



SEA-BIRD
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In Situ Nutrient Sensors



Sea-Bird Scientific's line of nutrient sensors deliver high-resolution, continuous nutrient measurements that provide unique insights into the coupling of hydrological, geochemical, and biological processes.

From lakes and rivers to deep oceans, continuous monitoring of nutrients is increasingly being used to understand ecosystem dynamics at time scales that capture daily processes, trends and events.

Eutrophication and Nutrient Monitoring

Eutrophication is the enrichment of natural water bodies with nutrients, usually from anthropogenic sources, causing significant changes in ecosystem structures. The two major sources of nutrient additions to lakes, rivers and coastal oceans are:

- Run-off from fertilizers used in terrestrial agricultural applications
- Discharge of wastewater, both directly and from treatment plants

The unnatural increase of macro-nutrients, especially nitrate and phosphorus, into coastal water bodies leads to the stimulation of algae blooms which can be disruptive and harmful to fish and humans. Once harmful algae blooms, or HABs, deteriorate and sink to deeper layers, anoxic conditions can occur as bacteria break down the dead organic material. As the severity and frequency of HABs increase, governments and scientists have become increasingly interested in monitoring and understanding nutrient cycles with *in situ* nutrient sensors.



SUNA V2 UV Nitrate Sensor



A versatile UV Nitrate sensor for operation in diverse environments

The Sea-Bird Scientific SUNA V2 (Submersible Ultraviolet Nitrate Analyzer) is an optical UV nitrate sensor based on the ISUS (In Situ Ultraviolet Spectroscopy) UV nitrate measurement technology developed at MBARI. Sea-Bird Scientific adapted the technology to develop the SUNA V2 to measure nitrate in increasingly more challenging environments including extremely turbid and high CDOM conditions. With improved optics and built-in logic, the SUNA V2 measures nitrate with industry-leading accuracy and stability over a wide range of environmental conditions, from blue-ocean nitraclines to storm runoff in rivers and streams.

Standard Features

- Accuracy and stability over a wide range of environmental conditions
- Adaptive sampling intelligence
- Universal real-time nitrate processing algorithm
- 10 or 5 mm pathlength
- Serial data output and a 500 m depth rating
- Titanium housing
- User-friendly UCI software (Windows and Mac OS X compatible)

Optional Features

- Reduced 5 mm pathlength for high turbidity environments
- Active fouling control with built in wiper
- Freshwater and seawater calibrations
- Internal data logging and scheduling with 2 GB memory
- SDI-12 interface
- USB communications



SUNA V2 UV Options



Top Left: Optional SUNA V2 Hydro-Wiper

The Hydro-Wiper is an external anti-fouling system fully integrated with the SUNA V2 nitrate sensor. The Hydro-Wiper keeps the SUNA V2 sample windows clean for several months and is specifically intended for use in freshwater and coastal systems.



Middle Left: Optional SUNA V2 Flow Cell

The SUNA V2 flow cell is designed to adapt the SUNA V2 for flow through operations on moorings with pumped flow, ship-board underway systems or for laboratory testing and calibration. The flow cell attaches to the SUNA V2 sample chamber and tightly seals against the optical chamber windows. Nylon barbed fittings are provided to connect the flow cell to available pumped flow.



Bottom Left: Optional SUNA V2 Anti-fouling Guard

The SUNA V2 anti-fouling guard is a semi-circular piece of perforated copper attached to a plastic armature that fits into the sample chamber. It provides passive fouling prevention through the release of copper ions that inhibit biological growth in the area. The anti-fouling guard is a reliable and affordable approach to increase deployment time and decrease operating costs. It is intended for use in blue-ocean applications with low-to-no suspended sedimentation and/or low-to-no turbidity.

Deep SUNA

Measuring nitrate concentrations in deep ocean environments

Based on the proven MBARI-ISUS nitrate sensor, the Deep SUNA has been redesigned for easy integration with AUVs of all types. Deep SUNA provides real-time, optical nitrate measurements and easy integration with profiling systems in deep ocean environments using advanced UV absorption technology.

Deep SUNA Features

- Real-Full UV spectrum for maximum accuracy
- Real-time temperature/salinity compensation
- Real-time nitrate calculation
- Corrosion-proof anodized aluminum housing with 2000 meter depth rating
- Simple, software-based, in-field reference checks
- User-friendly UCI software (Windows and Mac OS X compatible)



Photo: Teledyne Marine

HydroCycle-PO₄ Phosphate Sensor

Wet chemistry engineered for environmental monitoring

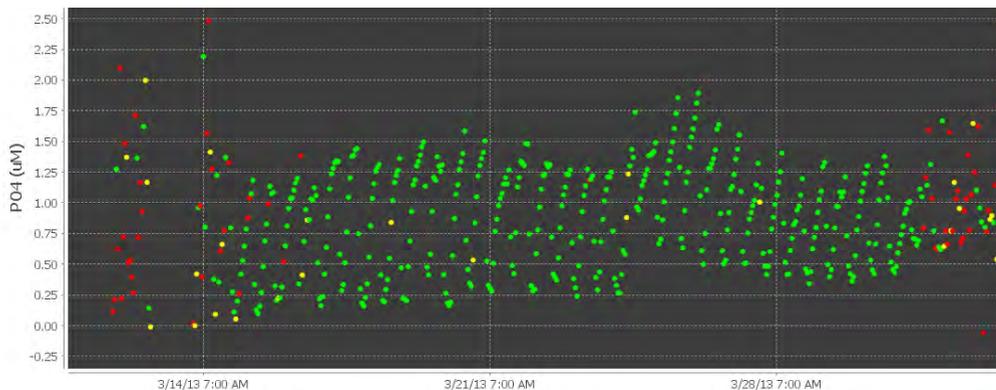
The HydroCycle-PO₄ is a wet-chemical sensor engineered for environmental monitoring to enable valid, scientifically defensible results that lead to better management recommendations. It is ideally suited to monitoring for point and non-point source nutrient inputs and environmental dynamics and change. The HydroCycle-PO₄ is intended for continuous or real-time measurement of dissolved phosphate in:

- Lakes and reservoirs
- Streams, rivers, channels, and canals
- Estuaries

A NIST traceable on-board standard, factory calibration check, a 2.3 µgP/L detection limit, and an accurate calibration mean you can trust the data, line up grab sample records, and swap sensors with minimal offsets. Autonomous operations and low power consumption enable extended deployments in remote locations. Resistance to high oxygen levels means increased data quality. Quality control (QC) flags have been developed to speed up troubleshooting, increase uptime, and provide confidence in data quality. You can know that your instrument is operating properly so you can spend your time analyzing results.

Features

- Nanomolar resolution and scattering intensive optical cell
- Five month reagent stability
- Color-coded QC flags in real-time PO₄ plot and analysis plot
- NIST traceable on-board standard
- Over 1500 samples between services
- SDI-12 and RS232 telemetry options
- Up to four samples per hour



Left: CycleHost Plotting

CycleHost is a graphical user interface for configuring and controlling the HydroCycle PO₄ sensor and processing and analyzing phosphate measurements.

- Good Data
- Suspect Data
- Bad Data
- Missing Data