LP UVA 02

GB

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 UVA 02

1 Introduction

The LP UVA 02 radiometer measures the broadband UVA irradiance on a plane surface (Watt/ m^2). Measured irradiance is the result of the sum of direct solar irradiance and of diffuse irradiance.
The radiometer can measure the UVA irradiance in closed room too.
The radiometer is produced in three versions:

LP UVA 02	PASSIVE*
LP UVA 02 AC	ACTIVE , 4..20mA CURRENT output
LP UVA 02 AV	ACTIVE , 0..1 or 0..5 or 0..10 V VOLTAGE output, to be defined at the order.

* Using SICRAM Module VP 472 it is possible to connect passive pyranometer to Indicator D09847.

2 Working Principle

LP UVA 02 radiometer is based on a solid state sensor, the spectral match with the desire curve is obtain using special filter. The relative spectral response is reported on figure 1.

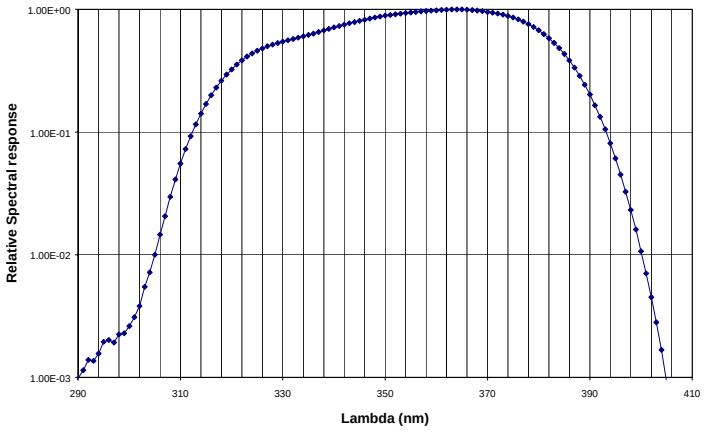

Fig1

In order to protect the diffuser from the dust, LP UVA 02 is equipped with a 50mm glass dome.
The cosine low response is obtained with a particular shaped PTFE diffuser in figure 2 the cosine error versus angle of incident is reported

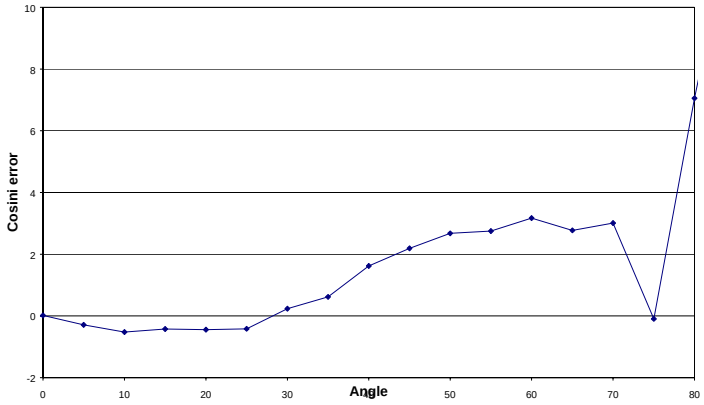

Fig.2

The good cosine low response of LP UVA 02 allow to use the radiometer at any sun ‘s zenithangle .

3 Installation and Mounting of the Radiometer for the Measurement of Global Radiation:

Before installing the radiometer, refill the cartridge containing silica-gel crystals. Silica gel absorbs humidity in the dome chamber and prevents (in particular climatic conditions) internal condensation forming on the internal walls of the domes and measurement alteration.
Do not touch the silica gel crystals with your hands while refilling the cartridge. Carry out the following instructions in an environment as drier as possible:

1- Loosen the three screws that fix the white shade disk
2- Unscrew the silica gel cartridge using a coin
3- Remove the cartridge perforated cap
4- Open the sachet containing silica gel (supplied with the radiometer)
5- Replace the silica gel crystals
6- Close the cartridge with its own cap, paying attention that the sealing O-ring be properly positioned.
7- Screw the cartridge to the radiometer body using a coin
8- Check that the cartridge is screwed tightly (if not, silica gel life will be reduced)
9- Position the shade disk and screw it with the screws
10- The radiometer is ready for use

Figure N.3 shows the operations necessary to fill the cartridge with the silica gel crystals.

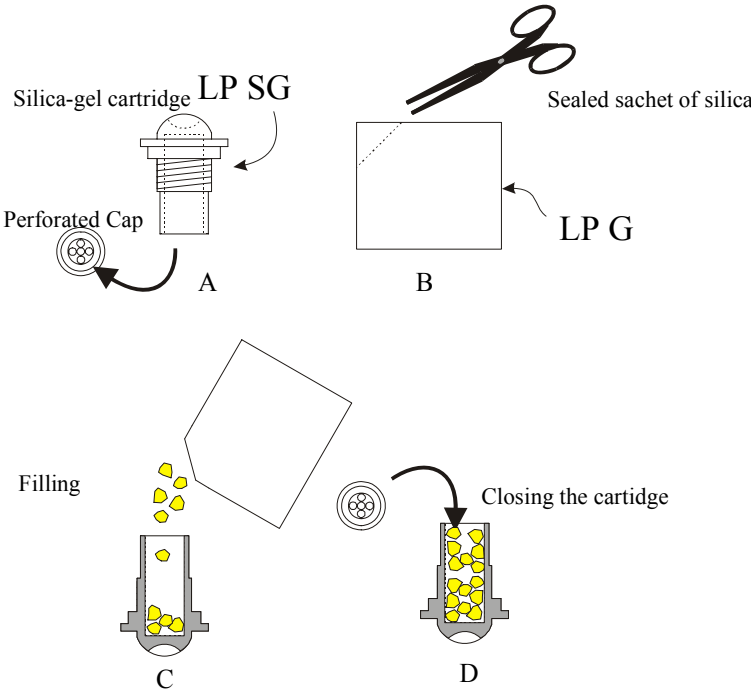

Fig. 3

- The LP UVA 02 radiometer has to be mounted in a readily accessible location to clean the dome regularly and to carry out maintenance. At the same time, check that no building, construction, tree or obstruction exceeds the horizontal plane where the radiometer lays. If this is not possible, select a site where obstructions do not exceed 5 degrees of elevation, in the path followed by the sun, between earliest sunrise and latest sunset. **N.B The presence of obstructions on the horizon line significantly affects the measurement of direct irradiance.**
- The radiometer has to be located far from any kind of obstruction, which might reflect sunlight (or sun shadow) onto the radiometer itself.
- The LP UVA 02 radiometer is provided with a spirit level for carrying out an accurate horizontal leveling. The adjustment is made by means of two leveling screws that allow to adjust the radiometer inclination. Use the two 6mm-diameter holes and a 65mm interaxial distance to mount the instrument on a plane. Remove the shade disk to access the holes and reposition it after mounting (see fig. 4).
- The LP S1 mounting kit (figure 5), supplied on demand as an accessory, allows an easy mounting of the radiometer on a mast. The mast maximum diameter shall not exceed 50 mm. The operator shall take care that the mast height does not exceed the radiometer plane to avoid measurement errors caused by any reflection or shadow of the mast itself. To fix the radiometer to the mounting bracket, remove the shade disk loosening the three screws, fix the radiometer, and mount the white shade disk again.
- It is suggested to thermally isolate the radiometer from its mounting brackets, and to check that the electrical contact with the ground be done properly

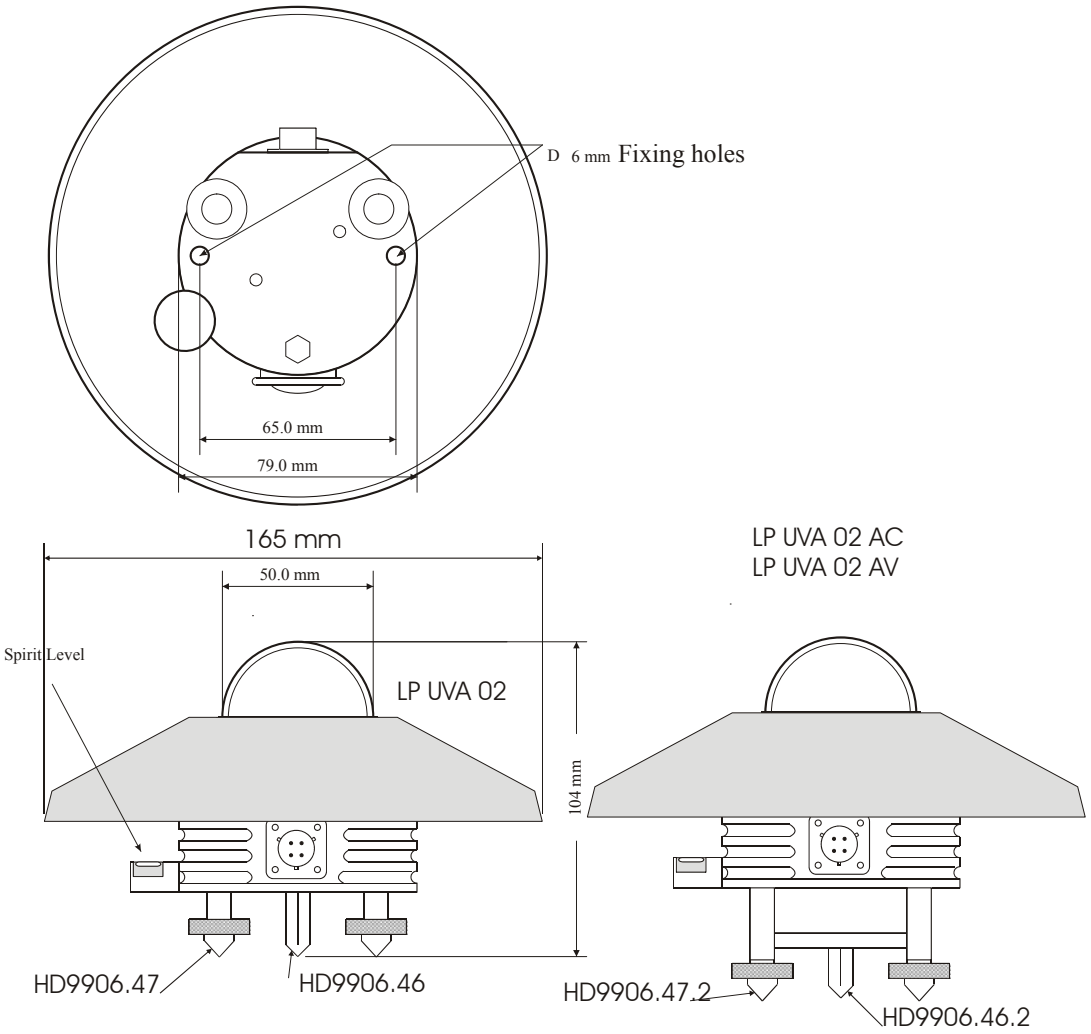
D 6 mm Fixing holes
65.0 mm
79.0 mm
165 mm
50.0 mm
Spirit Level
LP UVA 02
104 mm
HD9906.47
HD9906.46
LP UVA 02 AC
LP UVA 02 AV
HD9906.47.2
HD9906.46.2

Fig 4

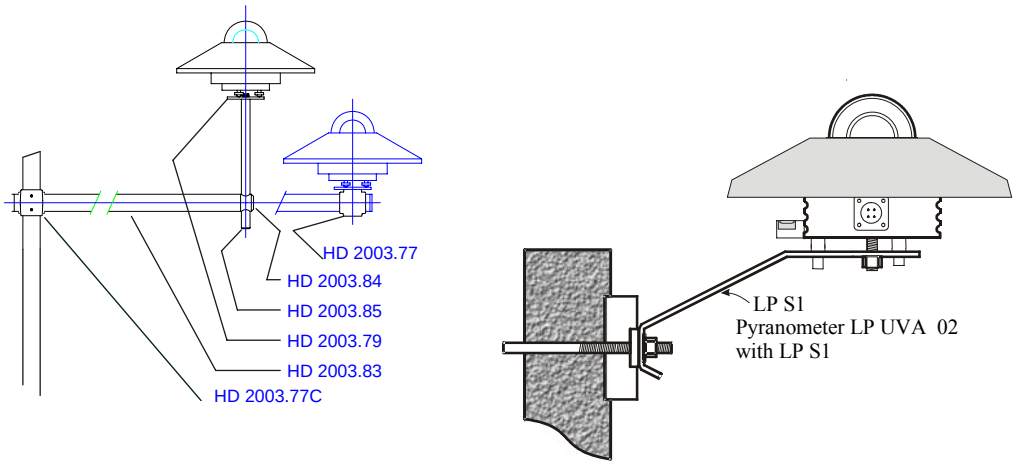
HD 2003.77
HD 2003.84
HD 2003.85
HD 2003.79
HD 2003.83
HD 2003.77C
LP S1
Pyranometer LP UVA 02
with LP S1

Fig. 5

4 Electrical Connection and Requirements for Electronic Readout Devices:

LP UVA 02 is produced in 3 versions, LP UVA 02, LP UVA 02 AC and LP UVA 02 AV.

- LP UVA 02 radiometer is passive and it does not require any power supply.
- LP UVA 02 AC, AV are active and need power supply.
  Required voltage is as follows:
  8-30 Vcc for LP UVA 02 AC and LP UVA 02 AV with 0..1V and 0..5V autput supply.
  14-30 Vcc for LP UVA 03 AV with 0..10 V output.
- All version are supplied with a 4 pole connector.
- 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 6):

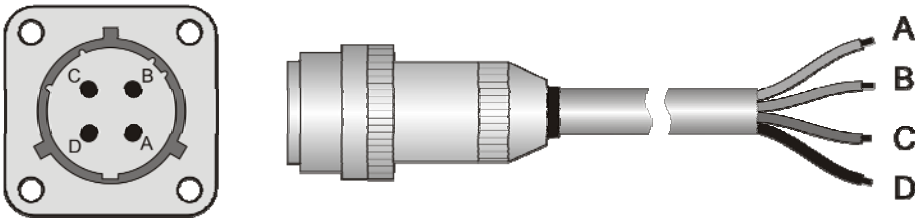

Fig.6

LP UVA 02

Connector	Function	Color
A	Shield (⏚)	Black
B	Vout (+)	Red
C	Vout (-)	Blue
D	Housing (⏥)	White

LP UVA 02 AC

Connector	Function	Color
A	Shield (⏚)	Black
B	Positive (+)	Red
C	Negative (-)	Blue
D	Housing (⏥)	White

LP UVA 02 AV

Connector	Function	Color
A	Shield (⏚)	Black
B	(+) Vout	Red
C	(-) Vout e (-)Vcc	Blue
D	(+) Vcc	White

- The LP UVA 02 radiometer has to be connected either to a millivoltmeter or to a data acquisition system with input resistance > 5MΩ. Typically, the radiometer output signal does not exceed 100 mV. In order to better exploit the radiometer features, the readout instrument should have a 1μV resolution.

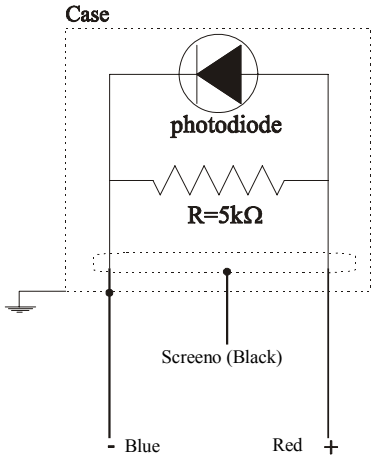

fig. 7

- LP UVA 02 AC is to be connected to a DMM and a power supply as show below (Figure 8).To read the signal, the load resistance must be ≤500Ω

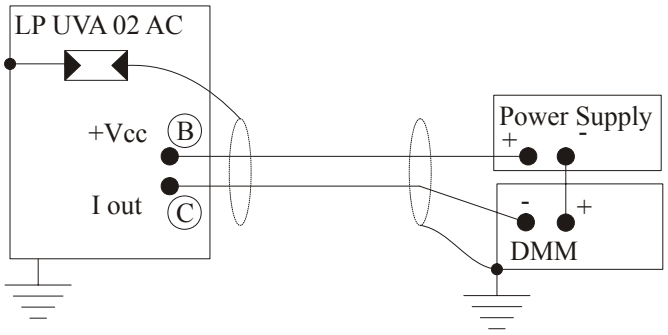

Fig. 8

- LP UVA 02 AV is to be connected to a DMM and a power supply as show below (Figure 9). To read the signal, the load resistance must be ≥ 100kΩ

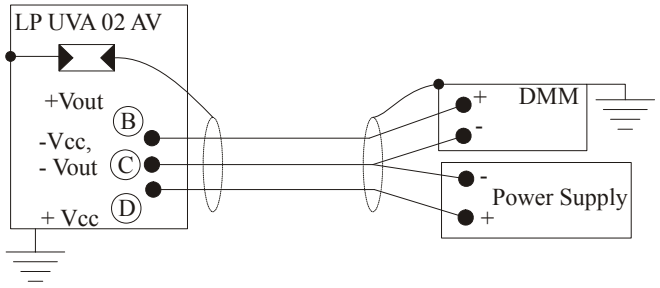

Fig. 9

5 Maintenance:

It is important to keep the outer glass dome 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.
Because of the high rise/fall in temperature between day and night, some condensation might appear on the radiometer dome. To minimize the condensation growth, the radiometer is provided with a cartridge containing dessicant material: Silica gel. The efficiency of the Silica gel crystals decreases in the course of time while absorbing humidity. Silica gel crystals are active when their color is **yellow**, while they turn **blue** as soon as they loose their power. Read instructions at paragraph **"3"** about how to replace them. Silica gel typical lifetime goes from 2 to 6 months depending on the environment where the radiometer works.

6 Calibration and Measurements:

LP UVA 02

The radiometer **S** sensitivity (or calibration factor) allows to determine the irradiance by measuring a signal in Volts at the ends of the resistance which short-circuits the terminals of the photodiode ends. The **S** factor is measured in $\mu V/(Wm^{-2})$.
Once the difference of potential (DDP) has been measured at the ends of the sensor, the E_e irradiance is obtained applying the following formula:

$$E_e = DDP/S$$

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 $\mu V/(W/m^2)$ shown on the radiometer label (and mentioned in the calibration report) .

LP UVA 02 AC

The radiometer sensitivity is set so that:
4..20 mA = 0..200 W/m^2
To obtain irradiance the following procedure is to be applied:
-once you know the current (I_{out}) absorbed by the instrument and measured with the DMM, following formula must be applied:

$$Ee = 12.5 \cdot (I_{out} - 4mA)$$

where;
E_e: Irradiance in W/m^2,
I_{out}: current in mA absorbed by the radiometer

LP UVA 02 AV

The pyranometer sensitivity is set so that according to the version:

0..1 V = 0..200 W/m^2

0..5 V = 0..200 W/m^2

0..10 V = 0..200 W/m^2

To obtain irradiance the following procedure is to be applied:

-once you know the instrument output voltage (V_{out}) measured with the DMM, following formula must be applied:

$$E_e = 200 \cdot V_{out}$$ for the version 0…1 V

$$E_e = 40 \cdot V_{out}$$ for the version 0…5 V

$$E_e = 20 \cdot V_{out}$$ for the version 0…10 V

where;

E_e: Irradiance in W/m^2,

V_{out}: Output voltage (in Volt) measured by the voltmeter

Radiometers are factory calibrated one by one and they are marked by their own calibration factor.

The calibration is carried out following procedure N° DHLF-E-59. This procedure is used in the SIT calibration center N° 124 for the calibration of UVA radiometer.

The calibration was performed by reference to Delta Ohm srl primary standard with monochromatic light at 365 nm obtained separating the emission line of a Xe-Hg lamp with an inferential filter. To get best performances from your LP UVA 02 it is strongly recommended that the calibration be checked annually.

At the moment no international agreement exist for the calibration of this kind of radiometer, so the calibration coefficient is dependent from the calibration procedure like reported in the following article:

"*Source of Error in UV Radiation Measurements* ", T. C. Larason, C. L. Cromer on "*Journal of Reaserch of the National Institute of Standards and Technology*" Vol. 106, Num. 4, 2001. (The article is free on the NIST's WEB site at the following address : http://www.nist.gov/jers)

7 Technical Specifications:

Typical sensitivity:	150 ÷ 350μV/(W/m^2) LP UVA 02 4..20 mA (0-2000 W/m^2) LP UVA 02AC 0..1,5,10V (0-2000 W/m^2) LP UVA 02AV
Response time:	<0.5 sec (95%)
Impedance:	5 ÷ 7.5 KΩ
Measuring range:	0-1000 W/m^2
Viewing angle:	2π sr
Spectral range:	327 nm ÷ 384 nm (1/2) 312 nm ÷ 393 nm (1/10) 305 nm ÷ 400 nm (1/100)
Operating temperature:	-40 °C ÷ 80 °C
Cosine response:	< 8 % (tra 0° e 80°)
Long-term non-stability: (1 year)	< | ±3 | %
Non-linearity:	<1 %
Temperature response:	< 0.1%/°C
Dimensions:	figura 4
Weight:	0.90 Kg

8 Ordering Codes

ORDERING CODE	ARTICLE
LP UVA 02-5	Radiometer complete with shade disk, desiccant sachet with silica gel crystals, 2 silicagel cartridges, spirit level, 4 pole plug and Calibration Report.
LP UVA 02 AC	Radiometer complete with shade disk, desiccant sachet with silica gel crystals, 2 silicagel cartridges, spirit level, 4 pole plug and Calibration Report. 4..20 mA signal Output
LP UVA 02 AV	Radiometer complete with shade disk, desiccant sachet with silica gel crystals, 2 silicagel cartridges, spirit level, 4 pole plug and Calibration Report. 0..1V, 0..5V, 0..10V signal output (to be defined when order)
CP AA 1.5	4 pole plug with UV proof cable, L=5m.
CP AA 1.10	4 pole plug with UV proof cable, L=10m.
HD 2003.85	Fixing kit to mount height pyranometer on ϕ 40mm mast (HD2003.84 + HD2003.85 + HD2003.79)
HD 2003.79	Fixing kit to mount pyranometers on clamping ϕ 40mm (HD2003.77 + HD2003.79)
HD 2003.77	Clamping for mast ϕ 40mm
LP SP1	UV resistant plastic shade disk (BASF LURAN S777K)
LP S1	Mounting kit for LP UVA 02: bracket for attachment to a mast, including fasteners and leveling screws.
LP SG	Desiccant sachet with silica gel crystals, complete with inner O-ring and cap.
LP G	Pack of 5 cartridges of silica gel crystals

GARANZIA GUARANTEE

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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 UVA 02**

Serial number _____

RENEWALS

Date	Date
Inspector	Inspector
Date	Date
Inspector	Inspector
Date	Date
Inspector	Inspector

RoHS 2002/95/EC

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