Operating Instructions

GOSSEN

MAVOLUX 5032C/B *USB*

Illuminance Meter

15458 1/03/12

USB Port

Display

Key pad

Circular orifice

Light collector

Photometer head

Back of display unit:
- battery door
- serial number
- calibration seal for DAkkS- or calibration certificate (if available)

Back of photometer head:
- serial number of display unit
- tripod socket ¼ “

Perspective view of MAVOLUX *USB*

Contents

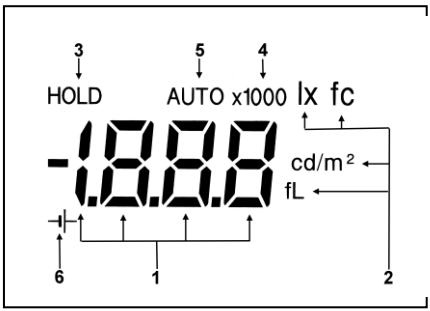
1 Applications

The MAVOLUX 5032 illuminance meters are handy, easy to use and high precision measuring instruments. They allow the accurate measurement of the illuminance in the unit lx or fc.
Combined with the Luminance Attachment, available as optional accessory, the MAVOLUX 5032 can also be used for measuring luminance in the unit cd/m² or fL.
The light sensor is color corrected, i.e. its relative spectral responsivity has been adapted to that of the human eye *V(λ).* All the important types of light can be measured with high precision, without the necessity to apply any additional correction factors.
The accuracy of that *V(λ)* adaptation is the main difference between the two types MAVOLUX 5032 C and MAVOLUX 5032 B. The quality classes for illuminance meters have been defined in the Standard Specifications DIN 5032, Part 7. Consequently, the MAVOLUX 5032 C complies with Class C, MAVOLUX 5032 B complies with Class B (DIN 5032, part 7 and 8).
The light collector with circular orifice in the photometer head has integrated cosine correction, so that oblique incident light will be measured accurately.
Both MAVOLUX types allow measuring very high intensity light (daylight, headlights) without additional accessories. Especially the MAVOLUX 5032 B having an initial sensitivity of 0.01 lx is ideally suited for measuring extremely low light intensities, such as emergency lighting.
The instruments are provided with a measuring value memory with 100 data spaces, which can be read and processed directly by the keys and the display but also through the integrated USB Port and the Standard Software supplied with the meters.

lx	=	Lux	1 lx	= 0.0929 fc
fc	=	footcandle	1 fc	= 10,76 lx
cd/m²	=	Candela per square meter	1 cd/m^2	= 0,2919 fL
fL	=	footlambert	1 fL	= 3,426 cd/m^2

2 Display

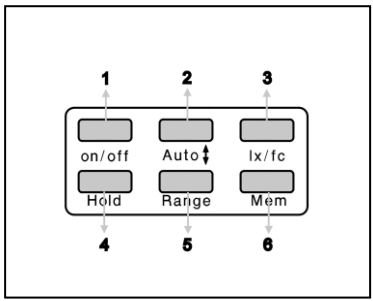
2.1 Description of Display Elements



1	Display of measuring value and Memory
2	Measuring Unit
3	Display „HOLD„ indication / Buffer Storage
4	Multiplying factor for measuring value
5	Auto ranging – automatic range selection
6	Low Battery

* MAVOLUX 5032 B *USB* with automatic backlight in HOLD function

2.2 Key Pad

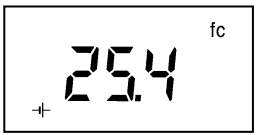


1	Switch On/Off
2	Range key – Memory/Measuring range ↑
3	lx/fc – Select measuring unit
4	HOLD – Function / Buffer Storage
5	Range key – Memory/Measuring range ↓
6	MEM – Memory key

3 Functioning of the MAVOLUX

3.1 Preparation

First remove the snap-on cover of the battery compartment at the back of the meter. Insert the battery included in the delivery contents (1.5 V size AA, IEC LR6) in the battery compartment.
Care should be taken to place the battery correctly according to the polarity indications "+" and "-" in the battery compartment.
When the battery warning symbol (⊣⊢) appears in the display, the battery must be replaced.
The values in the measuring data memory and also the preset individual values will be maintained, even when the battery is changed.



3.2 Duration of Display – Continuous Operation

If for approx. 4 minutes none of the keys of the MAVOLUX is pressed down, the instrument will be turned off automatically. When the instrument is switched off, the values stored in the measuring data memory and also the preset individual values will be maintained.
You can override the automatic switch-off, when you switch on the instrument and simultaneously keep the **HOLD** key pressed down. The measuring unit „lx / fc" in the display will blink and indicate that the Continuous Operation Mode is on.

4 MAVOLUX Operation

4.1 Switch On – Make Measurement

Press down the **on/off** key and the MAVOLUX will start up in measuring mode and will immediately be measuring at 2 times per second. The instrument is in the function „AUTO“, i.e. the MAVOLUX will select the best suited measuring range for the existing light level. By pressing one of the range keys, one of the measuring ranges can be set. Scrolling up or down through additional measuring ranges is accomplished by briefly pressing one of the range keys. If both keys are pressed and held simultaneously, the instrument is returned to „AUTO RANGING“.

4.2 Selecting the Measurement Unit lx or fc – cd/m² or fL

Use the key **lx/fc** to select the required unit for the read-out – lux or footcandle. With the additional Luminance Attachment (please refer to 6.2 – Optional accessories), this key also selects the measurement unit for luminance cd/m² or fL – candela per square meter or footlambert.

4.3 Overload Display – Zero Point Indication

When exceeding one of the measuring ranges „OL“ (Overload) appears in the display.

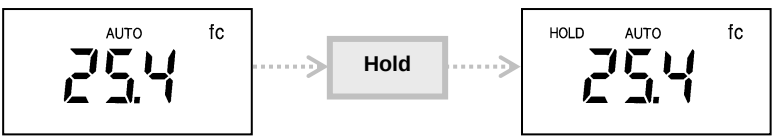
The zero point indication may be achieved by putting the protective cap over the light collector of the photometer head.

4.4 Memory Functions

In addition to the display buffer storage, the MAVOLUX has also been provided with a memory space for up to 100 measured values.
This function allows the user to make several measurements in the field and then to view them later. The data stored in the memory will be maintained, even if the meter is turned off or if the battery is changed.

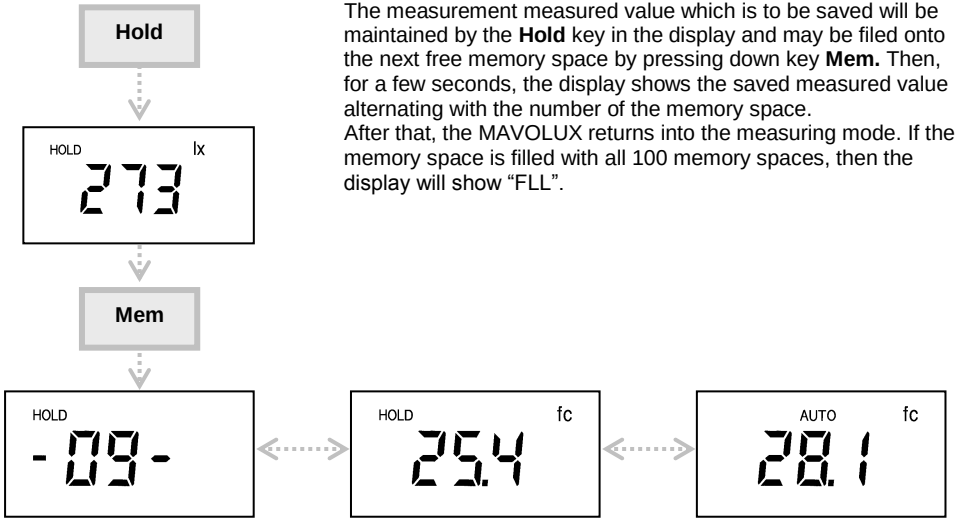
4.4.1 „HOLD“ - Display Hold Function

The MAVOLUX has been equipped with a Display HOLD Function in order to enable you to make measurements in very low light conditions and to read them out later in brighter light conditions.
The latest measurement will be buffer-stored in the display by striking the HOLD key. Then “HOLD” will appear in the display. Pressing down the HOLD key again will prompt the MAVOLUX to return to the measuring function.



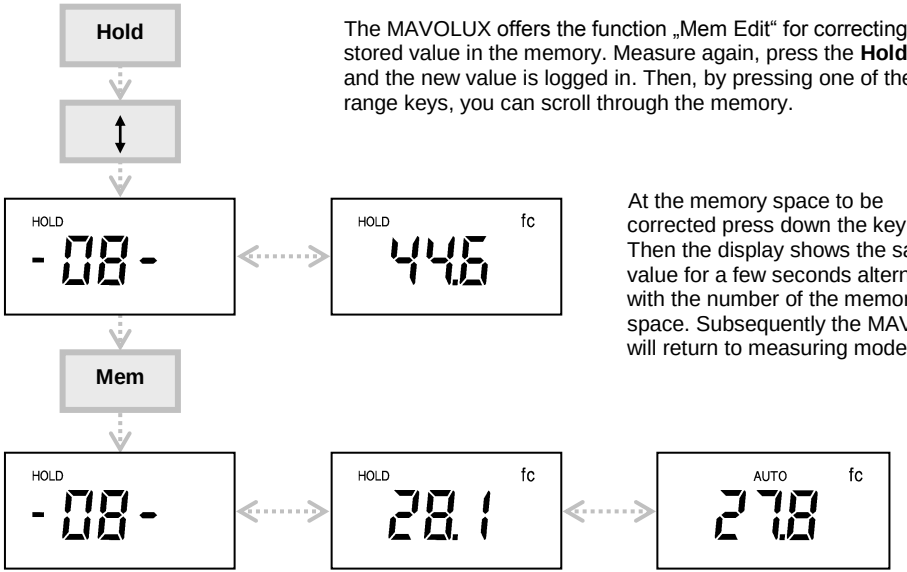
The function HOLD is the basic function for all the memory functions.

4.4.2 „Mem“ – Save Measured Values in Memory



The measurement measured value which is to be saved will be maintained by the **Hold** key in the display and may be filed onto the next free memory space by pressing down key **Mem.** Then, for a few seconds, the display shows the saved measured value alternating with the number of the memory space.
After that, the MAVOLUX returns into the measuring mode. If the memory space is filled with all 100 memory spaces, then the display will show “FLL”.

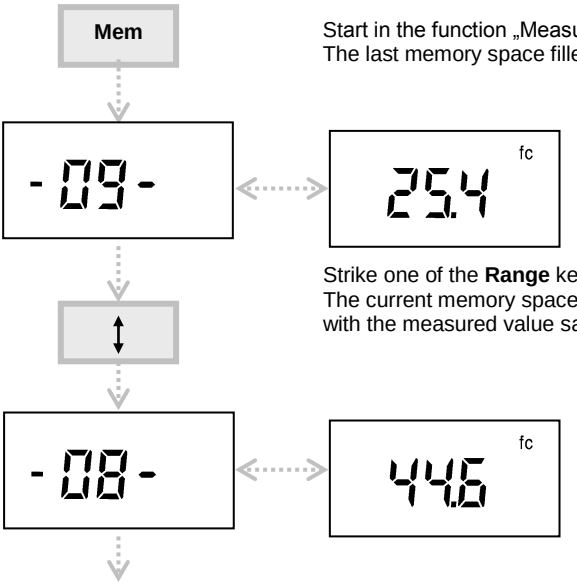
4.4.3 „Mem-Edit“ – Overwrite a Saved Measured Value



The MAVOLUX offers the function „Mem Edit“ for correcting a stored value in the memory. Measure again, press the **Hold** key and the new value is logged in. Then, by pressing one of the range keys, you can scroll through the memory.

At the memory space to be corrected press down the key **Mem**. Then the display shows the saved value for a few seconds alternating with the number of the memory space. Subsequently the MAVOLUX will return to measuring mode.

4.4.4 „Mem Recall“ – Data Memory Recall



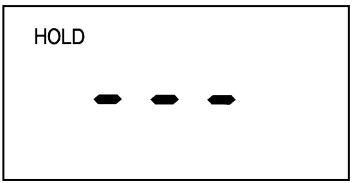
Start in the function „Measuring“ and press down the key **Mem**. The last memory space filled will be displayed first.

Strike one of the **Range** keys to scroll through the data memory. The current memory space is displayed as 01-02..., alternating with the measured value saved in the memory.

To return to the measuring mode just press down any one of the other keys or if for about ten seconds no further memory data is recalled by the **Range** keys, the MAVOLUX will return to the measuring mode.

4.4.5 „Mem-Clear“ – Clear Memory

The MAVOLUX must be in function „HOLD“.
Pressing down the **Range** keys simultaneously, will clear the complete measuring data memory. The cancelling is confirmed in the display by three dashes.



5 USB Port – Standard Software

The MAVOLUX is equipped with a USB Port which allows the meter to be connected to a PC by the USB cable (in the delivery contents). The CD Rom supplied with the MAVOLUX contains, among other information, a standard software which permits the immediate start of the operation by PC. More details about the PC operational functions are also available on that CD-Rom.
With the standard software gLux the memory can be read and MAVOLUX can be controlled (automatic measurements from 2 times per second up to 1 time per day). The values can be presented as a chart or as graphics and be transferred to customer specific calculations.

6 Accessories

6.1 Standard Equipment

- Aluminium Case
- Battery
- Protective cover cap
- Standard Software on CD-ROM
- USB cable
- Instruction Manual

6.2 Optional Accessories

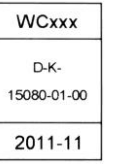
- **Luminance Attachment cd/m² and fL (Order Code M516G)**
  Measures the reflected light, i.e. the luminance of a surface with a measuring angle ε $^{1}/_{10}$ approx. 15°. By a micro switch the MAVOLUX automatically detects the luminance attachment screwed onto the light measuring probe. The measured luminance value is displayed correctly in value and unit.
  Please keep in mind that the luminance attachment is adapted to the light collector of 10 mm ∅, older luminance attachments can not be used!
  The luminance attachment can not be used for classified luminance measurements!
- **Adapter disc for Luminance attachment (Order Code M499G)**
  The adapter disk may easily be plugged onto the luminance attachment.
  * For all kinds of screens the light of the room will be shielded. The measuring results will be more precise if you use the adapter disc.
  * On sensitive surfaces the contact pressure is reduced by the big surface of the adapter disc. Therefore, the risk of damage during the measurement will be reduced considerably.

6.2 Calibration Certificate (Optional)

The traceability of the measuring results is guranteed by our calibration reference: Scientific Standard Lamps, type Wi 41G of the PTB (Physikalisch Technische Bundesanstalt Braunschweig – National Standard Institute of Germany). Depending on how the instrument is being used we recommend a recalibration interval between 12 and 24 month. For this purpose please contact our Calibration Service Department (telephone +49 911 8602 172).

6.4 DAkks Certificate (Optional)

With our calibration laboratory accredited according to ISO/IEC/EN 17025 for illuminance (registration number D-K-15080-01-00) of DAkkS we can offer you the highest industrial level for the performance and traceability of calibrations for light metering.



7 Service and Maintenance

No special maintenance is required, if the MAVOLUX is being handled correctly. Keep the outside surfaces clean. Use a slightly dampened cloth for cleaning. Do not use cleansers, abrasives or solvents. Should the instrument nevertheless not work to your satisfaction or if you will require repeated calibration with calibration or DAkkS certificate, please send the MAVOLUX to:

GOSSEN Foto- und Lichtmesstechnik GmbH
Lina-Ammon-Str.22
D – 90471 Nürnberg

8 Specifications

Light Sensor	Silicon photo diode with *V (λ)* filter
Classification	MAVOLUX 5032 USB – Class C according to DIN 5032, Part 7 (CIE 69) MAVOLUX 5032 USB – Class B according to DIN 5032, Part 7 (CIE 69)
Measuring Rate	2 measurements per second
LCD display	50 mm x 25 mm, (MAVOLUX 5032 B USB: back lighted display)
Read-out	7 segments, $3^1/_2$ digits, 13 mm
Overload signal	„OL“ in the display
Memory	100 memory space (measured values), display indication „FLL“ = memory full
Interface	USB 1.1 Port
Power Supply	
Battery	one 1.5 V AA alkaline manganese cell Size AA (IEC LR 6) or suitable rechargeable battery
Battery life	approx. 45 hour continuous operation with alkaline manganese battery
Battery test	Automatic display of ⊣⊢ „ symbol, when battery voltage drops below 1.0 Volt
External	When the MAVOLUX is connected to a PC, power will be supplied by the PC via the USB cable.

Weights and Dimensions

Housing	Plastics	
Dimensions	Display Unit:	65 x 120 x 19 mm 2.56 x 4.73 x 0.75“ (without carrying case)
	Photometer Head:	31 x 105 x 30 mm 1.22 x 4.13 x 1.18” tripod socket ¼ “ on bottom side
Weight	Display unit and photometer head approx. 200 g without battery	
Light sensor	Light sensitive surface of the diffuser: approx. 10 mm ∅ with circular orifice. Location of the reference plane is on the surface of the light collector.	
Cable length	Approx. 1.5 m. Available on special order available 3 m, 5 m and 10 m.	

Electromagnetic Compatibility EMC
The MAVOLUX meets the German specifications 89/336/EWG 01.01.1996

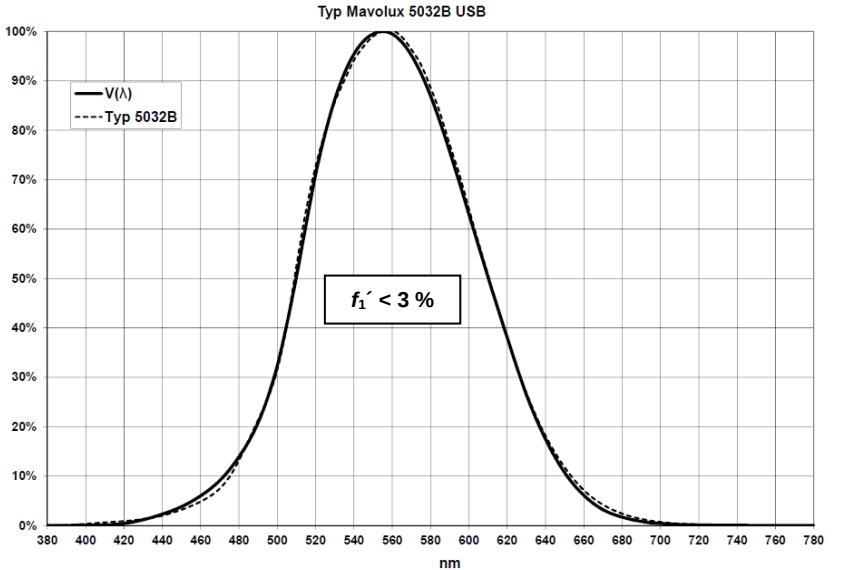
Characteristics MAVOLUX 5032 B *USB*

Measuring Quantity		Measuring Range in Lux (lx)		Measuring Range in footcandle (fc)		Resolution in lx	Resolution in fc
Illumination	I	0.01...	19.99	0.001...	1 999	0.01	0.001
	II	0.1...	199.9	0.01...	19.99	0.1	0.01
	III	1...	1 999	0.1...	199.9	1	0.1
	IV	10...	19 900	1...	1 999	10	1
	V	100...	199 000	10...	19 990	100	10
		in Candela/m² (cd/m²)		in footlambert (fL)		in cd/m²	in fL
Luminance with luminance attachment for cd/m² or fL	I	0.1...	199.9	0.01...	19.99	0.1	0.01
	II	1...	1 999	0.1...	199.9	1	0.1
	III	10...	19 990	1...	1 999	10	1
	IV	100...	199 900	10...	19 990	100	10
	V	1000...	1 999 000	100...	199 900	1000	100

Most Important Error Limits MAVOLUX 5032 B *USB*

Characteristics	Admissible Error according to DIN 5032 Class B	Typical Error MAVOLUX 5032 B *USB*
V(λ)-Adaptation (f_1)	6%	3.0%
True Cosine Evaluation (f_2)	3%	2.0%
Linearity (f_3)	2%	1.0%
Adjustment Error (f_{11})	1%	0.8%
Overall Error (f_{ges})	10%	~ 8.0%

V(λ)-Adaptation (f_1') MAVOLUX 5032B USB



EG – KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY

GOSSEN

Dokument-Nr./ Document.No.:	**102/2004**
Hersteller/ Manufacturer:	**GOSSEN Foto- und Lichtmesstechnik GmbH**
Anschrift / Address:	**Thomas-Mann-Str.16-20** **90471 Nürnberg**
Produktbezeichnung/ Product name:	**Beleuchtungsstärkemessgerät / Luxmeter / Footcandle meter**
Typ / Type:	**MAVOLUX 5032 B *USB***
Bestell-Nr / Order No:	**M503G**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender Europäischer Richtlinien überein, nachgewiesen durch die vollständige Einhaltung folgender Normen:
The above mentioned product has been manufactured according to the regulations of the following European directives proven through complete compliance with the following standards:

Nr. / No.	Richtlinie	Directive
73/23/EWG 73/23/EEC	Elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen - Niederspannungsrichtlinie –Anbringung der CE-Kennzeichnung : 2003	**Electrical equipment for use within certain voltage limits** **- Low Voltage Directive -** **Attachment of CE mark : 2003**
EN/Norm/Standard EN 61010-1 : 1993 EN 61557-3 : 1997	**IEC/Deutsche Norm** IEC 61010-1 : 1992 IEC 61557-3 : 1997	VDE-Klassifikation/Classification VDE 0411-1 : 1994 VDE 0413-3 : 1997
Nr. / No.	Richtlinie	Directive
89/336/EWG 89/336/EEC	Elektromagnetische Verträglichkeit - EMV - Richtlinie	Electromagnetic compatibility -EMC directive

Fachgrundform / Generic Standard: **EN 61326 : 2002**

Nürnberg, den 24. Juni 2004

Ort, Datum / Place, date:

Vorsitzender der Geschäftsführung

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentationen sind zu beachten.

This declaration certifies compliance with the above mentioned directives but does not include a property assurance. The safety notes given in the product documentations which are part of the supply, must be observed.

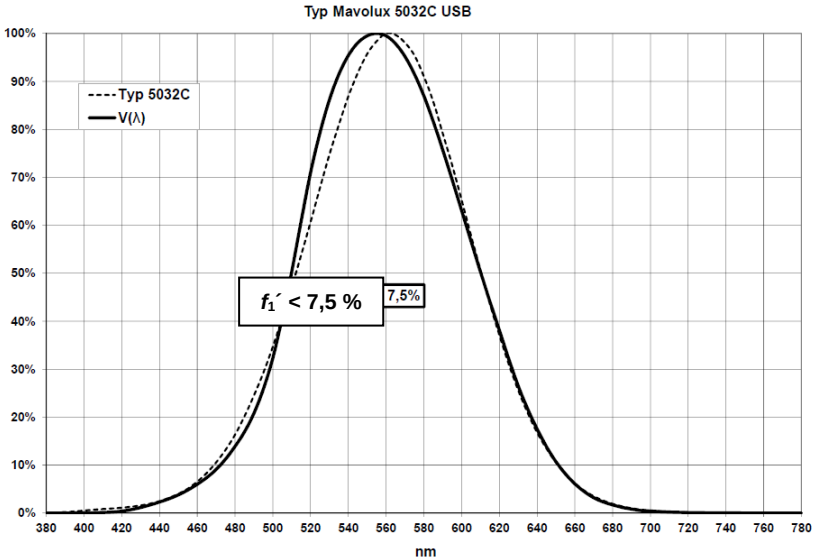
Characteristics MAVOLUX 5032 C *USB*

Measuring Quantity		Measuring Range in Lux (lx)		Measuring Range in footcandle (fc)		Resolution in lx	Resolution in fc
Illumination	I	0.1...	199.9	0.01...	19.99	0.1	0.01
	II	1...	1 999	0.1...	199.9	1	0.1
	III	10...	19 900	1...	1 999	10	1
	IV	100...	199 000	10...	19 990	100	10
		in Candela/m² (cd/m²)		in footlambert (fL)		in cd/m²	in fL
Luminance	I	1...	1 999	0.1...	199.9	1	0.1
with luminance	II	10...	19 990	1...	1 999	10	1
attachment	III	100...	199 900	10...	19 990	100	10
for cd/m² or fL	IV	1000...	1 999 000	100...	199 900	1000	100

Most Important Error Limits MAVOLUX 5032 C *USB*

Characteristics	Admissible Error according to DIN 5032 Klasse C	Typical Error MAVOLUX 5032 C *USB*
V(λ)-Adaptation (f_1)	9%	7.5%
True Cosine Evaluation (f_2)	6%	2.0%
Linearity (f_3)	5%	1.5%
Adjustment Error (f_{11})	2%	1.0%
Overall Error (f_{ges})	20%	~ 15.0%

V(λ)-Adaptation (f_1') MAVOLUX 5032C USB



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Anschrift / Address:	**Thomas-Mann-Str.16-20** **90471 Nürnberg**
Produktbezeichnung/ Product name:	**Beleuchtungsstärkemessgerät / Luxmeter / Footcandle meter**
Typ / Type:	**MAVOLUX 5032 C *USB***
Bestell-Nr / Order No:	**M502G**

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89/336/EWG 89/336/EEC	Elektromagnetische Verträglichkeit - EMV - Richtlinie	Electromagnetic compatibility -EMC directive

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GOSSEN Foto- und Lichtmesstechnik GmbH is also a leading provider of further interesting light measuring instruments:

- MAVO-MONITOR *USB*: High quality and precision instrument for measuring luminance, classified according to the Standard Specifications DIN 5032, Part 7, Class B and CIE 69. The measuring sensor to be placed directly on the luminous or back lighted surface may be used for contact measurement such as i.e. monitors, TV screens, light boxes, light panels, illuminated advertising boards, traffic sign etc.

- MAVO-SPOT 2 USB: For precision spot metering of the luminance with a measuring angle of 1 degree under consideration of the ambient light.
  The sensitive light sensor is colour corrected, i.e. its spectral sensitivity is adapted to the spectral brightness sensitivity of the human eye V(λ) according to DIN 5032, Part 7, Class B. The MAVO-SPOT 2 USB is especially suited for inspecting and constancy testing of viewing monitors in medical applications according to DIN 6868/57. Other applications are projection screens, street surfaces and street lightings, illumination of tunnels and sport areas.

- MAVO-MAX: For monitoring the ambient light in the surroundings of monitors according to IEC 61223-2-5 (QS-RL dt. 20/11/2003). The use of the MAVO-MAX permits the prolongation of the required repeat test intervals of the “veil luminance“ and the “maximum contrast“ at medical imaging displays to six months.

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