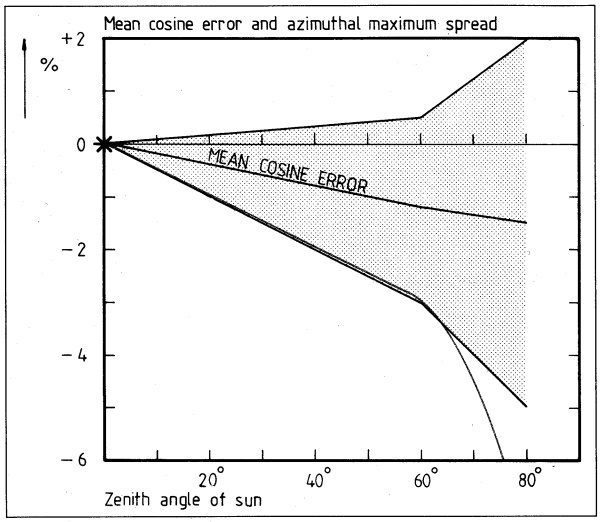


Fig. 3

Characteristic	*Secondary standard*	*First class*	*Second class*
Resolution (smallest detectable change in W m^{-2})	±1	±5	±10
Stability (percentage of full scale, change/year)	±1	±2	± 5
Cosine response (percentage deviation from ideal at 10° solar elevation on a clear day)	<±3	<±7	<±15
Azimuth response (percentage deviation from the mean at 10° solar elevation on a clear day)	<±3	<±5	<±10
Temperature response (percentage maximum error due to change of ambient temperature within the operating range)	±1	±2	± 5
Non-linearity (percentage of full scale)	±0.5	±2	± 5
Spectral sensitivity (percentage deviation from mean absorptance 0.3 to 3 μm)	±2	±5	±10
Response time (99% response)	<25s	<1 min	<4 min

Table of WMO-Classification of pyranometers.
CM5/6-Pyranometer is a first class pyranometer.

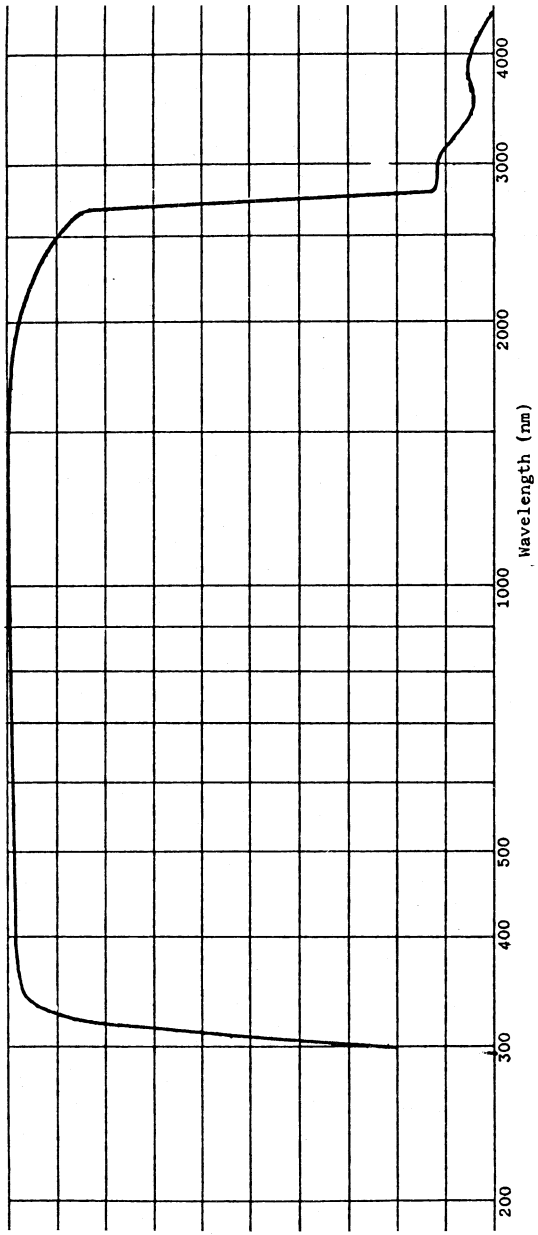


Fig. 4

Relative transmittance vs. wavelength of two Schott K5 glass domes, each 2 mm thick, as used in the CM 5/6. Four surface reflections included (normal incidence), taking into account the index change with wavelength.

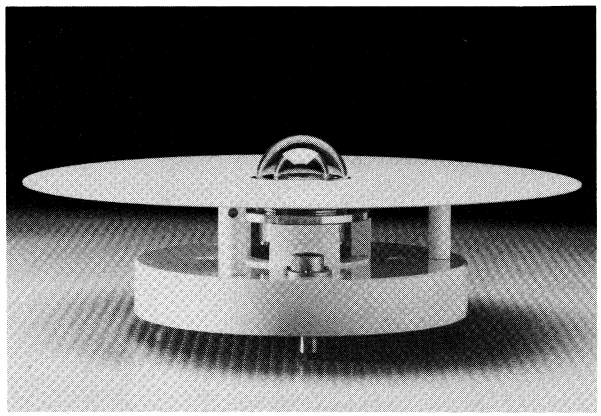
DIRECTIONS FOR USE

CM 5/6-8901

PYRANOMETER

FOR OUTDOOR INSTALLATION

MODEL CM5 – CM6



Pyranometer with base and screen model CM 6

KIPP & ZONEN DELFT BV

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PYRANOMETER FOR OUTDOOR INSTALLATION CM 5 – CM 6

Introduction

The pyranometer CM 5 is designed for measuring the irradiance on a plane surface, which results from the direct solar radiation and from the diffuse solar radiation incident from the hemisphere above.

Reflected solar radiation can be measured with the pyranometer in the inverted position.
The pyranometer CM 5 complies with the specifications for a 'first class' pyranometer, as published in the 'Guide to meteorological instruments and methods of observation', Fifth edition, 1983, from the Secretariat of the World Meteorological Organization (WMO)-Geneva, Switzerland.
See table on page 5.

Installation & Maintenance

Pyranometer with base and screen model CM 6 is provided with a spirit level. It should be placed in a horizontal position by means of the two levelling screws.

The pyranometer CM5 is screwed onto the base by means of the three screws provided. The screen is fixed by pushing three studs into the three supports on top of the base and tightening the screws.

The WMO recommends that the output cable is pointing to the nearest pole. This minimizes heating by the sun of the electrical connections.

The model CM 5 (without base and screen) can be flange mounted into a plate.
For best accuracy body and domes of the pyranometer must have equal temperature: If the temperature of the mounting stand is expected to rise and fall considerably relative to air temperature then the CM 5 must be thermally isolated e.g. with a plastic ring.

In order to avoid condensation on the inside of the glass domes the interior of the pyranometer is kept dry by means of a built-in drying cartridge.
This drying cartridge (1) can be withdrawn from the mounting after removal of the retaining screw-ring (2) as indicated in fig. 1. Upon pulling the two parts of the cartridge apart, the perforated tube can be filled with new blue silicagel or other suitable drying agent e.g. every six months.

Pink silicagel can be activated again in an oven at 130°C within a couple of hours.

If necessary the outer glass dome (4) can be taken off by unscrewing the retaining screw-ring (3).

Connection to measuring equipment

The pyranometer is provided with a two-core output cable. Black is the negative and blue the positive.

Extension cables with a length upto some hundreds of metres may be used but care has to be taken that these are provided with a shield and that the cable resistance is lower than 0.1% of the impedance of the read-out equipment. Connect the shield at one end only to 'ground' in order to prevent shield currents.

Operating

The irradiance level (in W/m²) outside the pyranometer in the plane of the sensing element can be computed when the output voltage (μV) is divided by the sensitivity figure (in μV/Wm^{-2}) of the pyranometer.

The sensitivity can change slightly with temperature, irradiance, tilt angle, direction of radiation, etc. Some typical curves (of relative sensitivity) are shown in figures 2 and 3.

The spectral range of the instrument is limited by the transmission of the glass domes. See figure 4. The black paint of the sensor has a constant absorptance in this range.
Small offset voltages can arise due to lack of thermal equilibrium in the instrument. E.g. at clear windless nights the infra red emission to the cold sky results in a zero offset of down to – 50 μV.

Recalibration

Kipp & Zonen can recalibrate pyranometers at cost.
Many National Weather Services have also calibration facilities.
Details of calibration methods are found in the above mentioned WMO-guide.

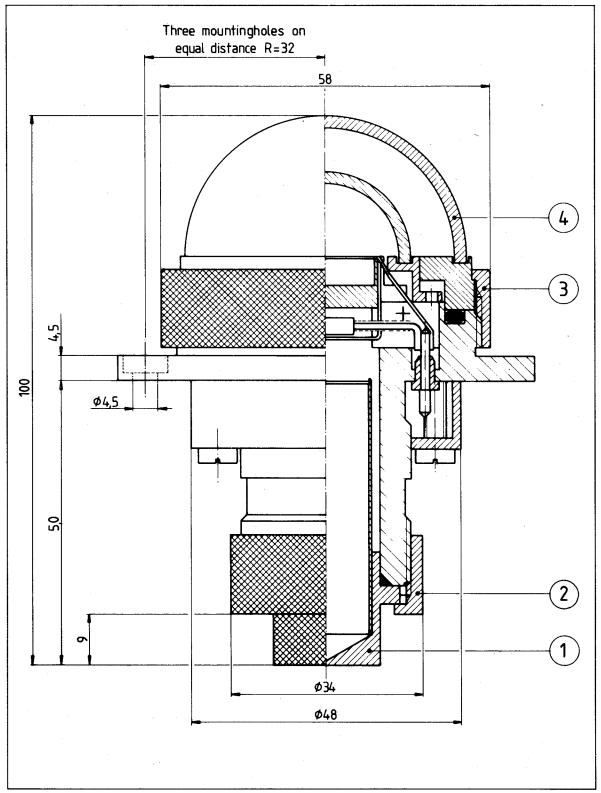

Fig. 1.
Dimensions of CM5 pyranometer.

SPECIFICATIONS

PYRANOMETER CM 5 – 6
if manufactured and calibrated after November 15th, 1987

Sensitivity (see calibration certificate)	9-15 μV/Wm^{-2}
Impedance	70-100 Ohm
Response time (l/e value)	5 s
99% value after	55 s
Ambient operating temperatures	– 40 to + 60°C
Max. irradiance	2000 W/m²

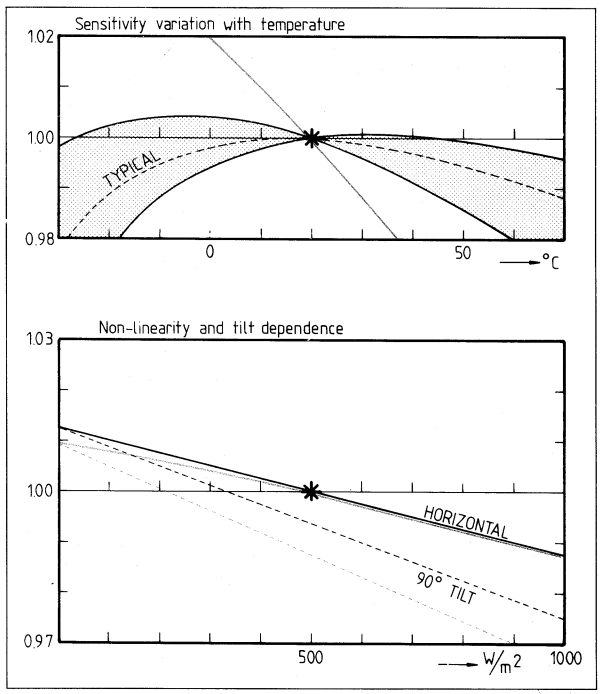

Fig. 2
✱ *Calibration conditions at Kipp & Zonen.*
— Old type CM 5, manufactured and calibrated before November 15th, 1987.

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