

LPPHOT03, LPPAR03, LPUVA03, LPUVB03



**LPPHOT03 - LPPAR03 - LPUVA03 - LPUVB03
PHOTOMETRIC AND RADIOMETRIC PROBES WITH OUTPUT SIGNAL IN
mV OR NORMALIZED 4...20 mA OR 0...10 Vdc OR RS485 MODBUS-RTU
OUTPUT**

Photo-radiometric probes with output signal in mV or standard output 4...20 mA or 0...10 Vdc or RS485 MODBUS-RTU output.

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 (400 nm...700 nm).

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...20 mA or voltage 0...10 Vdc or RS485 MODBUS RTU output require external power supply.

The probe LPUVB03 is available only with standard output voltage 0...5 Vdc and requires external power supply.

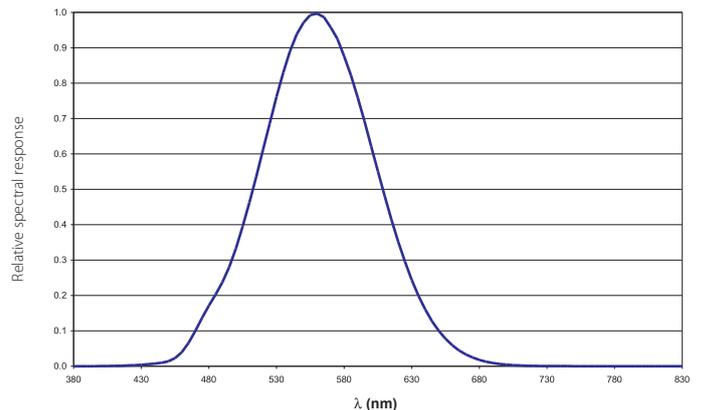
All probes of the series LP...03 are equipped with diffuser for cosine correction and protection dome. M12 male 4-pole connector (M12 8-pole connector for the LPUVB03). Cables with female connectors and with 2, 5 or 10 m length available on request.

LPPHOT03

The probe LPPHOT03 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 LPPHOT03 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...20 mA or 0...10 Vdc 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...20 mA	4 mA = 0 klux, 20 mA = 150 klux
Version with normalized output 0...10 Vdc	0 V = 0 klux, 10 V = 150 klux
Version with RS485 MODBUS-RTU output	0...200 klux
Power supply	- 10...30 Vdc for version with normalized output 4...20 mA - 15...30 Vdc for version with normalized output 0...10 Vdc - 5...30 Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve of LPPHOT03



ORDERING CODES

LPPHOT03: 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: CPM12AA4... (except LPPHOT03BLS) or CPM12-8D... (only LPPHOT03BLS) with cable length 2, 5 or 10 meters.

Available versions

- **LPPHOT03** = mV / klux
- **LPPHOT03BL** = mV / klux output, base with levelling device
- **LPPHOT03BLAC** = base with levelling device output 4...20 mA
- **LPPHOT03BLAV** = base with levelling device output 0...10 V
- **LPPHOT03BLS** = RS485 MODBUS-RTU output, base with levelling device

LPPAR03

The probe **LPPAR03** measures the ratio between the number of photons that strike a surface in one second, in the 400 nm...700 nm spectral range and the surface area (m²).

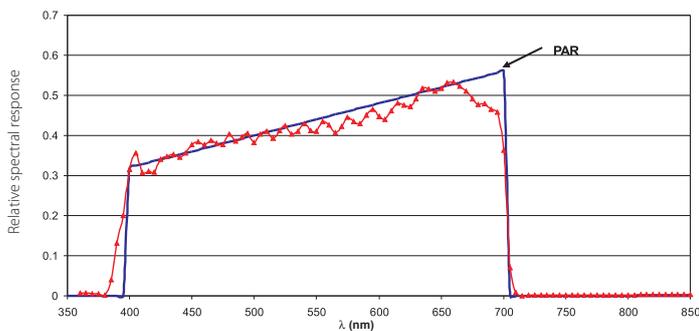
This quantity is defined as **PAR: Photo-synthetically Active Radiation**.

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 $\mu\text{V}/(\mu\text{mol}(\text{m}^{-2}\text{s}^{-1}))$ or 4...20 mA or 0...10 Vdc 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...20 mA	4 mA = 0 $\mu\text{mol}(\text{m}^{-2}\text{s}^{-1})$, 20 mA = 5000 $\mu\text{mol}(\text{m}^{-2}\text{s}^{-1})$
Version with normalized output 0...10 Vdc	0 V = $\mu\text{mol}(\text{m}^{-2}\text{s}^{-1})$, 10 V = 5000 $\mu\text{mol}(\text{m}^{-2}\text{s}^{-1})$
Version with RS485 MODBUS-RTU output:	0...5000 $\mu\text{mol}(\text{m}^{-2}\text{s}^{-1})$
Power supply	- 10...30 Vdc for version with normalized output 4...20 mA - 15...30 Vdc for version with normalized output 0...10 Vdc - 5...30 Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve LPPAR03



ORDERING CODES

LPPAR03: 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: CPM12AA4... (except LPPAR03BLS) or CPM12-8D... (only LPPAR03BLS) with cable length 2, 5 or 10 meters.

Available versions

- **LPPAR03** = $\mu\text{V}/(\mu\text{mol m}^{-2}\text{s}^{-1})$ output
- **LPPAR03BL** = $\mu\text{V}/(\mu\text{mol m}^{-2}\text{s}^{-1})$ output, base with levelling device
- **LPPAR03BLAC** = base with levelling device output 4...20 mA
- **LPPAR03BLAV** = base with levelling device output 0...10 V
- **LPPAR03BLS** = RS485 MODBUS-RTU output, base with levelling device

LPUVA03

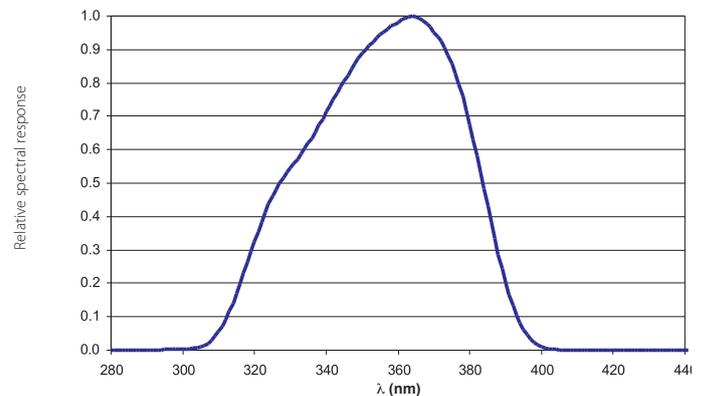
The **LPUVA03** probe measures **irradiance (W/m²)** defined as the ratio between the radiant flux (W) passing through a surface and the surface area (m²) in the UVA (315 nm...400 nm) spectral range. Thanks to a new type of photodiode, LPUVA03 is blind to visible and infrared light.

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 $\mu\text{W}/\text{cm}^2$ or 4...20 mA or 0...10 Vdc normalized output or RS485 MODBUS-RTU output.

TECHNICAL SPECIFICATIONS	
Typical sensitivity	70...200 $\mu\text{V}/(\text{W}/\text{m}^2)$
Measuring range	327...384 nm (1/2) 312...393 nm (1/10) 305...400 nm (1/100) Peak: 365 nm
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...20 mA	4 mA = 0 W/m^2 , 20 mA = 200 W/m^2
Version with normalized output 0...10 Vdc	0 V = 0 W/m^2 , 10 V = 200 W/m^2
Version with RS485 MODBUS-RTU output:	0...200 W/m^2
Power supply	- 10...30 Vdc for version with normalized output 4...20 mA - 15...30 Vdc for version with normalized output 0...10 Vdc - 5...30 Vdc for version with RS485 MODBUS-RTU output

Typical spectral response curve LPUVA03



ORDERING CODES

LPUVA03: 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: CPM12AA4... (except LPUVA03BLS) or CPM12-8D... (only LPUVA03BLS) with cable length 2, 5 or 10 meters.

Available versions

- **LPUVA03** = $\mu\text{V}/(\mu\text{W}/\text{cm}^2)$ output
- **LPUVA03BL** = $\mu\text{V}/(\mu\text{W}/\text{cm}^2)$ output, base with levelling device
- **LPUVA03BLAC** = base with levelling device output 4...20 mA
- **LPUVA03BLAV** = base with levelling device output 0...10 V
- **LPUVA03BLS** = RS485 MODBUS-RTU output, base with levelling device

LPUVB03BLAV

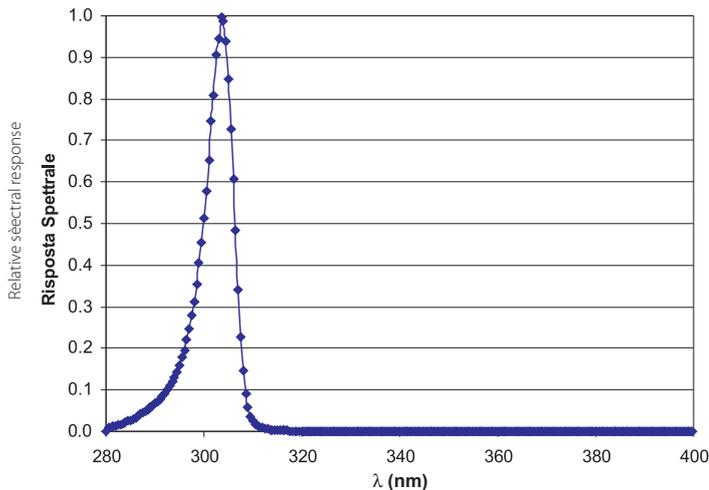
The LPUVB03BLAV probe measures **global irradiance** (W/m^2) on a surface area (m^2) in the UVB (280 nm...315 nm) spectral region.

In particular, the spectral sensitivity is focused at 305 nm, with a bandwidth (FWHM) of 5 nm. 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	$\approx 6V/(W/m^2)$
Measuring range	301 nm...306 nm (1/2) 295...308.5 nm (1/10) 290...311.5 nm (1/100) Peak at 304 nm
Calibration uncertainty	<6%
f_2 (cosine response)	<6%
f_3 (linearity)	<1%
Operating temperature	-20°C...+60°C
Output	0...1 W/m^2
Power supply	15...30 Vdc

Typical spectral response curve LPUVB03BLAV



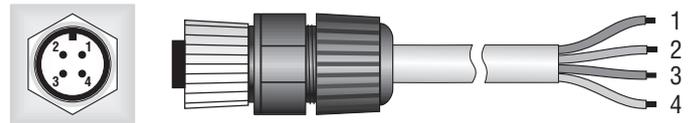
ORDERING CODES

LPUVB03BLAV: 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: CPM12AA8 ..., with cable lengths 2, 5 or 10 meters.



WIRING DIAGRAM

4-pole wire CPM12AA4...



Fixed 4-pole plug M12 Flying 4-pole M12 connector

LPPHOT03 / LPPHOT03BL - LPPAR03 / LPPAR03BL - LPUVA03 / LPUVA03BL

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

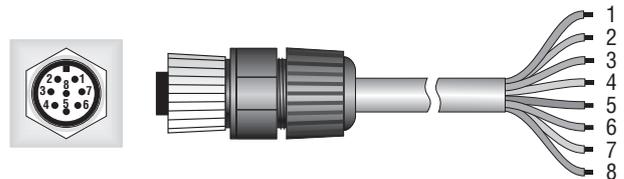
LPPHOT03BLAV - LPPAR03BLAV - LPUVA03BLAV

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

LPPHOT03BLAC - LPPAR03BLAC - LPUVA03BLAC

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

8-pole wire CPM12-8D...

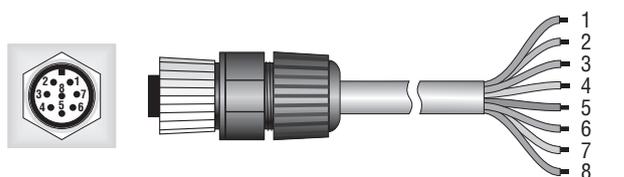


Fixed 8-pole plug M12 Flying 8-pole M12 socket

LPPHOT03BLS - LPPAR03BLS - LPUVA03BLS

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 CPM12AA8...



Fixed 8-pole plug M12 Flying 8-pole M12 socket

LPUVB03BLAV

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	LPPHOT03 : low range (20,000 lux) ^(*) : illuminance in lux LPPHOT03 : high range (200,000 lux) ^(*) : illuminance in lux/10 (e.g.: 3278 means 32780 lux, the resolution is 10 lux) LPPAR03 : photon flow in $\mu\text{mol m}^{-2} \text{s}^{-1}$ LPUVA03 : UVA irradiance in $\text{W/m}^2 \times 10^{-1}$ - (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	LPPHOT03 : low range (20,000 lux) ^(*) : sensor signal in μV LPPHOT03 : high range (200,000 lux) ^(*) : sensor signal in $\mu\text{V}/10$ (e.g.: 3278 means 32780 μV , the resolution is 10 μV) LPPAR03 : sensor signal in μV LPUVA03 : sensor signal in μV	16-bit integer

(*) In the LPPHOT03BLS probe, the low or high range can be selected with a serial command.



ACCESSORIES

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

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

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

CPM12AA8.2: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 2m. For LPUVB03LAV.

CPM12AA8.5: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 5m. For LPUVB03LAV.

CPM12AA8.10: Cable with 8-pole M12 connector on one end, open wires on the other side. Length 10m. For LPUVB03LAV.

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...20 mA (20...4 mA) output**. Input range -10...+60 mVdc. Standard configuration 0...20 mVdc. Minimum measuring range 2 mVdc. **For DIN rail 35 mm.** Configurable with HD778TCAL

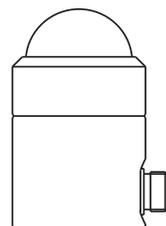
HD978TR5: Configurable signal converter amplifier with **4...20 mA (20...4mA) output**. Input range -10...+60mVdc. Standard configuration 0...20mVdc. Minimum measuring range 2mVdc. **Container for wall mount installation.** Configurable with HD778 TCAL.

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

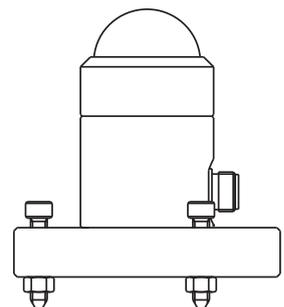
HD978TR6: Configurable signal converter amplifier with **0...10 Vdc (10...0 Vdc) output**. Input range -10...+60mVdc. Standard configuration 0...20mVdc. Minimum measuring range 2mVdc. **Container for wall mount installation.** Configurable with HD778 TCAL.

HD778TCAL: Voltage generator in the range -60mVdc...+60mVdc, controlled by PC through the RS232C serial port, DeltaLog7 (downloadable from Delta OHM website) software for setting K, J, T, N thermocouple transmitters and HD978TR3, HD978TR4, HD978TR5, HD978TR6 converters.

LPPHOTS: Transmitter with RS485 MODBUS-RTU output for LPPHOT03 with output in mV. Connections via screw terminals. Wall mount installation. Power supply 5...30 Vdc. Casing dimensions: 80 x 84 x 44 mm. IP 66 protection degree. Operating temperature / humidity: -30...+70 °C / 0...90 %RH not condensing.



LP ... 03



LP ... 03BL...