

LI-190R Quantum Sensor



The LI-190R measures Photosynthetically Active Radiation (PAR, in μmol of photons $\text{m}^{-2} \text{s}^{-1}$). It provides accurate measurements—in the open, in greenhouses, under plant canopies, or in growth chambers—for most broad-spectrum light sources, including natural sunlight, artificial, or mixed sources.

Plants use light in the wavelength range from about 400 to 700 nm to drive photosynthesis. The efficiency with which plants use light varies somewhat across this range, but McCree¹ showed that measuring PAR provided a consistent way to predict plant photosynthetic response regardless of the spectrum of the light source.²

1. McCree, K.J., 1972. The action spectrum, absorptance and quantum yield of photosynthesis in crop plants. *Agric. Meteorol.* 9: 191-216.

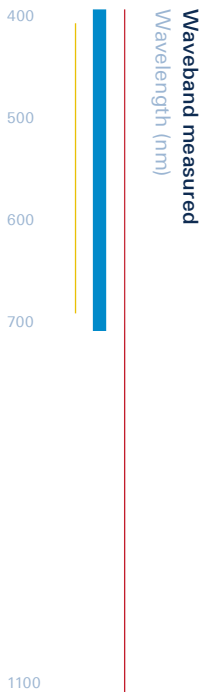
2. McCree, K.J., 1972. Test of current definitions of photosynthetically active radiation against leaf photosynthesis data. *Agric. Meteorol.* 10: 443-453.

Why choose the LI-190R?

- Uniform sensitivity across the PAR waveband for accurate measurements outdoors, under vegetation, or in artificial lighting without changing the calibration
- Newly designed optical filter tailors the spectral response to an unprecedented performance standard
- Weather resistant and durable in high-temperature, high-humidity, long-term deployments
- Cosine correction is accurate even when the light source is not directly overhead
- Sensor heads are detachable and interchangeable for simplified installation, removal, and recalibration

How does it work?

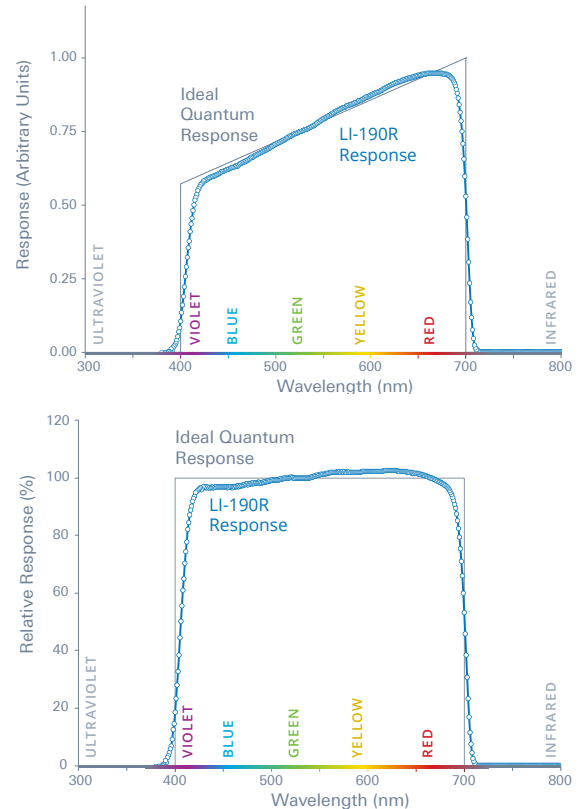
A high-quality silicon photodiode is matched with a specially designed glass optical filter to create nearly uniform sensitivity to all the wavelengths within the PAR waveband (400 to 700 nm). This ensures accurate measurements irrespective of the light source. The glass filter excludes light with wavelengths outside the PAR waveband. Exclusion of wavelengths beyond 700 nm is critical for measurements under vegetation.



LI-190R Specifications

- Absolute Calibration: $\pm 5\%$ traceable to the U.S. National Institute of Standards and Technology (NIST)
- Sensitivity: Typically $5 \mu\text{A}$ to $10 \mu\text{A}$ per $1,000 \mu\text{mol s}^{-1} \text{m}^{-2}$
- Linearity: Maximum deviation of 1% up to $10,000 \mu\text{mol s}^{-1} \text{m}^{-2}$
- Response Time: Less than $1 \mu\text{s}$ (2 m cable terminated into a 604 Ohm load)
- Temperature Dependence: $\pm 0.15\%$ per $^{\circ}\text{C}$ maximum
- Cosine Correction: Cosine corrected up to 82° angle of incidence
- Azimuth: $< \pm 1\%$ error over 360° at a 45° elevation
- Tilt: No error induced from orientation
- Operating Temperature Range: -40°C to 65°C
- Relative Humidity Range: 0% to 95% RH, Non-Condensing
- Detector: High stability silicon photovoltaic detector (blue enhanced)
- Sensor Housing: Weatherproof anodized aluminum body with acrylic diffuser and stainless steel hardware; O-ring seal on the sensor base
- Size: 2.36 cm diameter x 3.63 cm (0.93" x 1.43")
- Weight: 24 g head; 60 g base and cable assembly (2 m) with screws
- Cable Length: 2 m, 5 m, 15 m, 50 m (6.5', 16.4', 49.2', 164')

The LI-190R quantum response and the ideal quantum response curve in energy units (top) and photon units (bottom).



Specifications subject to change without notice.