

# Measure Photosynthetic Photon Flux



The SQ series sensors are quantum sensors designed for use with dataloggers. Photosynthesis is driven by the number of photons between 400 and 700 nanometers (nm). This is called the Photosynthetic Photon Flux (PPF) and is measured in  $\mu\text{mol m}^{-2} \text{s}^{-1}$  (micromols of photons per square meter per second). PPF sensors are commonly called quantum sensors because a quantum refers to the amount of energy carried by a photon. Line quantum sensors are often used to quantify the variable light in greenhouses and below plant canopies because they provide a spatial average.

An innovative blue lens improves the accuracy of these sensors, filtering incoming light for an improved spectral response (Figure 1).

50 cm line with 3 sensors

50 cm line with 6 sensors

70 cm line with 10 sensors

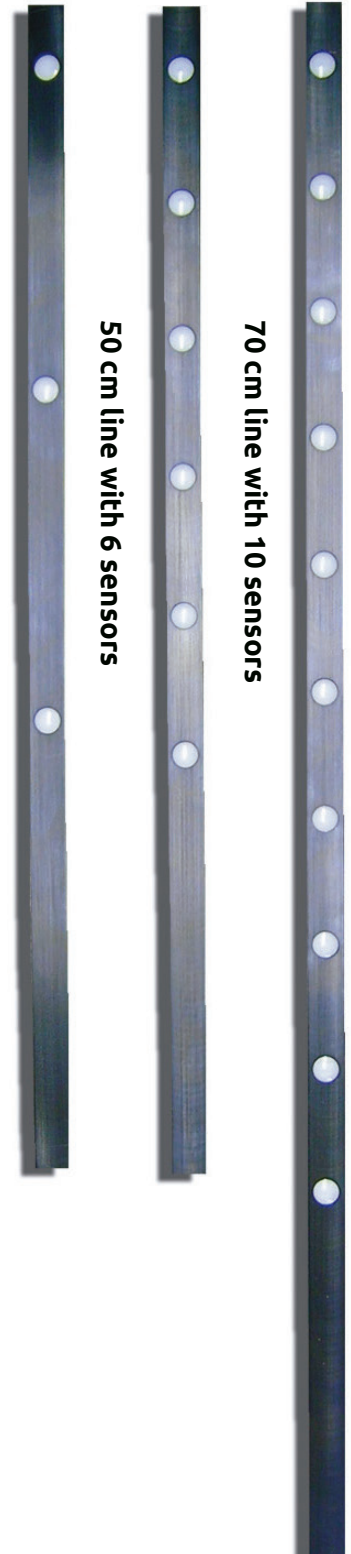
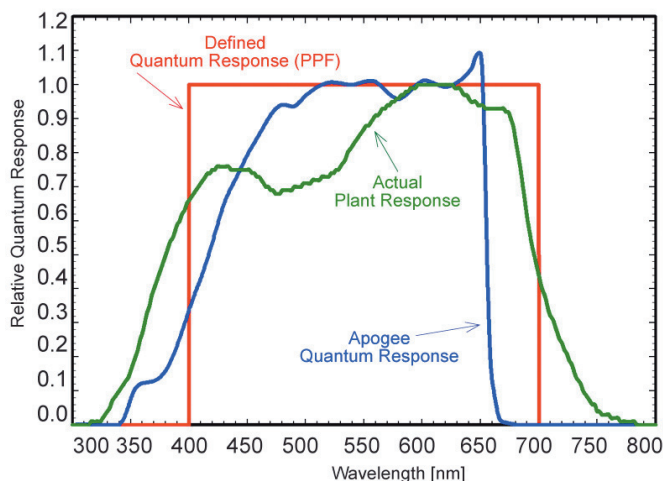


Figure 1: Quantum response is from 400 to 700 nm and gives equal emphasis to all photons. A blue lens filters the light and improves the spectral response. The spectral response of the Apogee sensor and a typical plant response are shown below.



## Related Product



### AL-100

A plate used to keep the sensor heads level.

# Specifications

## Cosine Response

- 45° zenith angle:  $\pm 1\%$
- 75° zenith angle:  $\pm 5\%$

## Absolute Accuracy

- $\pm 5\%$

## Uniformity

- $\pm 3\%$

## Repeatability

- $\pm 1\%$

## Spectral Range

- 409 to 659 nanometers

## Output

**SQ-110, SQ-120, SQ-313, SQ-323, SQ-316, SQ-326, SQ-311, SQ-321**

- Responsivity = 0.2 mV per  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , Full sunlight = 440 mV ( $2200 \mu\text{mol m}^{-2} \text{s}^{-1}$ )
- Calibration Factor = 5.0  $\mu\text{mol m}^{-2} \text{s}^{-1}$  per mV
- Range = 0 to 600 mV (0 to 3000  $\mu\text{mol m}^{-2} \text{s}^{-1}$ )

**SQ-212, SQ-222**

- Responsivity = 1 mV per  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , full sunlight = 2.2 V ( $2200 \mu\text{mol m}^{-2} \text{s}^{-1}$ )

- Calibration Factor = 1.0  $\mu\text{mol m}^{-2} \text{s}^{-1}$  per mV
- Range = 0 to 2.5 V (0 to 2500  $\mu\text{mol m}^{-2} \text{s}^{-1}$ )

**SQ-215, SQ-225**

- Responsivity = 2 mV per  $\mu\text{mol m}^{-2} \text{s}^{-1}$ , full sunlight = 4.4 V ( $2200 \mu\text{mol m}^{-2} \text{s}^{-1}$ )
- Calibration Factor = 0.50  $\mu\text{mol m}^{-2} \text{s}^{-1}$  per mV
- Range = 0 to 5 V (0 to 2500  $\mu\text{mol m}^{-2} \text{s}^{-1}$ )

## Power Requirement

**SQ-110, SQ-120, SQ-313, SQ-323, SQ-316, SQ-326, SQ-311, SQ-321** = None, self-powered

**SQ-212, SQ-222** = 2.5 to 5.5 VDC

- Current Draw = nominal 300  $\mu\text{A}$
- SQ-215, SQ-225** = 5 to 5.5 VDC
- Current Draw = nominal 300  $\mu\text{A}$

## Response Time

- Less than 1 millisecond

## Long Term Drift

- Less than 3% per year

## Field of View

- 180°

## Operating Environment

- -25 to 55 C
- 0 to 100% relative humidity
- Designed for continuous outdoor use
- Can be submerged in water

## Materials

- Anodized aluminum with cast acrylic lens

## Mass

- SQ-100 & 200 series: 70 g (with 5 meters lead wire)
- SQ-313, 316, 323, 326: 275g
- SQ-311, 321: 375g

## Dimensions

- SQ-100 & 200 series: 2.4 cm diameter by 2.75 cm height
- SQ-313, 316, 323, 326: 50 cm
- SQ-311, 321: 70 cm

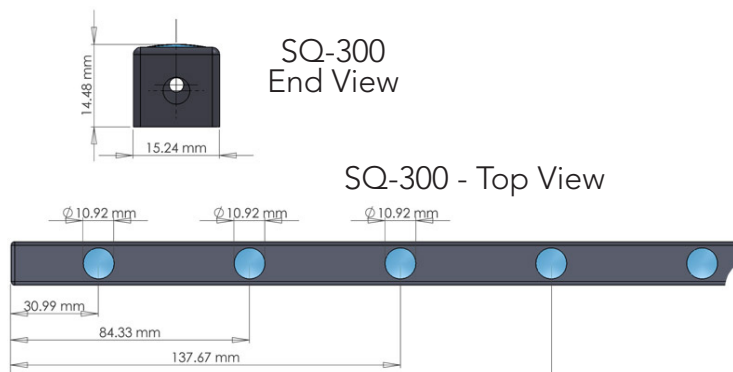
## Cable

- 5 meters of twisted-pair, shielded wire with Santoprene jacket
- Custom lengths available

## Warranty

- 1 year against defects in materials and workmanship

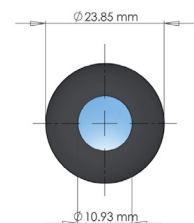
# Measurements



SQ-100 & 200 Side View



SQ-100 & 200 Top View



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www.apogeeinstruments.com



Scan for more information on SQ sensors