.
3. In the Experiment Tools menu, touch/click “Configure Sensor” and then touch/click “OK” to open the Sensor Configuration screen.
4. The screen shows three selections: “Edit Sensor Properties”, “Edit Timer Properties” and “Edit Spectrometer Properties”. Touch or click Edit Sensor Properties to show the sensor menu, and then touch/click “Optical Dissolved Oxygen Sensor”. The Edit Sensor Properties screen changes to show “Salinity Constant” and “Cap Coefficient”.
5. In the text area for “Cap Coefficient”, enter the Calibration Code Coefficients (K1 through K5 and KC) consecutively without spaces. Touch or click “Set Cap Coefficient” to save the coefficients. A small window opens to confirm that the procedure was successful.



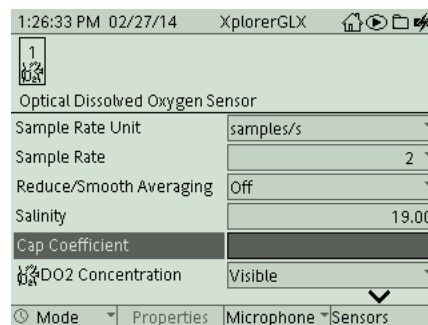
6. Touch or click “OK” to return to the Graph display screen.



Xplorer GLX: Calibration Code Coefficients

1. With the replacement sensor cap installed, the sensor connected to the interface, and the interface turned on, go to the Home Screen (⌂).
2. In the Home Screen, press F4 (F4) to go to the Sensors screen.

3. In the Optical Dissolved Oxygen Sensor screen, use the down arrow (⌵) to highlight the “Cap Coefficient” text area. Press “Check” (✓) to select the text area for the coefficients.
4. Use the keypad to enter the Calibration Code Coefficients (K1 to K5, and KC) consecutively without spaces. After the forty-two letters and numbers are entered, press “Check” to save the coefficients.
 - REMINDER: Press a numeric key twice to switch to the alphabetic characters that are on the key.
 - NOTE: An error message screen will appear if the sensor is not connected to the interface, or the Calibration Code Coefficients were not entered properly. Press “OK”. Check the sensor connection or re-enter the Calibration Code Coefficients.
5. Perform a one point or two point calibration with “known standard” solutions. (Refer to Appendix D.)



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 8383 (worldwide)
877-373-0300 (U.S.)

Web: www.pasco.com

Email: support@pasco.com

Limited Warranty

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

Copyright

The PASCO scientific 012-14243A *Optical Dissolved Oxygen Sensor Instruction Manual* 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, Capstone, SPARK Science Learning System, SPARKvue, PASPORT, and Xplorer GLX 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.

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.

