Instrument Systems
KONICA MINOLTA Group

LGS 650

Goniophotometer for mid- to large-sized SSL products

We bring quality to light.

The features at a glance

- Type C goniophotometer with horizontal optical axis
- For samples up to max. 1300 mm diameter and 10 kg weight
- Accurate determination of the luminous intensity distribution and luminous flux
- Angular-resolved analysis of spectral and colorimetric quantities
- Data export in IES and EULUMDAT format

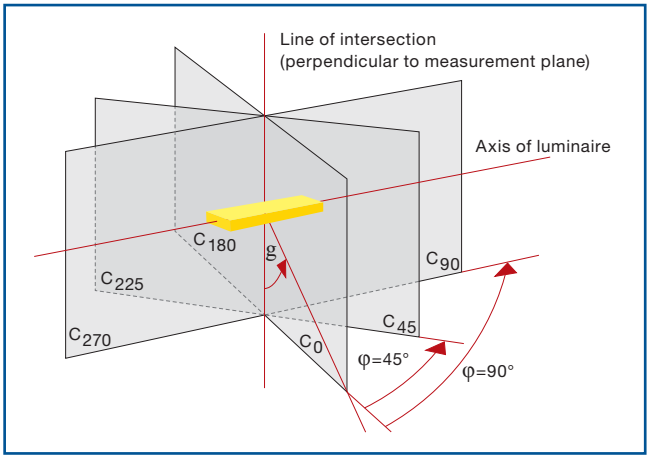
01 \\ Perfect for mid- to large-sized SSL light sources and LED modules

The LGS 650 Goniophotometer was developed for the analysis of angle-dependent spatial radiation properties from medium to large-sized SSL sources and LED modules. The test specimen is operated in a horizontal burning position and measurements can be taken at an angular range of ±160° in the gamma axis. The angular resolution of 0.01° means that very fine measuring grids can be recorded with a high level of accuracy and reproducibility. The LGS 650 is compliant with all the relevant specifications in conformity with CIE, DIN and IES standards.

Combined with a spectroradiometer from Instrument Systems, all spectral quantities such as color coordinates, color temperature and even color rendering index can be determined as a function of angle. C-plane measurements can also be carried out very quickly “on-the-fly” using the DSP 10 or DSP 200 Photometer. This provides an overview of the spatial light distribution for the test specimen very quickly. A comprehensive software package facilitates easy evaluation and reporting of the measured data. The measurement results can also be exported in standard file formats like IES and EULUMDAT.

The goniometer unit

The LGS 650 comprises the actual goniometer with a sample plate for fixing the test specimen and the LGS Controller that drives the stepper motor and the angle display. If a photometer is used, the LGS Controller also displays the measured values in candela or lux.



Definition of the Type C coordinate system.

The optical probe of the spectro-radiometer or the photometer head for taking measurements is placed outside the photometric distance and attached to a stray light tube adjusted to the measuring distance and the sample size. The measuring distance should be 10 to 15 times the diameter of the light source being tested.

The LGS 650 Goniometer rotates the test specimen in the gamma and C axes. The horizontal alignment of the CIE 121-1996 coordinate system facilitates a particularly compact test setup. Both axes can be operated simultaneously and can be moved smoothly and with minimal vibration even when the test specimen is subject to maximum load. The design features a highly torsion-resistant frame with high-precision gearbox bearings. This guarantees a high level of reproducibility for sample positioning of ≤ 0.1° for a load even with maximum sample weight of 10 kg.

Sample plate and electrical connection

The sample plate measures 100 x 100 mm² and has 2 x 2 size 6 grooves and 2 x M6 x 12 tapped threads.
This allows customer-specific specimen holders to be conveniently mounted on the plate with bolts. The sample plate is also provided with fitting bushes to ensure reproducible fixing.

Sample plate with sample connector.

LGS Controller.

The electrical sample connector is a compact component mounted between the C axis gearbox and the sample plate. It therefore swivels with the sample plate and allows the lamp or luminaire to be connected with short cables without any hazard of the cables becoming ruptured. The sample can be connected using safety banana sockets and plugs.

Power supply and mounting of samples

The LGS Controller drives the goniometer and is integrated in the goniometer base rack. Apart from accommodating the LSG Controller, the base rack offers additional space for e.g. power supply modules.

Instrument Systems has developed a turnkey solution to drive and measure the samples. A high-quality measurement device for recording electrical characteristics is supplied as well as AC power supplies in different classes.

The LGS SwitchBox connects the instruments integrated in the rack with the test specimen connector terminal on the sample plate. It also allows the connection of customer-owned power supplies and power meters to the goniometer.

The LGS SwitchBox offers the following functions:

- Easy to use interface to the sample terminal at the sample plate
- Connection and control of system-integrated power supply units and power meters
- Connection of customer-owned power supplies and power meters

The LGS 650 is designed to measure a great variety of samples. This ranges from retro-fit lamps to street lamps or LED tubes. A comprehensive range of accessories is offered to support an easy and versatile mounting of these samples.

A universal sample holder for mid- to large-sized LED modules and lamps, and a lamp holder for standard fittings of the type E10, E27, E40, etc. are supplied.

Sample holders for TEC test adapters of the LED-850 and LED-870 series are available. The test adapters facilitate the analysis of thermal properties of single LEDs, LED arrays and modules using minimum resources. The Peltier elements integrated in the test adapters permit adjustment over a wide temperature range from +5 °C to +85 °C.

02 \\ The full spectrum of measuring options

Depending on the specific task for precise measurements of SSL products, the relevant guidelines recommend to use the goniometer unit with a photometer or spectroradiometer.

CAS 140D spectroradiometer.

Spectroradiometric measurements

The LGS 650 is compatible with all spectroradiometers supplied by Instrument Systems. The CCD array spectrometers of the CAS series are ideal because they feature a very large dynamic measuring range and very short measuring times. The measurement system is supplemented with optical probes from the EOP series. They are calibrated together with the spectrometer in the ISO 17025 certified laboratories of Instrument Systems.

Spectroradiometers offer the distinct advantage that all the characteristics – radiometric, colorimetric and photometric – can be determined with maximum precision.

Photometric measurements

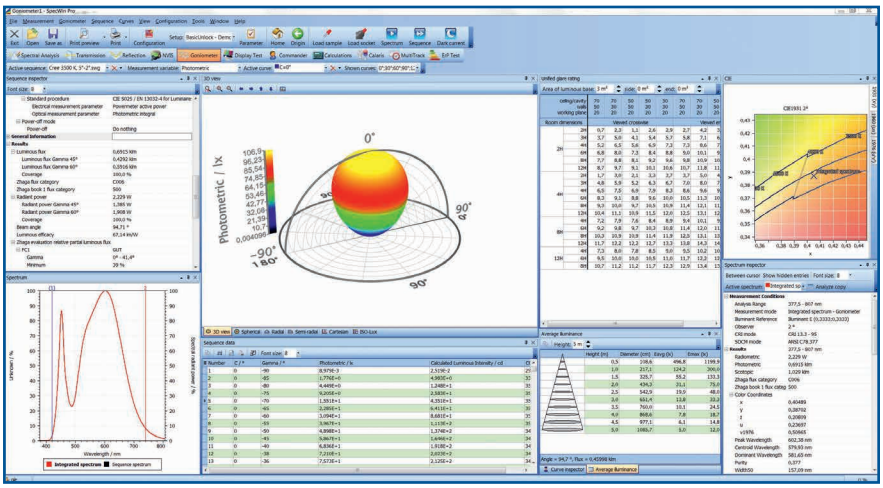
Instrument Systems also supplies very fast photometers for performing integral measurements. They are recommended for pure photometric measurements and for time critical test sequences.

The photometers are compliant with the highest class of accuracy in conformity with DIN 5032-7 (class L) and feature outstanding V(λ) correction (f_1'< 1.5 %) and very high linearity.

Combined with the LGS 650, the photometers allow “on-the-fly” measurements, meaning the measuring system records the light distribution while the goniometer is moving. The digital signal processing of the measurement amplifier ensures optimum adjustment of the integration and filter parameters during the recording. Thus, the overall measuring time is significantly reduced even at a high angular resolution. This saves valuable time in the daily laboratory routine.

DSP 200 Photometer with stray light tube on stand.

03 \\ Evaluation and reporting



Some highlights of SpecWin Pro features:

- IES TM-30-15 evaluations
- Unified Glare Rating calculations
- Average Illuminance Cone-Diagram
- Iso-Lux display with adjustable room settings
- Classification of energy efficiency according to EU regulations
- Zhaga evaluations

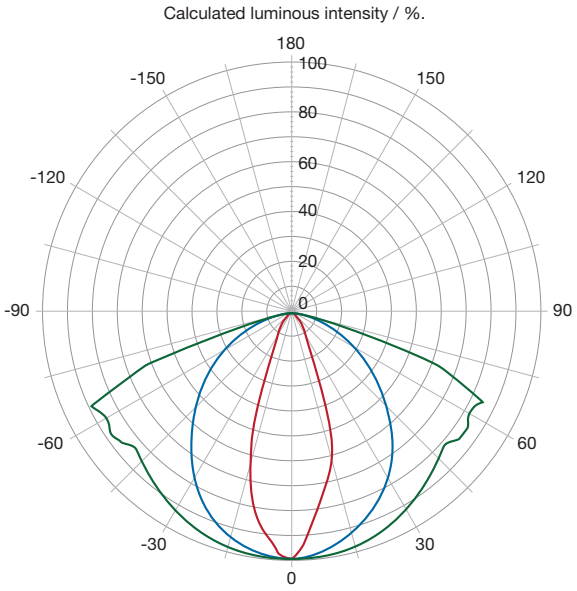
Control and evaluation in SpecWin Pro

The LGS 650 is operated via the goniometer module of the SpecWin Pro Software. The software routinely performs measurement sequences to record the spatial radiation pattern of the test specimen.
SpecWin Pro controls the power supply to the test specimen and records electrical data. Voltage, current, switch-on and burn-in procedure as well as the sequencing are storable presets and can be retrieved for repeat measurement functions.

Display options and output formats

The graphics window is the central element of the user interface of SpecWin Pro. This window displays all measurements. Six different display options are available for the spatial radiation pattern:

Radial display (luminous intensity distribution curve), semi-radial and cartesian view, and a two-dimensional spherical display with Isocandela lines and a 3D view.
All displays accept photometric, radiometric, colorimetric and spectral measured data for evaluation. The measured data obtained can also be exported in IES and EULUMDAT format for use in simulation programs.



Burn-in procedures

One of the major sources of error when it comes to goniophotometric measurements of SSL products is a wrong or insufficient burn-in of the test specimen. Internationally recognized measurement standards and methods, like CIE S025 or IES LM-79, account for this problem by defining special burn-in procedures. These procedures are sophisticated sequences of optical and electrical measurements over specific time intervals.
SpecWin Pro offers a push-button solution to this complicated but critical procedure by predefined routines. With a single command, the software performs a correct burn-in procedure and starts the goniometric measurement automatically after successful burn-in. This ensures a constantly high quality of the measurement in the lab, even when performed by a non-experienced user. For experts, the routines can be customized to adapt perfectly to customer specific needs.

Reporting

SpecWin Pro offers a powerful but easy to use function for generating custom test reports. A large variety of predefined subreports covering a specific field of interest e.g. measurement conditions or display options are available. By simply checkmarking the subreports of interest, the user can create a custom test report with a highly professional appearance within seconds.

For experienced user, the report manager also allows the definition of custom subreports and changing the overall look and feel of the test report.

04 \\ Our test laboratories – accredited quality

As a leading manufacturer of light measurement equipment we strive to ensure that you are able to place the greatest possible trust in our instruments. Our customers enjoy significantly greater certainty and guaranteed comparability of readings with the accreditation of our test labs according to DIN EN ISO / IEC 17025 with flexible scope of application of category III. This enables our customers to demonstrate the quality of measurements to any third party and ensures a long-term investment. Besides test procedures for photometric quantities, the company's test labs are also accredited to ISO 11664 for the measurement of colorimetric quantities. All standards used are directly traceable to the reference standard of the national laboratories PTB (Germany) or NIST (USA). The test certificates included with our measuring instruments depict details of the traceability chain.

05 \\ Service and support

We at Instrument Systems are setting a benchmark not only with our products. Our services secure the long-term value of your investment and guarantee optimum productivity over the entire period of use.

Our service offerings include the following:

- Engineering services
- Technical advice, also post-sales
- Re-calibration with certificate
- Instrument repair and hardware upgrade
- Software updates

06 \\ Technical specifications

Specification	Description
Equipment setup	Stable base with integrated LGS Controller
19” module slots	14 U in height; 10 U occupied, 4 U free
Height	1732 mm
Width	502 mm
Depth	727 mm
Weight	approx. 101 kg
Height of the optical axis	1672 mm ± 5 mm (adjustable)
Goniometer	
CIE goniometer type	Type C with horizontal optical axis
Driver	Stepper motors
Angular range C axis	-70° to + 250° with limit switches (0° to 180° used for C-plane measurements)
Angular range γ axis	±160° with end switches
Angular resolution	0.01°
Reproducibility C axis	≤ 0.1° (at max. sample load)
Reproducibility γ axis	≤ 0.05° (at max. sample load)
Angular speed C axis	16 speeds selectable from 2.5 °/s to 36 °/s
Angular speed γ axis	16 speeds selectable from 2.1 °/s to 34 °/s
Clear width C axis – swivel arm	670 mm
Alignment laser	Integrated in the center of rotation of the C axis, 1 mW, laser class 2
Machine safety	Emergency stop switch on the goniometer and the LGS Controller, safety strips on the swivel arm
Sample table	
Mounting plate	100 x 100 mm² with 2 x 2 grooves size 6 (inside dimension 50 mm) for slot nuts size 6 – M5 or T-bolts M6; also 2 tapped threads M6 x 12 (inside dimension 80 mm)
Maximum sample size	Maximum extension is 670 mm measured from the center point of the mounting plate, e.g. 1320 x 100 mm² or 920 x 920 mm² (in each case for symmetrical mounting)
Maximum sample mass	10 kg (near symmetrical weight distribution)
Electrical sample connection	2 safety banana sockets for specimen power supply; 2 safety banana sockets for probe cable; 1 protective conductor; max. 300 V, 10 A
LGS Controller	
Functions	Driving the stepper motors for the goniometer; display of the angle positions; optional display of measured values for the DSP 10 photometer
Interfaces	RS-232-C for connecting a PC; CAN bus for DSP 10 photometer and RecoCAN remote control
Power supply	230 VAC (optional 115 VAC)
Power rating	120 W
LGS Motion Driver	
Functions	Power electronic for the goniometer, main switch for goniometer power supply, start button to unlock gears, emergency stop switch, Laser on/off switch, connection of RecoCAN remote control
Interfaces	Circular connector for stepper motors, CAN bus for LGS Controller, Sub-D for control signal of goniometer, power socket for power supply of LGS Controller
Power supply	230 VAC (optional 115 VAC)
Power rating	720 W

Instrument Systems is working continuously to develop and upgrade its product range. Any technical changes, mistakes and printing errors do not form grounds for claiming compensation for damages. Our General Terms and Conditions are applicable in all other respects.

07 \\ Ordering information

Order number	Description
Goniometer	
LGS650-100	LGS 650 Goniometer with stable base; 2-axes goniometer in type C configuration with horizontal optical axis; integrated 19” rack for LGS Controller (includes stepper-motor control and space for another 2 modules); without photometer or spectroradiometer
Options	
LGS650-300	Optional 115 VAC power supply unit for LGS 650
LGS650-330	Optional module LGS SwitchBox for electrical supply and taking measurements of the test specimen
LGS650-550	Universal sample holder for mid-size LED modules and lamps
LGS650-570	Standard lamp holder for E27
Accessories	
LGS-415	Stand with mount for a stray light tube; height of the optical axis approx. 1600 – 1800 mm (variable)
LGS-440	Stray light tube with ± 4.5° field of view; for measuring luminous intensity distribution in the far field; for optical probe EOP-120 or photometer head
LGS-450	Stray light tube with ± 45° field of view; for measuring luminous flux in the near field; for optical probe EOP-120 or photometer head
LGS-470	Mobile cart for spectroradiometer
Photometer	
LGS-610	DSP 10 Photometer comprising - PMH-100 photometer head (10 x 10 mm² detector aperture), class L in conformity with DIN5032-7, EN-DIN13032-1, CIE69 - Measuring amplifier with digital signal processor for connecting to LGS Controller - Factory calibration certificate and certificate of V-Lambda correction of the detector; incl. mounting plate for stand
Spectroradiometer with optical probe	
CAS140D151U1A	CAS 140D Compact Array Spectrometer; Model VIS; 360 – 830 nm; 1024 x 128 pixel back-illuminated CCD detector; 2.2 nm spectral resolution (100 µm slit); 0.5 nm/pixel data point interval
EOP-120	Optical probe for irradiance; medium light throughput and cosine correction from 190 – 1700 nm; adapter for fiber bundle
OFG-414	Fiber bundle with ferrule; 1.5 mm diam., 2 m long; 380 – 1600 nm
PLG-411	Fiber bundle adapter; 300 – 2200 nm, optimized for VIS
CAL-100	Calibration of irradiance; wavelength range UV, VIS or IR
Software	
SW-130	SpecWin Pro spectral software for Windows; support of all spectrometers, goniometers and positioning systems.

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