

USB Smart Quantum Sensor | JSQ-520

We are proud to announce our new USB quantum sensor with an improved spectral response providing accurate PAR/PPFD measurements under all light sources, including LEDs.



Refined Spectral Response

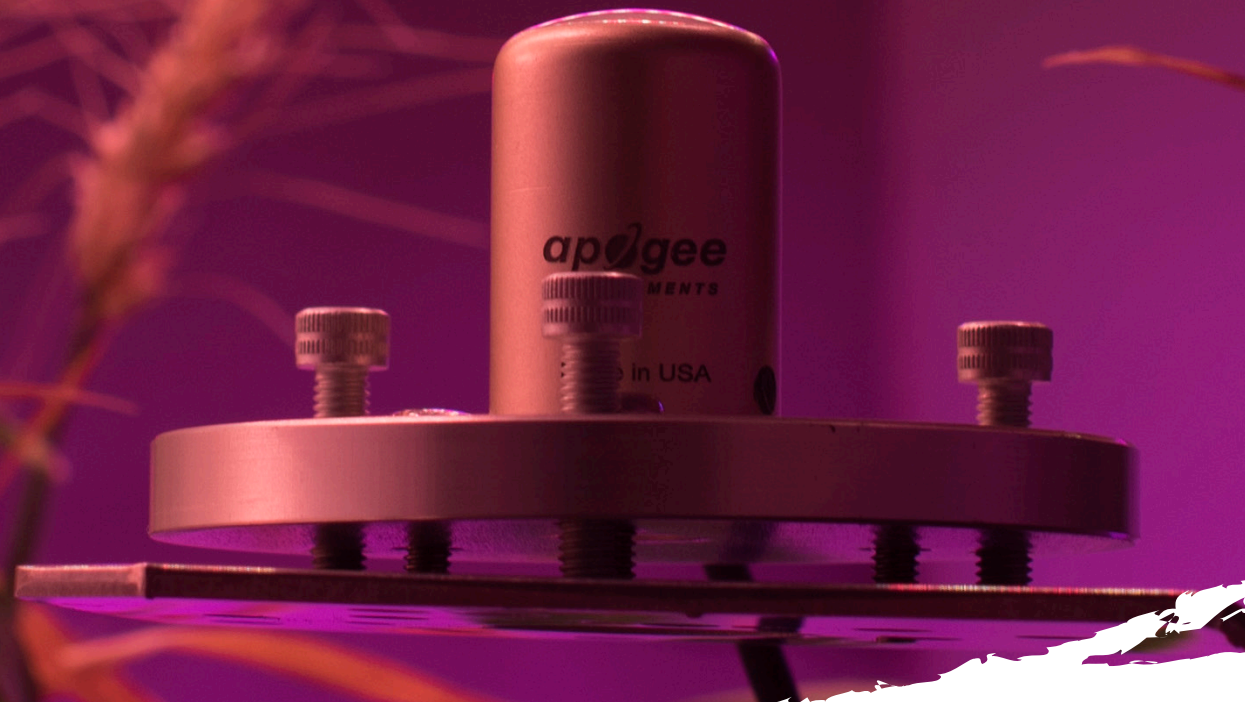
The improved spectral response of the JSQ-520 increases the accuracy of LED measurements making it ideal for use with both natural and electric light sources.

Internal Data Storage

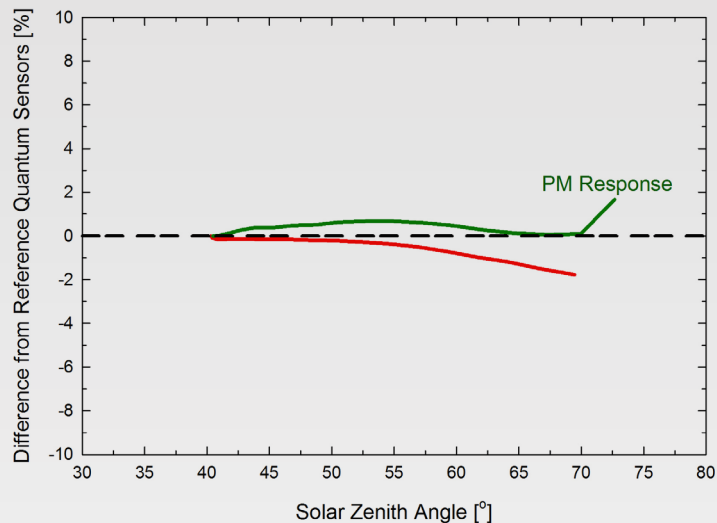
The sensor has internal data storage capability with the ability to hold up to 10,000 measurements. This allows the sensor to collect data while connected to a stand-alone 5 V DC power supply such as a USB wall adapter.

No Datalogger Required

The sensor can be connected to a desktop, laptop, or tablet computer via a USB 2.0 type A plug to be used with the software. The included software gives the user control of data logging and calibration settings, provides a real time output display and graph of PPFD measurements, and allows the data set to be saved as a csv file.

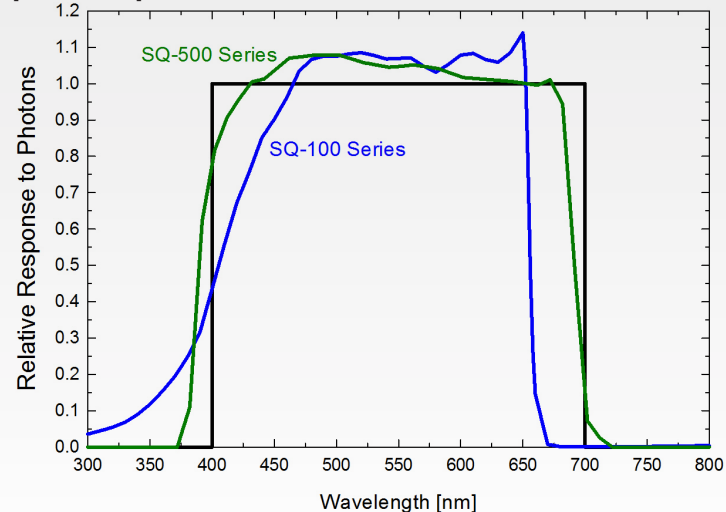


Cosine Response



Mean cosine response of seven JSQ-500 quantum sensors. Cosine response measurements were made on the rooftop of the building in Logan, UT. Cosine response was calculated as the relative difference of JSQ-500 quantum sensors from the mean of replicate reference quantum sensors (LI-COR models LI-190 and LI-190R, Kipp & Zonen model PQS 1). The red data are AM measurements; the green data are PM measurements.

Spectral Response



Mean spectral response measurements of six replicate JSQ-100 and JSQ-500 series quantum sensors. Spectral response measurements were made at 10 nm increments across a wavelength range of 300 to 800 nm in a monochromator with an attached electric light source. Measured spectral data from each quantum sensor were normalized by the measured spectral response of the monochromator/electric light combination, which was measured with a spectroradiometer.

Spectral Errors of Commercial Quantum Sensors

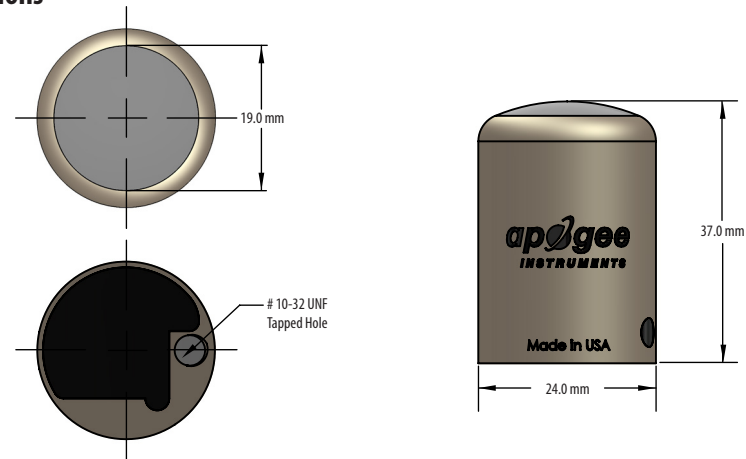
Radiation Source	JSQ-500	JSQ-110 JSQ-120	LI-COR LI-190	Kipp & Zonen PQS 1
Sun (Clear Sky)	-2.2	0.0	-0.4	-1.0
Sun (Cloudy Sky)	-1.7	1.4	-0.2	-1.3
Sun (Reflected from Deciduous Leaves)	-2.0	4.9	-0.8	1.1
Sun (Transmitted below Wheat Canopy)	-1.1	6.4	-0.1	-0.3
Cool White Fluorescent (T5)	0.0	0.0	0.0	0.0
Metal Halide	0.9	-3.7	0.2	-1.7
Ceramic Metal Halide	-0.3	-6.0	0.4	-0.7
High Pressure Sodium	0.0	0.8	1.3	1.4
Red/Blue LED (16 % 444 nm, 84 % 667 nm peaks)	-3.4	-65.3	3.5	-1.8
Red/White LED (6.5 % 436 nm, 4.5 % 531 nm, 89 % 668 nm peaks)	-3.0	-60.3	2.6	-1.7

Spectral errors are theoretical errors calculated from sensor spectral responses (JSQ-100 and JSQ-500 series shown in graph above) and spectral output of radiation sources (measured with a spectroradiometer). Only spectral errors are listed in the table. Calibration, cosine, and temperature error can also contribute to measurement error.

Calibration Traceability

JSQ-500 series quantum sensors are calibrated through side-by-side comparison to the mean of four JSQ-500 transfer standard quantum sensors under high output T5 cool white fluorescent lamps. The transfer standard quantum sensors are calibrated through side-by-side comparison to the mean of at least three LI-COR model LI-190 reference quantum sensors under high output T5 cool white fluorescent lamps. The reference quantum sensors are recalibrated on a biannual schedule with a LI-COR model 1800-02 and quartz halogen lamp that are traceable to the National Institute of Standards and Technology (NIST).

Dimensions



Resolution	0.1 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Calibration Factor	custom for each sensor and stored in the firmware
Calibration Uncertainty	$\pm 5\%$ (see Calibration Traceability above)
Measurement Repeatability	less than 1% (up to 4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$)
Long-term Drift (Non-stability)	less than 2% per year
Non-linearity	less than 1% (up to 4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$)
Response Time	software updates every second
Field of View	180°
Spectral Range	389 to 692 nm ± 5 nm (wavelengths where response is greater than 50% of maximum)
Spectral Selectivity	less than 10% from 412 to 682 nm ± 5 nm (see Spectral Response; left)
Directional (Cosine) Response	$\pm 5\%$ at 75° zenith angle
Azimuth Error	less than 0.5%
Tilt Error	less than 0.5%
Temperature Response	$-0.11 \pm 0.03\% \text{ C}^{-1}$
Uncertainty in Daily Total	less than 5%
Detector	blue-enhanced silicon photodiode
Housing	anodized aluminum body with acrylic diffuser
IP Rating	IP68
Operating Environment	-40 to 70 C; 0 to 100% relative humidity; can be submerged in water up to depths of 30 m
Dimensions	24 mm diameter; 37 mm height
Mass	100 g (with 5 m of lead wire)
USB Cable	4.6 m (15 ft)
Current Draw (when Logging)	5.1 mA
Warranty	4 years against defects in materials and workmanship