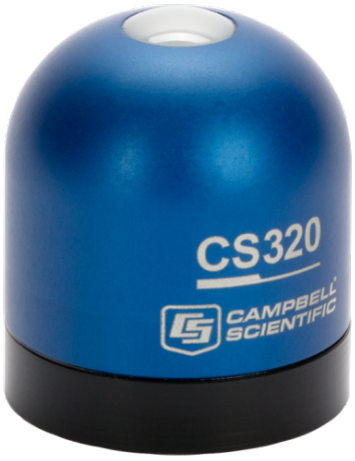
CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

Solar Radiation Sensors

Pyranometers, quantum sensors, and net radiometers



Campbell Scientific offers pyranometers, net radiometers, and quantum sensors, all designed to measure various aspects of the energy imparted by the sun on the Earth's surface.

A leveling fixture fitted with a bubble level may be required to accurately install solar radiation sensors. For solar radiation sensor mounts and leveling fixtures, see Tripods, Towers, and Mounts.

CS320
Digital Thermopile Pyranometer

The CS320 is a digital thermopile pyranometer that measures broad-spectrum short-wave radiation and communicates over the simple SDI-12 protocol to the data logger. This sensor design eliminates measurement error and programming errors that can adversely affect data quality.

This pyranometer has been designed to improve the global solar radiation measurement significantly (even under cloudy conditions) without adding substantial cost. The CS320 is suitable for applications ranging from environmental research to agriculture to large mesoscale weather networks (mesonets).

The CS320 is manufactured using a high-grade anodized aluminum body and IP68-rated 316 stainless-steel M8 connector (marine grade). The CS320 sensor is heated (on/off switchable under user control) and allows continuous operation in changing environmental conditions. The pyranometer's calibration data is stored on the sensor.

CS301
Pyranometer

The CS301, manufactured by Apogee Instruments, measures total sun and sky solar radiation for solar, agricultural, meteorological, and hydrological applications. Its spectral range of 360 to 1120 nanometers encompasses most of the short-wave radiation that reaches the Earth's surface. Because the CS301 connects directly to Campbell Scientific data loggers, the output of this pyranometer can be collected on site, as well as remotely.

This pyranometer features an IP67-rated, marine-grade 316L connector that allows the user to easily swap sensors for recalibration or to replace damaged cables.

CS310
Quantum Sensor

The CS310 is a self-powered, analogue full-spectrum quantum sensor with a 0 to 40 mV output. The sensor incorporates a blue-enhanced silicon photodiode and custom optical filters with a rugged, self-cleaning sensor housing design that includes an anodized aluminium body with an acrylic diffuser. Typical applications include PPFD measurement over plant canopies in outdoor environments, greenhouses, and growth chambers, as well as reflected or under-canopy (transmitted) PPFD measurement in the same environments.

SP230SS
Heated Pyranometer

The SP230SS pyranometer, manufactured by Apogee, includes a 0.18 W internal heater and an elevated base that allow it to provide solar radiation measurements during the most severe weather. Its small heater draws just 15 mA of current, allowing it to be powered by a small solar panel and battery—even on days with a short duration of daylight and at high latitudes (far away from the equator).

This pyranometer features an IP67-rated, marine-grade 316L connector that allows the user to easily swap sensors for recalibration or to replace damaged cables.

LP02
Pyranometer

The LP02, manufactured by Hukseflux, is an ISO-second-class pyranometer that monitors solar radiation for the full solar spectrum range. It connects directly to a Campbell Scientific datalogger and is used for many meteorological applications.

SR11
First Class Pyranometer

The SR11, manufactured by Hukseflux Thermal Sensors and cabled by Campbell Scientific, is an ISO-first-class pyranometer that monitors solar radiation for the full solar spectrum range. It produces a millivolt signal that is measured directly by a Campbell Scientific data logger. The SR11 can provide solar radiation measurements for a variety of meteorological applications.

SR20-T2-L
ISO Secondary Standard Pyranometer

The SR20-T2, manufactured by Hukseflux Thermal Sensors, is an ISO 9060 secondary standard pyranometer that measures solar short-wave radiation in a full hemisphere of the sky. It has a built-in case temperature sensor and embedded heater for removing dew and light rain. It connects directly to a Campbell Scientific data logger and is designed for applications that require high measurement accuracy in demanding applications such as scientific meteorological observation networks and utility scale solar-energy-power production sites.

NB: The SR20-T2 is an alternative to the CMP11.

SR30-L
Secondary Standard Pyranometer with RS-485 Modbus Communications and Integrated Heating and Ventilation

The SR30, manufactured by Hukseflux, features Recirculating Ventilation and Heating (RVH™) technology. As a standalone unit, the SR30 is fully compliant with IEC 61724-1 standards, whereas other pyranometers would require external ventilation/heating units to be compliant. The SR30 is an ideal instrument for solar resource and PV performance monitoring.

MS-80-L
Secondary Standard Pyranometer

The MS-80, manufactured by EKO Instruments, is an innovative, next-generation secondary standard pyranometer inspired by the combination of latest technologies and state-of-the-art thermopile sensor with an unprecedented low zero-offset behavior; fast sensor response; and a five-year warranty and recalibration interval.

The MS-80 features a compact design with internal desiccation, single dome, isolated thermopile detector, quartz diffusor, immunity to offsets, ultra-low temperature dependency, and exceptional non-linearity characteristics. EKO instruments is the only ISO 17025 accredited pyranometer manufacturer in the world, enabling highest-quality calibration, compliant to international standards (ISO/IEC 17025/9847).

For a similar pyranometer with RS-485 Modbus communication, refer to the MS-80M.

MS-80M-L Secondary Standard Pyranometer with RS-485 Modbus Communication		The MS-80M, manufactured by EKO Instruments, is an innovative, next-generation secondary standard pyranometer inspired by the combination of latest technologies and state-of-the-art thermopile sensor with an unprecedented, low zero-offset behavior; fast sensor response; Modbus RTU 485 output; and a five-year warranty and recalibration interval. The MS-80M features a compact design with internal desiccation, single dome, isolated thermopile detector, quartz diffusor, immunity to offsets, ultra-low temperature dependency, and exceptional non-linearity characteristics. EKO instruments is the only ISO 17025 accredited pyranometer manufacturer in the world, enabling highest-quality calibration, compliant to international standards (ISO/IEC 17025/9847).
CMP3-L Pyranometer with Sun Shield		The CMP3, manufactured by Kipp & Zonen, is an ISO-second-class pyranometer that monitors solar radiation for the full solar spectrum range. It connects directly to a Campbell Scientific datalogger and is used for many meteorological applications.
CMP6 Pyranometer		The CMP6, manufactured by Kipp & Zonen, is an ISO first-class pyranometer that monitors solar radiation for the full solar spectrum range. It connects directly to a Campbell Scientific datalogger and is commonly used for environmental monitoring, solar resource assessment, and solar power performance applications.
CMP10-L ISO Secondary Standard Pyranometer		The CMP10, manufactured by Kipp & Zonen, is an ISO secondary standard pyranometer that monitors solar radiation for the full solar spectrum range. It connects directly to a Campbell Scientific data logger and is well-suited for meteorological networks and solar-energy research and development.
CMP11 Pyranometer		The CMP11, manufactured by Kipp & Zonen, is an ISO secondary-standard pyranometer that monitors solar radiation for the full solar spectrum range. It connects directly to a Campbell Scientific datalogger and is well-suited for meteorological networks and solar-energy research and development.
CMP21 Pyranometer		The CMP21, manufactured by Kipp & Zonen, is an ISO secondary-standard pyranometer with an internal thermistor. It monitors solar radiation for the full solar spectrum range, and is well-suited for scientific use and in top-level solar-radiation monitoring networks. This pyranometer connects directly to a Campbell Scientific datalogger.
NR-LITE2-L Net Radiometer		The NR-LITE2 is a rugged net radiometer that measures the energy balance between incoming short-wave and long-wave infrared radiation relative to surface-reflected short-wave and outgoing long-wave infrared radiation. It is directly connected to a Campbell Scientific datalogger and is widely used in agriculture and hydrology applications.
SN500SS Net Radiometer		This four-component net radiometer, manufactured by Apogee Instruments, provides individual measurement of net radiation components. This sensor features an SDI-12 output, eliminating the need for multiple analog channels to measure the individual components of net radiation. The SN500SS offers a complete package that includes a net radiometer, mounting rod, pigtail lead cable for data logger interface, and a carrying case.
NR01 4-Component Net Radiometer		The NR01, manufactured by Hukseflux, is a research-grade net radiometer that measures the energy balance between incoming short-wave and long-wave infrared radiation versus surface-reflected short-wave and outgoing long-wave infrared radiation. Our dataloggers measure the NR01's output and control its internal heater. This net radiometer offers a professional solution for scientific-grade energy balance studies. **Note:** NR01 radiometers with a serial number less than 2313 used the pn #21271 fitting. NR01 radiometers with a serial number greater than 2312 do not need the pn #21271 fitting.

CNR4 4-Component Net Radiometer		The CNR4, manufactured by Kipp & Zonen, is a research-grade net radiometer that measures the energy balance between incoming and outgoing radiation. Our dataloggers measure the CNR4's output. This net radiometer offers a professional solution for scientific-grade energy balance studies.
LI200R Pyranometer		The LI200R, manufactured by LI-COR, is a silicon pyranometer that accurately monitors sun plus sky radiation for solar, agricultural, meteorological, and hydrological applications. It uses a silicon photovoltaic detector mounted in a cosine-corrected head to measure solar radiation. A shunt resistor in the sensor's cable converts the signal from microamps to millivolts, allowing this sensor to be measured directly by a Campbell Scientific data logger.
LI190R-L Quantum Sensor		The LI190R Quantum Sensor, manufactured by LI-COR, accurately measures photosynthetic photon flux density (PPFD), which is the number of photons in the 400 to 700 nm waveband incident per unit time on a unit surface. It uses a silicon photovoltaic detector mounted in a cosine-corrected head. A shunt resistor in the sensor's cable converts the signal from microamps to millivolts, allowing these sensors to be measured directly by a Campbell Scientific data logger. .

For comprehensive details, visit: www.campbellsci.eu/solar-radiation

CAMPBELL SCIENTIFIC
80 Hathern Road, Shepshed, LE12 9GX UK | +(0)1509 828888 | sale@campbellsci.co.uk | www.campbellsci.eu
UK | AUSTRALIA | BRAZIL | CANADA | CHINA | COSTA RICA | FRANCE | GERMANY | THAILAND | SOUTH AFRICA | SPAIN | USA