

# Ultraviolet (UV) Radiometers

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## ▶ INTRODUCTION

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A UV radiometer is needed for quantification and documentation of the impact of UV radiation on biological or chemical processes, as well as the UV effect on the health of human beings, animals, plants or material properties (i.e. occupational and environmental impacts).

The features of a UV radiometer of choice will depend on the individual customer's requirements or a standard/guideline. The following UV radiometers are available for different purposes, viz. for validation of DVGW/ÖNORM duty sensors (DVGW W 294-3:2006 / ÖNORM M 5873); for UV hazard assessment in workplaces (2006/25/EC); and for the measurement of the UV Index (ISO 17166). The last category refers to UV radiometers that are configured and calibrated according to the customer's requirements and UV datalogger for long-term UV dosimetry.

We produce radiometers with "classical" appearance consisting of a handheld device and a UV sensor. Alternatively, our digital UV sensor can be connected to a Smartphone (Android) using an Android radiometer / dosimeter app.

The core components of a UV radiometer or datalogger are the UV sensor and the sensor's calibration. sglux is strictly committed to uncompromising quality, reliability and accuracy of the UV sensor and its calibration. Our quality management is DIN/ISO 9001 certified. Our well-equipped calibration laboratory works in close cooperation with governmental metrology authorities. Please find collaborative publications here ([LINK](#)). The calibration is PTB (Physikalisch-Technische Bundesanstalt, German National Metrology Institute) traceable, and works according to guideline DAkkS-DKD-MB-3 and the technical report CIE 220:2016.



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## REFERENCE RADIOMETERS FOR UV PURIFIER SENSOR VALIDATION

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Reference radiometers are used to validate the calibration of UV duty sensors used in UV water purifiers.

UV purifiers use UV light to inactivate bacteria. These purifiers use UV duty sensors to control the UV light emission of the source (e.g. a low pressure UVC tube) and, eventually, to detect a fouling effect of UV transparent glass components of the purifier.

If a UV purifier is designed and operated according to the guidelines DVGW W 294-3:2006 or ÖNORM M 5873, the UV duty sensor needs (according to chapter 8.2 of the guidelines DVGW W 294-3:2006) a recalibration after 10,000 hours of operation or after two years of use. This recalibration is usually organized by the purifier's manufacturer.

The owners of purifiers need to regularly validate the duty sensor using a reference radiometer (designed according to guideline DVGW W 294-3:2006). This is done by replacing the duty sensor with the reference radiometer sensor, and comparison of the values. If these values deviate by more than 5 % the duty sensor needs to be recalibrated or replaced.

The sglux reference radiometers listed below are used for this purpose. We calibrate the reference radiometers using the world's first traceable calibration standard for high irradiation levels, in particular for UV water purification duty sensor calibration. sglux developed this standard in the years 2010 to 2012, in collaboration with the German PTB.

Please refer to our website ([www.sglux.com](http://www.sglux.com)) for datasheet download and price information of the products listed below.



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## UVRRM ÖNORM



Reference Radiometer for validation of ÖNORM/DVGW-160° duty sensors according to ÖNORM M 5873. The unit is powered by a 9 V battery that allows several years of use if infrequently used. The radiometer price includes a PTB traceable calibration.

## UVRRM DVGW



Reference Radiometer for validation of DVGW-40° duty sensors according to DVGW W 294-3:2006. The unit is powered by a 9 V battery that allows several years of use if infrequently used. The radiometer price includes a PTB traceable calibration.

## UVRRM DVGW 40° + ÖNORM 160°



Reference Radiometer with two sensors for validation of DVGW-40° and ÖNORM-160° duty sensors according to DVGW W 294-3:2006 and ÖNORM M 5873. The unit is powered by a 9 V battery that allows several years of use if infrequently used. The radiometer price includes a PTB traceable calibration.

## AQUATOUGH



Reference Radiometer with two sensors for validation of DVGW-40° and ÖNORM-160° duty sensors according to DVGW W 294-3:2006 and ÖNORM M 5873. The AQUATOUGH device is designed for developers and for all-day use under harsh conditions. It offers a broad range of functions such as a datalogger, data export and graphic display with trend information. The radiometer price includes a PTB traceable calibration.

# Ultraviolet (UV) Radiometers

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## UV RADIOMETERS FOR UV HAZARD ASSESSMENT IN WORKPLACES

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The radiometers are used for hazard assessment of artificial UV radiation in workplaces.

If a workplace in the European Union is suspected to be exposed to artificial UV radiation, a UV hazard assessment according to guideline 2006/25/EC needs to be done. This method ensures that the maximum dose of 30 J/m<sup>2</sup>/day (as defined by this guideline) will not be exceeded. Basically, the guideline stipulates that artificial UV radiation needs to be avoided as much as possible.

Harmful UV radiation needs to be suspected in companies that use or maintain UV polymerisation machines for lacquer or print hardening, or companies where UV radiation is used to disinfect air or liquids (e.g. hospitals, canteen kitchens or laundries).

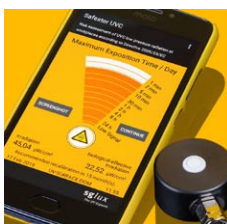
The mandatory hazard assessment needs a suitable radiometer such as the sglux Safester UVC. These radiometers need a spectral responsivity according to Table 1.2 of the guideline 2006/25/EC and a calibration on the UV source used. The Safester UVC complies with class 1 (highest precision requirements) of DIN/ISO 5051-11 for actinic radiometers.

For a correct understanding of the measurement value obtained by such a radiometer, it is adequate to divide the exposure limit of 30 J/m<sup>2</sup>/day by the actual value and subsequently calculate the maximum exposure time. However, this procedure is quite impractical and prone to errors.

The special feature of the sglux Safester UVC is not just to display the measurement value, but also to calculate the maximum exposure time and to display this information using graphic symbols which are easy to understand. Based on this information, it is possible to generate actions to eliminate the harmful radiation. If this is not possible, e.g. during machine maintenance, suitable guidelines for skin and eye protection need to be developed, communicated and implemented.

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### SAFESTER UVC



Radiometers for hazard assessment of artificial UV radiation emitted by low pressure UVC sources in workplaces, according to European Union guideline 2006/25/EC, visualization of the maximum exposure time per day, with acoustical and optical warning features.

The radiometers comply with class 1 (highest precision requirements) of DIN 5031-11 for actinic radiometers. The price includes the following:

- a UV sensor with PTB traceable calibration
- a calibration certificate and,
- a Smartphone.

The Safester UVC is also available without the Smartphone as a software download.



# Ultraviolet (UV) Radiometers

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## MEASUREMENT OF THE SOLAR UV INDEX ACCORDING TO ISO 17166

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The radiometers are used to measure the UV Index according to the ISO 17166 standard.

The UV Index quantifies the risk of sunburn at a given exposure to solar radiation. The ISO 17166 standard defines the scientific background and the requirements for UV Index radiometers. The sglux UV Index radiometers are renowned worldwide for their high precision (= lowest measurement uncertainty) and are used by governmental institutions that use the obtained value to carry out their duty of informing the respective populations about the UV Index.

The Safester UVI radiometer is used by persons that need to pay special attention to solar UV radiation, in particular persons suffering from lupus erythematosus or xeroderma pigmentosum, or persons with increased risk of developing skin cancer. Another group of users are persons that by medical prescription and therapeutic purposes need to be exposed to UV radiation, such as psoriasis patients. Another important application of the Safester UVI is the documentation of the UV Index while investigating the impact of solar UV on plants or animals.

A UV Index radiometer should not be used for lifestyle reasons, e.g. to monitor solar UV exposure during sunbathing or outdoor activities. Even though sglux radiometers are extremely precise measuring instruments, the measured value can never replace the common sense together with daily local UVI forecast that should remind us to enjoy exposure to solar UV only in moderation.

Please refer to our website ([www.sglux.com](http://www.sglux.com)) for datasheet download and price information of the products listed below.

### UV INDEX REFERENCE RADIOMETER (SMARTPHONE BASED)



Digital Smartphone (Android) based UV Index radiometer with graphic display for hazard assessment of natural UV radiation in workplaces according to the ISO 17166 standard (UV Index). The price includes a UV sensor with PTB traceable calibration, a calibration certificate and a Smartphone. The radiometer is also available without a Smartphone and a software download.

### UV INDEX REFERENCE RADIOMETER (CLASSICAL DESIGN)



Digital UV Index radiometer with graphic display for hazard assessment of natural UV radiation in workplaces according to the ISO 17166 standard (UV Index). This device is designed for developers and for all-day use under harsh conditions. It offers a broad range of functions such as a datalogger, data export and graphic display with trend information. The price includes a UV sensor with PTB traceable calibration, and a calibration certificate.



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## OTHER UV RADIOMETERS AND UV DATALOGGERS

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The radiometers are used to measure UV radiation of various processes conforming to various standards.

Industrial, medical or scientific processes use UV radiation to influence or modify the properties of materials or tissues. Usually this UV radiation needs to be quantified to guarantee the process reproducibility. Every process is distinct, with regard to the type of UV radiation and its intensity. A standard UV radiometer cannot be used; an individual calibration and a customized configuration are required instead. Furthermore, some applications require that the sensor device have a specific geometry, e.g. a side-looking sensor. sglux provides a customization service which are applicable to the radiometers listed below.

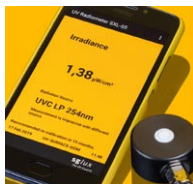
Please refer to our website ([www.sglux.com](http://www.sglux.com)) for datasheet download and price information of the products listed below.

### UVTOUCH



Digital 2-channel UV radiometer with graphic display, touch screen, dosimeter and datalogging function. Data transmission (CAN) complies with GLP and LIMS standards. The UVTOUCH device is designed for developers and for all-day use under harsh conditions. The price includes one sglux UV sensor (free selection from the sglux line) and a customized PTB traceable calibration.

### UV RADIOMETER SXL 55



Digital Smartphone (Android) based UV radiometer with graphic display and dosimeter function. Data transmission (CAN) complies with GLP and LIMS standards. The price includes one sglux UV sensor (free selection from the sglux line) and a customized PTB traceable calibration.

### UVMICROLOG



Rugged UV datalogger for long-term monitoring of moving goods, persons or animals. It includes one customized UV sensor (broadband UV, UVA, UVB, UVC, erythema or  $v(\lambda)$ ) with PTB traceable calibration. Additional sensors for temperature, pressure, relative humidity, and illuminance (VIS) are available. The UVMicrolog stores up to 2,000,000 data records and is also available in an IP67 waterproof version.

### UVMINILOG



Rugged UV datalogger for long-term monitoring of moving goods, persons or animals. It includes one or two customized UV sensors (broadband UV, UVA, UVB, UVC, erythema or  $v(\lambda)$ ) with PTB traceable calibration. Additional sensors for temperature, pressure, relative humidity, and illuminance (VIS) are available. The UVMiniLog stores up to 2,000,000 data records. The battery lifetime is up to 18 months of permanent logging without re-charging of the battery.

## LIST OF PUBLICATIONS

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Metrologia, Issue 51 (2014), p. 282-288.

P. Sperfeld<sup>1</sup>, B. Barton<sup>1</sup>, S. Pape<sup>1</sup>, A. Towara<sup>1</sup>, J. Eggers<sup>2</sup>, G. Hopfenmueller<sup>3</sup>

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B. Barton<sup>1</sup>, P. Sperfeld<sup>1</sup>, A. Towara<sup>1</sup>, G. Hopfenmueller<sup>2</sup>

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EMEA Regional Conference, Karlsruhe, Germany (2013)

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G. Hopfenmueller<sup>1</sup>, T. Weiss<sup>1</sup>, B. Barton<sup>2</sup>, P. Sperfeld<sup>2</sup>, S. Nowy<sup>2</sup>, S. Pape<sup>2</sup>, D. Friedrich<sup>2</sup>, S. Winter<sup>2</sup>,

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D. Prasai<sup>1</sup>, W. John<sup>1</sup>, L. Weixelbaum<sup>1</sup>, O. Krueger<sup>1</sup>, G. Wagner<sup>2</sup>, P. Sperfeld<sup>3</sup>, S. Nowy<sup>3</sup>, D. Friedrich<sup>3</sup>, S. Winter<sup>3</sup> and T. Weiss<sup>4</sup>

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S. Nowy<sup>1</sup>, B. Barton<sup>1</sup>, S. Pape<sup>1</sup>, P. Sperfeld<sup>1</sup>, D. Friedrich<sup>1</sup>, S. Winter<sup>1</sup>, G. Hopfenmueller<sup>2</sup>, and T. Weiss<sup>2</sup>

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