

LP PYRA 06



Our instruments' quality level is the results of the product continuous development. This can bring about differences between the information written in this manual and the instrument that you have purchased. We cannot entirely exclude errors in the manual, for which we apologize.

The data, figures and descriptions contained in this manual cannot be legally asserted. We reserve the right to make changes and corrections without prior notice.

LP PYRA 06

1 Introduction

The LP PYRA 06 (see figure 1) albedometer measures the net global radiation, as well as the albedo of grounds (albedo is the ratio between diffuse radiation from a determined surface and the quantity of radiation that arrives on the surface).

The LP PYRA 06 can be used as a pyranometer for the measurement of global radiation.

The LP PYRA 03 is a Second Class pyranometer in accordance with the ISO 9060 standard and with the criteria of WMO "Guide to meteorological Instruments and Methods of Observation", fifth edition (1983).

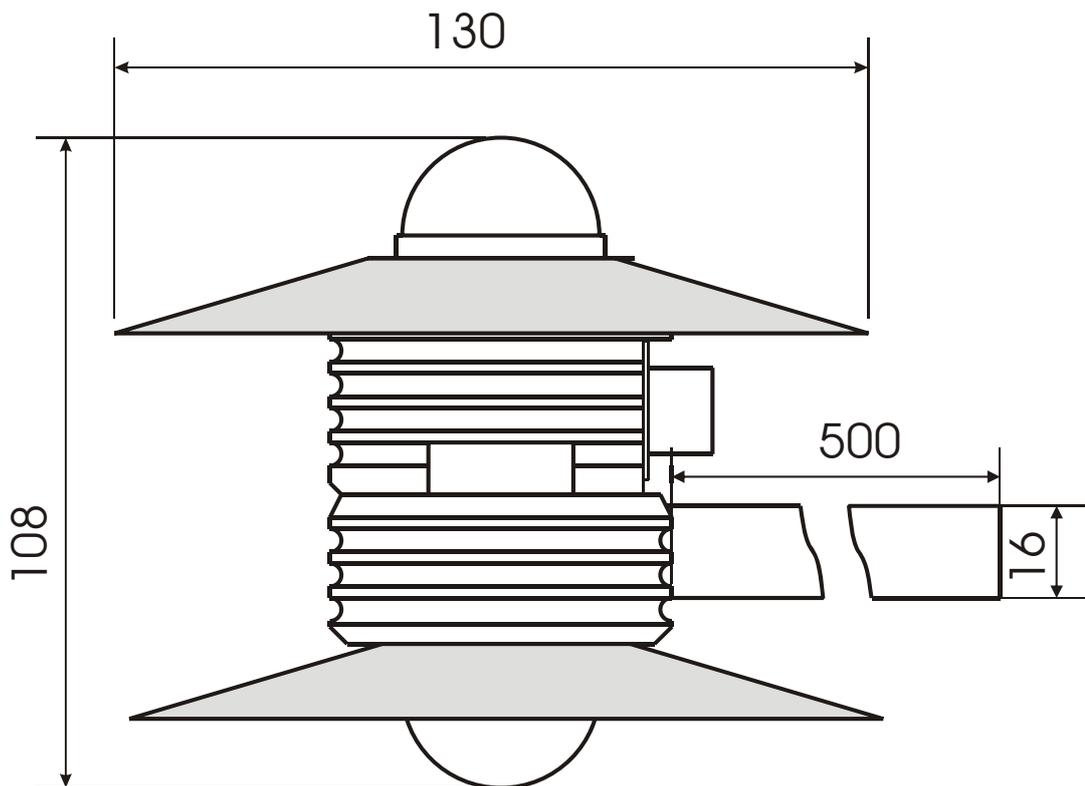


Figure 1

2 Working Principle:

The LP PYRA 06 albedometer is based on a pair of thermopile pyranometers, one of them measuring the incident radiation on the ground [↓] and the other one the reflected radiation [↑].

The thermopile sensitive surface is coated with a black matt paint, which allows the pyranometer not to be selective at different wave lengths.

The pyranometer spectral range is determined by the transmittance of the two glass domes type K5. Radiant energy is absorbed by the thermopile black surface, creating a difference of temperature between the center of the thermopile (hot junction) and the pyranometer body (cold junction). Thanks to the Seebeck effect, the difference of temperature between hot and cold junction is converted into a Difference of Potential.

In order to grant the thermopile a proper thermal insulation from the wind and to reduce the sensitivity to thermal irradiance, the pyranometer that make up the albedometer are provided with a 4mm thick glass dome having a 32mm outer diameter.

The domes protect the thermopile from the dust, which, laying down on the black surface, might change the spectral sensitivity.

3 Installation and Mounting of the Albedometer:

- The PYRA 06 has to be mounted in a readily accessible location to clean the outer domes regularly and to carry out maintenance. Mount the albedometer 1-2m above the ground. Grass should be kept at the same height all the year long. In snowy regions, keep the instrument above the blanket of snow so that the distance from the albedometer to the snow be constant.
- Pursuant to ISO TR9901 standard and to WMO recommendations, the albedometer has to be positioned in such a way that the power lines of the two pyranometers be pointed to the North Pole, if the instrument is used in the Northern Hemisphere, and to the Southern pole, if used in the Southern Hemisphere.
- The LP PYRA 06 pyranometer is provided with a spirit level for carrying out an accurate horizontal leveling. Mounting can be made using the rod provided with the instrument (see Fig. 1).
- Check that the electrical contact with the ground is done properly.

4 Electrical Connections and Requirements for Electronic Readout Instruments:

- The LP PYRA 06 pyranometer does not require any power supply.

- The **optional** cable is terminated with a connector at one end and it is made of PTFE UV-proof. It is provided with 3 wires and a braided wire (shield). Cable colors and connector poles are matched as follow (figure 3):

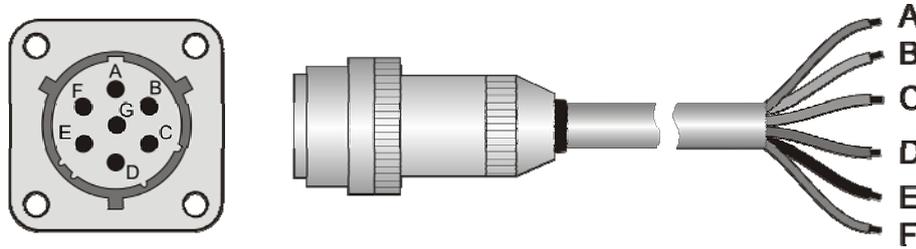
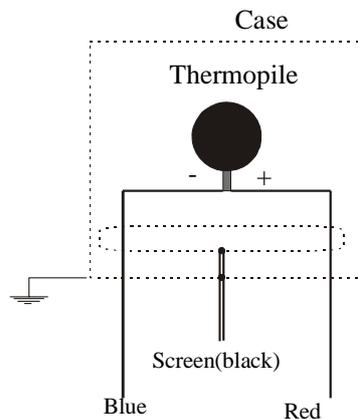


Figure 3

Connector	Function	Color
A	Vout (+) positive pole of the signal generated by the lower detector (\uparrow)	Green
B	No connected	White
C	Vout (-) negative pole of the signal generated by the upper detector (\downarrow)	Blu
D	Vout (+) positive pole of the signal generated by the upper detector (\downarrow)	Red
E	shield	Black
F	Vout (-) negative pole of the signal generated by the lower detector (\uparrow)	Brown

The electrical diagram of each pyranometer is shown in figure 2:



- The LP PYRA 06 has to be connected either to a millivoltmeter or to a data acquisition system capable to accept the two inputs. Typically, the output signal does not exceed 20 mV. In order to get best performances from the pyranometer specifications, the readout instrument should have a $1\mu\text{V}$ resolution.
- N.B.** Generally, the two pyranometers have a different sensitivity, thus consider the calibration coefficient of each pyranometer when calculating albedo and net radiation.

5 Maintenance:

It is important to keep the outer glass domes clean to grant measurement best accuracy. Consequently, the more the dome will be kept clean, the more measurements will be accurate. Washing can be made using water and standard papers for lens, or, in some cases, using pure ETHYL alcohol. After using alcohol, clean again the dome with water only.

6 Calibration and Measurements:

Each of the two pyranometers part of the albedometer is calibrated individually. The S calibration factor is in $\mu\text{V}/(\text{Wm}^{-2})$.

- Once the difference of potential (DDP) has been measured at the ends of the sensor, E_e irradiance is obtained applying the following formula:

$$E_e = \text{DDP}/S$$

where;

E_e : is the Irradiance expressed in W/m^2 ,

DDP: is the difference of potential expressed in μV and measured by the multimeter,

S : is the calibration factor in $\mu\text{V}/(\text{W}/\text{m}^2)$ shown on the label of each pyranometer (and mentioned in the calibration report).

Each pyranometer part of the albedometer is individually factory calibrated and is marked by its calibration factor. To get best performances from your LP PYRA 06 it is strongly recommended that the calibration be checked annually

The instruments and the equipment of Delta Ohm Photo-Radiometry meteorological laboratory grant the calibration of pyranometers (that make up an albedometer) according to the WMO specifications and assure that measurements are traceable to the international standards.

7 Technical Specifications:

Technical specifications listed hereunder are the same for both pyranometers that make up the albedometer. Thus here are the specifications related to a single sensor.

Typical sensitivity:	10 $\mu\text{V}/(\text{W}/\text{m}^2)$
Impedance:	33 $\Omega \div 45 \Omega$
Measuring range:	0-2000 W/m^2
Viewing angle:	2 π sr

Spectral range: (dome transmission)	305 nm ÷ 2800 nm (50%) 335 nm ÷ 2200 nm (95%)
Operating temperature:	-40 °C ÷ 80 °C
Dimensions:	figure 1
Weight:	1.10 Kg

Technical specifications according to ISO 9060

1- Response time: (95%)	<30 sec
2- Zero off-set:	
a) response to a 200W/m ² thermal radiation:	< 25 W/m ²
b) response to a 5K/h change in ambient temperature:	< 6 W/m ²
3a- Long-term non-stability: (1 year)	< ±2.5 %
3b- Non-linearity:	< ±2 %
3c- Cosine response:	< ±22 W/m ²
3d- Spectral selectivity:	< ±7 %
3e- Temperature response:	<8 %
3f- Tilt response:	< ±4 %

8 Ordering Codes

LP PYRA 06	Albedometer made up by 2 Second Class LP PYRA 03 pyranometers, pursuant to ISO 9060 standard. Complete with: top and bottom shade disks, spirit level, rod for attachment to a mast, 7 pole plug and Calibration report.
CP AA 2.5	7 pole plug with UV proof cable, L=5m.
CP AA 2.10	7 pole plug with UV proof cable, L=10m.
LP SP2	Shade disk for pyranometer LP PYRA 03.

GARANZIA



GUARANTEE

GARANTIE

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GUARANTEE CONDITIONS

All DELTA OHM instruments have been subjected to strict tests and are guaranteed for 24 months from date of purchase. DELTA OHM will repair or replace free of charge any parts which it considers to be inefficient within the guarantee period. Complete replacement is excluded and no request of damages are recognized. The guarantee does not include accidental breakages due to transport, neglect, incorrect use, incorrect connection to voltage different from the contemplated for the instrument. Furthermore the guarantee is not valid if the instrument has been repaired or tampered by unauthorized third parties. The instrument has to be sent to the retailer without transport charge. For all disputes the competent court is the Court of Padua.

This guarantee must be sent together with the instrument to our service centre.
N.B.: Guarantee is valid only if coupon has been correctly filled in all details.

Instrument type LP PYRA 06

Serial number _____

RENEWALS

Date _____

Date _____

Inspector _____

Inspector _____

Date _____

Date _____

Inspector _____

Inspector _____

Date _____

Date _____

Inspector _____

Inspector _____



CE CONFORMITY	
Safety	EN61000-4-2, EN61010-1 LEVEL 3
Electrostatic discharge	EN61000-4-2 LEVEL 3
Electric fast transients	EN61000-4-4 LEVEL 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55020 class B