

Specifications to ISO 9060 / WMO standards

- Secondary Standard (CMP 11, CMP 21, CMP 22)
- First Class (CMP 6)
- Second Class (CMP 3)

Reliable all-weather performance

The widest range of pyranometers and accessories available



RADIATION MEASUREMENT FOR ATMOSPHERIC RESEARCH AND INDUSTRY



In the range of secondary standard pyranometers, Kipp & Zonen supplies equipment with special features; record breaking response time, exceptional levelling accuracy and a test certificate also covering the directional and temperature responses. These important parameters ensure the highest accuracy measurements.

Pyranometers are radiometers designed for measuring the irradiance on a plane surface resulting from radiant fluxes in the wavelength range from 300 to 3000 nanometers. Kipp & Zonen has been manufacturing pyranometers for over 75 years.

The instruments are used in meteorology, solar energy research, material testing, climate control in greenhouses, building physics science and many other applications. Kipp & Zonen can supply a full range of pyranometers and accessories, according to the ISO 9060 and World Meteorological Organisation (WMO) standards.

Common characteristics of the pyranometers are the robustness, and all-weather performance. The instruments are easy to use, require no power, and are all supplied with calibration certificates that are traceable to WRR (World Radiometric Reference). For ease of mounting, exchange and recalibration the instruments have a waterproof connector. The standard supplied 10 m shielded cable has the waterproof sealed counterpart connector.

The comparison table shows the specifications, dimensions and options of the various types and helps selection of the right model for a specific application.

CMP SERIES

PYRANOMETER RANGE

CMP3 is smaller and lighter than all other CMP pyranometers. It has a robust 4 mm dome to protect the thermopile from external influences. A spirit level and leveling screws are mounted in the base of the pyranometer. The small size and sealed construction make this instrument the ideal choice for agricultural and industrial applications and networks.

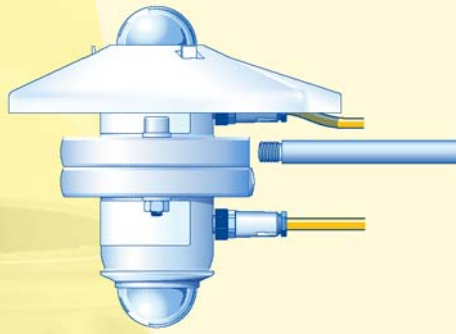
CMP6 has a similar detector to the CMP3, but has improved performance due to the increased thermal mass and the double glass dome construction. It is ideal for cost-effective, good quality, measurements in hydrological networks and agriculture. The connector with gold-plated contacts allows for easy exchange and re-calibration.

CMP11 uses higher quality glass domes and a version of the detector technology originally developed for the CM22 and is a step up in performance from the CMP6. It is particularly suitable for meteorological networks and the reduced response time of 1.66 seconds (63 %) meets the requirements for solar energy applications.

CMP21 has the same detector as the previous CM22 and individually optimised temperature compensation. A standard thermistor sensor is fitted to monitor the housing temperature. Each instrument is supplied with its own temperature and directional (cosine response) test data. It is the choice for scientific use and in top level solar radiation monitoring networks such as the BSRN (Baseline Surface Radiation Network) of WMO.

CMP22 has all the features of CMP21 but uses very high quality quartz domes for a wider spectral range, improved directional response, and reduced thermal offsets. Because of the high optical quality of these domes the directional error is reduced below 5 W/m^2 . Kipp & Zonen is confident that CMP22 is the best Pyranometer currently available.





To create an albedometer two **CMP3**'s can be mounted opposite to each other. A rod can be screwed in one of the housings for fixating the mounted instruments to a mast. Each sensor has a separate cable that can be fixed along the mounting rod.

CV2 ventilation unit is designed for use with all CMP pyranometers (except the CMP 3) Ventilation and two levels of heating will improve the reliability and accuracy of the measurement under all weather conditions. Ventilation will keep the dome clean from precipitation and snow plus suppresses the infrared offset by stabilization of the dome temperature.

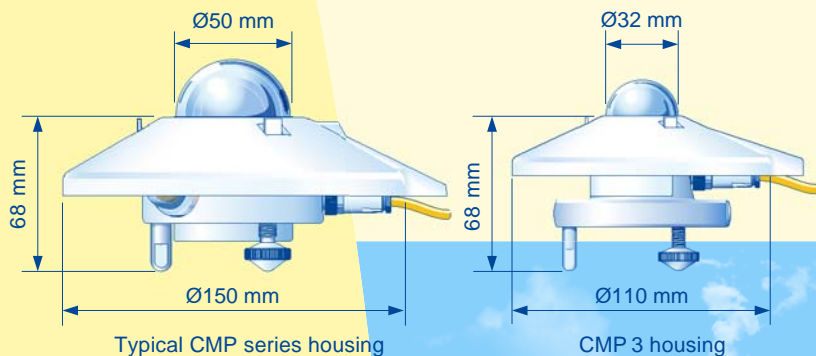


The combination of a pyranometer and shadow ring **CM 121B** offers a simple solution to the problem of measuring diffuse radiation from the sky. The shadow from the ring covers the pyranometer dome completely. The ring will not need adjustment for several days.

The **2AP** tracker is an all-weather, reliable and affordable tracking and positioning instrument. It is used to accurately point small and medium sized payloads, either as a dedicated Sun tracker or as a computer based Positioner. A wide range of accessories is available for mounting instruments and adaptation to extreme climate conditions. The 2AP specification match with the requirements for BSRN stations. (Baseline Surface Radiation Network)



AMPBOX is a current loop amplifier for the complete range of pyranometers. Pyranometers have output signals in the mV range, the AMPBOX can amplify this to a 4 - 20 mA level. Amplification is advised for noisy environments, read-out equipment with high-level inputs and for very long (> 100 m) cables.



Note: The performance specifications quoted are worst-case and/or maximum values

Kipp & Zonen B.V. reserve the right to alter specifications of the equipment described in this documentation without prior notice

SPECIFICATIONS

	CMP 22	CMP 21	CMP 11	CMP 6	CMP 3
ISO CLASSIFICATION	Secondary Standard	Secondary Standard	Secondary Standard	First Class	Second Class
Response time (95 %)	5 s	5 s	5 s	18 s	18 s
Zero offsets					
(a) thermal radiation (200 W/m ²)	± 3 W/m ²	± 7 W/m ²	± 7 W/m ²	± 15 W/m ²	± 15 W/m ²
(b) temperature change (5 K/hr)	± 1 W/m ²	± 2 W/m ²	± 2 W/m ²	± 4 W/m ²	± 5 W/m ²
Non-stability (change/year)	± 0.5 %	± 0.5 %	± 0.5 %	± 1 %	± 1 %
Non-linearity (0 to 1000 W/m ²)	± 0.2 %	± 0.2 %	± 0.2 %	± 1 %	± 2.5 %
Directional error (at 80 ° with 1000 W/m ² beam)	± 5 W/m ²	± 10 W/m ²	± 10 W/m ²	± 20 W/m ²	± 20 W/m ²
Temperature dependence of sensitivity	± 0.5 % (-20 to +50 °C)	± 1 % (-20 to +50 °C)	± 1 % (-10 to +40 °C)	± 4 % (-10 to +40 °C)	± 5 % (-10 to +40 °C)
Tilt error (at 1000 W/m ²)	± 0.2 %	± 0.2 %	± 0.2 %	± 1 %	± 3 %

OTHER SPECIFICATIONS

Sensitivity	7 to 14 µV/W/m ²	7 to 14 µV/W/m ²	7 to 14 µV/W/m ²	5 to 16 µV/W/m ²	5 to 20 µV/W/m ²
Impedance	10 to 100	10 to 100	10 to 100	20 to 200	20 to 200
Level accuracy	0.1 °	0.1 °	0.1 °	0.5 °	1 °
Operating temperature	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C
Spectral range (50 % points)	200 to 3600 nm	310 to 2800 nm	310 to 2800 nm	310 to 2800 nm	310 to 2800 nm
Typical signal output for atmospheric applications	0 to 15 mV	0 to 15 mV	0 to 15 mV	0 to 15 mV	0 to 15 mV
Maximum irradiance	4000 W/m ²	4000 W/m ²	4000 W/m ²	2000 W/m ²	2000 W/m ²
Expected daily accuracy	± 1 %	± 2 %	± 2 %	± 5 %	± 10 %
Recommended applications	Scientific research requiring the highest level of measure- ment accuracy and reliability	Meteorological net- works, reference measurements in extreme climates, polar or arid	Meteorological net- works, PV panel and thermal collector testing, materials testing	Good quality meas- urements for hydrology networks, greenhouse climate control	Economical solution for routine measurements in weather stations, field testing

CMP instruments have a standard cable length of 10 m. Optional cable 25 or 50 m

Standard 10 k Thermistor or optional Pt-100 temperature sensor with CMP 21 and CMP 22

Individual directional response and temperature dependence test data with CMP 21 and CMP 22

SOLAR RADIATION INSTRUMENTS

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