

ÖNORM & DVGW reference radiometer



DVGW Reference radiometer RMD with sensor according to DIN 19294-3

The German Technical and Scientific Association for Gas and Water (DVGW) and the Austrian standardization committee have defined the requirements for UV water disinfection systems with UV low-pressure lamps in DIN 19294-1:2020-08. This also specifies the design, function and opening angle of sensors. The previous technical rule W294-3 and ÖNORM 5873 continue to apply to devices for drinking water disinfection with medium-pressure lamps. The sensors are inserted into a pressurized water-tight measuring window tube, which enables simple and reproducible replacement of the sensors.

With an aperture angle of 160° , our sensors are suitable for precise radiometric measurement of UVC irradiance in UV water disinfection systems. We offer these with reference radiometer RMD.

The RMD radiometer is one of the latest developments from Opsytec Dr. Gröbel GmbH. This easy-to-use radiometer incorporates more than 30 years of experience in all areas of irradiance measurement. It is characterized by a wide dynamic range and extremely low noise.

For this purpose, the sensor already contains a multi-stage amplification, an extremely precise analog-to-digital converter and a temperature sensor. The memory contained in the sensor contains all sensor identifications and the calibration history.

The use of suitable materials ensures excellent corrosion resistance and long-term stability. No ageing can be detected over a period of one year. The sensors are factory or DAKKS / ISO17025 calibrated.

TYPICAL TECHNICAL DATA

Calibration uncertainty	5-7% (k=2)
Linearity error	< 1%
Aging / year	< 2%

ORDER NUMBERS

DVGW Reference sensor	810322
RMD	814401
RMD Pro	814400
Transport case	921001

TECHNICAL DATA DVGW REFERENCE SENSOR

Spectral range	240 - 290 nm	Dimensions	Ø 20 x 60 mm
Measurement range, typ.	0 - 200 W/cm ²	Optical area	Ø 15 mm
Resolution	0,001 µW/cm ²	Weight	160 g
Dynamic range	up to 10 ⁷	Connecting cable	1,5 m
AD conversion	24 bit	Operation temperature	0 to 60 °C
Temperature sensor	integrated	Storage temperature	-20 to 60 °C
Opening angle	160°	Humidity	< 80% non-condensing

TECHNICAL DATA RMD PRO

Sensor connectors	2, fully digital	Power supply	Li-Ion battery, USB
PC interface	USB 2.0 (only RMD PRO)		100 - 240 V, 50/60 Hz
Display	graphical, illuminated		plug-in power supply
Display output	1 + 2 channels	Internal memory	8 GB (only RMD PRO)
	Irradiance + Dose	Sampling rate	adjustable: 1 s - 15 min
	Min/Max Irradiance	Recording time	> 2400 h
Dimensions	160 x 85 x 35 mm	Operation temperature	0 to 60 °C
Weight	250 g	Storage temperature	-20 to 60 °C
		Humidity	< 80% non-condensing

The RMD can be subsequently upgraded with the Pro functions. For this purpose, please order upgrade kit article number 814403.

You can perform the upgrade yourself. It is not necessary to send in the device. We would be pleased to perform the upgrade during the annual recalibration.

FUNCTIONS IN DETAIL

	RMD	RMD Pro
Irradiance measurement	✓	✓
Dose measurement	✓	✓
2 digital sensors can be connected	✓	✓
Integrated temperature sensor	✓	✓
Languages: German / English	✓	✓
Internal memory	-	8 GB
Recording measurements	-	✓
Real time clock	-	✓
USB connection	-	✓
Remote control from PC	-	✓
PC software	-	✓
Measurement data evaluation MIN/MAX	-	✓
Easy firmware upgrades	✓	✓

SCOPE OF DELIVERY

DVGW reference sensor with protective cap and factory or ISO17025 calibration certificate

RMD oder RMD Pro mit USB-Kabel und Steckernetzteil, Anleitung zum download

BACKGROUND INFORMATION

Lamps that generate UV radiation in the short-wave UVC spectral range are used for UV drinking water disinfection. According to TrinkwV §11, low-pressure mercury lamps and medium-pressure mercury lamps are approved for drinking water disinfection. Low-pressure mercury lamps generate almost monochromatic radiation at 253.7 nm.

Due to their high output and high lamp pressure, mercury medium-pressure lamps generate a broad spectrum of UV radiation during operation, including UV-C radiation, which is required for the disinfection of water.

The DIN 19294-1:2020-08 standard not only specifies the requirements for devices with low-pressure mercury lamps for UV drinking water disinfection and their DVGW sensors for UV drinking water disinfection systems, but also defines precise specifications for their calibration.

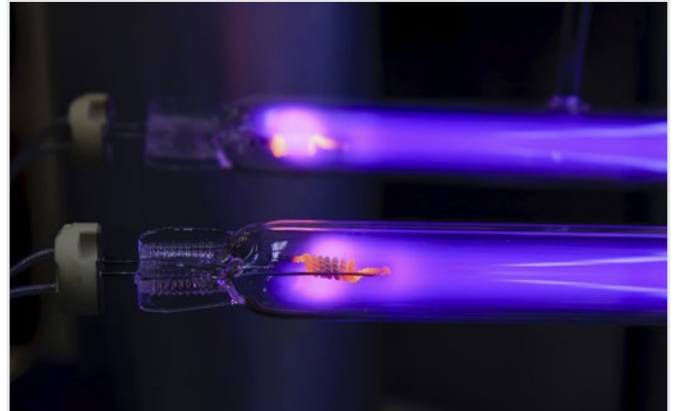
The technical rule DVGW W294-3 and ÖNORM 5873 continue to apply to devices for drinking water disinfection with medium-pressure mercury lamps. During operation, the irradiance in UV drinking water disinfection systems must be continuously monitored in order to monitor ageing, failure and contamination. Both lamp types require regular checks and reference measurements to maintain their effectiveness.

Device sensors that are exposed to UV radiation are subject to an ageing process and must be checked and calibrated regularly. Reference radiometers and sensors with the same measuring field angle and valid calibration are suitable for this purpose and are used by waterworks personnel to carry out regular comparative measurements on UV devices in operation.

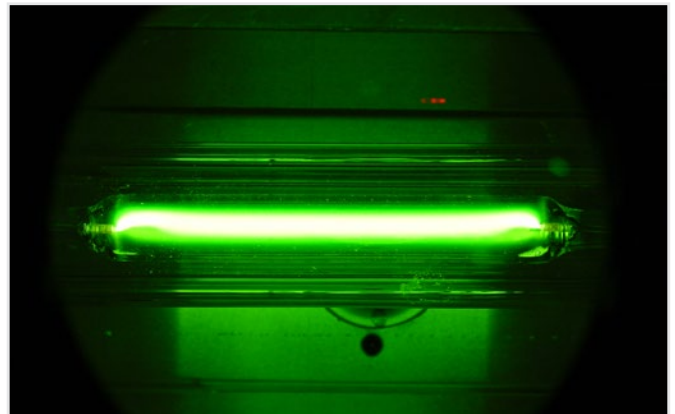
The new technical rule DVGW W294-1:12/2023 also specifies requirements for sensors and reference measurements in order to ensure the performance of these lamps in drinking water disinfection.

Compared to the last edition the new changes are:

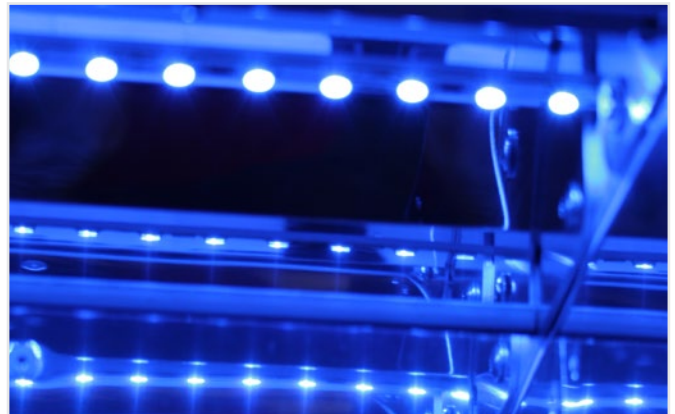
- regular calibrations (annually)
- Intervals for reference measurement (monthly!)



Low-pressure mercury lamps



Mercury medium pressure lamp



UV-LEDs



Measuring window tube

TYPICAL UV SPECTRA

While mercury vapor lamps are a proven technology, UVC LEDs are increasingly becoming an alternative for UV drinking water disinfection due to their mercury-free nature and the latest advances in efficiency and radiation flux. The first pilot systems have already been installed and the latest research results show that the UVC LEDs used are very effective. UVC LEDs use special semiconductors to generate UV radiation.

Their emission is narrow-band, with the wavelength and radiation flux depending on the manufacturing process and the resulting binning. UVC LEDs can be precisely controlled. Not only the device technology, but also the standard for defining device characteristics and determining disinfection efficacy for UVC LED devices in public drinking water supplies is currently being developed.

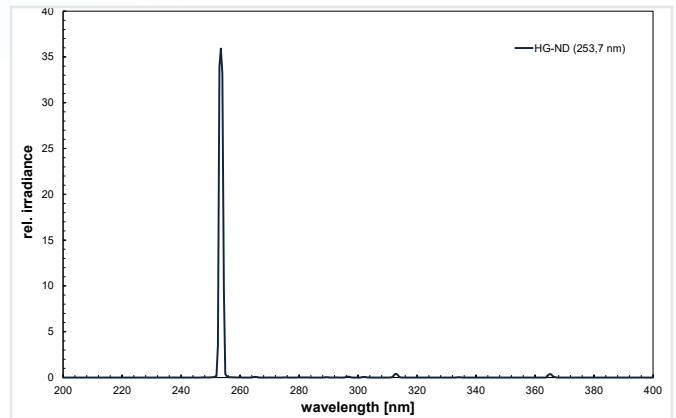
In summary, reference measurement and calibration are becoming increasingly important. Calibration of DVGW sensors is already critical to ensure accurate measurement and control of the UV radiation required for UV disinfection of drinking water. Only appropriately calibrated sensors and reference radiometers may be used for UV devices with one type of lamp and sensor (same design and same type of calibration lamp).

Regular calibrations in accordance with the standard specifications of DIN 19294-1:2020-8 / DIN 19294-3:2020-8 ensure the accuracy of the sensors, which in turn ensures reliable monitoring and control and thus effective and safe drinking water disinfection.

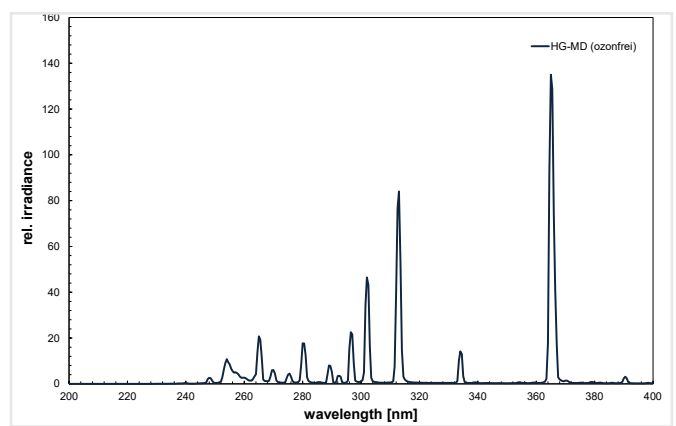
We can calibrate DVGW sensors to these lamps in our laboratory:

- Low-pressure mercury lamps (253.7 nm)
- Mercury medium-pressure lamps (240 - 290 nm)
- UV LEDs (255, 265, 270, 275, 278 and 280 nm)

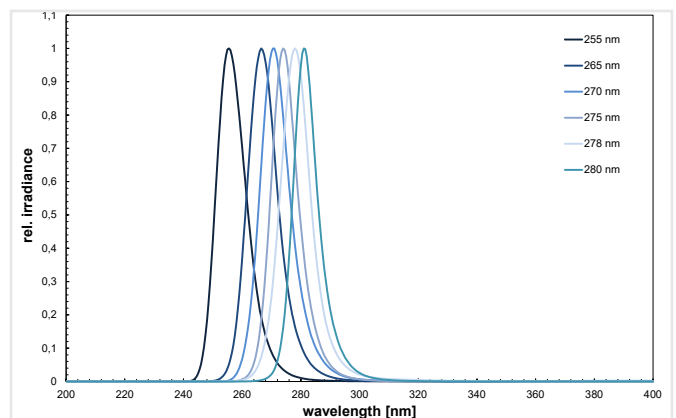
We are accredited as a calibration laboratory for UV sensors and as a testing laboratory for spectrometers, spectroradiometers and light sources in accordance with DIN EN 17025:2018.



Typical emission spectra for low-pressure mercury lamps (253.7 nm)



Typical emission spectra for medium pressure mercury lamps



Typical UV LED emission spectra for UVB and UVC