

LPPYRA11, LPPYRA05, LPPYRA06,



LPPYRA11 - LPPYRA05 - LPPYRA06 ALBEDOMETERS

Delta OHM manufactures three different models of albedometers:

- LPPYRA11 is constructed starting from two Secondary Standard Pyranometers
- LPPYRA05 is constructed starting from two First Class Pyranometers
- LPPYRA06 is constructing starting from two Second Class Pyranometers

All pyranometers are according to ISO 9060 standards and to specifications published by the World Meteorological Organization). An albedometer basically consists of two pyranometers, mounted back-to-back, one looking upward (sky) and one downward (earth). The upward pyranometer measures the incident global radiation (direct radiation + diffuse radiation) striking the ground, while the downward one, measures the global radiation reflected from the ground. The outputs of the two pyranometers electric signals can be directly sent to a data logger or to an automatic data processor. The two pyranometers which made up the LPPYRA05 and LPPYRA11 are coupled in order to have the same sensitivity. Albedo is the fraction of solar radiation that is reflected from the ground, with respect to incident radiation:

$$\text{ALBEDO} = \frac{\text{Reflected Global Radiation}}{\text{Incident Global Radiation}}$$

By using albedometers, we can calculate the net radiation obtained through the difference between incident global radiation and reflected global radiation.

Delta OHM albedometers operate within $0.3 \mu\text{m} \div 3 \mu\text{m}$ spectral range. No power supply is needed, as the two pyranometers generate a voltage which is usually equal to:

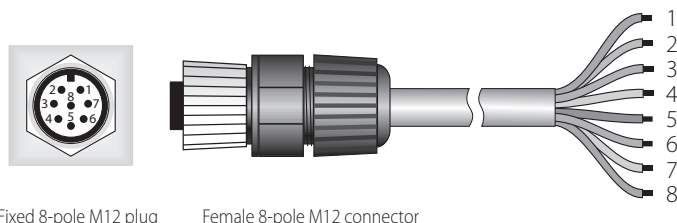
$$10 \frac{\text{mV}}{\text{kW} \cdot \text{m}^{-2}}$$

Every pyranometer composing the albedometer is calibrated separately as per the WRR (World Radiometric Reference) standard and is supplied with the relevant Report of Calibration.

These are strong and reliable ground-based instruments, especially designed to be used under all weather conditions. They are suitable for installation of the field.

Recommended use: climatological research, weather stations, road weather stations, agriculture stations, etc...

WIRING DIAGRAM LPPYRA11, LPPYRA05 - LPPYRA06



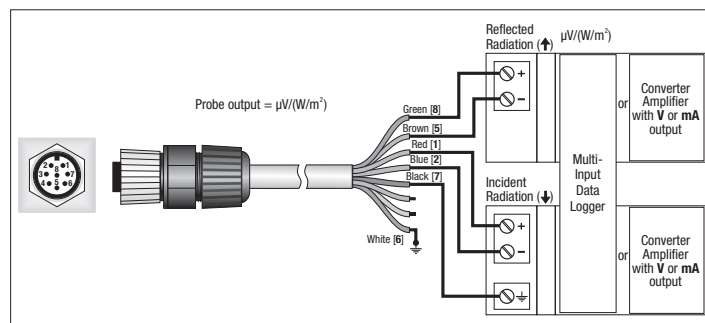
Fixed 8-pole M12 plug

Female 8-pole M12 connector

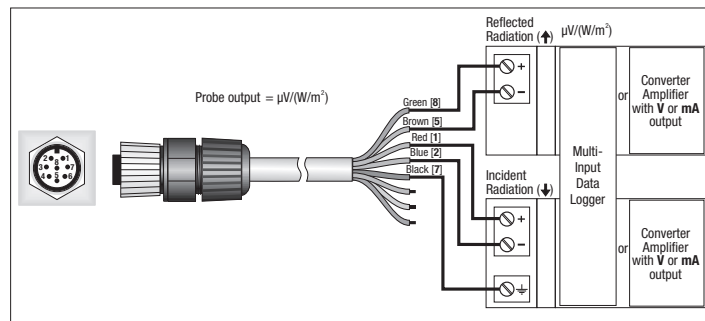
Connector	Function	Colour
1	Output positive (+Vout) of upper detector(↓)	Red
2	Output negative (-Vout) of upper detector(↓)	Blue
3	Not connected	
4	Not connected	
5	Output negative (-Vout) of lower detector (↑)	Brown
6	Housing (↗) (LPPYRA05/LPPYRA11) Not connected (LPPYRA06)	White
7	Cable shield (⊥)	Black
8	Output positive (+Vout) of lower detector (↑)	Green

CONNECTION DIAGRAMS

LPPYRA11 / LPPYRA05



LPPYRA06



Technical Specifications	LPPYRA11*	LPPYRA05*	LPPYRA06*
Typical sensitivity	6 to 11 $\mu\text{V}/(\text{W}/\text{m}^2)$	6 to 12 $\mu\text{V}/(\text{W}/\text{m}^2)$	5 to 15 $\mu\text{V}/(\text{W}/\text{m}^2)$
Impedance	5 $\Omega \div 50 \Omega$	33 $\Omega \div 45 \Omega$	33 $\Omega \div 45 \Omega$
Measuring range	0 $\div 4000 \text{ W}/\text{m}^2$	0 $\div 2000 \text{ W}/\text{m}^2$	0 $\div 2000 \text{ W}/\text{m}^2$
Viewing field	2 π sr	2 π sr	2 π sr
Spectral range (50%)	283 nm $\div$ 2800 nm	283 nm $\div$ 2800 nm	300 nm $\div$ 2800 nm
Operating and storage temperature range	-40 $^{\circ}\text{C} \div 80 ^{\circ}\text{C}$	-40 $^{\circ}\text{C} \div 80 ^{\circ}\text{C}$	-40 $^{\circ}\text{C} \div 80 ^{\circ}\text{C}$
Weight	1.35 kg	1.35 kg	1.1 kg
ISO 9060 Specifications			
Response time 95%	<5 s	< 28 s	< 30 s
Zero Off-set	a) Response to thermal radiation (200Wm ⁻²)	<7 W/m ²	15 W/m ²
	b) Response to temperature change 5K/h	< $\pm$ 2 W/m ²	< $\pm$ 4 W/m ²
Non stability over 1 year	< $\pm$ 0.5 %	< $\pm$ 1.5 %	< $\pm$ 2.5 %
Non-linearity	< $\pm$ 0.2 %	< $\pm$ 1 %	< $\pm$ 2 %
Cosine response	< $\pm$ 10 W/m ²	< $\pm$ 18 W/m ²	< $\pm$ 22 W/m ²
Spectral selectivity	< $\pm$ 3 %	< $\pm$ 5 %	< $\pm$ 7 %
Temperature response (-10 $^{\circ}\text{C}$ to +40 $^{\circ}\text{C}$)	< 1 %	< 4 %	< 8 %
Tilt response	< $\pm$ 0.2 %	< $\pm$ 2 %	< $\pm$ 4 %
Humidity Range	0 to 100%	0 to 100%	0 to 100%
Mean Time Between Failures	> 10 years	> 10 years	> 10 years
Accuracy of bubble level	<0.1 $^{\circ}$	<0.1 $^{\circ}$	<0.2 $^{\circ}$
Ingress Protection (IP) rating	67	67	67

* All technical data, excluding weight, are referred to one of the two pyranometers composing the albedometer.

ORDERING CODES:

LPPYRA11: Albedometer made up of two Secondary Standard Pyranometers, according to ISO 9060. Complete with: top shade disk and bottom shade disk, drying cartridge with silicagel crystals, 2 silica gel cartridges, levelling device, $\varnothing$ 16x500 rod for attachment to a mast, M12 8-pole connector and ISO 9001 Calibration Report. Typical sensitivity 6 to 11 $\mu\text{V}/(\text{W}/\text{m}^2)$. The connection cable CPM12AA8... has to be ordered separately.

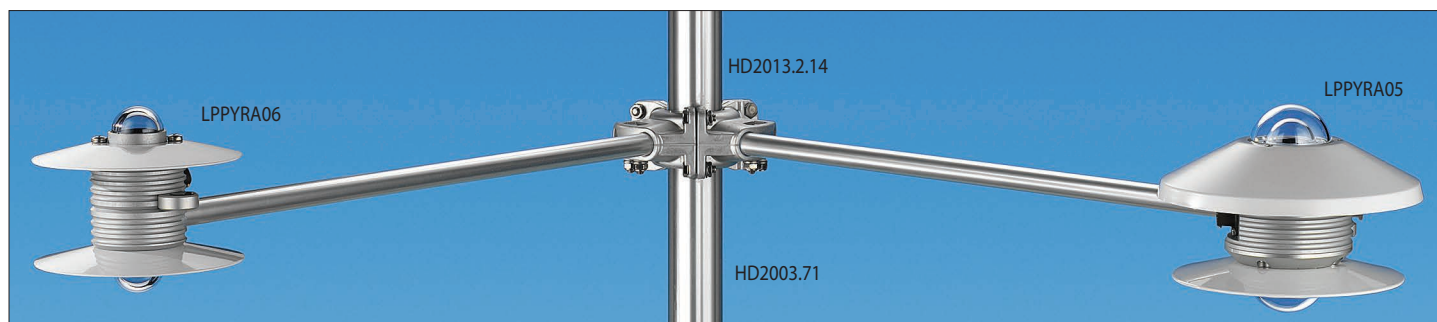
LPPYRA05: Albedometer made up of two First Class Pyranometers, according to ISO 9060. Complete with: top shade disk and bottom shade disk, drying cartridge with silicagel crystals, 2 silica gel cartridges, levelling device, $\varnothing$ 16x500 rod for attachment to a mast, M12 8-pole connector and ISO 9001 Calibration Report. Typical sensitivity 6 to 12 $\mu\text{V}/(\text{W}/\text{m}^2)$. The connection cable CPM12AA8... has to be ordered separately.

LPPYRA06: Albedometer made up of two Second Class Pyranometers, according to ISO 9060. Complete with: top shade disk and bottom shade disk, levelling device, $\varnothing$ 16x500 rod for attachment to a mast, M12 8-pole connector and ISO 9001 Calibration Report. Typical sensitivity 5 to 15 $\mu\text{V}/(\text{W}/\text{m}^2)$. The connection cable CPM12AA8... has to be ordered separately.



LPPYRA06

For connecting cables and mounting accessories see page 21



HD2013.2.14 + LPPYRA05 + LPPYRA06

Accessories for Pyranometers

Connecting Cables

CPM12AA4.2: 4-pole UV resistant cable. Length 2m. 4-pole M12 connector on one end, open wires on the other side

CPM12AA4.5: 4-pole UV resistant cable. Length 5m. 4-pole M12 connector on one end, open wires on the other side

CPM12AA4.10: 4-pole UV resistant cable. Length 10m. 4-pole M12 connector on one end, open wires on the other side

CPM12AA8.2: 8-pole UV resistant cable. Length 2m. 8-pole M12 connector on one end, open wires on the other side For LPPYRA11 - LPPYRA05 - LPPYRA06.

CPM12AA8.5: 8-pole UV resistant cable. Length 5m. 8-pole M12 connector on one end, open wires on the other side For LPPYRA11 - LPPYRA05 - LPPYRA06.

CPM12AA8.10: 8-pole UV resistant cable. Length 10m. 8-pole M12 connector on one end, open wires on the other side For LPPYRA11 - LPPYRA05 - LPPYRA06.

CPM12-8D.2: 8-pole cable. Length 2m. 8-pole M12 connector on one end, open wires on the other side (**only for LPPYRA...S and S12**)

CPM12-8D.5: 8-pole cable. Length 5m. 8-pole M12 connector on one end, open wires on the other side (**only for LPPYRA...S and S12**)

CPM12-8D.10: 8-pole cable. Length 10m. 8-pole M12 connector on one end, open wires on the other side (**only for LPPYRA...S and S12**).

Other lengths available on request

CP24: PC connecting cable for the RS485 MODBUS parameters configuration of the LPPYRA...S pyranometers. With built-in RS485/USB converter. 8-pole M12 connector on instrument side and A-type USB connector on PC side.

Spare parts

LPSP1: UV resistant shade disk for pyranometers LPPYRA02, LPPYRA05 (top pyranometer), LPPYRA10, LPPYRA11 (top pyranometer), LPPYRA12.

LPSP2: Shade disk for pyranometers LPPYRA03, LPPYRA 06.

LPSP3: Bottom shade disk for albedometer LPPYRA05 (downward pyranometer).

LPSG: Drying cartridge with silicagel crystals, complete with O-ring.

LPG: Pack of 5 cartridges of silicagel.

Mounting accessories

LPSP4: Flange for fixing the pyranometers on a flat surface.

LPS1: Only attachment bracket for pyranometers of the LPPYRA02 and LPPYRA10 series, suitable for mast with diameter 40 ± 50 mm. Installation on horizontal or vertical mast, including fasteners and screws.

LPS2: Base to fix with Ø 16 x 500 mm mast to install the LPPYRA03 pyranometer. It easily allows to fix and set, in combination with the HD2013.2.14 flange, the pyranometer LPPYRA03.

LPS3: Only attachment bracket for LPPYRA03 serie, suitable for mast with Ø 40 ± 50 mm. Installation on horizontal or vertical mast.

LPS6: Kit for the installation of LPPYRA10, LPPYRA02 and LPPYRA03 pyranometers. The kit includes: 750 mm mast (HD2003.83.1), base fitting (LPS6.04), graduated support plate (LPS6.01), bracket for pyranometers (LPS6.03). On request, HD9007T29.1 bracket for HD9007 or HD32MTT.03.C

LPRING02: Base with levelling device and adjustable holder for mounting the LPPYRA02 and LPPYRA10 series pyranometers in an inclined position. (Specify upon ordering on which pyranometer model has to be mounted)

LPRING04: Adjustable holder for mounting the LPPYRA10, LPPYRA02, LPPYRA03 series pyranometers in an inclined position on Ø 40 mm mast with internal thread.

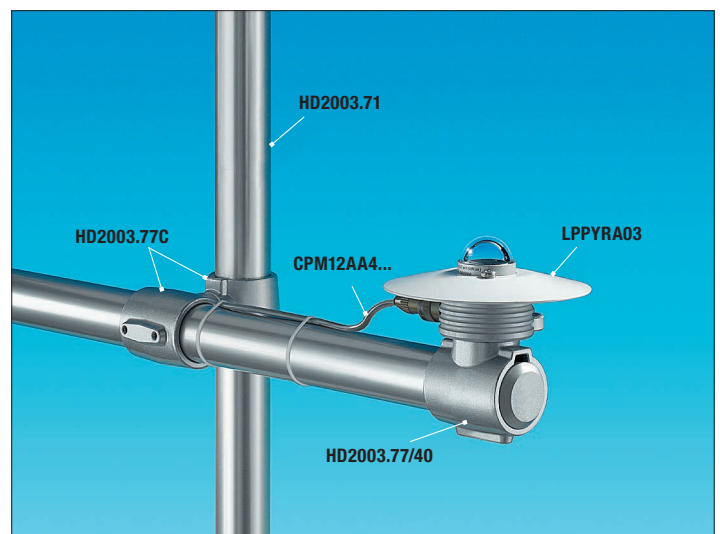
LPRING12: Ring base for measuring the diffused radiation, for LPPYRA02 and LPPYRA10 pyranometers.

LPRING13: Ring base for measuring the diffused radiation, for LPPYRA03 pyranometer.

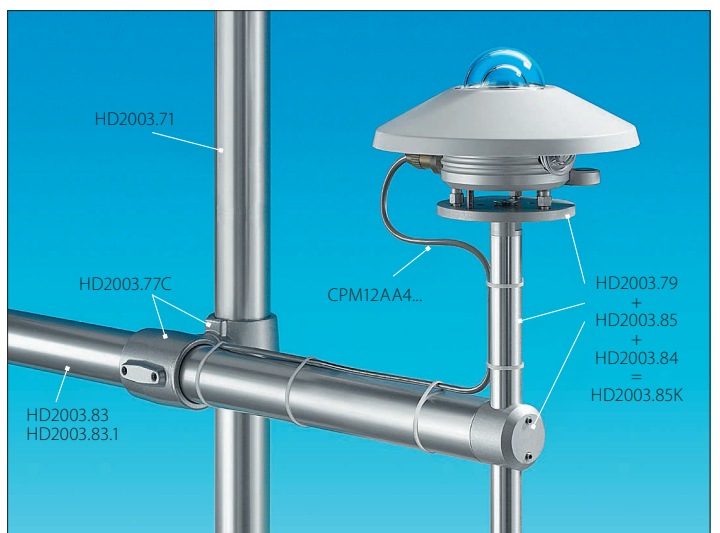
HD2003.85K: Mounting kit with adjustable height for the installation of the pyranometer on pole with diameter Ø 40 mm (HD2003.84 + HD2003.85 + HD2003.79). Not suitable for LPPYRA03 series.

HD2003.79K: Kit to mount pyranometers on clamping Ø 40 mm (HD2003.77/40, HD2003.79). To install the LPPYRA10, LPPYRA02 and LPPYRA03 pyranometers on the transverse mast.

HD2003.77/40: Clamping for mast Ø 40mm.



Example of mounting



Example of mounting

Configurable signal converter

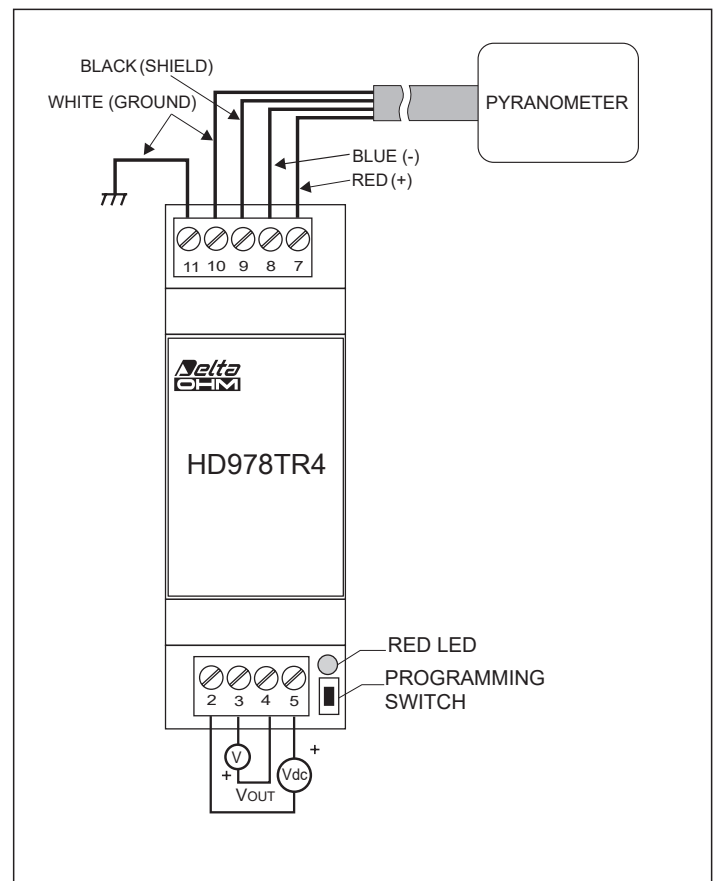
HD978TR3: Configurable signal converter amplifier with 4÷20mA (20÷4mA) output. Input range -10...+60mVdc. Standard configuration 0÷20mVdc. Minimum measuring range 2mVdc. For DIN rail 35mm. Configurable with HD778 TCAL.

HD978TR5: Configurable signal converter amplifier with 4÷20mA (20÷4mA) output. Input range -10...+60mVdc. Standard configuration 0÷20mVdc. Minimum measuring range 2mVdc. Configurable with HD778 TCAL. Container for WallMount installation.

HD978TR4: Configurable signal converter amplifier with 0÷10Vdc (10÷0Vdc) output. Input range -10...+60mVdc. Standard configuration 0÷20mVdc. Minimum measuring range 2mVdc. For DIN rail 35mm. Configurable with HD778 TCAL.

HD978TR6: Configurable signal converter amplifier with 0÷10Vdc (10÷0Vdc) output. Input range -10...+60mVdc. Standard configuration 0÷20mVdc. Minimum measuring range 2mVdc. Configurable with HD778 TCAL. Container for Wall Mount installation.

HD778TCAL: Voltage generator in the range -60mVdc...+60mVdc, controlled by PC through the RS232C serial port, DELTALOG-7 software for setting K, J, T, N thermocouple transmitters and HD 978TR3, HD 978TR4 converters.



Connection diagram of the HD978TR3 to a pyranometer.

Connection diagram of the HD978TR4 to pyranometer.

