Biospherical Instruments Inc.

Optical Instruments for Environmental Monitoring

QSP-2000, Quantum Scalar Sensors

Measuring Downwelling Irradiance over PAR(400-700nm)

Scalar PAR sensors in our new QSP-2000 series, feature Biospherical's patented spherical collector. This unique design ensures uniform directional response over 3.7 p steradians. An aluminum-encased optical light-pipe funnels flux from the collector to a silicon photodetector that has a flat quantum response over PAR (Photosynthetically Active Radiation; 400 – 700 nm).

The most noteworthy improvement in this new series, is the capability of direct connection to a PC or laptop computer. Our **QSP-2100** sensors contain imbedded calibration information and data are transmitted directly into a PC computer. This new low-power circuitry requires no batteries, relying instead upon power from the host computer's comport.

Linear output models, **QSP-2200** feature high-quality, low-drift, electrometer-grade amplifiers and are are compatible with most commercially available dataloggers.

When equipped with an optional depth transducer, **(QSP-2000D)** and a matching surface reference sensor **(QSR-2000)** the QSP series offers researchers a truly low-cost, scalar irradiance profiling system.

A logarithmic output version, **QSP-2300** is also available. This sensor was designed specifically for integration with CTD systems and dataloggers requiring a limited-range of signal input.

The new QSP-2000 is rugged and compact.

Key Features

- *Designed to measure downwelling PAR (400-700 nm) irradiance to depths of 2000 meters*
- *1.9 cm (3/4") diameter solid Teflon® spherical irradiance collector*
- *Compact, rugged, and low-cost*
- *QSP-2100 includes operating software allowing direct connection to a PC or laptop computer*

Specifications

Optical Features

Scalar Irradiance Collector: 1.9 cm (3/4") diameter solid Teflon® sphere optically connected to the main housing by a 2.5 cm aluminum-encased quartz light pipe.

Photodetector: Blue-enhanced high-stability silicon photovoltaic detector with dielectric and absorbing glass filter assembly.

PAR Spectral Response: Equal (better than ±10%) quantum response from 400 nm to 700 nm with response sharply attenuated above 700 nm and below 400 nm. Spectral response-induced errors will cause less than 5% errors in naturally occurring light fields.

Directional Response: Each instrument's directional response is optimized before final calibration. Front-to-side (approximately 85° from head on) response over all angles is equal (± 6%) with response attenuated to 0 (at 95°) by the 20-cm diameter cutoff shield. Individual detector response plots are available as an option.

Optical Features (Cont.)

Sensitivity: When purchased alone, the sensor is calibrated in quanta/(cm^2·sec))/volt. Nominal sensitivity is 1 volt = $1x10^{17}$ quanta/(cm^2·sec) (slightly less than full sunlight). Noise level is typically less than 1 millivolt, temperature coefficient of the dark signal is less than 10 microvolts/°C, and response temperature coefficient is less than 0.15%/°C.

Electronic Features

Measured Signals: PAR Dynamic Range: $1.4x10^{-5}$ µE/(cm^2·sec) to 0.5 µE/(cm^2·sec)

Environmental

Temperature Range: -2°C to 35°C

Calibration

Each QSR-2000 sensor is calibrated using a National Institute of Standards and Technology- (NIST) traceable 1000-watt type FEL Standard of Spectral Irradiance using procedures recommended by NIST. Annual recalibration is strongly recommended.

Mechanical Features

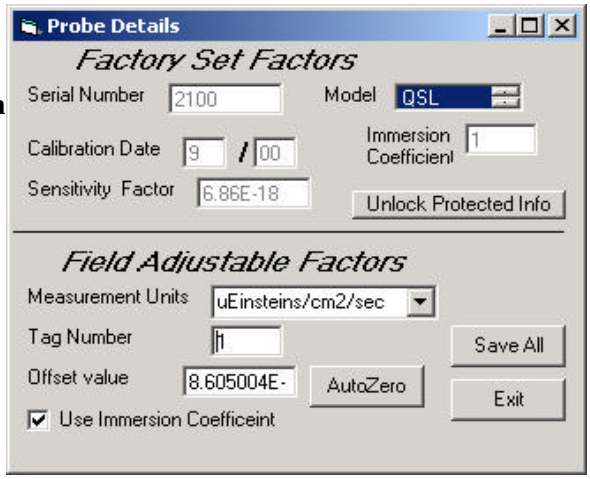
Collector: Solid PTFE sphere, epoxy mounted to a machined aluminum base

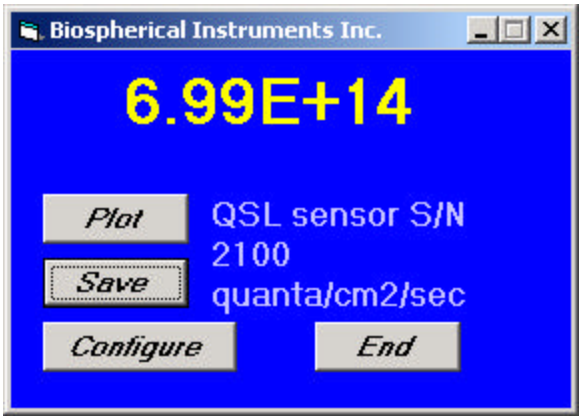
Housing: Hard-anodized aluminum, rated to 2000 meters

Dimensions:

Diameter: 20.0 cm
Height: 19.0cm
Weight: 1.1 kg

Fully calibrated with lamps traceable to NIST, each QSP-2100 digital sensor contains imbedded calibration factors and permits.





Using BSI's LOGGER-2100 software, the QSP-2100 logs and displays calibrated data in either Quanta or µEinsteins .

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Biospherical Instruments Inc.
5340 Riley Street
San Diego, CA 92110-2621 USA
Phone: (619) 686-1888
Fax: (619) 686-1887
E-mail: sales@biospherical.com
URL: www.biospherical.com

**Specifications subject to change without notice*