

# CMP6, CMP11, CMP21

## Kipp & Zonen Solar Radiation Sensors



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.\*\*

A desiccant-filled drying cartridge prevents dew from forming on the inner sides of the domes. Campbell Scientific also offers the CVF3 heater/ventilator that keeps the pyranometers' domes free from ice and dew.

These pyranometers produce a millivolt signal that is measured directly by a Campbell Scientific datalogger. Please note that the CMP6, CMP11, and CMP21 are not compatible with our CR200(X)-series dataloggers.

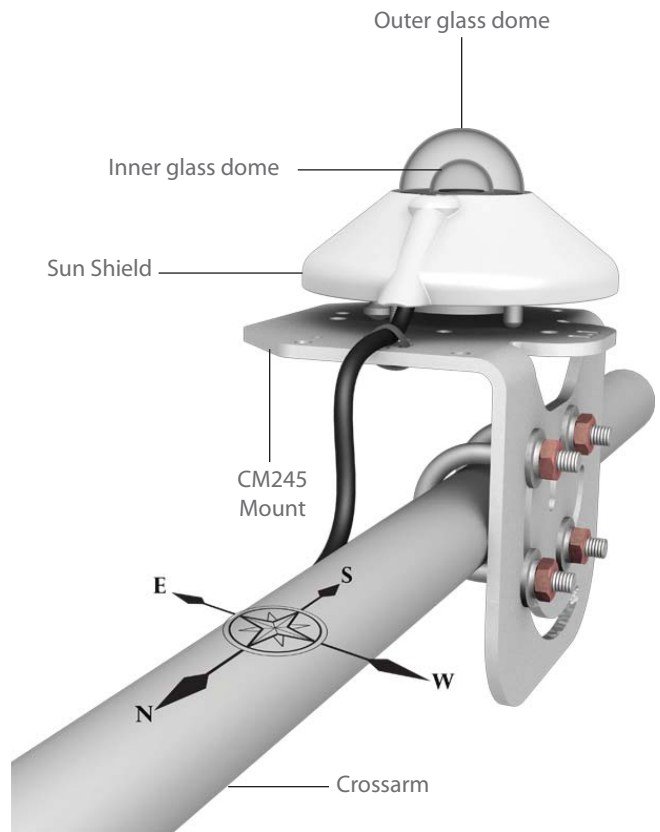
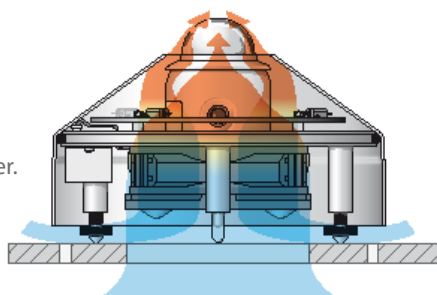
### Models Description

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 pyranometers have a bubble level and two leveling feet, which allow them to be leveled without using a leveling base. They mount to a mast, crossarm, or pole (1.0-in. to 2.1-in. OD) via the CM245 or 27084 mounting stands. The CM245 Mounting Stand is for pyranometers without the heater/ventilator. The 27084 is for pyranometers using the heater/ventilator.

Transparent view of the CVF3 shows air drawn and heated over the pyranometer.



These pyranometers include a white sun shield that reduces the sensor's temperature. The bubble level is viewable while the sun shield is attached. The pyranometer is typically mounted and leveled horizontally.



Slots in the CM245 mount can be adjusted to any angle from horizontal to vertical.

\*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. A cable termination option must be chosen for the pyranometers (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.

### 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 for attachment to a prewired enclosure.
- CWS** CMP6/CMP11 cable terminates in a connector for attachment to a CWS900 interface, which allows the CMP6 or CMP11 to be used in a wireless sensor network. This option is not available for the CMP21.

### Optional Heater/Ventilation Unit

- CVF3-L** Heater/Ventilator for CMP6, CMP11, or CMP21. 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 for attachment to a prewired enclosure.

### Mounts/Replacement Parts

- CM245** Mounting Stand for attaching a CMP-series pyranometer to a mast or to crossarm.
- 27084** CVF4 Mounting Stand that attaches a CMP6, CMP11, or CMP21 housed in a CVF4 to a mast or to crossarm.
- 27052** Replacement desiccant used in the drying cartridge. Replace when desiccant changes color from orange to clear. Desiccant has limited shelf life.
- 27055** Replacement filters for the CVF4 Heater/Ventilator.

## Specifications

### ISO Classification

<b>CMP6:</b>	First Class
<b>CMP11, CMP21:</b>	Secondary Standard

**Spectral Range:** 285 to 2800 nm

### Sensitivity

<b>CMP6:</b>	5 to 20 $\mu\text{V W}^{-1} \text{m}^2$
<b>CMP11, CMP21:</b>	7 to 14 $\mu\text{V/W/m}^2$

### Temperature Dependence of Sensitivity

<b>CMP6:</b>	$\pm 4\%$ (-10° to +40°C)
<b>CMP11:</b>	< 1% (-10° to +40°C)
<b>CMP21:</b>	< 1% (-20° to +50°C)

### Response Time (95% of final value)

<b>CMP6:</b>	<18 s
<b>CMP11, CMP21:</b>	<5 s

### Zero Offset Due To Thermal Radiation (200 W/m<sup>2</sup>)

<b>CMP6:</b>	< 15 W/m <sup>2</sup>
<b>CMP11, CMP21:</b>	< 7 W/m <sup>2</sup>

### Non-Stability (change/year)

<b>CMP6:</b>	< 1%
<b>CMP11, CMP21:</b>	<0.5%

### Non-Linearity (0 to 1000 W/m<sup>2</sup>)

<b>CMP6:</b>	< 1%
<b>CMP11, CMP21:</b>	< 0.2%

### Directional Error (up to 80° with 1000 W/m<sup>2</sup> beam)

<b>CMP6:</b>	< 20 W/m <sup>2</sup>
<b>CMP11, CMP21:</b>	< 10 W/m <sup>2</sup>

### Tilt Error

<b>CMP6:</b>	<1%
<b>CMP11, CMP21:</b>	<0.2%

**Level Accuracy:** 0.1°

### Impedance

<b>CMP6:</b>	20 to 200 $\Omega$
<b>CMP11, CMP21:</b>	10 to 100 $\Omega$

**Operating Temperature:** -40° to +80°C

### Typical Signal Output for Atmospheric Applications

<b>CMP6:</b>	0 to 20 mV
<b>CMP11, CMP21:</b>	0 to 15 mV

### Maximum Irradiance

<b>CMP6:</b>	2000 W/m <sup>2</sup>
<b>CMP11, CMP21:</b>	4000 W/m <sup>2</sup>

### Expected Daily Uncertainty

<b>CMP6:</b>	< 5%
<b>CMP11, CMP21:</b>	< 2%

### Dimensions

<b>Width with Shield:</b>	5.9 in. (15 cm)
<b>Height:</b>	3.64 in. (9.25 cm)
<b>Dome Diameter:</b>	2 in. (5 cm)

**Weight with 33 ft cable:** 2 lb (0.9 kg)

### CVF3 Heater/Ventilator

**Power Supply:** 12 Vdc, 1.3 A (with 10 W Heater)

**Operating Temperature:** -40° to +70°C

**Ventilation Power:** 5 W continuously

**Heating Power:** 5 W or 10 W

**Heater Induced Offset:** <1 W/m<sup>2</sup> (with CMP11)

**Weight without cable:** 3.5 lb (1.6 kg)

### Dimensions

<b>Height:</b>	5.1 in. (12.9 cm)
<b>Diameter:</b>	8.8 in. (22.4 cm)

