

MAVOMASTER, MAVOPROBE

Light Metering System

1/09.22

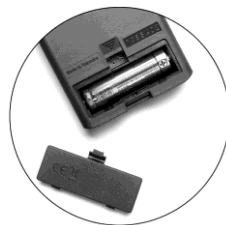


Device Overview, MAVOMASTER with MAVOPROBE



MAVOMASTER, Bottom:

- MAVOMASTER serial number
- Battery compartment with lid



MAVOPROBE, Bottom:

- MAVOPROBE serial number
- 1/4" tripod thread

Thank you for purchasing the MAVOMASTER-MAVOPROBE light metering system from GOSSEN.

Please read these operating instructions carefully before using the system for the first time, and keep them in a safe place for future reference.

The light metering system has a variety of basic product features.

- **Various MAVOPROBES can be used with a MAVOMASTER**
- **Impact and slip resistant** thanks to rugged rubber holster with tilt stand for convenient readability during tabletop operation
- Acquisition of **minimum, maximum** and **mean values**
- **Relative and integral measurement**
- **Grid measurement** for the assessment of workplaces
- **Data logger** with adjustable time interval
- **Large measured value memory** – measured and function values stored in **CSV format**
- **Prolonged operation** with USB interface via PC, mains power pack or power bank
- **MAVOPROBE** can be used in combination with MAVOMASTER or autonomously via USB
- **MAVOPROBE extension cord**, 3, 5 or 10 meters
- **3-year guarantee**

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1 Safety Precautions

Explanation of Symbols

Signal words in warnings indicate the nature and severity of possible consequences if measures for the prevention of the respective hazard are not implemented. The signal words are defined below and may be used in this document.

 Warning!	Means that serious to life-threatening personal injury may occur
 Caution	Means that minor to moderately serious personal injury may occur
Note	Means that property damage may occur
	Identifies additional information without reference to danger for persons or property
	Identifies important information that should be read before the product is placed in service

 Warning!

- In the event of malfunction, switch the meter off immediately. If smoke or odors occur for which the meter is the cause, remove the battery from the meter – risk of fire and injury.
- Do not use the meter in proximity to flammable or combustible gases, as there is a risk of fire and explosion.
- Keep the meter and all accessories out of the reach of children – risk of suffocation and strangulation due to parts which can be swallowed, as well as carrying straps and cables.
- Do not dismantle, modify or repair the meter – risk of injury, fire and electric shock.
- Do not expose batteries to moisture, high heat or open fire, and never short circuit batteries or attempt to open them. Use only batteries which are recommended for this meter and which demonstrate no apparent damage. Improper handling of batteries can result in fire, explosion, serious injury or environmental damage.
- When measuring hazardous radiation, observe all applicable safety regulations and use the stipulated protective equipment. Non-compliance may result in significant impairment of health. Meter settings and stored measured values are retained when the battery is changed. If you wait too long to change the battery, it may become necessary to reset date and time.



Caution

- Remove the batteries from the meter if it's not used for lengthy periods of time, or when they're fully depleted. In particular in the case of depleted batteries, leakage may occur and the meter may be damaged.
- Ensure correct polarity when inserting the battery.
- When plugging in the measuring probe, make sure that the plug and socket guides are correctly aligned and avoid the use of excessive force. An incorrectly connected probe can damage the meter or the probe.
- Do not use the meter where it is exposed to moisture or rain, and do not immerse it in water. Avoid operation with wet or damp hands as well. This may result in electric shock or damage to the meter.
- Do not dismantle, modify or repair the meter. This may result in erroneous measurement results or damage to the meter.

Note

Note identifies precautions or limitations with regard to use of the product. Please read all notes in order to avoid operating errors.

- **Before starting one-time only measuring tasks, you should first make sure that the meter is working properly by performing a test measurement.**
- **If the meter is used in quality-relevant applications, for acceptance measurements or for assessments, check to make sure that the meter's calibration is still valid.**
- **If the instrument is subjected to extreme temperature during transport, it requires at least two hours for acclimatization before it's switched on.**

Limitations

There are several safety precautions and limitations regarding the use of this product. Please read and understand the following before using the meter.

- **GOSSEN does not accept any liability for damages, costs or lost profits resulting from malfunctioning or improper use of the meter.**
- **GOSSEN reserves the right to make changes of any kind to products or documentation without issuing prior notice. The latest versions of the documentation, firmware and software can be downloaded from GOSSEN's website.**

- **Reproduction of product documentation or duplication of any excerpts therefrom necessitates the express consent of GOSSEN. This applies as well to duplication in any electronic format and translation into other languages.**

Use for Intended Purpose

The meter may only be used under the conditions and for the purposes for which it has been designed. In this respect, special attention must be given to safety precautions, technical data regarding ambient conditions and use in dry environments.

Only accessories and replacement parts which have been tested by GOSSEN are permissible for use in accordance with intended purpose. In case of alterations or modifications implemented by the user, operating safety can no longer be assured.

Intended Users

The meter is intended for use by the following persons:

- **Persons who monitor and assess the quality of lighting and irradiation systems, lamps, luminaires and lighting technology products**
- **Persons who inspect and assess lighting and irradiation systems for the purpose of ensuring compliance with design specifications, standards, and regulations**
- **Persons who determine and optimize the efficiency of lighting and irradiation systems**

2 Disposal

The legal regulations regarding disposal and recycling of batteries and electronic devices are different in every country. Please inform yourself about the respectively valid regulations for environmentally friendly disposal in your country, and proceed accordingly.

In **European countries**, consumers must comply with the following regulations:

- **Batteries and rechargeable batteries may not be disposed of with household trash. You are required to return used batteries and rechargeable batteries to a municipal collection point or to your dealer. You can also return used batteries from our devices directly to us in quantities usual for end users, or send them to us for disposal after affixing sufficient postage.**
- **Electrical and electronic equipment** may not be disposed of with household trash. At the end of its service life, you are required to return it to an authorized collection point for old equipment, to the dealer or to the manufacturer.

The above mentioned products may contain hazardous substances which, if released, could result in severe environmental damage or health impairments. Compulsory return ensures environmentally friendly disposal, and raw materials contained in old equipment can be recycled.

Identification for Separate Collection of Recyclable Materials / Hazardous Waste in European Countries



This symbol indicates that the respective product must be disposed of separately, and not with household trash. The chemical symbols for cadmium (Cd), lead (Pb) or mercury (Hg) may also be included if their concentrations exceed permissible limits.

3 Initial Startup

3.1 Inserting the Battery

Open the MAVOMASTER's battery compartment by pressing the cover's snap lock down in the direction indicated by the arrow and folding the cover out. Insert the included 1.5 V AA battery (IEC LR6) into the battery compartment, observing the polarity markings in the battery compartment. Then guide the two tabs on the battery compartment cover into the recesses provided in the housing and press the cover until the snap lock engages. The meter is now ready for operation.

The battery level display  indicates how much capacity remains in the battery.



Meter settings and stored measured values are retained when the battery is changed. If you wait too long to change battery, it may become necessary to reset date and time.

3.2 Automatic Shutdown – Continuous Operation

Elapsed time, after which the MAVOMASTER is shut down automatically when no keys are pressed, can be specified in the settings. Automatic shutdown is inactive whenever the MAVOMASTER is supplied with power from a PC, a power bank or an external mains power pack via the USB interface. Automatic shutdown can also be disabled by pressing and holding the HOLD key when switching the meter on. Continuous operation is indicated by the  symbol in the status bar.



If the meter will be operated continuously for a lengthy period of time, the use of an optional USB mains power pack or power bank is recommended, because the AA battery has a limited service life.

Display	Continuous Operation	Power Supply
	Off	Battery level
	On	Battery level
	On	Power pack, power bank
	On	USB port

3.3 Connecting the MAVOPROBE

The MAVOMASTER has a sensor socket to which different MAVOPROBES with a standard cable length of 1.5 meters can be connected. Longer sensor cable lengths of up to 10 meters are made possible through the use of optional MAVOPROBE extension cords. The connected MAVOPROBE is detected automatically and its data is displayed in the settings menu under “Information”. Only one MAVOPROBE can be connected at a time. The MAVOMASTER automatically adapts its displays and operating options to the connected MAVOPROBE.

4 Display Elements and Controls

4.1 Display Elements



4.2 Controls

The meter is operated with 6 keys. Any desired measuring functions can be assigned to function keys F1 and F2 in the settings menu and the corresponding labeling appears above the respective function key in the display. The PEAK key is permanently assigned to extreme and mean values. The settings menu is accessed by pressing and holding the  key, and the 6 keys are used for navigation and selection functions as shown on the right edge of each key.



The HOLD and MEM keys are permanently assigned to memory functions. The keys have different functions depending on the meter's operating state. Pressing and holding a key always terminates the respective measuring function and deletes values.

4.3 Operation in the Measuring Mode

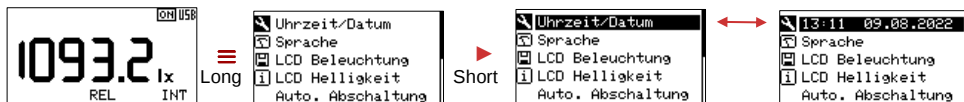
Key	Status	Press	Function
	Off	Short	Switch meter on
	On	Short	Switch meter off
	On	Long	Setting mode
F1, F2	Inactive	Short	Activate assigned measuring function, reset all extreme values
	Active	Short	Terminate assigned measuring function, save results if required
HOLD	Measure	Short	Freeze measured value display
	HOLD	Short	Return to continuous measured value display
PEAK	Measure	Short	Display and scroll through extreme values – MIN, MAX, AVG
		Long	Reset extreme values
MEM	Measure	Short	Save measured value
		Long	Display measured values, switch between data sets and folders with ▲ / ▼ / ↩ keys
	MEM	Short	Return to continuous measured value display

4.4 Operation in the Setting Mode

Key	Function	Key	Function
	Return to measuring mode		Apply settings
	Move cursor up		Down one menu level
	Move cursor down		Up one menu level

5 Setting Mode

Various basic settings and presets can be entered for the MAVOMASTER in the setting mode. The setting mode is entered from the measuring mode by pressing and holding the  key.



After selecting a parameter, it's displayed inversely and the display alternates between the parameter and the currently selected value. The black line at the right edge of the display indicates that the menu contains additional parameters.

5.1 Settings Overview

The following table provides an overview of the various parameters which are grouped thematically in menus, as well as their setting options and default settings.

	Setting	Default Setting	Selection Options
	Time/Date	00:00 01.01.2020	
	Language	English	English – German
	LCD illumination	On	Off – On – Hold – Auto
	LCD brightness	60%	10% to 100% in steps of 10%
	Auto shutdown	30 s	Off, 10 s, 30 s, 1 min., 2 min., 5 min.
	Default settings		Restore default settings: No – Yes

	Measurement		
	System of units	lx – cd/m ²	lx – cd/m ² , fc - fL
	Irradiation reference	/cm ²	/cm ² , /m ²
	Function key F1	REL	REL, LOG, GRID, B/A, %A, B-A, INT
	Function key F2	LOG	REL, LOG, GRID, B/A, %A, B-A, INT
	Storage		
	Log interval	00:00	HH:MM:SS
	Filename	Number	Time, number
	Decimal separator	Comma	Period, comma
	Time format	24 h	24 h, 12 h
	Date format	DD.MM.YYYY	DD.MM.YYYY, MM/DD/YYYY, YYYY/MM/DD
	Information		
	Serial number	22C10082	
	Hardware	Version 5	
	Firmware	Version 1.0.0	
	Probe type	M527G – 5032 B	
	Probe serial number	0C10082	
	Probe hardware	Version 2	
	Probe firmware	Version 1.0.0	
	Temperature	21.8° C	
	Battery voltage	1.42 V	

5.2 Settings Menu

Time/Date

When saving data, the meter uses time and date for the filename and the point in time at which the measurement was performed. If time is not set by the user, time and date begin with the factory setting after inserting the battery, and is then used for data storage. If the battery is depleted, the integrated real-time clock continues to run for approximately xx hours before it stops. In order to ensure that date and time are not affected, it's advisable to replace a depleted battery as soon as possible.

Language

The meter's menu can be set to the desired language.

LCD Illumination

LCD illumination can be adjusted individually. In the hold function, it's only activated in the hold mode in order to read measured values in dark environments without influencing the measurement. In the auto mode, display illumination is only activated in dark environments.

LCD Brightness

LCD illumination brightness can be individually adjusted from 10% to 100% and has a direct effect on the battery's service life.

Automatic Shutdown

The meter is shut down automatically if no keys are pressed during the specified time period in order to save energy. All measured values and settings are saved and retained until the meter is switched back on again by pressing the  key. This function is inactive when power is supplied via the USB interface, a power bank or a mains power pack.

Default Settings

The meter is reset to its default settings as described in the settings overview, and date and time are retained.

5.3 Measuring Menu

System of Units

Units of measure for the visual range can be switched from the metric system to the imperial system. Illuminance in lux (lx) is then changed to foot candles (fc) and luminance in candelas per square meter (cd/m²) becomes foot lamberts (fL).

Irradiation Reference

Units of measure for irradiance can be changed from per cm² to per m².

Function Keys F1 and F2

Measuring functions REL, LOG, GRID, B/A, %A, B-A and INT can be freely assigned to the F1 and F2 function keys. Descriptions of the individual measuring functions can be found in the corresponding sections.

5.4 Storage Menu

All of the settings in this menu are related to the memory mode. In order for the CSV file to be read in correctly by country-specific software applications, the time format, the date format and the decimal separator may need to be adjusted.

Log Interval

The log interval can be set in HH:MM:SS and specifies the time interval at which measured values are written to the file during data logger operation.

Filename

The filename consists of the name of the measuring function and either the respective time (Realtime_hh-mm-ss.csv) or a consecutive number (Realtime_xxxx.csv). The filename extension can be selected.

Decimal Separator

The decimal comma (,) is used in some countries as the decimal separator, and the decimal point (.) in others. This setting may have to be adjusted in order to ensure correct transfer of the measured values to country-specific software applications.

Time Format

Some countries use a 24-hour clock (24h), and others use a 12-hour clock (12h) together with the abbreviations a.m. (ante meridiem) for before noon and p.m. (post meridiem) for afternoon. This setting only affects the timestamp in the stored measured values and is used for correct display in country-specific software applications.

Date Format

The date is written differently in various countries. This setting only affects the timestamp in the stored measured values and is used for correct display in country-specific software applications.

5.5 Information Menu

Important device information is summarized in this menu. This includes serial number, the hardware and firmware versions of the MAVOMASTER and the connected MAVOPROBE, and the MAVOMASTER's temperature and battery voltage level.

6 Measuring Functions

The user can assign various measuring functions to the F1 and F2 function keys under Settings in the Measuring menu, which appear in the display above the key as a label. Briefly pressing the function key activates the respective measuring function, and briefly pressing it once again deactivates the measuring function. The activated measuring function is displayed inversely.

6.1 REL– Relative

The REL measuring function is activated by briefly pressing the assigned function key. It uses the value measured at the time of activation or frozen with the HOLD key as a reference value and subtracts it from the momentary measured value. The difference between the momentary measured value and the reference value appears at the display. The measuring function is deactivated by briefly pressing the assigned function key.



F2
Short

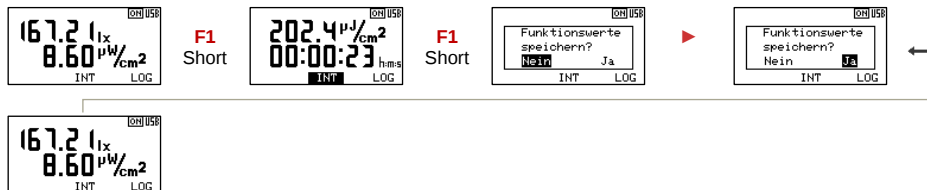


F2
Short



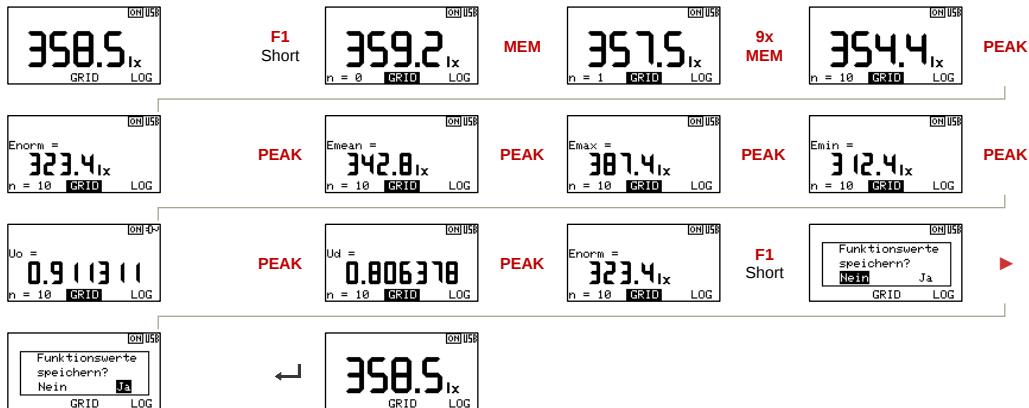
6.2 INT – Integral

The INT measuring function is used to determine the irradiation dose and integrates irradiance over time. The INT measuring function is activated by briefly pressing the assigned function key. Irradiation dose then appears at the upper display and integration time at the lower display. The INT measuring function is terminated by briefly pressing the assigned function key and a prompt is displayed asking whether the function values should be saved or discarded.



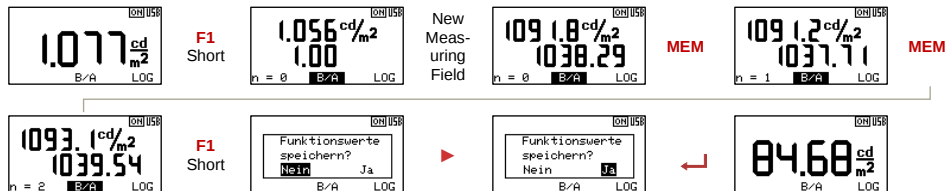
6.3 GRID – Grid

The GRID measuring function is used to assess workplaces and indoor lighting. It's capable of processing any number of measuring points and, after saving a measuring point, it automatically determines mean value E_m , maximum value E_{max} , minimum value E_{min} , uniformity $U_o = E_{min} / E_m$ and non-uniformity $U_d = E_{min} / E_{max}$ for illuminance. The measurement series can be saved upon completion.



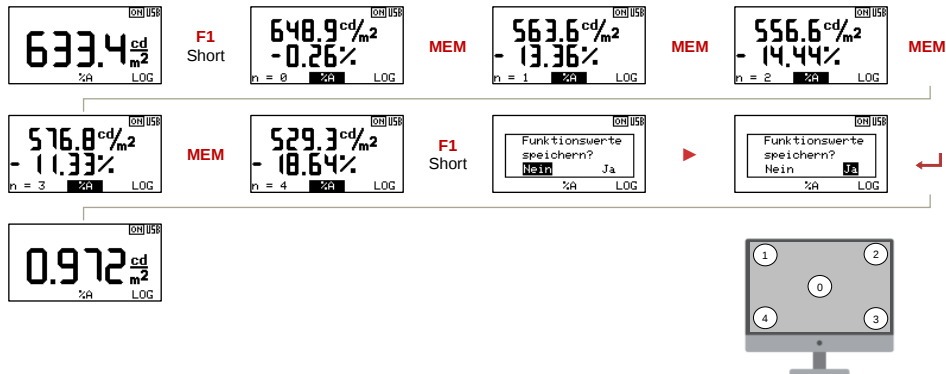
6.4 B/A – Ratio

The B/A measuring function is used for contrast measurement or to determine workplace luminance distribution. Reference value A can be frozen by pressing the HOLD key. After briefly pressing the assigned function key, the B/A measuring function is activated and the measured or frozen measured value is saved as reference value A. Momentary measured value B then appears at the upper display and B/A at the lower display. The momentary measured value pair is saved by pressing the MEM key and the number of measured values is increased at the display. The B/A measuring function is terminated by briefly pressing the assigned function key and a prompt is displayed asking whether the function values should be saved or discarded.



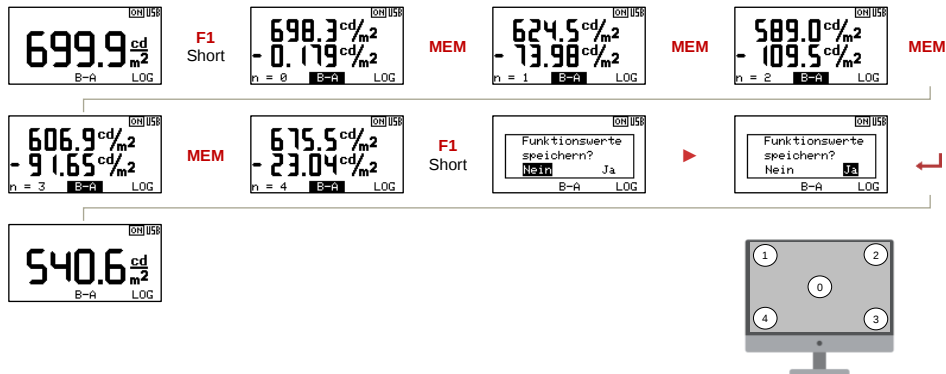
6.5 %A – Percentage Deviation

Measuring function %A can be used to assess the uniformity of monitor screens, uniform illumination of projection surfaces and uniform lighting of workplaces. The value obtained at the center is usually used as reference value A. Reference value A can be frozen by pressing the HOLD key. After briefly pressing the assigned function key, the %A measuring function is activated and the measured or frozen measured value is saved as reference value A. The momentary measured value then appears at the upper display and percentage deviation appears at the lower display. The momentary measured value pair is saved by pressing the MEM key and the number of measured values is increased at the display. The %A measuring function is terminated by briefly pressing the assigned function key and a prompt is displayed asking whether the function values should be saved or discarded. The %A measuring function is terminated by briefly pressing the assigned function key and a prompt is displayed asking whether the function values should be saved or discarded.



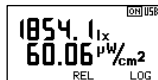
6.6 B-A – Relative Deviation

Measuring function B-A can be used to determine deviation. The value obtained from the reference part is usually used as reference value A. Reference value A can be frozen by pressing the HOLD key. After briefly pressing the assigned function key, the B-A measuring function is activated and the measured or frozen measured value is saved as reference value A. The momentary measured value then appears at the upper display and relative deviation appears at the lower display. The momentary measured value pair is saved by pressing the MEM key and the number of measured values is increased at the display. The B-A measuring function is terminated by briefly pressing the assigned function key and a prompt is displayed asking whether the function values should be saved or discarded.

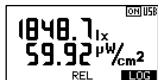


6.7 LOG – Data Logger

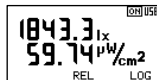
Measured values are saved at the log interval specified under Settings in the Storage menu in the LOG measuring function. A brief acoustic signal confirms each storage operation. The measuring function or the meter can only be switched off as long as the data logger is active. When the measuring function is ended, recording is stopped and the measured value file is closed. The data logger function can be used to create illumination profiles over a period of time.



F2
Short

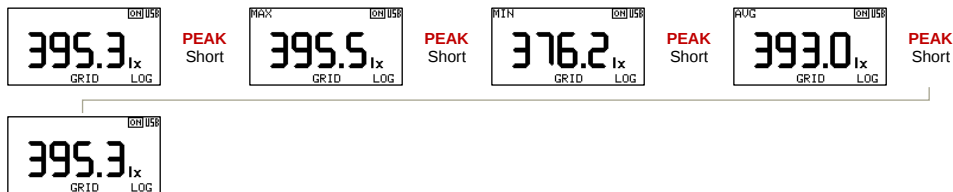


F2
Short



6.8 PEAK – Extreme Values, Mean Value

The PEAK function acquires the largest value (MAX), the smallest value (MIN) and the arithmetic mean value (AVG) in the background during measurement. MAX, MIN and AVG values are displayed successively by briefly pressing the PEAK key repeatedly. If no further operation takes place during the PEAK display, the PEAK display is automatically exited. MAX, MIN and AVG values are reset by pressing and holding the PEAK key. An acoustic signal is generated and Reset appears at the message window as confirmation.



With active measuring functions, extreme values are determined from the function values stored via the MEM key. MIN, MAX and AVG values cannot be reset while a measuring function is active.

7 Memory Functions

In addition to a display memory, the MAVOMASTER is also equipped with an 8 GB measured value memory. This makes it possible to record several measurements on site, and to read them out and evaluate them at a later point in time. Stored values are retained when the instrument is switched off, as well as when the batteries are replaced.

7.1 HOLD – Freeze Display

The HOLD function freezes values at the display and facilitates delayed meter reading. The HOLD function is activated by pressing the **HOLD** key and HOLD appears at the display. After pressing the **HOLD** key once again, the MAVOMASTER is returned to the continuous measuring function. Display backlighting is controlled according to the selected LCD illumination mode.



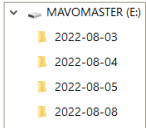
7.2 MEM – Saving Measured Values

During normal measuring operation, the momentary measured value is saved as a file in CSV format to a daily folder (yyyy-mm-dd) by briefly pressing the **MEM** key – depending on the corresponding setting as either *Realtime_xxxx.csv* or *Realtime_hh-mm-ss.csv*. The measured value's number (xxxx) is incremented for each storage operation, and current time is used for the time setting. A window with the message “saved” appears as confirmation and an acoustic signal is generated.

If the **REL** measurement function has been activated, *Relative_xxxx.csv* or *Relative_hh-mm-ss.csv* is used as the filename and the reference value is written to the file as well.

7.3 Saving Function Values

A separate filename is assigned to each measuring function, which is laid out as described in section 7.2. When the measuring function is exited, a prompt appears asking the user whether or not the function values should be saved. If “Yes” is selected, a measured value file is saved to the daily folder. Storage is acknowledged by an acoustic signal and “saved” appears at the display.

	Filenames	Filename	Measuring Function
	<i>BtoA_0001.csv</i>	<i>BtoA_10-12-20.csv</i>	B/A
	<i>%A_0001.csv</i>	<i>%A_10-12-20.csv</i>	%A
	<i>B-A_0001.csv</i>	<i>B-A_10-12-20.csv</i>	B-A
	<i>Grid_0001.csv</i>	<i>Grid_10-12-20.csv</i>	GRID
	<i>Integral_0001.csv</i>	<i>Integral_10-12-20.csv</i>	INT

7.4 MEM – Deleting Measured Values

The contents of measured value memory can be retrieved during normal measuring operation by pressing and holding the MEM key. The MENU keys are used to navigate between directories and files, and pressing the  key opens the delete prompt. The measured value memory display is exited by briefly pressing the MEM button.

8 MAVOPROBES

Various measuring requirements from the fields of photometry and radiometry are covered by individual MAVOPROBE measuring probes. All of the intelligence required for the processing of measured values is in the probe, thus permitting universal use and separate calibration. They can be used as autonomous measuring instruments in conjunction with the MAVOMASTER. As an alternative, each probe can be connected directly to a USB interface with the help of the optional USB adapter cable, and can be used in single or multi-channel measuring systems. Power is supplied from the USB interface.

8.1 MAVOPROBE LUX 5032 B – Illuminance, Class B

Due to its outstanding accuracy in accordance with class B, the MAVOPROBE LUX 5032 B is used primarily for certification and inspection applications. An additional, high-resolution measuring range (0.001 lx) makes it possible to measure extremely small illumination intensities. This even permits reliable measurement of emergency lighting. Matching to the spectral brightness sensitivity of the human eye $V(\lambda)$ is highly precise with minimal deviation of just $f1' < 3\%$.

8.2 MAVOPROBE LUX 5032 C – Illuminance, Class C

With accuracy in accordance with class C, the MAVOPROBE LUX 5032 C is used primarily for general applications as an industrial measuring instrument. The smallest of four measuring ranges begins with a resolution of 0.1 lx. $V(\lambda)$ matching deviation, which amounts to $f1' < 7.5\%$, is considerably better than the permissible error limit for class C.

8.3 MAVOPROBE MONITOR – Luminance, Class B

The luminance of actively luminous or transilluminated surfaces such as monitors of any type, TV screens, light tables, trough luminaires, illuminated advertising surfaces and viewing screens can be determined with the MAVOPROBE MONITOR by means of contact measurement in cd/m^2 or fL. The included adapter disc with velvety coating protects against incident light from the side during measurement and prevents scratches on sensitive surfaces.

Conversion to other units of measure:

Luminance		Conversion Factors			
Initial Quantity	UoM	cd/m^2	nt	fL	cd/ft^2
Candelas per m^2	cd/m^2		1	0.2918635	0.0929030
Nit	nt	1		0.2918635	0.0929030
Foot-lamberts	fL	3.4262591	3.4262591		0.3183099
Candelas per ft^2	cd/ft^2	10.7639104	10.7639104	3.1415297	

Example: $x \text{ cd/m}^2 = x * 0.2918635 \text{ fL}$

8.4 MAVOPROBE LUX / UVA – Illuminance, Class B / UV-A Irradiance

The high-precision MAVOPROBE LUX/UVA combination probe for non-destructive testing is classified for class B illuminance in accordance with DIN 5032-7, DIN EN 13032-1 appendix B and ISO/CIE 19476, and measurement of UV-A irradiance complies with requirements set forth in DIN EN ISO 3059 and ASTM E2297 for measuring instruments for fluorescent penetrant and magnetic particle testing.

Performance of the non-destructive materials testing system must be checked regularly to ensure inspection quality and reliability. This inspection includes the intensity of the UV-A radiation as well as illuminance. The viewing conditions for this test method are described in DIN EN ISO 3059, which contains the minimum requirements for illuminance and UV-A irradiance and their measurement. Calibration intervals according to the manufacturer's specifications, but in any case at least once every 12 months, are also stipulated and must be verified with a calibration certificate.

9 USB Interface

The meter's USB interface is located on the left-hand side of the housing. The meter is connected to a PC via the USB interface cable, and the PC detects the integrated micro SDHC memory card as a removable data storage medium. The measurement files stored in CSV format can then be easily opened, copied, moved or deleted. As long as the meter is connected to the PC, it's supplied with electrical power via the USB port and is not switched off.

The open protocol for device control and data communication permits incorporation into the user's own applications. The interface description and an associated demo application can be downloaded from the MAVOMASTER product page at www.gossen-photo.de.

9.1 Firmware Update

The sustainable device concept is open for future function expansions and amendments to the applicable standards. If necessary, new firmware versions will be made available by GOSSEN, which the customer can install to the device himself. After updating the firmware, the meter is then fully up to date. User settings remain unchanged. Updating instructions and new firmware can be downloaded from the MAVOMASTER product page at www.gossen-photo.de.

10 Accessories

10.1 Scope of Delivery, MAVOMASTER

- MAVOMASTER
- Interface cable, USB type A to micro B, length: 1.8 m
- Battery, 1.5 V AA alkaline-manganese cell (IEC LR 6)
- Operating instructions

10.2 Scope of Delivery, MAVOPROBE

- MAVOPROBE
- Permanently attached connection cable with Binder series 711 plug, length: 1.5 m
- Light-proof sensor protection cap
- Operating instructions
- Calibration report

10.3 MAVOMASTER Accessories

USB Interface Cable (V075A)

The MAVOMASTER can be connected to a PC, a power bank or a USB mains power pack with the USB interface cable (USB 2.0 type A plug to type B micro plug, 1 m).

USB Mains Power Pack, 5 V / 1 A (15431)

With the help of the USB mains power pack, the MAVOMASTER can be continuously operated and supplied with electrical power via the USB interface cable.

Rubber Holster (V076A)

The rubber holster protects the MAVOMASTER against impacts, provides it with a unique feel and also has an integrated tilt stand for convenient tabletop use.

Aluminum Carrying Case (V077A)

A high-quality aluminum case with matching foam insert can be used to transport the MAVOMASTER with rubber holster and up to two MAVOPROBES.

Plastic Carrying Case (M520G)

A high-quality plastic case with matching foam insert can be used to transport the MAVOMASTER without rubber holster, along with one MAVOPROBE LUX 5032 B/C or LUX/UVA.

10.4 MAVOPROBE Accessories

MAVOPROBE Extension Cords

MAVOPROBE extension cords can be inserted between the MAVOMASTER and the MAVOPROBE. They consist of a cable with matching Binder series 711 5-pin socket-plug combination. Depending on length, battery service life is slightly reduced when using the extension cord.

- **MAVOPROBE Extension Cord, 3 m (V071A)**
- **MAVOPROBE Extension Cord, 5 m (V072A)**
- **MAVOPROBE Extension Cord, 10 m (V073A)**

USB Adapter Cable (V074A)

Any MAVOPROBE can be connected directly to and operated via a USB interface using the USB adapter cable (USB 2.0 type A plug to Binder series 711 socket). The MAVOPROBE is supplied with electrical power from the USB interface.

Luminance Attachment (M516G)

The luminance attachment with measuring angle $\varepsilon_{1/10}$ of approximately 15° permits use of the MAVOPROBE LUX 5032 B/C as a non-classified luminance meter. The meter automatically detects that the luminance attachment has been screwed on and displays luminance in cd/m^2 or fL.

Please note: The luminance attachment is matched to the diffuser with a diameter of 10 mm and has yellow printing inside. Older luminance attachments with white printing deliver incorrect measured values.



Adapter Disc (M499G)

The adapter disc is fitted onto the luminance attachment and prevents light from entering from the side during all contact measurements on luminous surfaces and monitors. The large, velour-coated contact area protects surfaces from being scratched or damaged.



10.5 Calibration Certificates for MAVOPROBES

MAVOPROBES are intelligent measuring probes with comprehensive measured value processing and serial data transmission. As a result, each measuring probe can be sent in separately for calibration. Depending on how the meter is used, we recommend a calibration interval of either 12 or 24 months.

Factory Calibration Certificate

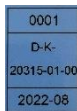
Traceability of illuminance, directly to the national standards of the PTB (German Federal Institute of Physics and Metrology), is ensured by several standard calibration lamps (Wi41/G), and traceability of UV-A irradiance at 365 nm by means of a reference meter.



- **Illuminance or Luminance (H997B)**
- **UV-A Irradiance at 365 nm (H997U)**

DAkkS Calibration Certificate

We ensure strictest possible industry standards for calibration and traceability with our ISO/IEC/EN 17025 accredited calibration laboratory for illuminance and irradiance (D-K-20315-01-00).



- **Illumination (H997D)**
- **UV-A irradiance at 365 nm (H997U)**
- **Illumination and UV-A irradiance at 365 nm for ZfP/NDT (H997N)**

11 Service Notes

The instrument does not require any special maintenance if used in accordance with the operating instructions.

- **If the outside of the device becomes contaminated during use, clean the surface of the housing with a slightly moistened cloth. Avoid the use of cleansers, abrasives and solvents.**
- **Make sure that the light receiver doesn't become dusty, dirty or scratched because this can affect measurement accuracy.**

If at any time your instrument doesn't function to your full satisfaction, send it to:

GOSSEN Foto- und Lichtmesstechnik GmbH | Lina-Ammon-Str. 22 | D-90471 Nuremberg |
Germany
Phone: +49 911 800621-0 | Fax: +49 911 800621-29 | e-mail: info@gossen-photo.de

www.gossen-photo.de

Customers outside of Germany are requested to contact their authorized dealer, whose address can be found on our website at www.gossen-photo.de.

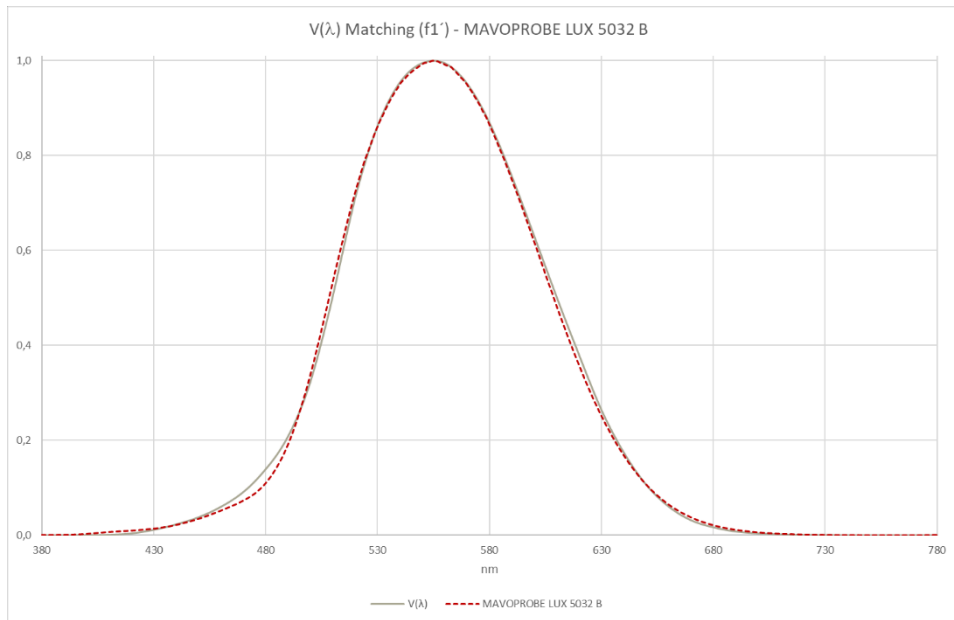
12 Technical Data

12.1 MAVOMASTER – Control and Display Unit

Operation	
Language settings	German, English
Display	FSTN graphic display, 128 x 64 pixels, monochrome, 50 x 25 mm
Display illumination	Modes Off – On – Hold – Auto Brightness 10% to 100% in steps of 10%
Display rate	2 displays per second
Controls	6 keys
Measured value memory	8 GB
Interface	USB 2.0 with micro B socket
Software	MAVOSOFT
Power Supply	
Battery	1.5 V AA alkaline-manganese per LR 6 or equivalent rechargeable battery
Automatic battery monitoring	Display of remaining battery capacity
Automatic shutdown	Off, 10 s, 30 s, 1 min., 2 min., 5 min.
Battery service life	Up to 16 hours with alkaline manganese battery
Continuous operation	Supply via USB cable – PC, mains power pack or power bank
Ambient Conditions	
Operating temperature	-10° C ... + 50° C
Storage temperature	-20° C ... +70° C
Relative humidity	45 ... 75%, no condensation allowed
Elevation	To 2000 m
Mechanical Design	
Dimensions	65 x 120 x 19 mm
Weight	100 g without battery

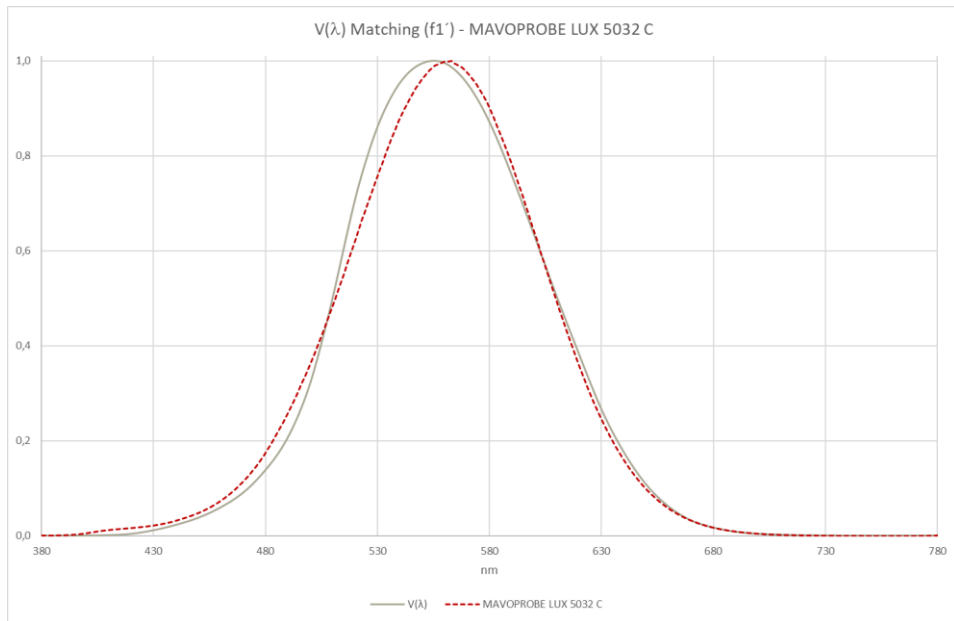
12.2 MAVOPROBE LUX 5032 B – Illuminance, Class B

Measuring Functions	
Classification	Class B – DIN 5032-7
Illuminance	0.001 lx ... 199,990 lx / 0.001 fc ... 19,999 fc
Luminance	0.01 cd/m ² ... 1,999,900 cd/m ² / 0.001 fL ... 199,990 fL with optional luminance attachment, not classified
Sampling rate	2 measurements per second
Measuring sensor	Silicon photodiode with V(λ) filter, diffusor diameter: approx. 10 mm
Reference plane	Diffusor surface
Probe with ¼" tripod thread	Yes
Probe connector cable	1.5 m, plug-in, Binder series 711 plug, 5-pin
Compliance with standards	DIN 5032-7 class B / DIN EN 13032-1 appendix B / ISO CIE 19476
V(λ) matching f1', typically	< 3%
Cos-like rating f2, typically	< 2%
Temperature dependence	< 0.1%, temperature compensated
Accuracy	± 2.5% rdg. ± 1 digit
Operation	
Interface	USB 2.0 with adapter cable to PC
Software	MAVOSOFT
Power Supply	
Continuous operation	Power supply via MAVOMASTER or USB interface
Ambient Conditions	Same as MAVOMASTER
Mechanical Design	
Dimensions	33 x 115 x 27 mm
Weight	110 g



12.3 MAVOPROBE LUX 5032 C – Illuminance

Measuring Functions	
Classification	Class C – DIN 5032-7
Illuminance	0.1 lx ... 199,990 lx / 0.01 fc ... 19,999 fc
Luminance	1 cd/m ² ... 1,999,900 cd/m ² / 0.1 fL ... 199,990 fL with optional luminance attachment, not classified
Sampling rate	2 measurements per second
Measuring sensor	Silicon photodiode with V(λ) filter, diffusor diameter: approx. 10 mm
Reference plane	Diffusor surface
Probe with ¼" tripod thread	Yes
Probe connector cable	1.5 m, plug-in, Binder series 711 plug, 5-pin
Compliance with standards	DIN 5032-7 class C / DIN EN 13032-1 appendix B / ISO CIE 19476
V(λ) matching f1', typically	< 7.5%
Cos-like rating f2, typically	< 2%
Temperature dependence	< 0.1%, temperature compensated
Accuracy	± 3 % rdg. ± 1 digit
Operation	
Interface	USB 2.0 with adapter cable to PC
Software	MAVOSOFT
Power Supply	
Continuous operation	Power supply via MAVOMASTER or USB interface
Ambient Conditions	Same as MAVOMASTER
Mechanical Design	
Dimensions	33 x 115 x 27 mm
Weight	110 g



Luminance Measurement Accuracy with Luminance Attachment

MAVOPROBE LUX 5032 B/C with dedicated luminance attachment ¹	$\pm 4.5\% \pm 1 \text{ digit}$
MAVOPROBE LUX 5032 B/C with non-dedicated luminance attachment ²	$\pm 8.0\% \pm 1 \text{ digit}$

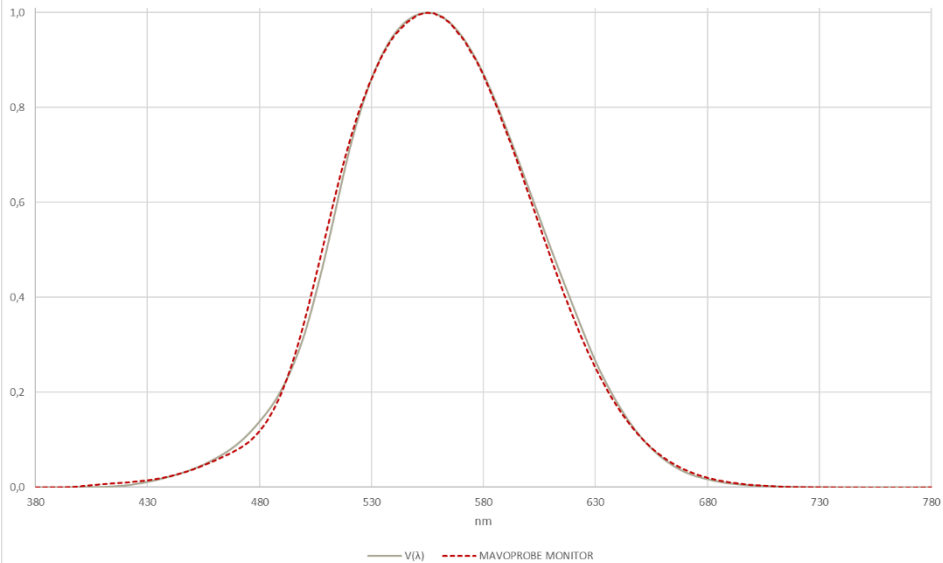
¹ If the luminance attachment is ordered together with the MAVOPROBE and permanently dedicated to it, the accuracy of this specific combination can be fine-tuned.

² If the luminance attachment is ordered separately and used with any MAVOPROBE.

12.4 Technical Data – MAVOPROBE MONITOR

Measuring Functions	
Classification	Class B – DIN 5032-7
Luminance	0.001 cd/m ² ... 19,999 cd/m ² / 0.001 fL ... 1999 fL
Sampling rate	2 measurements per second
Measuring method	Contact measurement
Measuring sensor	Silicon photodiode with V(λ) filter, light entry surface diameter: approx. 19 mm
Probe with ¼" tripod thread	Yes
Probe connector cable	1.5 m, plug-in, Binder series 711 plug, 5-pin
Compliance with standards	DIN 5032-7 class B / DIN EN 13032-1 appendix B / ISO CIE 19476
V(λ) matching f1', typically	< 3%
Temperature dependence	< 0.1%, temperature compensated
Accuracy	± 2.5% rdg. ± 1 digit
Operation	
Interface	USB 2.0 with adapter cable to PC
Software	MAVOSOFT
Power Supply	
Continuous operation	Power supply via MAVOMASTER or USB interface
Ambient Conditions	Same as MAVOMASTER
Mechanical Design	
Dimensions	33 x 115 x 97 mm
Weight	180 g

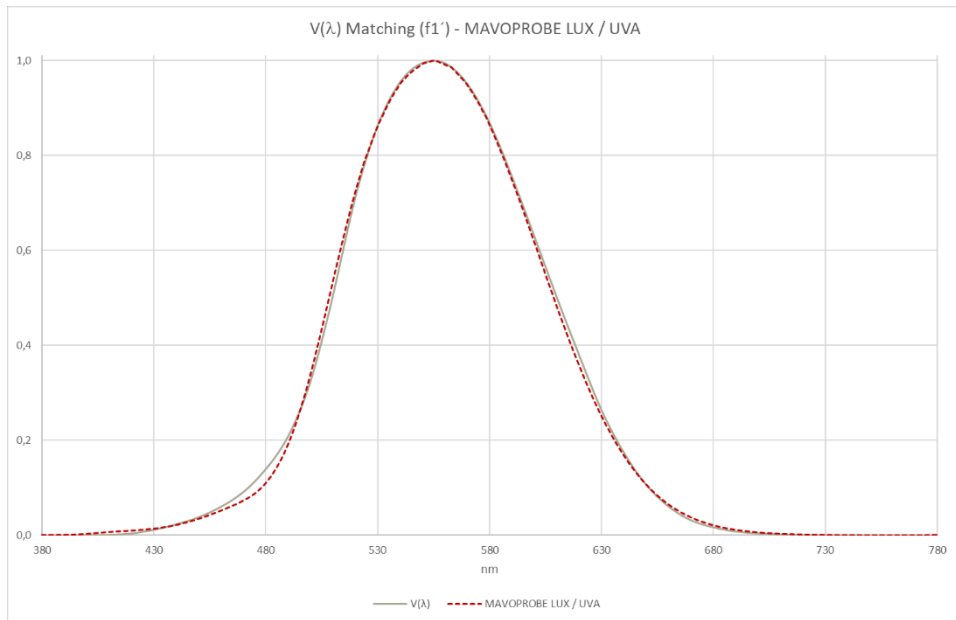
$V(\lambda)$ Matching (f_1') - MAVOPROBE MONITOR



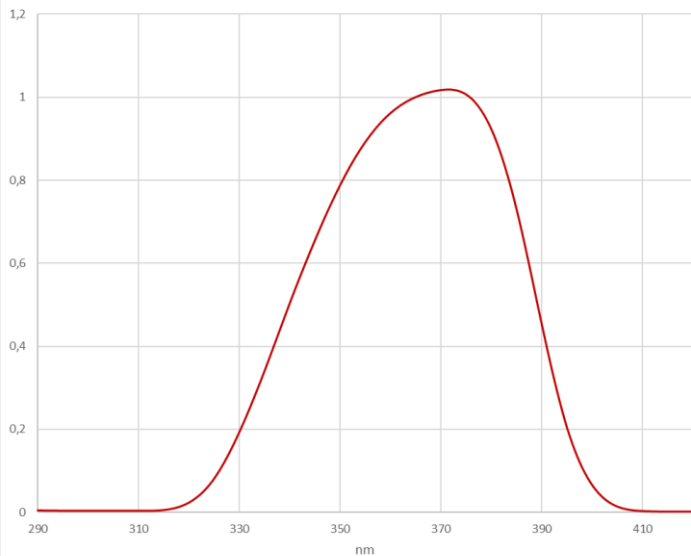
12.5 MAVOPROBE LUX / UVA – Illuminance

Measuring Functions	
Classification	Class B – DIN 5032-7
Illuminance	0.001 lx ... 199,990 lx / 0.001 fc ... 19,999 fc
Luminance	0.01 cd/m ² ... 1,999,900 cd/m ² / 0.001 fL ... 199,990 fL with optional luminance attachment, not classified
UV-A irradiance at 365 nm	0.01 µW/cm ² ... 199,990 µW/cm ²
Sampling rate	2 measurements per second
Measuring sensor	Silicon photodiode with V(λ) filter, silicon photodiode with UV-A filter, diffusor diameter: approx. 10 mm
Reference plane	Diffusor surface
Probe with ¼" tripod thread	Yes
Probe connector cable	1.5 m, plug-in, Binder series 711 plug, 5-pin
Compliance with standards	DIN 5032-7 class B / DIN EN 13032-1 appendix B / ISO CIE 19476 DIN EN ISO 3059 / ASTM E2297-15
V(λ) matching f1', typically	< 3%
Cos-like rating f2, typically	< 2%
Temperature dependence	< 0.1%, temperature compensated
Accuracy	± 2.5% rdg. ± 1 digit (LUX) ± 10% rdg. ± 1 digit (UV-A 365 nm)
Operation	
Interface	USB 2.0 with adapter cable to PC
Software	MAVOSOFT
Power Supply	
Continuous operation	Power supply via MAVOMASTER or USB interface
Ambient Conditions	Same as MAVOMASTER
Mechanical Design	

Dimensions	33 x 115 x 27 mm
Weight	115 g



UVA Matching according DIN EN ISO 3059 - MAVOPROBE LUX / UVA



Additional Information

- **Calibration of Measuring Equipment**

Information concerning the calibration of measuring equipment is available as a PDF download at www.gossen-photo.de under LICHTLABOR. You'll also find information about our light lab, our calibration capabilities and samples of corresponding calibration certificates.

- **Photometry Compendium**

The photometry compendium answers many questions covering all aspects of the issues surrounding light, basic lighting technology and colorimetry terminology, and includes tips for the selection of measuring equipment and an overview of applications and standards. It's available at www.gossen-photo.de under the respective product in the CATALOGS download area.

- **Compendium of UV Measuring Technology**

This compendium of UV measuring technology provides an overview of the entire range of UV radiation and deals with its classification and generation, associated safety precautions, applications and standards, as well as its measurement and the calibration of the utilized measuring instruments. Non-destructive materials testing, along with requirements for measurement and calibration, are dealt with specifically for the various applications – an issue which GOSSEN addresses with the extended service offerings of its calibration laboratory. It's available at www.gossen-photo.de under the respective product in the CATALOGS download area.

- **licht.wissen**

Detailed information concerning everything about light and lighting can be found in the free "licht.wissen" publication series at www.licht.de.

GOSSEN Foto- und Lichtmesstechnik GmbH | Lina-Ammon-Str. 22 | 90471 Nuremberg | Germany
Phone: +49 911 800621-0 | Fax: +49 911 800621-29 | e-mail: info@gossen-photo.de

www.gossen-photo.de

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