



QSP-200: Quantum Scalar Irradiance Profiling Sensor

Until the introduction of Biospherical Instrument's Quantum Scalar Irradiance sensors, accurate measurement of scalar irradiance in aquatic environments was difficult to achieve. The rugged QSP-200 features a patented solid Teflon® spherical collector, ensuring uniform directional response over 3.7π 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). Linear output models feature high-quality, low-drift, electrometer-grade amplifiers and can be constructed with either positive or negative going outputs (negative going is standard).

When equipped with an optional depth transducer (QSP-200D), surface reference sensor (QSR-240), and DAS-186 Data Acquisition System, the compact, rugged QSP system offers researchers an integrated, low-cost, automated scalar irradiance profiling system. For users not requiring automated data acquisition, an optional QSP-170BD battery-powered display provides an LCD digital display as well as analog output for data recorders or loggers.

A special logarithmic output version of the QSP-200 sensor (QSP-200L4S) is also available

for integration with CTD or STD profiling systems or other environmental monitoring systems. These logarithmic output models are particularly useful for users that acquire their sensor readings through a CTD or other limited-dynamic-range data acquisition system. The sensors rely on a high-quality, industry-standard, log amplifier to produce an output that varies over three to four orders of range.

Optional accessories for the QSP-200 include the DAS-186 automated Data Acquisition System and power supply or QSP-170BD digital display and power supply, QSC-305 underwater cable, QSP-200D sensor with depth transducer, QSP-200L log output



QSP-200 Quantum Scalar Profiling Sensor

sensor, and QSR-240 surface reference scalar sensor.

Key Features

- Measures scalar irradiance or PAR
- 1000-meter depth capability
- Optional 200 m depth (QSP-200D) transducer
- Surface reference sensor (QSR-240) available
- Logarithmic output version (QSP-200L4S) available for integration with CTD or STD

Specifications

Physical

Housing: Hard-black anodized 6061-T6 aluminum

Environmental: Rated to 1000 meters; operating temperature range of -2 to 35°C; typical response temperature coefficients are <0.15%/°C.

Cable Requirements: QSP-200 uses a QSC-205 underwater shielded cable; QSP-200D requires a PSC-305 4-conductor underwater cable with shield; QSP-200L4S uses a QSC-206 underwater shielded cable.

Lowering Frame: Optional QSP-210 lowering frame to minimize shading while providing secure cable attachment and correct orientation of the sensor.

Optical

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 ±8%) quantum response from 400 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 (ap-

proximately 110° from head on) response is equal (±6%), with some falloff occurring as the angle of incidence approaches that where the ball is obscured by the instrument housing. Individual detector response plots available.

Electronic

Output Characteristics:

Output Signal Polarity: negative going, or positive going upon request

(configured during construction)

Maximum Output Voltage: ± 5V (configured during construction)

Standard Output Voltage at Saturating Irradiance: ±2.5V

(configured during construction)

Saturating Irradiance Linear Models: Per SeaWiFS recommendations, other levels upon request

Maximum Noise Sensor Dark: <100 µV RMS

Dark Offset: <1mV

Output Impedance: 100 ohms

QSP-200L4S Log Sensor:

~1 mV to 5 VDC. Output voltage calibrated as log of irradiance.

QSP-200D: Pressure/Depth:

0 to 5 VDC (normally 200 m full scale). Accuracy is ±1% full scale; calibrated in meters assuming water density of 1.000 g/cm⁻³.

Sensitivity: Nominal sensitivity is 1 volt = 1x10¹⁷ quanta/(cm²-sec) (slightly less than full sunlight).

Noise level typically less than 1 millivolt; temperature coefficient of the dark signal is less than 10 microvolts/°C, and response



QSP-170- Digital Display

temperature coefficient is less than 0.15%/°C.

Measured Signals: Photosynthetically Active Radiation (400 – 700 nm). Dynamic Range: 1.4x10⁻⁵ µE/(cm²-sec) to 0.5 µE/(cm²-sec)

Power Requirements:

QSP-200: 6 to 15 VDC at 2mA;
QSP-200L Logarithmic Output Sensor: 6 to 28 VDC at 100 mA.

Compatible Power Supplies:

DAS-186 automated Data Acquisition System or QSP-170BD Power Supply and Digital Display (both purchased separately).

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