Description

Pyranometers are radiometers designed for measuring the irradiance on a plane surface resulting from radiant fluxes in the wavelength range from 300 to 3000 nanometer.

The instruments are used in meteorology, solar energy research, material testing, climate control in greenhouses, building physics science and many other applications.

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.

Type 6006.0000 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.

Technical data

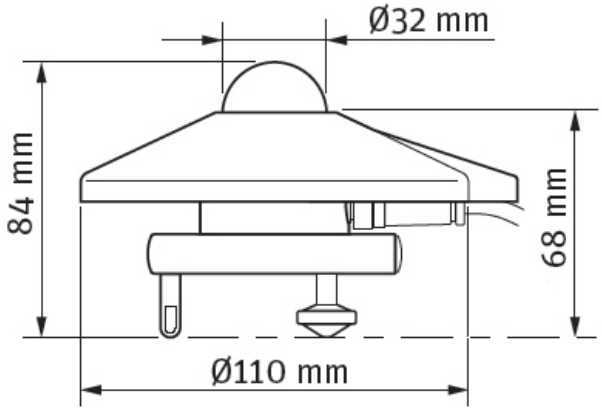
ISO classification	**Second class**
Response time (95 %):	18 s
Zero offsets (a) thermal radiation: (200 W/m^2): (b) temperature change: (5 K/hr):	 ± 15 W/m^2 ± 5 W/m^2
Non-stability (change/year):	± 1 %
Non-linearity (0 to 1000 W/m^2):	± 2.5 %
Directional error (at 80° with 1000 W/m^2 beam):	± 20 W/m^2
Temperature dependence of sensitivity:	± 5 % (-10 to +40 °C)
Tilt error (at 1000 W/m^2):	± 3 %

Other specification

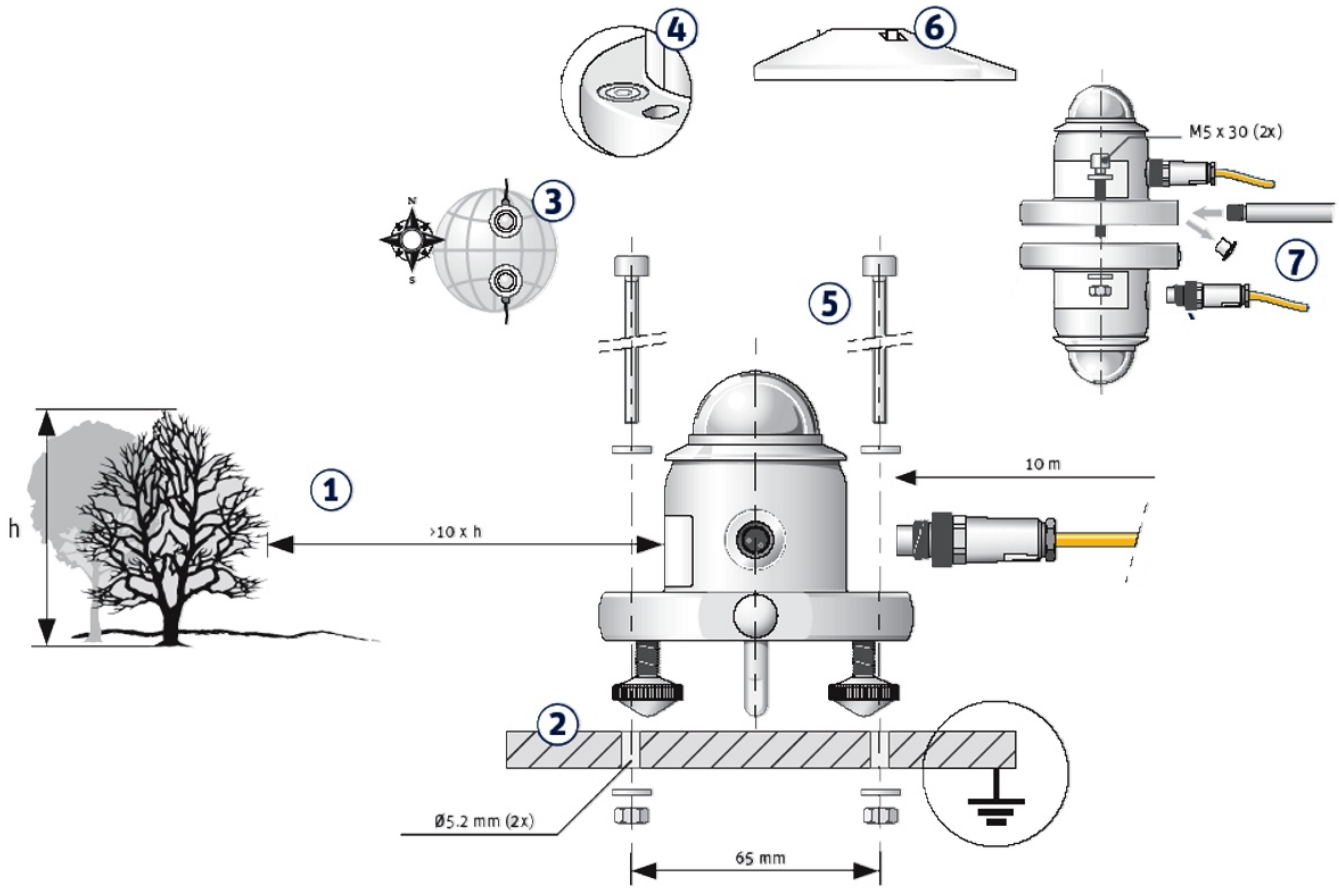
Sensitivity:	5 to 20 µV/W//m^2
Impedance:	20 to 200 Ω
Level accuracy:	1°
Operation temperature:	-40 to +80 °C
Spectral range: (50 %points)	310 to 2800 nm
Typical signal output for atmospheric applications:	0 to 15 mV
Maximum irradiance:	2000 W/m^2
Expected daily accuracy:	± 10 %
Recommended applications:	Economical solution for routine measurements in weather stations, field testing
Connection:	**2-wire Li2YD11Y (pluggable)** Cable ∅: 5 mm Wire ∅: 1.2 mm Number of strands: 7 x ∅ 0.2 mm, tinned copper Wire insulation: PE Shield: Spiral wrap tinned copper ∅ 0.15 mm

The instruments have a standard cable length of 10 m.

Dimension sketch

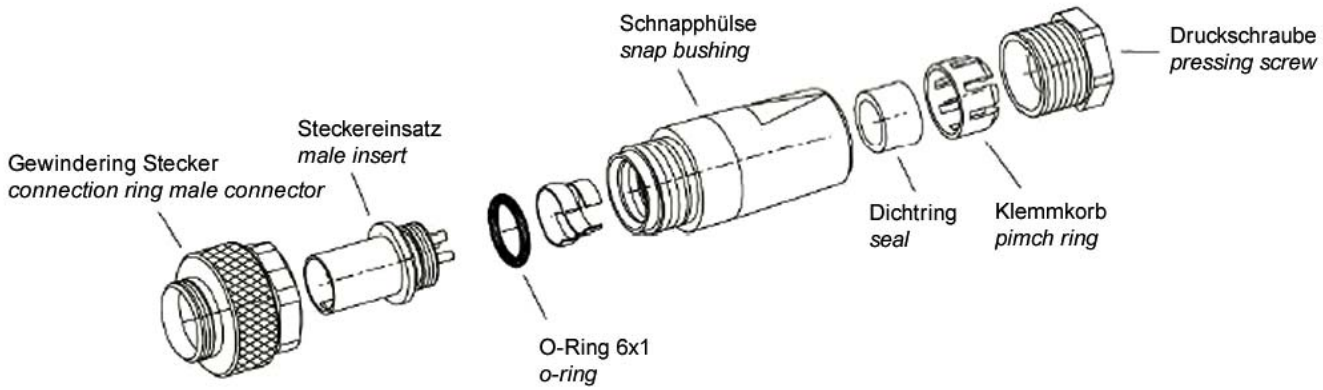


Installation – Mechanical



1. Unobstructed horizon
2. Solid surface
3. Point cable towards nearest pole
4. Level instrument
5. Mount with screws, washers and nuts
6. Mount sun screen
7. Albedo set-up

Connector layout



Connection plan Pyranometer

PYRANOMETER Connection			
	Wire	Function	Connect with
1	Red	+	+ (Hi)
2	Blue	-	- (Lo)
	Shield	Housing	Ground
* Connect to ground if pyranometer not grounded			

Pin layout

1 = Red

2 = Blue

Calculate Irradiance

$$E_{Solar} = \frac{U_{emf}}{S}$$

E_{Solar}	$\left[\frac{W}{m^2}\right]$	= Irradiance
U_{emf}	$[\mu V]$	= Output Voltage
S	$\left[\frac{\mu V}{W/m^2}\right]$	= Sensitivity

Typical Values

Fully clouded

50 … 120 W/m²

Sunny, partly clouded

120 … 500 W/m²

Clear and Sunny

500 … 1000 W/m²

Reading reduced if dome is not clean

1. Keep dome clean using water or alcohol
2. Keep instrument levelled
3. Replace dessicant if clear
4. Recalibrate every 2 years

Technical data are subject to change!

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Certificate of Calibration

Project no.:

Pyranometer model: **6006.0000**

Serial number:

Sensitivity: $\mu V/W/m^2$
at normal incidence on horizontal pyranometer

Impedance: Ohm

Temperature: 22 ± 2 °C

Calibration procedure:

The indoor calibration procedure is based on a side-by-side comparison with a reference pyranometer under an artificial sun fed by an AC voltage stabiliser. It embodies a 150 W Metal-Halide high-pressure gas discharge lamp. Behind the lamp is a reflector with a diameter of 16.2 cm. The reflector is 110 cm above the pyranometers producing a vertical beam. The reference and test pyranometers are mounted horizontally on a table, which can rotate. The irradiance at the pyranometers is approximately 500 W/m^2. During the calibration procedure the reference and test pyranometer are interchanged to correct for any non-homogeneity of the beam. The dark offsets of both pyranometers are measured before and after the interchange and taken into account.

Reference Pyranometer:

CMP 3 sn060193 active from 03/01/2011.

Hierarchy of traceability:

This pyranometer was compared with the sun and sky radiation as source under mainly clear sky conditions using the "continuous sun-and-shade method". The readings are referred to the World Radiometric Reference (WRR) as stated in the WMO Technical Regulations. The measurements were performed in Davos (latitude: 46.8143°, longitude: -9.8458°, altitude: 1588 m above sea level).

The inclination of the receiver surfaces versus their horizontal position were set to 0.0 degrees, the instrument signal wire to the north. During the comparisons, the instrument received global radiation intensities from **639** to **973** with a mean of **823** W/m^2. The angle between the solar beam and the normal of the receiver surface varied from **24.5** to **50.0** with a mean of **37.1** degrees. The instrument temperature ranged from **+18.2** to **+26.8** with a mean of **+23.5** °C. The sensitivity calculation and the single measurements deviation (σ) are based on **384** individual measurements. The obtained sensitivity value and its expanded uncertainty (95% level of confidence) are valid for similar conditions and are: **14.7** $\pm$ **0.5** $\mu V/W/m^2$ (but is corrected to **15.0** $\mu V/W/m^2$. See "correction applied" below.)
Dates of measurements: **2010, July 7 – 9, 12.**

Global radiation data were calculated from the direct solar radiation as measured with the absolute cavity pyrheliometer PMO2 (member of the WSG, WRR-Factor: 0.998618, based on the last International Pyrheliometer Comparison IPC-2005) and from the diffuse radiation as measured with a continuous disk shaded pyranometer **CM 22 sn020059** with sensitivity **8.91** (ventilated with heated air, instrument-wire to the north).

Correction applied:

+2.0 %
This correction was necessary to correct for the mean directional errors of the reference CMP 3 in Davos. This error is estimated measuring the cosine error for the mean angle of incidence at azimuth S-30° and S+30°. The reference CMP 3 now measures the vertical directed beam of the indoor calibration facility more correctly

Date: Signature: _____

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