MAVO-MONITOR *USB*

1 Applications

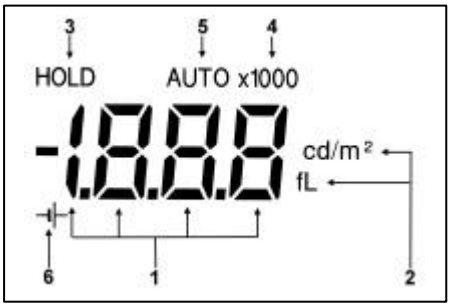
The MAVO-MONITOR Luminance Meter is a handy, easy to use and high precision measuring instrument. It allows the accurate measurement of the luminance in cd/m² or fL. The MAVO-MONITOR is ideally suited for contact measurements with the light measuring probe placed direct on luminous or backlighted surfaces (monitors, TV sets,light boxes, light panels). When combined with the MAVO-SPOT Attachment (optional accessory), it can be used for spot metering the luminance at a distance from 34 cm to ∞, the measuring angle being 1 degree. (Monitors, with the ambient light being taken into consideration in the measurement - lighting and illumination of work stations, streets, airports, museums, projection screens). The light sensor is color corrected, i.e. its spectral responsitivity has been matched to the spectral photonic vision of the human eye (V λ). The accuracy class for luminance meters has been defined in the Standard Specification DIN 5032, Part 7. The MAVO MONITOR fully complies with the requirements of Class B.Consequently all the important types of light can be measured with high precision, without the necessity to apply additional corrrection factors. The MAVO-MONITOR is provided with a data memory with 100 measurement value locations, which can be read and processed direct with the keys and display, but also through the integrated USB Port and the standard software provided with the instrument.

cd/m² = Candela per m²
fL = footLambert

1 cd/m^2 = 0.2919 fL = 0.0929 cd/ft^2
1 fL = 3.426 cd/m^2 = 0.3183 cd/ft^2
1 cd/ft^2 = 10.76 cd/m^2 = 3.142 fL

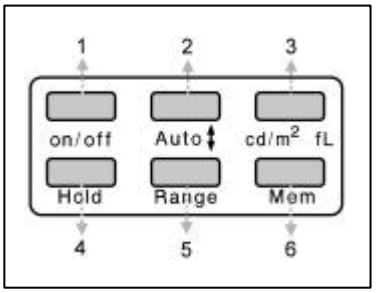
2 Display

2.1 Description of display



1	Display of measured value and Memory indication
2	Measurement Unit
3	Display „HOLD„ indication
4	Multiplying factor for measurement value
5	Auto ranging – automatic range selection
6	Low Battery

2.2 Key pad



1	Switching on/off
2	Range key – Memory/Measuring range ↑
3	cd/m^2 fL- Select measurement unit
4	Hold - Function
5	Range key – Memory/Measuring range ↓
6	Mem – Memory key

3 Functioning of the MAVO-MONITOR

3.1 Preparation

First remove the snap-on cover and open the battery compartment at the back of the meter. Insert the battery included with the meter (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 measurement 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 MAVO-MONITOR is pressed, the instrument will be switched off automatically. During the last 4 seconds before automatic switch off an acoustic signal will sound. By pressing any one of the keys, you can override the automatic switch off. When the instrument is switched off, the values stored in the data memory and also the preset individual values will be maintained. You can override the automatic switch off, when switching on the instrument and simultaneously keep the HOLD key depressed.
The measuring unit (cd/m² or fL) in the display will blink and indicate that the continuous operation mode is on.

4 Using the MAVO-MONITOR

4.1 Switching on – Making Measurement

Press the **on/off** key and the MAVO-MONITOR is immediately in the measuring mode and is measuring at the rate of 2 times per second. The instrument is in the function „AUTO“, i.e. the MAVO-MONITOR 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 locked. Browsing 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 desired measurement unit cd/m² or fL

Use the key **cd/m² fL** to select the desired unit for the read-out – cd/m² or fL.

4.3 Overload Display

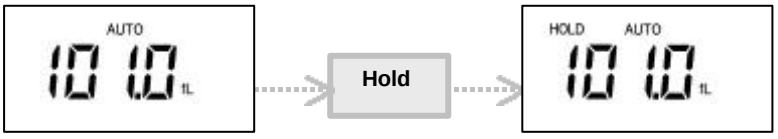
When exceeding one of the measuring ranges „OL“ (Overload) appears in the display.

4.4 Memory Functions

The MAVO-MONITOR is provided in addition to the „Display Hold“ also with a memory for data up to 100 measurement values.
This function allows several measurement operations in the field and read-out at a later time. The data stored in the memory will be maintained, even when the instrument is turned off or the battery is changed.

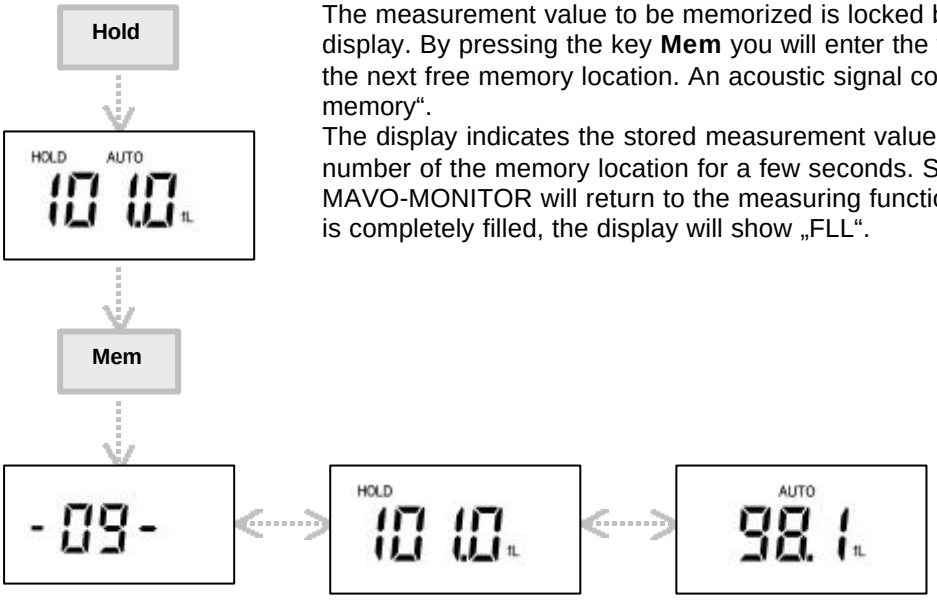
4.4.1 „HOLD“ Display Hold Function

The display HOLD function allows you to measure even at very low light levels, where it would be difficult to read the display. By pressing the HOLD key, the last value measured is held on the display to be read at brighter light. Pressing the HOLD key again will return the MAVO-MONITOR to the measuring function.



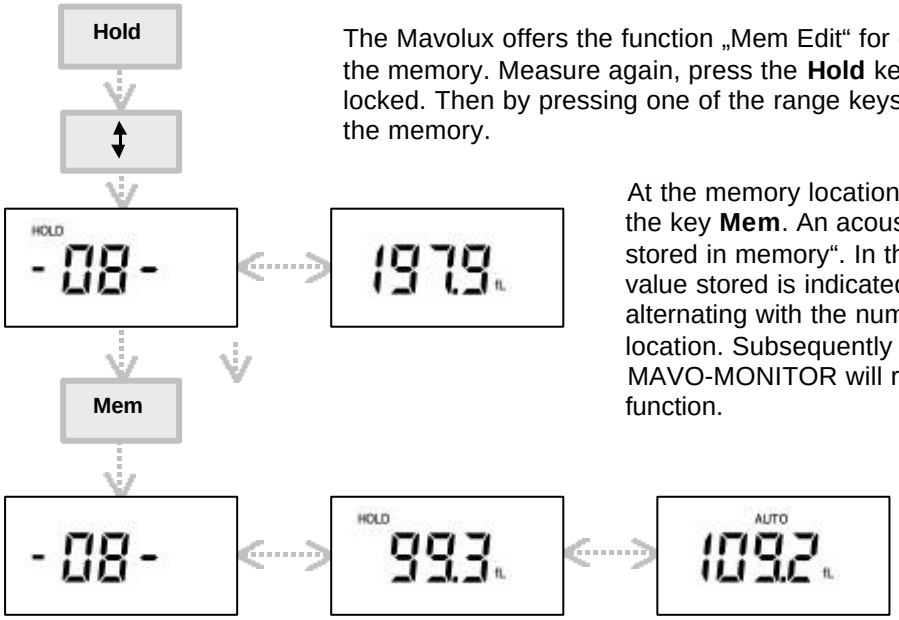
The function HOLD is the basic function for all the memory functions.

4.4.2 „Mem“ – Storing measurement value in memory



The measurement value to be memorized is locked by the **Hold** key in the display. By pressing the key **Mem** you will enter the value to be stored in the next free memory location. An acoustic signal confirms „value stored in memory“.
The display indicates the stored measurement value alternating with the number of the memory location for a few seconds. Subsequently, the MAVO-MONITOR will return to the measuring function. When the memory is completely filled, the display will show „FLL“.

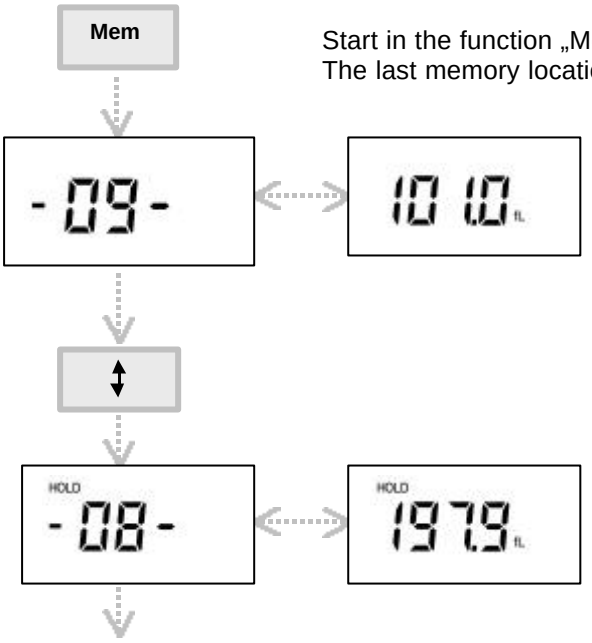
4.4.3 „Mem-Edit“ – Deleting a value in memory and entering a new value



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

At the memory location to be corrected press now the key **Mem**. An acoustic signal confirms „value stored in memory“. In the display the measurement value stored is indicated for a few seconds alternating with the number of the memory location. Subsequently the MAVO-MONITOR will return to measuring function.

4.4.4 „Mem Recall“ –Data memory Recall

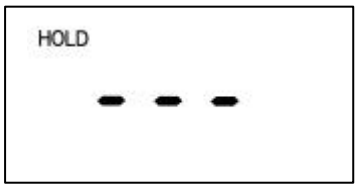


Start in the function „Measuring“ and press the key **Mem**.
The last memory location filled will be indicated first.

Press one of the range keys to browse through the data memory. The current memory location is indicated in the display alternating with the measurement value stored in the memory.
By pressing any one of the other keys or when for about ten seconds no further memory data will be recalled with the Range keys, the MAVO-MONITOR will return to the measuring function.

4.4.5 „Mem-Clear“ – Clear memory

The MAVO-MONITOR must be in function „HOLD“.
When pressing simultaneously the **Range** keys, you clear the complete measuring data memory. The cancelling is confirmed by an acoustic signal and three dashes in the display.



5 USB Port – Standard Software

The MAVO-MONITOR is equipped with a USB Port which allows the meter to be connected to a PC with the USB cable (supplied).
The CD Rom supplied with the MAVO-MONITOR contains, among other information, a Standard Software which allows you to start the PC operation immediately.
More details about the PC operational functions are also available on that CD-Rom.

6 Accessories

6.1 Standard Equipment

- Leather carrying case
- Battery
- Standard Software on CD-ROM
- USB-cable
- Instruction Manual

6.2 Optional Accessories

- **MAVO-SPOT** (ordering no. M494G) Attachment
  For precision spot metering of the luminance, non contact, at a distance from 34 cm to ∞, with measuring angle of 1 degree. The ambient light is being taken into consideration in the measurement. The light sensor is color corrected, i.e. its spectral responsitivity is adapted to the photonic vision of the human eye. (V λ) according to DIN 5032, Part 7, Class B. The
  MAVO-MONITOR with attached MAVO-SPOT is especially suited for inspecting and constancy testing of viewing monitors in medical imaging applications according to DIN 6868/57. Other applications: Projection screens, street surfaces and street lighting, illumination of tunnels and sport areas.
- **CALCULATOR,** calculating disk (ordering no. 5999V0380)
  For converting the value measured with the MAVO-MONITOR into photographic shutter speed/f-stop combinations based on the film speeds.

6.3 Calibration Certificate (Optional)

Calibration reference: Scientific Standard Lamps, type Wi 41G of the PTB (Physikalische Technische Bundesanstalt Braunschweig – National Standard Institute of Germany). Depending on how the instrument is being used we recommend a recalibration interval between 12 and 18 months. For this purpose please contact our Calibration Service Department (telephone +49 911 8602 172).

7 Servicing and Repairs

No special maintenance is required, if the MAVO-MONITOR is 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 Test Certificate, please send the MAVO-MONITOR to:

GOSSEN Foto- und Lichtmesstechnik GmbH
Thomas-Mann-Strasse 16 – 20
D – 90471 Nürnberg

8 Technical Data

Light Sensor Silicon photo diode with V (λ) filter
Classification Class B according to DIN 5032, Part 7 (CIE 69)

Measuring Rate 2 measurements per second

LCD display 50 mm x 25 mm
Read-out 7 segments, $3^1/_2$ digits, 13 mm
Overload signal „OL“ in the display

Memory for measurement values 100 memory locations, display indication „FLL“ = memory full

Port USB 1.1
Power Supply
Battery one 1.5 V alkaline – manganese cell, size AA (IEC LR 6) or suitable rechargeable battery
Battery life approx. 45 hours continuous operation with alcaline – manganese battery
Battery test Automatic display of „ „ symbol, when battery voltage drops below 1.0 Volts
External When the MAVO-MONITOR is connected to a PC, power will be supplied by the PC via the USB cable.
Weights and Dimensions
Housing Plastics
Dimensions Measuring instrument: 65 x 120 x 19 mm (2,56 x 4,73 x 75“)
(without carrying case)
Measuring Probe: 31 x 105 x 30 mm
Weight Measuring instrument with measuring probe approx. 265 g – without battery
Measuring probe Aperture: approx. 18.5 mm ∅
Sensor surface area: 6,5 x 6,5 mm
Length of cable approx. 1.5 m; available in 3m, 5m and 10 meters, on special order.

Electromagnetic Compatibility (EMC)
The MAVO-MONITOR meets the Specifications 89/336/EWG dt. 01.01.1996

Characteristics Mavo-Monitor *USB*

Meas. Quantity		Measuring Range in Candela/m^2 (cd/m^2)		in footLambert (fL)		Resolution in cd/m^2	Resolution in fL
Luminance	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...	19 990	1...	1 999	10	1

Most Important Error Limits Mavo-Monitor *USB*

Characteristics	**Admissible Error per DIN 5032 Klasse B**	**Maximum Error Mavo-Monitor *USB***
V(λ)-Matching (f_1)	6%	≤ 3.0%
Linearity (f_3)	2%	≤ 1.0%
Adjustment Error (f_{11})	1%	≤ 0.8%
Total Error (f_{ges})	10%	≤ 8.0%

CE

EG - KONFORMITÄTSERKLÄRUNG
DECLARATION OF CONFORMITY

GOSSEN

Dokument-Nr./ Document.No.: **103/2004**
Hersteller/ Manufacturer: **GOSSEN Foto- und Lichtmesstechnik GmbH**
Anschrift / Address: **Thomas-Mann-Str.16-20**
90471 Nürnberg

Produktbezeichnung/ Product name: **Leuchtdichtemessgerät/Luminance Meter**
Typ / Type: **MAVO-MONITOR *USB***
Bestell-Nr / Order No: **M504G / M506G**

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.

Gossen Foto- und Lichtmesstechnik GmbH is also a leading provider for other interesting light measuring instrumemts:

-**MAVOLUX 5032 C *USB***: Digital precision instrument for measuring the illuminance in lx or fc, classified acc. to DIN 5032, Part 7 and CIE 69 in Class C. Ideally suited for use in industry, trade institutes and inspection authorities, also for very high light intensities.

-MAVOLUX 5032 B *USB*: Digital precision instrument for measuring the illumenance in lx or fc, classified acc. to DIN 5032, Part 7 and CIE 69 in Class B. Especially wide measuring range and high sensitivity for inspection and certification, suited for checking emergency lighting, but also for very high light intensities.

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