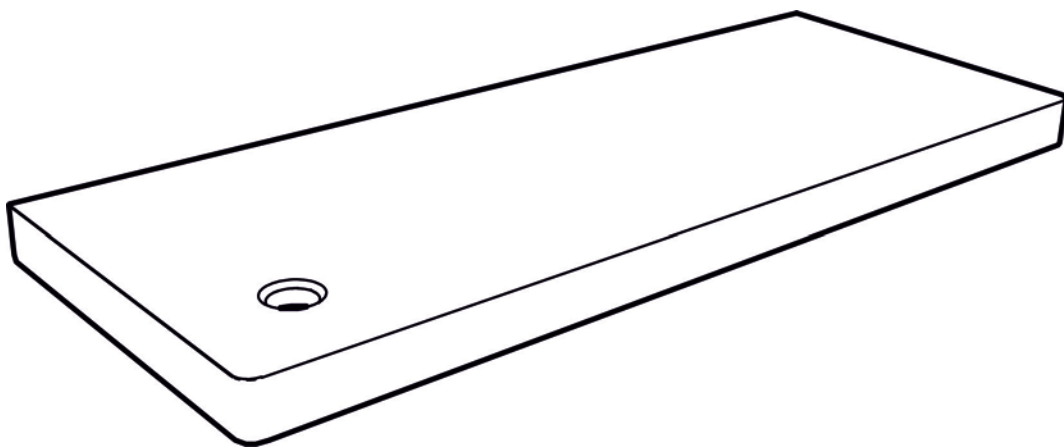


Tinytracker 172

Manual



Operation Manual

Version 1.3e

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1 TABLE OF CONTENTS

1	Table of Contents	2
2	Preface	4
3	Directives and Norms	5
4	Identification	6
4.1	Manufacturer, Ordering of Spares and Customer Service	6
4.2	Change History	6
4.3	Copyright	6
4.4	Identification of the Device.....	7
4.5	Intended Use	7
4.6	Foreseeable Misuse	8
4.7	Legal Information	9
	Limitation of Liability	9
	Declaration of conformity.....	9
	Warranty Terms	9
5	General	10
5.1	Information about this Manual	10
5.2	Information about the Symbols	11
	Safety Instructions	11
	Prohibition Signs.....	11
	Warning Signs	12
	Attention 12	
	Fire Protection Sign	13
	Rescue Sign	13
5.3	Owner/Operator Information	14
5.4	Personnel Requirements	15
	Qualifications	15
	Training and Qualification of Personnel.....	16
	Personal Protective Equipment	17
6	Safety Information and Residual Risk	18
6.1	General	18
6.2	Safety Information Concerning Normal Operation	18
6.3	Safety Information Concerning Service and Repair Work.....	19
6.4	UV Safety Information.....	20
7	System Description	21
8	Commissioning	22
8.1	Installation.....	22
8.2	Practical Hints.....	22

9	Operate the TinyTracker172.....	23
9.1	Controls of the TinyTracker172	23
9.2	Definition of the status lights.....	24
1.1	Name convention for data files	24
9.3	Connecting the TinyTracker172 to the PC	25
10	Using the PC software.....	26
10.1	Open last measurement	26
10.2	Open from tracker.....	26
10.3	TinyTracker172 setup	27
10.4	Setting the sample time	27
10.5	Setting the Threshold.....	27
10.6	Setting the sample rate.....	27
10.7	TinyTracker172 Information.....	28
10.8	Real-time measurement	28
10.9	Evaluating the data	29
10.10	The Measurement Info.....	29
10.11	The Table tab.....	30
10.12	The Graph tab.....	30
10.13	The Memo Tab	31
10.14	Creating a report.....	31
10.15	Setup and settings	32
10.16	Calibrating the TinyTrackers172.....	33
10.17	Set total dose.....	33
10.18	The About window	33
11	Structure of a data file	34
12	Technical data	36
13	Spare Parts & calibration	37
14	Declaration of Conformity.....	38
15	NOTES.....	39

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 in the text and in chapter 6.

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.

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

We will gladly assist you in case of any queries or problems. We are available at the address (see below). We always welcome any suggestions or proposals for improvement.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

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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).

Directives	
EC Directives	06/42/EC (Machinery) (partially observed) 2014/30/EC (EMC) 2014/35/EC (Low voltage)
Harmonised standards	
EN ISO 12100:2010	Safety of Machinery – General Principles for Design Risk Assessment and Risk Reduction
EN 60204-1:2006 +A1:2009 +AC:2010	Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements
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	Changed by	Date	Change
V1.0	S. Rau	19.10.2016	Created
V1.1	S. Rau	15.12.2016	Adapted Tracker to Tiny
V1.2e	S. Rau	05.04.2017	Adapted Software v2
V1.3e	Paravia	01.10.2019	Layout changes

4.3 COPYRIGHT



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

Copyright in accordance with DIN ISO 16016:

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

Non-compliance will 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 IDENTIFICATION OF THE DEVICE

Description of machinery:	TinyTracker172
Date of construction (MM-YYYY):
Machine No.
Project no.

4.5 INTENDED USE

The radiometer TinyTracker172 is a handheld instrument for precise measurement of irradiance profile and the dose in a irradiance channel. The dose is calculated by integrating the irradiance values. The measured values are stored on a SD memory card. The associated PC software allows evaluating the data.

The unit is battery driven and can be charged by USB or an AC power supply.

The integrated sensor is calibrated with respect to a PTB reference.

The system is exclusively intended for industrial use in Ordinary Locations as defined in the National Electric Code (NEC), NFPA 70. It is forbidden to use the devices in explosive environments or for general illumination.

- Installation, commissioning, operation, maintenance and service works must solely be performed by trained and educated, qualified personnel, which observes all safety regulations and standards.
- Responsibility: Damages resulting from unintentional or unauthorized interventions terminate every right, to raise warranty or liability claims against the manufacturer.
- Guarantee exclusion: The use of any non-original parts voids the guarantee.
- Environmental protection: Defect parts, which may contain environmentally harmful substances, must be disposed of accordingly.
- Operation is only permitted in a dry environment.
- Only suitable for the operation in closed rooms.
- Prior to opening, the system must be disconnected from the voltage and it must be checked that there is no voltage present.
- Wear gloves for maintenance, cleaning.
- Any other use than the above mentioned, results in damages to the product. Furthermore, it is associated with risks such as short circuits, fire and electric shocks. The entire device must not be changed and/or modified! The safety notes must be observed at all times.

4.6 FORESEEABLE MISUSE

The following is considered foreseeable misuse:

- Activities of uninstructed personnel on the device.
- Non-compliance with the operating instructions of the owner/operator.
- Ignoring of the operating manual.
- Processing of other materials than those specified in the technical data.
- Any other use outside the intended specified use.

4.7 LEGAL INFORMATION

LIMITATION OF LIABILITY

All the information in this manual was compiled with consideration of the currently valid standards and regulations, of the technical standard and our long-standing knowledge and experience.

The manufacturer shall not be liable for damage in the event 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,
- Non-approved spare parts are used.

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.

DECLARATION OF CONFORMITY

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

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.

5 GENERAL

IMPORTANT SAFETY INSTRUCTIONS

WARNING – When using electric equipment, basic precautions should always be followed, including the following:

- a) Read all the instructions before using the equipment.
- b) This equipment is to be used only by qualified and trained personnel. See the training section in this manual.
- c) Know how to turn off the product. Be thoroughly familiar with the controls.
- d) Stay alert – watch what you are doing.
- e) Do not operate the product when fatigued or under the influence of alcohol or drugs.
- f) Keep danger zone clear of all persons.
- g) Do not place the equipment on an unstable surface.
- h) Follow the maintenance instructions specified in the manual.
- i) Store these instructions in an area provided on the equipment.

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.


5.2 INFORMATION ABOUT THE SYMBOLS


SAFETY INSTRUCTIONS


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

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

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

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

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

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



NOTE

Information for use or useful important information

PROHIBITION SIGNS



General "Prohibited-sign"

WARNING SIGNS

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



Warning of hot surface!



Warning of electricity!

ATTENTION

Wear eye protection!



Opaque eye protection must be worn!



Disconnect mains plug from electrical outlet!



Disconnect before carrying out maintenance or repair!



Use hand protection!



Wear foot protection!



Refer to instruction manual/booklet

FIRE PROTECTION SIGN

Extinguishing hose



Fire extinguisher

RESCUE SIGN

Emergency exit: marking of all emergency exits with this symbol

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 professional operators that may be in the location simultaneously: 2

QUALIFICATIONS

	⚠ WARNING
	<p>RISK OF INJURY WHEN PERSONNEL ARE INSUFFICIENTLY QUALIFIED!</p> <p>If unqualified personnel carries out work on the system or stays in the danger area of the system risks arise that may cause severe injuries and serious material damage.</p> <ul style="list-style-type: none"> • Have all activities carried out only by personnel qualified for the activity. • Keep unqualified personnel away from the danger area.

	⚠ WARNING
	<p>RISK OF INJURY WHEN TOUCHING LIVE PARTS OR HOT SURFACES</p> <p>Generally, low voltage devices like this system can have dangerous live parts and hot surfaces. All works for transportation, installation, commissioning, start-up and maintenance must be performed by respectively trained and responsible, qualified personnel (in accordance with EN 50110-1 (VDE 0105-100); IEC 60364). Inappropriate behaviour can lead to serious injuries or damages.</p>

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

Electrically skilled person

Due to their professional training, knowledge and experience and knowledge of the relevant standards and regulations, electrically skilled persons are able to carry out work on electrical systems and to recognize and avoid risks independently.

Electrically skilled persons are specially trained for the work environment where they are working and they know the relevant standards and regulations. Electrically skilled persons must fulfil the requirements of the valid legal regulations for accident prevention.

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.

Operators

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.

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.

- Particular hazards when working on the electrical system.

- Meanings of the information and warning notes; here correct conduct is explained.

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.

PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective equipment is to protect the personnel from risks that might affect his safety or health when working.

When executing various activities on and with the system, the personnel must wear personal protective equipment. This will be pointed out again in the individual chapters of this manual. Below, personal protective equipment is explained:

Protective Gloves

Protective gloves are used to protect hands from visible and invisible radiation, friction, abrasion, stabs and deep injuries.


Protective Goggles


Protective goggles are used to protect eyes from intense visible and invisible radiation.

Protective eyewear and storage boxes can be ordered from UVEX AREITSSSCHUTZ GMBH, Würzburger Str. 181 – 189, 90766 Fürth, Germany:

Protective eyewear part number: 9169065

Storage box part number: 9957502

	⚠ CAUTION
	Use eyewear when working with UV source inside the danger zone.

	⚠ CAUTION
	Store eyewear at storage location when the eyewear is not in use.

Safety Boots

Safety boots are used as protection from heavy parts falling down and slipping on slippery surfaces.

Protective clothing


Use protective clothing over all exposed skin.

6 SAFETY INFORMATION AND RESIDUAL RISK

6.1 GENERAL

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

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

	⚠ WARNING
	<p>RISK OF INJURY WHEN PERSONNEL DO NOT READ THE OPERATION MANUAL!</p> <p>Prior to commissioning and operation, read the operation manual completely. Read all safety information and instructions. Negligence concerning safety information and instructions may cause electric shock and/or severe injuries.</p>


6.2 SAFETY INFORMATION CONCERNING NORMAL OPERATION

For activities in normal operation a brightness of at least 300 Lux must be provided.


Operation the machine is only permitted for instructed operating personnel.


Removing or disabling protective devices is not allowed during operation of the system.


If any protective devices or equipment fail or have become faulty, this must be reported to the operations supervisor immediately. He will decide about further procedure.

	⚠ CAUTION
	<p>RISK OF DAMAGE</p> <ul style="list-style-type: none"> • The sensors are calibrated. • Opening the housing can result in loss of calibration. • Skin fat and dirt are absorbent in the UV and visible spectral range. Avoid fingerprints on the optically active sensor surface. If necessary, the components must be cleaned carefully with Isopropyl.

6.3 SAFETY INFORMATION CONCERNING SERVICE AND REPAIR WORK

	⚠ CAUTION
	<p>RISK OF DAMAGE</p> <ul style="list-style-type: none"> • Before opening the system, disconnect all components from the supply voltage and check that no voltage is present. • Switch off the USB supply voltage prior to connecting / disconnecting the system.

	⚠ CAUTION
	<p>RISK OF DAMAGE</p> <ul style="list-style-type: none"> • The sensors are calibrated. • Opening the housing can result in loss of calibration. • Skin fat and dirt are absorbent in the UV and visible spectral range. Avoid fingerprints on the optically active sensor surface. If necessary, the components must be cleaned carefully with Isopropyl.

	⚠ CAUTION
	<p>RISK OF DAMAGE</p> <ul style="list-style-type: none"> • Skin fat and dirt are absorbent in the UV and visible spectral range. • Avoid fingerprints on the optically active sensor surface. If necessary, the components must be cleaned carefully with Isopropyl.

Service, repair and cleaning work must only be carried out by authorized and specifically trained professionals. The system must be power-free and secured before major work is carried out (including cleaning).

Carry out the prescribed setting, service and inspection work according to schedule.

Only specialized electricians may perform work on electrical equipment.

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

For service and maintenance work, important safety installations may not be functional. Work of this kind therefore requires special caution.

6.4 UV SAFETY INFORMATION

Unprotected and prolonged exposure to any form of UV light, including UV-A, can result in skin injuries, cataracts and possibly cancer. Even brief exposure can be hazardous, if the UV intensity is very high. Thus, it is advised to always shield the eyes/face. For maximum protection and whenever possible, hands and arms should also be covered with long sleeves and gloves of a non-fluorescent material.

Artificial UV light is often regarded as something completely different from the sun's radiation, which it is not. As a result, recommended hygienic exposure times have been calculated for these types of UV-sources, the aim being to prevent injuries and increase safety awareness when working with artificial UV. Artificial UV, such as that emitted from UV lamps, should be regarded as natural UV, i.e. sunlight, and appropriate safety measures should be taken accordingly. Artificial UV sources are used in many industries for many applications. UV is used in combination with a fluorescent media, which is excited by the UV energy and "reflects" light in the visible range of the electromagnetic spectrum.

Certain individuals are naturally hypersensitive to all forms of UV and should avoid any exposure. In general, if itching, inflammation or other unusual symptoms occur, UV exposure should cease immediately. People using certain drugs that produce photosensitivity should avoid exposure to all UV sources.

7 SYSTEM DESCRIPTION

The radiometer TinyTracker172 is a handheld instrument for precise measurement of irradiance profile and the dose in a irradiance channel. The dose is calculated by integrating the irradiance values. Different UV and visible spectral ranges can be measured with the respective sensors. The measured values are stored on a SD memory card. The associated PC software allows evaluating the data.

The unit is battery driven and can be charged by USB or an AC power supply.

The integrated sensor is calibrated with respect to a PTB reference.

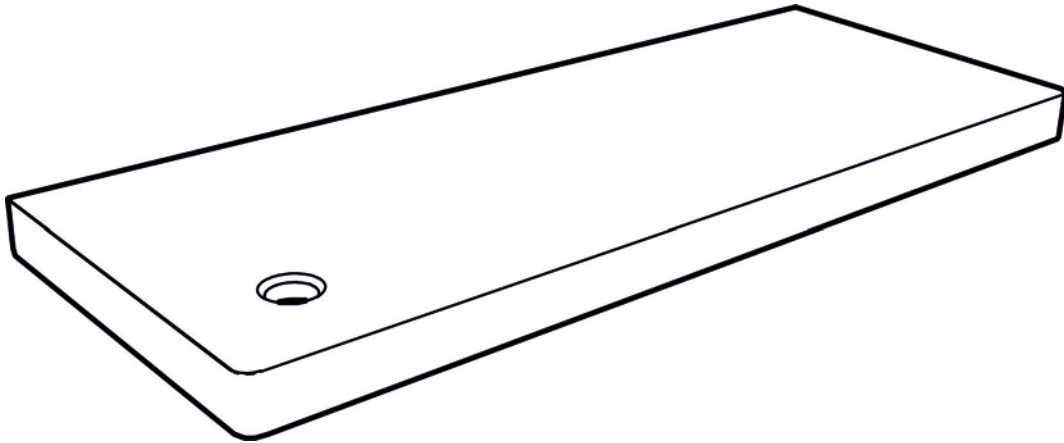


Fig. 1 Top View with photodiode in the lower left corner



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

The following components are required by the customer:

- Windows 10 PC
- USB Port 2.0
- Nitrogen or Argon flushing for detection of 172 nm

8 COMMISSIONING

8.1 INSTALLATION

- Unpack all components and remove the packaging materials.
- Insert USB stick and install PC software.
- Connect the tinytracker172 to PC.

8.2 PRACTICAL HINTS

The sensor is integrated into the TinyTracker172. The design of the TinyTracker172 housing is optimized so that the sensor does not heat up. The sensor is calibrated.

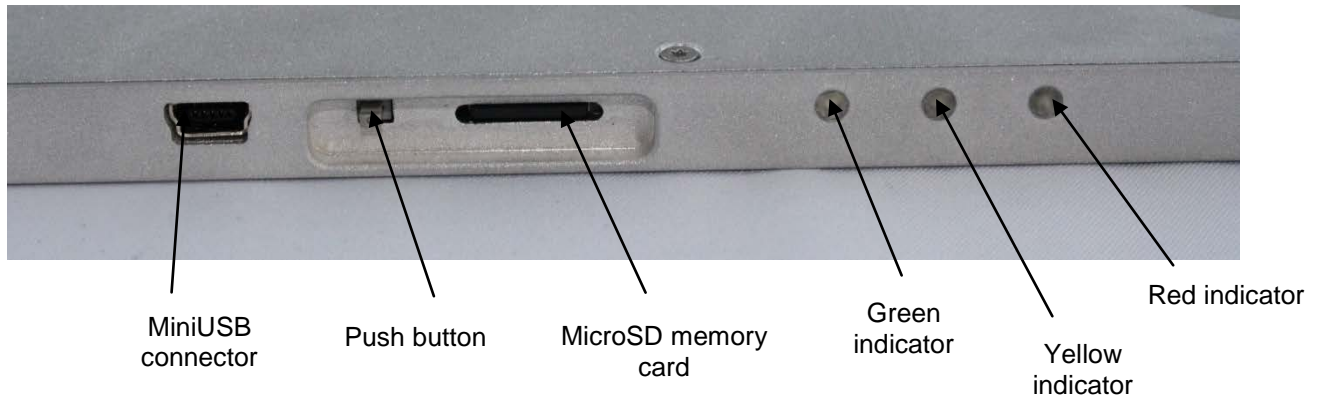
It should be noted that radiometric measurements are not as simple as, for example, measuring distances in a room. Although the meter gives a value, this value is highly dependent on the position of the lamp to the sensor and the reflective behavior of the surrounding. If the sensor is tilted with respect to the lamp, it will result in a cosine-like reduction of the value.

To achieve reproducible results the surrounding, the geometric arrangement, the temperature and the power of the lamp must be controlled. Furthermore, the appropriate sensor must be chosen to fit the particular measurement application. Any sensor is designed to measure radiation over a specified spectral range. Although our sensors are highly insensitive to other spectral regions, than those they are designed for, there is a physical limitation for integral measuring equipment caused by steepness of the filter wings and the width of the sensitive region. The limitation results in an error factor of 10^{-4} to 10^{-2} .

9 OPERATE THE TINYTRACKER172

9.1 CONTROLS OF THE TINYTRACKER172

The TinyTracker172 has only one button and 3 status lights. Most of the setup is done in the PC software. The lights are showing the status of the TinyTracker172. The button is used to switch the TinyTracker172 on and off.



To switch on the TinyTracker172 press the button briefly. To switch off the TinyTracker172 press and hold the button until all three indicators illuminate. Now you can release the button and the TinyTracker172 is powered down. Switching off during an active measurement stops the measurement and closes the file. The measurement can be evaluated then like any other measurement with the PC software.

9.2 DEFINITION OF THE STATUS LIGHTS

Dependent of the status the TinyTracker172 status lights are illuminate / flashing in a different pattern. Each status light has 4 different modes: off, flash short, flash long and on.

At a short flash, the light is on for 1/8th and off for 7/8th of the time. In comparison, the long flash has an on : off ratio from 1:1.

The following table helps to indicate the function which belongs to the pattern.

Function	Green	Green Flash Short	Green Flash Long	Yellow	Yellow Flash short	Yellow Flash long	Red	Red Flash Short	Red Flash long
Off									
Power up - TinyTracker172 testing the hardware									
TinyTracker172 ready - Waiting for UV light (for a max. of 10 minutes - then tracker switches off)									
TinyTracker172 is collecting data									
Measurement in TinyTracker172 finished ready for download the data (for a max. of 10 minutes - then tracker switches off)		dark							
Switching off - Power Key holded									
Connected to USB or Power supply (Green flash shows battery state;									
Yellow is read access to SD card Red is write access to SD card)									
System Error (missing SD, no space on SD, Battery empty)									

1.1 NAME CONVENTION FOR DATA FILES

Measurements are automatically saved in a data file. The file format is described in chapter 4: Structure of a data file. The files are stored in a directory according to the date of the measurement. The filename is according to the start time of the measurement.










Example:

Path and filename	Start of measurement
\\20120116\093644.csv	January 16, 2012 at 9:36:44 am
\\20111222\160752.csv	December 22, 2011 at 4:07:52 pm
\\20120110\070000.csv	January 10, 2012 at 7am
\\20111222\104630.csv	December 22, 2011 at 10:46:30 am

9.3 CONNECTING THE TINYTRACKER172 TO THE PC

First time the tracker is connected to a PC, it will be recognized as a new device and the PC installs the driver for the TinyTracker172. There is no need for an interaction of the user, because Windows supports all protocols used in the TinyTracker172. The only thing to see during the installation is the notify icon in the notification area.

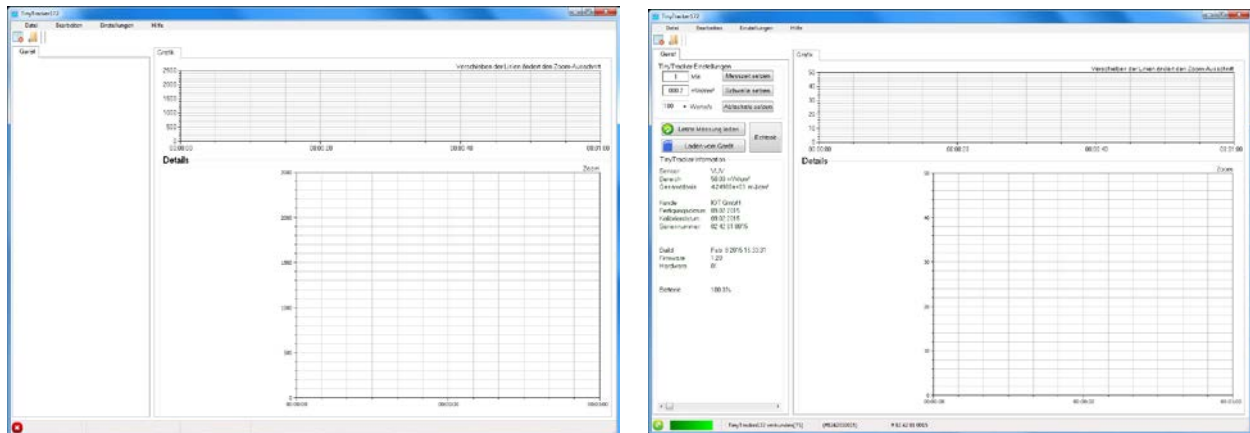
Here is an overview about the different notifications:

	 <p>USB Composite Device</p>
	 <p>USB - Mass storage device</p>
	
	 <p>Drive</p>
 <p>Your new hardware is installed and ready to use.</p>	<p>The first line is always "Found New Hardware",</p>

Thereafter the TinyTracker172 is installed and ready to use with the PC software.

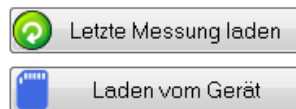
10 USING THE PC SOFTWARE

The TinyTracker172 software comes with a powerful, easy to use PC software. After installation and start of the software you can see one of the following user interfaces:



User interface with no tracker connected

If no tracker is connected the only possibility is to open data files from the local hard drive. This is done using the menu "File -> open".



If a TinyTracker172 is connected you get two buttons to open a file.

10.1 OPEN LAST MEASUREMENT

With "open last measurement" the software triggers a communication with the TinyTracker172 to get the filename of the last measurement and the drive name. Thereafter, this file is loaded into the software.

It could be possible, that no last measurement is stored in the TinyTracker172, e.g. after an update or an empty battery. The software will inform you about this with a message.

10.2 OPEN FROM TRACKER

The software tries to get the drive name and opens a window in the root directory of the TinyTracker172 drive.

10.3 TINYTRACKER172 SETUP

The whole setup is done in the setup box. This box is only visible when a TinyTracker172 is connected to the computer.

Setup

<input type="text" value="15"/>	min	<input type="button" value="Set Sample Time"/>
<input type="text" value="020.0"/>	mW/cm ²	<input type="button" value="Set Threshold"/>
<input type="text" value="16"/>	Samples/s	<input type="button" value="Set Sample-rate"/>

Each time the TinyTracker172 is connected and the software is active, the real time clock of the TinyTracker172 is synchronized with the system clock. The

10.4 SETTING THE SAMPLE TIME

Sample time can be set from 1 to 180 minutes. The sample time is read from the TinyTracker172 after connection. To transfer the new sample time, press the “set sample time” button.

10.5 SETTING THE THRESHOLD

The threshold can be set between 0.1 and the maximal irradiation value of the TinyTracker172. To transfer the threshold, press the “Set threshold” button.

The threshold should be chosen so that the TinyTracker172 triggers when entering into the channel as early as possible, however, is not triggered earlier by noise.

10.6 SETTING THE SAMPLE RATE

The sample rate is adjustable from 2 to 100 samples per second. Due to the inner construction of the TinyTracker172 device not all sample rates are precise.

To set the sample rate choose the rate and press the transfer button.

10.7 TINYTRACKER172 INFORMATION

If a TinyTracker172 is connected the Tracker Information box is displayed. This box contains all hardware information about the TinyTracker172.

First thing is a colored bar. This bar is the battery indicator. It changes the color in dependence of the energy level. The TinyTracker172 is automatically loaded when connected to the PC. Alternatively you can use the power supply.

Next to the battery indicator there is the Version box. This box contains information about the Firmware version of the TinyTracker172. This information is used for the Firmware update function.

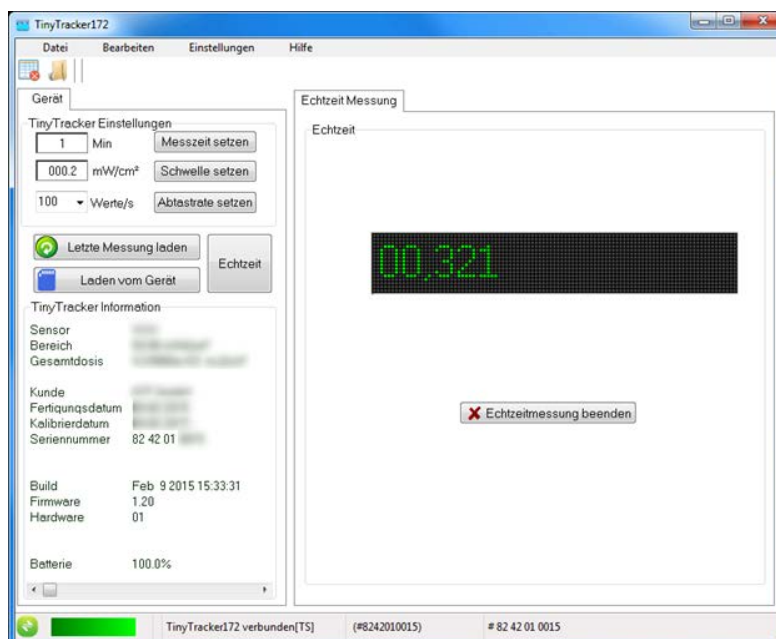
At least there is the TinyTracker172 information. Here you can find the serial number, build date, calibration date and the included sensor typ. Also the customer is stored inside the tracker.

10.8 REAL-TIME MEASUREMENT

In the Tracker Information box there is also a button called "Real Time".



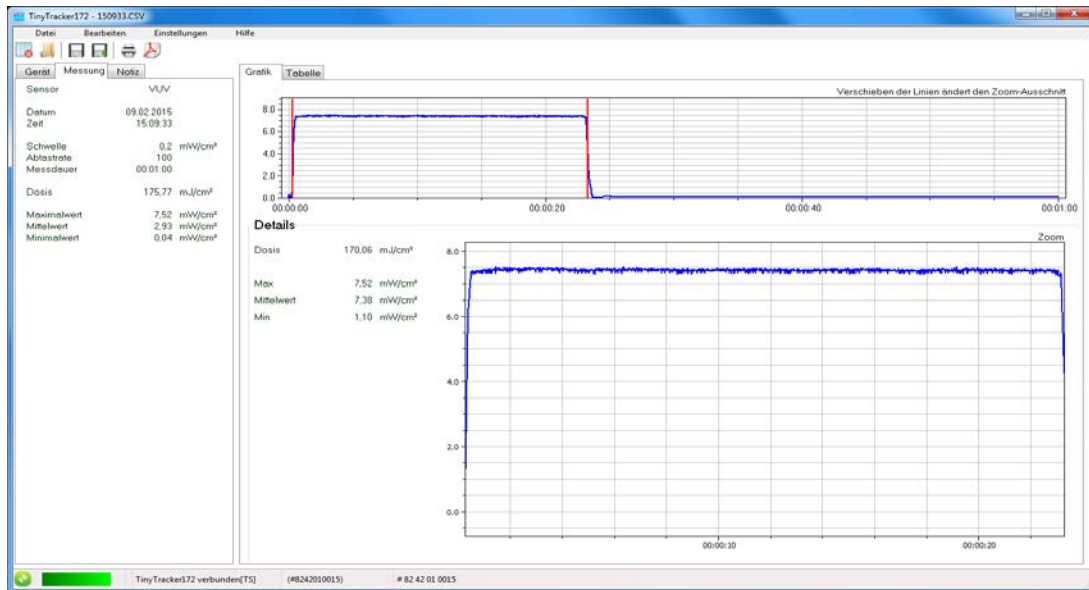
After pressing this button, a new tab is displayed and the TinyTracker172 is functioning as a standard radiometer. The TinyTracker172 is measuring the irradiance and transfers the value to the software.



To exit the real time measurement press the "Finish real-time mode" button.

10.9 EVALUATING THE DATA

After loading a data file the measurement info box and three additional tabs appear.



10.10 THE MEASUREMENT INFO

10.10

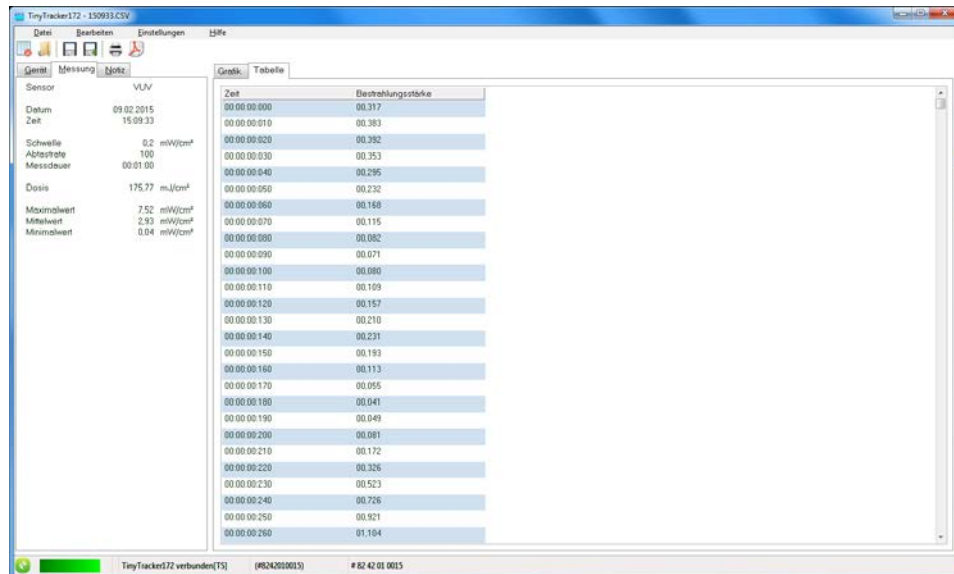
10.10

Gerät	Messung	Notiz
Sensor	VUV	
Datum	09.02.2015	
Zeit	15:09:33	
Schwelle	0,2 mW/cm ²	
Abtastrate	100	
Messdauer	00:01:00	
Dosis	175,77 mJ/cm ²	
Maximalwert	7,52 mW/cm ²	
Mittelwert	2,93 mW/cm ²	
Minimalwert	0,04 mW/cm ²	

In the measurement info box you get a short overview about the measurement.

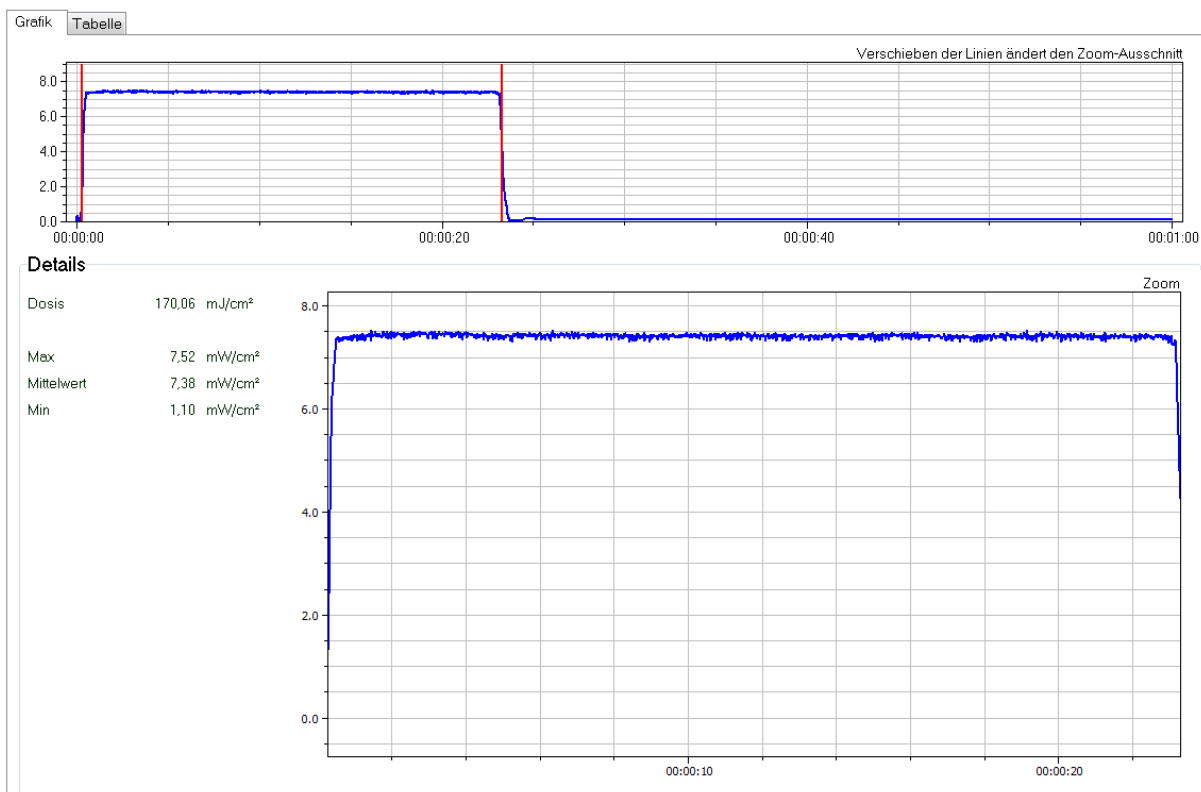
First off all the measurement date and time is displayed. Also the setup for the measurement is shown. The main result is the dose measured, which is shown in big letters. Additionally, the maximum, minimum and average values are shown.

10.11 THE TABLE TAB



In the table tab the data table is displayed. You can scroll using the trackbars. Editing the data is not possible.

10.12 THE GRAPH TAB



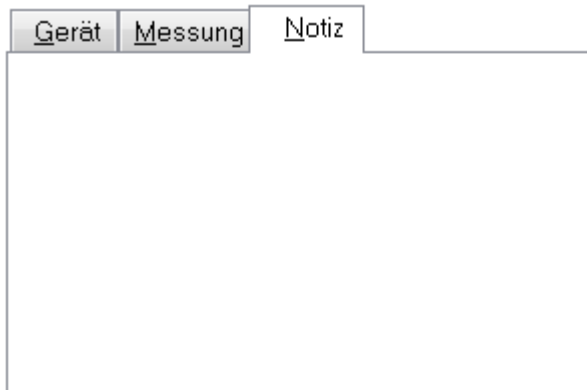
In the graph tab the data is shown as two graphs. The top graph shows the whole measurement. The second graph is inside the details box.

Inside the first graph you can see two red lines. These lines define the range for the second graph – the detail graph. You can move the crosshair lines with the mouse. To move the whole details area, you can move it with the middle button of the mouse.

The details box displays additionally to the detail graph also the detail dose, max, min and average value for the chosen detail. If the mouse is inside the graph, the data point next to the mouse is highlighted with a crosshair and the intensity and time for this data point is shown.

The detail graph can also be moved with the middle button. Using the mouse wheel results in a zoom in or out function. While pressing the CTRL key and the left mouse button, you can open a zoom window.

10.13 THE MEMO TAB



The Memo tab is a memo field to add comments to the measurement. The memo text can be stored in the original data file.

10.14 CREATING A REPORT

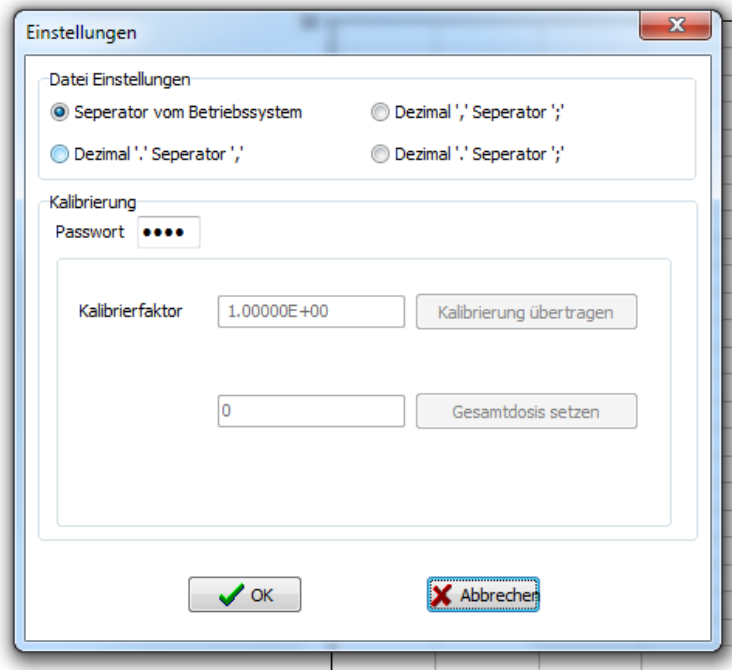
The report can be printed or saved as a PDF file.



The report includes all data including the detail view of the measurement.

10.15 SETUP AND SETTINGS

The setup menu allows you to change the separators in the data file. The data file is described in chapter 4: Structure of a data file.



You can change the decimal separator and value separator in dependence of your needs. In most cases the “take separator from the OS” is the best choice. This allows you to open the file with a spreadsheet program without the need of any adjustments.

The separator setup is written in any data file and the software reads this setup before trying to read the data. So the PC software can read data with every setup.

10.16 CALIBRATING THE TINYTRACKERS172

To calibrate the TinyTrackers172 please send the device to the manufacturer / distributor. The internal calibration factor is given in the software.

10.17 SET TOTAL DOSE

The total dose is given in the software.

10.18 THE ABOUT WINDOW



The About window shows the build version of the PC software.

11 STRUCTURE OF A DATA FILE

The data files are stored as CSV files. A **comma-separated values** (CSV) file stores tabular data (numbers and text) in plain-text form. As a result, such a file is easily human-readable (e.g., in a text editor).

CSV is a simple file format that is widely supported by consumer, business, and scientific applications. Among its most common uses is to move tabular data between programs that naturally operate on a more efficient or complete proprietary format.

The CSV format was chosen because the files can easily be loaded in a spreadsheet software like Microsoft Excel or OpenOffice.org Calc.

The following part of a file explains the content of the different lines:

Explanation	Sample file
Marking as TinyTracker172 data file	TinyTracker172 Data File
empty	
Original Filename used for date and time in the software	Filename: 20111222\104630.csv
Sensor type and measurement range of the TinyTracker172	Measurement range: UV-A 2500 $\mu\text{W}/\text{cm}^2$
Trigger threshold used for this measurement	Trigger threshold: 100
Sample rate at this measurement	Sample Rate: 16 Samples per Second
Decimal separator for this file	Decimal: ,
Value separator for this file	Seperator: ;
Marking for Start of Memo :	SOM:
Memo text (variable number of lines)	Calibration at 580 $\mu\text{W}/\text{cm}^2$
Marking for End of Memo	EOM
Start of data array 1 st Line: Time for split second for each value	Time;+0,0000;+0,0625;+0,1250;+0,1875;+0,2500;+0,3125;+0,3750;...
2 nd row to end: 1 st Value is the time, followed by sample rate count values	00:00:00;0146,1;0566,0;0579,4;0579,4;0579,9;0578,2;0578,8;0580,1;... 00:00:01;0579,1;0579,6;0579,7;0579,6;0577,7;0579,3;0577,9;0578,7;... 00:00:02;0582,2;0580,1;0577,1;0578,1;0578,3;0578,9;0579,9;0580,7;... 00:00:03;0580,6;0578,8;0578,3;0579,4;0579,3;...
Number of lines is dependent on the measurement duration	...

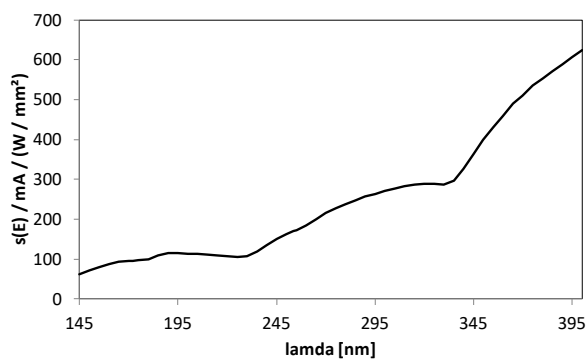
Excel will import the TinyTracker172 data file to the following format:

Beschreibung	Beispieldatei
Markierung als TinyTracker172 Datei	TinyTracker172 Data File
Leerzeile	
Geräteseriennummer	TinyTracker172 SN 82 42 01 0015
Original Dateiname benutzt um Messuhrzeit und Messdatum im PC-Programm zu bestimmen	Filename: 20111222\104630.csv
Messbereich der Datei	Measurement range: 0050,0
Spektralbereich	Spectral range: VUV
Einheit für Bestrahlungstärke	Unit: mW/cm ²
Einheit für Dosis	Dose Unit: mJ/cm ²
Triggerschwelle der Messung	Trigger threshold: 100
Abtastrate der Messung	Sample Rate: 100 Samples per Second
Dezimal Separator für die Datei	Decimal: ,
Werte Separator für die Datei	Seperator: ;
Markierung für Start of Memo :	SOM:
Memo text (variable Anzahl von Zeilen)	Calibration at 7,8mW/cm ²
Markierung für End of Memo	EOM
Start der Daten	Time; Irradiance
2. Zeile bis Ende	00:00:00:000;00,244
	00:00:00:010;00,283
Zeit, Messwerte	00:00:00:020;00,332
	00:00:00:030;00,390
	...
Die Anzahl der Zeilen hängt von der Messzeit ab.	

12 TECHNICAL DATA

General Data	
Ambient temperature	0 to 40 °C
Storage temperature, ca.	-10 to 40 °C
Humidity	0% to 80% rel. humidity, not condensing
Dimensions	195 x 78.5 x 10 mm
Weight, module rack	Ca. 250 g
Maximum housing temperature	< 40 °C
Power supply / Battery	internal Li-Ion battery, Capacity: 1250mAh
Battery life	up to 80 hours
Cooling	Passive cooling
Emission, sound, noise	Lpa < 70 dB according DIN 45635 T.

Connections	
Operational voltage	5 V DC
Interface	MiniUSB 2.0

Measurement	
Integration time	1 – 180 minutes
Sample rate:	100 measurements per second Storage rate 1, 2, 5, 10, 25, 50 or 100 measurements per
Typical spectral UV sensitivity	
Typical spectral VIS sensitivity	Up to 520..550 nm

13 SPARE PARTS & CALIBRATION



When ordering spare parts and recalibrations, please contact:

Opsytec Dr. Gröbel GmbH

Am Hardtwald 6-8

76275 Ettlingen

Germany

Phone +49 - 7243 - 94 783 - 50

Fax +49 - 7243 - 94 783 – 65

Visit our website at: www.opsytec.de

14 DECLARATION OF CONFORMITY

Hereby we,

**Opsytec Dr. Gröbel GmbH
Am Hardtwald 6-8
76275 Ettlingen**

declare that the following product

tinytracker172

Type designation:

824204

have been developed, constructed and produced under our sole responsibility and that the product is conform with the following standard(s) or guideline(s) in this declaration:

2014/35/EU

“Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States regarding the provision of electrical equipment for use within certain voltage limits on the market (Low-Voltage Directive)“.

Ettlingen, 01.10.2019

Dr. Mark Paravia
Executive Board

