CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

# CMP6, CMP11, CMP21

*Kipp & Zonen Solar Radiation Sensors*

# High Quality Pyranometers

## Double glass dome

## Overview

The CMP6, CMP11, and CMP21 pyranometers* measure solar radiation with a high-quality blackened thermopile protected by two glass domes. Their flat spectral sensitivity, from 285 to 2800 nm, makes them ideal for applications in natural sunlight, under plant canopies, in green houses or buildings, and inverted to measure reflected solar radiation. Typical uses include environmental monitoring, solar resource assessment, and solar power performance applications.** These pyranometers produce a millivolt signal that is measured directly by a Campbell Scientific datalogger.

## Benefits and Features

- Double glass dome
- Compatible with most Campbell Scientific dataloggers
- Integrated bubble level is visible without removing sun shield
- Desiccant-filled drying cartridge prevents dew from forming on the inner sides of the domes
- Compatible with the CVF4 heater/ventilator that keeps the domes free from ice and dew
- Measures reflected solar radiation when inverted
- Provides measurements in direct sunlight, under plant canopies, when the sky is cloudy, and in artificial light

## Model Description

Based on differences in accuracy and performance, the CMP6 has an ISO classification of *First Class*, and the CMP11 and CMP21 have an ISO classification of *Secondary Standard*. The CMP21 also includes an internal thermistor allowing individually optimized temperature compensation of the measurements.

## Mounting

The CMP6, CMP11, and CMP21 should be mounted away from all obstructions and reflective surfaces that might adversely effect the measurement. They have a bubble level and two leveling feet, which allow them to be leveled without using a leveling base.

The pyranometers typically mount to a mast, crossarm, or pole (1.0 in. to 2.1 in. OD) via the CM255 or CM255LS mounting stand, assuming the heater/ventilator is not used. The pyranometers mount near the end cap of an ATI or NexTracker torque tube via the CM260 or CM265 mounting kit, respectively.

The CVF4 Heater/Ventilator attaches to the 31153 Mounting Stand, which mounts to a crossarm or pole via the CM225 Right-Angle Mount or the 17953 NU-RAIL fitting.

**The CMP3, CMP6, CMP11, and CMP21 are manufactured by Kipp & Zonen, and then cabled by Campbell Scientific.*

*** Typically, these pyranometers are oriented perpendicular to the Earth's surface to measure global horizontal irradiance (GH). Diffuse sky radiation can also be measured with the use of a shade mechanism (contact Campbell Scientific for more information).*

# Ordering Information

### Solar Radiation Sensors

*The pyranometers have user-specified cable lengths; enter the length, in feet, after the -L. Must choose a cable termination option (see below).*

**CMP6-L** Kipp & Zonen pyranometer with an ISO-classification of First Class.

**CMP11-L** Kipp & Zonen pyranometer with an ISO-classification of Secondary Standard.

**CMP21-L** Kipp & Zonen pyranometer with an internal thermistor and an ISO-classification of Secondary Standard.

### Optional Heater/Ventilation Unit

**CVF4-L** Heater/Ventilator. Enter cable length, in feet, after the -L. Must choose a cable termination option (see below).

#### Cable Termination Options (choose one)

**-PT** Cable terminates in stripped and tinned leads for direct connection to a datalogger's terminals.

**-PW** Cable terminates in connector that attaches to a prewired enclosure.

**-CWS** Cable terminates in a connector for attachment to a CWS900 interface, which allows the sensor to be used in a wireless sensor network. Option not available for the CMP21 nor CVF4.

### Mounts

**CM255** Mounting Stand for attaching a CMP-series pyranometer to a mast or crossarm.

**CM255LS** Mounting Stand with leveling screws for attaching a CMP-series pyranometer to a mast or crossarm.

**CM260-S** Adjustable Solar Sensor Mounting Kit for ATI Torque Tube with Pyranometer Plate.

**CM265-S** Adjustable Solar Sensor Mounting Kit for NexTracker Torque Tube with Pyranometer Plate.

**31153** Mounting Stand for the CVF4 Ventilator. The 31153 mounts to a crossarm using either the CM225 or 17953 NU-RAIL (see below).

**CM225** Right-Angle Mount used to attach the 31153 to a mast or crossarm.

**17953** 1 by 1 inch NU-RAIL Crossover Fitting used to attach the 31153 to a crossarm.

### Replacement Parts

**27052** Replacement desiccant for the drying cartridge. Replace when color changes from orange to clear. Desiccant has limited shelf life.

**27055** Replacement filters for the CVF4 Heater/Ventilator.

# Specifications

| | CMP6 | CMP11 | CMP21 |
|---|---|---|---|
| ISO Classification | First Class | Secondary Standard | |
| Spectral Range | 285 to 2800 nm | | |
| Sensitivity | 5 to 20 µV $W^{-1}$ $m^2$ | 7 to 14 µV $W^{-1}$ $m^2$ | |
| Temperature Dependence of Sensitivity | < 4% (-10° to +40°C) | < 1 % (-10° to +40°C) | < 1 % (-20° to +50°C) |
| Response Time (95% of final value) | <18 s | <5 s | |
| Zero Offset Due To Thermal Radiation (200 $W/m^2$) | < 15 $W/m^2$ | < 7 $W/m^2$ | |
| Non-Stability (change/year) | < 1% | <0.5% | |
| Non-Linearity (0 to 1000 $W/m^2$) | < 1% | < 0.2% | |
| Directional Error (up to 80° with 1000 $W/m^2$ beam) | < 20 $W/m^2$ | < 10 $W/m^2$ | |
| Tilt Error | < 1% | < 0.2% | |
| Level Accuracy | 0.1° | | |
| Impedance | 20 to 200 Ω | 10 to 100 Ω | |
| Operating Temperature | -40° to +80°C | | |
| Typical Signal Output for Atmospheric Applications | 0 to 20 mV | 0 to 15 mV | |
| Maximum Irradiance | 2000 $W/m^2$ | 4000 $W/m^2$ | |
| Expected Daily Uncertainty | < 5% | < 2% | |
| Dimensions | Width w/Shield: 15 cm (5.9 in); Height: 9.25 cm (3.64 in); Dome Diameter: 5 cm (2 in) | | |
| Weight with 33 ft cable | 0.9 kg (2 lb) | | |

## *CVF4 Heater/Ventilator*

- Power Supply: 12 Vdc, 0.9 A (with 5.5 W Heater)
- Operating Temperature Range: -40° to +70°C
- Ventilation Power: 5 W continuously
- Heating Power: 5.5 W
- Heater Induced Offset: <1 $W/m^2$ (with CMP11)
- Weight without cable: 1.6 kg (3.5 lb)
- Height: 12.95 cm (5.1 in)
- Length: 35.5 cm (14.0 in)
- Width: 23.0 cm (9.1 in)