

Radiometer RM-12

Manual



version 1.2.2E

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2 Preface

Dear Customer!

Thank you for choosing a product manufactured by us!

Please take your time to read this manual carefully. Please pay special attention to the safety instructions.

This is the condition for safe handling and safe operation of the system and its components.

If you have any questions that you do not find answered in this manual, please call us and we will be pleased to assist you. In addition, we always welcome any suggestions or proposals for improvement.

Our products undergo constant advanced development; therefore there may be minor differences between your system and the illustrations given in this Operating Manual.

We will be happy to help you with any questions or problems. You can reach us at the address below. We are also always happy to receive suggestions or ideas for improvement.

THIS MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS.
KEEP THIS MANUAL.

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This is a translation of the original operating manual.

3 Directives and Norms



The system is machinery under Annex II A of the Machinery Directive and is therefore delivered with a declaration of conformity and with a CE mark (in accordance with the Machinery Directive).

Guidelines	
EC Directives	06/42/EC (Machinery) (partially observed) 2014/30/EC (EMC) 2014/35/EC (Low voltage)
Harmonized standards	
EN 61000-6-2:2005	Electromagnetic Compatibility (EMC) – Part 6-2: Immunity for Industrial Environments
EN 61000-6-4:2007 + A1:2011	Electromagnetic Compatibility (EMC) – Part 6-4: Emission Standard for Industrial Environments

4 Identification

4.1 Manufacturer, Ordering of Spares and Customer Service

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4.2 Change history



We reserve the right to make changes in content. Opsytec Dr. Gröbel GmbH is not liable for any errors in this documentation. No liability shall be accepted for indirect damages arising from the delivery or use of this documentation, in as far as this is legally permissible.

Version	Editor	Date	Change
1.2.2	Paravia	22.10.2020	Editorial changes

4.3 Copyright



Opsytec Dr. Gröbel GmbH shall retain the copyright for these operating manual. The operating manual is intended for the owner/operator and his personnel.

Copyright in accordance with DIN ISO 16016:

Reproduction and copying of this document, use and disclosure of its contents are prohibited unless expressly authorized.

Non-compliance may result in a claim for damages. All rights reserved in case of registration of patent, utility patent, or design patent.

Contraventions may be subject to prosecution.

4.4 Intended use

The RM-12 determines, with the corresponding sensors, the irradiance and dose in the UV and VIS spectral range and shows it on the integrated display. Operation is only allowed in dry environment. ~~Die Aufbauanlage ist beliebig.~~

If required, the sensors are available splash-proof to IP65.

When using the sensors, light, IR and UV radiation can be reflected and scattered. If necessary, suitable protective measures must be taken to protect against radiation.

The system is intended exclusively for industrial use in ordinary locations as defined by the National Electric Code (NEC), NFPA 70. It is prohibited to use the equipment in hazardous areas or for general lighting.

It is prohibited to use the devices in explosive environments or for general lighting

- Installation, commissioning, operation, maintenance and service work may only be carried out by trained and qualified personnel who comply with all safety guidelines and standards.
- Responsibility: Damage resulting from unintentional or unauthorized interference terminates any right to make warranty or liability claims against the manufacturer.
- Exclusion of warranty: The use of any non-original parts invalidates the warranty.
- Environmental protection: Defective parts containing environmentally harmful substances must be disposed of accordingly.
- Only suitable for operation in closed rooms.
- Before opening, the system must be disconnected from the power supply and it must be checked that no voltage is present.
- Wear gloves for cleaning the sensors.
- Any use other than that mentioned above will result in damage to the product. It is also associated with hazards such as short circuits, fire and electric shock. The entire device must not be changed and/or modified! The safety instructions must be observed at all times.

4.5 Foreseeable misuse

The following is considered to be foreseeable misuse:

- Operation of the device without safety devices and equipment.
- Work on the device by untrained personnel.
- Non-compliance with the owner/operator's operating instructions.
- Ignoring of the operating manual.
- Processing of materials other than those specified in the technical data.
- Any other use outside the intended specified use.

4.6 Legal Information

4.6.1 Limitation of liability

All information in this manual has been compiled taking into account the currently applicable standards and regulations, the technical standard and our many years of knowledge and experience.

The manufacturer is not liable for damages in case that:

- This manual is ignored,
- The device is improperly used,
- Untrained personnel is deployed,
- Untrained personnel operates the machine incorrectly,
- Unauthorized modifications are made,
- Technical changes are made,
- Unauthorized modifications are made,
- Non-observance of the instructions in the manual regarding safety, transport, storage, assembly, commissioning, operation and maintenance
- Improperly performed repairs
- Impact of foreign bodies or mechanical damage

We shall not be liable for common faults of the device caused by power outage or failure of the control system.

The actual scope of delivery may be different than the explanations and pictures in this manual in case of special versions, when additional options are ordered or due to the latest technical changes.

The obligations agreed in the delivery contract, as well as the legal requirements valid at the time the contract was concluded shall apply.

4.6.2 Declaration of conformity

The declaration of conformity is in the annex or can be requested from the manufacturer.

4.6.3 Warranty Terms

The warranty terms and guarantee conditions are governed by the German Civil Code (BGB). The warranty period is one year unless otherwise agreed in the purchase documents.

Warranty and liability claims are excluded if they are due to one or more of the following causes:

-
- Improper use
 - Improper assembly, commissioning and operation
 - Non-observance of the instructions in the manual regarding safety, transport, storage, assembly, commissioning, operation and maintenance
 - Unauthorised spare parts have been used
 - technical modifications have been made
 - Improperly performed repairs
 - Impact of foreign bodies or mechanical damage
 - act of nature beyond control

We expressly reserve the right to make technical changes that serve to improve or increase the safety standard without separate notification.

5 General

IMPORTANT SAFETY INSTRUCTIONS

WARNING - Always observe the following basic precautions when using electrical equipment:

- a) Read all instructions before using the device.
- b) This device may only be used by qualified and trained personnel. See the training section of this manual.
- c) Do you know how to switch off the product become thoroughly familiar with the controls.
- d) Stay alert - observe what you do.
- e) Do not use the product if you are tired or under the influence of alcohol or drugs.
- f) Keep the danger zone away from all persons.
- g) Do not place the device on an unstable surface.
- h) Follow the maintenance instructions given in the user manual.
- i) Keep this manual in a safe place.

5.1 Information about this Manual

This manual intends to make handling of this system and its components safe and efficient. The manual is part of the system and must be kept in its immediate vicinity where it is accessible for the personnel at any time.

This documentation contains the necessary information for the intended use of the described system. It is intended for technically qualified personnel who have been especially trained for operation, laboratory use, quality assurance, service and repair.

The personnel must have read this manual carefully and understood its content before commencing any work. The basic condition for safe working is observation of all stated safety information and operating instructions in this manual.

Knowledge and technically faultless implementation of the instructions, safety requirements, safety information and warnings are a condition for safety in operation, service and repair. Only qualified personnel has the required professional knowledge to apply the safety requirements, safety information and warnings stated in this operating manual in a general way correctly in a concrete situation.

In addition, the local accident prevention regulations and general safety regulations apply for the area of application of the system.

Illustrations in this manual serve the purpose of general understanding; they may differ from the actual version.

Apart from this manual the instructions for the installed components included in the appendix apply.

This operating manual cannot take any possible case of maintenance into account. If you need further information or if special problems occur that are not treated extensively enough in this manual please request the required information from the manufacturer.



For a simple description, the above mentioned components are collectively referred to as system.



5.2 Information about the Symbols



5.2.1 SAFETY INSTRUCTIONS



In this manual, safety information is indicated by means of symbols. Safety information is preceded by signal words that indicate the scope of risk.

To avoid accidents and damage to persons or property, always follow the information and act prudently.

Throughout the text, you will find the following pictograms with the following meanings:

	 DANGER
	<p>Imminent danger Possible consequences: death or most serious injuries.</p> <ul style="list-style-type: none"> • Prevention

	 WARNING
	<p>Dangerous Situation Possible consequences: death or most serious injuries.</p> <ul style="list-style-type: none"> • Prevention

	 CAUTION
	<p>Possible Situation Possible consequences: slight or minor injuries. Sometimes also used for warning of material damage.</p> <ul style="list-style-type: none"> • Prevention



Note

Information for use or useful important information

5.2.2 WARNING SIGNS



Warning of optical radiation
(such as UV, IR, or visible radiation)

5.2.3 ATTENTION



Wear eye protection!



Use hand protection!



Refer to the instruction manual/booklet

5.3 Owner/operator information

The System is used in the commercial sector. The owner/operator of the system is therefore subject to the legal obligations concerning work safety.

In addition to the safety information in this manual, the generally applicable regulations valid for the application area of the system concerning safety, prevention of accidents and for protection of the environment must be noted and complied with.

The following applies in particular:

The owner/operator must acquire information about the valid occupational health and safety information and in a risk assessment determine additional hazards incurred due to the special operating conditions at the location of use of the system. He must implement these in the form of operating instructions for operation of the system and specifically for the individual work stations.

The owner/operator is obliged to check during the entire lifetime of the system whether the operating instructions that he generated comply with the current status of the regulations and update them if necessary.

The owner/operator must assign and define the responsibilities for installation, operation, rectification of faults, service and cleaning unambiguously.

The owner/operator must ensure that all personnel dealing with the system have read and understood this manual. Furthermore, he is obliged to provide personnel training in regular intervals and provide information about risks.

The owner/operator must provide the required personal protective equipment for his personnel. Furthermore, the owner/operator is responsible that the system is always in faultless technical condition. To ensure this, the service intervals specified in this



manual and in the technical documents for the individual systems must be observed and all safety installations must be checked regularly for function and completeness.

The owner/operator must have all safety devices checked regularly for function and completeness.

The owner/operator must ensure that the operating personnel have knowledge about first aid measures and local rescue installations.

5.4 Personnel requirements

5.4.1 Qualifications

 WARNING	
	<p>Risk of injury when personnel are insufficiently qualified!</p> <p>If unqualified personnel carries out work on the system or stays in the danger area of the system risks arise that may cause severe injuries and serious material damage.</p> <ul style="list-style-type: none">• Have all activities carried out only by personnel qualified for the activity.• Keep unqualified personnel away from the danger area.

Below, this manual lists the qualifications of the personnel for the various areas of activity:

5.4.2 Qualified person

Qualified persons are trained or can be trained by Opsytec Dr. Gröbel GmbH in extended operation and parameterization of the system as well as in execution of preventive service work.

In addition, due to their technical training, knowledge and experience and knowledge of the relevant standards and regulations, they are able to carry out work they have been assigned and to recognize and avoid possible risks independently.

5.4.3 Operator

Operators use and operate the system in the scope of the intended use. They are trained by the owner/operator in the work assigned to them and informed about possible risks.

5.4.4 Training and qualification of personnel

In regular instructions and training, operating personnel must be informed about the special risks when working with and handling the system.

The instruction and training should have the following content:

Hazards when working with the system in normal operation.

Hazards in connection with service, repair and cleaning activities.

Conduct to minimize consequences of accidents.

Conduct in case of accidents.

Rescue of injured persons.

Working without personal protective equipment may cause health damage. The company supervisor is instructed to pay attention that personnel are wearing personal protective equipment.

Instruction and training must be carried out in regular intervals by the owner/operator. For better tracking, execution of instruction and training should be recorded.

5.5 Personal protective equipment

The purpose of personal protective equipment is to protect personnel from hazards that could affect their safety or health when working with the RM-12 and UV lamps, LEDs or lights.

When performing various activities on and with the system, personnel must wear personal protective equipment. This is pointed out repeatedly in the individual chapters of this manual. The personal protective equipment is explained below:

5.5.1 Protective gloves

Protective gloves are used to protect the hands from visible and/or invisible radiation, friction, abrasions, stitches and deep injuries.

5.5.2 Safety goggles


Safety glasses are used to protect the eyes from visible and/or invisible.

Safety glasses and storage boxes can be ordered from Opsytec Dr. Gröbel GmbH, Am Hardtwald 6-8, 76275 Ettlingen, Germany or UVEX AREITSSSCHUTZ GMBH, Würzburger Str. 181 - 189, 90766 Fürth, Germany:

Protective eyewear part number: 9169065

Storage box part number: 9957502

	⚠ CAUTION
	Use eye protection when working with the light source in the danger zone.


	⚠ CAUTION
	Store the safety glasses in a protected place at the place of use when not in use.


6 Safety instructions and residual risk


6.1 General

The system is state-of-the-art and has been built in compliance with recognized safety regulations. Nonetheless, its use may constitute risks for life and limb of the operating and repair personnel (service personnel) or third parties or impairments to the machine. Operate the system only when its safety devices are in faultless condition. Disruptions that impair its safety must be rectified at once.

The following safety information must be strictly observed to prevent damage to the machine and personal injury!

	⚠ WARNING
	<p>Risk of injury if personnel do not read the operating manual! Before commissioning and operation, read the operating manual completely. Read all safety notes and instructions. Failure to follow the safety warnings and instructions may result in electric shock and/or serious injury.</p>

	CAUTION
	<p>Material damage due to kinking of the cables If you bend the cables too much, cable breaks may occur. This can lead to impairment up to Lead the cables through the functional inaccessibility. -avoid bending or kinking the cables too much. -Lay the cables together in a wide circle.</p>

	CAUTION
	<p>Material damage due to improper handling If you carry the sensors on the cable, material damage may occur over time. This can lead to malfunctions or even to the sensors not functioning properly. -Pick up the sensors for transport.</p>

CAUTION	
	<p>Material damage due to high temperatures</p> <p>If the sensors are exposed to high temperatures, material damage may occur.</p> <p>This can lead to impairments or even to the inoperability of the sensors.</p> <p>-The sensors may be exposed to max. 60 °C.</p> <p>-If necessary, do not expose the sensors to radiation for long periods of time to avoid overheating.</p>

6.2 Safety instructions in relation to normal operation

Never look directly into LEDs, lamps or UV lamps.

The RM-12 itself does not emit any hazardous radiation.

Safety for persons working with UV radiation:

The wearing of personal protective equipment (e.g. safety goggles and hand protection) is generally recommended when measuring LEDs, lamps or UV lamps. Wear personal protective equipment to protect eyes and skin if you cannot ensure complete shielding of UV radiation.

Safety glasses used must comply with the EN 170 standard (max. spectral transmission (365 nm) 0.3%) and provide protection against direct and lateral radiation.

Attach warning signs to the work area and all access points.

Demarcate the working area for manual workstations or mobile use accordingly.

The risk assessment for a UV workstation is the responsibility of the customer. This requires measurements / assessments according to DIN EN 14255-1:2005-06 "Measurement and assessment of personal exposures to incoherent optical radiation - Part 1: Ultraviolet radiation emitted by artificial sources in the workplace".

DIN 14255-1 itself does not contain any limit values. These are given in Directive "2006/25/EC of the European Parliament and of the Council on minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation)".

CAUTION	
	<p>Risk of damage</p> <ul style="list-style-type: none">• Skin grease and dirt are absorbent in the UV and visible spectral range.• Avoid fingerprints on the optically active sensor surface. If necessary, the components must be carefully cleaned with isopropanol.

6.3 Maintenance and troubleshooting

The chapter "Maintenance" describes all necessary work, the regular execution of which ensures reliable operation.

Apart from the measures described in this manual, no unauthorized repairs or modifications may be carried out. Furthermore, no changes, additions or conversions may be made without the manufacturer's approval.

If a fault occurs which cannot be rectified using the instructions, contact the manufacturer's customer service department.


In addition, carry out regular maintenance, servicing and cleaning work to ensure a technically perfect condition and increase the service life.

Eliminate immediately any faults that impair safety.

Immediately replace components and parts that are not in perfect condition.

Operation is not permitted if there is visible damage to the device.

6.4 Safety instructions regarding service and repair work

CAUTION	
	<p>Risk of damage</p> <ul style="list-style-type: none"> • Skin grease and dirt are absorbent in the UV and visible spectral range. • Avoid fingerprints on the optically active sensor surface. If necessary, the components must be carefully cleaned with isopropanol.

Service, repair and cleaning work may only be carried out by authorised and specially trained specialists. The system must be de-energized and secured before major work (including cleaning) is carried out).

Perform the prescribed adjustment, service and inspection work according to the plan.

Only qualified electricians may carry out work on the electrical system.

Safety devices may only be removed during service and repairs if the system has been previously switched off and brought into a safe condition.


During service and maintenance work, important safety installations may no longer function. This type of work therefore requires special care.

6.5 Safety instructions regarding the power supply

The device is powered by 9V battery.

The battery condition is monitored during operation. If an arrow appears in the display, the battery must be replaced immediately. The battery compartment is located on the underside of the device.

To replace the battery, use the same type. Open the battery compartment cover on the rear side, bottom, replace the battery and close the battery compartment cover..

CAUTION	
	<p>Risk of damage</p> <ul style="list-style-type: none"> • Only high-quality, leak-proof batteries should be used for operation, e.g. Varta 3022 or 4022, IEC 6 F 22.

7 Description of the system and functional overview

The battery-operated compact radiometer RM-12 is equipped with a 3½ digit LC-Display. Three preset versions with different sensitivities are available. For example:

- 0 - 19.99 mW/cm²
- 0 - 199.9 mW/cm²
- 0 - 1999 mW/cm²

Using the button "ON/OFF" the instrument is switched on and off. The button "Range" allows switching between the two ranges and hereby enhances resolution and accuracy.

Note, sensor calibration and measuring range are stored in sensor and given on sensor type label.

The meter is extremely linear over the whole measuring range.

The sensors are connected to the display unit via cable, thus allowing measurements in positions inaccessible to the unit. The spectral sensitivity ranges from 200 to 780 nm, for which different sensors are available. The sensor inputs use cosine-corrected diffusors.

Fields of application are:

- Control of UV-lamps in production and manufacturing
- Analysis of the ageing of lamps
- Transmission measurement
- Radiation protection
- Measurement of radiation rate and dose in Biology, Medicine etc.
-

The following components are supplied:

- RM-12
- Sensor* / Sensors*
- Suitcase*
- Factory calibration certificate, optionally ISO 17025 calibration certificate*
- this documentation



For simple description, the above components are collectively referred to as a system.

The following components are required by the customer:

- Personal protective equipment

7.1 Battery monitoring

The battery condition is monitored during operation. If an arrow appears in the display, the battery must be replaced immediately. The battery compartment is located on the underside of the device.

7.2 Radiation protection

UV radiation is harmful to humans, so please observe the protective regulations when working. Furthermore, UV-C radiation in particular is destructive to materials. It is therefore advisable not to expose the sensors to excessive radiation. Avoid overloading the sensors and use an aperture in good time.

If the thermal load from the radiators is too great, it may be useful to place a shielding hood over the sensors, which only exposes the receiver surface. In this way the heating of the sensors can be reduced considerably.

7.3 Practical tips

The sensors are connected to the RM-12 via a cable of about 2 m length. This ensures that even when measuring in inaccessible places, readings can be taken easily.

But keep in mind that radiation measurements are not as easy as measuring lengths with a scale. Although the measuring device provides you with a number, this number depends in many ways on your measuring arrangement. For example, the measured value decreases with the cosine of the tilt angle when the sensor is tilted off the axis of the radiator-sensor.

For reproducible measurement results, the environment around the lamp must have constant reflection ratios; the lamp voltage and lamp wattage must remain constant, as must the ambient temperature and the air flow conditions at the lamp. In addition, of course, the measurement position in relation to the lamp must be maintained and - very important - the spectral composition of the lamp must not have changed.

For each type of lamp - UV-A, UV-B or UV-C lamps - the appropriate sensor must be used. The determination of the UV-B and/or UV-C irradiance on UV-A lamps or correspondingly UV-A and/or UV-C irradiance on UV-B lamps naturally leads to incorrect measurements, as the sensors in the adjacent area are still partially sensitive and thus, for example, the very high UV-A content of a UV-A lamp in a UV-B measurement leads to an increase in the measured value.

7.4 Transmission measurements

For transmission measurements the probe is positioned between lamp and sensor. Transmission is calculated using the ratio of the reading with and without the probe. The spectral range can be reduced using an interference filter.

7.5 Transport, storage, delivery



Sensitive components

When transporting the system, therefore, make sure that it is not subjected to any load or hard impacts. Store the system according to the technical data - dry and dust-protected.

**Check the scope of delivery**

Check the delivered parts for completeness, damage or other conspicuous features. Document any damage found and report it immediately to the manufacturer or supplier.

No liability is assumed for obvious transport damage reported later.

**Packaging material**

Please dispose of the packaging material in an environmentally friendly manner.

7.6 Commissioning

Ensure appropriate workplace safety, especially from UV radiation

Operate the device only in dry rooms (relative humidity max. 80 %, non-condensing) and in an environment with max. 40 C. Do not operate the device in hazardous areas, not in dirty, dusty or oily environments.

Protect the device from chemical vapors and solvents, shocks and vibrations, splash water, condensation on its surface and corrosive media.

- Unpack all components and remove the packaging materials.
- Position the sensor(s) at the desired location.
- Connect the sensor(s) to the connectors at the top of the RM-12. It does not matter which of the two inputs you plug the sensor into.
- Switch on the RM-12.

8 Operation

The RM-12 radiometer is operated via two keys. These are located on the front panel below the display. The keys and the function assignment are shown below:

Button	Function
ON/OFF	ON/OFF /Aus
RANGE	Switching the decimal place / measuring range switching



8.1 Switching on / off

The instrument is switched on or off with the ON/OFF switch.

8.2 Measuring with the RM-12

The RM-12 displays the currently measured irradiance or, in the case of LUX sensors, the illuminance. The unit can be taken from the sensor.

The measurement screen updates approximately 2 times per second.

8.3 Battery monitoring

The battery condition is monitored during operation. If an arrow appears in the display, the battery must be replaced immediately. The battery compartment is located on the underside of the device.

9 Technical data



The pin assignment for special versions may vary and can be found in the "Technical Drawing" appendix.

General data	
Ambient temperature	0 to 60 °C
Storage temperature, approx.	-20 to +60 °C
Air humidity	0% to 80% relative humidity, non-condensing
Type of structure	Handset
Mounting position	any
Dimensions, control electronics	160 x 85 x 35 mm
Weight	Approx. 250 g
Display	3.5 digits, depending on version 0 - 19.99 0 - 199.9 0 - 1999
Noise emission	Lpa < 70 dB at the workplace in normal operation according to DIN 45635 T. 19

Measurement	
Display output	Irradiance

Connections	
Sensor connections	1 piece

TECHNICAL DATA SENSORS (TYPICALLY)	
Measuring range	0 - 200 mW/cm ² ; alternating 0 - 20 mW/cm ² ; 0 - 2000 mW/cm ² 0 - 2 mW/cm ²
Dimensions	Ø 40 mm, h 35 mm
Optical surface	Ø 10 mm
Weight	160 g
Connection cable	2 m
Operating temperature	0 to 40 °C
Storage temperature	-20 to 60 °C
Air humidity	<80%, non-condensing



The technical data for special versions may vary and can be found in the appendices to the special versions.

Spectral ranges of the sensors	
UVC	200 - 280 nm
UVB	280 - 315 nm
UVA	315 - 400 nm
UVA+	330 - 455 nm
UVBB (Broadband)	230 - 400 nm
VISB	400 - 480 nm
VISBG	400 - 570 nm
LUX	380 - 780 nm, V(λ)

10 Errors / faults

The following notes and error messages are directed to the user. The explanations should help to ensure proper operation. Possible reasons and remedies are given.

Function / Display	Meaning	Measures
The RM-12 cannot be switched on	Battery empty	Charge the battery.
The irradiance is too low	Sensor aging Sensor dirty	Have the sensor recalibrated Clean sensor (e.g. with ISOPROPANOL)
Sensor is not displayed	Sensor not recognized	Reconnect sensor Restart RM-12
RM-12 does not display anything	saturation	Reduce irradiance

11 Maintenance & Cleaning



This chapter is intended for qualified users with maintenance tasks.

The system is largely maintenance-free. Clean the optical components only if necessary.

The RM-12 is a system that requires only occasional cleaning as maintenance according to need and calibration.

For cleaning, we recommend that this is only carried out when necessary and not regularly, as the sensor surface is (scratch) sensitive.

The following table gives some maintenance steps as a recommendation:

No.	Maintenance item	Procedure	Recommended frequency
1	Sensor check	Check sensors, must be free of dirt, otherwise clean / recalibrate.	Monthly
2	Cleaning of the components	Visual inspection The surfaces must be clean. Cleaning only as required.	Monthly
3		If cleaning is necessary, use compressed air or isopropanol (UV-IR grade) and a very soft paper towel.	If required
4	Calibration	Check the calibration by comparison measurement or calibration date.	If required
5		If recalibration is necessary, send to the manufacturer	Annually
6	Testing the cables	Check all wiring connections for possible damage or loose contacts. Replace if necessary.	All 6 weeks

Only carry out cleaning work on the sensor as required. This gives you the best possible stability. Clean exclusively with isopropanol (UV-IR-GRADE), with oil-free compressed air or with clean, lint-free cloths.



Wear clean, lint-free gloves.


Apply the cleaning agent only to the cloth, only moisten.

The cleaning agent could get inside and cause damage to property.

Wipe with little pressure, in a circular motion over the surfaces.

Then remove all residues of the cleaning agent.

 CAUTION	
	<p>The surfaces of the sensors can be affected by UV radiation heat it up. This can cause burns on contact.</p> <p>Therefore please note:</p> <ul style="list-style-type: none">- wear protective gloves if necessary- If necessary, observe the cooling phase

CAUTION	
	<p>Risk of damage</p> <ul style="list-style-type: none">• Skin grease and dirt are absorbent in the UV and visible spectral range.• Avoid fingerprints on the optically active sensor surface. If necessary, the components must be carefully cleaned with isopropanol.

11.1 Calibration

We recommend to have the sensors used calibrated every year by the manufacturer to ensure accurate measurement results.

12 Spare parts



Please contact us for replacement orders:

Opsytec Dr. Gröbel GmbH

At Hardtwald 6-8

76275 Ettlingen

Germany

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When operating with damaged components or foreign components, no guarantee can be given for the correctness of the measured values. Furthermore, compatibility with foreign components is not guaranteed.

 CAUTION	
	<p>Damaged components or foreign components</p> <p>When operating with damaged components or foreign components, operational safety is not guaranteed.</p> <p>There is a risk of injury and damage to property.</p> <ul style="list-style-type: none">- Replace damaged parts immediately- Only use original parts, spare parts and accessories

13 Declaration of conformity



Manufacturer :	Company name: Opsytec Dr. Gröbel GmbH Road: Am Hardtwald 6-8 Place: 76275 Ettlingen Country: Germany
Authorized person for compiling the technical documentation:	Company name: Opsytec Dr. Gröbel GmbH Road: Am Hardtwald 6-8 Place: 76275 Ettlingen Country: Germany
product:	Radiometer RM-12 with sensors
Type designation:	RM-12
Type number:	821200 XXXX 8110XX XXXX 921000

The manufacturer hereby declares that we have developed, designed and produced the above-mentioned product(s) under our sole responsibility and that the product complies with the following standard(s) or directive(s) in this declaration:

2014/35/EU

"Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the provision of electrical equipment for household and commercial use Equipment for use within certain voltage limits on the market (Low Voltage Directive)".

2014/30/EU

"Directive of the European Parliament and of the Council on electromagnetic compatibility (EMC Directive, recast)".

The conformity of the designated product with the provisions of the Directive is demonstrated by full compliance with the following standards:

DIN EN 60204-1: Safety of machinery - Electrical equipment of machines -
Part 1: General requirements (IEC 60204-1:2005, modified)

Ettlingen, 22.10.2020

signed. Dr. Mark Paravia