

Pyranometers LP PYRA 02 and LP PYRA 03 are well suited for the measurement of incoming global solar radiation (0.3µm...3µm spectral range). LP PYRA 12 shadow ring is designed to shield the instrument sensor from direct radiation; by that, an exact measurement of the diffuse sky radiation is possible.

LP PYRA 0x with direct, unamplified output, no external power supply required

LP PYRA 0x AC with 4..20 mA current output- 2-wire connection, requires external power supply

LP PYRA 0x AV with 0..1Vdc, 0..5Vdc or 0..10 Vdc voltage output, requires external power supply

LP PYRA 0x S with serial RS485 and MODBUS-RTU protocol, requires external power supply

The pyranometers with unamplified output have a typical sensitivity of:

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

Every pyranometer is calibrated separately and is supplied standard with a WRR (World Radiometric Reference) Report of Calibration.

Technical Specification	LP PYRA 02 / LP PYRA 12	LP PYRA 03
Typical sensitivity	10 µV/(W/m ²)	
Impedance	33 Ω ÷ 45 Ω	
Measuring range	0 ÷ 2000 W/m ²	
Viewing field	2π sr	
Spectral field	305 nm ÷ 2800 nm	
Operating temperature	-40 °C ÷ 80 °C	
Weight	0.90 Kg	0.45 Kg
ISO 9060 Specifications		
Response time 95%	< 28 sec	< 30sec
Zero Off-set		
a) Response to thermal radiation (200Wm ⁻²)	15 W/m ²	25 W/m ²
b) Response to temperature change 5K/h	<± 4IW/m ²	<± 6IW/m ²
3a) Non stability over 1 year	<± 1.51%	<± 2.51%
3b) Non linearity	<± 11%	<± 21%
3c) Cosine response	<±18IW/m ²	<±22IW/m ²
3d) Spectral selectivity	<±51%	<±71%
3e) Response with regard to temperature	< 4 %	< 8 %
3f) Tilt response	<± 21%	<± 41%
Shadow ring for LP PYRA 12		
Weight	5.90 Kg	
Diameter	570 mm	
Height	54 mm	
Basis diameter	300 mm	



LP PYRA 02 - LP PYRA 03 - LP PYRA 12 PYRANOMETERS

Delta Ohm manufactures First Class **LP PYRA 02** and **LP PYRA 12** and Second Class **LP PYRA 03** pyranometers which fully comply with ISO 9060 standards, and meet the requirements defined by the World Meteorological Organization (WMO). These are strong and reliable instruments, especially designed to be used under all weather conditions. They are suitable for installation on the field.

Recommended use: atmospheric research, weather stations, climatology, energy saving research, productive efficiency test of photovoltaic plants, etc...



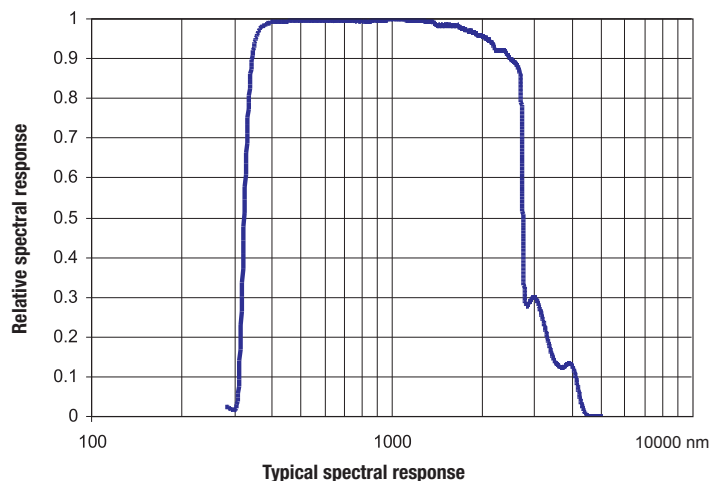
LP PYRA 02

ORDERING CODE

LP PYRA 02: First class pyranometer according to ISO 9060. Complete with: shade disk LP SP1, desiccant sachet with silica-gel crystals, 2 cartridges, spirit level, **M12** 4-pole connector and Report of Calibration. Typical sensitivity 10µV/(W/m²). **Connection cable has to be ordered separately.**

LP PYRA 02AC: First class pyranometer according to ISO 9060. Complete with shade disk LP SP 1, desiccant sachet with silica-gel crystals, 2 cartridges, spirit level, **M12** 4-pole connector and Report of Calibration. **Connection cable has to be ordered separately. Current output 4...20mA.** 4mA = 0W/m², 20mA = 2000W/m². Power supply: 10...30Vdc.

LP PYRA 02AV: First class pyranometer according to ISO 9060. Complete with shade disk LP SP 1, desiccant sachet with silica-gel crystals, 2 cartridges, spirit level, **M12** 4-pole connector and Report of Calibration. **Voltage output**



0...1Vdc, 0...5Vdc, 0...10Vdc. $0V = W/m^2$, $1/5/10Vdc = 2000W/m^2$. Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LP PYRA 02 S: First class pyranometer according to ISO 9060. Complete with shade disk LP SP 1, desiccant sachet with silica-gel crystals, 2 cartridges, spirit level, **M12** 8-pole connector and Report of Calibration. **Connection cable CPM12-8P...** with M12 connector with 2, 5 or 10m length have to be ordered separately. **Serial output RS485 MODBUS-RTU**. Power supply: 5...30Vdc.

LP S1: Mounting kit for LP PYRA 02: bracket for attachment to a mast, including fasteners and leveling screws.

LP SP1: Shade disk for LP PYRA 02

LP RING 02: Base with levelling device and adjustable holder for mounting the LP PYRA 02 pyranometers in an inclined position. Not suitable for LP PYRA02AV, LP PYRA02AC.

LP SG: Drying cartridge with silicagel crystals, complete with 0-ring.

LP G: Pack of 5 cartridges of silicagel.

LP PYRA 03: Second class pyranometer according to ISO 9060. Complete with spirit level, **M12** 4-pole connector and Report of Calibration. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable has to be ordered separately**.

LP PYRA 03AC: Second class pyranometer according to ISO 9060. Complete with spirit level, **M12** 4-pole connector and Report of Calibration. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable has to be ordered separately**. **Current output 4...20mA**. $4mA = 0W/m^2$, $20mA = 2000W/m^2$. Power supply: 10...30Vdc.

LP PYRA 03AV: Second class pyranometer according to ISO 9060. Complete with spirit level, **4-pole connector and Report of Calibration**. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable has to be ordered separately**. **Voltage output 0...1Vdc, 0...5Vdc, 0...10Vdc**. $0V = W/m^2$, $1/5/10Vdc = 2000W/m^2$. Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LP PYRA 03 S: Second class pyranometer according to ISO 9060. Complete with spirit level, **8-pole connector and Report of Calibration**. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable CPM12-8P...** with M12 connector with 2, 5 or 10m length have to be ordered separately. **Serial output RS485 MODBUS-RTU**. Power supply: 5...30Vdc.

LP RING 03: Base with levelling device and adjustable holder for mounting the LP PYRA 03 pyranometer in an inclined position.

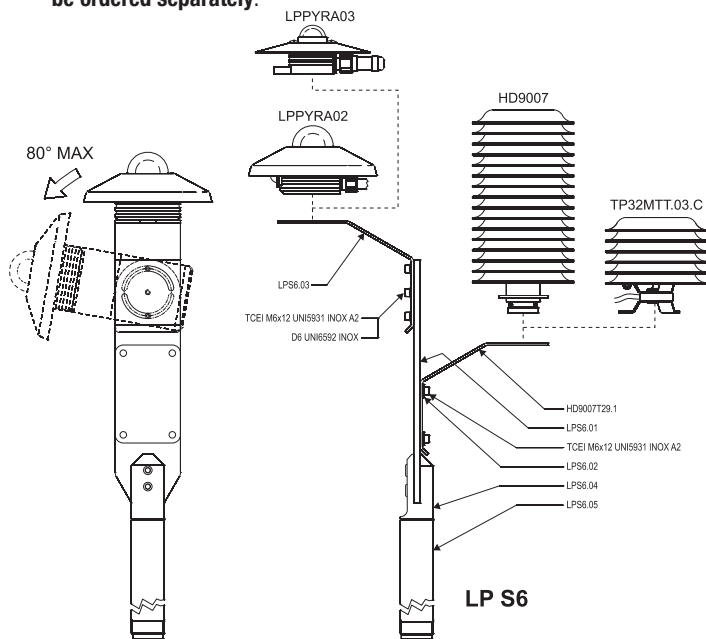
LP S2: Mounting kit: spirit level and stud for mounting LP PYRA 03 on a support which is also part of the kit. Fasteners, shade disk LP SP2 are included.

LP SP2: Shade disk.

LP S3: Attachment bracket for pyranometers LP PYRA 03, LP PYRA03AC...AV. Suitable for mast with diameter of 40÷50mm.

LP S6: Kit for the installation of LP PYRA 02 and LP PYRA 03 pyranometers. The kit includes: 1 m mast (LP S6.05), base fitting (LP S6.04), graduated support plate (LP S6.01), bracket for HD9007 or HD32MTT.03.C (HD 9007T29.1), bracket for pyranometers (LP S6.03).

LP PYRA 12: First Class Pyranometer (LP PYRA 02) according to ISO 9060. Complete with shade disk, shadow ring for diffuse radiation, drying cartridge for silicagel crystals, 2 silicagel cartridges and Report of Calibration. M12 4-pole connector. Typical sensitivity $10\mu V/(W/m^2)$. **Connecting cable has to be ordered separately**.



HD 9007.T29.1: White powder-coated anticorrosion aluminium mounting bracket. Supplied with screws for fixing to the LPS6.01 support. For the air temperature probe TP32MTT.03.C or the protection from solar radiations HD9007.

HD 9007.T29K: White powder-coated anticorrosion aluminium mounting bracket. Supplied with accessories for fixing to a $\varnothing 25...44$ mm mast. For the air temperature probe TP32MTT.03.C.

LP PYRA 12AC: First Class Pyranometer (LP PYRA 02) according to ISO 9060. Complete with shade disk, shadow ring for diffuse radiation, drying cartridge for silicagel crystals, 2 silicagel cartridges and Report of Calibration. M12 4-pole connector. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable has to be ordered separately**. **Current output 4...20mA**. $4mA = 0W/m^2$, $20mA = 2000W/m^2$. Power supply: 10...30Vdc.

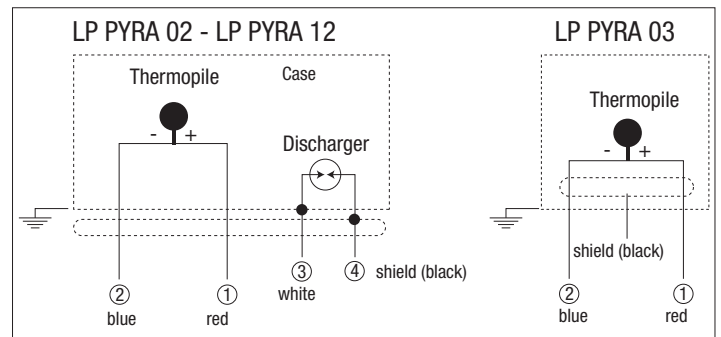
LP PYRA 12AV: First Class Pyranometer (LP PYRA 02) according to ISO 9060. Complete with shade disk, shadow ring for diffuse radiation, drying cartridge for silicagel crystals, 2 silicagel cartridges and Report of Calibration. M12 4-pole connector. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable has to be ordered separately**. **Voltage output 0...1Vdc, 0...5Vdc, 0...10Vdc**. $0V = W/m^2$, $1/5/10Vdc = 2000W/m^2$. Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LP PYRA 12 S: First Class Pyranometer (LP PYRA 02) according to ISO 9060. Complete with shade disk, shadow ring for diffuse radiation, drying cartridge for silicagel crystals, 2 silicagel cartridges and Report of Calibration. Typical sensitivity $10\mu V/(W/m^2)$. **Connection cable CPM12-8P...** with M12 connector with 2, 5 or 10m length have to be ordered separately. **Serial output RS485 MODBUS-RTU**. Power supply: 5...30Vdc.

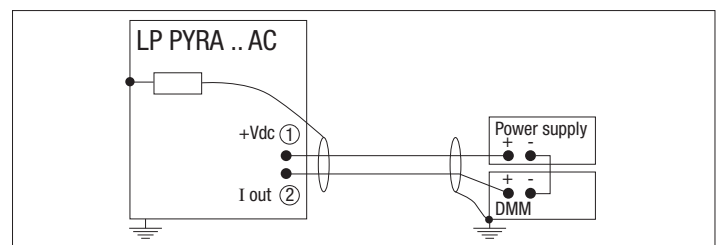
LP RING 12: Ring base for measuring the diffuse radiation, for LP PYRA 12.

LP RING 02: Base with levelling device and adjustable holder for mounting the LP PYRA 02 pyranometers in an inclined position.

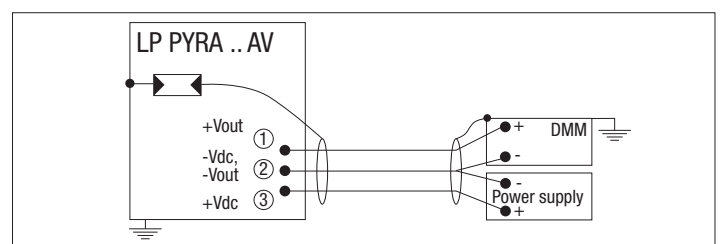
Wiring diagram LP PYRA



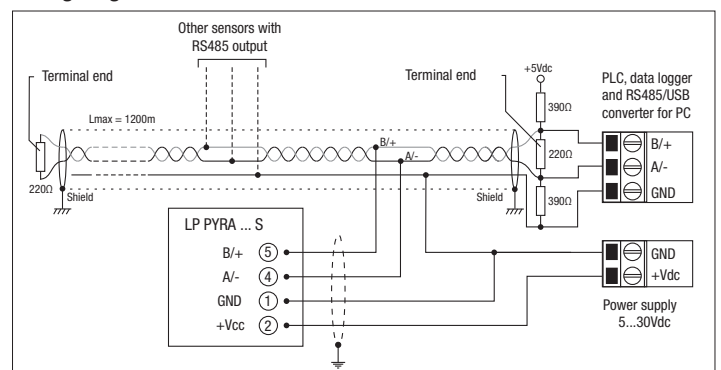
Wiring diagram LP PYRA .. AC



Wiring diagram LP PYRA .. AV



Wiring diagram LP PYRA ... S



Environmental analysis

Connection cables for LP PYRA 02... - 03...- 12...

CPM12 AA4.2: 4-pole cable. Length 2m. 4-pole M12 connector on one end, open wires on the other side

CPM12 AA4.5: 4-pole cable. Length 5m. 4-pole M12 connector on one end, open wires on the other side

CPM12 AA4.10: 4-pole cable. Length 10m. 4-pole M12 connector on one end, open wires on the other side

CPM12-8P.2: 8-pole cable. Length 2m. 8-pole M12 connector on one end, open wires on the other side (only for LP PYRA...S)

CPM12-8P.5: 8-pole cable. Length 5m. 8-pole M12 connector on one end, open wires on the other side (only for LP PYRA...S)

CPM12-8P.10: 8-pole cable. Length 10m. 8-pole M12 connector on one end, open wires on the other side (only for LP PYRA...S)

CP 24: PC connecting cable for the RS485 MODBUS-RTU parameters configuration of the LP PYRA...S pyranometers. With built-in RS485/USB converter. 8-pole M12 connector on instrument side and A-type USB connector on PC side. Supplied with a CD-ROM including the USB drivers and a software for the Modbus connection to PC.

HD978TR3: Configurable signal converter amplifier with 4÷20mA (20÷4mA) output. Input measuring range -10...+60mV. Default setting 0÷20mV. Minimum measuring range 2mV.

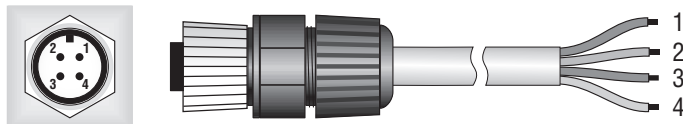
HD978TR4: Configurable signal converter amplifier with 0÷10 (10÷0Vdc) output. Input measuring range -10...+60mV. Default setting 0÷20mV. Minimum measuring range 2mV.

HD978TR5: Wall configurable, signal converter amplifier with 4÷20mA (20÷4mA) output. Input measuring range -10...+60mV. Default settings 0÷20mV. Minimum measuring range 2mV.

HD978TR6: Wall configurable, signal converter amplifier with 0÷10 (10÷0Vdc) output. Input measuring range -10...+60mV. Default settings 0÷20mV. Minimum measuring range 2mV.

HD 778 TCAL: Voltage generator in the range -60mVdc...+60mVdc, controlled by PC through the RS232C serial port, **DELTA LOG-7** software for setting of HD 978TR3, HD 978TR4, HD978TR5, HD978TR6 converters.

WIRING DIAGRAM LP PYRA 02 - LP PYRA 03 - LP PYRA 12



Fixed 4-pole plug M12

Flying 4-pole M12 connector

LP PYRA 02 - LP PYRA 03 - LP PYRA 12

Connector	Function	Color
1	Positive signal (+)	Red
2	Negative signal (-)	Blue
3	Not connected (LP PYRA 03) Container (LP PYRA 02 - LP PYRA 12)	White
4	Shield (≡)	Black

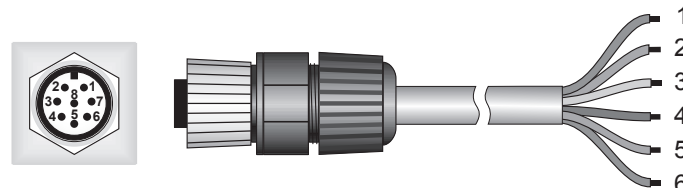
LP PYRA 02AC - LP PYRA 03AC - LP PYRA 12AC

Connector	Function	Color
1	Positive signal (+)	Red
2	Negative signal (-), -Vdc	Blue
3	Not connected (LP PYRA 03) Container (LP PYRA 02 - LP PYRA 12)	White
4	Shield (≡)	Black

LP PYRA 02AV - LP PYRA 03AV - LP PYRA 12AV

Connector	Function	Color
1	(+) Vout	Red
2	(-) Vout e (-) Vcc	Blue
3	(+) Vcc	White
4	Shield (≡)	Black

WIRING DIAGRAM LP PYRA 02 S - LP PYRA 03 S - LP PYRA 12 S



Fixed 8-pole plug M12

Flying 8-pole M12

LP PYRA 02 S - LP PYRA 03 S - LP PYRA 12 S

Connector	Function	Color
1	Positive power supply (-Vdc)	Black
2	Positive power supply (+Vdc)	Red
4	RS485 A/-	Brown
5	RS485 B/+	White
6	Not connected	Blue
8	Not connected	Green



LP PYRA 02 + HD 9008TRR



LP RING 02

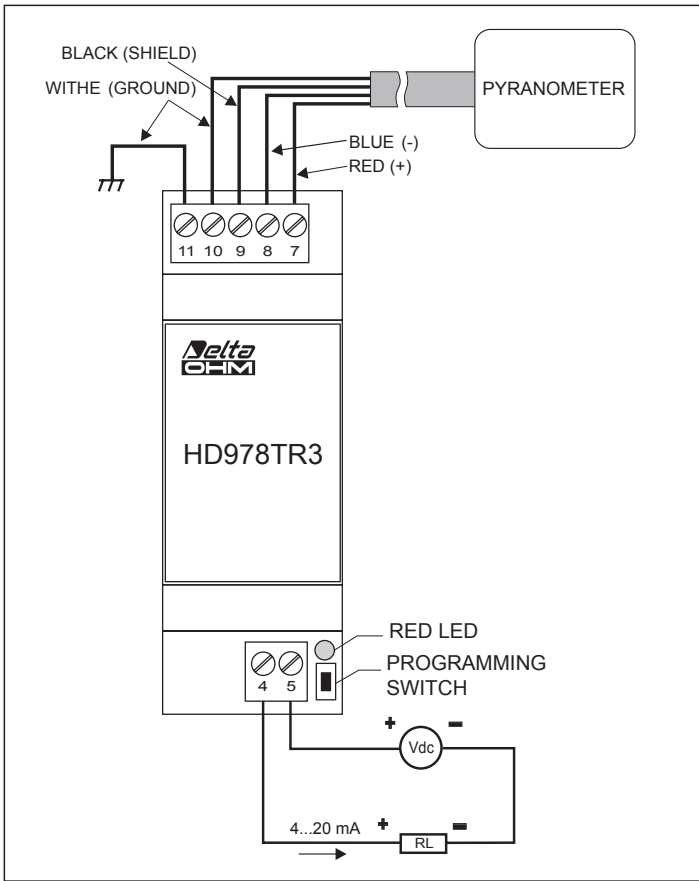


Fig.5 Connection diagram of the HD978TR3 to a pyranometer.

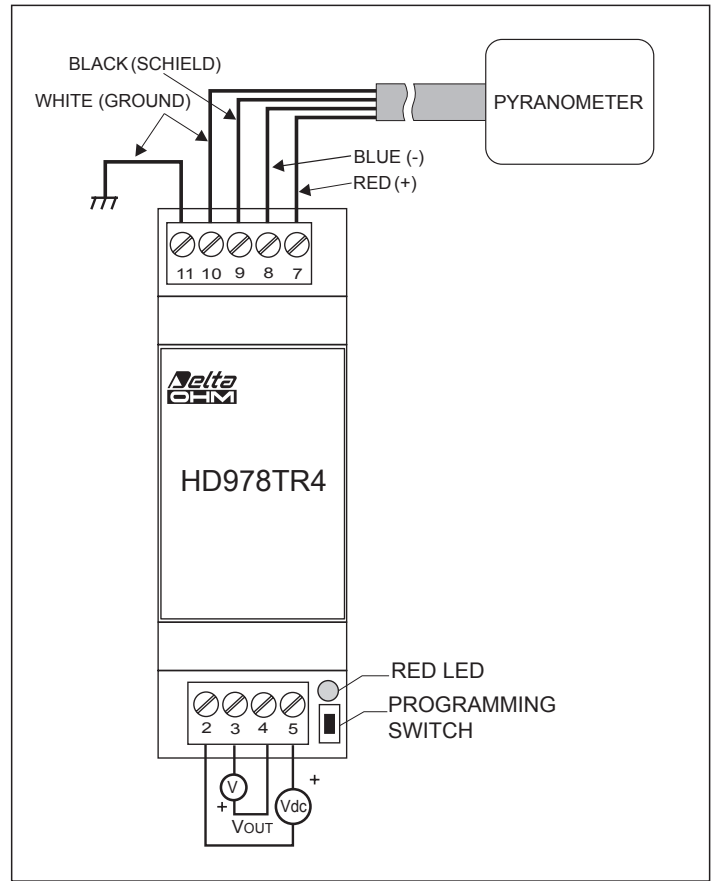
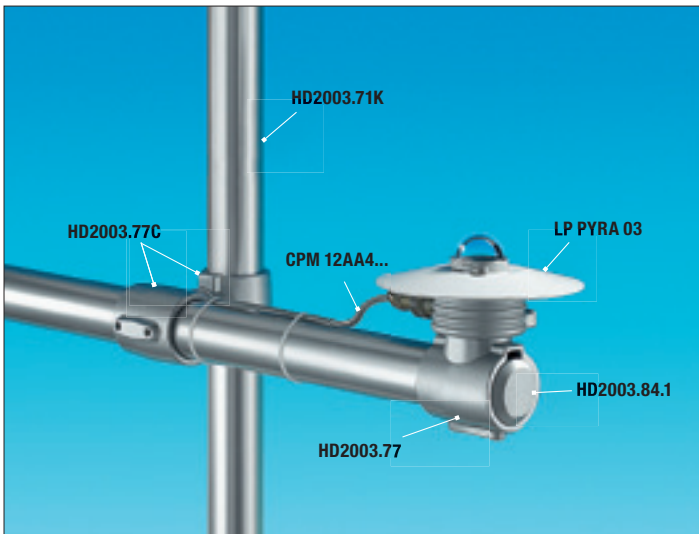


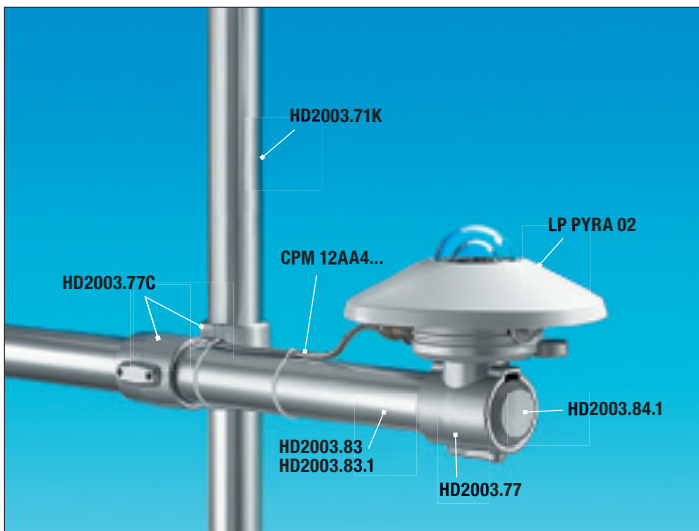
Fig.6 Connection diagram of the HD978TR4 to pyranometer.



LP PYRA 03 + HD2003.77 + HD2003.77C



HD978TR3, HD978TR4, HD978TR5, HD978TR6



LP PYRA 02 + HD2003.77C + HD2003.77



LP PYRA 02 + HD2003.85K + HD2003.77C