

# PRODUCTS & SOLUTIONS

Excellent Light Measurement Technology



# Working together for a perfect solution!

Are you looking for a partner in light measurement technology who can offer you not only first-class systems, but also comprehensive advice and support? Someone with whom you can react flexibly to the growing technical requirements?



As market leader, Instrument Systems has always stood for premium quality and problem-solving expertise in light measurement. For over 35 years we have specialized in high-quality spectrometers, photometers, imaging colorimeters, IR cameras and innovative complete systems that are developed and manufactured exclusively in Germany. We are actively involved in standardization committees and professional associations such as DIN and CIE. We cooperate closely with leading metrology institutes and participate in the development of international standards in light measurement technology.

Our high-precision measuring instruments and all-round solutions are indispensable worldwide in the automobile and aviation industries, LED and VCSEL manufacturing, the consumer electronics field and in research and development. The key factor behind our success and strong growth over many years is a multitude of satisfied customers.

As a subsidiary of Konica Minolta we have access to a reliable global network, and at the same time we benefit from the flexibility of a successful medium-sized enterprise.

On the following pages you will learn more about the broad product portfolio in our core sectors:

- » Spectrometers and software
- » Display measurement technology
- » LED and VCSEL measurement technology
- » SSL measurement technology and photometry

**We understand your measuring tasks and will help you find a solution!**



# Spectrometers and Software





## // CAS 140D Array Spectrometer

The CAS 140D is already the 4th generation of the CAS 140 series from Instrument Systems that has been extremely successful worldwide. As a new reference in light measurement technology it assures the highest degree of measurement accuracy at high and low light intensities, with efficient stray light suppression and wide dynamic range. Automatic accessory recognition facilitates the flexible use in a wide range of spectroradiometric and photometric measurement tasks. For wavelengths in the infrared, broadband and narrow-band CAS models are available.



## // CAS 120 Array Spectrometer

The CAS 120 is particularly attractive for price-sensitive applications such as in LED production or quality assurance. It is reliable and robust, and satisfies the highest standards in measurement accuracy and stability. It is thus available for a broad range of uses.

The high-resolution version CAS 120-HR measures narrow band emission sources, e.g. laser diodes, and enables extremely high spectral resolution in shorter measuring times for unrivaled short light pulses in the laboratory and production (also available as a CAS 140CT-HR version with cooled CCD).



## // CAS 125 Array Spectrometer

The CAS 125 is a highly reliable and robust model with a small footprint and very short integration time down to 10  $\mu$ s. It is based on a CMOS sensor with thermal stabilization and features a recipe mode for ultrafast measurement sequences, perfect for price-sensitive applications as LED production testing and quality assurance.



## // SpecWin Pro Spectral Software

The SpecWin Pro control and evaluation software automatically calculates all optical parameters from the measured spectra and offers numerous measurement functions, processes and display options for the measured values. The modular setup guarantees a high level of user friendliness through separate application windows for the different measuring modes. The SpecWin Light version with a reduced range of functions is also available as lower cost alternative.

# Display Measurement Technology





## // LumiCam Imaging Colorimeters

The imaging colorimeters of the LumiCam series 2400B and 4000B deliver spatially resolved brightness and color parameters of displays, display symbols, lamps and luminaires with a high degree of precision in a matter of seconds. The 2400B/4000B series with motorized lenses was designed for automotive test applications and permits comprehensive analyses and evaluations with high resolution. With their innovative 6-filter technology, the LumiCam Advanced models have set new standards in color measurement accuracy, in particular for narrow band light sources.



## // DMS Display Measurement System

The turnkey systems of the DMS series have set global standards in the determination of viewing angle-dependent electro-optical characteristics of displays. They are based on multiple-axis goniometers and permit comprehensive characterization of the luminance, contrast and color characteristics of displays from different viewing angles under variable electrical driving conditions and sample temperature control.



## // LumiTop Display Measurement System

As a 3-in-1 display measurement system, the LumiTop 4000 combines an RGB CCD camera and a flicker-diode with a high-end spectroradiometer from the CAS series. It enables 2D measurements with unprecedented precision and minimum measuring time, and is thus ideally suited to use in display production lines and in-process quality controls, using a broad variety of different lenses. A special AR/VR periscopic lens measures near-eye displays with absolute photometric accuracy. Within our new LumiTop X series the X150 model offers up to 600 MP per color channel for subpixel analysis whereas the X20/X30 models will solve even demanding low luminance challenges.



## // LumiSuite Software

LumiSuite is a comprehensive software for image-resolved measurements with LumiCam and LumiTop devices as well as for our VTC cameras for VCSEL measurement. It comes with a user-friendly GUI for laboratory applications and an SDK for integration in production applications for all analysis needs.

# LED Measurement Technology from UV to IR







### // ISP Integrating Spheres for LEDs

The determination of radiant flux or luminous flux of LEDs with the aid of integrating spheres is one of the most important applications in LED measurement technology in the spectral range from UV to IR. The small integrating sphere models of the ISP series with diameters ranging from 75 mm to 250 mm are optimally tuned to applications in LED production and the laboratory and come with different coatings, optimised for the respective visible or non-visible spectral range.



### // LED Test Sockets and TEC Adapters

Instrument Systems offers a broad range of LED test sockets to match the extensive measurement accessories. Their design enables fast replacement of LEDs and saves valuable time in day-to-day lab work due to their versatile use on all measuring devices. Reproducible alignment and reliable electrical contacting ensure error-free measurements. Developed specifically for high-power LEDs, the LED-850 series with active TEC cooling is available.



### // LED Optical Probes

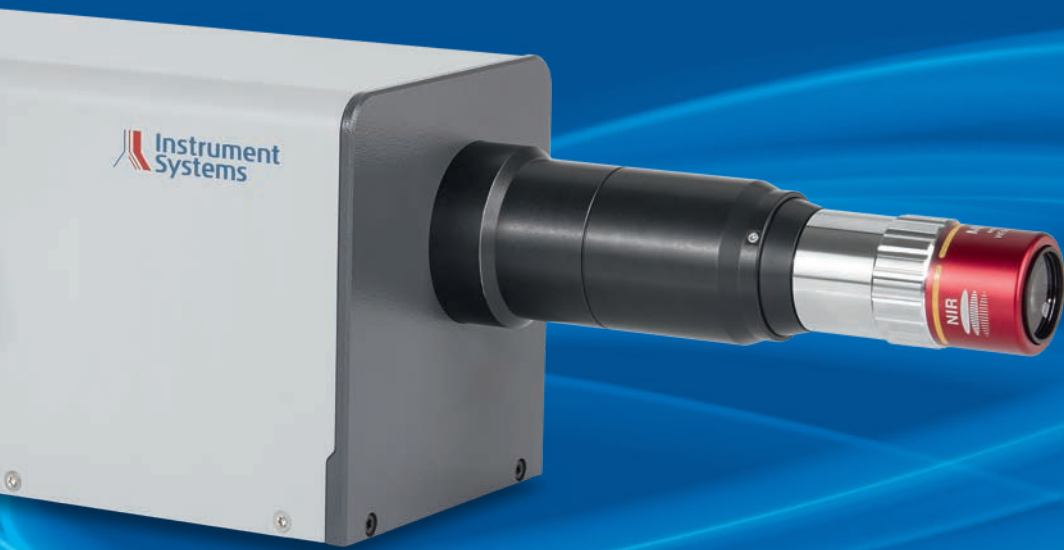
Instrument Systems offers the LED optical probes of the LED 4xx series for the correct measurement of LED luminous intensity (averaged LED intensity ILED-B acc. to CIE 127). Their laboratory versions feature a clamping mechanism for mounting an LED test socket.

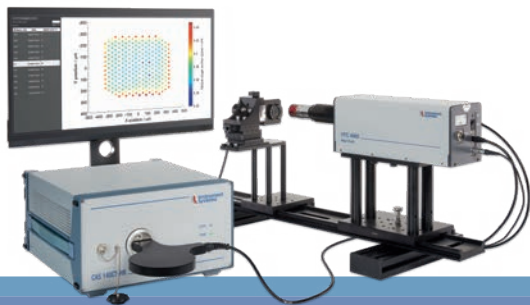


### // LEDGON Goniophotometer

The LEDGON records the angle-dependent spatial radiation properties of LEDs and small LED modules as well as for VCSEL far-field measurement. When combined with a spectroradiometer it can also measure color coordinates or color temperature as a function of angle. The compact desktop enclosure shields it from disturbing ambient light and it can thus be used in a bright laboratory environment.

# Measurement Technology for IR Emitters/VCSEL/Laser





### // VCSEL Test Camera for 2D Near-field Analysis

The VTC 4000 IR measurement camera has been designed for the ultrafast, precise 2D analysis of VCSEL arrays. It has a unique one-shot measurement capability of polarisation characteristics, total power and other relevant parameters simultaneously for the single emitters of the VCSEL array. It is available in two versions: Without fiber output, for determining power, polarization and spatial radiation properties of single emitters and with fiber output, for additional analysis of wavelengths with a high-resolution spectroradiometer.



### // VCSEL Test Camera for 2D Far-field Analysis

The VTC 2400 is a SWIR far-field camera for beam profiling, hot spot detection and eye-safety calculation ( $2^\circ$ ) of VCSEL. It comes with a transparent screen, optionally delivered in a lightproof housing. This solution of the VTC 2400 is suitable for fast and reliable production testing of VCSEL as well as of other laser diodes and IR-LEDs.



### // PVT Pulsed VCSEL Testing

The PVT 100/110 is an all-in-one VCSEL test system for the time-resolved measurement of nanosecond pulses. Due to the use of fast photodiodes, it allows power measurement and characterization of nanosecond pulses, fast acquisition and evaluation of all resulting data streams.



### // LIV Test System for Laser Diodes

The LIV test is a fast and simple method of determining the key performance parameters of laser diodes. LIV test systems usually consist of photodiodes, integrating spheres and source-measure-units (SMUs). Our solution for the optical characterization of laser diodes includes also a spectroradiometer to determine additional spectral properties of the laser diodes such as peak wavelength and FWHM widths. The software application SpecWin Pro supports the characterization of laser diodes by integrating and precisely synchronizing all measuring instruments, as well as numerical and graphical analysis of the data.

# SSL Measurement Technology and Photometry





### // ISP Integrating Spheres for SSL

All Instrument Systems integrating spheres have a lateral measurement aperture for performing measurements in the  $2\pi$  configuration. The larger models with diameters of 500 mm, 1 m and 2 m can also be completely opened. Extensive accessories such as the sample stage and flexible lamp holders permit the precise positioning of the test object at the center of the sphere, so that measurements in the  $4\pi$  configuration can also be realized.



### // LGS Goniophotometer for SSL

The LGS 350, LGS 650 and the LGS 1000 can be used to characterize all LED and SSL products with regard to their angle-dependent properties. In combination with a spectroradiometer, besides the photometric data all spectral parameters such as color coordinates, color temperature and color rendering index can be determined with a high degree of precision.



### // Luminous Flux Integrator/Positioning Correction

Our accessories for the LGS 1000 goniophotometer system satisfy all measurement requirements for modern light sources. The luminous flux integrator measures test specimens with a diameter of up to 200 mm in their burning position according to CIE S 025, EN 13032-4 and IES LM-79-2008. The positioning correction permits measurement of the relevant key indicators independent of the burning position, even in the case of larger test specimens. By the so-called auxiliary photometer method it guarantees conformance to the current standards.



### // DSP Photometer

The DSP photometers from the Instrument Systems' Optronik line is suitable for "on-the-fly" measurements in combination with all goniometers from Instrument Systems. The devices offer outstanding sensitivity and stability, so that extremely low irradiance can be precisely measured. They cover all measurements of pulse-width modulated light sources and all applications in the automotive, traffic and signaling fields.

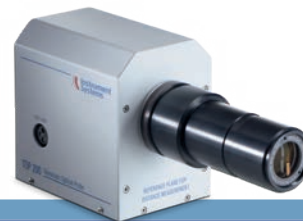
# Further Accessories





### // ACS 586/587 & ACS 570 LED Calibration Standard

ACS LED advanced calibration standards work with a thermally and electrically stabilized high-power LED. ACS 570 is designed for averaged LED intensity (ILED<sub>b</sub>), and luminous and radiant flux. ACS 586/587 are new, highly stable LED luminance standards which deliver reference values for luminance. They are used for the specification of color coordinates and color temperature, and for the testing of luminance meters on both a filter and spectroradiometric basis. Instrument Systems measuring instruments can be simply and reliably checked, and the photometric absolute value can be instantly recalibrated.



### // TOP 200/150 Telescopic Optical Probes

The TOP 200/150 telescopic optical probe is based on Pritchard optics with an integral view-finder camera. In combination with a spectrometer from Instrument Systems, the device permits precise spot measurements of radiance and luminance, as well as the chromaticity of displays, panel graphics and other light sources. A multimode fiber is used to guide the light radiation from the TOP 200/150 to the spectrometer.



### // EOP Optical Probes

A range of different optical probes is offered by Instrument Systems for the measurement of irradiance and the general coupling of light into the spectrometer. They incorporate a diffusor for scattering incident light that determines the respective light throughput, the degree of cosine correction and the spectral range. The ISP 40 optical probe achieves optimum cosine correction with a broad spectral range.



### // ISP 150 for Transmission and Reflection

The Instrument Systems ISP 150 integrating sphere is ideally suited to determining the degree of transmission and reflection of diffusely scattering samples. Its flexible setup enables the ISP 150 to be quickly and simply reconfigured for the different measurement geometries. For measurement geometries with diffused light a halogen light source is attached directly to the integrating sphere. In contrast, illumination at an 8° angle of incidence is achieved using an external light source that is connected by optical fiber to the collimation optics.

# Automotive Exterior Lighting Measurement







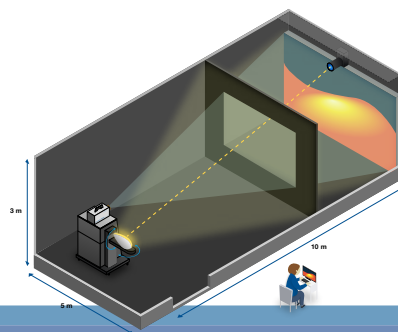
## // AMS Goniophotometer for Automotive

The AMS series of high-performance CIE Type A goniophotometers includes models for measuring heavy duty vehicle lamps as well as for large or medium sized lamps. All AMS devices guarantee accurate and reliable measurement results for photometric, spectroradiometric and colorimetric quantities. In conjunction with a DSP 200 photometer they measure pulse-width modulated light sources even in very short duty cycles.



## // RMS Retroreflectometer

The RMS 1200 measures retroreflection values with precise color temperature control to standard illuminant A for all types of automotive retroreflectors. The automatic dark current compensation ensures that even small measurement values are captured accurately and reproducibly.



## // AMS Screen Imaging System

The AMS Screen Imaging System consists of a combination of the LumiCam imaging colorimeter with an established AMS far-field goniophotometer and projection screen. It realizes 2D spatially resolved measurement of the light distribution of all possible lighting scenarios for modern HD, ADB or matrix/pixel headlights. In a fraction of the time needed for traditional measurement.



## // LightCon Laboratory Software

LightCon is a modularly expandable software for the compliance analysis of automotive lamps. It determines all photometric and colorimetric properties of directed radiation sources and comes with an extensive regulation database for UN-ECE, SAE and FMVSS108 conformity analysis. Conformity assessments can be prepared at any time to the currently applicable standards and as photometric test reports with pass/fail analysis.

# We bring quality to light. Worldwide.

Instrument Systems is represented in Germany and worldwide: Our company headquarters with Development, Manufacturing, Marketing and Sales is located in Munich. A further development and production site is located in Berlin as an excellence center for specific product lines. In addition to these locations, we maintain a comprehensive service and support network that also benefits from the resources of the Konica-Minolta Group.

A multitude of renowned international companies and leading research institutes all over the world place their trust in Instrument Systems for the characterization and qualification of their products. Our main concern is to support them in the best way possible with expert advice and high-precision measurement systems.

In Germany our customer support takes place through direct sources, and in other countries through a global network of representatives. Our sales partners have a high level of technical expertise and are a competent local point of contact for all questions and enquiries. Together with our qualified sales engineers in Munich and Berlin, they will find the right solution for all measurement tasks worldwide. Interdepartmental cooperation within the company ensures that our customers receive comprehensive technical support at all times – both before and after the purchase.

Instrument Systems – that means innovative strength, quality and reliability, customer proximity and professional advice.



# References (excerpt)

## **Display measurement technology**

Airbus  
Audi  
Bosch  
BMW  
Continental  
DENSO  
LG Electronics  
Magneti Marelli  
Panasonic  
Samsung  
Sharp  
Sony  
The Boeing Company  
US Air Force/Navy  
Valeo  
Volkswagen Gruppe  
ZF

## **Spectroradiometry and photometry**

3M  
Carl Zeiss  
Giesecke & Devrient  
Hella  
ITRI Taiwan  
KRISS Korea  
L'Oréal  
Metas  
NIM China  
NIST USA  
PTB Deutschland  
Roche Diagnostics  
Unilever Research  
BASF

## **LED measurement technology**

Edison  
Epistar  
Everlight  
Lextar  
LG Innotek  
Lite-On  
Lumens  
Nichia  
ams Osram  
Lumileds  
Samsung  
Sanan Optoelectronics  
Seoul Semiconductor  
Sora

## **SSL measurement technology**

CEPREI Calibration Testing Center  
Fraunhofer Gesellschaft  
GE Lighting  
IKEA  
Ledvance  
ams Osram  
Philips Lighting  
SGS  
TCL Corporation  
Trilux  
TÜV  
Vossloh Schwabe  
Zumtobel





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