

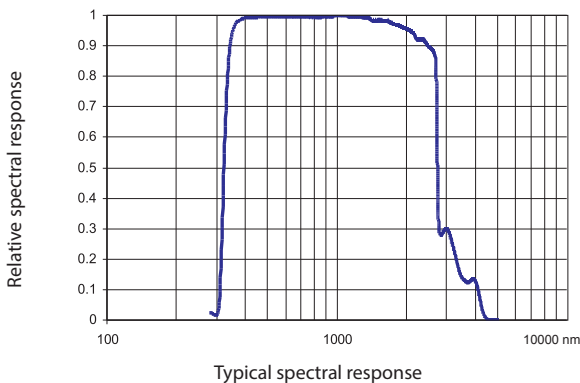
LPPYRA02, LPPYRA03, LPPYRA12



LPPYRA02 - LPPYRA03 - LPPYRA12 FIRST CLASS AND SECOND CLASS PYRANOMETERS

Delta OHM manufactures First Class LPPYRA02 and LPPYRA12 and Second Class LPPYRA03 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...



Pyranometers LPPYRA02 and LPPYRA03 are well suited for the measurement of incoming global solar radiation (GHI - Global Horizontal Irradiance). LPPYRA12 (pyranometer with shadow ring) is designed to shield the instrument sensor from direct radiation; by that, an exact measurement of the diffuse sky radiation is possible (DHI - Diffuse Horizontal Irradiance).

- LPPYRAxx with direct, unamplified output, no external power supply required
- LPPYRAxxAC with 4..20 mA current output- 2-wire connection, requires external power supply
- LPPYRAxxAV with 0..1Vdc, 0..5Vdc or 0..10 Vdc voltage output, requires external power supply
- LPPYRAxxS with serial RS485 and MODBUS-RTU protocol, requires external power supply
- LPPYRAxxS12 with digital SDI-12 output, requires external power supply

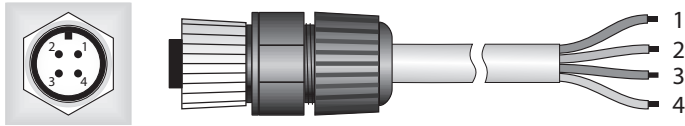
The pyranometers with unamplified output have a typical sensitivity of:

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

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

Technical Specifications	LPPYRA02 / LPPYRA12	LPPYRA03
Typical sensitivity	6 to 12 $\mu\text{V}/(\text{W}/\text{m}^2)$	5 to 15 $\mu\text{V}/(\text{W}/\text{m}^2)$
Impedance	$33 \Omega \div 45 \Omega$	$33 \Omega \div 45 \Omega$
Measuring range	$0 \div 2000 \text{ W}/\text{m}^2$	$0 \div 2000 \text{ W}/\text{m}^2$
Viewing field	$2\pi \text{ sr}$	$2\pi \text{ sr}$
Spectral range (50%)	283 nm \div 2800 nm	300 nm \div 2800 nm
Operating and storage temperature range	$-40^\circ\text{C} \div 80^\circ\text{C}$	$-40^\circ\text{C} \div 80^\circ\text{C}$
Weight	0.90 kg	0.45 kg
ISO 9060 Specifications		
Response time 95%	< 28 s	< 30 s
Zero Off-set		
Zero Off-set	a) Response to thermal radiation ($200\text{W}/\text{m}^2$)	15 W/m^2
	b) Response to temperature change 5K/h	< $ \pm 4 \text{ W}/\text{m}^2$
Non stability over 1 year	< $ \pm 1.5 \%$	< $ \pm 2.5 \%$
Non-linearity	< $ \pm 1 \%$	< $ \pm 2 \%$
Cosine response	< $ \pm 18 \text{ W}/\text{m}^2$	< $ \pm 22 \text{ W}/\text{m}^2$
Spectral selectivity	< $ \pm 5 \%$	< $ \pm 7 \%$
Temperature response (-10°C to $+40^\circ\text{C}$)	< 4 %	< 8 %
Tilt response	< $ \pm 2 \%$	< $ \pm 4 \%$
Humidity Range	0 to 100%	0 to 100%
MTBF	> 10 years	> 10 years
Accuracy of bubble level	< 0.1°	< 0.2°
Ingress Protection (IP) rating	67	67
Shadow ring for LPPYRA12		
Weight	5.90 kg	
Diameter	570 mm	
Height	54 mm	
Basis diameter	300 mm	

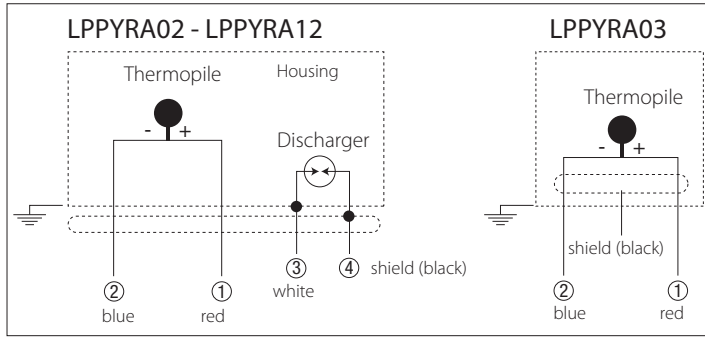
CONNECTION SCHEME FOR 4-PIN CONNECTOR



Fixed 4-pole M12 plug Female 4-pole M12 connector

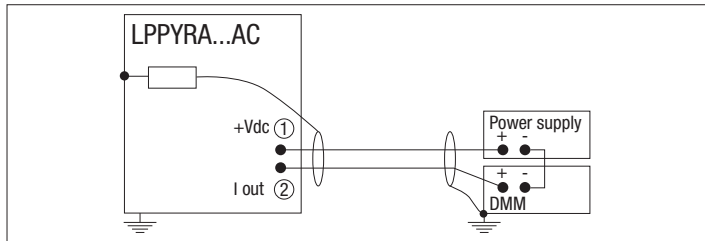
LPPYRA02 - LPPYRA03 - LPPYRA12

Connector	Function	Color
1	Output positive (+Vout)	Red
2	Output negative (-Vout)	Blue
3	Housing	White
4	Cable shield	Black



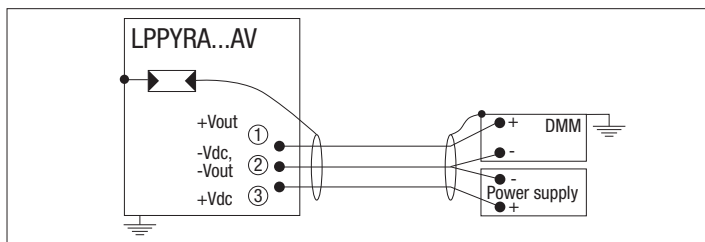
LPPYRA02AC - LPPYRA03AC - LPPYRA12AC

Connector	Function	Color
1	Positive (Current in)	Red
2	Negative (Current out)	Blue
3	Housing	White
4	Cable shield	Black

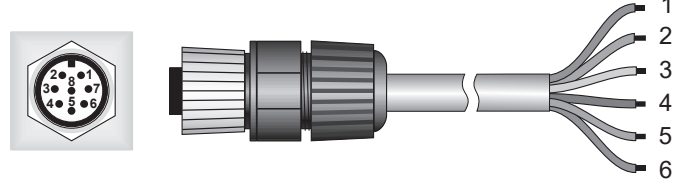


LPPYRA02AV - LPPYRA03AV - LPPYRA12AV

Connector	Function	Color
1	Output positive (+Vout)	Red
2	Output negative (-Vout) Power supply negative (GND)	Blue
3	Power supply positive (+Vdc)	White
4	Cable shield	Black



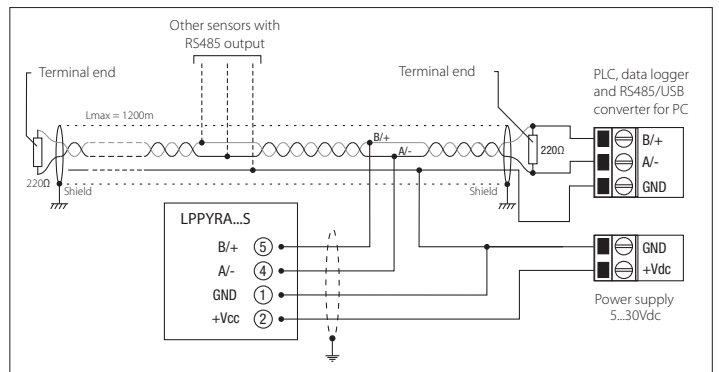
CONNECTION SCHEME FOR 8-PIN CONNECTOR



Fixed 8-pole M12 plug Female 8-pole M12 connector

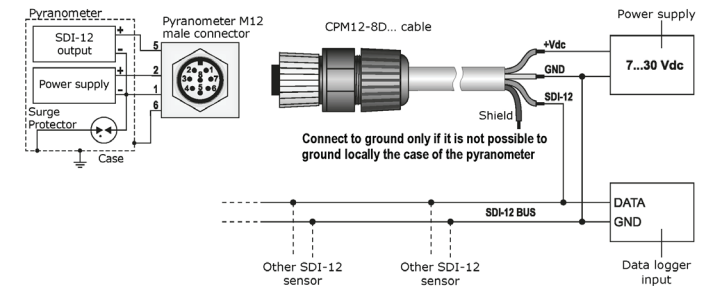
LPPYRA02S - LPPYRA03S - LPPYRA12S

Connector	Function	Color
1	Power supply negative (GND)	Blue
2	Power supply positive (+Vdc)	Red
3	Not connected	
4	RS485 A/-	Brown
5	RS485 B/+	White
6	Housing	Shield (Black)
7	Not connected	
8	Not connected	



LPPYRA02S12 - LPPYRA03S12 - LPPYRA12S12

Connector	Function	Color
1	Power supply negative (GND) SDI-12 output negative	Blue
2	Power supply positive (+Vdc)	Red
3	Not connected	
4	Not connected	
5	SDI-12 output positive	White
6	Housing	Shield (Black)
7	Not connected	
8	Not connected	



ORDERING CODES:

LPPYRA02: First Class Pyranometer according to ISO 9060. Supplied with shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and ISO 9001 Calibration Report. The connection cable CPM12AA4... has to be ordered separately. Typical sensitivity 6 to 12 $\mu\text{V}/(\text{W}/\text{m}^2)$.

LPPYRA02AC: First Class Pyranometer according to ISO 9060. Supplied with shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and ISO 9001 Calibration Report. The connection cable CPM12AA4... has to be ordered separately. Current output 4...20mA. 4mA = 0W/m², 20mA = 2000W/m². Power supply: 10...30Vdc.

LPPYRA02AV: First Class Pyranometer according to ISO 9060. Supplied with shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and ISO 9001 Calibration Report. The connection cable CPM12AA4... has to be ordered separately. Voltage output 0...1Vdc, 0...5Vdc, 0...10Vdc. 0V = 0W/m², 1/5/10Vdc = 2000W/m². Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LPPYRA02S: First Class Pyranometer according to ISO 9060. Supplied with shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and ISO 9001 Calibration Report. The connection cable CPM12-8D... has to be ordered separately. Serial output RS485 MODBUS-RTU. Power supply: 5...30Vdc.

LPPYRA02S12: First Class Pyranometer according to ISO 9060. Supplied with shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and ISO 9001 Calibration Report. The connection cable CPM12-8D... has to be ordered separately. SDI-12 output. Power supply 7...30 Vdc.

LPPYRA03: Second Class Pyranometer according to ISO 9060. Complete with levelling device, connector and ISO 9001 Calibration Report. Typical sensitivity 5 to 15 $\mu\text{V}/(\text{W}/\text{m}^2)$. The connection cable CPM12AA4... has to be ordered separately.

LPPYRA03AC: Second Class Pyranometer according to ISO 9060. Complete with levelling device, connector and ISO 9001 Calibration Report. The shade disk and the connection cable CPM12AA4... have to be ordered separately. Current output 4...20mA. 4mA = 0W/m², 20mA = 2000W/m². Power supply: 10...30Vdc.

LPPYRA03AV: Second Class Pyranometer according to ISO 9060. Complete with levelling device, connector and ISO 9001 Calibration Report. The shade disk and the connection cable CPM12AA4... have to be ordered separately. Voltage output 0...1Vdc, 0...5Vdc, 0...10Vdc. 0V = 0W/m², 1/5/10Vdc = 2000W/m². Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LPPYRA03S: Second Class Pyranometer according to ISO 9060. Complete with levelling device, connector and ISO 9001 Calibration Report. The shade disk and the connection cable CPM12-8D... have to be ordered separately. Serial output RS485 MODBUS-RTU. Power supply: 5...30Vdc.

LPPYRA03S12: Second Class Pyranometer according to ISO 9060. Complete with levelling device, connector and ISO 9001 Calibration Report. SDI-12 output. Power supply 7...30 Vdc. The shade disk and the connection cable CPM12-8D... have to be ordered separately.

LPPYRA12: First Class pyranometer according to ISO 9060, with shadow ring for measuring the diffuse radiation only. Equipped with protection, silica-gel crystals cartridge, 2 recharges, levelling device, connector and ISO 9001 Calibration Report. The cable CPM12AA4... has to be ordered separately. Typical sensitivity 6 to 12 $\mu\text{V}/(\text{W}/\text{m}^2)$.

LPPYRA12AC: First Class pyranometer according to ISO 9060, with shadow ring for measuring the diffuse radiation only. Equipped with protection, silica-gel crystals cartridge, 2 recharges, levelling device, connector and ISO 9001 Calibration Report. The cable CPM12AA4... has to be ordered separately. Current output 4...20mA. 4mA = 0W/m², 20mA = 2000W/m². Power supply: 10...30Vdc.

LPPYRA12AV: First Class pyranometer according to ISO 9060, with shadow ring for measuring the diffuse radiation only. Equipped with protection, silica-gel crystals cartridge, 2 recharges, levelling device, connector and ISO 9001 Calibration Report. The cable CPM12AA4... has to be ordered separately. Voltage output 0...1Vdc, 0...5Vdc, 0...10Vdc. 0V = 0W/m², 1/5/10Vdc = 2000W/m². Power supply: 10...30Vdc (15...30Vdc for models with output 0...10Vdc).

LPPYRA12S: First Class pyranometer according to ISO 9060, with shadow ring for measuring the diffuse radiation only. Equipped with protection, silica-gel crystals cartridge, 2 recharges, levelling device, connector and ISO 9001 Calibration Report. The cable CPM12-8D... has to be ordered separately. Serial output RS485 MODBUS-RTU. Power supply: 5...30Vdc.

LPPYRA12S12: First Class pyranometer according to ISO 9060, with shadow ring for measuring the diffuse radiation only. Equipped with protection, silica-gel crystals cartridge, 2 recharges, levelling device, connector and ISO 9001 Calibration Report. The cable CPM12-8D... has to be ordered separately. SDI-12 output. Power supply 7...30 Vdc.

For connecting cables and mounting accessories see page 21



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).

LPSPG: 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.

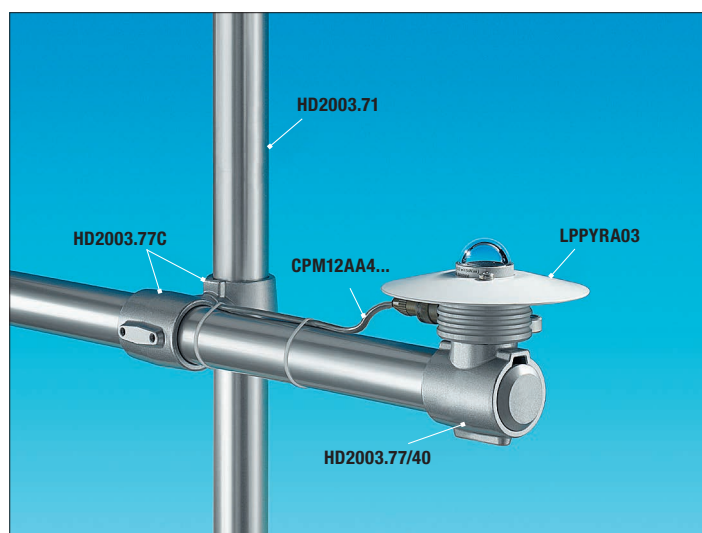
LPRING12: Ring base for measuring the diffused radiation, for LPPYRA02 and LPPYRA10 pyranometers.

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

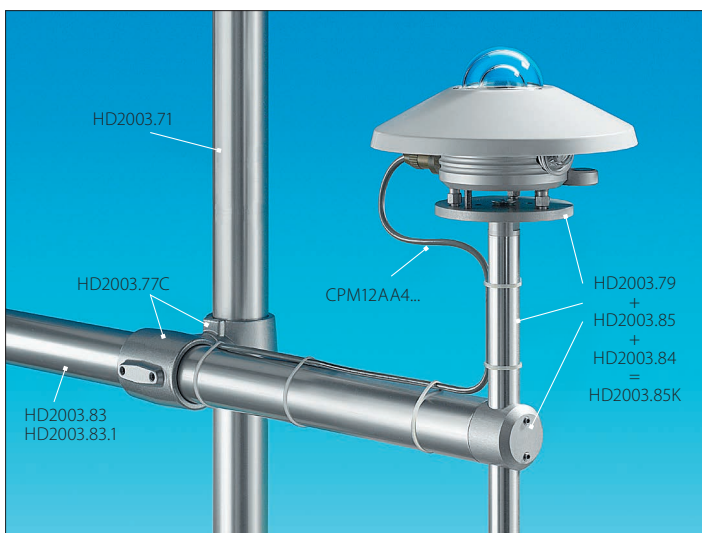
HD2003.85K: Mounting kit with adjustable height for the installation of the pyranometer on pole with diameter Ø 40 mm (HD2003.84 + HD2003.85 + HD2003.79). Not suitable for LPPYRA03 series.

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

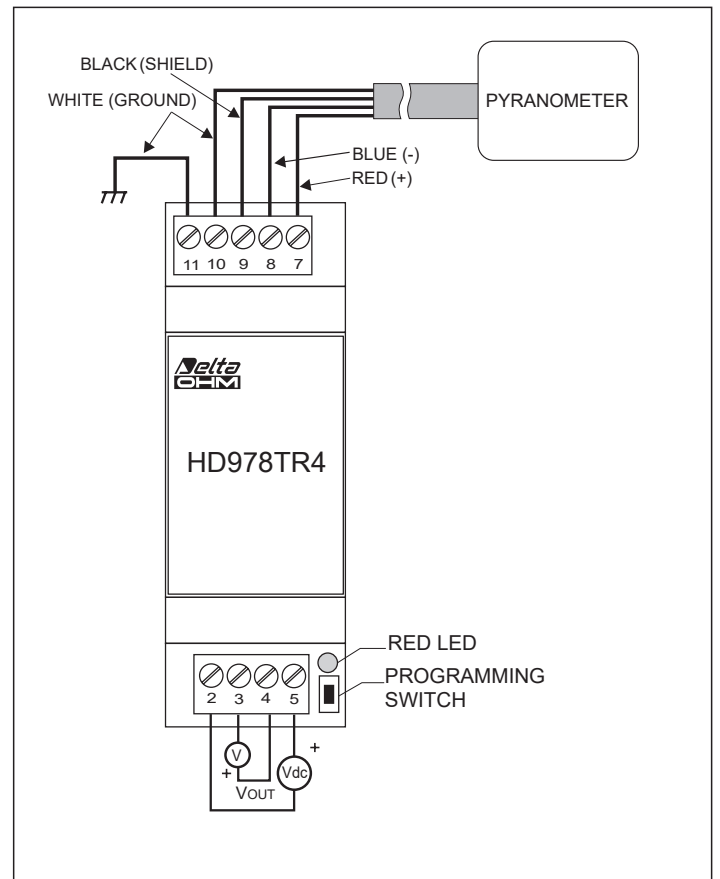
HD978TR3: Configurable signal converter amplifier with 4÷20mA (20÷4mA) output. Input range -10 ..+60mVdc. Standard configuration 0÷20mVdc. Minimum measuring range 2mVdc. For DIN rail 35mm. Configurable with HD778 TCAL.

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 HD978TR4 to pyranometer.

Connection diagram of the HD978TR3 to a pyranometer.

