



1. Introduction

The Starpyranometer in the present design has been developed by Dirmhirm. Among the meteorological solar radiation instrumentation it ranges in the category of "Black and White Pyranometers" and is used for measuring global and reflected global radiation and solar radiation on surfaces inclined to the horizontal. The solar radiation coming from the whole sphere and received on a horizontal surface in the spectral range from 0,3 - 3 μm is called global radiation. This includes radiation received directly from the sun (direct solar irradiance) and also diffuse sky radiation that has been scattered in traversing the atmosphere. At electric pyranometers the intensity of radiation is not directly determined, but indirectly by temperature differences which are converted to a proportional electromotive force (EMF) by means of a highly sensitive thermopile. Thus, the complex measurement of the radiation flux is reduced to the simple measurement of electric voltage. Global radiation is an important parameter in the meteorological research and has to be determined at all conditions. Only a sturdy and weather-proof instrument can supply continuous and reliable measurements.

2. Description

The sensing element of the instrument consists of a 12 sector star, the sections of which are painted with a special white reflective paint and an absorbing black paint. When exposed to solar radiation the black sectors are heated more than the white ones and this temperature difference is determined by the thermocouples embedded below the star. The voltage supplied is approximately $1.5 \mu\text{V}/\text{W}^{\text{m}^2}$ at an internal resistance of about 35 ohms. A precisely cut dome made of optical "SCHOTT"- glass shields the sensing element from wind and moisture. One threaded ring and two O-rings clamp the glass of the instrument base providing a watertight seal. A desiccator with Silicagel prevents condensation within the casing. The white painted base shields the desiccator and prevents an overheating of the instrument. A watertight cable outlet (screw-type fitting) prevents intrusion of ambient air. For levelling the instrument is equipped with a spirit level and 3 levelling screws.

3. Care of the Instrument

When pyranometers are in continuous operation the glass dome of the instrument should be wiped clear and dry at least once a day. If frozen snow, glazed frost, hoar frost or rime is present, an attempt should be made to remove the deposit very gently (at least temporarily) with the sparing use of a de-icing fluid, and subsequently wipe the glass clean. If the instrument is used during cold season, the protective housing Model no. 8106 for ventilating the Starpyranometer by a blower, avoids deposits. A daily check should ensure that the instrument is levelled and that the sensing surfaces are still black and white. If there should be defects on the sensing elements, the instrument has to be checked in our company. If local pollution or sand forms a deposit on the dome, the wiping process should be carried out very gently, preferably after blowing off most of the loose material or after wetting it a little, in order to prevent scratching the surface. About every 2 weeks the drying agent in the desiccator should be replaced or reactivated. The colour of the agent should be blue, if not, please exchange. The container is easily removed and a new charge of silica gel can be added. If no fresh silica gel is available, the contents of the container may be reactivated by heating at a temperature of 80°C.

4. Calibration

It is recommended that a pyranometer being in continuous operation has to be standardised at least every six months, better every three months by comparison with a secondary standard. If you have any questions about calibration please contact our company.

4. Warranty

All instruments are checked carefully during production and before delivery. Our company warrants them to be free from defects in material and workmanship under normal use and service for 12 months from date of delivery. The obligation is limited to repairing or replacing parts which have been returned to the Company and which were defective in material or workmanship at time of manufacture. Costs of shipping are not subject of the warranty. This warranty shall not apply to instruments which have been subject to misuse, negligence or accident. Costs incurred in removing or reinstalling parts by the customer or others are not reimbursed by the Company as well.

5. Options, Spareparts

- * Protective Housing Model No. 8106 for ventilating the Starpyranometer by a blower to avoid or minimise deposits in cold weather and to cool the dome in calm weather situations (B1810600).
- * Glass dome (B1810107)
- * 1 set of O-rings (3 ea.) (B1810108)
- * Silica gel container with filling (B1810109)

STARPYRANOMETER

Suitable for the measurement of global radiation G

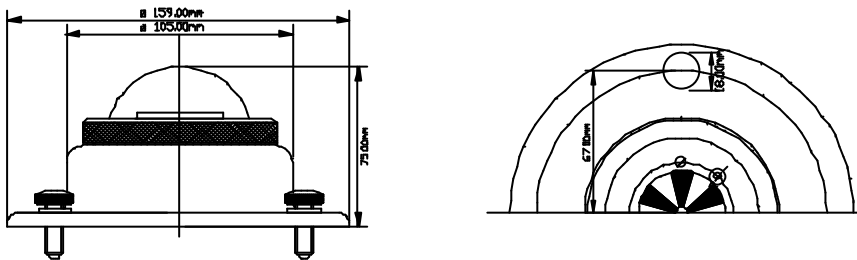
G = direct solar irradiance + diffuse sky radiation on a plane surface (W/m^2)

- * "First class" according to WMO and ISO 9060
- * world-wide market-leader
- * independent from ambient temperature
- * all-season measurements

The measuring principle of the starpyranometer is the measurement of, the temperature difference between white and black painted sectors. By that means the measuring result is not affected from ambient temperature. A precisely cut dome shields the sensing elements from environmental factors.

A drying cartridge keeps the interior free from humidity. An optional protective housing (Model no. 8106) enables measurements even in cold weather.

The pyranometer is supplied with a spirit level and 3 levelling screws for accurate levelling. All pyranometers are supplied with a calibration certificate.

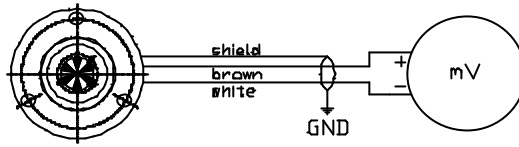


Technical Data:

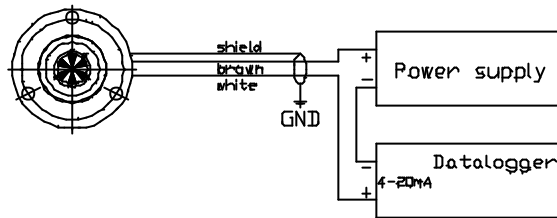
Measuring range:	0 ... 1500 Wm^{-2}
Spectral sensitivity:	0.3 ... 3 μm
Output:	about 15 $\mu\text{V}/\text{Wm}^{-2}$ or 4 ... 20 mA = 0 ... 1500 Wm^{-2}
Impedance:	about 35 Ohm
Ambient temperature:	- 40°C ... + 60°C
Resolution:	< 1 Wm^{-2}
Stability:	< 1 % per year (temporary operation)
Cosine response:	< 3 % of the value, zenith angle 0° ... 80°
Azimuth response:	< 3 % of the value
Temperature effect:	< 3 % of the value between - 20°C ... + 40°C
Linearity:	< 0.5% in the range 0.5 ... 1330 Wm^{-2}
Response time:	< 25 sec. (95%) < 45 sec. (99%)
Weight:	1.0 kg
Cable:	2-polar shielded, 3 m length
Order code:	461105 (μV Output): B1810100 461105 (μV Output) with 10m cable: B1810111 461105/2 (4 ... 20 mA Output): B1810200

Attention: Type 461105/2 needs an external power supply 12 - 36 VDC
(Order Code 99075190 - DIN-rail mounting)

Wiring - diagrams



Specifications: model 461105
 measuring range 0...1500 W/m²
 output approx. 15μV/W/m²



Specifications: model 461105/2
 measuring range 0...1500 W/m²
 output 4-20mA
 power supply 12-36VDC
 load resistance is Fig. below

