

Data logging radiometer RM-22



The RM-22 radiometer is a high-precision hand-held instrument with data logging function for measuring irradiation and illumination levels as well as the doses. The dose is automatically calculated by integrating the irradiance. Ambient light can be effectively corrected effectively by an automatic offset.

Two sensors can be connected to RM-22 simultaneously. Different sensors for UV and visible spectral ranges can be used due to integrated electronics. Sensors to evaluate the biological effects of irradiation and customized sensors are also available. The sensor is identified by the built-in memory, so that the a valid spectral range is used. Calibration and date of manufacture are also stored in the sensor. The integrated diffusers ensure the required cosine correction. The sensors are calibrated with traceability to the PTB; after being calibrated, they are supplied with a factory calibration certificate. Repair and spare parts service is, of course, available for many years.

Compared with the RM-12, the RM-22 features a higher resolution, an extended measuring range, an internal storage (4 GB) and illuminated graphic displays. The measured values can be stored internally and, also be recorded by the computer. The RM-22 user software allows to control measurements. The unit can be powered by a battery or AC adapter. Splash/-waterproof sensors built in accordance with IP65 or customer-specific measuring and spectral ranges are available.

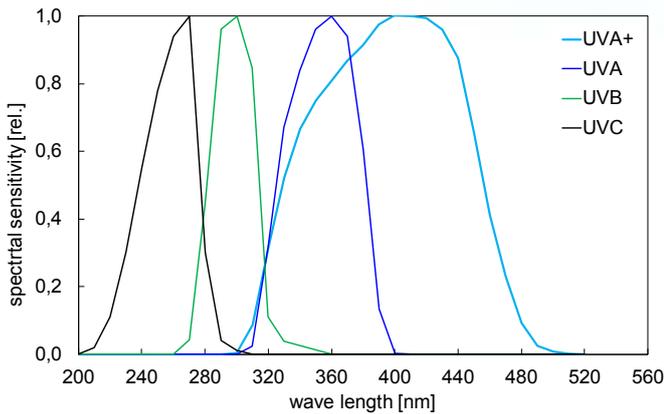
Applications:

- Measurement of UV lamps, UV LEDs, and light sources
- Dose control in UV curing and bonding
- Control of UV irradiation
- Measurement of job security due to artificial optical radiation
- Photometric measurements

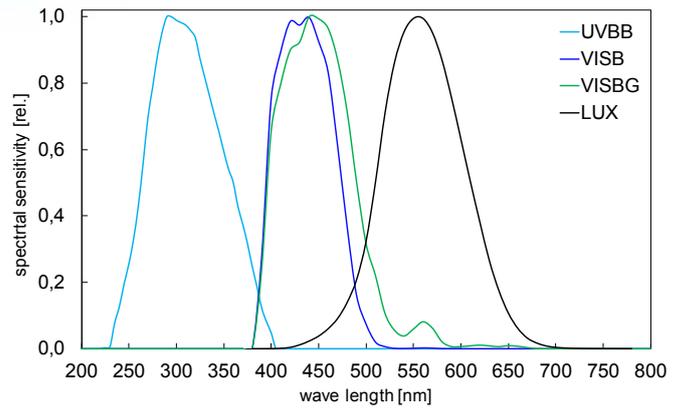
Since 1981, Opsytec Dr. Gröbel GmbH manufactures UV sensors. All sensors are calibrated in our own laboratory.



TECHNICAL DATA



Spectral sensitivity UVA+, UVA, UVB and UVC sensors



Spectral sensitivity UVBB, VISB, VISBG and VISL sensors

TECHNICAL DATA RM-22

Measurement range	0 - 200 mW/cm ²
	0 - 2000 mW/cm ² (opt. -1)
	0 - 20 W/cm ² (opt. -2)
	0 - 20 mW/cm ² (opt. -3)
Resolution	0 - 2 mW/cm ² (opt. -4)
	0,001 mW/cm ²
	0,01 mW/cm ² (opt. -1)
	0,0001 W/cm ² (opt. -2)
Dose range	0,0001 mW/cm ² (opt. -3)
	0,01 μW/cm ² (opt. -4)
	0 - 1 MJ/cm ²
	2400 h
max. integration time	2400 h
Illumination meas. range	0 - 200.000 lx
Dimensions	160 x 85 x 35 mm
Weight	300 g
Power supply	internal Li-Ion battery
Battery lifetime	up to 80 h
Operation temperature	0 to 40 °C
Storage temperature	-10 to 40 °C
Humidity	< 80% non-condensing
Sensor connectors	2
PC interface	USB 2.0
Internal memory	4 GB
Sampling rate	adjustable: 1 s, 5 s, 15 s,
	1 min, 5 min, 15 min
Recording time	> 1000 h

TECHNICAL DATA SENSORS

Operation voltage	+/- 3,3V
Signal voltage	0 - 2,5 V
Dimensions	Ø 40, h 35 mm
Weight	150 g
Connecting cable	2 m
Operation temperature	0 to 40 °C
Storage temperature	-10 to 40 °C
Humidity	< 80% non-condensing

SENSOR SPECTRAL RANGES

UVC	200 - 280 nm
UVB	280 - 315 nm
UVA	315 - 400 nm
UVA+	330 - 455 nm
UVBB (broad-band)	230 - 400 nm
VISB	400 - 480 nm
VISBG	400 - 570 nm
LUX	380 - 780 nm, V(λ)



Example: UVC sensors with reduced height of 7 mm

PART NUMBERS

Radiometer RM-22	822201
RM sensor UVC	812210
RM sensor UVB	812220
RM sensor UVA	812230
RM sensor UVA+	812245
RM sensor UVBB	812212
RM sensor VISB	812240
RM sensor VISBG	812250
RM sensor LUX	812261
Transport case	921002
UV safety goggles	918800

SCOPE OF DELIVERY

RM-22 (radiometer without sensor), power supply, USB cable, PC software and manual. Please select desired sensor and measurement range during order. If no measurement range is specified we'll deliver standard range (0 -200 mW/cm²).

APPLICATION NOTES

One watt of visible light corresponds to approximately 10¹⁹ photons. This large number of photons is the basis for the application of light and UV radiation as the surface interaction of the photons is usually limited to a few nm².

The scope of our UV sensors is just as varied, ranging from process monitoring, risk assessment, and job security to medical applications of UV lamps and UV LEDs. The following notes should assist in the selection of suitable sensors.

For **process monitoring** and dose control, the spectral range of the sensor depends basically on the UV application or usually the photoinitiator. UV spotlight sources such as the HP-120 reach irradiance in the range of a few W/cm². This is lower outside the spots or at a greater distance. The sensor should provide a wide measuring range of 0-2000 mW/cm² or more.

Low-pressure UV lamps and UVC amalgam lamps usually reach irradiances of less than 100 mW/cm² in the irradiation level. We recommend our sensors with a measuring range of 0 - 200 mW/cm².

The emission of **UV LEDs** occurs, for example, at 365, 385, 395, or 405 nm. A UVA+ sensor has been developed to measure UV LEDs. The latter has a wider spectral range. Measurements of UV LEDs in the area of the filter edge should be avoided since the smallest changes of temperature and charge fluctuations can cause high measurement errors.

For **risk assessments and occupational or job safety**, DIN EN 14255-1:2005 regulates the measurement and assessment of personal exposure to artificial optical radiation. DIN 14255-1 itself contains no limits. Limits are given in directive 2006/25/EC „Artificial Optical Radiation.“

The sensors must be sufficiently sensitive for the measurements. To achieve this, select a sensor (e.g., UVA, UVB) with a measuring range 0 - 2 mW/cm². In accordance with 2006/25/EC directive, the UVA radiation limit is 10⁴ J/m² for an 8h working day. This corresponds to continuous irradiance of 0.035 mW/cm². The maximum irradiance may be higher for short-term work, for example:

Scope of work: Daily cleaning

Duration: 10 min

Exposure dose: $H_{UVA} = 10^4 \text{ J/m}^2$

Irradiance: 1.68 mW/cm²

Tip: UV systems should be designed so that the irradiance relative to the duration of the activity does not exceed the exposure dose. In general, installations should be checked if they continuously irradiate the worker with more than 1-2 mW/cm².

For **medical applications**, process safety and the calibration in the foreground are of most importance. Our sensors are durable and can be individually recalibrated. Repair and spare parts service is available for many years. Take advantage of our many years of experience as a calibration laboratory.

Applications with different UV lamps can be reproducibly measured with our radiometer sensors. A measurement of all spectral ranges at the same time is also possible (e.g., with the UVpad).