



Pyranometer Model CM 11

Summary of features

According to the ISO 9060 / WMO standards

- Secondary standard (CM 11, CM 21)
- First class (CM 6B)
- Second class (CM 3)

Robust; all weather performance

Used in atmospheric research, industry and applied in meteorological networks

Kipp & Zonen pyranometers for atmospheric research and industry

Pyranometers are radiometers designed for measuring the irradiance on a plane surface, resulting from radiant fluxes in the wavelength range from 0.3 to 3 micrometers.

The most common application for pyranometers is the measurement of solar radiation and radiation from lamps. Kipp & Zonen has been manufacturing pyranometers for over 70 years. The instruments have been used in meteorological research, 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, all according to the applicable ISO 9060 standard that is also adopted by the World Meteorological organisation.

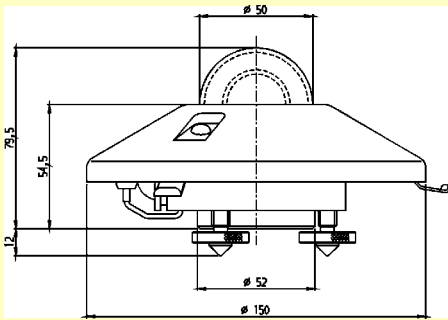
The differences between the various types of pyranometers are shown in the table on the rear page.

Common characteristics of Kipp & Zonen pyranometers are the robustness, and all weather performance. Pyranometers are easy to use, require no power, and are all supplied with calibration certificates that are traceable to WRR (World Radiometric Reference).

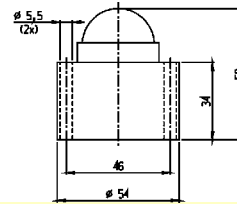
In the range of secondary standard pyranometers, Kipp & Zonen supplies equipment with special features; a record breaking 99% response time, a record breaking levelling accuracy and a test certificate also covering the directional response. These are all important specifications to get the highest accuracy measurements.

Technical specifications

Release 99.08



Dimensions of pyranometers CM 21, CM 11, CM 6B



Dimensions of pyranometer CM 3

	CM 21	CM 11	CM 6B	CM 3
ISO classification	Secondary Standard	Secondary Standard	First Class	Second Class
Recommended applications	Reference measurements in extreme climates, Polar or Arid. When long cable length is required.	Meteorological networks, solar collector testing.	Routine measurements, agricultural stations, indoor material testing under lamps.	Where robustness counts more than accuracy.
ISO specifications				
Response time 95% (sec)	5	12	18	18
Zero offsets*				
* thermal radiation (200 Wm ⁻²)	< 7 Wm ⁻²	< 7 Wm ⁻²	< 7 Wm ⁻²	< 15 Wm ⁻²
* temperature change (5K/hr)	< +/- 2 Wm ⁻²	< +/- 2 Wm ⁻²	< +/- 4 Wm ⁻²	< +/- 4 Wm ⁻²
Non stability (% change/year)	+/- 0.5 max	+/- 0.5 max	+/- 1 max	+/- 1 max
Non linearity (at 1000 Wm ⁻²)	< +/- 0.2 %	< +/- 0.6 %	< +/- 1.2 %	< +/- 2.5 %
Directional error (at 1000 Wm ⁻²)	< +/- 10 Wm ⁻²	< +/- 10 Wm ⁻²	< +/- 20 Wm ⁻²	< +/- 25 Wm ⁻²
Temperature dependence of sensitivity	+/- 1% (-20 to + 50 °C)	+/- 1% (-10 to + 40 °C)	+/- 2% (-10 to + 40 °C)	+/- 6% (-10 to + 40 °C)
Tilt response (+/- 80°) (at 1000 Wm ⁻²)	+/- 0.25%	+/- 0.25%	< +/- 1 %	< +/- 2%
Special features				
Response time 99% (sec)	12	24	55	Not specified
Level accuracy (degrees)	0.1 (radiometrically levelled relative to the sensor)	0.1 (radiometrically levelled relative to the sensor)	0.5	1
Test certificate	sensitivity & directional error	sensitivity & directional error	sensitivity	sensitivity
Other specifications				
Sensitivity (µV/Wm ⁻²)	7-17	4 - 6	9 - 15	10 - 35
Impedance (Ω)	40 - 100	700 - 1500	70 - 100	79 - 200
Operating temperature	-40 to + 80 °C	- 40 to + 80 °C	- 40 to + 80 °C	- 40 to + 80 °C
Cable length	10 m	10 m	10 m	5 m
Spectral range (50% points, nm)	305-2800 (see options)	305-2800 (see options)	305-2800	305-2800
expected signal output in atmospheric application	0 - 25 mV	0 - 10 mV	0 - 25 mV	0 - 50 mV
Max. irradiance	4000 Wm ⁻²	4000 Wm ⁻²	2000 Wm ⁻²	2000 Wm ⁻²
Expected accuracy for daily sums	+/- 2 %	+/- 3 %	+/- 5 %	+/- 10 %

Options

- Cable extension (5, 10, 15, 20, 25, 100 m) ^{1,2,3,4}
- Connector to extended cable ^{1,2,3}
- Filter glass or Quartz dome ^{1,2}
- Incorporated temperature sensor, Pt-100 or thermistor ^{1,2}

¹⁾ for CM 21 ²⁾ for CM 11 ³⁾ for CM 6B ⁴⁾ for CM 3

Accessories

- CV 1 ventilation system ^{1,2,3}
- CM 121 shadow ring ^{1,2,3} ⁴⁾ with CLF 1
- CC 20 radiation indicator ^{1,2,3,4}
- CLF 1 levelling fixture ⁴⁾
- CAF 1 albedometer fixture ⁴⁾

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