

UVpad



Manual

Version: 1.6.4

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2 Change history

Date	Version	Changed by	Comment
28.03.2012	1.4.0	Paravia	first Version
22.11.2013	1.5.4	Paravia	added saturation note
08.10.2014	1.5.5	Paravia	added LowGain
02.04.2015	1.5.6	Paravia	Software version 1.1.0, Firmware 1.0.4
23.03.2017	1.5.7	Uhl	Upgrade measurement time; UVA/VIS range adjusted Quick start guide
19.02.2018	1.5.8	Paravia	Editorial modifications
21.11.2018	1.5.9	Uhl	Addition of sampling rate ranges
18.12.2018	1.5.10	Uhl	Editorial modifications, range tolerance
08.01.2019	1.6.0	Paravia	Config tool added
20.05.2019	1.6.1	Paravia	Manual dark measurement
10.06.2019	1.6.2	Uhl	Correction dark mode, scope deleted
04.03.2021	1.6.3	Paravia	EU change
10.03.2022	1.6.4	Paravia	Technical data moved to data sheet

3 Symbols Overview



Meaning:
Failure to observe the mentioned instructions can result in an injury of the user.



Meaning:
Failure to observe the mentioned instructions can result in a damage of the device.



Meaning:
Instructions are to be observed for the regular operation.

*

Optional functions, not available for every UVpad

4 Function Overview

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, broadband 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:

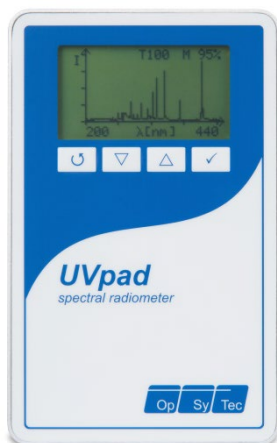
- Real-time of the spectrum (scope measurement)

Radiometric measurements:

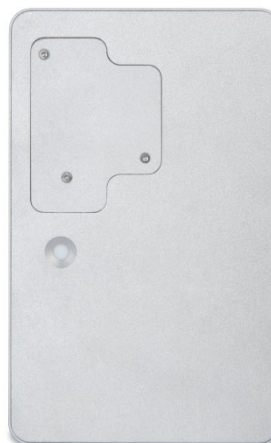
- Spectrum at max irradiance
- Irradiance (UVA, UVB, UVC, VIS)
- Profile of irradiance
- Dose of irradiance (UVA, UVB, UVC, VIS)

Measurements related to cause and effects:

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



Front panel

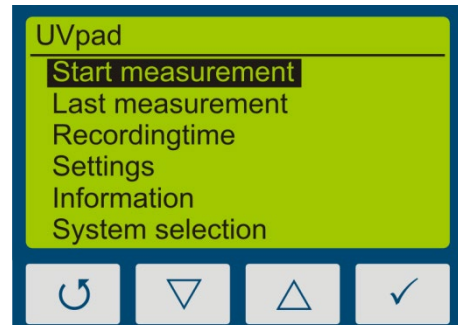


Rear panel

4.1 Quick start guide

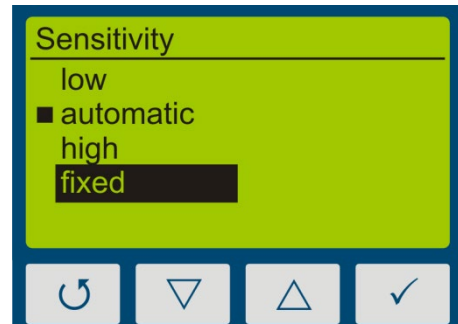
This quick start guide is intended to explain the function of the UV pad by means of an operating procedure.

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**.

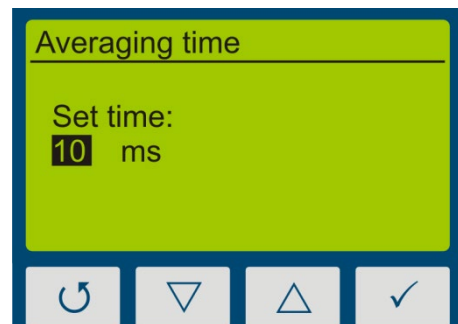
Therefore select sensitivity to „fixed“ under settings → sensitivity and set the desired time.



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

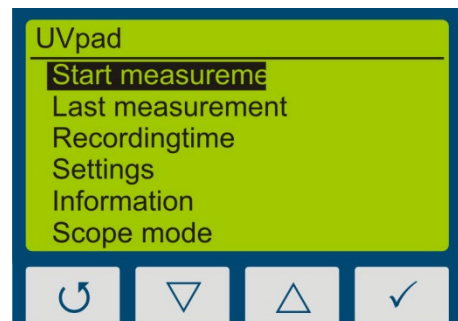
Start with a fixed integration time of 10 ms.

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

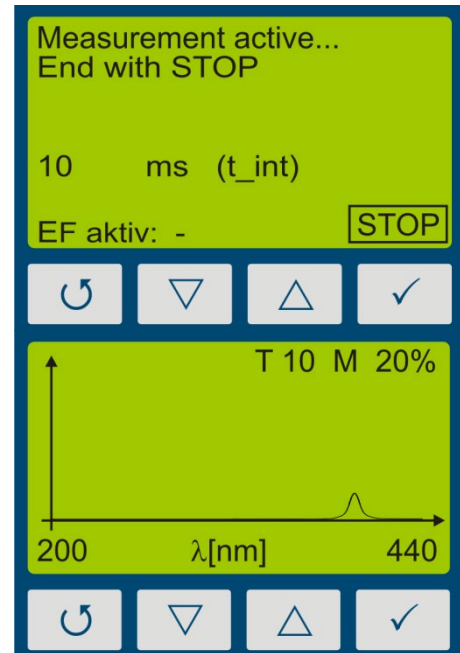


Step 4 Start a first measurement to determine the modulation of the measuring device.

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:

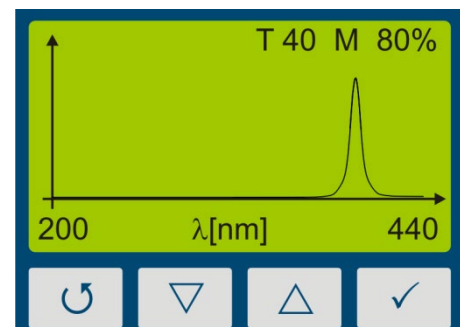
For optimum measurement results, the measuring range should be fully controlled. Very good measuring results are achieved when the measuring range is at least 50%.



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.

5 Technical Data

5.1 General technical data

Size (L x W x H)	160 x 100 x 14,4 mm ³
Weight	375 g
Power	battery powered, 3 x CR2032
Max. operational temperature	70°C
Display	graphical, 128 x 64 px
Optically active surface	Diameter: 6 mm
Optically active surface position	on rear panel, 3 mm behind surface
internal memory	50 measurements 6 Preset configurations

5.2 Radiometric measurements

Spectral range	200 - 440 nm ±5 nm
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) with export option, otherwise only „Total“
Measurement time	0 bis 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) 8 min (1Hz)
Time resolution	10 ms to 250 ms, adjustable
Sampling rate	10 ms - 1000 ms, automatically set storage rate for export: see time resolution
Gain	normal / LowGain for 10 to 30 ms
Cosine correction	yes
Calibration	yes, traceable to PTB / NIST
frequency of checks (Recalibration)	12 months

5.3 Spectral ranges

The classification of the UV regions in the spectral radiometer is carried out according to CIE as follows: UVC 200 – 280 nm; UVB 280 – 315 nm; UVA 315 – 400 nm; VIS 200 – 440 nm.

according	CIE
UV-C	200 - 280 nm
UV-B	280 - 315 nm
UV-A	315 - 400 nm
VIS	400 - 440 nm
based customer specification	optional

5.4 USB / hardware-software-requirements

USB connector	MiniUSB
PC requirements	min Intel CORE i3, 2 GB Ram, >40 Gb HDD
operating system	Windows 10

5.5 Effect related measurements

Photoinitiator / Sensitivity curve	optional
------------------------------------	----------

5.6 Dark mode*

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.

6 Intended Use

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.

7 Conventional Use

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

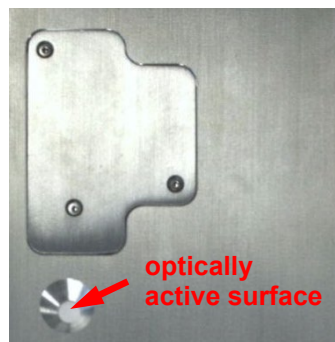
The UVpad is battery operated and suitable for usage with lithium batteries, type CR2032. In case other batteries, than the supplied ones, are used, an operating range of up to 70 °C has to be observed. Spare batteries are to be obtained from your supplier.

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

When using the UVpad, light and UV radiation can be reflected and distributed at the housing. Appropriate protection measures for the protection against radiation need to be applied, if necessary. Note: The UVpad itself does not emit any hazardous radiation.

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.

8 Important Information



Please read the **instruction manual** completely before start-up and operation. The latest version of the instruction manual applies.



Skin oil and contamination are absorbing in the UV spectral range. Finger prints / contamination on the optically active entrance opening are to be avoided. If necessary, clean thoroughly with Isopropanol. Use gloves when cleaning.



The UVpad is calibrated.

ATTENTION: Opening of the housing (except for the battery compartment) leads to a loss of calibration.



Only use **batteries**, which are suitable for up to 70 °C.



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



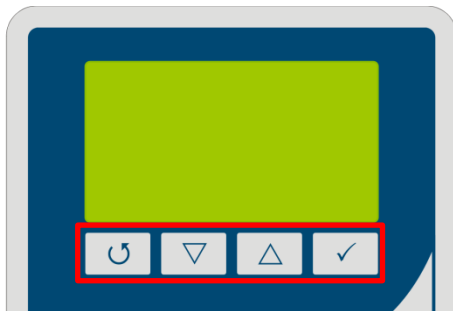
When using the UVpad, light and UV radiation can be reflected and distributed at the housing. Appropriate protection measures for the **protection against radiation** need to be applied, if necessary.



The maximum housing temperature can reach > 60 °C and there is the risk of skin burns on contact. Please allow for the UVpad to cool down and use protective gloves to avoid **skin burns**.

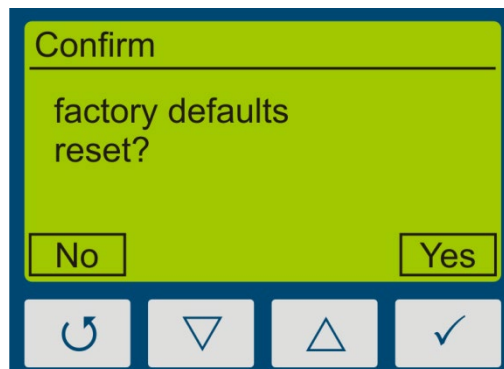
9 Operation

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:



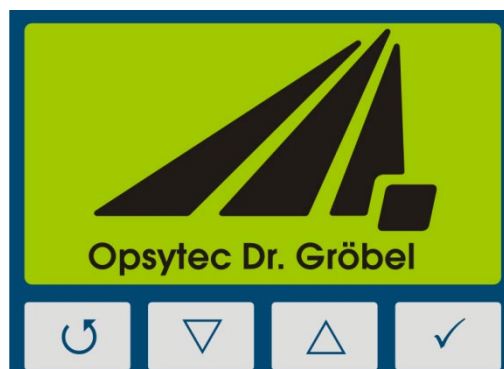
Key	Function
↶	Back / Cancel / Off
▽	Down
△	Up
✓	Confirm / Continue

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

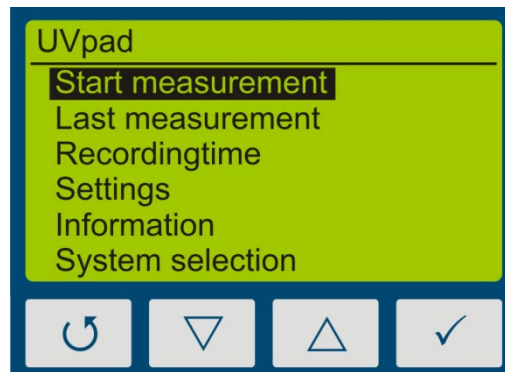


9.1 Switching the device on and off

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 \cup -key.



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

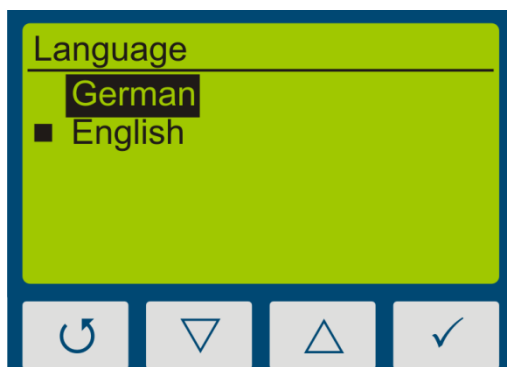
9.2 Standby Menu

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 \triangle -key. Confirm the active menu item with the key \checkmark -key. With \cup -key, you return to the previous menu without saving any changes.

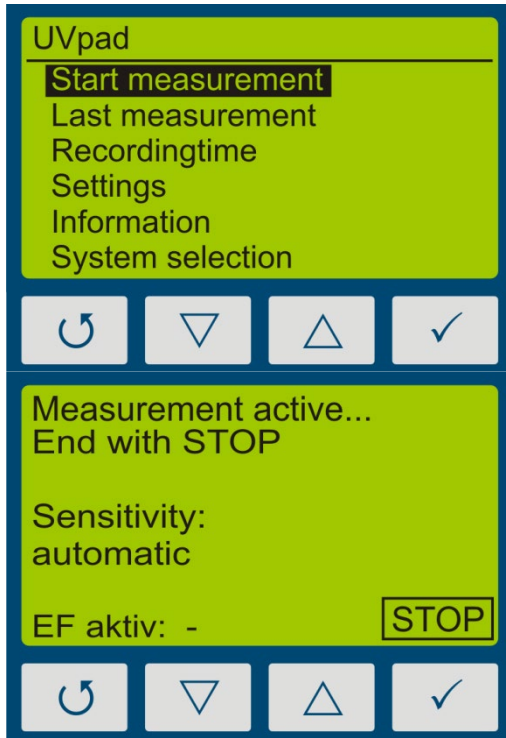
The selected menu item is highlighted in black and displayed inverted. If several settings are selectable, then the selected setting is marked with \blacksquare . Example:



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

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

9.2.1 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 | 3. Measurement in progress | 4. Turn measurement device |
| 2. Turn measurement device | | 5. Stop measurement |

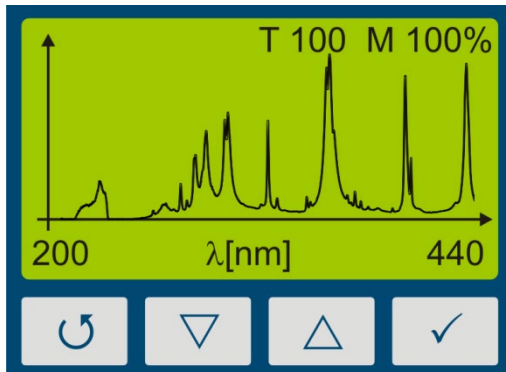


The UV pad requires approx. 2 seconds for the automatic adjustment of the integration time. This can lead to fluctuating measuring results on belt conveyor systems. Use a fixed Sensitivity under Setting> Sensitivity> Fixed

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.

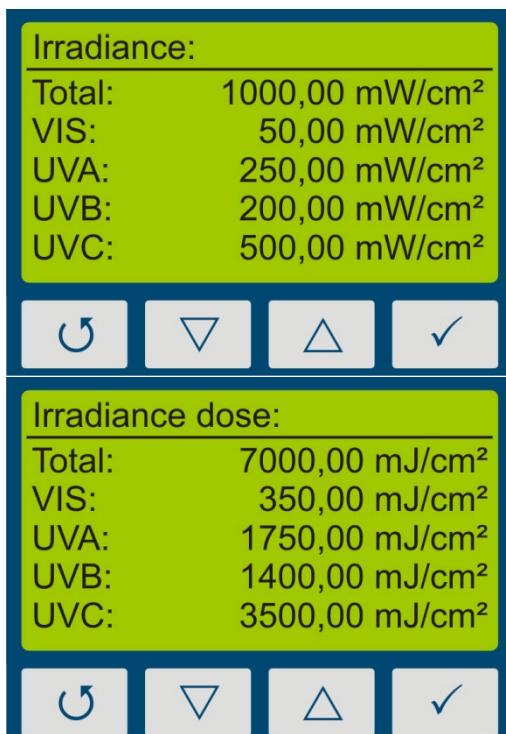
Notes:

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

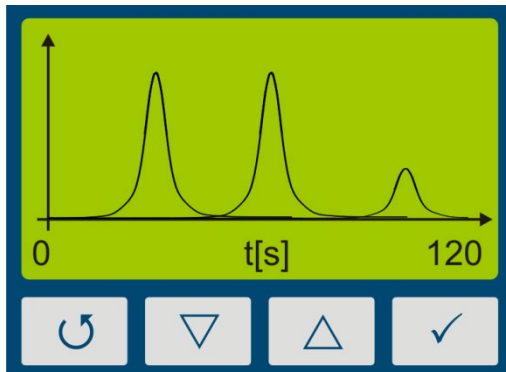
For optimal measurement results, the measurement range has to be fully modulated. For this purpose, the UVpad has a 12-bit analogue/digital converter, which scans the spectrum continuously. Excellent measurement results are achieved, when the measurement range is used to at least 50%. Example:

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 ∇ -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 \curvearrowright -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 “-“.

9.2.2 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.

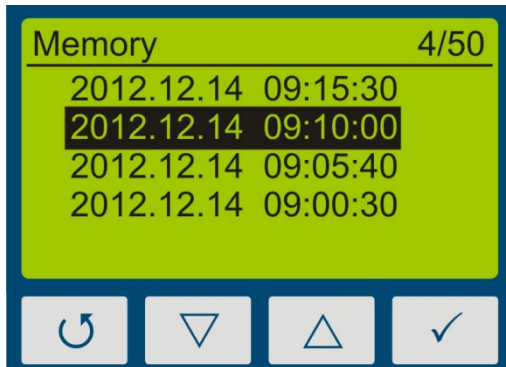
Manual dark measurement is important if the irradiance at the short-wave end of the measuring range (e.g. 240 nm) is not "zero", otherwise the measured values are too low.

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

<p>Dark measurement...</p> <p>100 ms (t_int)</p>	<ol style="list-style-type: none"> 1. After the start of the measurement, the dark measurement is started first. For this the sensor surface must be covered.
<p>Measurement active...</p> <p>Modus: dark+radiometrisch fixed 100 ms</p> <p>STOP</p>	<ol style="list-style-type: none"> 2. After the dark measurement, the UVpad automatically starts the normal measurement. <p>Note that the optically active area always points in the direction of the radiation source and is not obscured.</p>
<p>Measurement active...</p> <p>Modus: dark+radiometrisch fixed 100 ms</p> <p>STOP</p>	<ol style="list-style-type: none"> 3. Press and hold the ✓ key (approx. 1 sec) to end the measurement and display the result on the display.

9.2.3 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 9.2.1.



Select the measurement with the keys ∇ -key and \triangle -key. Confirm with \checkmark -key. Return with \curvearrowright -key.

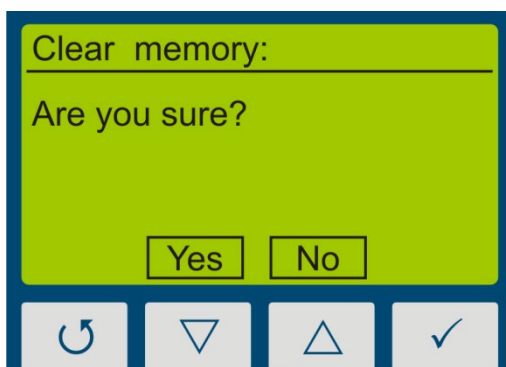


If 50 measurements have already been saved, then a note comes up prior to a new measurement, stating that the memory is full and that the measurement can be taken out without saving it, or that alternatively, the oldest measurement result is being overwritten.

- ⇒ See Delete all Measurements
- ⇒ See Data Export

Delete all measurements:

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

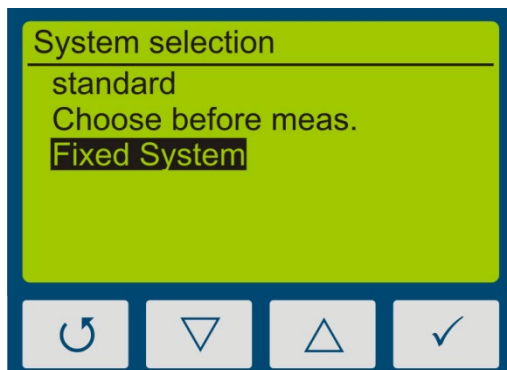


Confirm with Yes (∇ -key). Return with \curvearrowright -key or \triangle -key.

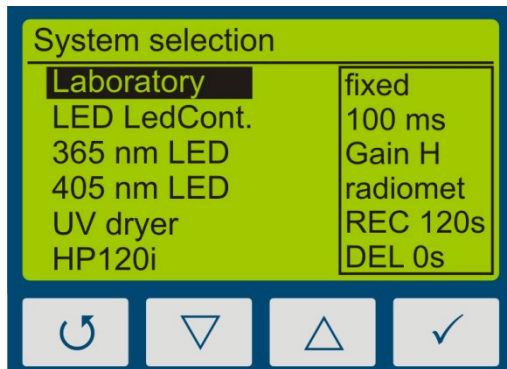
9.2.4 System selection

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 ∇ -key and \triangle -key. Confirm with \checkmark -key. Return with \curvearrowright -key.



Example: UV Systems

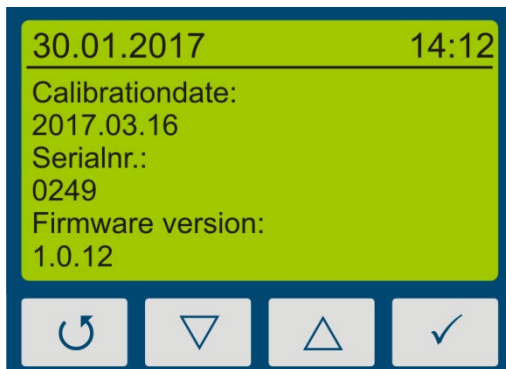
Select the system with the keys ∇ -key and \triangle -key. Confirm with \checkmark -key. Return with \curvearrowright -key.

9.2.5 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.

9.2.6 Information

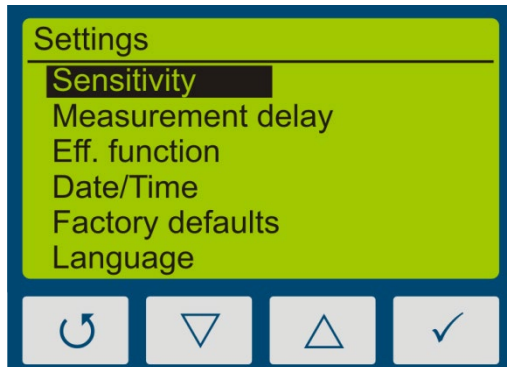
Select the menu item “Information” from the standby menu, to display the serial number, the firmware version, as well as the date of calibration.



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

9.3 Settings

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



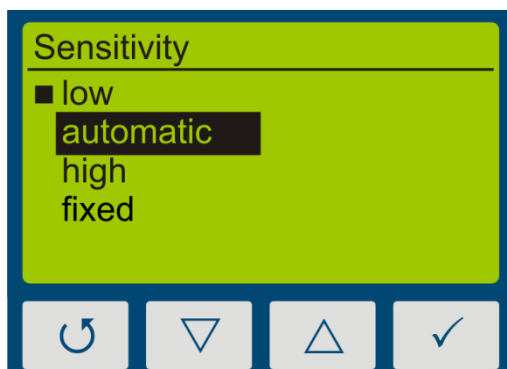
In this menu, the following functions are available:

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

9.3.1 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.



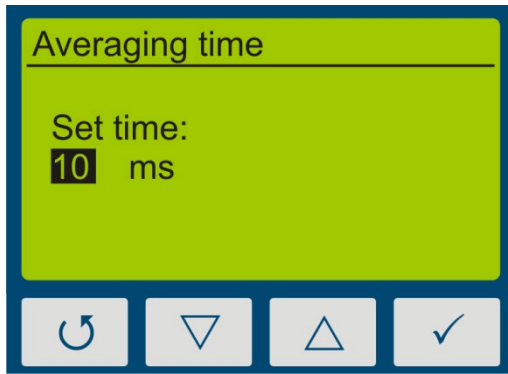
In the setting „automatically“, the UVpad adjusts the sensitivity, once a minimum irradiance is existent. This setting is suitable for most applications.

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

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



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

The integration time is set via the keys ∇ -key and \triangle -key. Confirm with \checkmark -key or cancel the setting with \cup -key.



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

9.3.2 Measurement mode / Effective functions

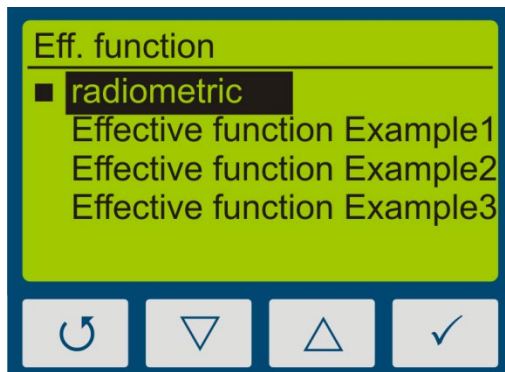
In this menu, the effective function and manual dark measurement can be set.

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 ∇ -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 ²
VIS:	50,00 mW/cm ²
UVA:	250,00 mW/cm ²
UVB:	200,00 mW/cm ²
UVC:	500,00 mW/cm ²

Example: radiometric

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

Example: with effective function



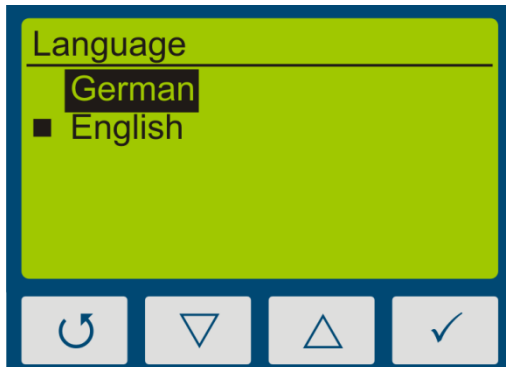
The function “Effective Function” is only available, if your UVpad has been programmed with a customized effective function at factory.

9.3.3 Measurement delay

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

9.3.4 Language

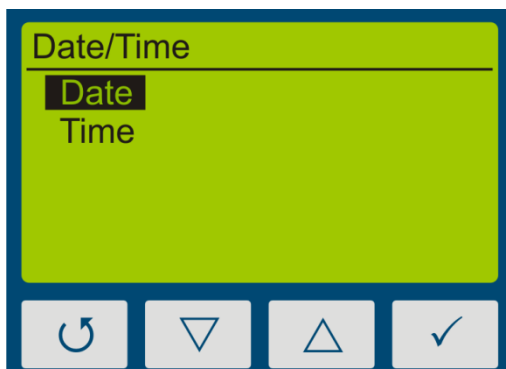
The UVpad comes with a menu in the German and English language.



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

9.3.5 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“.



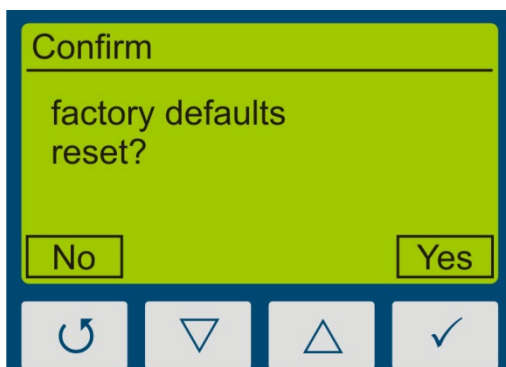
First set the day with the keys ∇ -key and \triangle -key. Select \checkmark -key for the month, the year, the hours and minutes.

Confirm your settings with \checkmark -key.

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

9.3.6 Factory Settings

Reset the UVpad to the factory settings and confirm.



Confirm the restoration of the factory settings with \checkmark -key.

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

10 Data Export / PC Software

10.1 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.



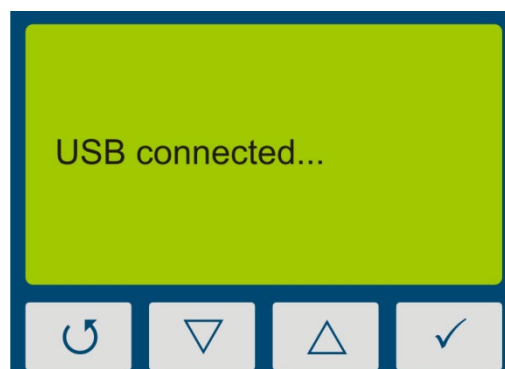
For the software UVpad Viewer, the Microsoft .NET Framework Version 4.0 or higher is required. This is found on the installation CD or free of charge at: www.microsoft.de.

- 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 7.

10.2 Connecting with the PC

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

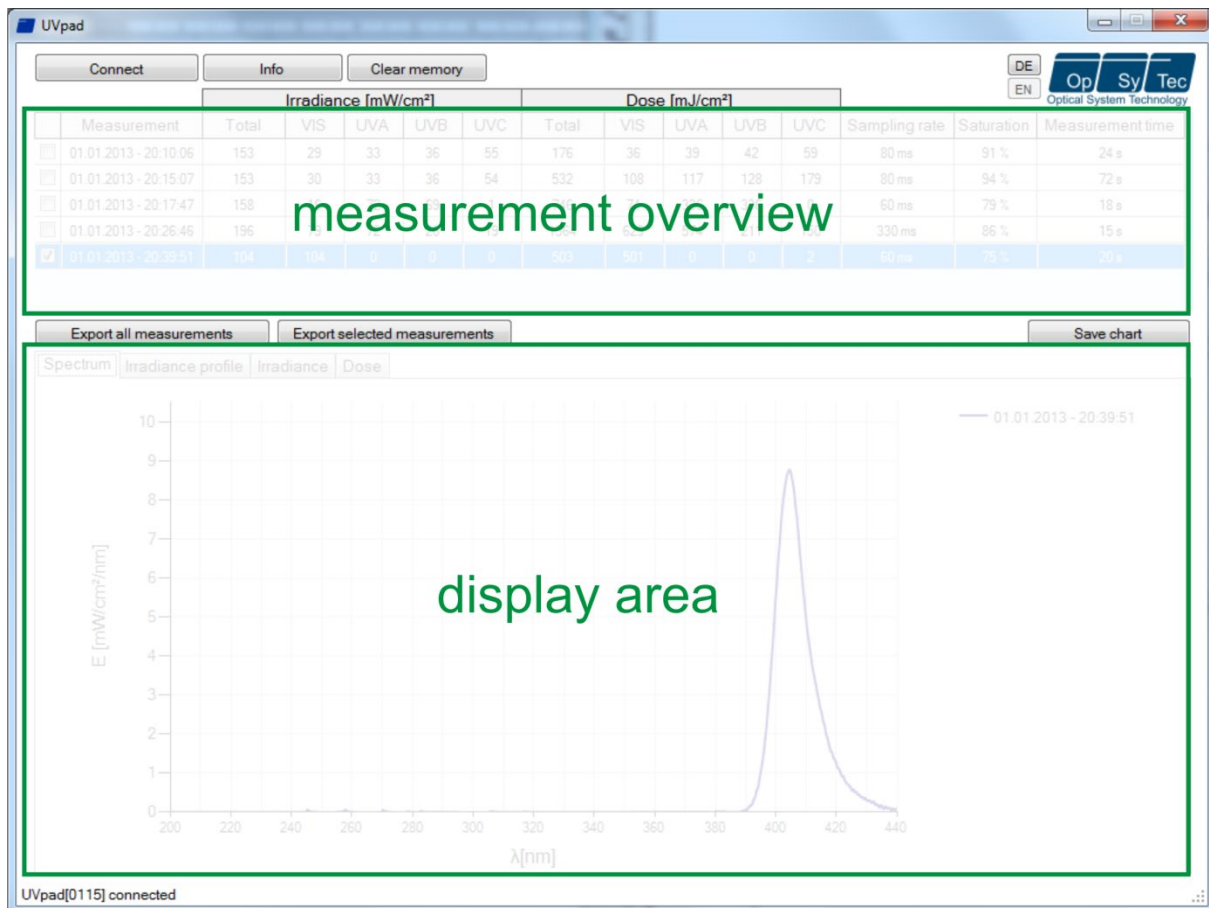
Once the UVpad is connected with the PC, it does not react to any keystroke. Disconnect the connection with the PC and the UVpad continues working autonomously.



10.3 Viewer Software

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

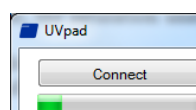
Individual measurements can be compared in the display area based on spectra, irradiance profile or by means of measurement data.



The buttons EN and DE let you change the language (German / English).

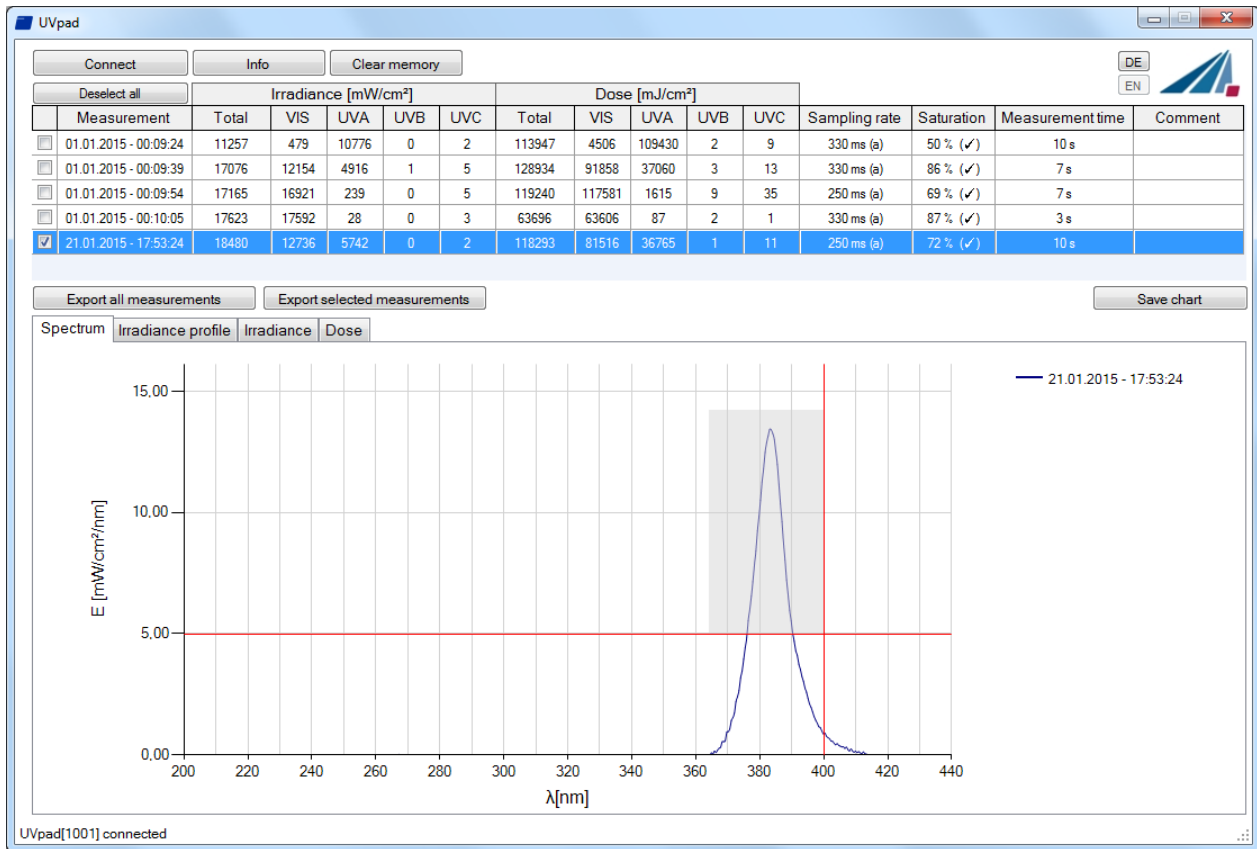


When starting the software, the measurements are automatically imported, when an UVpad is being detected. Importing can take a few seconds. During this time, a progress bar displays the import:

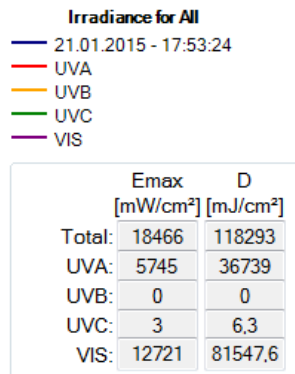


If the UVpad is not connected or not ready yet, then an error message pops up. Restart the import after a few seconds via the button „Connect“.

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:

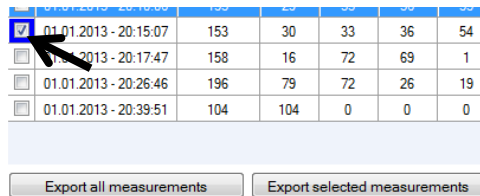
You can select and compare different measurements. You can also add a comment in the table before exporting data.



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

10.4 Export of measurements

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

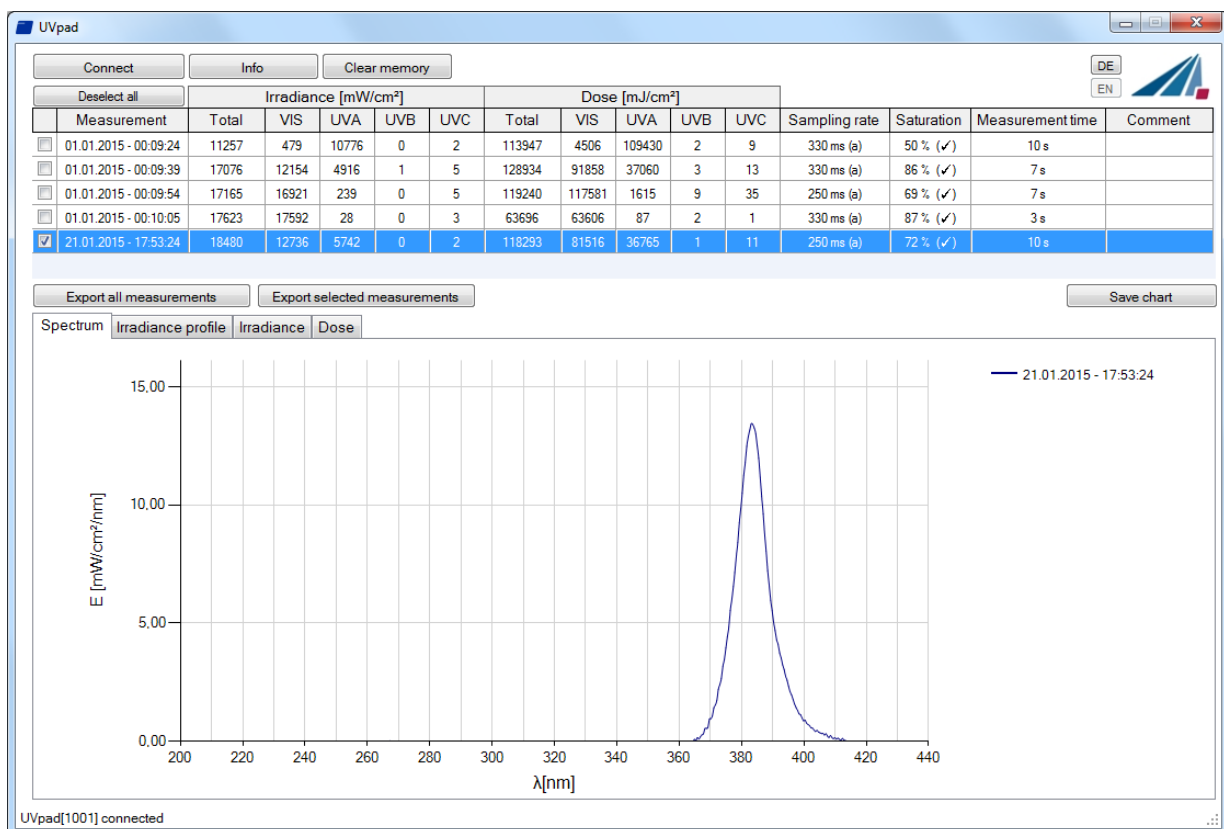


Button „Deselect all“ deselect marked measurements.

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.

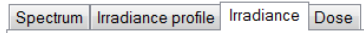
The exported file contains all information to the measurement, the spectrum and the irradiation profile.

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



10.5 Displaying and comparing Measurements

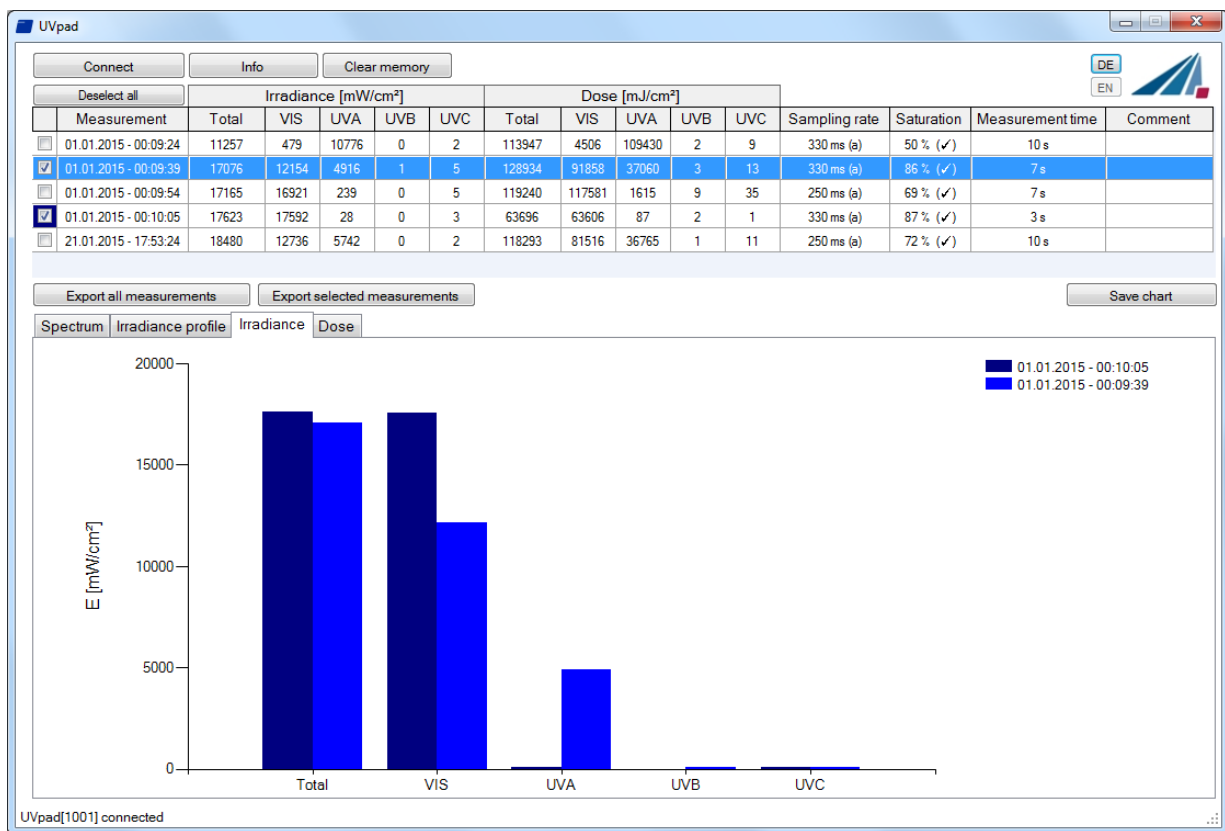
Select the desired display via the tab:



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).



10.6 Displaying the Irradiance profile

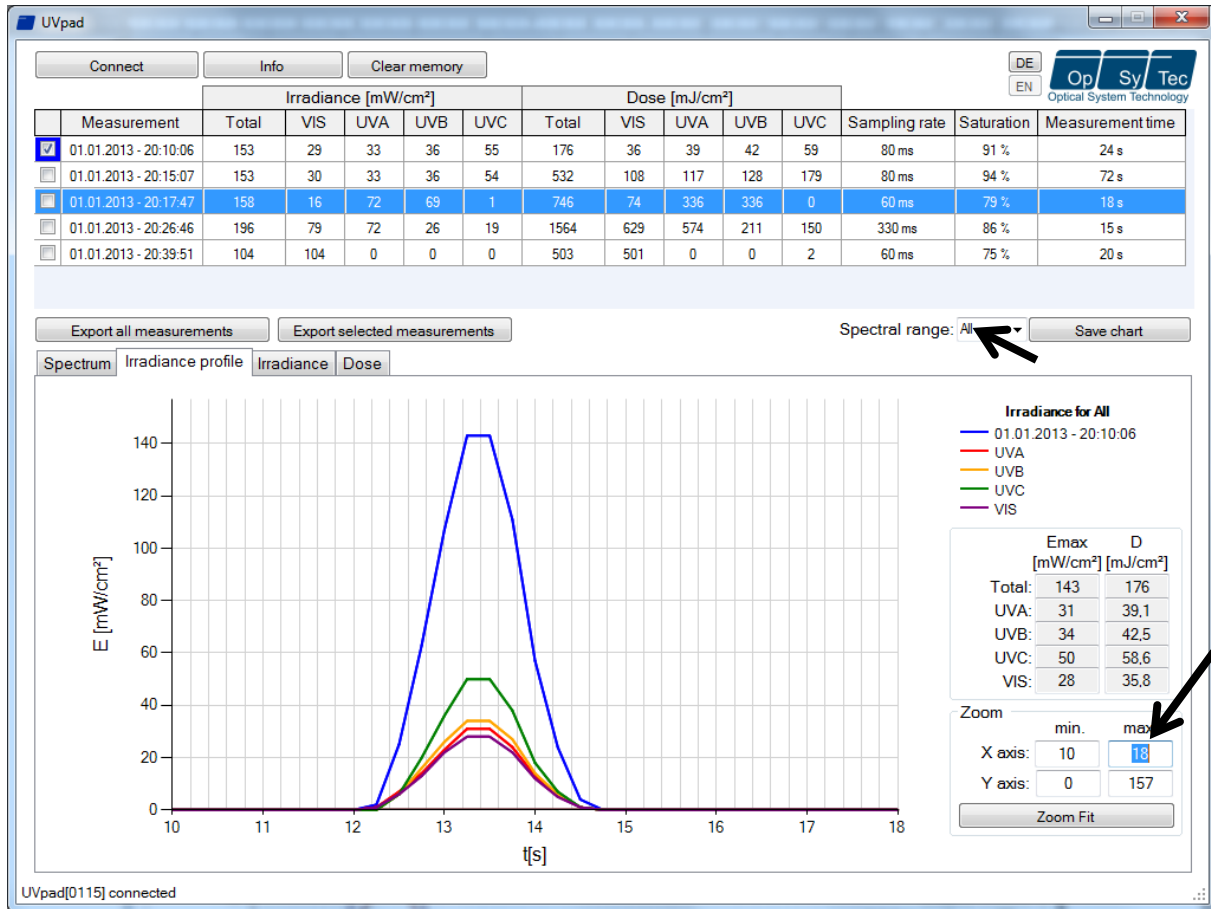
The irradiance profiles are separately available for all four spectral ranges. For this purpose, mark the desired measurements and select the desired spectral range on the tab “Irradiance profile”.

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.



10.7 Deleting Measurements

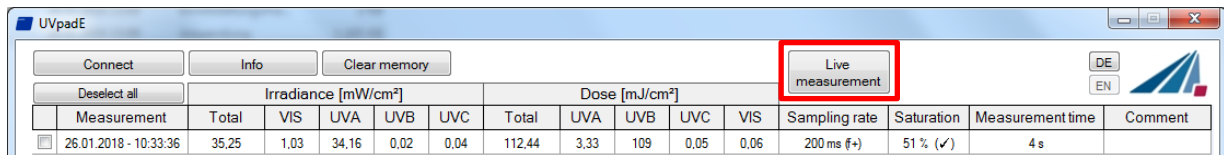
You can delete the entire memory of the UVpad via the button “Delete all measurements”. Confirm the confirmation prompt with OK. Individual measurements cannot be deleted.



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

11 Remote control / Live measurement

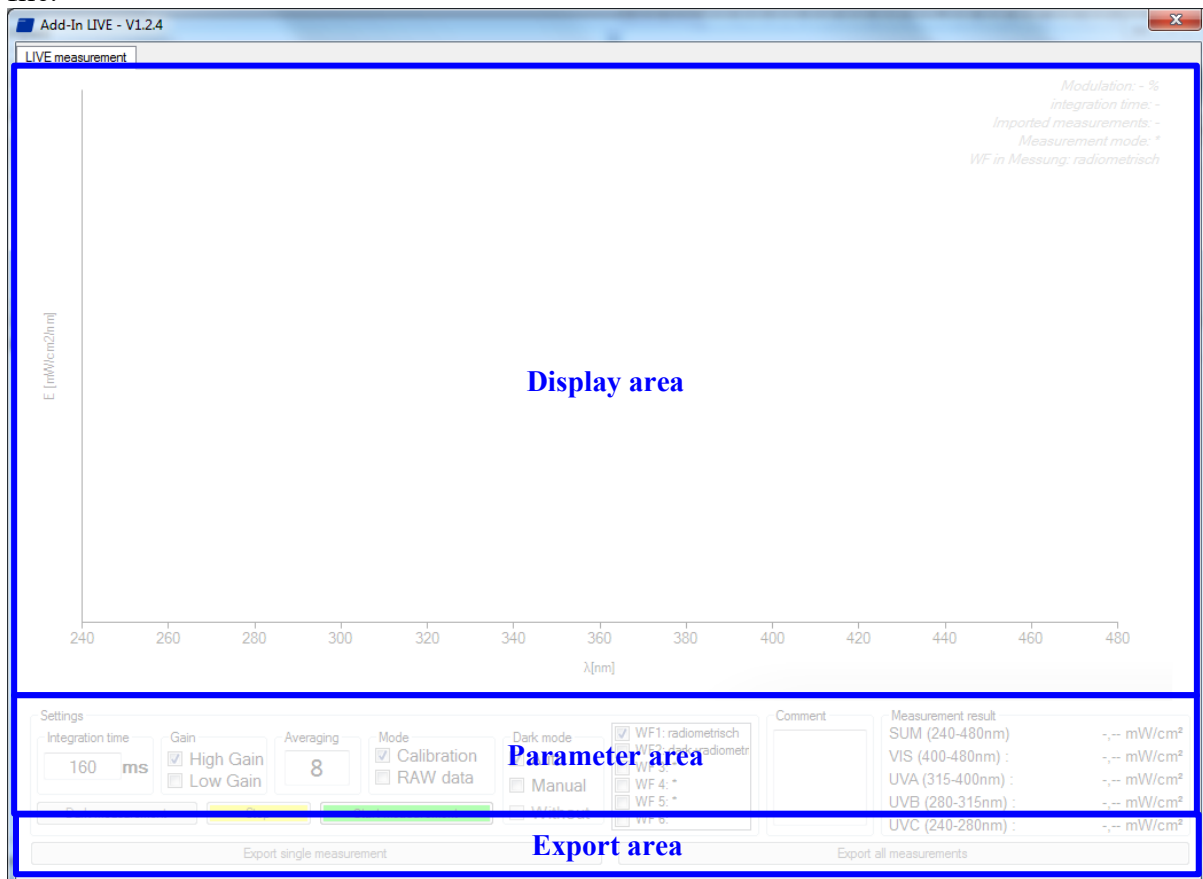
In addition to the export functions, the UVpad E software also has a remote control called "Live measurement". The button with the same name takes you to a separate user interface for remote control of the UVpad.



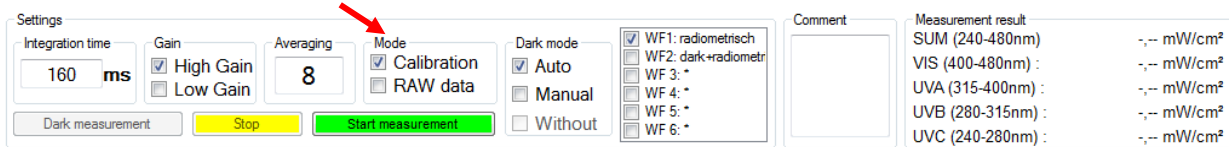


The remote control is available for firmware version 1.3.0 and higher. Ask for an update if necessary!

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.



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.



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:**

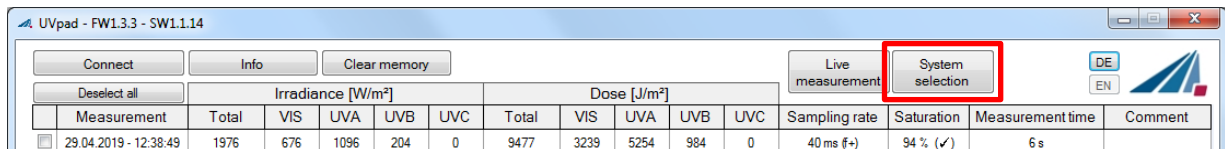
To switch between German and English use the key combination:

Ctrl + Shift + d ~ german

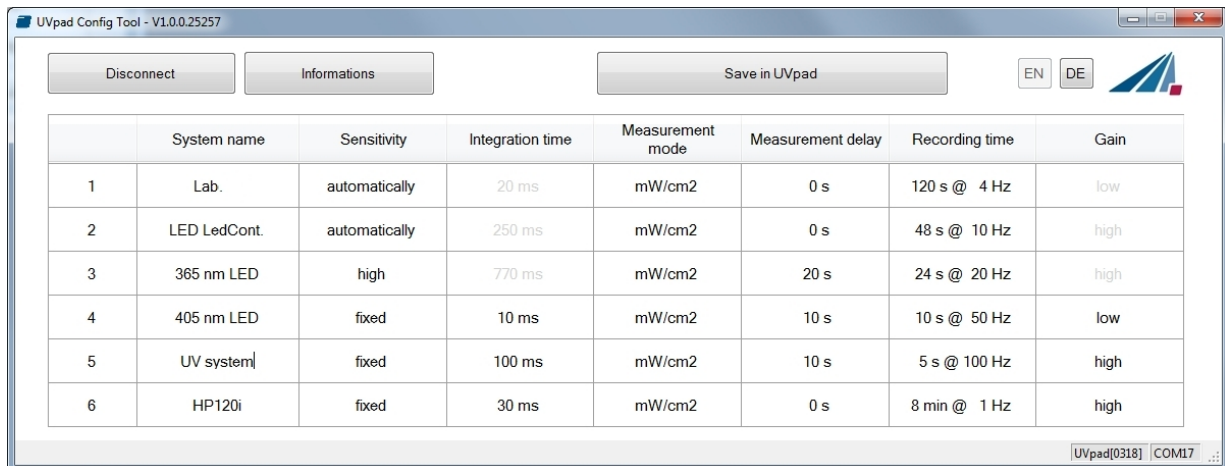
Ctrl + Shift + e ~ english

12 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.



13 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.

13.1 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.

13.2 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:

$$\text{Amount of measurements} = \frac{\text{Width}_{UV} \cdot \text{Aggregate}}{\text{Speed} \cdot \text{IntegrationTime}}$$

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

13.3 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.

13.4 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.

13.5 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.

13.6 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.



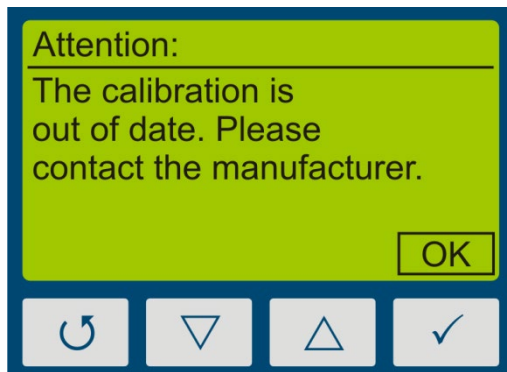
Select a fixed integration time.

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

14 Cleaning, Maintenance & Troubleshooting

14.1 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 recalibration. This can depend on the individual use, the environment and the radiation sources.

14.2 Cleaning

Skin oil and contamination are absorbing in the UV spectral range and thus affect the measurement result. Finger prints or contamination on the optically active entrance opening are therefore generally to be avoided.

Should a cleaning become necessary, please use a lintless cloth and Isopropanol. Clean the optically active surface with circular movements. Avoid a strong force. If necessary, leave the UVpad to dry completely after cleaning it.

Please note:



For cleaning the optically active surface, please wear gloves.



Do not use Acetone or other chemical cleaning agents to clean the UVpad.



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

14.3 Battery Change

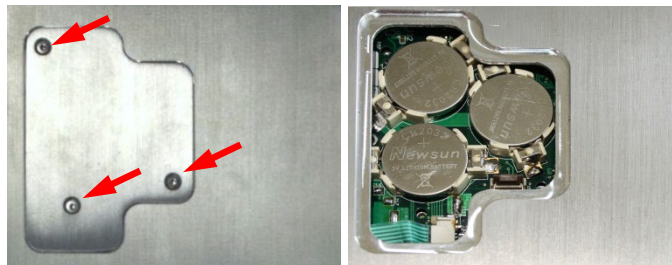


When the batteries are empty a measurement cannot be started and the UVpad reinitializes. The message "empty battery" is displayed.

Change the batteries.

The measured data will be stored. Date and time should be adjusted.

The UVpad is operated with lithium batteries. For a battery change, switch the UVpad off and turn it with the rear panel facing towards you. Loosen the three marked screws with a screwdriver (Torx T6) and remove the cover.



Remove the old lithium batteries carefully and replace them by new ones. Close the cover again and tighten the screws **very carefully**. If the screws are tightened with too high torque, this can lead to mechanical deformation of the housing, which influences the measurement results.

Please note:



Only use **batteries**, which are suitable for up to 70 °C. Appropriate batteries can be obtained from your supplier.



The housing, except for the battery compartment, must not be opened by the user.



The UVpad is calibrated.

ATTENTION: Opening of the housing (except for the battery compartment) leads to a loss of calibration.

14.4 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. Restart the device. For this purpose, remove all batteries and replace them after 5 minutes. The UVpad is in delivery status.
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 wrong settings Battery screws too tight	Check the settings for effect-related measurements. Clean the optically active surface. Have the UVpad recalibrated. 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 recalibrated.
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.

15 Declaration of Conformity



Manufacturer :	Company name: Opsytec Dr. Gröbel GmbH Street: Am Hardtwald 6-8 City: 76275 Ettlingen Country: Deutschland
Person authorized to compile the technical documentation	Company name: Opsytec Dr. Gröbel GmbH Street: Am Hardtwald 6-8 City: 76275 Ettlingen Country: Deutschland
Product:	Spectral radiometer
Type designation:	UVpad
Type number:	670011 xxxx

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

2014/30/EU

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

2011/65/EU

"Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)".

Ettlingen, 04.03.2021

gez. Dr. Mark Paravia

This document was created electronically and is valid without signature.

