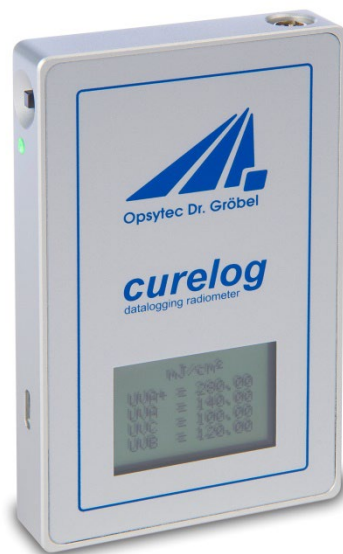


# *Dosimeter / Radiometer curelog*

## *Manual*



version 1.0.0E

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## 2 Preface

Dear Customer!

Thank you for choosing a product manufactured by us!

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

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

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

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

THIS MANUAL CONTAINS IMPORTANT SAFETY INSTRUCTIONS.  
KEEP THIS MANUAL.

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This is a translation of the original operating manual.

### 3 Directives and Norms



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

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

## 4 Identification

### 4.1 Manufacturer, Ordering of Spares and Customer Service

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### 4.2 Change history



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

Version	Editor	Date	Change
1.0.0E	Paravia	29.07.2020	Translation

### 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

The curelog is a precise radiometer with dose measurement and up to four spectral ranges. Due to its fast and precise measurements the curelog can universally be used for applications in the fields of lacquer curing, bonding, sterilization, disinfection, lithography and many other applications.

The adjustable data recording rate of up to 2000 Hz (measurements per second) allows reliable measurements on fast running UV belt systems.

The recording time of up to 180 h allows the measurement of long-lasting processes at low doses, like UV disinfection.

Light, IR and UV radiation can be reflected and scattered. If necessary, suitable protective measures must be taken to protect against radiation. The curelog itself does not emit UV.

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 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.

## **4.7 Legal Information**

### **4.7.1 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.

### **4.7.2 Declaration of conformity**

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

### **4.7.3 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 curelog 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.

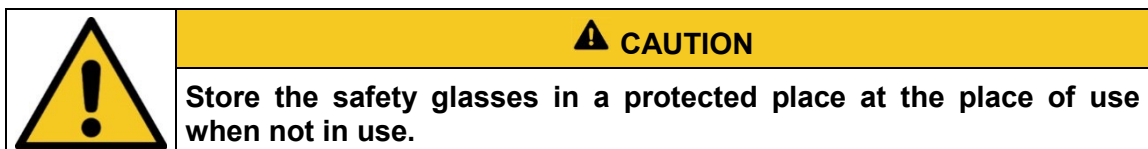
### 5.5.2 Safety goggles

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





## 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> <p>-The sensors may be exposed to max. 60 °C.</p> <p>-If necessary, do not expose the sensors to radiation for long periods of time to avoid overheating.</p>

## 6.2 Safety instructions in relation to normal operation

Never look directly into LEDs, lamps or UV lamps.

The curelog 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 curelog 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> If the device is exposed to strong thermal or mechanical influences, the lithium-polymer battery may be damaged. This may cause spontaneous combustion of the battery. Toxic vapours escape and a metal fire is started.</p> <p><b>Avoidance</b> Do not use or store the device</p> <ul style="list-style-type: none"><li>-near strong heat sources</li><li>-over 70 °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 curelog is a precise radiometer with dose measurement and up to four spectral ranges. Due to its fast and precise measurements the curelog can universally be used for applications in the fields of lacquer curing, bonding, sterilization, disinfection, lithography and many other applications.

The adjustable data recording rate of up to 2000 Hz (measurements per second) allows reliable measurements on fast running UV belt systems.

The recording time of up to 180 h allows the measurement of long-lasting processes at low doses, like UV disinfection. The curelog simultaneously records up to four spectral ranges, each with a high-precision 24 bit ADC. The high-precision ADC gives the curelog a extrem high dynamic range. The resolution of 0.0001 mW/cm<sup>2</sup> and a measurement range of 50 W/cm<sup>2</sup> are the main features of the curelog.

All common UV lamps and UV-LEDs can be measured and compared, no matter if spot or area lamps, fibre optics or UV/VIS LEDs are used. The display directly shows maximum irradiance and dose.

With the curelog software measurements can be analyzed, exported and compared. Previously stored reference measurements can be read in and superimposed in a time-synchronous manner. So, changes in the irradiation belt profile, i.e. irradiance over time, are visible. Errors that occur over time, such as dirty reflectors, are reliably and easily detected.

A further application is the adjustment and focusing of the reflector in UV systems. Due to its small dimensions the curelog can be placed on most objects / surfaces and records the irradiance with pinpoint accuracy.

The curelog spectral ranges do not overlap, so crosstalk is not possible. Regardless of whether you use low powered UVC disinfection lamps, high intensity mercury / xenon lamps or LEDs for bonding or medium pressure lamps for UV curing, with the curelog you always measure accurately and reproducibly.

The battery is charged via USB.

Applications:

- Measurement of UV LEDs & UV light sources
- NDT, material testing
- Monitoring of UV irradiation systems
- Measurement for workplace safety
- Measurement of  $H_{\text{eff}}$  and  $H_{\text{UVA}}$
- Multi-channel measurements
- Applications with high dynamics
- Data logging

### 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 sensors, which only exposes the receiver surface. In this way the heating of the sensors 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.

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

### The following components are supplied:

- CURELOG-Pro
- Suitcase\*
- USB power supply
- USB cable
- Software (USB stick)
- Factory calibration certificate, optionally ISO 17025 calibration certificate\*
- this documentation



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



The CURELOG is available in several variants. If some of the functions described in this manual are not available in your CURELOG, 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. 70 °C). Do not operate the device in hazardous areas, not in dirty, dusty or oily environments.

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

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

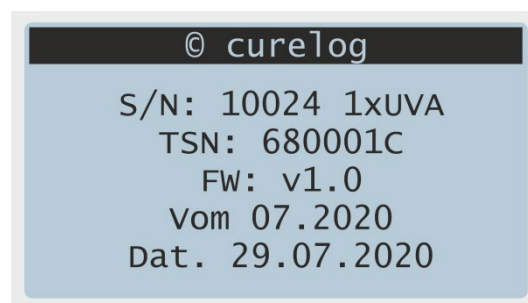
## 8 OperationOperation

The CURELOG radiometer is operated with only one key. This is located (looking on the front panel) at the top left-hand edge of the housing. A distinction is made between short and long operating times.

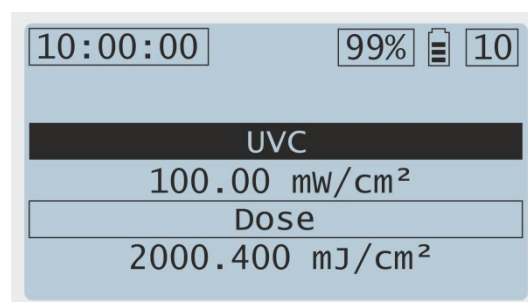
Duration of button pressure	Function
short	<ul style="list-style-type: none"> <li>• Switch on</li> <li>• Continue</li> <li>• Start measurement / confirm start of measurement</li> <li>• Stop measurement</li> </ul>
long	<ul style="list-style-type: none"> <li>• Switch off</li> <li>• Continue</li> </ul>

### 8.1 Switching on and off

The device is switched on with the button or by plugging in a USB connection. After starting the device, the current firmware version appears on the display.



The standby screen appears after pressing a button:

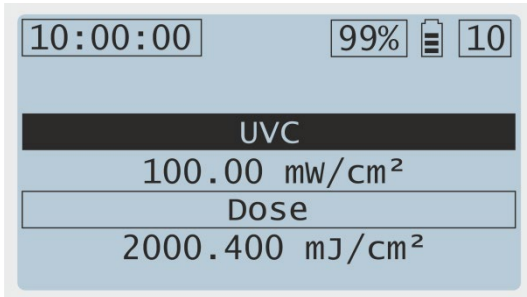


The device is switched off with a long keystroke.



## 8.2 Meaning of symbols

The following figure shows the symbols used:



The time is displayed in the upper left corner. The date has already been displayed in the home screen.

At the top center, the battery status is displayed by a battery icon.

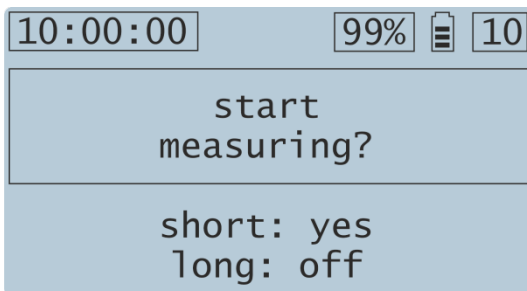
The number of measurements performed is displayed in the upper right corner.

A maximum of 30 measurements are possible.

## 8.3 Measurements with the curelog

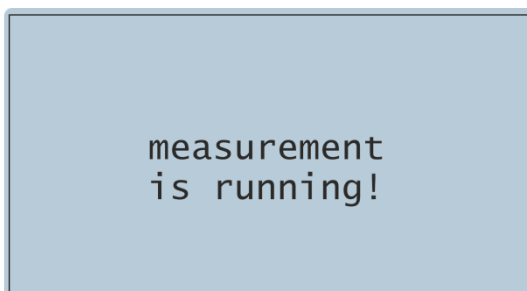
The curelog contains two modes: measurement and display of the last measurement.

### 8.3.1 Start measurement



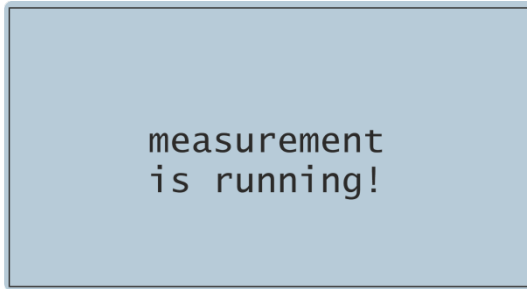
A measurement is initiated from the standby screen by pressing a button.

The measurement is started with another short keystroke.



This is followed by the screen shown. The measurement runs in the background.

### 8.3.2 Stop measurement

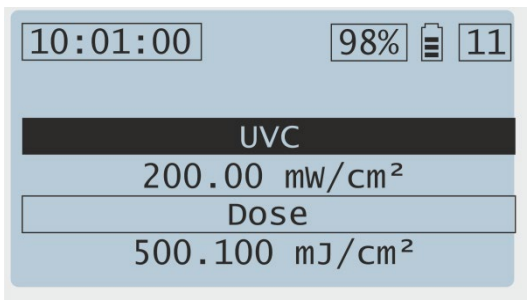


The measurement is stopped with another short keystroke.



This is followed by the screen shown. The measurement is stored.

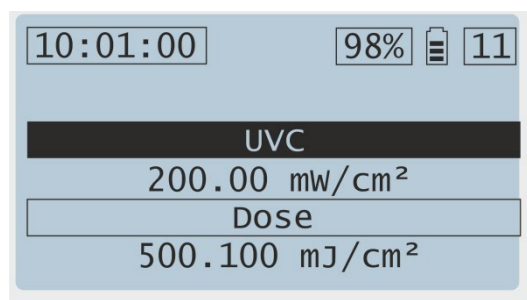
The measurement result is then displayed.



The measurement result is displayed. The measurement number, the peak irradiance (= the maximum of the measurement) and the dose are displayed.

#### 8.3.2.1 Measurement results

The measured irradiance, or for LUX sensors the illuminance, is displayed in the measurement window. Depending on the Curelog version, either only one spectral range is displayed individually or all spectral ranges together.



Example curelog ONE UVC

	mW/cm <sup>2</sup>	mJ/cm <sup>2</sup>
Total	670.200	335.10
UVA	100.000	500.00
UVB	400.200	200.10
UVC	120.000	60.00
VIS	150.000	75.00

Example curelog Pro

The further evaluation of the measured data is done on the PC.

#### 8.4 Settings / Deleting measurement data

Settings are made exclusively on the PC. The measurement data can also only be deleted on the PC.

#### 8.5 Charging

The curelog can be charged via USB either with the included power supply or with a PC. This should be done at the latest when the battery symbol indicates this.

Battery symbol:



Battery is discharging / charging

## 9 Software

The software is used to read out and control the curelog with a PC. The software makes it possible to:

- Display and export measured values
- Read in measured values and compare them with reference measurements
- Change settings

### 9.1 Installing the software

**Proceed as follows for the installation:**

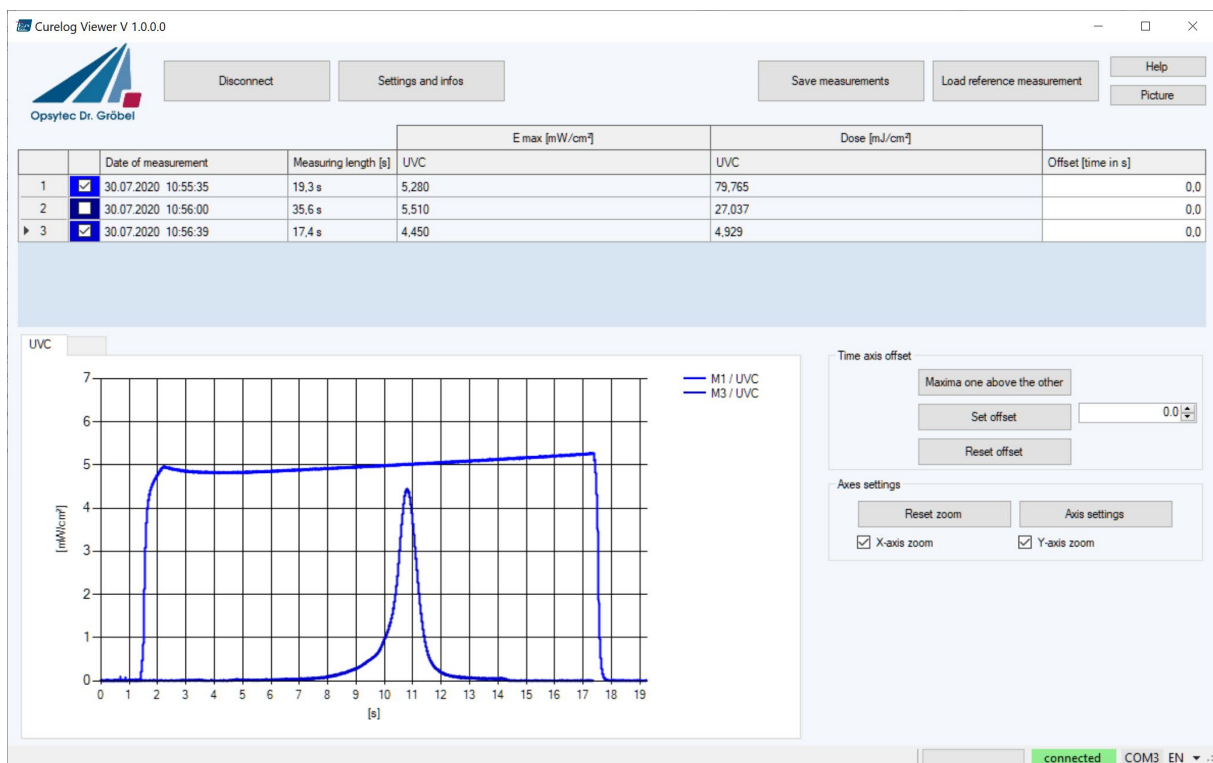
- 1.) Uninstall any old versions of the software first.
- 2.) If necessary, disconnect the curelog from the PC.
- 3.) Start the installation with "Setup.exe" in the root directory of the USB stick. Follow the instructions of the installation program.
- 4.) Once the installation is complete, connect the curelog to the PC. The driver installation is done automatically under Windows 10.
- 5.) Connect the curelog to the PC and start the software.

## 9.2 Operation

The operation of the software is divided into:

- A table with all measurements performed
- Time profile of the irradiance
- Control area for adjusting the time profile
- Export / and setting functions
- Status bar

The software is shown below:

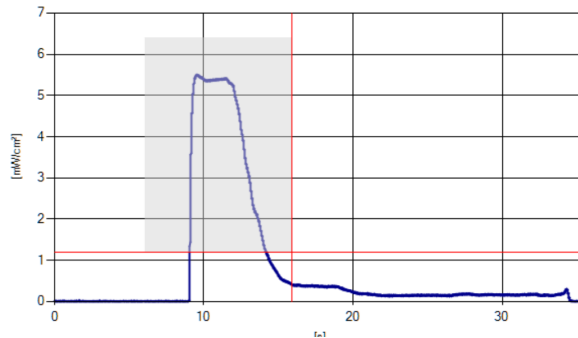


The language can be conveniently changed in the lower status bar under "DE" or "EN".

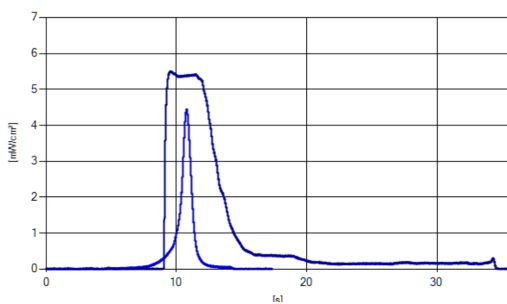
### 9.3 Display and compare measurements

Measurements are selected in the overview table and then appear in the time history. It is possible to select and compare several measurements simultaneously. It is also possible to import a measurement from a file.

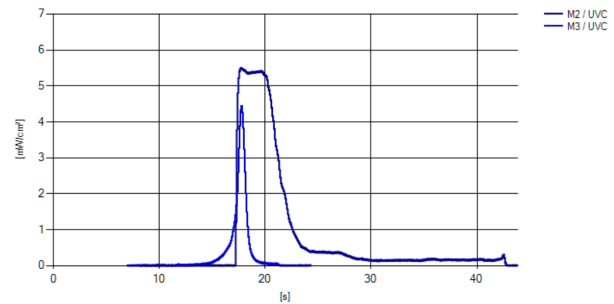
In the profile of time, "pitch-to-zoom" can be used to zoom in and out, i.e. dragging a range while holding down the mouse button.



In addition, several measurements can be synchronized in time. This can be done automatically to the maximum using the controls on the right-hand side or manually:



Example: not synchronized



Example: synchronized

Measurement data are not changed by the synchronization and can be displayed "as measured" again with the "reset" buttons.

**Time axis offset**

Maxima one above the other

Set offset 0.0

Reset offset

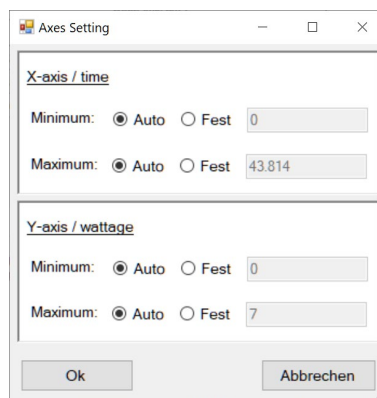
---

**Axis settings**

Reset zoom Axis settings

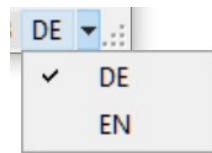
X-axis zoom  Y-axis zoom

The axes of the time profile can be adjusted with the button Axis settings:



## 9.4 Change language

The language can be conveniently changed in the lower status bar under "DE" or "EN".




## 9.5 Device control

The following figure shows the "Settings and Info" tab for controlling the curelog radiometer according to the described device settings. The device and software information, such as firmware, calibration, free memory etc. is displayed.

CureLog x

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**Software Infos**

Software Version:	V 1.0.0.0
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**Curlog Infos**

Firmware:	v1.0
Serial number:	0001-1XUVC
Type number:	680001C
Number of channels:	1
UVC	0 - 1000 mW/cm <sup>2</sup> 0.83975
Akku:	93 %
Free storage:	98 %
Number of measure.:	3
SPS:	500
Measurement trigger:	0.000

**Curelog Einstellungen**

Delete All

500 sps

0.000 mW/cm<sup>2</sup>

### 9.5.1 Erase memory

With the button "Delete all" the entire memory of the curelog is deleted. Afterwards 30 measurements are possible again.



### 9.5.2 Change Samples per second (SPS)

The recording rate is set in SPS. SPS stands for samples per second. So with 500 SPS, 500 samples per second are stored.

High SPS settings are useful for fast running systems. Low SPS settings should be used for long recording durations and slow running systems.

A good SPS setting is characterised by a clear time curve without any recognisable jumps.

### 9.5.3 Change measuring trigger

The measurement of the curelog can be started when a key is pressed or after a trigger threshold is exceeded for the first time. This threshold can be adjusted. Measured values below the measurement trigger are not considered in the dose calculation in order not to influence dose values during long recordings by a possible small offset.

For example, it makes sense not to consider measured values below 1 mW/cm<sup>2</sup> at expected high irradiances for the dose and therefore set the measurement trigger to 1 mW/cm<sup>2</sup>.

## 9.6 Data export / Load reference measurements

The curelog stores up to 30 measurements. The length of the recording time depends on the data recording rate. A high data recording rate reduces the total measurement duration. The measurement duration of a measurement is not limited. Therefore a long measurement or 30 partial measurements can be made.

In the following the content of the lines is explained at a file section:

```
20200730_105600_MeasProtocol_Curlog0001-1XUVC.csv
Protocol date (dd.mm.yyyy); 30.00.2020
Software version number; 1.0.0.0

***** Curlog info *****
Serial number;0001-1XUVC
Firmware version;v1.0
Type number;680001C
Currently set sampling rate;500 sps
Number of existing measurements;3
Number of channels;1

Channel 1;UVC
Measuring range;0-1000mW/cm²

***** Measurement No. 2 *****]
Sampling rate; 500
Quantity of measuring points; 17808
Peak [mW/cm²];4.45;
Can [mJ/cm²];4.929;
Start time / Meas. Lenth; 10:56:00;35,616 s
Date of measurement (dd.mm.yyyy); 30.07.2020
Adjusted offset; 0

Start measurement:
*****
Time [s];CH UVC [mW/cm²];
0;0,00611;
0,002;0,00511;
0,004;0;
0,006;0,001;

..
```

The data files are saved as CSV files. CSV stands for comma-separated-values. A CSV file stores tabular data (numbers and text) in plain text. This makes a CSV file easy to read (e.g. in a text editor).

CSV is a simple file format that is supported by many programs. The file format was chosen because it can easily be opened with a spreadsheet like Microsoft Excel or OpenOffice.org Calc.

In the software, measurements can be exported as CSV data using the Save measurement data function. For a simple import as a reference measurement, the file must not be modified.

## 10 Technical data



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

General data	
Ambient temperature	0 to 70 °C
	briefly for up to 60s at
	120°C ambient temperature
Storage temperature, approx.	0 to +40 °C
Air humidity	0% to 80% relative humidity, non-condensing
Type of structure	Handset
Mounting position	any
Dimensions	62.5 x 100 x 14 mm <sup>3</sup>
Weight	Approx. 125 g
Display	Graphic display, 128 x 64 px
Noise emission	Lpa = 0 dB at the workplace in normal operation according to DIN 45635 T. 19

Measurement	
Display output	1 to 4 channels Irradiance curve + dose Max irradiance
internal storage	64 Mbit
Data recording rate	1 Hz to 2000 Hz, adjustable
Recording duration	180 h to 5 min, depending on the time resolution
Measuring duration	30 h with one battery charge
Internal ADC	24 bit
Irradiance	0.0001 - 25000 mW/cm <sup>2</sup>
Irradiation dose	0.0001 mJ/cm <sup>2</sup> - 6 MJ/cm <sup>2</sup>
Resolution	0.0001 mWcm <sup>2</sup> / mJ/cm <sup>2</sup>

Connections	
Mains voltage and frequency, plug-in power supply	100-240VAC / 50-60 Hz
PC interface	USB 2.0
Maximum input power	See the type plate of the plug-in power supply unit
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>Spectral ranges</b>	
UVC	200 - 280 nm
UVB	280 - 315 nm
UVA	315 - 400 nm
UVA+	330 - 455 nm
UVBB (Broadband)	230 - 400 nm
VISB	400 - 480 nm
VISBG	400 - 570 nm
LUX	380 - 780 nm, V( $\lambda$ )

<b>Firmware version</b>	
Firmware version	1.0

## 11 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 curelog cannot be switched on	Battery empty  Fault	Charge the battery.  Reset the device. To do this, press the reset button on the side with a thin object.
The irradiance is too low	Sensor aging  Sensor dirty	Have the sensor recalibrated  Clean sensor (e.g. with ISOPROPANOL)

## 12 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 curelog 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	curelog check	Check optical surface, must be free of contamination, 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>

## 12.1 Calibration

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

## 13 Spare parts



**Please contact us for replacement orders:**

Opsytec Dr. Gröbel GmbH

At Hardtwald 6-8

76275 Ettlingen



Germany

Phone +49 - 7243 - 94 783 - 50

Fax +49 - 7243 - 94 783 - 65

Visit us on the Internet: [www.opsytec.de](http://www.opsytec.de)

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>



## 14 Declaration of conformity



Manufacturer :	Company name: Opsytec Dr. Gröbel GmbH Road: Am Hardtwald 6-8 Place: 76275 Ettlingen Country: Germany
Authorized person for compiling the technical documentation:	Company name: Opsytec Dr. Gröbel GmbH Road: Am Hardtwald 6-8 Place: 76275 Ettlingen Country: Germany
product:	Radiometer curelog with sensors
Type designation:	curelog
Type number:	68000X 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, 30.07.2020

signed. Dr. Mark Paravia

