

LP PHOT 03, LP RAD 03, LP PAR 03, LP UVA 03, LP UVB 03, LP PHOT 03S



LP PHOT 03 - LP RAD 03 - LP PAR 03 - LP UVA 03 - LP UVB 03 - LP PHOT 03S
PHOTOMETRIC AND RADIOMETRIC PROBES WITH OUTPUT SIGNAL IN mV
OR NORMALIZED 4...20mA OR 0...10Vdc OR RS485 MODBUS-RTU OUTPUT

Photo-radiometric probes with output signal in mV or standard output 4...20mA or 0...10Vdc. The probes of the series LP...03 **for outdoor use** allow to measure photometric and radiometric quantities such as: illuminance (lux), irradiance (W/m²) in the near ultraviolet spectral region VIS-NIR, UVA, UVB, and the photon flow across the PAR region (400nm...700nm). The probes with mV output do not require any power supply. The output signal is obtained from a resistance that short-circuits the terminal of the photodiode. The ratio of generated photocurrent to incident light power is converted into a Difference of Potential that can be read by a voltmeter. Once the DDP (Difference of Potential) is known, the measured value can be calculated through the calibration factor. **All probes are individually calibrated and the calibration factor is also shown on the probe housing.** The probes with normalized output current 4...20mA or voltage 0...10Vdc or RS485 MODBUS RTU output require external power supply. The probe LP UVB 03 is available only with standard output voltage 0...5Vdc and requires external power supply. All probes of the series LP...03 are equipped with diffuser for cosine correction and protection dome. **M12 male 4-pole connector (M12 8-pole connector for the LP UVB 03).** Cables with female connectors and with 2, 5 or 10m length available on request.

LP PHOT 03

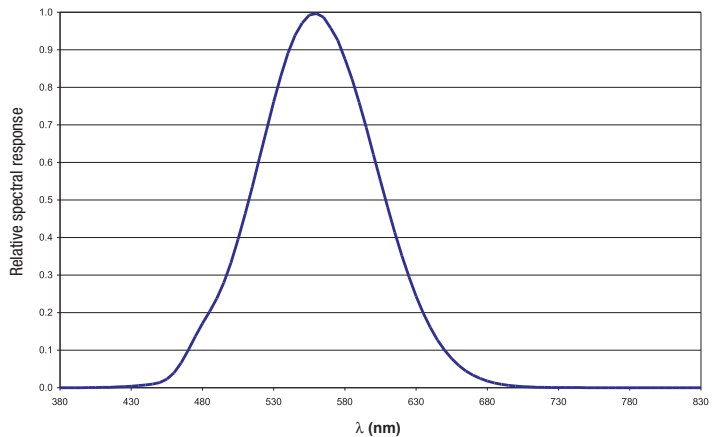
The probe LP PHOT 03 measures illuminance (lux), defined as the ratio between the luminous flux (lumen) passing through a surface and the surface area (m²). The spectral response curve of a photometric probe is similar to the human eye curve, known as standard photopic curve V(λ). The difference in spectral response between LP PHOT 03 and the standard photopic curve V(λ) is calculated by means of the error f₁. Calibration is carried out by comparison with a reference luxmeter, calibrated by a Primary Metrological Laboratory. The Calibration Procedure complies with the CEI publication No.69 "Methods of characterizing illuminance meters and luminance meters: Performance characteristics and specifications, 1987". The photometric measurement probe is designed **for outdoor readings**. CIE photopic filter. Output, according to the chosen configuration, in mV or 4...20mA or 0...10Vdc normalized output or RS485 MODBUS-RTU output.

TECHNICAL SPECIFICATIONS:

Typical sensitivity:	0.5...1.5 mV/(klux)
Spectral range:	V(λ)
Calibration uncertainty:	< 4%
f ₁ (agreement with the standard curve V(λ)):	<6%
f ₂ (Cosine response)	<3%
f ₃ (linearity)	<1%
Operating temperature:	-20°C...+60°C
Impedance:	0.5...1.0 kΩ non-normalized version
Version with normalized output 4...20mA:	4mA = 0 klux, 20mA = 150 klux
Version with normalized output 0...10Vdc	0V = 0 klux, 10V = 150klux
Version with RS485 MODBUS-RTU output:	0...150klux

Power supply:	10...30Vdc for version with normalized output 4...20mA
	15...30Vdc for version with normalized output 0...10Vdc
	5...30Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve of **LP PHOT 03:**

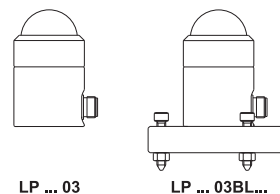


ORDERING CODE

LP PHOT 03: Photometric probe for the measurement of illuminance, complete with diffuser and glass dome, silica gel cartridge, female 4-pole connector, calibration report. **Cable with female connector has to be ordered separately.** Cables: **CPM12 AA4...**(except LP PHOT03BLS) or **CPM12-8D...**(only LP PHOT03BLS) with cable length 2, 5 or 10 meters.

LP PHOT	<input type="checkbox"/>	03 = mV / klux 03BL = mV / klux output, base with levelling device 03BLAC = base with levelling device output 4...20 mA 03BLAV = base with levelling device output 0...10 V 03BLS = RS485 MODBUS-RTU output, base with levelling device
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CABLE:		
CPM12 AA4.	<input type="checkbox"/>	2 = length 2m
CPM12-8D.	<input type="checkbox"/>	5 = length 5m
		10 = length 10m



LP RAD 03

LP RAD 03 probe measures irradiance (W/m²) defined as the ratio between the radiant flux (W) passing through a surface and the surface area (m²) in the VIS-NIR (400nm- 1050nm) spectral range. The probe is designed **for outdoor readings**.

Output, according to the chosen configuration, in μV per $\mu\text{W}/\text{cm}^2$ or 4...20mA or 0...10Vdc normalized output or RS485 MODBUS-RTU output.

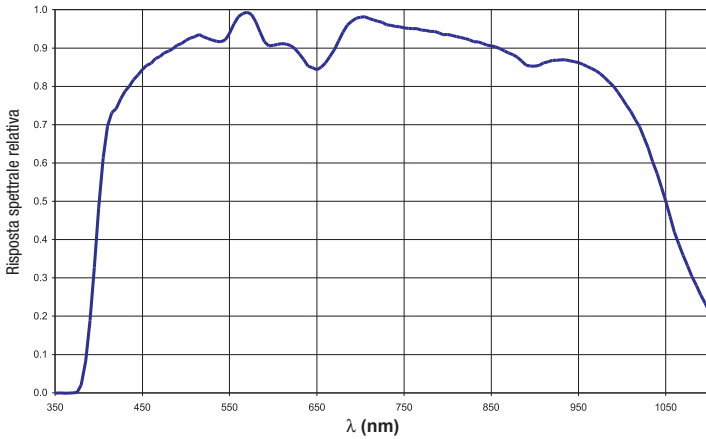
TECHNICAL SPECIFICATIONS

Typical sensitivity:	1...2.5 $\mu\text{V}/(\mu\text{W}/\text{cm}^2)$
Spectral range:	400nm...1050nm
Calibration uncertainty:	<5%
f_2 (cosine response):	<3%
f_3 (linearity)	<1%
Operating temperature:	-20°C...+60°C
Impedance:	0.5...1.0 k Ω (non-normalized version)

Version with normalized output 4...20mA:	4mA = 0 W/m ² , 20mA = 2000 W/m ²
Version with normalized output 0...10Vdc	0V = 0 W/m ² , 10V = 2000 W/m ²
Version with RS485 MODBUS-RTU output:	0... 2000 W/m ²

Power supply:	10...30Vdc for version with normalized output 4...20mA
	15...30Vdc for version with normalized output 0...10Vdc
	5...30Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve **LP RAD 03**



ORDERING CODE

LP RAD 03: Radiometric probe for the measurement of irradiance, complete with diffuser and glass dome, silica gel cartridge, 4-pole connector. Cable with female connector has to be ordered separately. Cables: **CPM12 AA4**... (except LP RAD03BLS) or **CPM12-8D**... (only LP RAD03BLS) with cable length 2, 5 or 10 meters.

LP RAD	<p>03 = $\mu\text{V}/(\mu\text{W}/\text{cm}^2)$ output</p> <p>03BL = $\mu\text{V}/(\mu\text{W}/\text{cm}^2)$ output, base with levelling device</p> <p>03BLAC = base with levelling device output 4...20 mA</p> <p>03BLAV = base with levelling device output 0...10 V</p> <p>03BLS = RS485 MODBUS-RTU output, base with levelling device</p>
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CABLE:	
CPM12 AA4.	2 = length 2m
CPM12-8D.	5 = length 5m
	10 = length 10m

LP PAR 03

The probe LP PAR 03 measures the ratio between the number of photons that strike a surface in one second, in the 400nm...700nm spectral range and the surface area (m²). This quantity is defined as PAR: Photo-synthetically Active Radiation.

The probe calibration is carried out by using an halogen lamp, with a known spectral irradiance in a specific spectral range. Temperature slightly affects the probe spectral response.

The probe is **designed for outdoor readings**. Output, according to the chosen configuration, in μV per $\mu\text{W}/\text{cm}^2$ or 4...20mA or 0...10Vdc normalized output or RS485 MODBUS-RTU output.

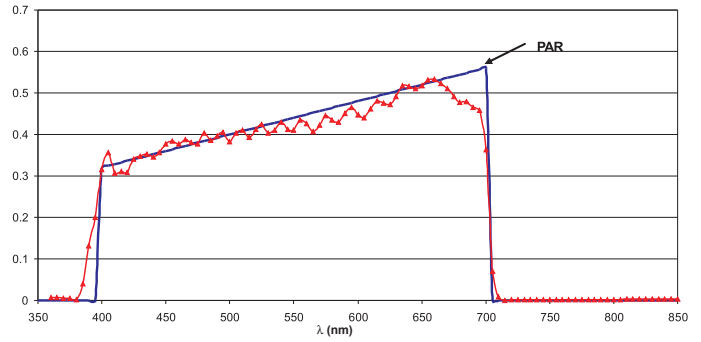
TECHNICAL SPECIFICATIONS

Typical sensitivity:	1...2.5 $\mu\text{V}/(\mu\text{mol}/\text{m}^2\text{s}^{-1})$
Typical spectral range:	400 nm...700 nm
Calibration uncertainty:	<5%
f_2 (cosine response):	<3%
f_3 (linearity)	<1%
Operating temperature:	-20°C...+60°C
Impedance:	0.5...1.0 k Ω non-normalized version

Version with normalized output 4...20mA:	4mA = 0 $\mu\text{mol}/\text{m}^2\text{s}^{-1}$, 20mA = 5000 $\mu\text{mol}/\text{m}^2\text{s}^{-1}$
Version with normalized output 0...10Vdc:	0V = $\mu\text{mol}/\text{m}^2\text{s}^{-1}$, 10V = 5000 $\mu\text{mol}/\text{m}^2\text{s}^{-1}$
Version with RS485 MODBUS-RTU output:	0... 5000 W/m ²

Power supply:	10...30Vdc for version with normalized output 4...20mA
	15...30Vdc for version with normalized output 0...10Vdc
	5...30Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve **LP RAD 03**



ORDERING CODE

LP PAR 03 Radiometric probe for the measurement of the Photon flux in the PAR action spectra, complete with diffuser and glass dome, silica gel cartridge, 4-pole connector. **Cable with female connector has to be ordered separately.** Cables: **CPM12 AA4**... (except LP PAR03BLS) or **CPM12-8D**... (only LP PAR03BLS) with cable length 2, 5 or 10 meters.

LP PAR	<p>03 = $\mu\text{V}/(\mu\text{mol m}^{-2}\text{s}^{-1})$ output</p> <p>03BL = $\mu\text{V}/(\mu\text{mol m}^{-2}\text{s}^{-1})$ output, base with levelling device</p> <p>03BLAC = base with levelling device, output 4...20 mA</p> <p>03BLAV = base with levelling device, output 0...10 V</p> <p>03BLS = RS485 MODBUS-RTU output, base with levelling device</p>
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CABLE:	
CPM12 AA4	2 = length 2m
CPM12-8D.	5 = length 5m
	10 = length 10m

LP UVA 03

The LP UVA 03 probe measures irradiance (W/m^2) defined as the ratio between the radiant flux (W) passing through a surface and the surface area (m^2) in the UVA (315 nm...400 nm) spectral range. Thanks to a new type of photodiode, LP UVA 03 is blind to visible and infrared light.

Probe calibration is carried out by using a 365 nm line of a Xe-Hg, filtered through a special interferential filter. Measurement is carried out by comparison with the primary standards, assigned to Delta OHM Metrological Laboratory. The probe is designed for **outdoor readings**. Output, according to the chosen configuration, in μV per $\mu W/cm^2$ or 4...20mA or 0...10Vdc normalized output or RS485 MODBUS-RTU output.

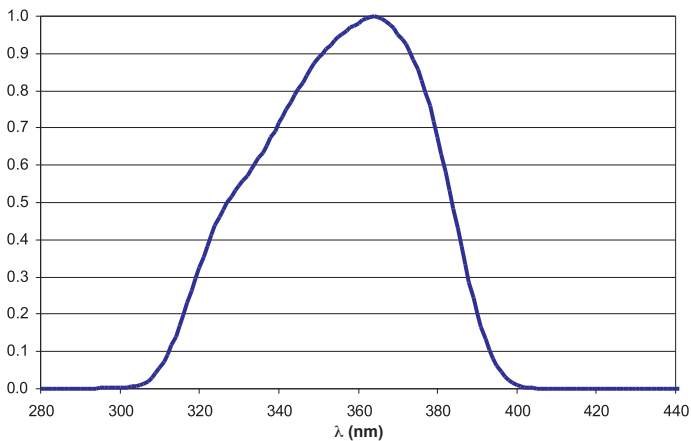
TECHNICAL SPECIFICATIONS

Typical sensitivity:	70...200 $\mu V/(W/m^2)$
Measuring range:	327...384nm (1/2)
	312...393nm (1/10)
	305...400nm (1/100)
	Peak: 365nm
Calibration uncertainty:	<6%
f_2 (cosine response):	<6%
f_3 (linearity):	<1%
Operating temperature:	-20°C...+60°C
Impedance:	0.5...1.0 k Ω non-normalized version

Version with normalized output 4...20mA:	4mA = 0 W/m^2 , 20mA = 200 W/m^2
Version with normalized output 0...10Vdc:	0V = 0 W/m^2 , 10V = 2000 W/m^2
Version with RS485 MODBUS-RTU output:	0... 200 W/m^2

Power supply:	10...30Vdc for version with normalized output 4...20mA
	15...30Vdc for version with normalized output 0...10Vdc
	5...30Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve LP UVA 03:



ORDERING CODE

LP UVA 03: Radiometric probe for the measurement of the UVA irradiance, complete with K5 dome, silica gel cartridge, 4-pole connector. **Cable with female connector has to be ordered separately.** Cables: **CPM12 AA4** ... with cable length 2, 5 or 10 meters.

LP UVA	<input type="checkbox"/>	03 = $\mu V/(\mu W/cm^2)$ output
	<input type="checkbox"/>	03BL = $\mu V/(\mu W/cm^2)$ output, base with levelling device
	<input type="checkbox"/>	03BLAC = base with levelling device output 4...20 mA
	<input type="checkbox"/>	03BLAV = base with levelling device output 0...10 V
	<input type="checkbox"/>	03BLS = RS485 MODBUS-RTU output, base with levelling device

CABLE:	<input type="checkbox"/>	2 = length 2m
CPM12 AA4.	<input type="checkbox"/>	5 = length 5m
CPM12-8D.	<input type="checkbox"/>	10 = length 10m

P UVB 03BLAV

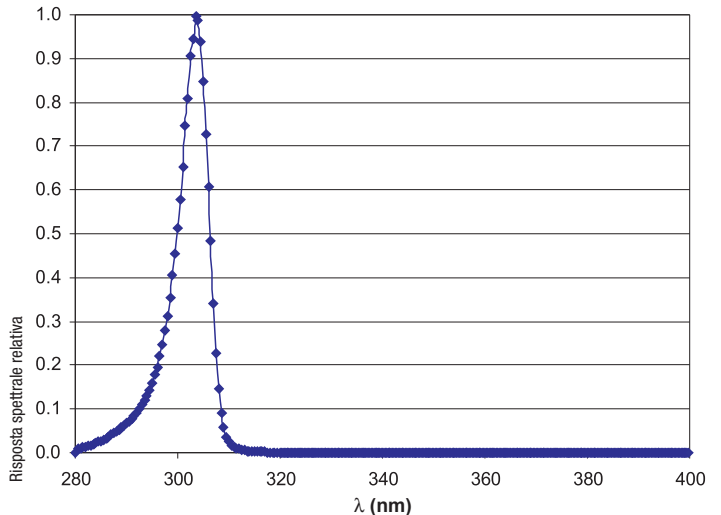
The LP UVB 03BLAV probe measures global irradiance (W/m^2) on a surface area (m^2) in the UVB (280 nm...315 nm) spectral region. In particular, the spectral sensitivity is focused at 305 nm, with a bandwidth (FWHM) of 5nm. The global irradiance is the result of the sum of direct solar irradiance and of diffused irradiance incident on a planar surface. In the UVB spectral region, unlike in the visible portion where the direct component prevails over the direct component, the light is strongly diffused by the atmosphere and thus the two components are equivalent, therefore is very important that the instrument is capable of measuring accurately both the components. The probe is designed for **outdoor readings**.

Typical output 0...5Vdc.

TECHNICAL SPECIFICATIONS

Typical sensitivity:	$\approx 6V/(W/m^2)$
Typical spectral range:	301nm...306nm (1/2)
	295...308.5nm (1/10)
	290...311.5nm (1/100)
	Peak at 304nm
Calibration uncertainty:	<6%
f_2 (cosine response):	<6%
f_3 (linearity):	<1%
Working temperature:	-20...+60°C
Output:	0...1 W/m^2
Power supply:	15...30Vdc

Typical spectral response curve LP UVB 03BLAV



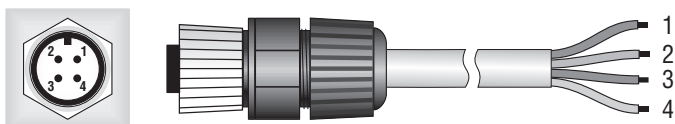
ORDERING CODE

LP UVB 03BLAV: Radiometric probe for the measurement of the UVB irradiance, complete with Quartz dome, 3 silica gel cartridges, 8-pole M12 connector, calibration report. **Cable with female connector has to be ordered separately.** Cables: **CPM12 AA8** ..., with cable lengths 2, 5 or 10 meters.

LP UVB	<input type="checkbox"/>	03BLAV = 0...5 V, complete with levelling device
CABLE:	<input type="checkbox"/>	2 = length 2m
CPM12 AA8.	<input type="checkbox"/>	5 = length 5m
	<input type="checkbox"/>	10 = length 10m

WIRING DIAGRAM

4-pole wire CPM12 AA4...



Fixed 4-pole plug M12

Flying 4-pole M12 connector

LP PHOT 03, LP PHOT 03BL

LP RAD 03, LP RAD 03BL

LP PAR 03, LP PAR 03BL

LP UVA 03, LP UVA 03BL

Connector	Function	Color
1	Positive (+)	Red
2	Negative (-)	Blue
3	Not connected	White
4	Shield	Black

LP PHOT 03BLAV

LP RAD 03BLAV

LP PAR 03BLAV

LP UVA 03BLAV

Connector	Function	Color
1	(+) Vout	Red
2	(-) Vout and (-) Vdc	Blue
3	(+) Vdc	White
4	Shield	Black

LP PHOT 03BLAC

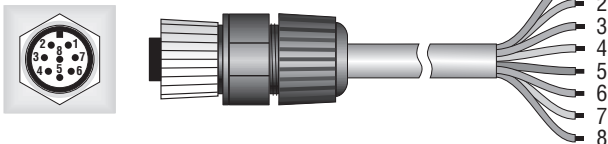
LP RAD 03BLAC

LP PAR 03BLAC

LP UVA 03BLAC

Connector	Function	Color
1	Positive (+)	Red
2	Negative (-)	Blue
3	Not connected	White
4	Shield	Black

8-pole wire CPM12-8D...



Fixed 8-pole plug M12

Flying 8-pole M12 socket

LP PHOT 03BLS

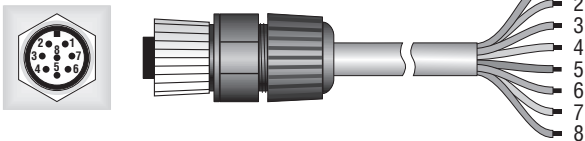
LP RAD 03BLS

LP PAR 03BLS

LP UVA 03BLS

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

8-pole wire CPM12 AA8...



Fixed 8-pole plug M12

Flying 8-pole M12 socket

LP UVB 03BLAV

Connector	Function	Color
1	Signal GND	Red
2	Vout UV (+)	Blue
3	Not connected	
4	Shield	Braid
5	Power GND (-)	Brown
6	Vout Temp. (+)	White
7	Housing	Black
8	Power (+) 7...30Vdc	Green

Address	Quantity	Format
2	LP PHOT03 : low range (20,000 lux) ^(*) : illuminance in lux LP PHOT03 : high range (200,000 lux) ^(*) : illuminance in lux/10 (e.g.: 3278 means 32780 lux, the resolution is 10 lux) LP RAD03 : irradiance in W/m ² LP PAR03 : photon flow in μmol m ⁻² s ⁻¹ LP UVA03 : UVA irradiance in W/m ² x 10 (e.g.: 425 means 42.5 W/m ² , the resolution is 0.1 W/m ²)	16-bit integer
3	Status register bit 0 = 1 measurement error bit 2 = 1 configuration data error bit 3 = 1 program memory error	16-bit integer
4	Average value of the last 4 measures	16-bit integer
5	LP PHOT03 : low range (20,000 lux) ^(*) : sensor signal in μV LP PHOT03 : high range (200,000 lux) ^(*) : sensor signal in μV/10 (e.g.: 3278 means 32780 μV, the resolution is 10 μV) LP RAD03 : sensor signal in μV/10 (e.g.: 9065 means 90650 μV, the resolution is 10 μV) LP PAR03 : sensor signal in μV LP UVA03 : sensor signal in μV	16-bit integer

(*) In the LP PHOT03BLS probe, the low or high range can be selected with a serial command. The setting procedure is provided in the probe operating manual

ACCESSORIES

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

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

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

CPM12 AA8.2: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 2m. **For LP UVB03LAV.**

CPM12 AA8.5: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 5m. **For LP UVB03LAV.**

CPM12 AA8.10: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 10m. **For LP UVB03LAV.**

CPM12-8D.2: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 2m. **For probes with RS485 MODBUS-RTU output.**

CPM12-8D.5: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 5m. **For probes with RS485 MODBUS-RTU output.**

CPM12-8D.10: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 10m. **For probes with RS485 MODBUS-RTU output.**

HD978TR3: Configurable signal converter amplifier with 4...20mA (20...4mA) output. Input range -10 ...+60mVdc. **Standard configuration 0...20mVdc.** Minimum measuring range 2mVdc. 2- DIN modules for 35mm rail. **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 Wall Mount installation.**

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

HD 778 TCAL: Voltage generator in the range -60mVdc...+60mVdc, controlled by PC through the RS232C serial port, DELTALOG-7 (downloadable from Delta OHM website) software for setting K, J, T, N thermocouple transmitters and HD978TR3, HD978TR4, HD978TR5, HD978TR6 converters.

LP PHOT S: Transmitter with RS485 MODBUS-RTU output for LP PHOT 01, LP PHOT 02 and LP PHOT 03 photometric probes with output in mV. Connections via screw terminals. Wall mount installation. Power supply 5...30 Vdc. Dimensions: 80 x 84 x 44 mm. IP 66.