



Easy-to-use handheld quantum meter designed for spot-check measurements



APOGEE FULL-SPECTRUM QUANTUM METER | MQ-501

Features

Accurate, Stable Measurements

Long-term non-stability determined from multiple replicate quantum sensors in accelerated aging tests and field conditions is less than 2 % per year.

Unique Design

Measure photosynthetically active radiation with a research grade, full-spectral response sensor. Offers a self-cleaning, cosine-corrected head to minimize errors and is fully-potted for a waterproof design.

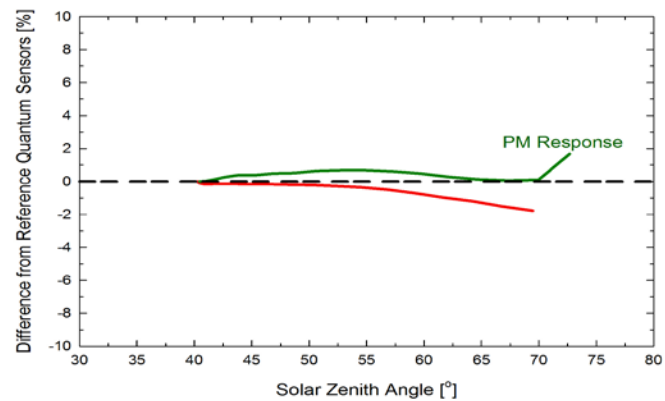
Mounting

The MQ-501 is designed to be an easy-to-use handheld meter for spot-check measurements. The meter includes the AM-001 meter mounting bracket to mount the sensor on a horizontal plane to the meter and shortened cable to accommodate the bracket length.

Spectral Errors

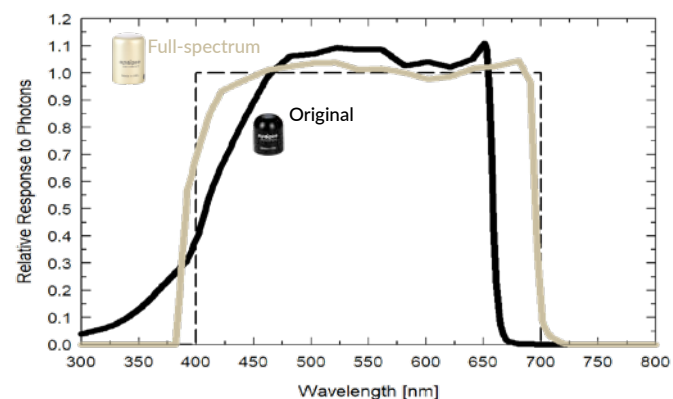
	Apogee SQ-500	Apogee SQ-110 SQ-120	LI-COR LI-190	Kipp & Zonen
Sun (Clear Sky)	-2.2	0.0	-0.4	-1.0
Sun (Cloudy Sky)	-1.7	1.4	-0.2	-1.3
Sun (Reflected from Deciduous Leaves)	-2.0	4.9	-0.8	1.1
Sun (Transmitted below Wheat Canopy)	-1.1	6.4	-0.1	-0.3
Cool White Fluorescent (T5)	0.0	0.0	0.0	0.0
Metal Halide	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

Cosine Response



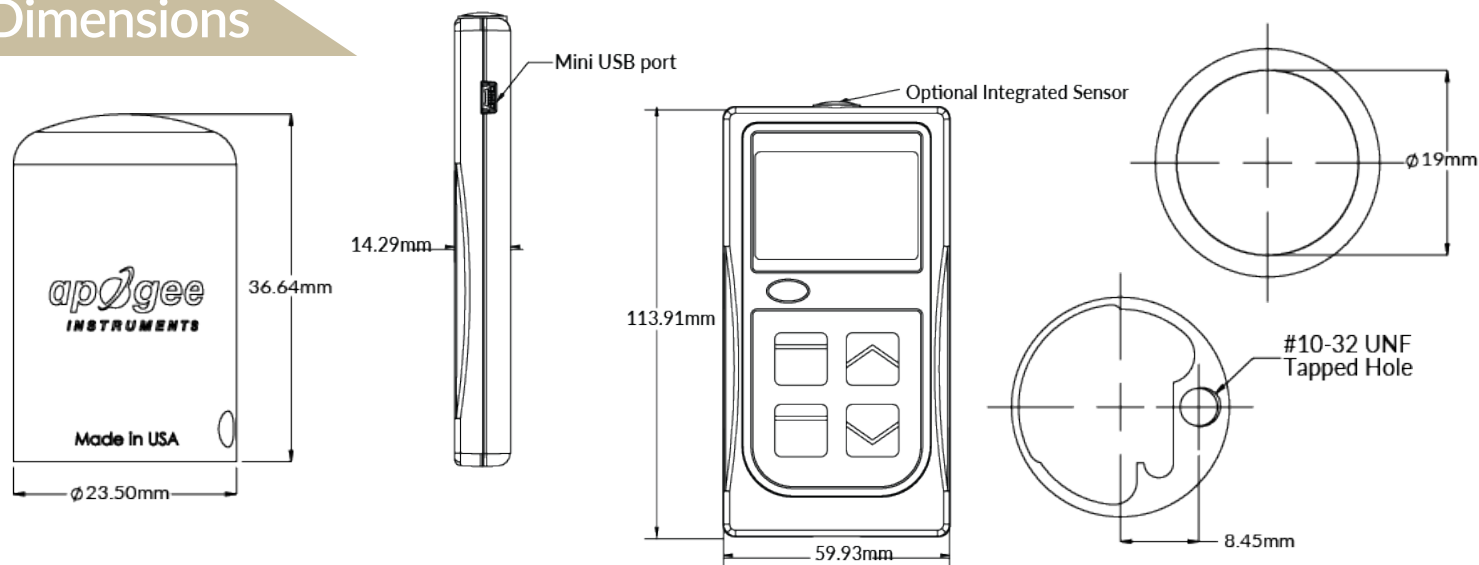
Mean cosine response of seven Apogee SQ-500 quantum sensors. Cosine response was calculated as the relative difference of SQ-500 quantum sensors from the mean of replicate reference quantum sensors. The red data are AM measurements; the green data are PM measurements.

Spectral Response



Mean spectral response measurements of six replicate Apogee SQ-100 and SQ-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.

Dimensions



Calibration Traceability

Apogee SQ-500 sensors are calibrated through side-by-side comparison to the mean of four transfer standard sensors under a reference lamp. The reference sensors are recalibrated with a quartz halogen lamp that are traceable to the National Institute of Standards and Technology (NIST).

Product Specifications

	MQ-501
Calibration Uncertainty	$\pm 5\%$
Measurement Range	0 to 4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Measurement Repeatability	Less than 0.5 %
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	Less than 1 ms
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
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 % per C
Uncertainty in Daily Total	Less than 5 %
Detector	Blue-enhanced silicon photodiode
Housing	Anodized aluminum body with acrylic diffuser
IP Rating	IP68
Operating Environment	0 to 50 C; less than 90 % non-condensing relative humidity up to 30 C; less than 70 % non-condensing relative humidity from 30 to 50 C; separate sensors can be submerged in water up to depth of 30 m
Cable	2 m of shielded, twisted-pair wire; additional cable available; TPR jacket
Warranty	4 years against defects in materials and workmanship