

# UVpad / UVpad E

## Manual



version 2.1.0E

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## 2 Preface

Dear Customer!

Thank you for choosing a product manufactured by us!

You have thus decided to purchase a high-quality precision UV meter. The operation is simple. Nevertheless, please take some time to read this manual carefully. Please pay special attention to the safety instructions.

This is the condition for safe handling, safe operation of the system and for the best possible measuring accuracy. In order to ensure this measurement accuracy over a longer period of use, we recommend that you send your instrument to us for recalibration every 12 months.

Please note:

These instructions apply to the UVpad with integrated sensor and the UVpad E with external sensor. You can operate both device versions identically, selecting the band mode for measuring curing systems.

If you have any questions that are not answered in this manual, please feel free to call us. We will be glad to help you.

Our products are under constant development; therefore, there may be minor differences between your system and the illustrations in this operating manual.

We will be happy to assist you with any questions or problems you may have. You can reach us at the address below. We are also always pleased 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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 www.opsytec.com

### 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
2.0.0	Paravia	15.11.2022	Translation
2.1.0	Paravia	04.12.2023	Change to Viewer 2

### 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 Device identification

Information for internal use:

Description of the machine:	.....
Year of manufacture:	.....
machine no.	.....
project number	.....

### 4.5 Intended use

In the quality control of UV-varnishes, broadband radiometers and spectral radiometers are used to monitor the lamp power and to adjust the system in an optimal way. However, broad-

band radiometers are only calibrated to one lamp type and differ in their sensitivity. Thus, comparisons between the measurement instruments of different manufacturers, different lamps (Hg, Ga, I,...) or UV-LEDs are not possible. By means of spectral radiometers, all UV-sources can be measured and compared.

Here, the UVpad offers enormous application advantages compared to the common spectral radiometers.

Not only is the UVpad the worlds flattest autonomic spectral radiometer, it also offers a high-quality spectral measurement technology in a robust and easy to operate measurement device.

The UVpad enables wireless measurements in production and conveyor systems for all UV processes. It measures the entire spectrum continuously and analyses the data in real-time. As a result, the spectral range is evaluated and illustrated conforming to standards. Hereby, comparisons of different lamps are possible. By optionally provided photo initiator spectrums, UV processes can also be optimized related to causes and effects. The UVpad offers these functions/features:

Spectral measurements:

- Real-time of the spectrum (scope measurement)

Radiometric measurements:

- Spectrum at max irradiance
- Irradiance (UVA, UVB, UVC, VIS)
- Profile of irradiance
- Dose of irradiance (UVA, UVB, UVC, VIS)

Measurements related to cause and effects:

- Photo initiator spectrums (optional)
- Sensitivity functions of broadband radiometers (optional)

When using the device, 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.

## 4.6 Intended Use UVpad

The UVpad determines the irradiance in the UV and VIS spectral range and indicates these on the integrated display. It can be used in UV curing systems, if the maximum operating temperature of 70 °C is not exceeded. For this reason, the UVpad is equipped with a thermal shield on the rear panel. The rear panel of the UVpad may be exposed to intensive UV radiation. The front panel must not be exposed to UV radiation.

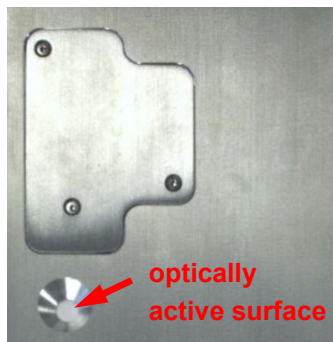
The UVpad is solely intended for the determination and visualization of irradiances, which are generated in UV curing systems.

The UVpad is operated by an internal accumulator.

Operation only allowed in dry environments. The assembly position is arbitrary.

The housing, with the exception of the battery compartment, must not be opened by the user.

The optically active surface must not be touched.



Gloves need to be worn when cleaning the optically active surface.

The UVpad is a highly sensitive optical measurement device. It must not be exposed to shocks.

Any other usage than the one described above leads to a damage of the product. Furthermore, this involves risks, such as short-circuits, fire and electric shocks. The entire device must not be modified and/or remodeled! The safety indications are to be observed without fail.

## 4.7 Intended Use UVpad E

The UVpad E determines the irradiance in the UV and VIS spectral range and indicates these on the integrated display. Typical Applications:

- Measurement of UV-LEDs and ultraviolet lamps
- UV dose measurements
- Universal irradiance measurement
- GMP and IQ/OQ documentation

The UVpad E is solely intended for the determination and visualization of irradiances, which are generated in UV curing systems.

The UVpad E is operated by an internal accumulator.

Operation only allowed in dry environments. The assembly position is arbitrary.

The housing, with the exception of the battery compartment, must not be opened by the user.

The optically active surface must not be touched.



Gloves need to be worn when cleaning the optically active surface.

The UVpad E is a highly sensitive optical measurement device. It must not be exposed to shocks.

Any other usage than the one described above leads to a damage of the product. Furthermore, this involves risks, such as short-circuits, fire and electric shocks. The entire device must not be modified and/or remodeled! The safety indications are to be observed without fail.

## 4.8 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.

## **4.9 Legal Information**

### **4.9.1 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.

### **4.9.2 Declaration of conformity**

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

### **4.9.3 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:

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

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

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



#### **Note**

Information for use or useful important information

## 5.2.2 Prohibition Signs



General "Prohibited-sign"

## 5.2.3 WARNING SIGNS



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



Warning about electricity!

## 5.2.4 ATTENTION



Wear eye protection!



Opaque eye protection must be worn!



Disconnect the power plug from the socket!



Disconnect before carrying out maintenance or repair!



Use hand protection!



Refer to the instruction manual/booklet



### 5.2.5 Optional functions

- \* Optional functions, not available for every system

## 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

The maximum number of qualified professionals who may be present at the site at the same time: 2

### 5.4.1 Qualifications

 <b>WARNING</b>	
	<p><b>Risk of injury when personnel are insufficiently qualified!</b></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"><li>• Have all activities carried out only by personnel qualified for the activity.</li><li>• Keep unqualified personnel away from the danger area.</li></ul>

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 RMD Pro 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

	<b>⚠ CAUTION</b>
	<b>Use eye protection when working with the light source in the danger zone.</b>


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


## 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!

	<b>⚠ WARNING</b>
	<p><b>Risk of injury if personnel do not read the operating manual!</b></p> <p>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>

	<b>CAUTION</b>
	<p><b>Material damage due to kinking of the cables</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>-avoid bending or kinking the cables too much.</li> <li>-Lay the cables together in a wide circle.</li> </ul>

	<b>CAUTION</b>
	<p><b>Material damage due to improper handling</b></p> <p>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.</p> <ul style="list-style-type: none"> <li>-Pick up the sensors for transport.</li> </ul>

<b>CAUTION</b>	
	<p><b>Material damage due to high temperatures</b></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> <ul style="list-style-type: none"><li>-The sensors may be exposed to max. 60 °C.</li><li>-If necessary, do not expose the sensors to radiation for long periods of time to avoid overheating.</li></ul>

## 6.2 Safety instructions in relation to normal operation

Never look directly into LEDs, lamps or UV lamps.

The UVpad / UVpad E 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)".

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

### 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

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

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 lithium polymer batteries. To recharge the batteries, plug the USB cable into the USB port of the UVpad / UVpad E and connect the other end of the cable to the USB interface of a computer or to the mains voltage using the supplied mains adapter.

 <b>WARNING</b>	
	<p><b>Fire hazard from lithium polymer batteries</b></p> <p>If the device is exposed to strong thermal or mechanical influences, the lithium-polymer battery may be damaged.</p> <p>This may cause spontaneous combustion of the battery.</p> <p>Toxic vapours escape and a metal fire is started.</p> <p><b>Avoidance</b></p> <p>Do not use or store the device</p> <ul style="list-style-type: none"><li>- near strong heat sources</li><li>- over 60 °C</li></ul> <p><b>Measures</b></p> <ul style="list-style-type: none"><li>- Don't breathe the fumes.</li><li>- Do not attempt to extinguish the metal fire yourself but inform the fire brigade immediately.</li></ul>



Lithium batteries must be disposed of as hazardous waste. Waste key number: 1606



## 7 Description of the system and functional overview

The UVpad is the flattest, spectral measuring and autonomous UV radiometer in the world. It combines scientific measurement technology with a compact and user-friendly measuring instrument.

With the UVpad E, we combine the advantages of spectral measurement technology with a handy and easy-to-use radiometer. The UVpad E is based on our successful radiometer UVpad. Due to the external sensor and optimized programming it is even more precise and easier to operate.

In both devices the UV light is spectrally decomposed. Thus, measurements are traceable to national standards. Since it works without filters, it is particularly suitable for measuring and comparing different lamps. For this purpose, 512 photodiodes record the spectrum in the wavelength range 240 - 480 nm. The classification into UVA, UVB, UVC is standard-compliant and traceable. Calibration to only one light source is not necessary.

All measurement data are immediately displayed on the instrument. 50 measurements are stored in the UVpad and can be read out via USB. The included PC software evaluates the irradiance profiles separately for UVA, UVB, UVC & VIS. Spectra and measurement data can be exported and stored.

During the measurement the spectrum is shown on the graphical display. With the push of a button the irradiances for UVA, UVB, UVC and VIS are available. The spectrum is already recorded in the background. During the measurement, the dose and the irradiance curve over time can also be documented. Spectra and measurement data can be exported and evaluated with the supplied software. In addition, the UVpad E can be used on the PC as a classic spectrometer.

Of course, the UVpad / UVpad E is already factory calibrated, long-term stable and precise at delivery. Optionally, we offer an accredited DAkkS calibration & testing according to ISO 17025 in our laboratory.

Applications:

- Control of UV curing systems
- Measurement of point light sources and UV LEDs
- Universal irradiance measurement
- Measurement of UV LEDs and UV lamps
- Documentation according to GMP, IQ/OQ
- Dose measurement

### 7.1 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 devices, which only exposes the receiver surface. In this way the heating can be reduced considerably.

## 7.2 Practical tips

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.

### The following components are supplied:

- UVpad / UVpad E
- Suitcase\*
- USB cable
- Software (download)
- Factory calibration certificate, optionally ISO 17025 calibration certificate\*
- this documentation (download)



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



The UVpad is available in several variants. If some of the functions described in this manual are not available in your UVpad, please contact the manufacturer or distributor for an upgrade.

### The following components are required by the customer:

- Personal protective equipment

### 7.3 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.

### 7.4 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. 60 °C). Do not operate the device in hazardous areas, not in dirty, dusty or oily environments.

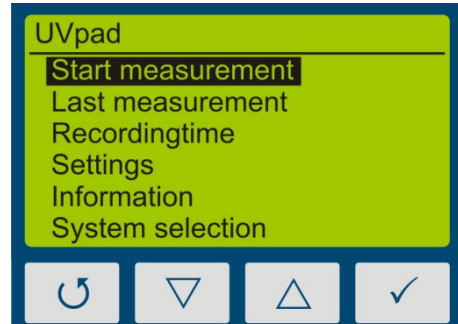
Protect the device from chemical vapors and solvents, shocks and vibrations, splash water, condensation on its surface and corrosive media.

- Unpack all components and remove the packaging materials.
- Position the sensor / UVpad at the desired location.
- Switch on the UVpad.

## 7.5 Quick start guide (BAND MODE ON)

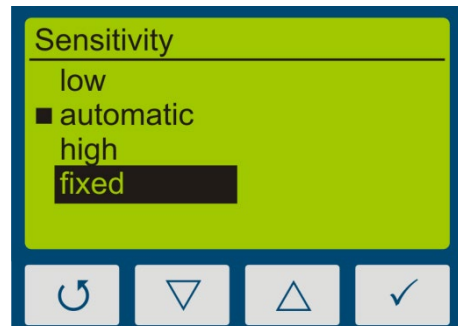
This quick start guide is intended to explain the function of the UV pad by means of an operating procedure.

- Step 1** Turn on the UV pad with any key on the front panel. Press again to enter the main menu.



- Step 2** For reproducible results, you should always select a **fixed integration time**.

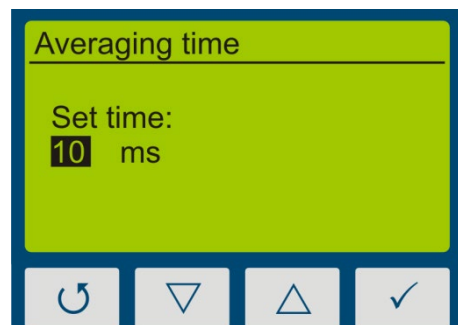
Therefore select sensitivity to „fixed“ under settings → sensitivity and set the desired time.



- Step 3** To adjust the integration time press the ▽-key or the △-key.

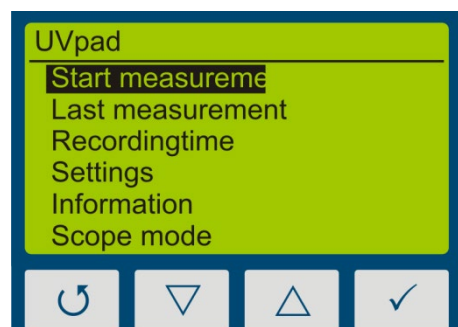
Start with a fixed integration time of 10 ms.

Confirm your integration time with the ✓-key and return to the main menu with the ↻-key.

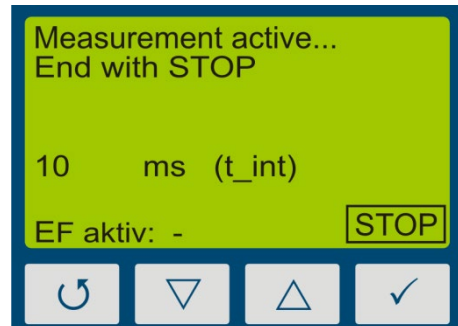


- Step 4** Start a first measurement to determine the modulation of the measuring device.

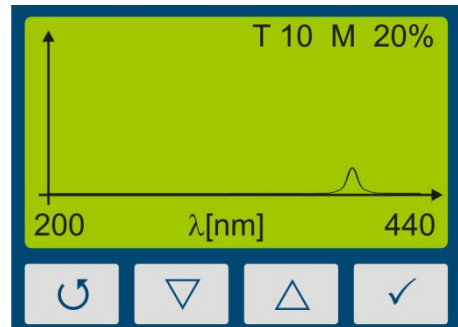
Note that the optically active surface always points in the direction of the radiation source and is not covered.



- Step 5** By pressing and holding the ✓-key for approx. 1 sec, the measurement will be interrupted and the measurement result is shown on the display.



- Step 6** Above the spectrum of your radiation source you will find information on the modulation (M) and the integration time (T).  
For reproducible measurement results the modulation should be between 80 - 90%. The integration time should be increased below 50% (see step 3).



**Hint:**

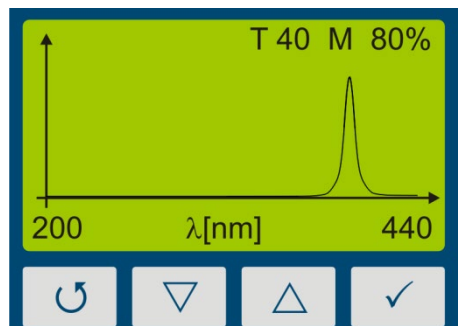
For optimum measurement results, the measuring range should be fully controlled. Very good measuring results are achieved when the measuring range is at least 50%.



The modulation is linear to the set integration time. Example:  
55/5000  
T10 M20%: Measuring range is 20% used => Bad  
T40 M80%: Measuring range is 80% used => Very good

- Step 7** Repeat the measurement until the recommended modulation is reached.

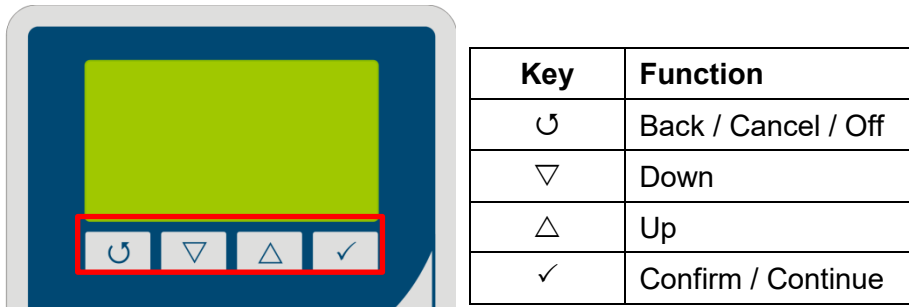
By using the ▽-key or the △-key, additional information such as the radiation intensity or radiation dose or the profile of irradiance for the four spectral ranges can be displayed.



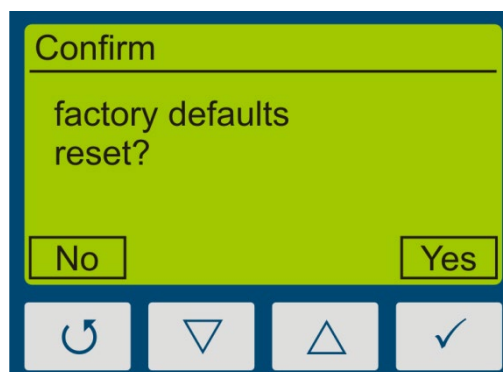
- Step 8** Connect the device to your PC using a Mini USB cable. With the software UVpad Viewer you can now transfer your measurements to the PC. For more information, see chapter 10 Data Export / PC-Software.

## 8 Operation

The UVpad is operated via four keys. These are arranged on the front panel below the display. The keys and the functions are illustrated as follows:

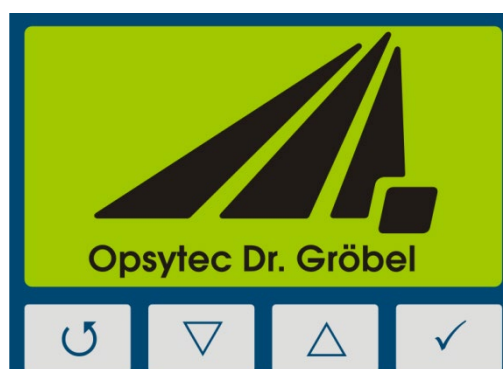


The keys ↶-key and ✓-key are additionally available as softkeys. Softkey functions are directly displayed above the key. Example:

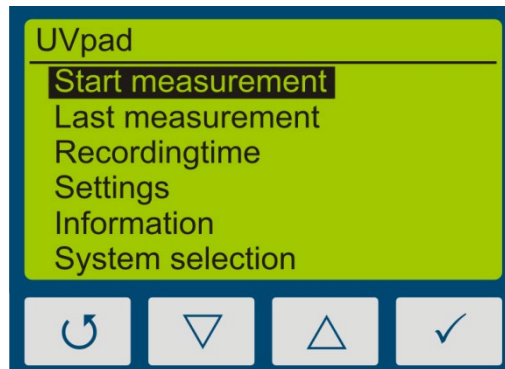


### 8.1 Switching the device on and off

The UVpad is activated via any key. During the initialization (ca. 2s), the welcome screen is displayed:



After the initialization, the standby menu is displayed:



In the standby menu, the UVpad is switched off via the key ⏪-key.



After 2 minutes of not using the UVpad, the device switches off automatically.

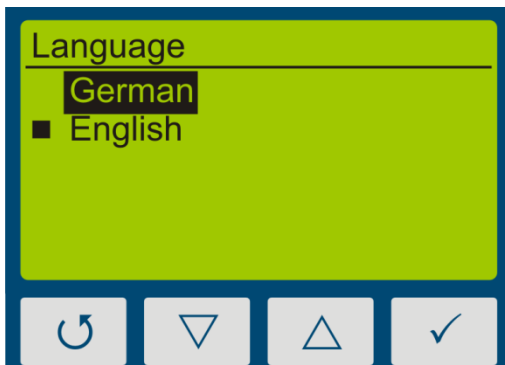
## 8.2 Standby Menu

Via the standby menu, all functions of the UVpad are available for you. These are:

- Start measurement
- Show last measurement
- Scope measurement
- Settings
- Information
- System selection

In the standby menu and in all other menus, select the active menu item via the keys ▾-key and ▲-key. Confirm the active menu item with the key ✓-key. With ⏪-key, you return to the previous menu without saving any changes.

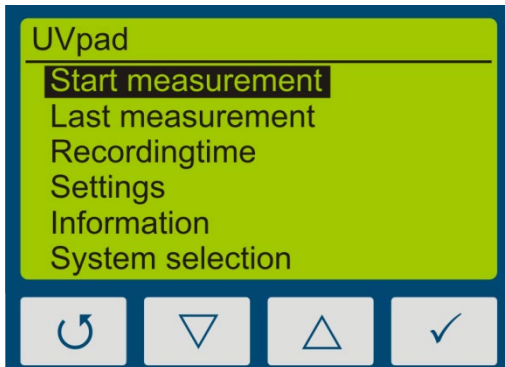
The selected menu item is highlighted in black and displayed inverted. If several settings are selectable, then the selected setting is marked with ■. Example:



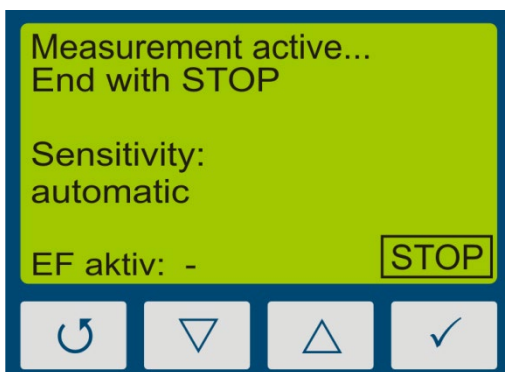
In this example, the language “English” is set. “German” is selected, but not set.

With the key ⏪-key, the setting is accepted and the language is being changed.

### 8.3 Band Mode ON - Start Measurement



From the standby menu, a measurement is started with the key ✓-key.



The measurement device displays that a measurement is in progress.

Stop the measurement by pressing ✓-key.

Turn the measurement device and position it for the measurement.



- |   |                            |         |
|---|----------------------------|---------|
| 1. Start measurement measurement device | 3. Measurement in progress | 4. Turn |
| 2. Turn measurement device measurement  |                            | 5. Stop |



The UV pad requires approx. 2 seconds for the automatic adjustment of the integration time. This can lead to fluctuating measuring results on belt conveyor systems. Use a fixed Sensitivity under Setting> Sensitivity> Fixed

Stop the measurement afterwards by pressing the key ✓-key for at least 0.5s.

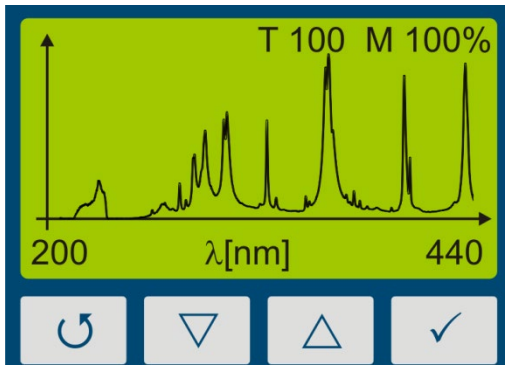
The measurement results are displayed automatically. For a better overview, these are partitioned to four screens.

1. Irradiance (UVA, UVB, UVC, VIS)
2. Dose of irradiance (UVA, UVB, UVC, VIS)



3. Spectrum at maximum irradiance
4. Irradiance profile over the duration of the measurement

These can be displayed with the keys ▽-key or △-key.



First, the spectrum is displayed.

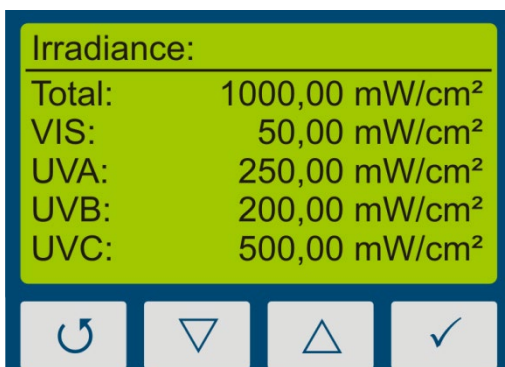
Notes:

The optimal integration time and the saturation of the measurement range are displayed at the upper display edge. The integration time is displayed in ms. Example:

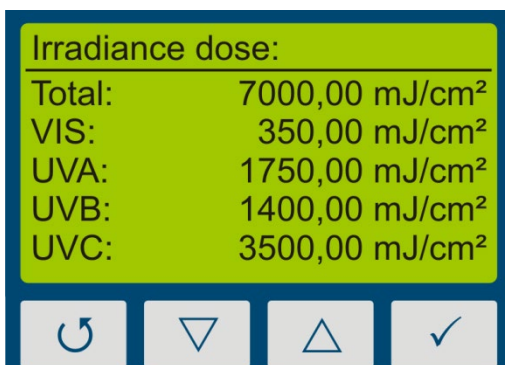
T 100: The optimal integration time is 100 ms

For optimal measurement results, the measurement range has to be fully modulated. For this purpose, the UVpad has a 12-bit analogue/digital converter, which scans the spectrum continuously. Excellent measurement results are achieved, when the measurement range is used to at least 50%. Example:

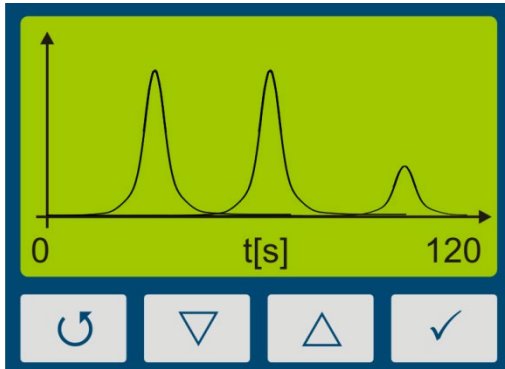
M 70: The measurement range is used to 70% => Excellent



With the key ▽-key, the irradiance is displayed.



With the key ▽-key, the dose of irradiance is displayed.



With the key  $\nabla$ -key, the profile of irradiance for UVA, UVB UVC and VIS is displayed.

With the key  $\triangle$ -key, you are respectively being redirected to the previous menu. With the keys  $\cup$ -key or  $\checkmark$ -key you can return to the standby screen.



**Note:**

If the irradiance is too low for the measurement range, then the UVpad displays no measured values. The irradiance and the dosage values are then displayed with "-".

### 8.3.1 Manual dark measurement

For manual dark measurement, select the "dark+radiometric" menu item under Settings, Measurement mode. If your UVpad is equipped with several active functions, manual dark measurement may be available for further active functions.

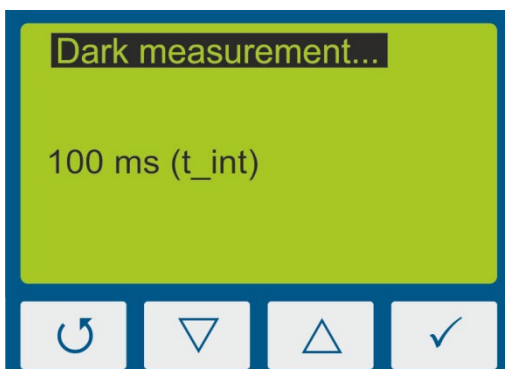


**Hint:**

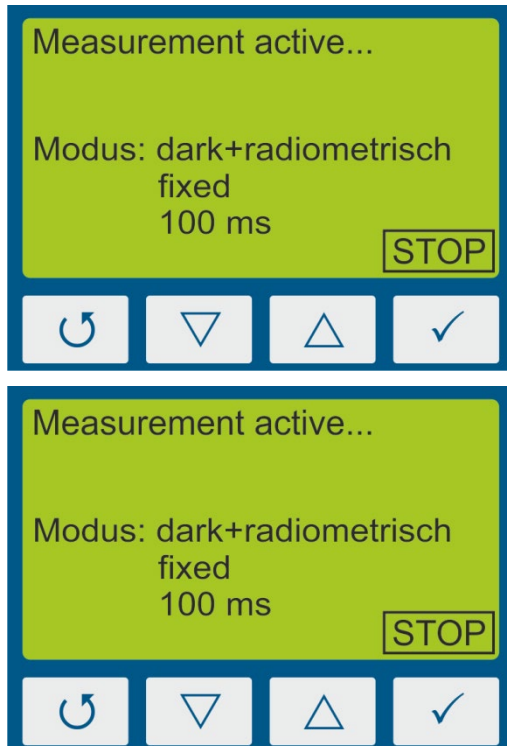
Manual dark measurement is only active in the "Fixed sensitivity" mode. Therefore, set a fixed integration time.

Manual dark measurement is important if the irradiance at the short-wave end of the measuring range (e.g. 240 nm) is not "zero", otherwise the measured values are too low.

Return to the main menu and start a measurement under "Start measurement".



1. After the start of the measurement, the dark measurement is started first. For this the sensor surface must be covered.

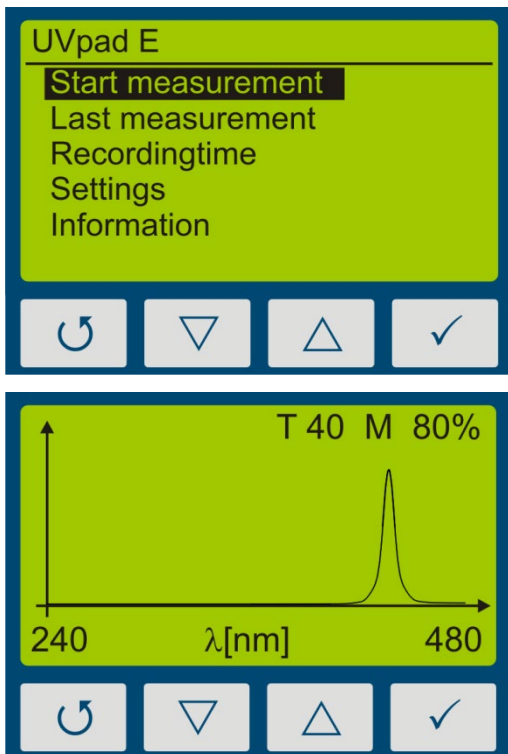


2. After the dark measurement, the UVpad automatically starts the normal measurement.

Note that the optically active area always points in the direction of the radiation source and is not obscured.

3. Press and hold the ✓ key (approx. 1 sec) to end the measurement and display the result on the display.

## 8.4 Band Mode OFF - Start Measurement



From the standby menu, a measurement is started with the key ✓.

First, the spectrum is displayed.

Use "Auto" mode to get the best integration time or, in fixed mode use ▾ and ▲ keys to adjust integration time.

### Notes:

The optimal integration time, gain (L/H) and the saturation of the measurement range are displayed at the upper display edge. The integration time is displayed in ms. Example:

T 100: The integration time is 100 ms



### Hint:

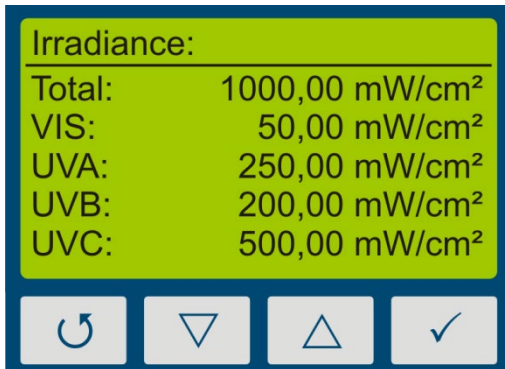
For optimum measurement results, the measuring range should be fully controlled. Very good measuring results are achieved when the measuring range is at least 50%.

The modulation is linear to the set integration time. Example:

55/5000

T10 M20%: Measuring range is 20% used => Bad

T40 M80%: Measuring range is 80% used => Very good



Switch between spectral and radiometric view by pressing ✓.

If storing measurements is selected via menu „recording time“, the measurement is automatically recorded if the radiometric view is shown.

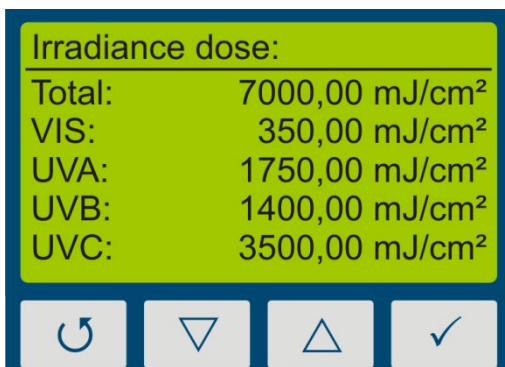


Stop the measurement by pressing the key ⏪ for at least 0.5s.

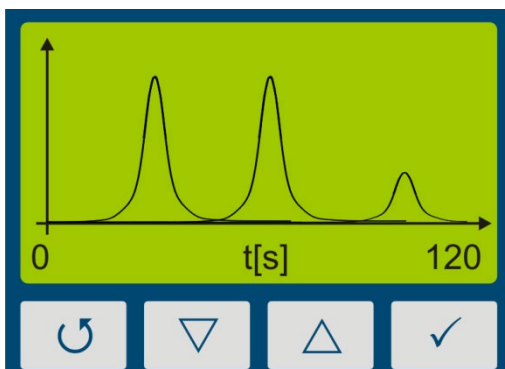
The measurement results are displayed automatically. For a better overview, these are partitioned to four screens.

1. Irradiance (only when viewing saved measurements)
2. Dose of irradiance (UVA, UVB, UVC, VIS)
3. Spectrum at maximum irradiance (only when viewing saved measurements)
4. Irradiance profile over the duration of the measurement

These can be displayed with the keys ▾ or ▲.



First, the dose of irradiance is displayed.



With the key ▾, the irradiance profile for UVA, UVB, UVC, VIS and total are displayed.

With the key ▲, you are respectively being redirected to the previous menu. With the keys ⏪ or ✓ you can return to the standby screen.



Note:

If the irradiance is too low for the measurement range, then the UVpad E displays no measured values. The irradiance and the dosage values are then displayed with “-“.

### 8.4.1 Setting integration time during measurements

If using fixed integration time, during a measurement you can set up the sensitivity of the UVpad E with the keys  $\nabla$  and  $\triangle$ . Select  $\nabla$  for a lower sensitivity and  $\triangle$  for a higher sensitivity. The sensitivity is not saved.

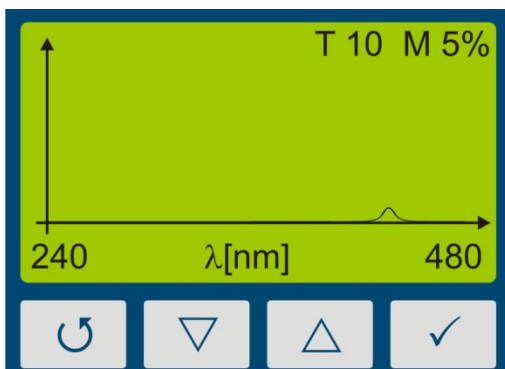


Select a higher sensitivity ( $\triangle$ ), if the spectrum is noisy or does not fill the display completely.

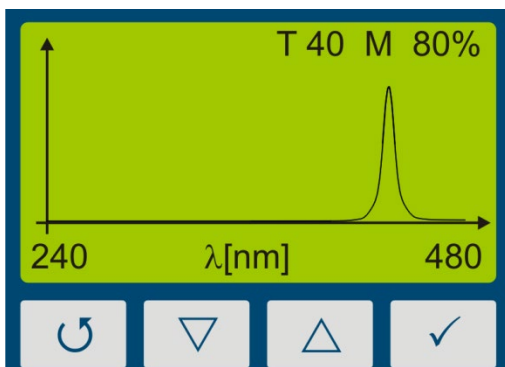


Select a lower sensitivity ( $\nabla$ ), if single lines of the spectrum are cut on top. The measurement range is then exceeded and is shown in the display MAX.

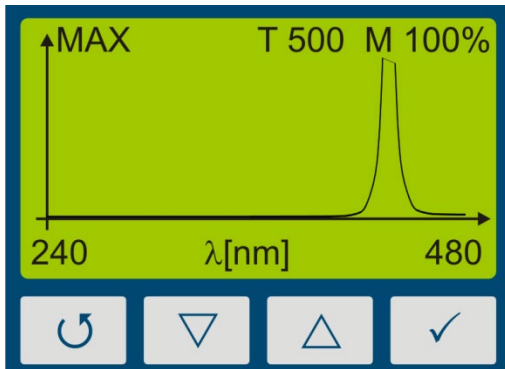
Examples:



Sensitivity too low



Sensitivity correct



Sensitivity too high

	<b>⚠ CAUTION</b>
	<p><b>Risk of UV radiation.</b></p> <ul style="list-style-type: none"><li>• Protect your skin and eyes during the work at and with UV radiation sources.</li></ul>

#### 8.4.2 Manual dark measurement

For manual dark measurement, select the "dark+radiometric" menu item under Settings, Measurement mode. If your UVpad E is equipped with several active functions, manual dark measurement may be available for further active functions.



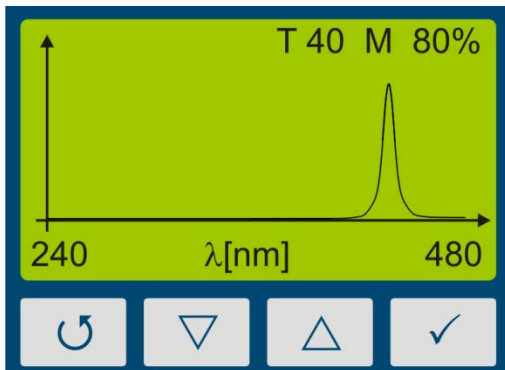
**Hint:**

Manual dark measurement is only active in the "Fixed sensitivity" mode. Therefore, set a fixed integration time.

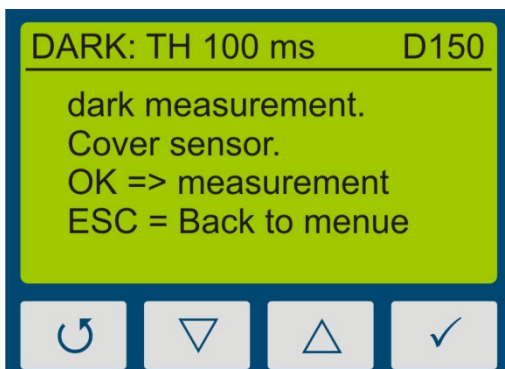
If the dark measurement for the integration time has not yet been carried out, the UVpad E does not display any measured values. The irradiance and dose values are then displayed with "-".

Manual dark measurement is important if the irradiance at the short-wave end of the measuring range (e.g. 240 nm) is not "zero", otherwise the measured values are too low.

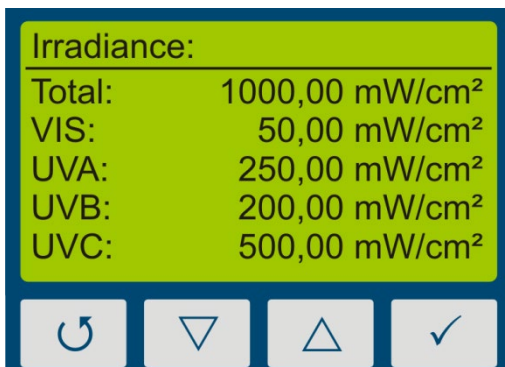
For measurement with manual dark measurement, start the measurement and set the integration time with the key  $\nabla$  or  $\Delta$ .



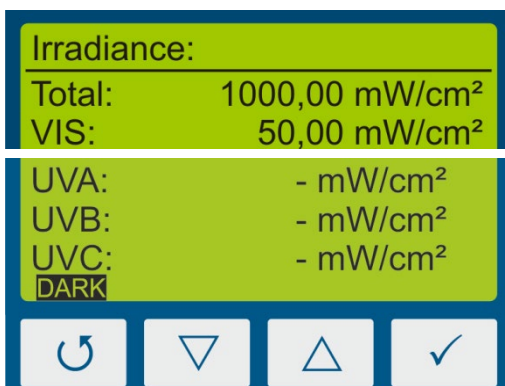
1. Set the integration time with the  $\nabla$  or  $\Delta$  button.
2. Start irradiance display with key  $\checkmark$  or start dark measurement with key  $\cup$ .



1. Cover the sensor, wait 1-2 seconds or 3-4 measurements and press  $\checkmark$  to switch to the irradiance display.



2. The irradiance is displayed.
3. Press the  $\cup$  button for at least two seconds to save the measurement. After that, the irradiation values are displayed.



Hint:

The irradiance is not displayed if the dark measurement has not yet been taken or the integration time has been changed.

The message DARK is displayed.

Hints:

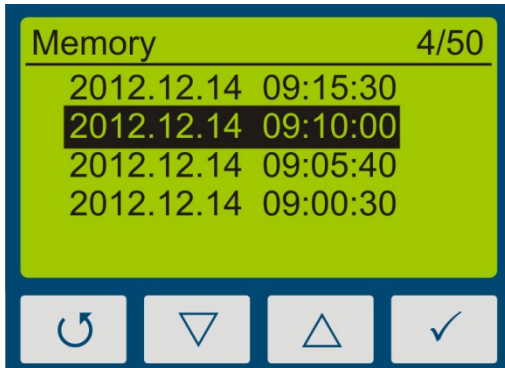
The optimum integration time, the gain (L/H) and the modulation of the measuring range are displayed at the top of the display. The integration time is displayed in ms. Example: T 100: The integration time is 100 ms



## 8.5 Show last Measurement

In the standby menu select the item “Show last measurement” to display the last measurement. Select the values from the list of measurements, which you want to display.

The navigation in the display screens is taken out, as described in chapter 8.3.



Select the measurement with the buttons ▾ and ▲. Confirm with ✓. Return with ↶.

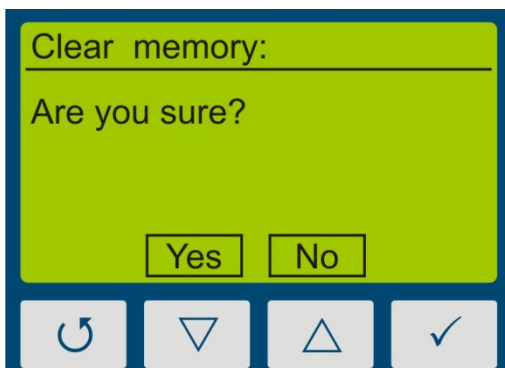


If 50 measurements have already been saved, then a note comes up prior to a new measurement, stating that the memory is full and that the measurement can be taken out without saving it, or that alternatively, the oldest measurement result is being overwritten.

- ⇒ See Delete all Measurements
- ⇒ See Data Export

### **Delete all measurements:**

The internal memory can be deleted directly on the UVpad E or via a PC. For this purpose, please select the prior menu item “Clear memory”.

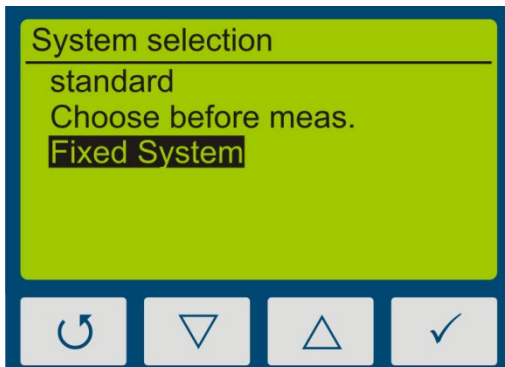


Confirm with Yes (▽). Return with ↶ or ▲.

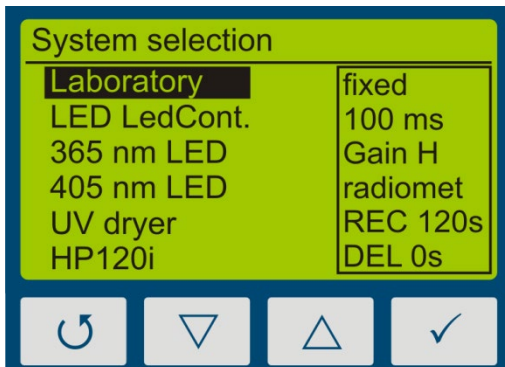
## 8.6 System selection

For the UVpad we recommend the setting "fixed integration time". Different settings may therefore be necessary for some UV systems. Settings for 6 UV systems can be parameterized on the PC with the UVpad Config Tool. The parameterization also allows a better assignment of the measurements based on a definable system name. The system name is displayed in the exported measurements.

The system settings can be selected on the UVpad either permanently or before each measurement. Alternatively, this selection can be switched off. The system settings cannot be changed on the UVpad.



Select the system selection with the keys  $\nabla$ -key and  $\triangle$ -key. Confirm with  $\checkmark$ -key. Return with  $\curvearrowright$ -key.



Example: UV Systems

Select the system with the keys  $\nabla$ -key and  $\triangle$ -key. Confirm with  $\checkmark$ -key. Return with  $\curvearrowright$ -key.

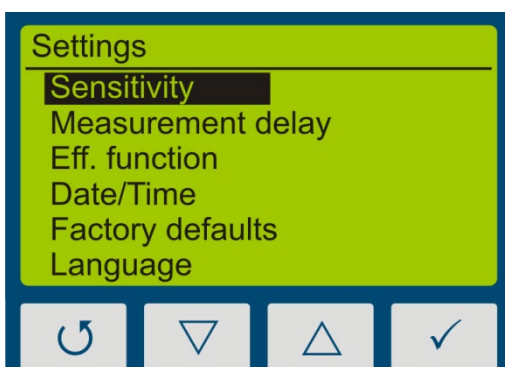
## 8.7 Settings

In the menu „Settings“, you can set up the sensitivity, the effective function, the menu language and the date / time. Furthermore, you can reset the UVpad to the factory settings.

## 8.8 Settings

In the menu „Settings“, you can set up the sensitivity, the effective function, the menu language and the date / time. Furthermore, you can reset the UVpad to the factory settings.

By selecting the menu item „Settings“, you are being directed to the settings menu of the UVpad.



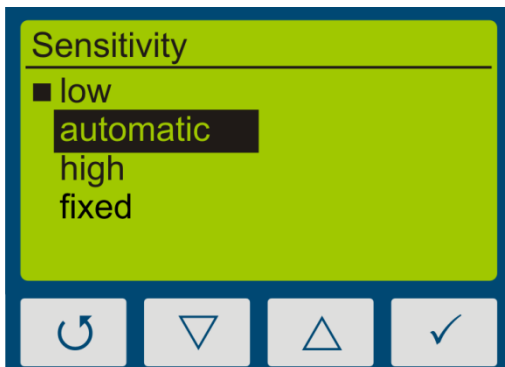
In this menu, the following functions are available:

- Settings of the sensitivity
- Selection of the effective function
- Language settings
- Settings of date and time
- Reset to factory settings

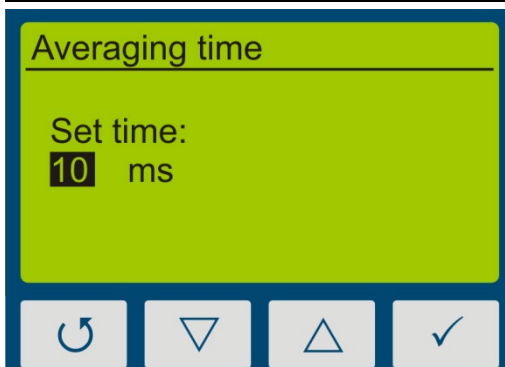
### 8.8.1 Sensitivity

The UVpad adjusts the sensitivity automatically, in order to ensure the optimal signal-noise ratio. The sensitivity is hereby set via the sampling rate. With high irradiances, the sampling rate is increased in order to not exceed the measurement range. With low irradiances the sampling rate is decreased. As a result in belt conveyor systems erroneous measurements may be recorded. Please follow the instructions on the display and / or set a fixed integration time as sensitivity.

Four pre-defined sensitivities are available.



	sampling rate
auto-low	10 – 100 ms
auto	10 – 330 ms
auto-high	150 – 850 ms



In the setting „automatically“, the UVpad adjusts the sensitivity, once a minimum irradiance is existent. This setting is suitable for most applications.

In the setting „low“, the sampling rate is always between 10 ms and 100ms. The UVpad can measure UV-systems with a very high irradiance or significant irradiance modifications (e.g. with shutter operation or with very high tape speed).

The setting „high“ is ideal for applications with a low irradiance.

In the setting „fixed“, the integration time is predetermined. The UVpad can be used optimally for known systems with shutters

The menu item “Sample rate” is displayed, if you have selected a fixed sensitivity.

The integration time is set via the keys ▾-key and ▲-key. Confirm with ✓-key or cancel the setting with ↺-key.



Pressing ▾-key on 10 ms setting switches to low sensitivity. This reduces sensitivity by factor of 5.

### 8.8.2 Measurement mode / Effective functions

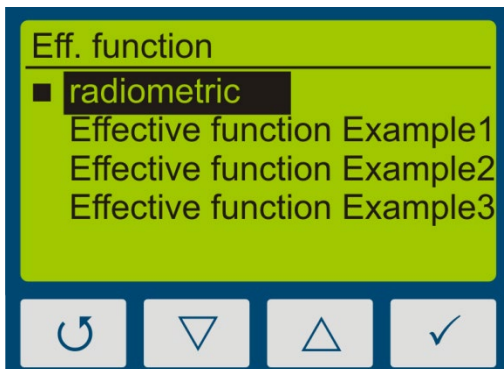
In this menu, the effective function and manual dark measurement can be set.

Effective functions serve for the process-oriented measurement. This is often also called effect-related or actinic measurement.

In that case, effective functions can be for example:

- Absorption spectrums of photo initiators
- Spectral sensitivity function
- Filter function for instrument comparisons

In the Eff. function menu, the desired function / dark mode can be selected using the  $\nabla$ -key or  $\triangle$ -key and confirmed with the  $\checkmark$ -key.



Select „radiometric“, for traceable and internationally comparable measurements.

Select an effective function for a process-oriented measurement and a targeted system optimization. The international comparability is not given.

If measurements are taken out effect-related, then this is displayed in the irradiance and in the dosage display by the addition “(ef)” for “effective”. Radiometric and effect-related measurements are illustrated subsequently.

Irradiance:	
Total:	1000,00 mW/cm <sup>2</sup>
VIS:	50,00 mW/cm <sup>2</sup>
UVA:	250,00 mW/cm <sup>2</sup>
UVB:	200,00 mW/cm <sup>2</sup>
UVC:	500,00 mW/cm <sup>2</sup>

Example: radiometric

Irradiance (ef)	
Total:	150 mW/cm <sup>2</sup>
VIS:	50 mW/cm <sup>2</sup>
UVA:	100 mW/cm <sup>2</sup>
UVB:	0 mW/cm <sup>2</sup>
UVC:	0 mW/cm <sup>2</sup>

Example: with effective function



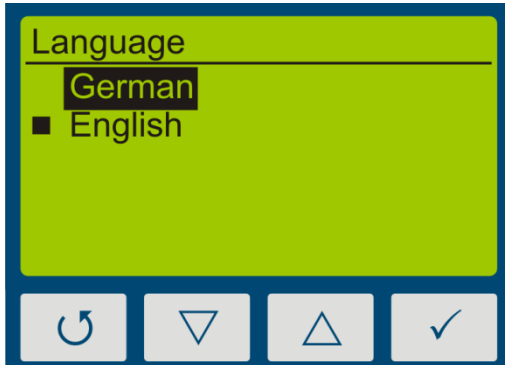
The function “Effective Function” is only available, if your UVpad has been programmed with a customized effective function at factory.

### 8.8.3 Measurement delay

Select a measurement delay in order to start a new measurement delayed.

### 8.8.4 Language

The UVpad comes with a menu in the German and English language.

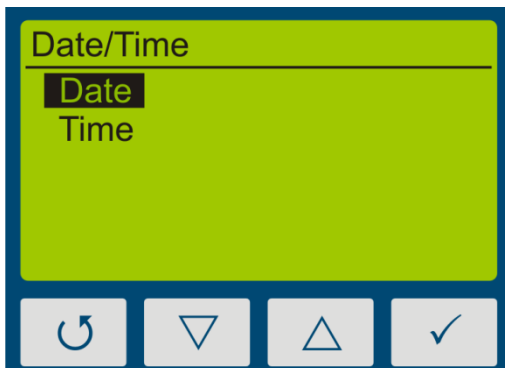


Select the desired language with the keys  $\nabla$ -key and  $\triangle$ -key and confirm with  $\checkmark$ -key.

### 8.8.5 Date / Time

The UVpad has a real-time clock to check the validity of the calibration.

You can set up the real-time clock in the menu „Date / Time“.



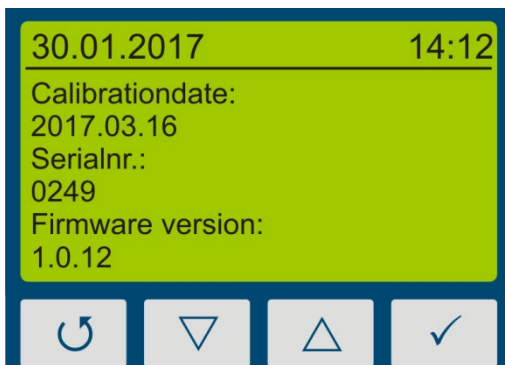
First set the day with the keys  $\nabla$ -key and  $\triangle$ -key. Select  $\checkmark$ -key for the month, the year, the hours and minutes.

Confirm your settings with  $\checkmark$ -key.

With  $\curvearrowright$ -key you can cancel the settings at any time.

### 8.8.6 Information

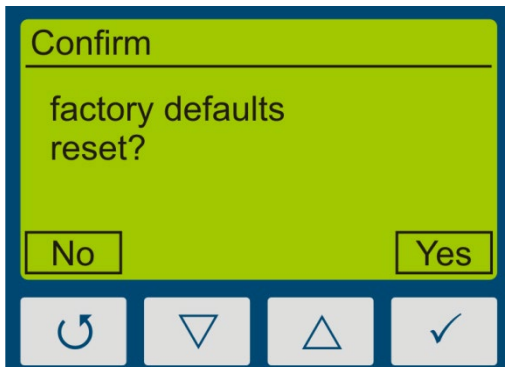
Select the menu item “Information” from the standby menu, to display the serial number, the firmware version, as well as the date of calibration.



With any key, you are being redirected to the menu.

### 8.8.7 Factory Settings

Reset the UVpad to the factory settings and confirm.



Confirm the restoration of the factory settings with ✓-key.

With ⌫-key you can cancel the restoration of the factory settings.

## 9 Data Export / PC Software

### 9.1 Installation

For the installation, please proceed as follows:

- 1.) If necessary, disconnect the connection of the UVpad with the PC.
- 2.) Start the installation with "setup.exe" in the master data of the Software CD. Follow the instructions of the installation program.



The driver installation is executed as an independent application TUSB3410.



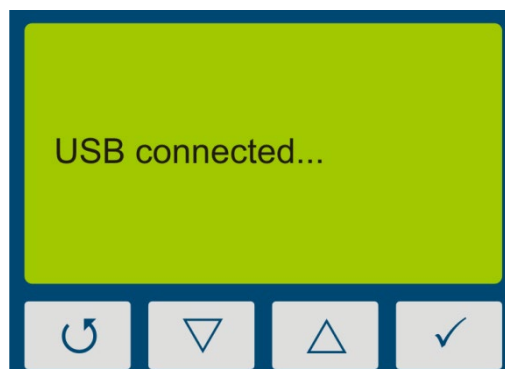
For the software UVpad Viewer 2, the Microsoft .NET Framework Version 4.0 or higher is required. This is found on the installation CD or free of charge at: [www.microsoft.de](http://www.microsoft.de).

- 3.) After completing the installation, connect the UVpad with the PC. The UVpad is integrated as a virtual, serial interface. The driver installation is taken out automatically under Windows 10/11.

### 9.2 Connecting with the PC

Connect the UVpad with the PC and switch it on. The screen displays the message "USB connected".

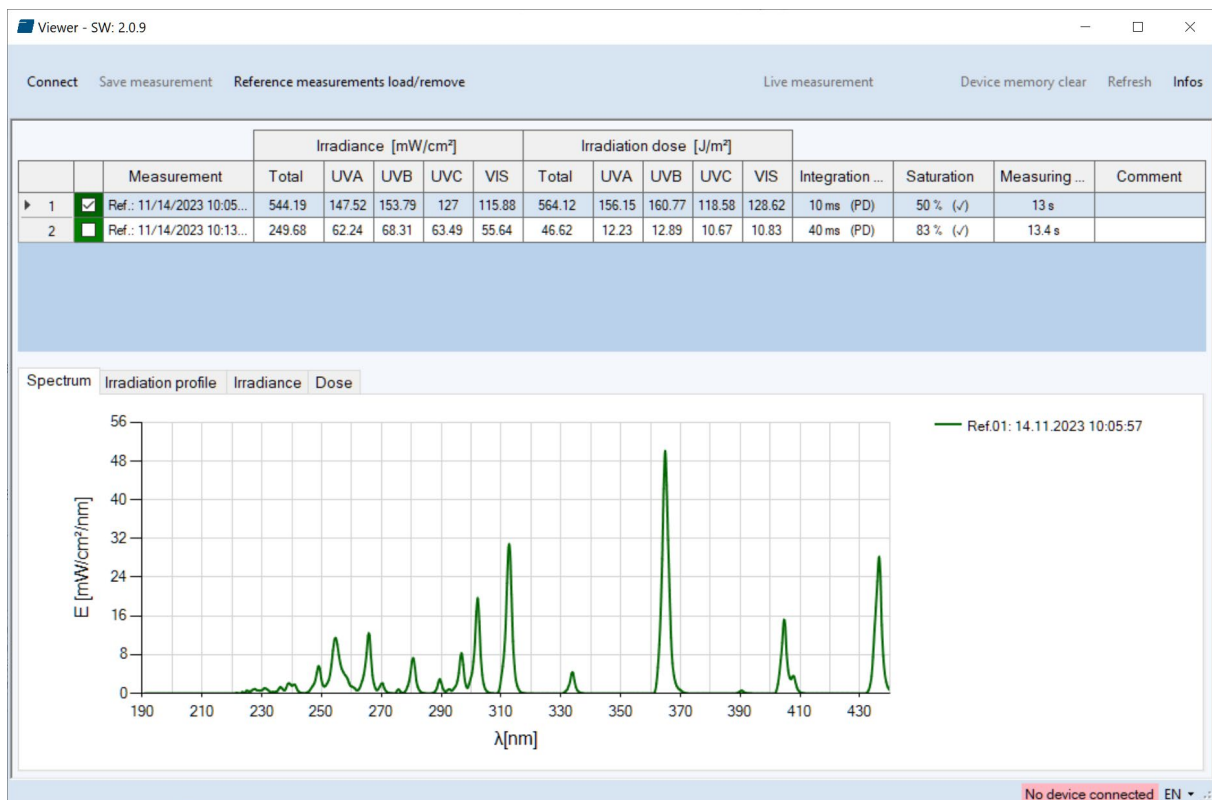
Once the UVpad is connected with the PC, it does not react to any keystroke. Disconnect the connection with the PC and the UVpad continues working autonomously.



### 9.3 Viewer Software

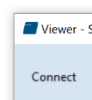
The UVpad software is divided into two areas. The upper area displays the executed measurements with date / time, irradiation and dosage, as well as the integration time, the saturation und the measurement duration.

Individual measurements can be compared in the display area based on spectra, irradiance profile or by means of measurement data.



The language can be changed in the status bar via EN and DE (German / English).

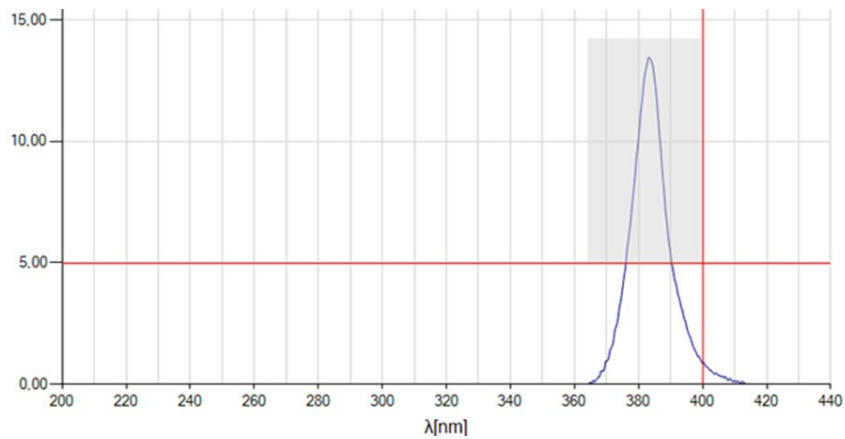
When starting the software, the measurements are automatically imported, when an UVpad is being detected. Importing can take a few seconds. During this time, a progress bar displays the import:



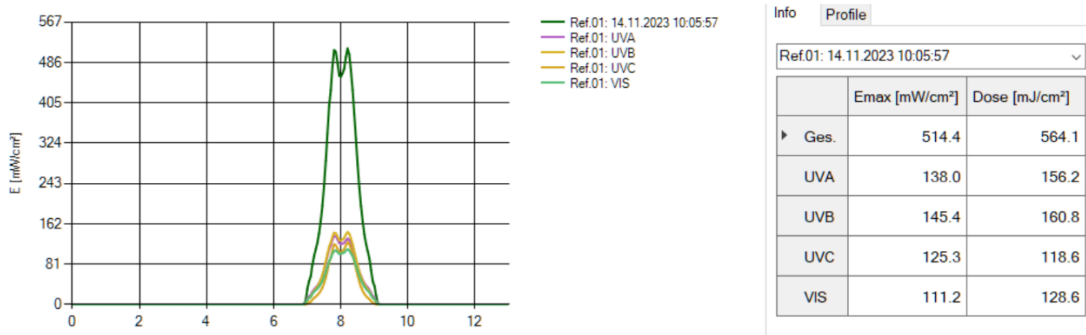
If the UVpad is not connected or not ready yet, then an error message pops up. Restart the import after a few seconds via the button „Connect“.

In the spectrum view and the irradiance profile graph, you can zoom with the right mouse button. Use left mouse button to zoom out again. Example:





The max. irradiance and dose will then be calculated in active view (irradiance profile).



Working with different measurements:

You can select and compare different measurements. You can also add a comment in the table before exporting data.



Note: The UVpad Viewer displays measurement settings and results as sensitivity, saturation and errors. Use mouse over function in table view this.

### 9.4 Export of measurements

Measurements can be exported individually, in a group or completely. For this purpose, mark up to 10 measurements.

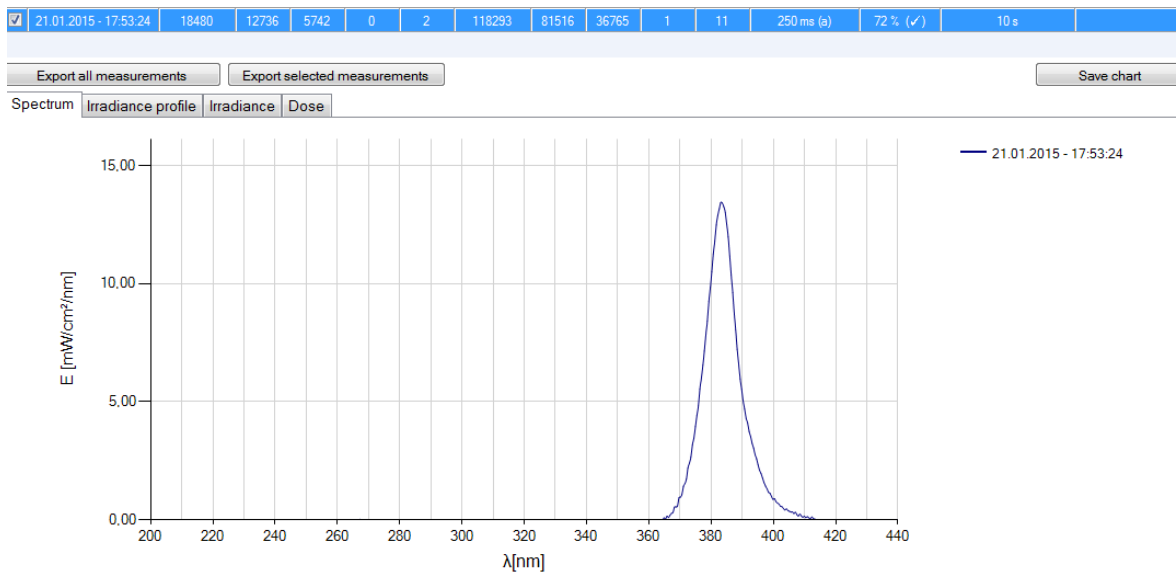
	152	23	30	36	54
<input checked="" type="checkbox"/> 01.01.2013 - 20:15:07	153	30	33	36	54
<input type="checkbox"/> 01.01.2013 - 20:17:47	158	16	72	69	1
<input type="checkbox"/> 01.01.2013 - 20:26:46	196	79	72	26	19
<input type="checkbox"/> 01.01.2013 - 20:39:51	104	104	0	0	0

Button „Deselect all“ deselect marked measurements.

Select “Export selected measurements” or “Export all measurements” for the data export. The measurements are exported as a text file, separated by a comma, and can thus be imported to a table calculation program, such as Microsoft EXCEL.

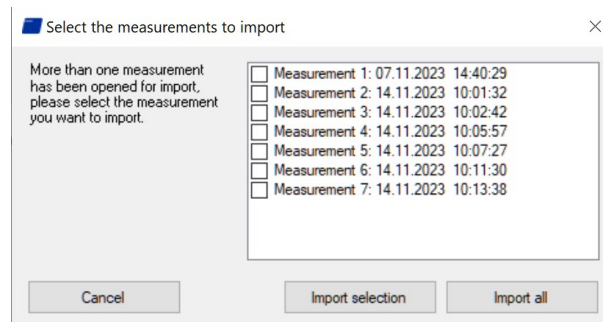
The exported file contains all information to the measurement, the spectrum and the irradiation profile.

Marked measurements appear in the display area, as illustrated by the following LED spectrum:



## 9.5 Import measurements

Saved measurements can be imported again. To do this, select Load/remove reference measurements and then select the desired, unchanged \*.csv file:

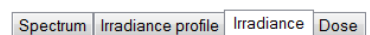


To do this, select up to 10 measurements and choose "Import selection" or "Import all".

Imported measurements are displayed in green tones, while measurements from the device are displayed in blue tones.

## 9.6 Displaying and comparing Measurements

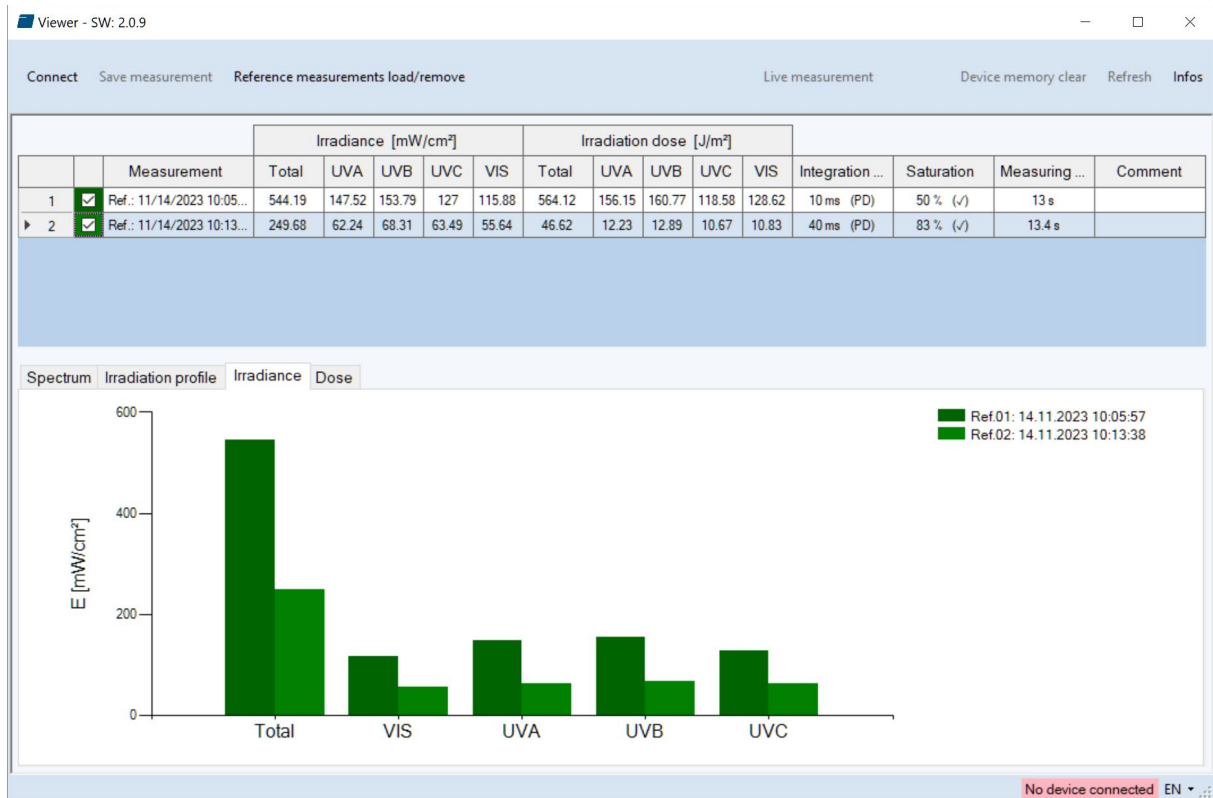
Select the desired display via the tab:



Below is an example with two irradiance measurements.

Up to 10 measurements are selectable at the same time and are labeled in the display area with date / time.

Each display can be saved via the button “save chart” as an image file (\*.jpg, \*.bmp, \*.tiff, \*.wmf).



## 9.7 Displaying the Irradiance profile

The irradiance profiles are separately available for all four spectral ranges. For this purpose, mark the desired measurements and select the desired spectral range on the tab “Irradiance profile”.

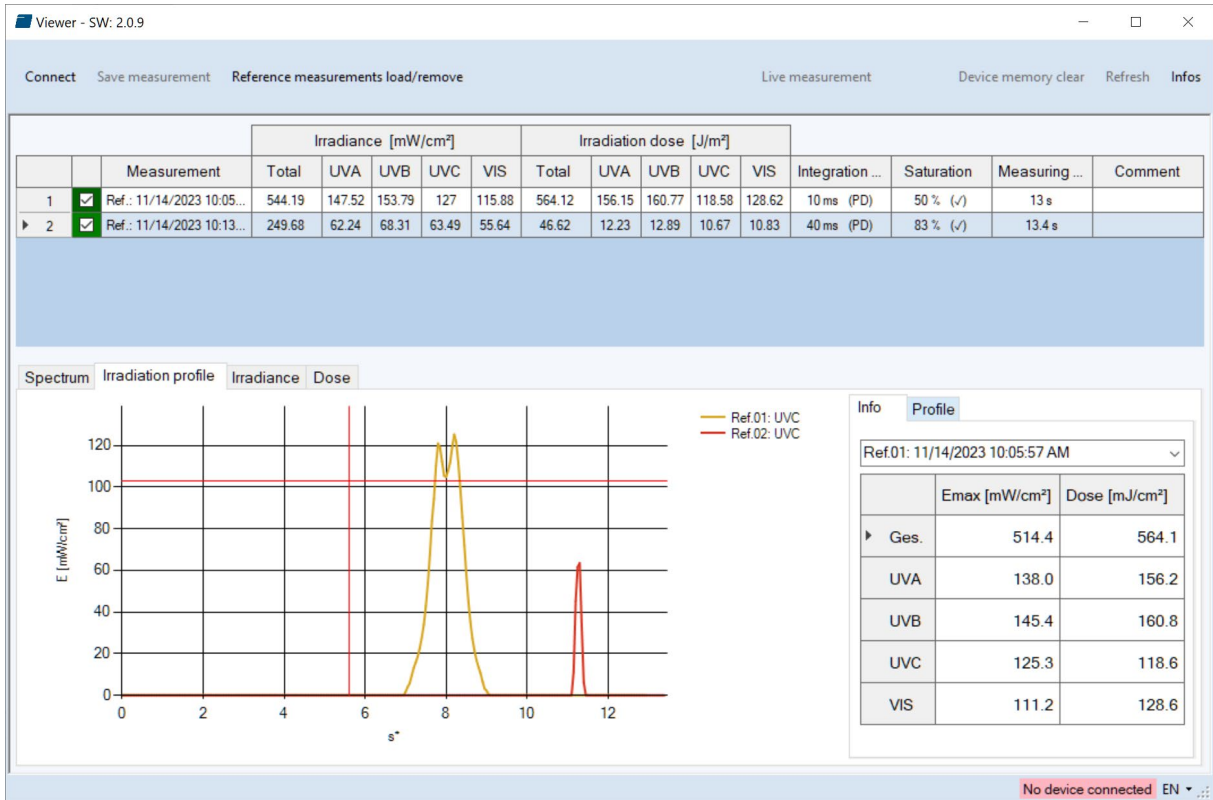
The following example illustrates an irradiance profile for all spectral ranges.



The data logging takes place adjustable between 10 and 250 ms. With shorter integration times, the maximum irradiance is being saved.

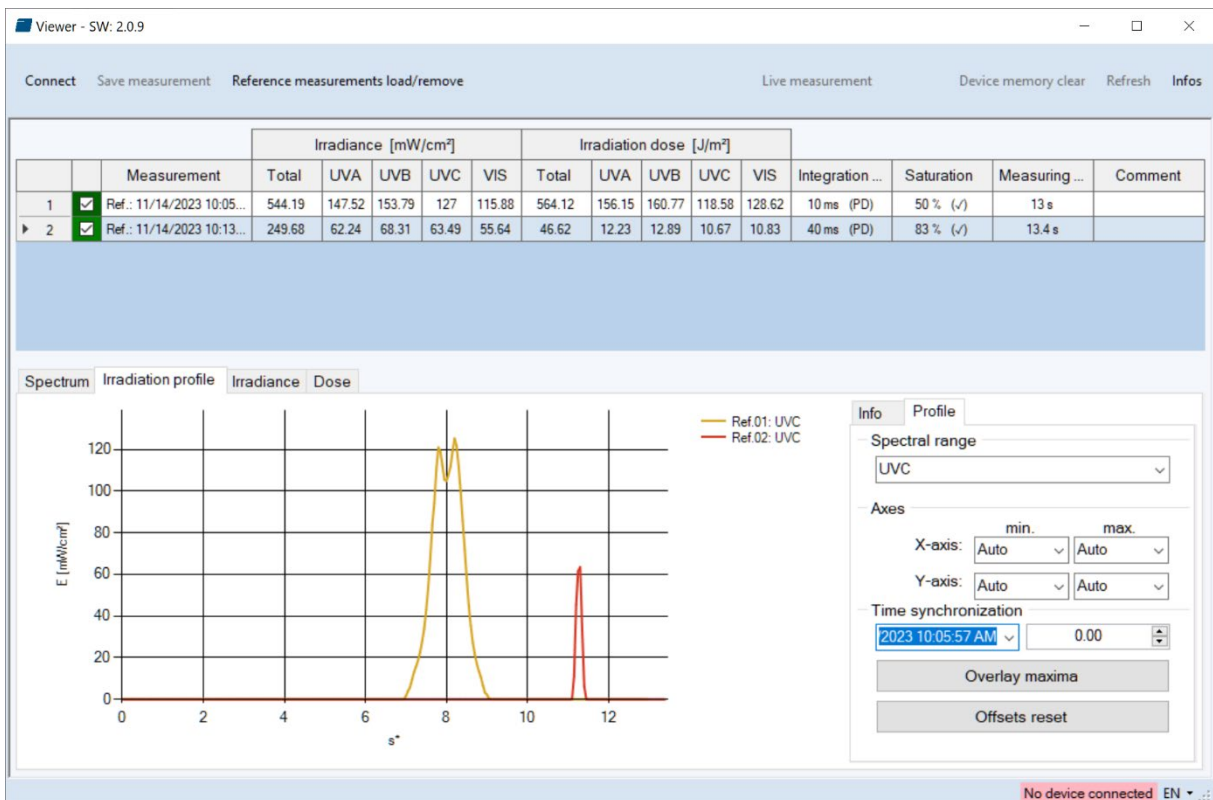
The calculation of the dosage is taken out independently in real time.

The screen can be adjusted via the zoom function. For this purpose, change the X and the Y intercept and confirm with „Zoom Fit“. The maximum irradiance  $E_{max}$  and the dosage  $D$  in the display area are displayed on the right.



The table on the right-hand side shows the maximum irradiance and the dose display range.

Measurements can also be synchronized / shifted in time in the profile tab:



## 9.8 Deleting Measurements

You can delete the entire memory of the UVpad via the button “Delete all measurements”. Confirm the confirmation prompt with OK. Individual measurements cannot be deleted.



Tip: Via the button „Info “, the serial number and the assignment of memory space of the UVpad are displayed.

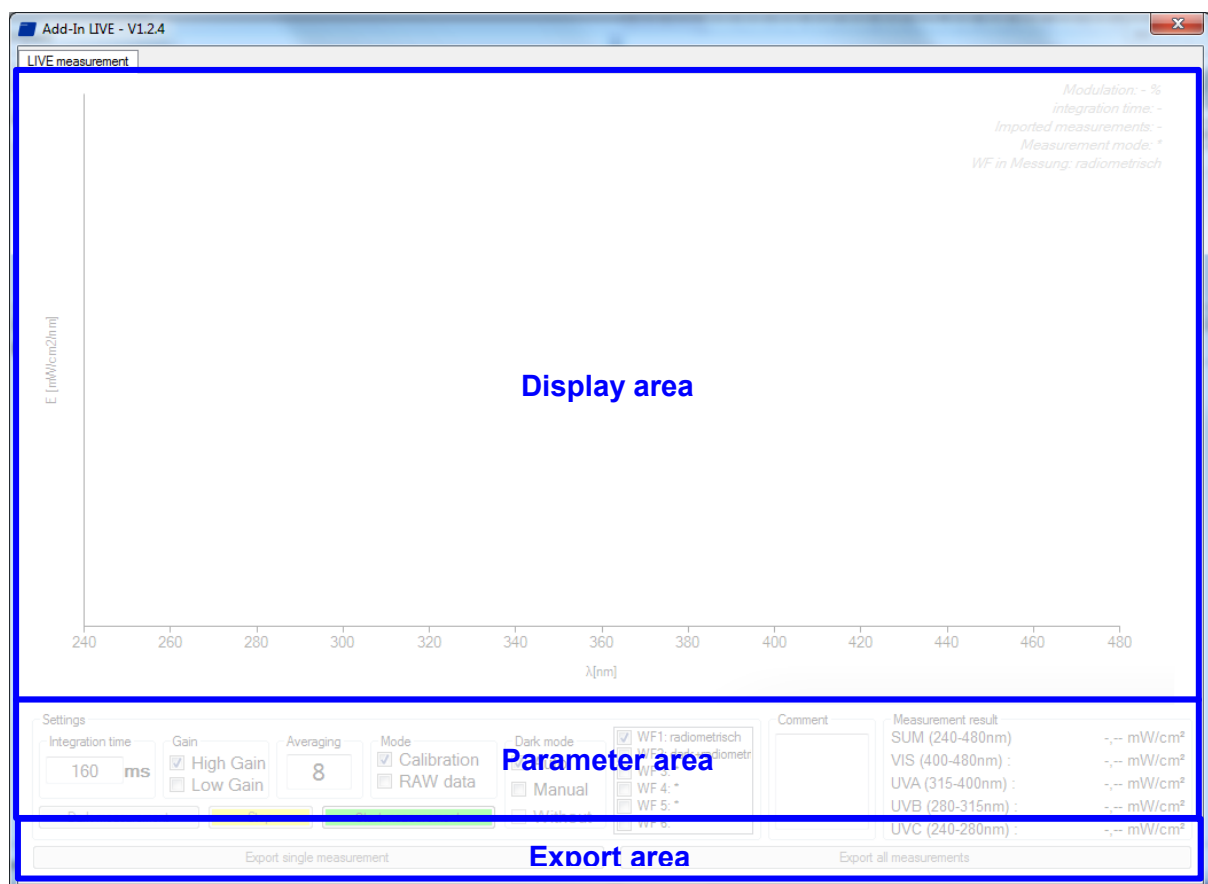
## 10 Remote control / Live measurement

In addition to the export functions, the UVpad E software also has a remote control called "Live measurement". The button with the same name takes you to a separate user interface for remote control of the UVpad.



The remote control is available for firmware version 1.3.0 and higher. Ask for an update if necessary!

The user interface is divided into sections. All measurements received by the UVpad are displayed in the display area. The parameters that must be adjusted for a measurement can be found in the parameter area. Once a measurement has been completed, the user has the option of exporting a "Single measurement" or "All measurements" in the export area. In contrast to the single measurement, when exporting all measurements not only the averaged spectrum is written to a \*.csv file. All single dark current or spectra measurements are also written to the file.



Before starting a measurement, integration time, dark current or another effective function can be set in the parameter area. Basically, two different operating modes are available for one measurement.

Settings

Integration time: 160 ms

Gain:  High Gain  Low Gain

Averaging: 8

Mode:  Calibration  RAW data

Dark mode:  Auto  Manual  Without

WF1: radiometrisch  
WF2: dark+radiometr  
WF 3: \*  
WF 4: \*  
WF 5: \*  
WF 6: \*

Comment

Measurement result

SUM (240-480nm)	---	mW/cm <sup>2</sup>
VIS (400-480nm)	---	mW/cm <sup>2</sup>
UVA (315-400nm)	---	mW/cm <sup>2</sup>
UVB (280-315nm)	---	mW/cm <sup>2</sup>
UVC (240-280nm)	---	mW/cm <sup>2</sup>

In the calibrated mode, radiometric weighted measured values are displayed.

In the "RAW data" mode, only unweighted count values can be recorded and exported. In contrast to the calibrated mode, there is no automatic dark current correction and calibration.

Three methods are available for the dark current measurement, depending on the selected mode. In the "Auto" mode a dark current measurement is done directly in the device. In "Auto" mode, dark current correction is carried out as usual in the UVpad device.



**“Calibration + Auto” mode corresponds to the measurement result of the UVpad.**

(All other modes are suitable for special applications and are calculated in the PC.)

In "Manual" mode, an entire dark current spectrum is recorded which is later calculated with the spectrum. If no dark current correction is to be carried out, select the mode "Without".

After starting a dark measurement or spectrum, the selected number of averages is imported from the device. The progress of a measurement series is displayed by a progress bar.



**Tip:**

For best measurement results, the measuring range should be almost completely controlled. Good measurement results are achieved if the measuring range is used by at least 50%. The modulation is linear to the set integration time. Example:

Integration time 10 ms; modulation 20%: Measuring range is used up to 20% → Bad

Integration time 40 ms; modulation 80%: Measuring range is used to 80% → Very good

After the measurement has been completed, there are two options in the export area (single measurement / all measurements) for saving the measurement results in a file.

Export single measurement      Export all measurements

When exporting all measurements, in addition to the averaged measurement result, all individual measurements as well as the measurement results for irradiance are exported to a \*.csv file. The export of a "single measurement" only provides the averaged measurement result. All measurement settings are also saved in the export file.

**Note:**

The subsequent modification of a parameter blocks both export options!

**Tip:**

To switch between German and English use the key combination:

Ctrl + Shift + d                      ~            german

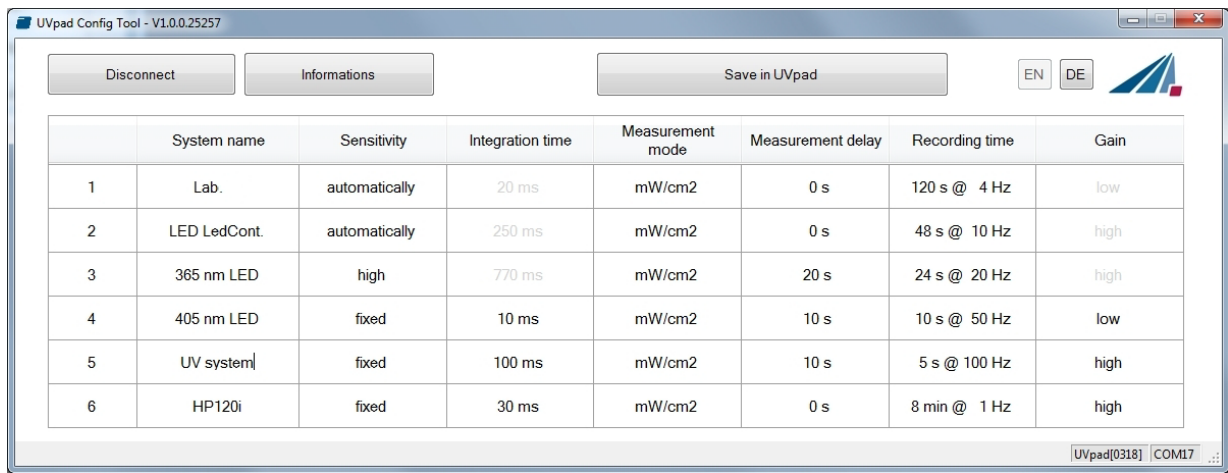
Ctrl + Shift + e                      ~            english



## 11 System selection

For the UVpad we recommend the setting "fixed integration time". Different settings may therefore be necessary for some UV systems. The UVpad Config Tool offers the possibility to parameterize the measurement settings for 6 UV systems. In addition, the system name is displayed in the exported measurements in order to be able to assign the measurements. The button with the name takes you to a separate user interface for system selection of the UVpad.

The system parameters are imported when connecting and saved with the buttons "Save in UVpad". The systems can be selected on the UVpad either permanently or before each measurement.



	System name	Sensitivity	Integration time	Measurement mode	Measurement delay	Recording time	Gain
1	Lab.	automatically	20 ms	mW/cm2	0 s	120 s @ 4 Hz	low
2	LED LedCont.	automatically	250 ms	mW/cm2	0 s	48 s @ 10 Hz	high
3	365 nm LED	high	770 ms	mW/cm2	20 s	24 s @ 20 Hz	high
4	405 nm LED	fixed	10 ms	mW/cm2	10 s	10 s @ 50 Hz	low
5	UV system	fixed	100 ms	mW/cm2	10 s	5 s @ 100 Hz	high
6	HP120i	fixed	30 ms	mW/cm2	0 s	8 min @ 1 Hz	high

## 12 Notes for optimal measurement results

The UVpad achieves optimal measurement results, if the measurement range is well adjusted to the irradiance and thus to the UV system. This is generally taken out automatically.

The following notes are there to support you with the setting of the UVpad, so that optimal measurement results can be achieved.

### 12.1 The UVpad displays „MAX“

The UVpad saves the maximum irradiance during the measurement. Due to the individual lines in the spectrum, the measurement signal can partly exceed the measurement range. In this case, the UVpad displays the message "MAX".

Select low sensitivity or a fixed integration time. Reduce the lamp power, if this is insufficient.



If the measuring range is over modulated in setting "fixed sensitivity" a hint will be shown after a measurement. Note that measurement data will not be stored.

### 12.2 Set UVpad for high belt speeds

The measurement time for the UVpad is set via the integration time. Typical integration times are 10 ms to 200 ms. If the UVpad is moved underneath an UV system at slow speed, then the maximum irradiance (directly underneath the UV lamp) is being determined, since several measurements are available for the irradiance. At the end of the measurement, the maximum irradiance and the total dose are displayed.



At high speed and a low lamp power, a higher integration time is required. Thus, the UVpad might possibly not measure directly underneath the UV lamp, but integrates (averages) this range. The displayed irradiance is then minimal lower. With the continuous measurement performed, the dosage is not affected.

You can determine, whether your UV system is fast or slow, if you calculate the amount of measurements underneath the UV system as follows:

$$\text{Amount\_of\_measurements} = \frac{\text{Width\_UV\_Aggregate}}{\text{Speed} \cdot \text{IntegrationTime}}$$

With less than 10 measurements, the displayed (maximum) irradiance can possibly decrease.



With UV systems with speeds >16 m/min, set a fixed integration time.  
With fast UV systems, set a fixed integration time

### 12.3 The UVpad displays too little irradiance values

Check if the sensitivity has been set correctly. Optimal measurement results are achieved, if the measurement range is used to at least 50%. After a measurement, the value M should be higher than 50%.



Select a low or automatic sensitivity or set a short integration time.



When "automatic sensitivity" is set, the spectrum and irradiance will be stored as the optimal measuring range is automatically found.

In the case of band systems, it may happen that a maximum is recorded prior to the lamp position and that UVpad is over modulated below the lamp.

In this case the shown irradiance may be too low. However, the dose is correctly. In this case a fixed integration time may be helpful.

### 12.4 The UVpad displays too high or too low UVC Values

The UVpad measures the entire UV spectrum range and divides it standardized into UV spectrum ranges (UVA, UVB, UVC).

For comparison:

Broadband radiometers possibly only measure a part of this range, if these do not operate with standardized spectral ranges. Thus, high deviations can arise especially in the UVC.

Furthermore, the UV lamps generally emit visible light and IR radiation apart from the UV radiation. Both can generate scattered light in the UVpad, which is then detected. It is also possible that the UVpad heats up during the measurement and thus the reading noise increases. Therefore, the UVpad has an automatic correction function. However, low UVC values can possibly not be avoided, even if the UV lamp does not emit UVC.

### 12.5 The UVpad displays “ - “

Just like each measurement device, the UVpad has a fixed measurement range. If this range is fallen below, then the UV radiation cannot be captured correctly. In that case, the UVpad displays “ - “.



Select a higher or automatic sensitivity or set a long integration time.

## 12.6 The measured value is not reproducible

Measurements are only stored and displayed in UVpad when the saturation is between 10% and 100%. This can cause to saturation direct under the light source, however correct measurement may be recorded before or after that. Especially UV LEDs can lead to a correct measurement switching the LED on within one measurement, while all other are saturated.



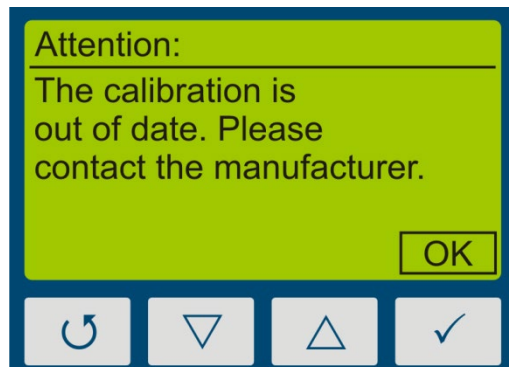
Select a fixed integration time.

Note: Reduce the integration time to 10ms and not saturation. Then set the highest possible integration time

## 13 Maintenance & Troubleshooting

### 13.1 Calibration

The calibration of the UVpads is checked during the initialization. If the UVpad is not calibrated properly anymore, then this is indicated by a note after the initialization process. Measurements are also possible at any time with an expired calibration.



Confirm with the key ✓-key.

The UVpad can only be maintained and calibrated by the manufacturer. For this purpose, please consult your supplier.



UV radiometers are in principle subject to a high high-energy load by UV radiation. This can affect the calibration and lead to an early due date for a re-calibration. This can depend on the individual use, the environment and the radiation sources.

### 13.2 Troubleshooting

The subsequent notes and error messages address the user. The information should help to ensure the release and the appropriate operation of the reference spectrometer. For this reason, possible causes and remedies are listed below:

Error / Error Message	Cause	Remedy
The UVpad cannot be switched on	The batteries are empty  Interruption	Change batteries.  Reset the device. To do this, press the reset button on the back with a thin object
The measured value is not reproducible	Automatic, low or high sensitivity selected	Use fixed sensitivity
The UVpad displays too high / too low results	Effect-related measurement  The optically active surface is contaminated  The calibration is invalid	Check the settings for effect-related measurements.  Clean the optically active surface.  Have the UVpad re-calibrated.

	wrong settings Battery screws too tight	check integration time Lightly tighten
The UVpad displays a saturation "MAX"	Measurement range exceeded	Use the sensitivity setting „low“.
The UVpad displays a strong noise	Sensitivity too low	Increase the sensitivity to „high“.
The calibration is expired	Calibration interval expired	Have the UVpad re-calibrated.
The UVpad is not detected by the PC	The UVpad is switched off Check USB cable	Switch the UVpad on and wait a few seconds for the initialization. Use delivered cable.

### 13.3 Charging the battery

The handset can be charged via USB either with the supplied power supply or on a PC. This should happen at the latest when the battery symbol starts flashing.

Battery symbol:



The battery is empty and should be charged urgently, symbol flashes



Battery is discharging



Battery is on current and fully charged



Battery Charging



Switched off when the unit is powered

### 13.4 Reset

Press the reset button (under the cover) with a thin object.

The measurement data is retained in the event of a reset. If the error cannot be rectified, the measurement data should be deleted manually.

### 13.5 Firmware update

It is possible to update the firmware of the UVpad via USB. For this purpose the R UVpad MD must be connected via USB to a suitable PC running the update program.

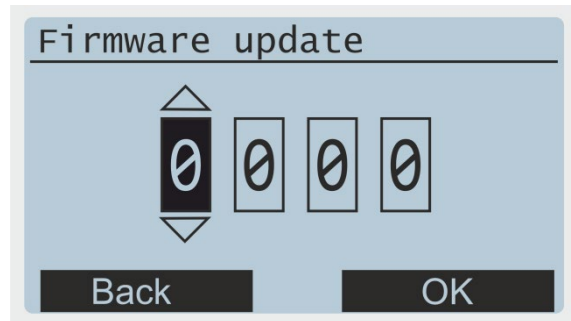
In addition, the UVpad must be put into update mode via menu, the update mode is secured by the password:

1. **Menu-> Settings->**

Firmware update

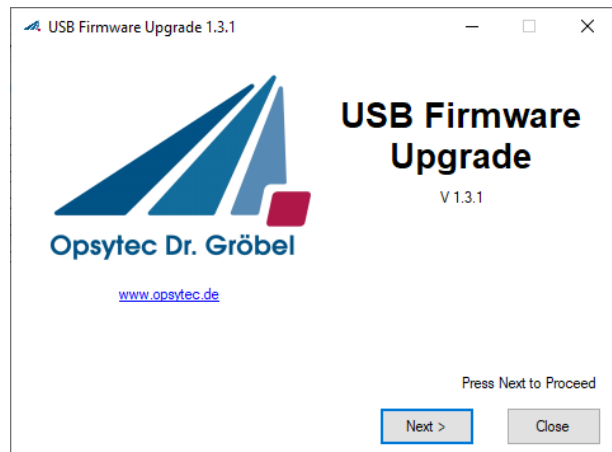
Use the arrow keys and to enter the password.

By confirming the password with **OK**, the device goes into update mode. This mode can only be interrupted by a reset!



Please contact the manufacturer.

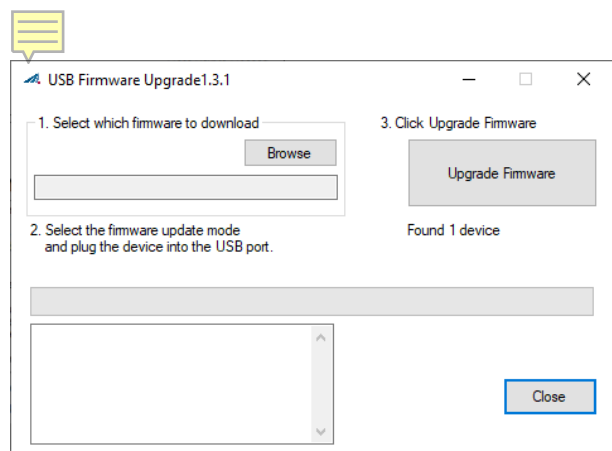
2. Open the software and click **Next**



3. Accept license and continue

4. Select the new firmware as TEXT file by **browsing**.

If the device is in update mode and has been found, the update can be started with **Upgrade Firmware**.

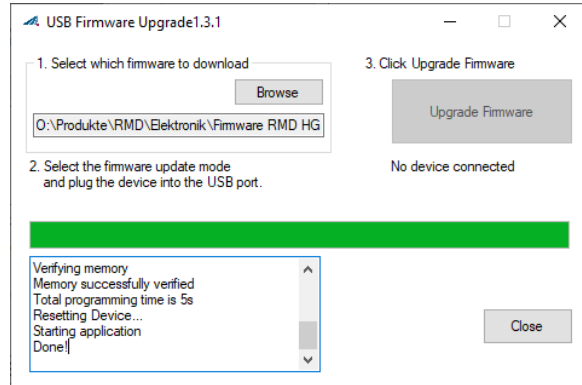




During the update, the USB connection must not be disconnected and the PC must not be switched off!

5. The loading bar shows the progress of the update, only when the info window says "Done" can the RMD be removed and the software closed.

After successful firmware update the RMD restarts and the date and time must be entered again.





## 14 Technical data



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

General data	
Display	graphical, 128 x 64 px
internal memory	50 measurements 6 System configurations
Noise emission	Lpa < 70 dB at the workplace in normal operation according to DIN 45635 T. 19

Technical data UVpad	
Size (L x W x H)	160 x 100 x 14 mm <sup>3</sup>
Weight	~ 375 g
Max. operational temperature	70 °C
Optically active surface	Diameter: 6 mm
Optically active surface position	back side, 3 mm recessed

Technical data UVpad e	
Size (L x W x H)	160 x 100 x 20 mm <sup>3</sup>
Weight	~ 500 g
Max. operational temperature	60 °C
Optically active surface	Diameter: 10 mm
Optically active surface position	external sensor

<b>Radiometric Measurement</b>	
Spectral range	Uvpad : 200 - 440 nm $\pm$ 5 nm as standard, Uvpad E : 240 - 480 nm $\pm$ 5 nm as standard, Optional: device specific
Spectral bandwidth	~ 2 nm
Irradiance measurement range	see technical datasheet + version
Irradiance dose measurement range	see technical datasheet + version
Irradiance profile	4 spectral ranges (UVA, UVB, UVC, VIS)
Measurement time	0 to 120 s, adjustable to ~ (rounded) 120 s (4 Hz) 48 s (10 Hz) 24 s (20 Hz) 10 s (50 Hz) 5 s (100 Hz)
Time resolution	10 ms to 5000 ms, adjustable
Sampling rate	10 ms - 1000 ms, automatically set storage rate for export: see time resolution
Averaging	1 - 32
Gain	normal / LowGain for 10 to 30 ms
Cosine correction	yes
Calibration	yes, traceable to PTB / NIST
frequency of recalibration, recommended	12 months

<b>spectral ranges</b>	
according	CIE
UV-C	240 - 280 nm
UV-B	280 - 315 nm
UV-A	315 - 400 nm
VIS	400 - 480 nm
based customer specification or CIE	optional

<b>Effect related measurements*</b>	
Photoinitiator / Sensitivity curve	optional

<b>Dark mode*</b>	
radiometric	Automatic dark current correction using the PIXEL 1-4
dark+radiometric	Automatic dark current correction at start of measurement via function key using the PIXEL[1]-

	[32].  CAUTION: Avoid heating the meter as it will not be corrected.
--	--

<b>Connections</b>	
Charging voltage and frequency, plug-in power supply	5 V DC
PC interface	USB 2.0
Power supply	Integrated Li-Ion battery,

<b>USB-Connection / Hardware- Software requirements</b>	
PC requirements	min Intel CORE i3, 2 GB Ram, >40 Gb HDD
Operating system	Windows 10 with .NET Framework > 4.0



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

<b>Firmware version</b>	
Firmware version	> 3.1.7

## 15 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 RMD Pro cannot be switched on	Battery empty  malfunction	Charge the battery.  Reset the device. To do this, press the reset button on the back (to the right of the nameplate) with a thin object.
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 RMD Pro
SD card is not displayed anymore		Reconnect SD card  Reset the device.

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

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

## 17 Spare parts



**Please contact us for replacement orders:**

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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.

 <b>CAUTION</b>	
	<p><b>Damaged components or foreign components</b></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"><li>- Replace damaged parts immediately</li><li>- Only use original parts, spare parts and accessories</li></ul>

## 18 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:	Spectral Radiometer
Type designation:	UVpad / UVpad E
Type number:	670011 xxxx 670027 xxxx 670027HP xxxx 670027HS xxxx

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, 15.11.2022

signed. Dr. Mark Paravia



