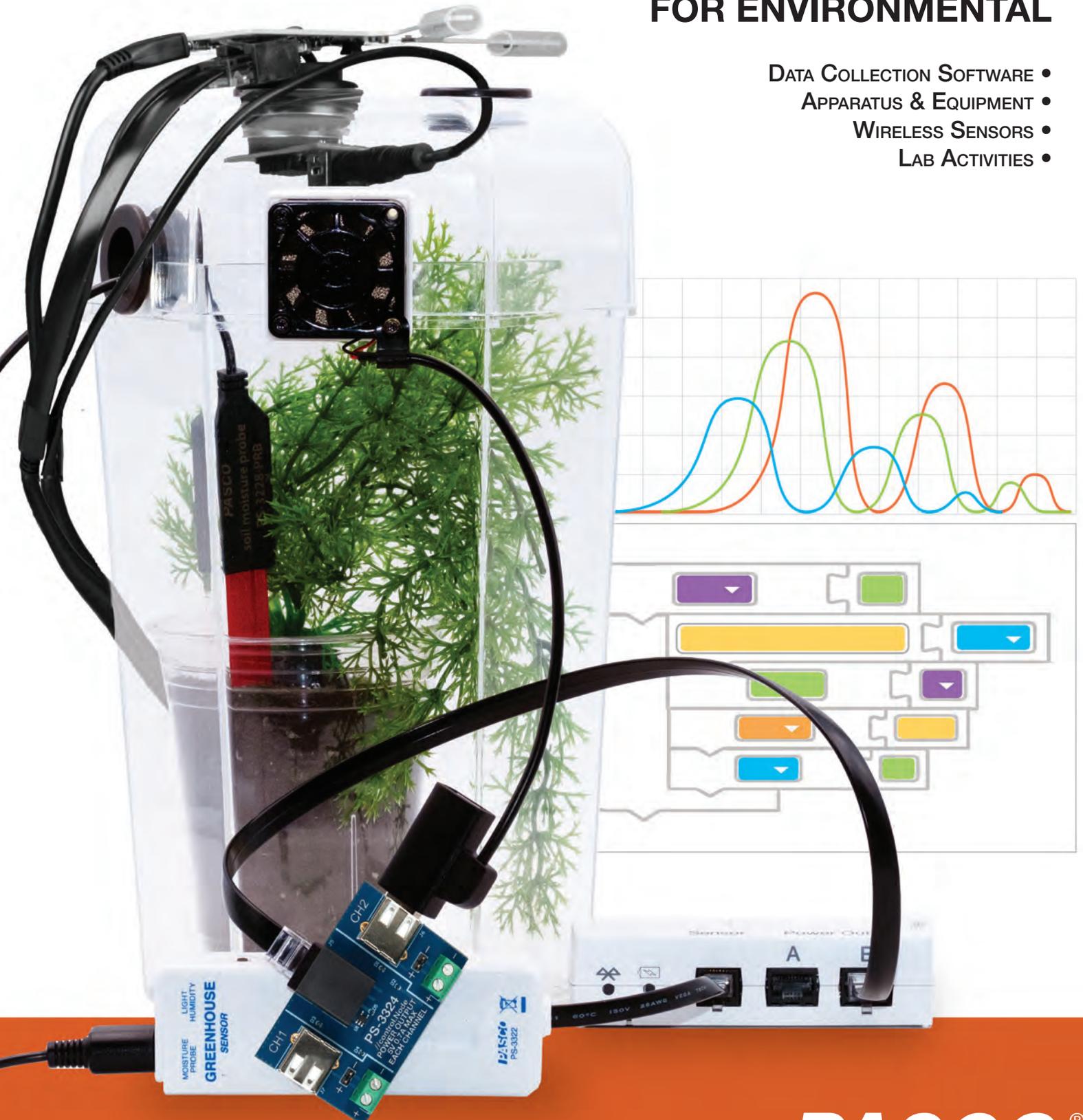


ENVIRONMENTAL

TECHNOLOGY SOLUTIONS FOR ENVIRONMENTAL

- DATA COLLECTION SOFTWARE
- APPARATUS & EQUIPMENT
- WIRELESS SENSORS
- LAB ACTIVITIES



SINCE 1964 **PASCO**®

60 YEARS
OF

INNOVATION

PASCO is Celebrating 60 Years of Innovation in Science Education

60 years ago, PASCO scientific introduced its first product, the Millikan Oil Drop Experiment, that had its origins as a high school science project. Amazingly, schools ordered this apparatus from a company they had never heard of – displaying a great amount of trust in a new company.

And for the past 60 years, high schools and colleges have continued to place their trust in the apparatus we design, manufacture, sell and support. For that trust over the years, we simply say, **“Thank You!”** With your continued support and suggestions, we will strive to maintain that trust into the future.

What have we been doing for the past 60 years? I invite you to peruse our catalog and see the hundreds of products that bear the name PASCO.



PASCO capstone™



SPARKvue™

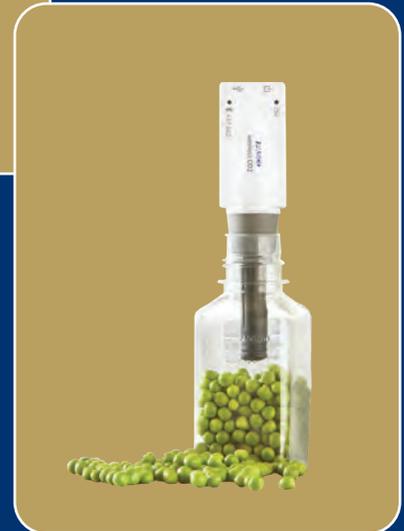




Table of Contents

Environmental Solutions.....	4
AG Lab Stations	4
Advanced Environmental	5
SPARKvue Software.....	6
Lab Equipment & Probes	8
Water Quality Testing	12
Greenhouse Sense & Control Kit	14





Environmental Science

Integrated Solutions for Environmental Science

Facilitate student investigations of environmental topics anytime, anywhere with PASCO. We offer cutting-edge solutions for both general and advanced environmental science courses, as well as agricultural science courses.

Using our award-winning Wireless Sensors and cross-platform software, students can collect and visualize live data, analyze lab results, and log measurements for long-term studies. Pair them with our standards-aligned labs to explore countless environmental concepts, both inside and outside the classroom.



World Class Support and Professional Development - Committed to Your Success!

We want you to have all the support, guidance, and training you need. Just let us know how we can help.

AG Science Starter Lab Station

Together, the Agricultural Starter and Extension Lab Stations offer a lab-ready solution for exploring essential topics in agricultural and environmental science. Complete with wireless sensors, ten student labs, and a storage case, the Agricultural Lab Stations let students investigate essential topics such as soil quality, water treatment, and the energy content of food. Using the included lab handouts, students can also explore more advanced topics, as they work to extract and separate leaf pigments, determine the energy content stored in plant-based foods, and model ecosystems using factors that create challenging and optimal growing conditions.



AG Science Station Lab Titles

The AG Science Starter Lab Station supports 7 of the 10 lab investigations. Add the Extension Lab Station to perform all 10 investigations.

Starter Station Labs

- Determining Soil Quality
- Water Treatment
- Respiration of Germinating Seeds
- Plant Respiration & Photosynthesis
- Energy Content of Food
- Diffusion

Extension Station Labs

- Freshwater Quality Monitoring
- Modeling an Ecosystem
- Greenhouse Gases



AG Science Starter Lab Station

Includes the Agricultural Science Lab Manual and these Wireless Sensors:

- Temperature
- pH
- CO₂
- Conductivity
- Colorimeter & Turbidity



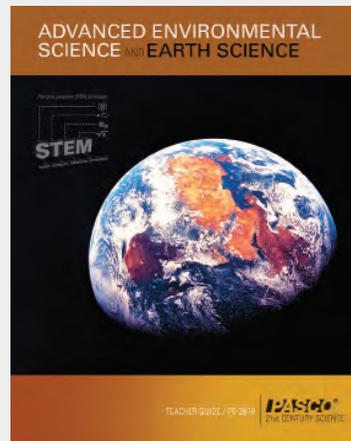
AG Science Extension Lab Station

Includes the Advanced Environmental Science Through Inquiry Lab Manual (digital) and these Wireless Sensors:

- Optical Dissolved Oxygen
- Weather with GPS
- EcoZone System

Lab Stations Support Advanced Environmental Science

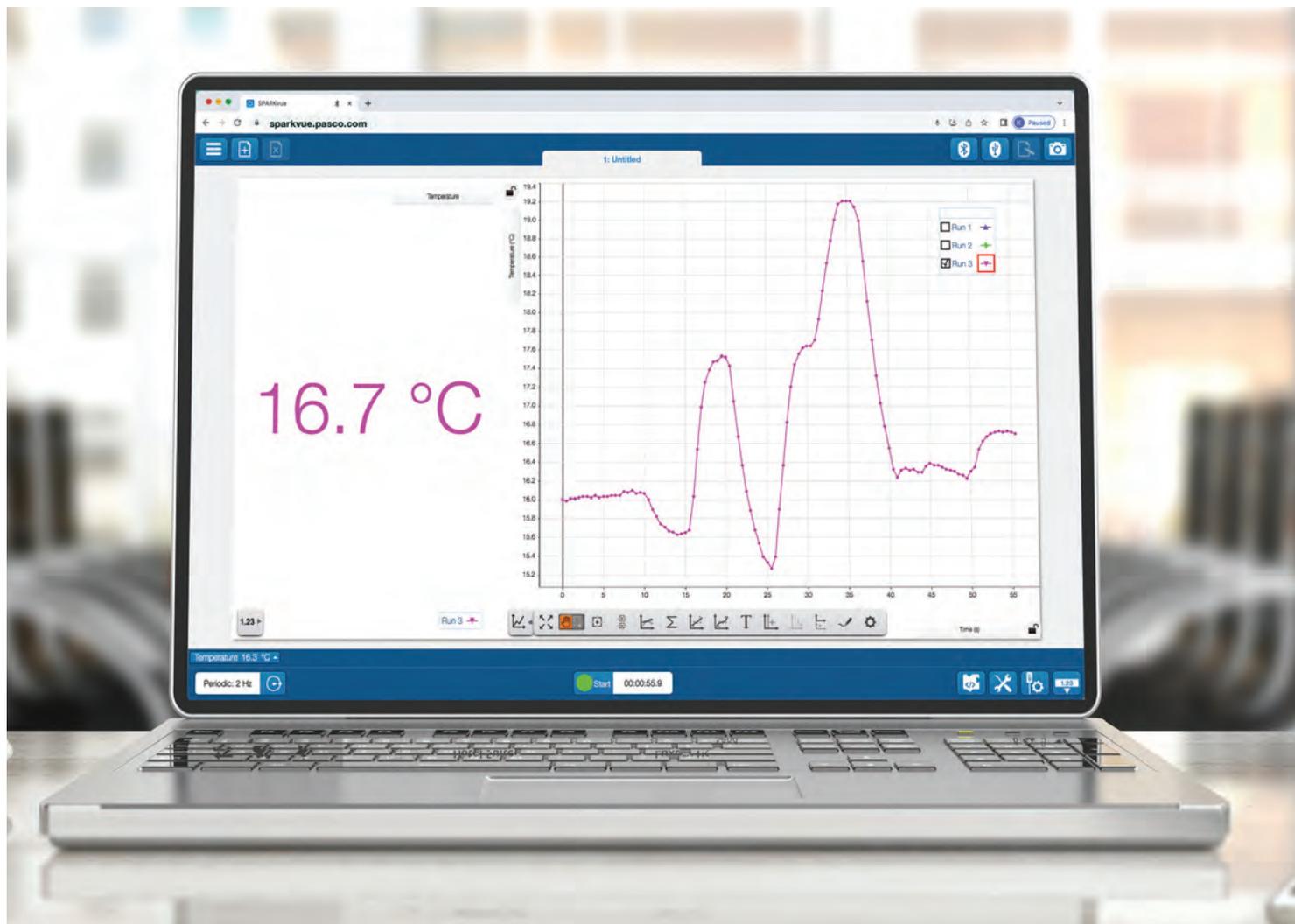
Pair the AG Lab Stations with PASCO's Advanced Environmental and Earth Sciences Teacher Lab Manual to support student investigations of advanced environmental science topics.



Advanced Environmental and Earth Sciences Teacher Guide (PS-2979)

Designed by educators and curriculum experts, the Advanced Environmental and Earth Sciences Teacher Guide, includes twenty-one hands-on investigations. Each activity covers a core AP[®] Environmental Science topic and includes supporting documents to help guide both students and teachers through the investigation.

Agricultural Science Starter Lab Station.....	EB-6336
Agricultural Science Extension Lab Station.....	EB-6337
Advanced Environmental and Earth Sciences Teacher Guide.....	PS-2979

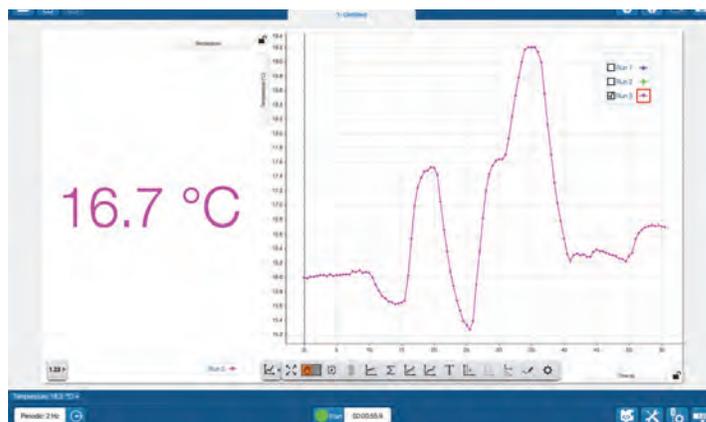


This FREE award-winning data collection and analysis software works on any platform!

 Windows •  Mac OS •  iOS •  chrome •  Android

SPARKvue's intuitive design has made it an award-winning tool for collecting and analyzing experimental data. The user-friendly platform optimizes data collection and provides tools for in-depth analysis within a compact, yet powerful workspace.

SPARKvue features Blockly coding, allowing students to use block-based code for sense and control of PASCO devices, including any of our sensors.

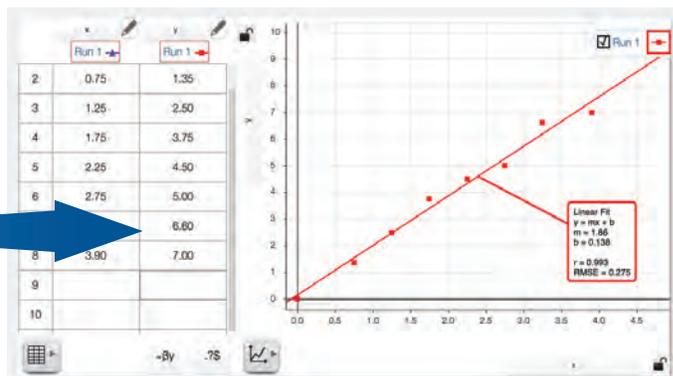


Student Data Collection...**MADE EASY!**

Student-Entered Data & Graphing **MADE EASY!**

Choose manual data collection to record live values with the click of a button.

Make a mistake? No problem! Simply select a data point to replace it.

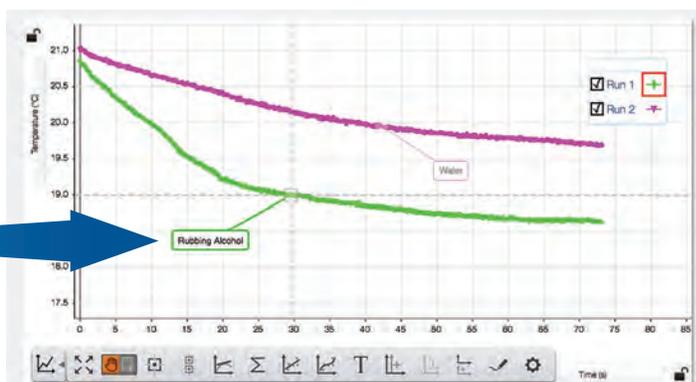


Graph & Analyze Student-Entered Data

Collecting & Graphing Sensor Data **MADE EASY!**

Automate sensor data collection to monitor measurements in real-time.

Save time with pre-made experiment files or easily build your own displays. You and your students will be up and running in minutes.



Rapid, Real-Time Data Collection & Analysis



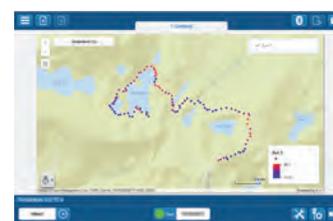
Digits Display



Bar Graph Display



Meter Display



GIS Map Display

Free award winning data collection and analysis software now runs in your browser!

We're excited to announce SPARKvue is now available **FREE** of charge on all your devices as a browser-based application. This new version of our software as a Progressive Web Application (PWA) means you have free access to all the features of SPARKvue from Google Chrome and Microsoft Edge browsers. That's right: No download fees, subscription fees, or update fees, even for Windows® and Mac®. Plus, the app is always updated to the latest version automatically, so you never have to worry about it.

Go to sparkvue.pasco.com to access the PWA. SPARKvue is also available as a **FREE** app for Chromebook™, iPad®, Android™ tablets, and Apple® and Android™ smartphones.



Looking for additional options? See pasco.com/sparkvue for more details.

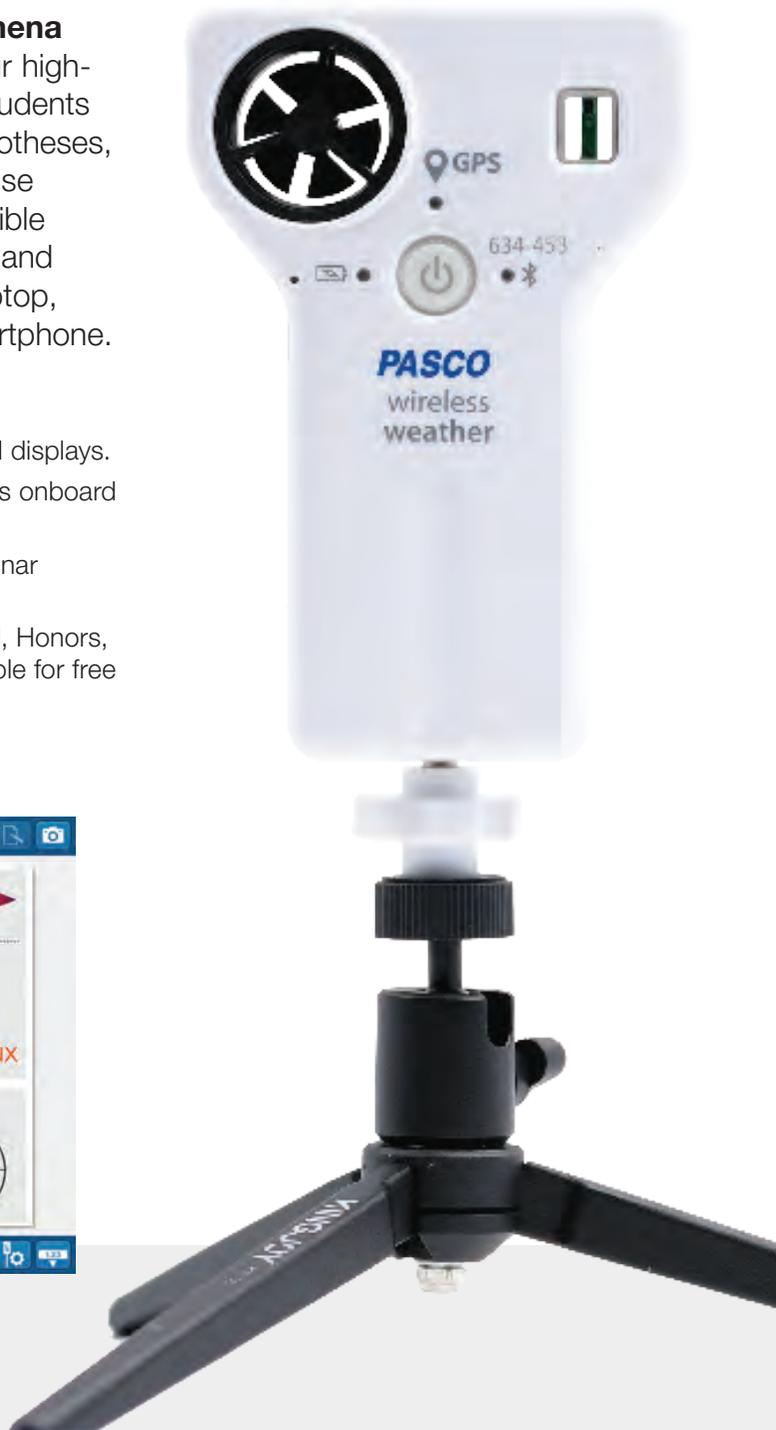
Environmental Sensors & Lab Equipment

Uncover patterns in environmental phenomena with world class solutions from PASCO. Our high-quality sensors, software, and labs empower students to think like real-life scientists, as they form hypotheses, collect data, and perform analyses to make sense of the world around them. Plus, they're compatible with most devices, enabling students to collect and display experimental data using a computer, laptop, Chromebook, tablet, or Bluetooth-enabled smartphone.

- Stream live sensor data to virtually any device.
- Contextualize measurements with a variety of graphical displays.
- Perform long-term studies by logging data to a sensor's onboard memory.
- Easily integrate new sensors or software with free webinar trainings, how-to videos, and technical support.
- Explore dozens of ready-made experiments for general, Honors, AP®, and IB® environmental science courses, all available for free from the PASCO Experiment Library.



Deepen student understandings of core concepts, while developing key 21st-century skills with live, interactive data that streams to virtually any device.



Our growing line now includes over 30 Wireless Sensors!



Wireless pH Sensor

The Wireless pH Sensor can be used to quickly obtain accurate pH readings, log data to the connected device, and even collect data autonomously for hours or weeks. Use the sensor for water quality studies, environmental monitoring, testing solutions, and chemical reactions.

Features:

- Simply pair and go, no cables or interfaces to manage
- Logs pH data directly onto the sensor for long-term experiments
- Compatible with Ion-Selective Electrodes (ISE) and the Oxidation Reduction Probe (ORP)
- Includes Bluetooth® connectivity and a long-lasting coin cell battery



Wireless pH Sensor.....PS-3204

Wireless Oxygen Gas Sensor

The Wireless Oxygen Gas Sensor measures gaseous O₂ concentrations as well as humidity and air temperature. It is durable, accurate, and easy to use, enabling students to quickly and easily make measurements of photosynthesis, respiration, and oxygen cycling, both in open and closed systems.

Features:

- Bluetooth® and USB connectivity
- 0-100% Oxygen Gas Concentration
- ±1% Oxygen at constant temperature/pressure
- Also reports ambient temperature and humidity



Wireless Oxygen Gas Sensor..... PS-3217

Wireless Conductivity Sensor

The Wireless Conductivity Sensor measures the electrical conductivity of an aqueous solution. It is ideal for investigating the properties of solutions, including total dissolved solids (TDS) for water quality inquiry.

Applications:

- Water quality investigations
- Study the effects of water pollution
- Measure Total Dissolved Solids (TDS)
- Investigate solution properties
- Track the diffusion of ions through membranes



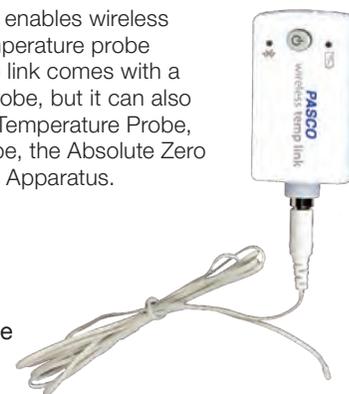
Wireless Conductivity SensorPS-3210

Wireless Temperature Link

The Wireless Temperature Link enables wireless connection for any PASCO temperature probe with a 3.5 mm connection. The link comes with a Fast Response Temperature Probe, but it can also connect to the Stainless Steel Temperature Probe, Skin/Surface Temperature Probe, the Absolute Zero Sphere, and the Ideal Gas Law Apparatus.

Features:

- Range of -30°C to 105°C
- Onboard datalogging
- Includes temperature probe
- Bluetooth® connectivity



Wireless Temperature Sensor Link PS-3222

Wireless Temperature Sensor

The Wireless Temperature Sensor connects to student devices to provide real-time temperature data anytime, anywhere. It can also store data to its onboard memory when long-term monitoring is required.

Features:

- Displays temperature data in real time
- Water-resistant
- Variable sampling rate for short, precise changes or lengthy, multi-day data collection
- Includes Bluetooth® connectivity and long-lasting battery



Wireless Temperature Sensor..... PS-3201

Wireless Light and Color Sensor

The Wireless Light and Color Sensor features two separate apertures: One measures ambient light from the side of the box, and the other measures percent color of directional light at the end of the box.

Features:

- Wirelessly connects to computers, Chromebooks, tablets, and smartphones
- On-board memory enables the sensor to function as an independent datalogger
- Variable sampling rate for short, precise experiments or lengthy, multi-day data collection
- Bluetooth® connectivity and long-lasting coin cell battery



Wireless Light and Color Sensor.....PS-3248

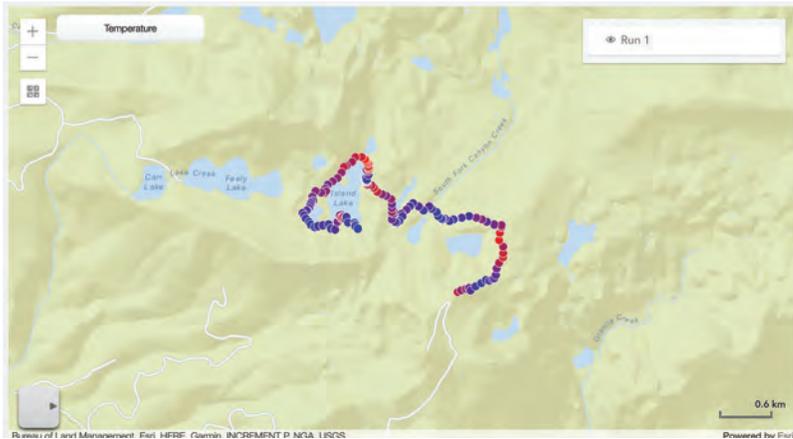
Modeling the Environment

Wireless Weather Sensor with GPS

The Wireless Weather Sensor is an all-in-one instrument for monitoring complex environmental conditions. It houses several sensing elements within a single unit to provide 19 different measurements. Use the sensor in logging mode with the Weather Vane Accessory for long-term monitoring, or use it as a handheld instrument to study microclimates and local environmental conditions.

Features:

- Logging mode for long-term experiments
- Water resistant for extended environmental monitoring
- Built-in light sensor for measuring light level and UV index
- Special SPARKvue map display for analyzing spatial data
- 19 different measurements that can be collected and analyzed



Visualize your data in seconds with a free ESRI's ArcGIS online account.

- Wireless Weather Sensor with GPSPS-3209
- Weather Vane AccessoryPS-3553



EcoZone™ System

PASCO's EcoZone System is designed to help students model and understand the complex interactions within, and among, different ecosystems. The three clear acrylic EcoChambers are specially designed to accommodate PASCO sensors, making qualitative and quantitative measurements as easy as observing.

All three chambers interconnect, enabling students to study interactions between three different systems. Compare the traditional terrestrial, aquatic, and decomposition environments, or create unique biomes to model and measure.



- EcoZone System ME-6668

Wireless CO₂ Sensor

Measure changes in carbon dioxide (CO₂) gas levels quickly and easily with the Wireless CO₂ Sensor. This sensor employs live data to make core labs such as photosynthesis, cellular respiration, and metabolism experiments engaging and impactful.

Features:

- Store up to 55,000 logged data points during long-term experiments
- Integrated stopper for use with sample bottle and common glassware



Wireless CO₂ Sensor (Carbon Dioxide)PS-3208



Wireless Optical Dissolved Oxygen Sensor

The Wireless Optical Dissolved Oxygen Sensor is ideal for monitoring DO₂ in the lab or field. In addition to the dissolved oxygen sensor, it also includes probes for measuring atmospheric pressure and water temperature. The optical technology is fast, accurate, and does not require stirring, filling solutions, warm-up, or frequent calibration.



Wireless Optical Dissolved Oxygen Sensor NEWPS-3246



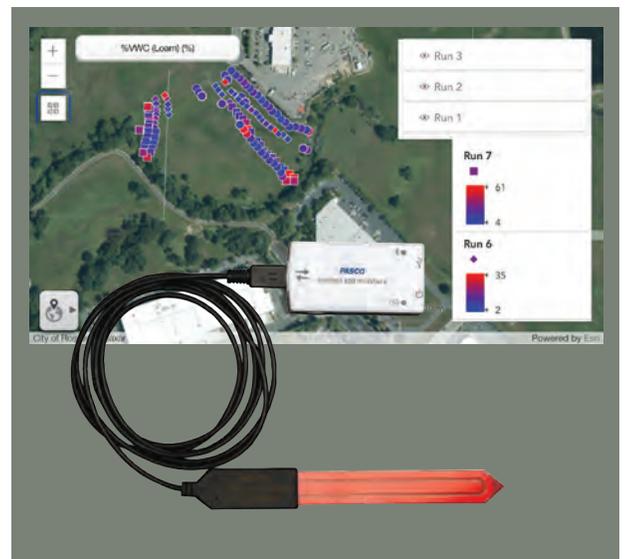
Wireless Soil Moisture Sensor

The Wireless Soil Moisture Sensor measures the volumetric water content (%VWC) of soil, reporting data in real time or storing it onboard the sensor's memory for long-term experiments. Durable and easy to use, the Wireless Soil Moisture Sensor is the perfect tool for monitoring controlled experiments both inside and outside of the classroom.

Features:

- Collect and display data in real time with PASCO software
- Collect data for hours, days, or weeks with Logging Mode
- Bluetooth® connectivity enables use in the classroom, lab, or field
- Use GPS data from a mobile device for GIS mapping activities
- Selectable calibrations for different soil types

Wireless Soil Moisture SensorPS-3228





Wireless Colorimeter & Turbidity Sensor

PS-3215

The Wireless Colorimeter & Turbidity Sensor simultaneously measures the absorbance and transmittance of six different wavelengths. The sensor can be used to study Beer's Law (absorbance vs. concentration), enzyme activity, photosynthesis, and the rates of chemical reactions (absorbance vs. time). After a simple calibration, students can quickly begin viewing live measurements as they materialize across the visible spectrum at 650 nm (red), 600 nm (orange), 570 nm (yellow), 550 nm (green), 500 nm (blue), and 450 nm (violet).

This sensor also functions as a high-quality turbidimeter for water quality analysis. Rather than simply measuring transmitted light, the Wireless Colorimeter and Turbidity Sensor measures light scattered at a 90 degree angle from the sample, resulting in accurate and repeatable measurements. Additionally, the internal housing for the cuvette is opaque, which limits ambient light interference to preserve accuracy.

Features:

- Stabilized light source for consistent readings
- Measures six different wavelengths simultaneously
- PASCO software displays the absorbance & transmittance at each wavelength in the appropriate color
- Quick and easy calibration
- Wireless design enables data collection in the field
- Pre-calibrated for ezSample Snap Vial Kits



Measure the absorbance and transmittance of a solution at six different wavelengths simultaneously!

WARNING! This product can expose you to chemicals including Formaldehyde, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Wireless Colorimeter & Turbidity SensorPS-3215
Includes USB Charging cable, 9 cuvettes, 2 cuvette racks, and one 100 NTU calibration cuvette.

Chemical Water Quality Testing in the Field

PASCO's ezSample water quality test kits simplify the chemical testing of water sources. Avoid the mess and difficulty of handling chemicals directly and get great results, even in the field.

Colorimetric Analysis

Conduct colorimetric tests in the field and avoid the mess and tedium of mixing chemicals. These ezSample Snap Vials contain a pre-formulated reagent to test a variety of water quality parameters. No more guessing at color variations — just drop the vial into the Wireless Colorimeter and read the concentration.



- ezSample Snap Vial - IronEZ-2331
- ezSample Snap Vial - Nitrate*EZ-2333B
- ezSample Snap Vial - AmmoniaEZ-2334A
- ezSample Snap Vial - PhosphateEZ-2337
- ezSample Snap Vial - ChlorineEZ-2339A
- ezSample Field Titrator - Total HardnessEZ-2338
- ezSample Field Titrator - AlkalinityEZ-2340

*** WARNING!** This product can expose you to chemicals including phenolphthalein, which is known to the State of California to cause cancer, and methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Go Wireless with PASPORT Sensors*

PASCO's AirLink Interface connects PASPORT (blue) sensors to your computer using Bluetooth or USB technology.



AirLink Interface

PS-3200

The AirLink connects PASPORT sensors to a Mac or Windows computer, Chromebook, iPad, tablet, or smartphone via Bluetooth or USB connection. The USB cable is included.



AirLink InterfacePS-3200

PASPORT Salinity Sensor*

PS-2195

The PASPORT Salinity Sensor works with the 10X Salinity Sensor Probe to measure the salinity, conductivity, and temperature of fresh to brackish water sources. The sensor determines salinity based on electrical conductivity. It also features a built-in calculation, based on the Practical Salinity Scale (PSS), that compensates for changes in conductivity caused by temperature changes.



PASPORT Salinity SensorPS-2195

PASPORT Non-Contact Temperature Sensor*

PS-2197

The Non-Contact Temperature Sensor measures surface temperature by detecting the emitted infrared light. Record the temperature of objects without touching them!



PASPORT Non-Contact Temperature SensorPS-2197

PASPORT Flow Rate/Temperature Sensor*

PS-2130

PASCO's Flow Rate Sensor allows students to measure the rate of movement and temperature of streams, rivers, and other flowing systems. The propeller is a rugged, single-piece unit encased by protective material — no more losing pieces at the bottom of the stream.

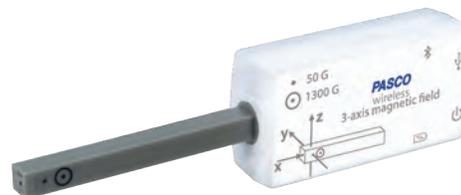


PASPORT Flow Rate/Temperature SensorPS-2130

Wireless Magnetic Field Sensor

PS-3221

This 3-Axis Magnetic Field Sensor can sense the Earth's magnetic field, magnetic fields from current-carrying coils, and permanent magnets. There are two ranges: ± 50 gauss and ± 1300 gauss. This sensor is primarily for static fields.



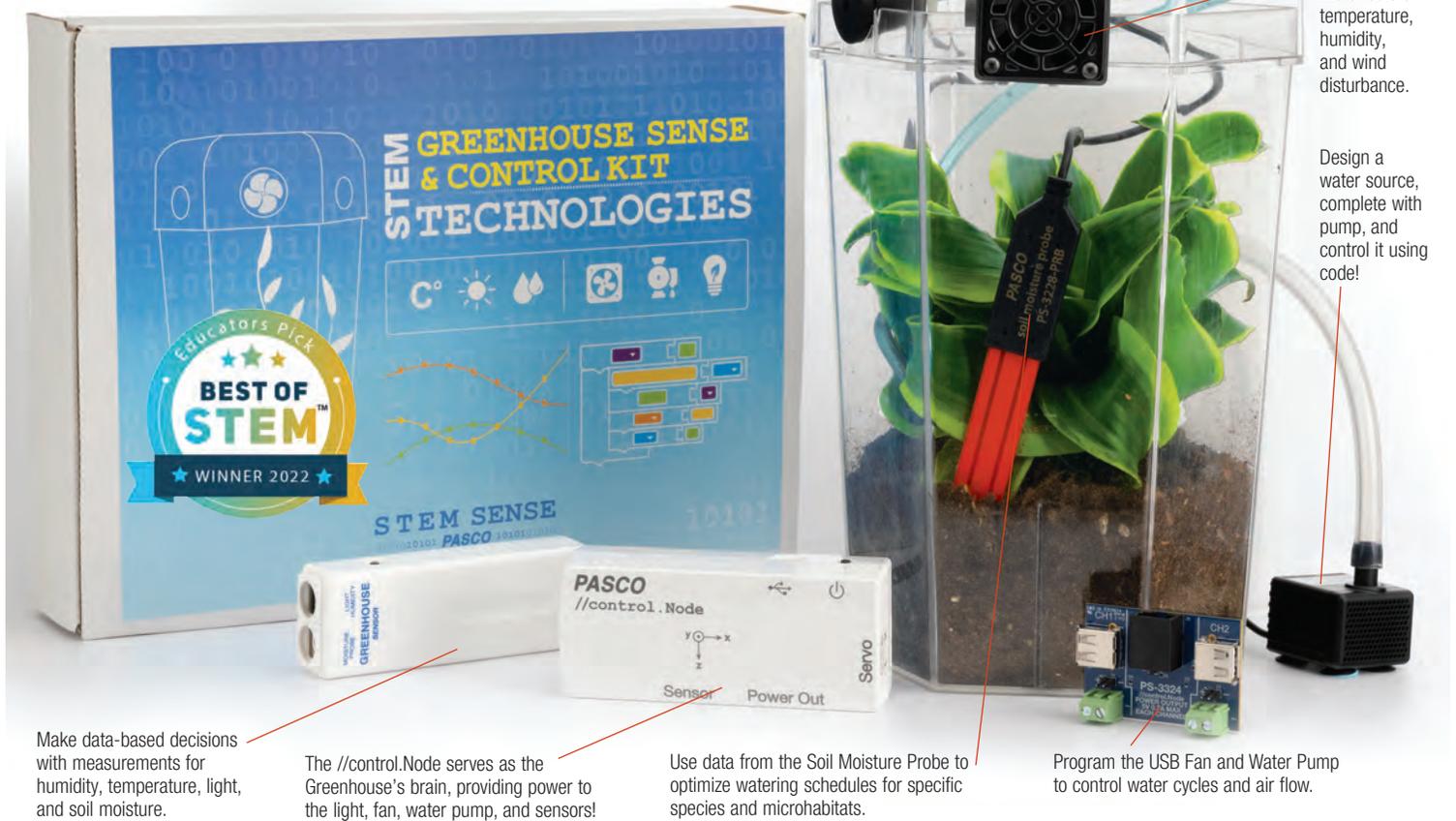
Wireless Magnetic Field SensorPS-3221

Greenhouse Sense & Control Kit

Greenhouse Sense & Control Kit

ST-2997

Designed for the exploration of biological and ecological concepts, the Greenhouse Sense & Control Kit includes everything students need to design, build, program, and study their very own greenhouse.



Make data-based decisions with measurements for humidity, temperature, light, and soil moisture.

The //control.Node serves as the Greenhouse's brain, providing power to the light, fan, water pump, and sensors!

Use data from the Soil Moisture Probe to optimize watering schedules for specific species and microhabitats.

Program the USB Fan and Water Pump to control water cycles and air flow.

Student Activities

The Greenhouse Sense & Control Kit includes five student activities that can be edited to fit your course needs. Each activity focuses on a key concept in biology or environmental science and includes extensions to engineering and design practices.

Build career awareness with activities that make real-world connections to:

- Agricultural monitoring
- Ecological management
- Plant physiology

Help students develop competency in:

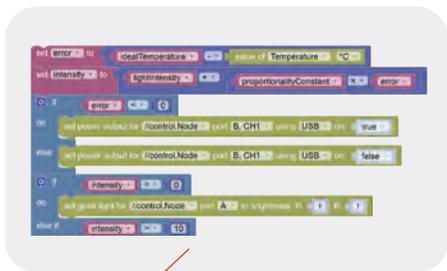
- Coding
- Problem solving
- Data collection and analysis
- Ecological concepts
- Science and Engineering practices



Student Activities

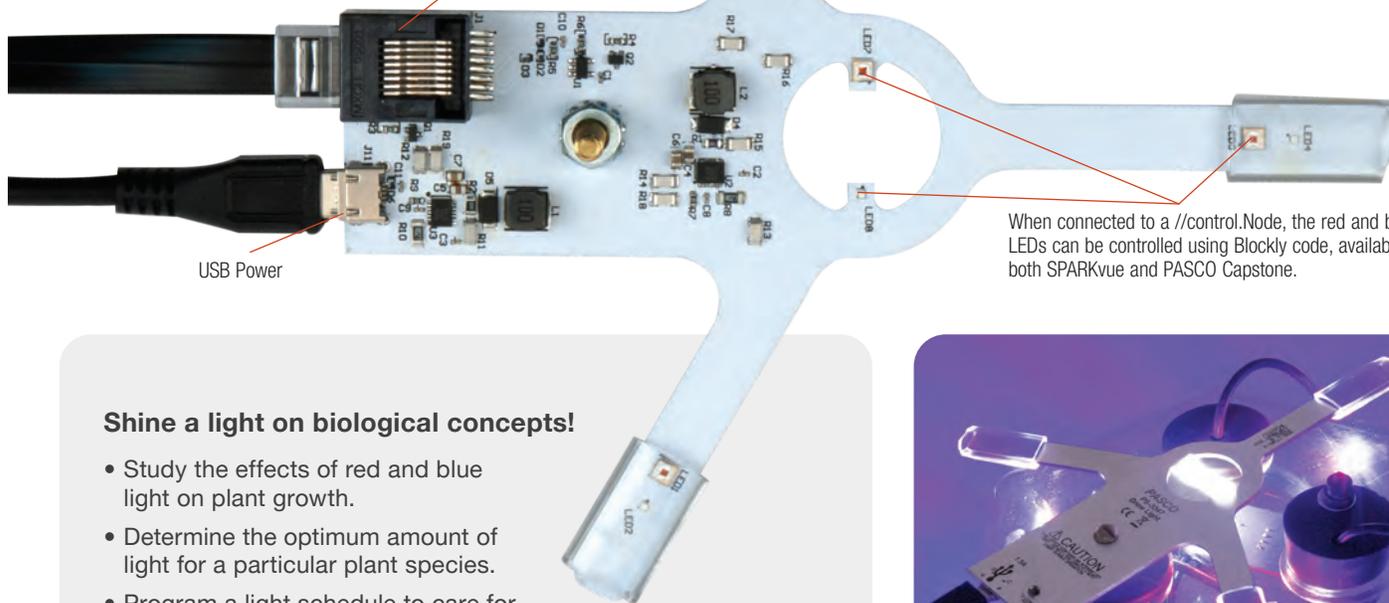
- Program a Sunny Day for Plants
- Coding a Cooling Breeze
- Program Perfectly Timed Rain
- Optimize Water Movement
- Program a Greenhouse Sense and Control System





Program your PASCO Grow Light

Control Port for //control.Node

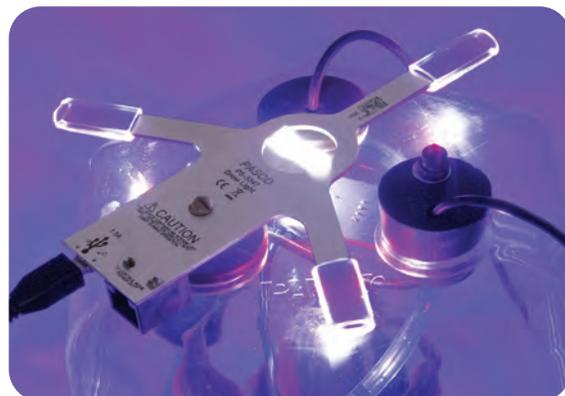


USB Power

When connected to a //control.Node, the red and blue LEDs can be controlled using Blockly code, available in both SPARKvue and PASCO Capstone.

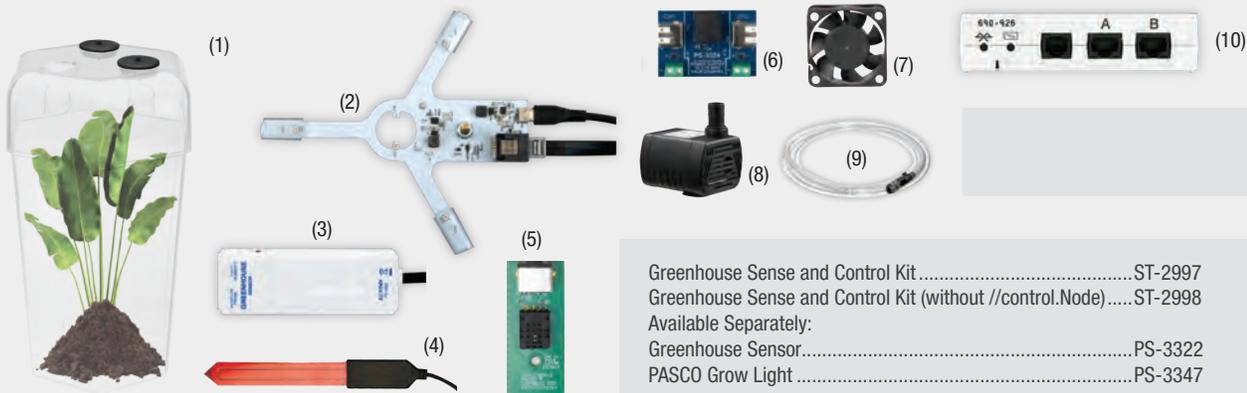
Shine a light on biological concepts!

- Study the effects of red and blue light on plant growth.
- Determine the optimum amount of light for a particular plant species.
- Program a light schedule to care for plants over weekends and breaks.



Greenhouse Sense & Control Kit Equipment

This complete kit includes: an EcoChamber (1), PASCO Grow Light (2), Greenhouse Sensor (3) Soil Moisture Probe (4), Humidity/Light/Temperature Probe (5), Power Output Module (6), Fan (7), Water Pump (8), tubing with drip-watering ends (9), and //control.Node (10).



Greenhouse Sense and Control Kit	ST-2997
Greenhouse Sense and Control Kit (without //control.Node)	ST-2998
Available Separately:	
Greenhouse Sensor	PS-3322
PASCO Grow Light	PS-3347

Greenhouse Sense & Control Kit

Designed for the exploration of biological and ecological concepts, the Greenhouse Sense & Control Kit includes everything students need to design, build, program, and study their very own greenhouse.

Build career awareness with activities that make real-world connections to:

- Agricultural monitoring
- Ecological management
- Plant physiology

Help students develop competency in:

- Coding
- Problem solving
- Data collection and analysis
- Ecological concepts
- Science & Engineering practices



This complete kit includes: EcoChamber and //control.Node; a breakout board; a fan; a water pump; tubing with drip-watering ends; a red and blue light; a sensor module; and a Greenhouse Sensor that measures light, temperature, humidity, and soil moisture.

SENSE & CONTROL

Power student creativity with the //control.Node and sensors!



Wireless and rechargeable, the //control.Node has two ports for stepper motors, two ports for servo motors, and one port for digital sensors.



Greenhouse Sense and Control KitST-2997