

# OPTICAL RADIATION

## What is 'Optical Radiation'?

Optical radiation covers the wave length range from 100nm to 1mm of the electromagnetic radiation spectrum. It must be considered that, with regard to the range limits, they do not preset a sharp separation, which is compulsory for all applications. The detection of optical radiation can, for example, be measured by means of radiometric, photometric, photobiological or plant-physiological measurable variables.

100 nm	200 nm	400 nm	600 nm	800 nm	1000 nm	1200 nm	1400 nm	1600 nm	1800 nm	3,0 µm	1 mm			
UV: ultraviolet radiation			VIS: visible radiation, light				IR: infrared radiation							
UV-C 100 - 280 nm		UV-B 280 - 315 nm	UV-A 315 - 400 nm	violet	blue	bluish green	green	yellowish green	yellow	orange	red	IR-A 800 - 1400 nm	IR-B 1400 nm - 3,0 µm	IR-C 3,0 µm - 1 mm

## Definition of Photometric and Radiometric Measurable Variables

Photometry	Limited to the range of the optical spectrum (light) that is visible to the human eye. Photometric measurable variables include: Light flux, illuminance, luminance and luminous intensity. The main characteristics of photometry is the evaluation of the brightness perception by the spectral luminosity function of the eye for photopic vision or, in rare cases, for scotopic vision (DIN 5031). Radiation detectors for photometric measuring tasks must, therefore, provide one of these spectral response characteristics.
Light Flux	The luminous power of a light source (lamp, LED etc.). As lamps do not generally emit a completely parallel luminous beam, the light flux measurement is performed by using measurement geometries, which detect the light flux independent from its geometric distribution. In most cases Ulbricht globe photometers or goniometers will be used.
Luminous Intensity	The part of a light flux, which radiates in one specific direction. The luminous intensity is an important variable for calculating the efficiency and quality of lighting equipment. The measurement is performed by detectors with a defined field of view and placed at distances that allow to consider the light source as a point light source.
Luminance	The brightness sensation provided by an illuminated or luminous surface to the eye. In many cases the luminance data will provide significantly better information regarding the quality of a light than the illuminance. For measuring the luminance, measuring heads with a defined measuring field angle are used.
Illuminance	The light flux of one or several light sources striking a certain surface horizontally or vertically. In case of a non-parallel incidence (which is the typical case in practical photometry) a cosine diffusor must be used as measurement geometries.
Radiometry	Metrological evaluation of optical radiation using the radiometric variables "Radiation Capacity", "Radiant Intensity", "Radiancy" and "Intensity of Irradiation". The main characteristic of radiometry is the wavelength-independent examination of the intensity of radiation. This is the significant difference between radiometry and actively weighted measurable variables, such as variables used in photometry, photobiology, plant physiology etc.
Radiation Capacity	The overall power provided by radiation.
Radiant Intensity	The quotient from the radiation capacity emitted by the light source into a certain direction and the solid angle being covered. The radiant intensity is used for the measurement of the geometric distribution of the radiation capacity.
Radiancy	The quotient from the radiation capacity passing through (striking) a plane in a certain direction and the product of the passed solid angle and the projection of the plane to a plane surface, which is perpendicular to the examined direction. The radiancy is used for the evaluation of aperture radiators. Steradian or telescopic adapters can be used as measurement geometries.
Intensity of Irradiation	The quotient of the radiation capacity striking a plane and the illuminated plane. For measuring the intensity of irradiation the spacial examination of the incident radiation is very important; therefore, a cosine-corrected field view function has been preset.

## Comparison of Photometric and Radiometric Variables

Every photometric variable corresponds to a radiometric variable and involves the same interrelationships between them. The variables can be distinguished by their index v (visual) and index e (energetic).

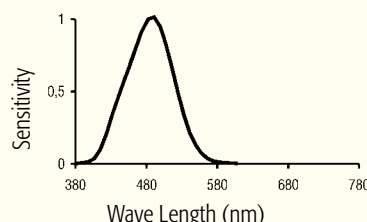
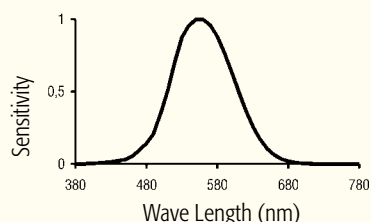
Lighting Engineering			Radiation Physics		
Variable	Symbol	Unit	Variable	Symbol	Unit
Light Flux	$\Phi_v$	lm=cd·sr	Radiation Capacity	$\Phi_e$	W
Luminous Intensity	$I_v$	cd	Radiant Intensity	$I_e$	W/sr
Luminance	$L_v$	cd/m	Radiance	$L_e$	W/sr·m
Illuminance	$E_v$	lx=lm/m	Intensity of Irradiation	$E_e$	W/m
Light Quantity	$Q_v$	lm · s	Radiation Energy	$Q_e$	Ws
Lumination	$H_v$	lx·s	Radiation	$H_e$	Ws/m

## Spectral Valuation Function

The relative spectral sensitivity of the human eye is specified with different functions for the light-adapted eye (photopic vision) or for the dark-adapted eye (scotopic vision). Due to the individual differences this data can only be considered for average values but is sufficient for most technical purposes. The detailed data of the spectral sensitivity curve are given in table format in the DIN 5031 standard.

The two different spectral action functions result from the different "sensor types" of the eye.

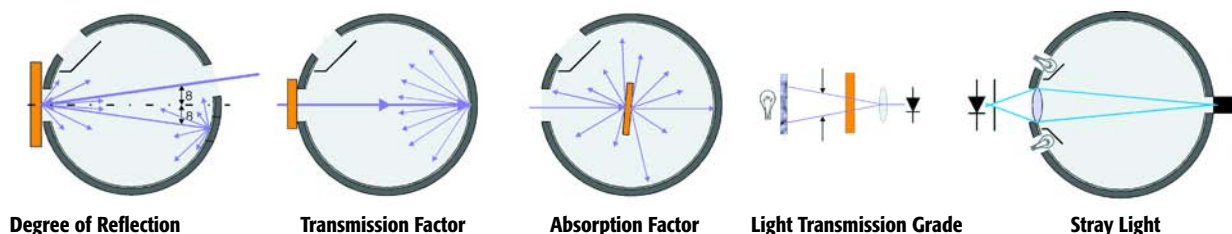
The relative luminous efficiency for photopic vision (rods,  $> 10\text{cd/m}^2$ ) is described with the function  $V(\lambda)$ , which is the function used in most cases. The spectral luminous efficiency for the scotopic vision (cones,  $< 0.001\text{cd/m}^2$ ) is described with the function  $V'(\lambda)$  and can, with regard to the practical use, only be rarely found.




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## Determination of Photometric Characteristic Factors

The metrological evaluation of the properties of materials regarding their reflection, transmission and absorption, as well as the stray light of objectives, is based on internationally accepted recommendations. These mainly include the CIE 130-1998 "Practical methods for the measurements of reflectance and transmittance", DIN 5036 Part 3 "Radiometric and photometric characteristics of materials", DIN 67507 "Light transmission factor of glazing", DIN 58186 "Stray light determination of optically image-forming systems".



 A detailed description of the metrological realisation would be beyond the scope of this catalogue. Please do not hesitate to contact us, the ALMEMO® system will also provide a solution for your measuring task in this field.

## Why Measure Optical Radiation?

A large part of the human sense impression is of an optical nature. Light is the only visible part of the electromagnetic spectrum. The human eye perceives different wave lengths of the light as colours. The spectral response of the eye, with regard to different colours, depends on the wave length. Furthermore, the human system is also influenced by ultraviolet radiation in a short-wave range and the infrared radiation in a long-wave range of the electromagnetic spectrum.

### Illumination:

People are used to daylight illumination. This can be approximately 5000 lux on a dull winter day, while on a sunny summer day approximately 100000 lux are reached. In contrast, only between 100 and 1000 lux are reached with artificial illumination. However, sufficient light is an essential factor for the well-being of people. Symptoms of tiredness, caused by insufficient light, do not generally occur at the eye but affect the whole body.

The standard DIN 5035/2, therefore, contains illumination standard values for health protection at work places.

These are legally bound in the guideline ASR 7/3 and it is imperative that this is observed.

The following nominal illuminations are valid for inside:

Offices:	office rooms	300 lux
	work places for writing and drawing	750 lux
Factories:	visual works within the production process	1000 lux
Hotels:	recreation rooms, reception, counter (cash)	200 lux
Shops:	front side of show windows	1500–2500 lux
Hospitals:	patients' rooms,	100–150 lux
	casualties	500 lux
Schools:	lecture rooms, gymnasiums	300 lux

### Global Radiation:

The global radiation is a measuring variable that is especially important for environmental research. It represents the entire diffuse and direct sun radiation that strikes the surface of the earth. The spectral range covers wavelengths from the short-wave range, at 300nm (UV-B), to the long-wave range, at 5000nm (IR).

### UVA Radiation:

The long-wave UV radiation (more than 313nm) reaches the surface of the earth almost unfiltered and tans the human skin and strengthens the immune system. In solariums the biological effect of the UVA spectrum is used, combined with other spectral ranges, to trigger the direct pigmentation (melanin colouring). Damages to the connective tissue and premature skin ageing are promoted by too much radiation.

### UVB Radiation:

The short-wave UV range (less than 313nm) can cause irreversible damages. All spectral characteristic functions that can have unfavourable effects on the human skin are summarised in the CIE recommendation. This recommendation is described in DIN 5050 and regarded as a guideline. A popular measure for the 'sunburn sensitivity' is, for example, the UV index 'UVI' provided by the German Weather Service. The measuring results provide, directly or in comparison with other spectral ranges, information that is of medical or biological relevance.

## Radiation probe FLA 623 x



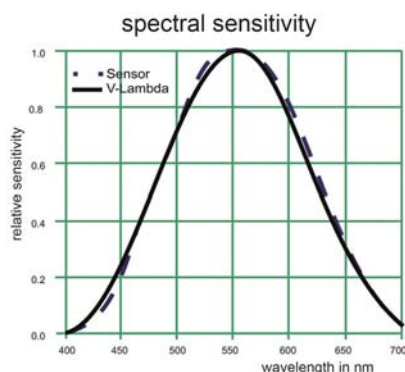
### Common technical data

Diffuser	PTFE
Cosine correction	Error f2 <3 %
Linearity	<1 %
Absolute error	<10 % (<5 % for FLA623VL)
V lambda adapter	<3 % (for FLA623VL only)
Nominal temperature	22 °C ±2 K
Operating temperature	-20 to +60 °C
Signal output	0 to +2 V
Duty cycle	<1 second
Power supply	via ALMEMO® connector (5 to 15 VDC)
Electrical connection	Mountable male connector, lateral
Connecting cable	PVC cable, plug-in, with ALMEMO® connector
Housing	Aluminum, black anodized
Fixture	2 screws M2 in base plate
Dimensions	Diameter 33 mm, height approx. 29 mm
Weight	approx. 50 g (without cable)

- Probes for various spectral ranges: Illuminance (V lambda), UVA, UVB, UVC, global radiation, IR, quantum (photosynthesis)
- Sturdy aluminum housing
- ALMEMO® connecting cable, plug-in
- For indoor applications, optional variant protected against damp (not for UV probes)

## Probe for measuring illuminance FLA 623 VL

- This measures the V lambda radiation (visible light, equivalent to sensitivity of the human eye).
- For evaluating lighting conditions, e.g. in the workplace
- The sensor complies with device class B as per DIN 5032.



### Technical data

Measuring range V lambda	0 to approx. 170 klx
Measuring channels	1st channel up to approx. 20,000 lx 2nd channel up to approx. 170.00 klx
Spectral sensitivity	380 to 720 nm, max. at 555 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

Illuminance probe with ALMEMO® connecting cable,  
length = 2 meters **Order no. FLA623VL**

#### Options

ALMEMO® connecting cable,  
length = 5 meters **Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters **Order no. OA9623L10**

Probe, protected against damp, diffuser, opal glass (instead of PTFE), silicone-sealed **Order no. OA9623W**

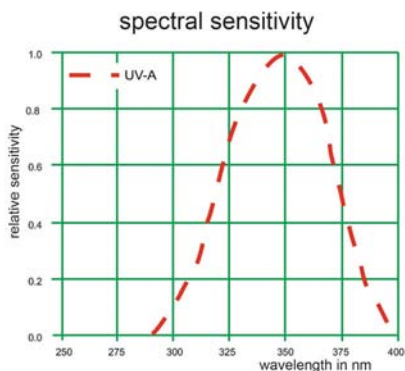
01/2011 We reserve the right to make technical changes.

**new!**

# OPTICAL RADIATION

## Probe for UVA radiation FLA 623 UVA

- ▶ This measures long-wave UV radiation (bronzing effect on human skin).
- ▶ Its spectral sensitivity is weighted towards global solar radiation.



### Technical data

Measuring range	0 to approx. 50 W/m <sup>2</sup>
Spectral sensitivity	310 to 400 nm, maximum at 335 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

UVA probe with ALMEMO® connecting cable,  
length = 2 meters

**Order no. FLA623UVA**

#### Options:

ALMEMO® connecting cable,  
length = 5 meters

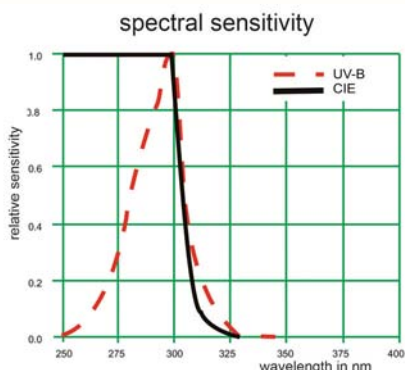
**Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters

**Order no. OA9623L10**

## Probe for UVB radiation FLA 623 UVB

- ▶ This measures short-wave UVB radiation.
- ▶ Its spectral sensitivity is weighted towards global solar radiation likely to cause erythema (sunburn) as per CIE recommendation (Commission Internationale de l'Eclairage). The UV index can be calculated.



### Technical data

Measuring range	0 to approx. 5 W/m <sup>2</sup>
Spectral sensitivity	265 to 315 nm, maximum at 297 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

UVB probe with ALMEMO® connecting cable,  
length = 2 meters

**Order no. FLA623UVB**

#### Options

ALMEMO® connecting cable,  
length = 5 meters

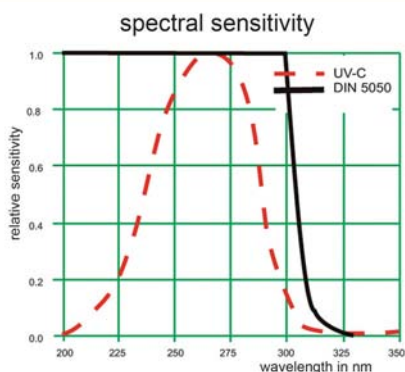
**Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters

**Order no. OA9623L10**

## Probe for UVC radiation FLA 623 UVC

- ▶ This measures UVC radiation, e.g. Hg line at 256 nm.
- ▶ This probe can be used inter alia in water disinfection units.



### Technical data

Measuring range	0 to approx. 1990 mW/m <sup>2</sup>
Spectral sensitivity	220 to 280 nm, maximum at 265 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

UVC probe with ALMEMO® connecting cable,  
length = 2 meters

**Order no. FLA623UVC**

#### Options:

ALMEMO® connecting cable,  
length = 5 meters

**Order no. OA9623L05**

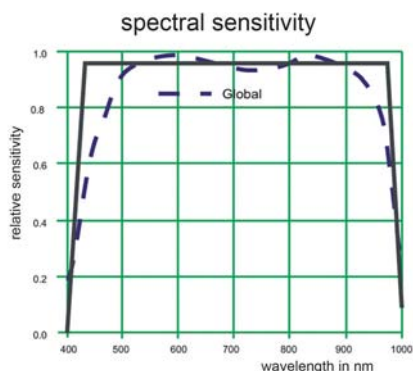
ALMEMO® connecting cable,  
length = 10 meters

**Order no. OA9623L10**



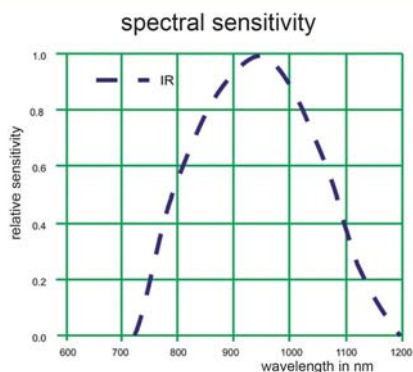
## Probe for global radiation FLA 623 GS

- This measures the solar spectrum in the visible range and in the short-wave IR range.
- Global radiation comprises both direct and diffused solar radiation.



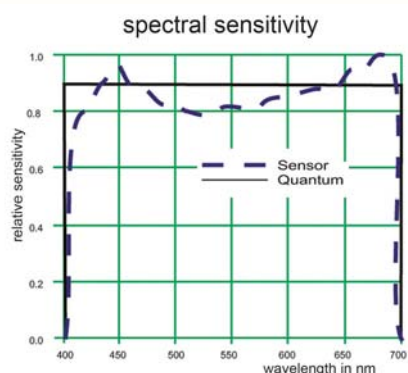
## Probe for infra-red radiation FLA 623 IR

- This measures the solar spectrum in the short-wave IR range (excluding the visible range).
- Global radiation comprises both direct and diffused solar radiation.



## Probe for quantum radiation FLA 623 PS

- This measures the visible light absorbed by the chlorophyll in plants during photosynthesis.
- It determines the level of quantum radiation in the spectral range specified.
- It is used to assess the conditions in which plants develop in open field and greenhouse cultivation.



### Technical data

Measuring range	0 to approx. 1300 W/m <sup>2</sup>
Spectral sensitivity	400 to 1100 nm, maximum at 780 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

Global radiation probe with ALMEMO® connecting cable,  
length = 2 meters **Order no. FLA623GS**

#### Options:

ALMEMO® connecting cable,  
length = 5 meters **Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters **Order no. OA9623L10**

Probe, protected against damp, diffuser, opal glass (instead of PTFE), silicone-sealed **Order no. OA9623W**

### Technical data

Measuring range	0 to approx. 400 W/m <sup>2</sup>
Spectral sensitivity	800 to 1100 nm, maximum at 950 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

IR probe with ALMEMO® connecting cable,  
length = 2 meters **Order no. FLA623IR**

#### Options:

ALMEMO® connecting cable,  
length = 5 meters **Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters **Order no. OA9623L10**

Probe, protected against damp, diffuser, opal glass (instead of PTFE), silicone-sealed **Order no. OA9623W**

### Technical data

Measuring range	0 to approx. 3000 µmol/m <sup>2</sup> s
Spectral sensitivity	380 to 720 nm, maximum at 420 and 700 nm

Common technical data and image see page 15.05

### Variants (including factory test certificate)

Quantum probe with ALMEMO® connecting cable,  
length = 2 meters **Order no. FLA623PS**

#### Options:

ALMEMO® connecting cable,  
length = 5 meters **Order no. OA9623L05**

ALMEMO® connecting cable,  
length = 10 meters **Order no. OA9623L10**

Probe, protected against damp, diffuser, opal glass (instead of PTFE), silicone-sealed **Order no. OA9623W**

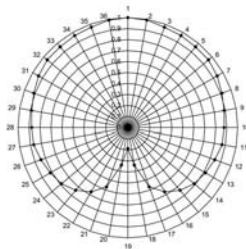
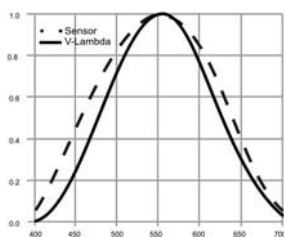
01/2011 We reserve the right to make technical changes.

# OPTICAL RADIATION

## Lux probe head for measuring luminous intensity FLA 613 VLK



- ▶ Measuring independent of direction - thanks to the probe head's spherical characteristics
- ▶ Weather-proof aluminum housing, with plastic globe
- ▶ Suitable for universal use, inter alia for measuring in photostability tests according to various international standards and ICH guidelines (International Conference on Harmonization)
- ▶ Spectral range of the probe head corresponds to the sensitivity of the human eye (V-lambda radiation).



### Type (including test protocol)

Lux probe head for measuring luminous intensity, with spherical characteristic, including 1.5-meter cable and ALMEMO® connector

**Order no. FLA613VLK**

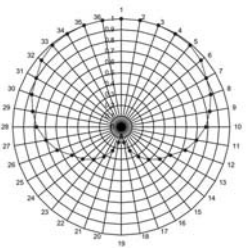
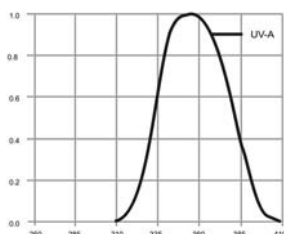
### Technical Data:

Measuring range	0 to 50 klux
Spectral sensitivity	360 to 760 nm
Maximum spectral sensitivity	555 nm
Signal output	0 to 2 V
Duty cycle	<1 second
Power supply	via ALMEMO® connector +5 to +15 V
Fastening	2 screws, M4, in base plate
Cable passage	at side
Housing	anodized aluminum
Diffuser	Plastic
Ball	Plastic
Directional characteristic	see diagram
Linearity	<1%
Absolute error	<10%
Nominal temperature	22 ± 2 °C
Operating temperature	-20 to +60 °C
Dimensions	Ball diameter : 40 mm Overall height : 76 mm
Weight	approx. 100 grams

## UVA probe head FLA 613 UVAK



- ▶ Measuring independent of direction - thanks to the probe head's spherical characteristics
- ▶ Weather-proof aluminum housing, with plastic globe
- ▶ Suitable for universal use, inter alia for measuring in photostability tests according to various international standards and ICH guidelines (International Conference on Harmonization)
- ▶ Measuring head for measuring the UVA



### Type (including test protocol)

UVA probe head, with spherical characteristic, including 1.5-meter cable and ALMEMO® connector

**Order no. FLA613UVAK**

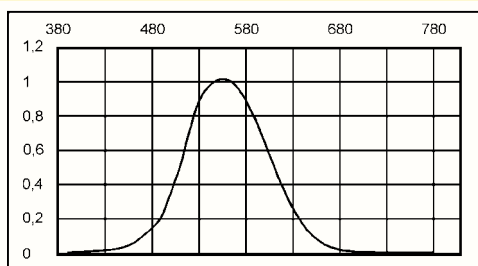
### Technical Data:

Measuring range	0 to approx. 50 W/m2
Spectral sensitivity	310 to 400 nm
Maximum spectral sensitivity	355 nm
Signal output	0 to 2 V
Duty cycle	<1 second
Power supply	via ALMEMO® connector +5 to +15 V
Fastening	2 screws M4, in base plate
Cable passage	at side
Housing	anodized aluminum
Diffuser	PMMA (polymethyl methacrylate, acrylic)
Ball	PMMA (transparent to UV)
Directional characteristic	see diagram
Linearity	< 1%
Absolute error	< 10%
Nominal temperature	22 ± 2 °C
Operating temperature	-20 to +60 °C
Dimensions	Ball diameter : 40 mm Overall height : 76 mm
Weight	approx. 100 grams

## Lux Probe Head FLA 603 VLx



- High quality probe head for determining the density of light in lighting engineering or in sunlight and any place where DIN standards recommend the use of a class B luxmeter.
- Spectral adaptation approximated to the photometric valuation function  $V(\lambda)$  for photopic vision, class B, better than 5%.
- Different measuring channels with different sensitivity.



### Type:

Lux probe head, DIN quality class B  
with ALMEMO® connecting cable 1.5m long,  
incl. factory calibration certificate with calibration in lx

for indoor lighting  
(3 measuring channels)

**Order no. FLA603VL2**

for ambient light  
(2 measuring channels)

**Order no. FLA603VL4**

### Technical Data:

Measuring range:	FLA603VL2: 0.05 lx to 12500 lx FLA603VL4: 1 lx to 250000 lx
Smallest resolution:	FLA603VL2: 0.01 lx FLA603VL4: 1 lx
Sensitivity:	approx. 20pA/lx
Spectral adaptation:	approxim. to photometric valuat. function $V(\lambda)$ for photopic vision, class B, better than 5%
Max. cos deviation:	class B, < 3%
Cos diffusor:	diameter 7mm
Nominal temperature:	24°C ±2K
Operat./storage temperature:	0 to 60°C/-10 to +80°C
Humidity range:	10 to 90% (non-condensing)
Dimensions:	Ø 37mm, height 20mm

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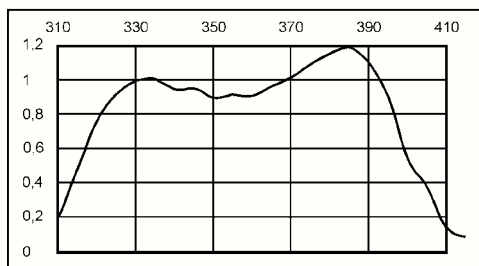


# OPTICAL RADIATION

## UVA Probe Head FLA 603 UV12 / 14



- ▶ High quality probe head for precise determination of UVA radiation in the wave length range from 315 to 400nm.
- ▶ Measurement geometries with cosine diffusor instead of simple diffusing screen for highest quality requirements.
- ▶ Three measuring channels with different sensitivity.



### Type:

Probe head for measuring UVA radiation intensity with ALMEMO® connecting cable 1.5m long incl. factory calibration certificate with calibration in mW/cm² for examinations in industrial medicine **Order no. FLA603UV12** for measurements in industrial plants **Order no. FLA603UV14**

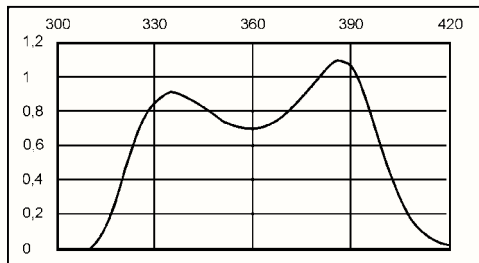
### Technical Data:

Measuring range:	FLA603UV12: 0.00002 mW/cm² to 5 mW/cm² FLA603UV14: 0.0004 to 100 mW/cm²
Smallest resolution:	FLA603UV12: 20 nW/cm² FLA603UV14: 100 nW/cm²
Sensitivity:	approx. 50 nA/(mW/cm²)
Spectral sensitivity:	315 to 400nm
Max. cos deviation:	< 5%
Cos diffusor:	diameter 15mm
Nominal temperature:	24°C ±2K
Operat./storage temperature:	0 to 60°C/-10 to +80°C
Humidity range:	10 to 90% (non-condensing)
Dimensions:	Ø 37mm, height 32mm

## UVA Probe Head FLA 603 UV22 / 24



- ▶ High quality probe head for precise determination of UVA radiation in the wave length range from 320 to 400nm.
- ▶ Measurement geometries with cosine diffusor instead of simple diffusing screen for highest quality requirements.
- ▶ Three measuring channels with different sensitivity.



### Type:

Probe head for measuring UVA radiation intensity with ALMEMO® connecting cable 1.5m long incl. factory calibration certificate with calibration in mW/cm² for examinations in medical therapy **Order no. FLA603UV22** for industrial measurements of the UV radiation hardening **Order no. FLA603UV24**

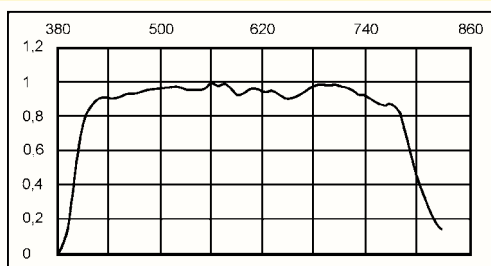
### Technical Data:

Measuring range:	FLA603UV22: 0.00002 to 5 mW/cm² FLA603UV24: 0.0004 to 100 mW/cm²
Smallest resolution:	FLA603UV22: 10 nW/cm² FLA603UV24: 100 nW/cm²
Sensitivity:	approx. 50 nA/(mW/cm²)
Spectral sensitivity:	320 to 400nm
Max. cos deviation:	< 5%
Cos diffusor:	diameter 15mm
Nominal temperature:	24°C ±2K
Operat./storage temperature:	0 to 60°C/-10 to +80°C
Humidity range:	10 to 90% (non-condensing)
Dimensions:	Ø 37mm, height 32mm

## Radiometric Probe Head FLA 603 RW4



- High quality radiometric probe head for precise determination of the radiation intensity in the visible wavelength range from 400 to 800nm.
- Measurement geometries with cosine diffusor instead of simple diffusing screen for highest quality requirements.
- Three measuring channels with different sensitivity.



### Type:

Radiometric probe head  
with ALMEMO® connecting cable 1.5m long  
incl. factory calibration certificate  
with calibration in  $\text{mW}/\text{cm}^2$

for evaluation of  
LED diodes and lasers

**Order no. FLA603RW4**

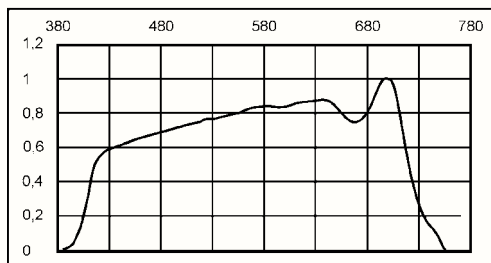
### Technical Data:

Measuring range:	0.00004 to $10 \text{ mW}/\text{cm}^2$
Resolution:	$10 \text{ nW}/\text{cm}^2$
Sensitivity:	approx. $500 \text{ nA}/(\text{mW}/\text{cm}^2)$
Spectral sensitivity:	400 to 800nm
Max. cos deviation:	< 5%
Cos diffusor:	diameter 15mm
Dimensions:	diameter 37mm, height 50mm

## Quantum Probe Head FLA 603 PS4 / PS5



- This high-grade probe directly evaluates photosynthetically active radiation (PAR) in the wavelength range from 400 to 700 nm.
- It meets the highest quality requirements thanks to its geometry with a cosine diffuser instead of a simple diffusing screen.
- The design is water-proof thanks to the transparent quartz dome sealing the diffuser.



### Type:

Quantum probe with ALMEMO® connecting cable, length = 1.5 meters, including factory calibration certificate, calibration in  $\mu\text{mol}/(\text{m}^2\text{s})$  For measuring photosynthetically active radiation intensities

Measuring low-level available light (e.g. dawn, dusk, artificial lighting)  
**Order no. FLA603PS4**

Measuring in greenhouses  
with daylight

**Order no. FLA603PS5**

in a water-proof variant with a transparent quartz dome  
(see illustr.)

**Order no. FLA603PS4/5WG**

### Technical Data:

Measuring range:	0.0002 to $5,0 \mu\text{mol}/(\text{m}^2\text{s})$
Measuring range	
FLA603PS4	0.0002 to $5 \mu\text{mol}/(\text{m}^2\text{s})$
FLA603PS5	$0.2 \mu\text{mol}/(\text{m}^2\text{s})$ to $100.00 \mu\text{mol}/(\text{m}^2\text{s})$
Smallest resolution	
FLA603PS4	$0.0002 \mu\text{mol}/(\text{m}^2\text{s})$
FLA603PS5	$0.1 \mu\text{mol}/(\text{m}^2\text{s})$
Resolution:	$0.0002 \mu\text{mol}/(\text{m}^2\text{s})$
Sensitivity:	approx. $100 \text{ nA}/(\mu\text{mol}/\text{m}^2\text{s})$
Spectral sensitivity:	400 to 700nm
Max. cos deviation:	< 5%
Cos diffusor:	diameter 15mm
Dimensions:	diameter 37mm, height 35mm

01/2011 We reserve the right to make technical changes.

# OPTICAL RADIATION

## Luminance Probe Head FLA 603 LDM2



- ▶ Luminance measuring head, equipped with achromatically corrected, low stray light optics and high quality  $V(\lambda)$  detector according to DIN class B.
- ▶ The external sighting device allows, at a working distance of 1m, to exactly locate the measuring point, therefore, it is particularly suitable for evaluating the luminance for service and constancy tests.
- ▶ Three measuring channels with different sensitivity.
- ▶ Typical applications:  
Luminescent surfaces such as colour monitors, alphanumerical displays, sign plates and light panels, and reflecting surfaces, such as walls and equipment at work places, projecting screens, traffic and sign plates, guided paths and roadway lines.

### Type:

Luminance probe head with  $1^\circ$  field of view and external sighting device, DIN quality class B, with ALMEMO® connecting cable 1.5m long, incl. factory calibration certificate calibration in  $\text{cd/m}^2$

**Order no. FLA603LDM2**

### Technical Data:

Measuring range:	0.04 $\text{cd/m}^2$ to 8333 $\text{cd/m}^2$
Smallest resolution:	10 $\text{mcd/m}^2$
Field of view:	$1^\circ$
Sensitivity:	approx. 30 $\text{pA}/(\text{cd/m}^2)$
Spectral adaptation:	approxim. to photometric valuat. function $V(\lambda)$ for photopic vision, class B, better than 6%
Field of view diameter :	approx. 30 mm at a distance of 0.5 meters approx. 40 mm at a distance of 1 meters approx. 120 mm at a distance of 5 meters
Nominal temperature:	$24^\circ\text{C} \pm 2\text{K}$
Operat./storage temperature:	0 to $60^\circ\text{C}$ /-10 to $+80^\circ\text{C}$
Humidity range:	10 to 90% (non-condensing)
Measuring surface:	21mm x 21mm at 1m operating distance
Meets standards:	IEC 61223-2-5, DIN 5032-T.7
Dimensions:	diameter 30mm, length 150mm

## Light Flux Probe Head FLA 603 LSM4

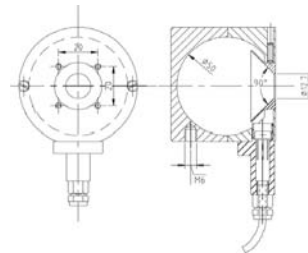


- ▶ High quality measuring head, DIN class B for light flux measurement with Ulbricht globe photometer.
- ▶ Perfect coating of the globe with  $\text{BaSO}_4$  for diffuse reflectivity and spectrally neutral reflection quality.
- ▶ Suitable for cold light sources, and lamps with high colour temperature and almost monochromatic radiation (as in LEDs).
- ▶ Examples for applications:  
Endoscopes, fiber optic bunches, light emitting diodes.

### Type:

Light flux probe head with ALMEMO® connecting cable 2m long and factory calibration certificate

**Order no. FLA603LSM4**



### Technical Data:

Measuring range:	0.0002 lm to 50 lm
Smallest resolution:	0.001 lm
Sensitivity:	20nA/lm
Acceptance angle:	up to $90^\circ$
Accuracy:	DIN quality class B
Nominal temperature:	$24^\circ\text{C} \pm 2\text{K}$
Humidity range:	10 to 90 % non-condensing
Operating temperature:	max. $100^\circ\text{C}$ inside globe
Inner diameter of globe:	50mm
Test opening:	12.7mm

