

Light Measurement



The Standard for over 40 Years

Introduction

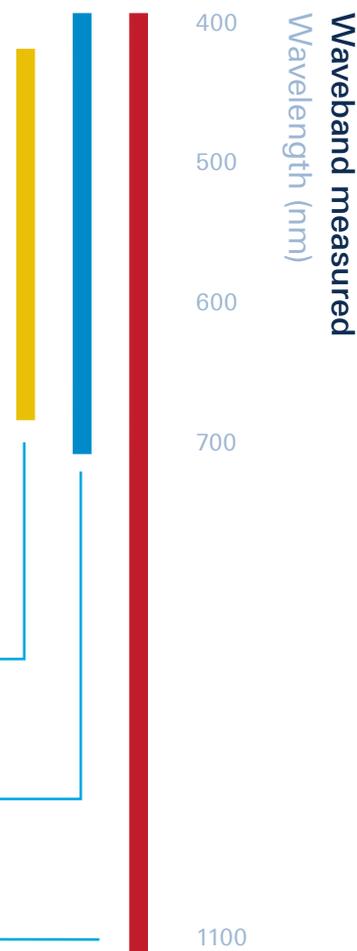
LI-COR radiation sensors measure the flux of radiant energy—the energy that drives plant growth, warms the earth, and lights our world. The properties of radiant flux depend on the wavelength of the radiation. Pyranometers are sensitive to the broadest waveband. Photometric sensors measure visible radiation (light). Quantum sensors measure Photosynthetically Active Radiation (PAR)—the radiant energy used in photosynthesis. These three sensor types cover a wide range of applications:

-  ecology
-  meteorology
-  solar energy
-  plant research
-  indoor lighting
-  underwater

Photometric Sensor
(Visible Light)

Quantum Sensor
(Photosynthetically Active Radiation)

Pyranometer
(Global Solar Radiation)



LI-1500 Light Sensor Logger



The LI-1500 Light Sensor Logger provides a direct digital readout and data logging from up to three LI-COR sensors at the same time. Log manually or set up one-time, daily, or continual logging routines. Take advantage of the intuitive, menu-driven interface, optional GPS system, high frequency measurements up to 500 Hz, and built-in math functions.

Why choose the LI-1500?

- Large 1-GB memory for storing data and up to 100 sensor-specific multipliers
- Rugged, weather-resistant housing and optional GPS for outdoor use or transect measurements
- Eight math functions, including integration, natural logarithm, and underwater attenuation

LI-1500 Specifications

Current Inputs: 3 BNC connectors for LI-COR sensors

Output Channels:

- Light
- 8 Math Channels: addition, subtraction, multiplication, division, natural logarithm, integration, daily integration, attenuation
- GPS (optional)
- Prompt
- Battery Voltage

Input Channel Specifications:

- Frequency Rejection: >70dB at 50 or 60 Hz (1 input channel @ sampling rates of 1, 2, 5, 10, 20Hz)
- Current Accuracy: $\pm 0.3\%$ of full scale reading @25 °C
- Signal Ranges:

Range #	Current Range	Resolution (Typical)
1	0 – 0.250 μ A	0.0305 nA
2	0 – 2.50 μ A	0.1525 nA
3	0 - 25 μ A	1.525 nA
4	0 - 250 μ A	15.25 nA

- Raw Mode (1 – 500 Hz): Selectable Range
- Standard Modes (Continual, Manual, Daily, One Time):
 - Auto range for total sampling rate ≤ 3 Hz (e.g. 1 Hz sampling on three input channels)
 - Fixed range (selectable) for total sampling rates > 3 Hz (e.g. 2 Hz sampling on two input channels)

Sampling Rates:

- Standard Modes: 0.01 Hz, 0.1 Hz, 1 Hz, 2 Hz, 5 Hz, 10 Hz, 20 Hz
- Raw Mode: 1 – 500 Hz (1 Hz through 500 Hz in whole number increments)

Logging Rates:

- Standard Modes Sampling: Every Sample, 100 msec, 200 msec, 500 msec, 1 sec, 5 sec, 10 sec, 15 sec, 30 sec, 60 sec, 100 sec, 5 min, 15 min, 30 min, 1 hr, 2 hr, 3 hr, 6 hr, 12 hr, 24 hr
- Raw Mode Sampling: Every sample (1 – 500 Hz)

Averaging:

- Multiple averaging windows available with standard mode sampling

Display: 128 x 64 graphics display

Real-Time Clock:

- Year, Month, Day, Hour, Minute, Seconds
- Accuracy of ± 3 minutes per month

Data Storage Capacity: 1 GB (FAT16 file system)

Communications: USB (as mass storage device)

Global Positioning System (Option): GPS RADIONOVA® RF Antenna Module

Power Supply Options:

- 4 "AA" size batteries
- USB, AC-DC power adapter
- USB, external battery power pack (customer supplied)

Battery Life:

- 80 hours life (typical usage with 1 Hz sampling and logging rate)
- 40 hours life (typical usage with GPS option on)

Environmental Conditions:

- Operating Temperature Range: -20 to 50°C
- Humidity Range: 0 to 95% RH (non-condensing conditions)
- Storage Temperature Range: -40 to 65°C

Size: 20.9 x 9.8 x 3.5 cm (8.2" x 3.9" x 1.4")

Weight: 0.454 kg (1.0 lb) with batteries

Specifications subject to change without notice.

LI-250A Light Meter

The LI-250A Light Meter provides a direct digital readout for any LI-COR radiation sensor equipped with a BNC connector. It displays instantaneous sensor output or 15-second averages, along with measurement units for any LI-COR sensor ($\mu\text{mol s}^{-1} \text{m}^{-2}$, lux, klux, or W m^{-2}).



Why choose the LI-250A?

- Retains two sensor multipliers in memory to aid in switching between sensors, or for storing in-air and in-water multipliers when used with underwater sensors
- Automatic range selection for the best accuracy and resolution in a wide variety of light environments
- Uses a high-gain amplifier for long-term stability, automatic zeroing, and low input impedance, resulting in excellent linearity

LI-250A Light Meter Specifications

- Accuracy:
 - 25 °C: Typically $\pm 0.4\%$ of reading ± 3 counts on the least significant digit displayed (all ranges).
 - 0 - 55 °C: Typically $\pm 0.6\%$ of reading ± 3 counts on the least significant digit displayed (all ranges).
- Range Selection: Autoranging (3 ranges).
- Linearity: $\pm 0.05\%$.
- Sensors: Designed for LI-COR sensors with BNC-type connectors.
- Sensor Calibration: Each sensor is supplied with a calibration multiplier. Calibration multipliers for two sensors can be stored in memory. Calibration multipliers are entered from the keypad.
- Signal Averaging: Sensor output can be collected and displayed as a 15-second average (approximately 60 readings). Averages are retained on the display in HOLD mode.
- Display: 4 ½" digit LCD display. Updated every 0.5 seconds in Instantaneous mode.
- Battery Life: 150 hours typical with continuous operation.
- Power Requirement: One 9V Alkaline battery.
- Operating Conditions: 0 to 55 °C, 0 to 95% RH (non-condensing).
- Storage Conditions: -55 to 60 °C, 0 to 95% RH (non-condensing).
- Size: 14 L x 7.7 W x 3.8 cm D (5.5" x 3" x 1.5").
- Weight: 0.26 kg (0.57 lbs).
- LI-250A Range and Resolution.

Sensor	Range	Resolution
Quantum	199 $\mu\text{mol s}^{-1} \text{m}^{-2}$	0.01 $\mu\text{mol s}^{-1} \text{m}^{-2}$
	1999	0.1
	19999	1
Pyranometer	19 W m^{-2}	0.001 W m^{-2}
	199	0.01
	1999	0.1
Photometric	199 lux	0.01 lux
	1999	0.1
	19999	1

Specifications subject to change without notice.

Ordering Information

Sensors

Terrestrial Sensors

Sensor: LI-190R Quantum Sensor, LI-200R Pyranometer, or LI-210R Photometric Sensor

Cable length: 2 m, 5 m, 15 m, or 50 m

Termination type: BNC, bare leads, millivolt adapter, or SMV (Standard Output Millivolt Adapter)

LI-191R Line Quantum Sensor

Each LI-191R includes a bubble level and carrying case.

Cable length: 2 m or 5 m

Termination type: BNC, Millivolt Adapter, or SMV (Standard Output Millivolt Adapter)

Underwater Quantum Sensors

Sensor: LI-192 Underwater Quantum Sensor or LI-193 Spherical Underwater Quantum Sensor

Cable length: 3 m, 10 m, 30 m, 50 m, or 100 m

Termination type: BNC or Millivolt Adapter

Logger and Meter

LI-1500 Light Sensor Logger

The LI-1500 connects up to three light sensors with BNC terminals. Includes four AA batteries, USB cable, AC power supply adapter, carabiner clip, carrying case, Windows® file viewer software. Sensors sold separately.

LI-1500G Light Sensor Logger with GPS

GPS-enabled.

LI-1500G-UW Light Sensor Logger with GPS – Underwater Package

GPS-enabled. Includes underwater lowering frame and carrying case for underwater light sensors, lowering frame, and cables.

LI-1500-UW Light Sensor Logger – Underwater Package

LI-1500 without GPS. Includes underwater lowering frame and carrying case for underwater light sensors, lowering frame, and cables.

LI-250A Light Meter

Connects to any light sensor with a BNC terminal and displays instantaneous or 15-second averaged measurements.

Accessories

1500GPS Upgrade Kit

User-installable upgrade adds GPS functionality to any LI-1500.

1500-01 Underwater Carrying Case

Case holds one LI-1500, underwater lowering frame, two LI-192 Underwater Quantum Sensors, two LI-193 Spherical Underwater Quantum Sensors, one terrestrial sensor (LI-190R, LI-200R, or LI-210R), and 3-meter or 10-meter underwater cable.

LI-250A Carrying Case

Fabric case for the LI-250A and one light sensor.

2001S Sensor Base Cover

Protects the base and cable when the sensor head is removed.

2003S Mounting and Leveling Fixture

For the LI-190R, LI-200R, and LI-210R Sensors. Anodized aluminum with stainless steel leveling screws and a weatherproof spirit level. 7.6 cm diameter (3.0") and 95 g (0.21 lbs.).

2009S Lowering Frame

Mounts one or two LI-192SA or LI-193SA sensors for lowering into water.

2420 Light Sensor Amplifier

Amplifies signal from light sensors. For use with logging devices that require an amplified voltage signal. Provides 15 gain settings to accommodate a wide variety of data loggers.

2420-BNC – For light sensors with BNC connectors.

2420-BL – For light sensors with bare leads.

Millivolt Adapters

Convert BNC connector to bare leads and the output signal to millivolts (mV). For use with logging devices that require a voltage signal. SMV-type adapters feature a standard output (0 to 10 mV) so that multipliers do not need to be changed when changing sensors. SMV-type adapters are factory adjusted to match a particular sensor's output. Provide the sensor's serial number when ordering.

2220 Millivolt Adapter – For the LI-200R Pyranometer.

2290 Millivolt Adapter – For the LI-190R Quantum Sensor, LI-210R Photometric Sensor, and LI-191R Line Quantum Sensor.

2291 Millivolt Adapter – For the LI-192SA and LI-193SA Underwater Sensors.

2320 (SMV) – For the LI-200R Pyranometer.

2319 (SMV) – For the LI-190R Quantum Sensor or LI-191R Line Quantum Sensor.

2321 (SMV) – For the LI-210R Photometric Sensor.