GOSSEN

Spectral Photometry

DATA

M

MENU

$\mu W/m^2/nm$

cd

cd/m^2

lx

lm

MAVOSPEC BASE

WHAT'S THE COLOR OF SUCCESS?

Color Your Light the Way You Want It
Mavospec Base – Light Redefined

Light orchestrates space and determines how it effects the observer. Light generates an atmosphere of suspense, supports the impulse to buy, increases productivity, creates a sense of security or simply invites people to linger – just a few of the demands that have to be met through the successful use of light.

The development of LEDs with high luminous efficacy, and thus outstanding energy efficiency, has opened up new creative options for lighting design, but at the same time it represents a great challenge with regard to the achieved light effect.

Decisive Factors for Lighting Design

The emitted light spectrum of an LED has entirely different characteristics than those of previously utilized light sources. LED brightness and color vary due to the manufacturing process. Daylight, incandescent light bulbs and halogen lamps achieve the highest color rendering index of 100 – a value which can't be reached at the moment with LED lamps. In addition to this, various manufacturing lots of LEDs demonstrate distinct differences, so that even when LED lighting is used exclusively, blended light environments occur which can no longer be adequately evaluated by means of previously used measurements for the determination of light color and illuminance.

Successful Light Qualification

An extended measurement of light quality is becoming more and more important for the implementation of lighting concepts. Whereas with conventional lighting technology it has been sufficient in the past to check illuminance and luminance, today it's also necessary to take spectrum, chromaticity, color temperature, color rendering index and flicker into consideration.

The Mavospec Base ascertains all of the relevant factors of your light and provides you with the assurance that all of your requirements are being fulfilled. The compact, high-quality spectrometer qualifies your light with high levels of precision, reads out the results clearly and concisely at the color display and documents the measured values – day after day for all light sources.

USB 2.0   micro SD

IES TM-30-15 inclusive

Report	
E vis	46478 lx
CCT	2718 K
CRI Ra	80,6
TM30 Rf	82,2
TM30 Rg	94,2
Flicker Index	0,042
Flicker [%]	14,8 %
Flicker [Hz]	99,9 Hz

GOSSEN

WHAT'S THE COLOR
OF CURIOSITY?

Perfect Light for Every Requirement
Mavospec Base – Documented Security

The qualification of light is becoming a decisive factor for more and more industry sectors. The Mavospec Base provides you with precision support for your requirements – from individual light sources right on up to the efficient evaluation of lighting situations.

LAMP DEVELOPMENT & MANUFACTURING
Process monitoring and quality assurance by means of random samples and storage of ascertained values for evaluation and incorporation into test systems via open interfaces.

INTERIOR DESIGN, LIGHTING DESIGN
Selection and coordination of various light sources, verification of the results of planning programs such as DIALux.

MEDICAL TECHNOLOGY
Testing of illuminance and color rendering according to room classifications for dental treatment rooms and dental laboratories.

WHOLESALE AND RETAIL
Quality assurance by means of examination, verification, comparison and evaluation of the light and color quality of various light sources, and light sources from various suppliers.

ELECTRICAL INSTALLATION
Examination of supplied and installed lamps with regard to light and color quality, as well as for homogenous light color conformity.

HUMAN CENTRIC LIGHTING RESEARCH
Adjustment and examination of brightness and color temperature during the course of the day in order to determine the biological influence of light on people.

SHOP LIGHTING – Optimization of light in order to meet requirements for the presentation of goods in the foods retailing sector and for true-color presentation of textiles and leather goods.

WORKPLACE LIGHTING – Perfect color rendering for exacting demands placed upon color selection and color monitoring in the graphics and chemicals industries, for hair care and cosmetics, as well as for processing wood, ceramics, textiles, leather goods and jewelry.

PUBLIC LIGHTING – Assurance of standards-compliant lighting for streets and public areas during the course of renovation, as well as where lighting is changed over to LED lamps.

EXHIBITIONS, MUSEUMS, LIBRARIES – Checking for adequate lighting and color rendering. Evaluation of the spectrum with regard to spectral components which might cause damage.

STUDIO, STAGE AND FILM LIGHTING – Coordination of various light sources, white balancing, evaluation of color rendering.

MONITORS, PROJECTORS, LARGE-FORMAT SCREENS – Examination and calibration of color rendering, determination of displayable color space, color coordination for replacement parts.

MADE IN GERMANY

WHAT'S THE COLOR OF JOY?

Precision Measurement and Intelligible Qualification Mavospec Base – the Innovative Spectrometer

We developed the Mavospec Base in order to make precise and easy photometry possible for everyone – whenever and wherever you need it. All measured quantities which are relevant for light such as illuminance, correlated color temperature, color rendering index according CIE 13.3 and IES TM-30-15, color coordinates in accordance with various CIE standards, flicker, spectral power distribution, peak wavelength and dominant wavelength are determined for the measured spectrum and displayed such that they can be understood by experts as well as laypersons.

Mavospec Base – Developed to Optimize Your Light

INTUITIVE ONE-HAND OPERATION – With the help of the ring controller and just a few keys.

BRILLIANT COLOR DISPLAY – for perfect read-outs under all lighting conditions and lucid evaluations directly at the display.

OUTSTANDING MEASURED VALUE STABILITY – by means of a large temperature range resulting from an integrated temperature sensor and automatic temperature compensation of the dark current.

PHOTOMETRIC AND RADIOMETRIC CALIBRATION – with calibration report for verifiably perfect results.

INVESTMENT SECURITY – thanks to top quality made in Germany and a 3-year guarantee, as well as the ability to install updates via the USB port for new features and changes to the standards.

Documented Light Quality – for Reliable Production and Verifiable Results

The Mavospec Base stores measured values to the integrated SD card. These measured values are conveniently transmitted to the PC via the USB port. Evaluations can be conducted in a simple and adaptable fashion with the help of the included Excel sample reports including graphic visualization. Trouble-free incorporation into customer systems and applications is also made possible by the open interface protocol.
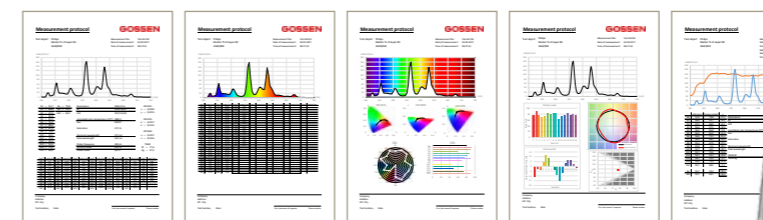
Simple Report Generation – The included Excel evaluation includes 5 standard reports which users can adapt to their own individual needs.

WHAT'S THE COLOR OF DESIRE?

Many factors determine how your light is perceived.

Spectral power distribution, color temperature, illuminance and other factors make light unique in each given situation. The Mavospec Base ascertains all relevant values, so that you can optimize your light for any specified requirements.

SPECTRAL POWER DISTRIBUTION – represents the radiant power of a light source for a wavelength or a waveband in the visible range. It provides us with information about color characteristics and can be used to compare the color temperature of different light sources. Information can be inferred from this regarding color rendering properties, because missing or attenuated portions of the spectrum result in color rendering errors. Abbreviation: SPD, unit of measure: mW/m²/nm)

COLOR COORDINATES – are a means of precisely defining a color, i.e. a color's chromaticity as specified by the coordinates of the CIE diagram. The human eye is equipped with sensory cells for the perception of the three primary colors, namely red, green and blue. Photopic curves for the standard observer were ascertained in 1931 by the CIE and indicate sensitivity for the individual wavelength ranges. Abbreviations: x, y [CIE 1931] / u, v [CIE 1960] / u', v' [CIE 1976]

ILLUMINANCE – indicates with how much intensity a surface is illuminated. It amounts to one lux when a luminous flux of one lumen illuminates a surface of one square meter. Luxmeters are used to measure illuminance at horizontal and vertical surfaces. However, illuminance does not indicate the brightness impression of a room, because this depends to a great extent on the room's reflective characteristics. As a rule, uniform light distribution is not achieved with normal lighting, for which reason specifications in the standards usually make reference to mean illuminance This value is calculated as the weighted arithmetic mean of all illuminance values in the room. Abbreviation: E, unit of measure: lux

COLOR TEMPERATURE – is a function which is used to quantitatively specify the respective color impression of a light source. The unit of measure for color temperature is degrees Kelvin (K). In concrete terms, it's the temperature whose light effect is most similar to the color to be described at uniform brightness under specified observation conditions. Abbreviation: CCT, unit of measure: Kelvin [K]

FLICKER – is the designation for fluctuation in the brightness of the light due to voltage fluctuation. The perception threshold for changes in luminance is a frequency-dependent quantity which indicates as of which relative change in luminance at a specified frequency perception takes place. These fluctuations have an impact on human health. A good LED driver smooths out voltage fluctuation and prevents flicker. The flicker value is a measure for the quality of the lamp or light fixture, and should be as low as possible. Abbreviation: F%

THE COLOR RENDERING INDEX – Ra is a measure of the color rendering properties of lamps and has a theoretical maximum value of 100. The higher the color rendering index, the better the color rendering properties of the lamp. Color rendering which is as natural as possible is achieved through the use of lamps with an Ra value of greater than 90. Ra is the arithmetic mean of the color deviation of the first 8 of 14 test colors according to DIN 6169. An extension to this is the color rendering index Re, which is calculated over all 14 test colors and the additional test color 15 (Asia Skin Color), which also takes into account saturated colors, leaf green and skin tones. DIN EN 12464 specifies the color rendering properties of lamps used to illuminate various types of rooms and activities.
Abbreviation: Ra

GAMUT AREA INDEX – is a measure of the vividness of the color representation and is used primarily in the evaluation of exhibition and museum lighting. It is an indicator of how well the octahedral surface defined by the eight test colors of the Ra in the color space is covered by the light source.

	low Ra	high Ra
low GAI	false and pale colors	correct but pale colors
high GAI	false and intense colors	natural colors

COLOR RENDERING IES TM-30-15 – is a new standard that makes use of 99 reference colors which are distributed over the entire color space. As a result, it makes use of significantly more colors and hues for the calculation of fidelity index Rf, which describes the same relationship as color rendering index Ra. Gamut index Rg provides information concerning color saturation and color shift, and is similar to gamut area index GAI used previously for the examination of color rendering.

IDENTICAL LIGHT COLOR
DAY AFTER DAY

Precision comes from experience, know-how and perfect calibration at regular intervals.

We are the experts for the measurement of light with decades of experience in our chosen field of endeavor. It's not without reason that the name GOSSEN stands for continuous innovation – in response to rapidly changing technologies, regulations and markets. And thus the Mavospec Base with intuitive user interface is one of the most accurate and reliable spectrometers in its class, and reflects the most up-to-date technology available on the market.

However, like all other precision light meters, this product also requires regular maintenance, recalibration and software updates in order to continuously fulfil performance capabilities within the stipulated tolerances and specifications.

Calibrated for the Most Exacting Demands

We recommend a calibration interval of 12 to 24 months for the Mavospec. Recalibration is conducted at the GOSSEN Light Lab with a tested and monitored optical table, whose traceability to the national standard maintained by the PTB (German Federal Institute of Physics and Metrology) is assured by means of a Wi41G standard lamp. The lab is subject to test equipment monitoring in accordance with DIN EN ISO 9001-9004, and is additionally accredited by DAkkS for illuminance. This assures top quality calibration with international recognition.

Model: MAVOSPEC BASE
Article number: M521G

PHOTOMETRY

Applications	Daylight, LEDs, halogen and more
Illuminance Evis	10 lx … 100,000 lx
Irradiance Ee	•
Luminous Efficacy Ratio LER	•
Color temperature CCT	1,600 K … 50,000 K (Duv ≥ − 0.1)
Color temperature difference relative to the Planckian locus Duv	(1,600 K ≤ CCT ≤ 50,000 K)
Color Rendering IES TM-30-15	Rf, Rg
Color rendering index CRI per CIE 13.3	Ra, Re, R1 … R15
Gamut Area Index GAI	•
Peak wavelength	•
Dominant wavelength per CIE 15	•
Color purity per CIE 15	•
Chromaticity coordinates [x',y'] per CIE 1931	•
Chromaticity coordinates [u',v'] per CIE 1976	•
Chromaticity coordinates [u,v] per CIE 1960	•
Flicker – Index	0.00 … 1.00 (f ≤ 400 Hz and Flicker % ≥ 2.5 %)
Flicker – %	2.5 % … 100 % (f ≤ 400 Hz)
Flicker – frequenzy	2 Hz … 6,000 Hz (Flicker % ≥ 2.5 %)
Configurable measured value display	•
Selectable Units Of Measure	lx / °C – fc / °F

MISCELLANEOUS

Mains power pack	100 - 240V (50/60 Hz) 0.15 A 5V, 1 A (DC) USB port
Power supply via USB port	•
Rechargeable battery	Li-Ion 3.7 V - 890 mAh
Automatic shutdown	Programmable for display + device
Rechargeable battery life	≥ 8 hours continuous operation
Charging time with power pack	1.5 h
Operating temperature	5 - 40 °C
Dimensions [H x W x D]	139 mm x 60 mm x 30 mm
Weight	150 g
Scope of delivery	Meter, sensor cover cap, V070A rechargeable battery, power pack, USB interface cable, aluminum case, neoprene sheath, carrying strap, calibration protocol, operating instructions in German and English, 4 GB micro SDHC memory card including EXCEL file with several protocol templates and operating instructions in German, English, French, Italian, Spanish as PDF, SD adapter

SENSOR TECHNOLOGY / MEASUREMENT TOLERANCES

Sensor	CMOS image sensor, 256 pixels
Diffusor light-entry surface	Φ 7 mm
Distance diffuser to surface to be measured	25 mm
Error limit - cos ike rating (f2')	≤ 3.00 %
Spectral range	380 - 780 nm (VIS)
Full width at half maximum (FWHM)	≤ 15 nm (typically 12 nm)
Physical resolution	~ 1.72 nm
A/D converter	16 bit
Wavelength reproducibility	± 0.5 nm
Integration time	automatic, manually 10 ms – 3,000 ms
Signal-to-noise ratio	1,000:1
Spurious light	-25 dB
Dark current compensation	automatic via temperature sensor
Measurement uncertainty illuminance*	± 3 %
Reproducibility chromaticity*	± 0.0005
Measurement uncertainty CCT*	± 2 %
Measurement uncertainty TM30*	± 1.5 %
Measurement uncertainty CRI*	± 1.5 %
Measurement uncertainty Flicker*	± 1.5 %

*Standard light type A, 2,856 K @ 1,000 lx

OPERATION, INTERFACES, MEMORY

Display	2.1" color TFT 320 x 240
Controls	3 keys, ring controller
Interface	USB 2.0
Interface protocol	open
Data storage	4 GB micro SD / 500,000 measurements
Memory mode	Manual, auto
Data format	CSV

OPTIONAL ACCESSORIES

Replacement battery	Li-Ion 3.7 V - 890 mAh Article number V070A

Subject to change without notice
• included function

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