opsira

CBS INC.

PRODUCT CATALOG

CBS INC. opsira

PRODUCT CATALOG

CBS Inc.

CBS Inc. is proud to be partnered with opsira, and represent their optical measurement systems and products used in general lighting, automotive, signal and medical lighting industries. For 20 years, opsira has been a leading company in the development of innovative and custom-made measurement systems for R&D support, light lab measurements, and field work. Supporting a vast range of engineers in the field of photometry, spectrometry, and goniometry.

Contact us at **sales@technixbycbs.com** for more information.

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01 ROBOGONIO

The multifunctional goniophotometer

Combining various advantages of different conventional goniometer types into one device, the robogonio enables flexible measurements of a number of angle-dependent photo and radiometric parameters.

The solid 6-axis construction of the goniometer supports the positioning of the light sources and luminaires to be test-ed as well as the manipulation of their angles with high precision and reliability.

The robogonio is able to concretely measure luminous intensity and radiant intensity distributions (EULUMDAT, IES etc.), color distributions as well as luminance distributions (glare, UGR). Near-field goniophotometric measurements to generate ray data for example are also possible.

OVERVIEW.

Type	mrg-4	mrg-8	mrg-12	mrg-18	mrg-26
Maximum lifting capacity* [kg]	4	8	12	18	26
Weight [kg]	52	160	245	245	665
Work envelope radius [mm] approx.	900	1,420	1,610	1,610	2,033
Position repeatability [mm]	±0.03	±0.04	±0.04	±0.04	±0.06
Highest measurement resolution [°]	0.01	0.01	0.01	0.01	0.01
Angle repeatability [°] [of up to]	±0.005	±0.005	±0.005	±0.005	±0.005

*Test pieces with high mass moments of inertia (e.g. very long test pieces) can lead to a reduction of the payload.
**Further models with up to 1,000 kg lifting capacity can be supplied.

Type	mrg-54	mrg-80	mrg-100	mrg-160	mrg-280**
Maximum lifting capacity* [kg]	54	80	100	160	280
Weight [kg]	665	1,058	1,049	1,059	1,120
Work envelope radius [mm] approx.	2,033	2,696	2,496	2,496	2,496
Position repeatability [mm]	±0.06	±0.06	±0.06	±0.06	±0.06
Highest measurement resolution [°]	0.01	0.01	0.01	0.01	0.01
Angle repeatability [°] [of up to]	±0.005	±0.006	±0.006	±0.01	±0.02

Detector mountings

Wall, floor, ceiling
or rail system mounting.

Measurement data

Depending on the configuration: luminous intensity distribution (LID), luminous flux, colorimetric data (COA), luminance, glarerating, ray data, etc.

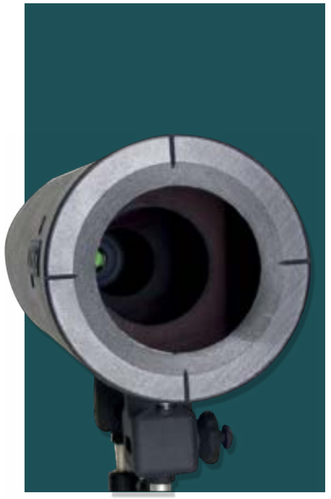
Power supplies

A number of high-quality DC and AC lab power supplies that can be controlled directly from the software are available with robogonio.

ROBOGONIO CONFIGURATION

opsira offers multiple configurations
and add-ons plus accessories.

Photometer and auxiliary photometer.
Flexible and powerful.
frc'3.



The High-End-Photometer.
Highest precision. Quick scans.
frc-f-l

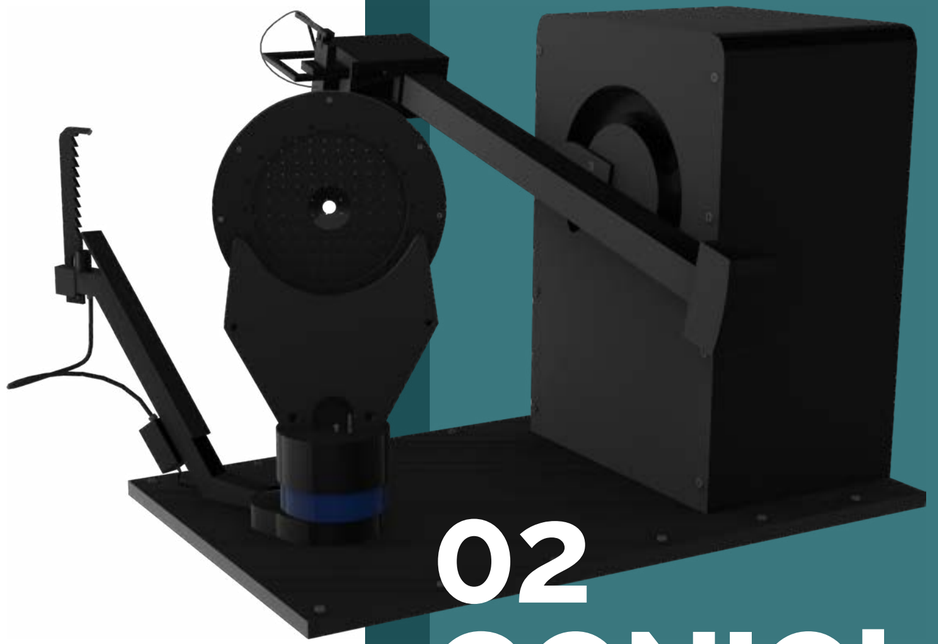
The spectroradiometer.
Complete solution for light and colour.
spr'3.

The spectrometer.
Quick and extensive.
spec'3.

The luminance camera.
High dynamics and flexibility. luca.

The colorimetry camera.
Luminance and colour distribution.
luca' color.

CONFIGURATION



02
GONIO'2PI

The state-of-the-art
and versatile measurement system

GONIO'2PI

gonio'2pi enables the professional and precise measurement of light source and luminaire characteristics (source imaging goniometer) as well as the scatter behavior (BSDF measurements) of materials and surfaces combined with very high measurement dynamics.

The goniometer is available in a source imaging (si) configuration, a scatter measurement configuration (bsdf) and in a complete version combining both approaches. Si can be easily upgraded to bsdf or vice versa at a later stage.

Compared to similar devices the opsira goniometers benefit from their very robust construction paired with a very high precision in the mechanical setup and from the reliable concept of zero backlash drives.

GONIO'2PI

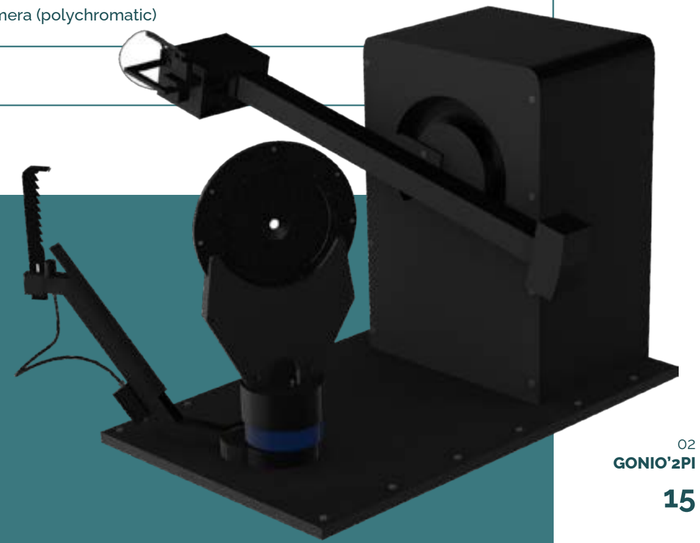
Type	si Version	bsdf Version
Dimensions	L 1500 mm x W 875 mm x H 2070 mm*1	
Total base dimensions	L 2215 mm x W 875 mm (approx. 2 m^2)*1	
Dimensions of switchboard	L 600 mm x W 550 mm x H 1300 mm	
Weight	approx. 350 kg (gonio)*1 - 100 kg (switchboard)	
Distance	700 mm and typical 850 mm for XL version	
Angular resolution	10-4 degrees internal, 10-2 degrees external*2	
Detectors	luca luminance measurement camera system	
Dynamics	12 Bit / 18 Bit*3	approx. 11 decades*4
Further detectors	spec'3 / spr'3 / frc'3	
Spectral weighting	high-quality V(λ)	
Light source		White light / Diode laser
Spatial deviation	≤0.03 mm	

*1 XXL version has larger dimensions / *2 Axes 1 to 3. / *3 14, 16 or 18 Bit in HighDyn mode by multiple exposure. / *4 3.5 mit PMT and approx. 8 with ND-filter wheel.
Changes are possible depending on the system configuration.
Variations to the technical data may occur due to the permanent improvement and development of our measurement systems.

CONFIGURATIONS.

Name	Type
-f	Goniophotometer (far field)
-spr	Spectroradiometer
-si	Light source measurement camera (near field)
-sic	Light source measurement camera (polychromatic)
-bsdf	Scattered light configuration

Extended version for the measurement of large luminaires*3
Example: gonio'2pi-sic-spr



INTEGRATING SPHERES

The flexible integrating spheres series

03

A well-stocked selection of accessories is available for the most flexible use possible for the various applications.

Uku series integrating spheres enable the fast and easy setup for measurements of the radiant power and the luminous flux of light sources as well as the reflection or transmission of materials.

The uls series models are used as a homogeneous light source – controlled or with a fixed light source. The integrating spheres of the uku series with a diameter of up to 240 mm are table top devices.

Larger models are supported by a solid frame. All models are made of high-quality and compact aluminum. A well-assorted selection of accessories enables the highly flexible use of the various integrating sphere models. Fast setups generating reliable measurements, is one of the strengths of the uku series.

The flexible integrating sphere series uku / uls

SPECIFICATIONS

Sphere material	Aluminum
Internal coating	$BaSO_4$, further coatings on request
Reflection factor	> 93 %
Port fraction (standard configuration)	f < 1% of the overall surface
Sphere factor (depending on model)	M about 8,6 – 12,2

UKU MODELS

uku120, uku240, uku315, uku500, uku800, uku1000, uku1600

APPLICATIONS

Measurement of the total luminous flux (4pi and 2pi)
Measurement of the integral spectral distribution and the color values
Measurement of the specular and diffuse reflection and transmission
Measurement of the luminous flux efficiency in lm/W (power efficiency ratio)
Measurement of the luminaire light output ratio in %

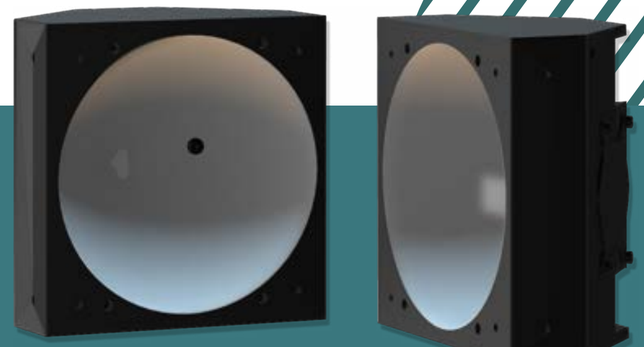
ACCESSOIRES

- FSMA port lock cover plate with fiber connection
- Auxiliary light source
- frc'3 photometer
- spec'3 spectrometer
- Fixing claw frc'3
- Fixing claw f
- Temperature and humidity sensor
- Power measuring device
- Port lock cover plate against dust and light
- Calibrated auxiliary light source
- spr'3 spectroradiometer
- luca'lux luminance measurement system
- Fixing claw spr'3
- Sample platform for the positioning of samples
- Optical bench outside the integrating sphere
- High-quality, programmable laboratory power supply

UKU SERIES

Integrating Sphere

UKU120



SPECIFICATIONS

Sphere diameter	120 mm
Internal coating	BaSO4
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/45 20 mm
Diameter Port 2	@ 90/-45 20 mm
Diameter Port 3	@ 90/135 20 mm
Port fraction f	< 0,7 %
Sphere factor M	about 11,5
Dimensions (Width x Depth x Height)	126 x 130 x 130 mm3
Weight	about 2 kg

Integrating Sphere

UKU240

SPECIFICATIONS

Sphere diameter	240 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/45 20 mm
Diameter Port 2	@ 90/-45 40 mm
Diameter Port 3	@ 90/129 (-6° to Port 2) 20 mm
Diameter Port 4	@ 90/141 (+6° to Port 2) 20 mm
Port fraction f	< 0,7 %
Sphere factor M	about 11,5
Dimensions (Width x Depth x Height)	265 x 260 x 260 mm3
Weight	about 14 kg

Integrating Sphere

UKU315

SPECIFICATIONS

Sphere diameter	315 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/180 60 mm
Diameter Port 2	@ 30/0 60 mm
Diameter Port 3	@ 90/45 20 mm
Diameter Port 4	@ 90/-45 20 mm
Diameter Port 5	@ 150/0 60 mm
Port fraction f	< 2,95 %
Sphere factor M	about 7.79
Dimensions (Width x Depth x Height)	320 x 435 x 460 mm3
Weight	about 20 kg

UKU SERIES

Integrating Sphere

UKU500

SPECIFICATIONS

Sphere diameter	500 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/180 100 mm
Diameter Port 2	@ 20/0 60 mm
Diameter Port 3	@ 90/45 20 mm
Diameter Port 4	@ 90/-45 20 mm
Diameter Port 5	@ 160/0 60 mm
Port fraction f	< 1,81 %
Sphere factor M	about 8.54
Dimensions (Width x Depth x Height)	525 x 700 x 800 mm3
Weight	about 28 kg

UKU SERIES

Integrating Sphere

UKU800

SPECIFICATIONS

Sphere diameter	800 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 100 mm
Diameter Port 2	@ 20/0 60 mm
Diameter Port 3	@ 45/45 20 mm
Diameter Port 4	@ 45/-45 20 mm
Diameter Port 5	@ 160/0 60 mm
Port fraction f (in the standard configuration)	< 0,71 %
Sphere factor M	about 9.44
Dimensions (Width x Depth x Height)	850 x 1000 x 1200 mm3
Weight	about 46 kg

Integrating Sphere

UKU1000

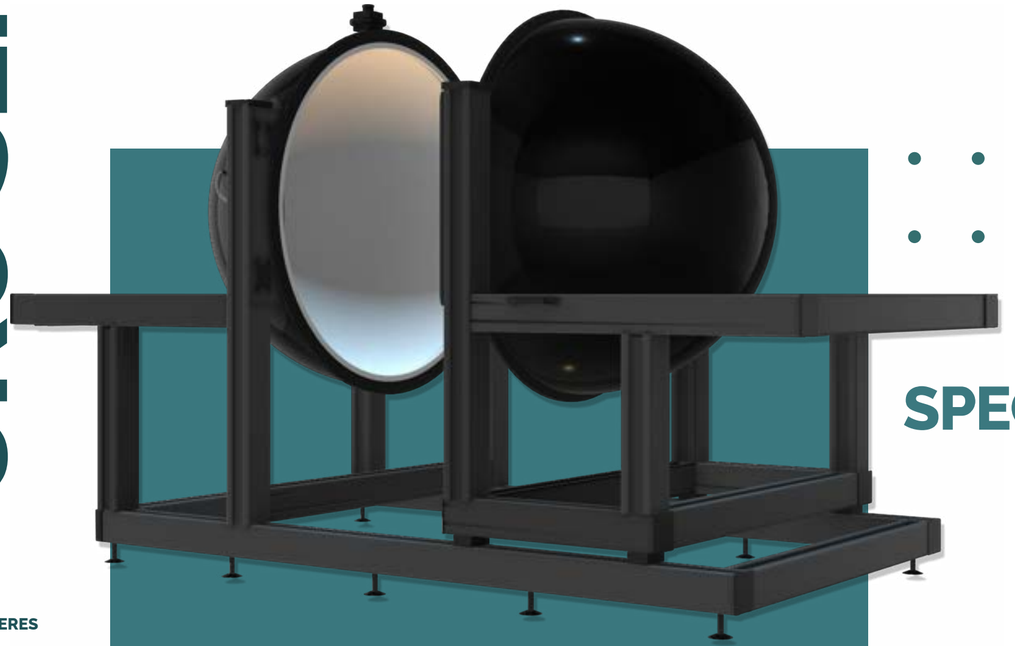
SPECIFICATIONS

Sphere diameter	1000 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 125 mm
Diameter Port 2	@ 12/0 60 mm
Diameter Port 3	@ 45/45 20 mm
Diameter Port 4	@ 45/-45 20 mm
Diameter Port 5	@ 168/0 60 mm
Port fraction f (in the standard configuration)	< 0,59 %
Sphere factor M	about 9.45
Dimensions (Width x Depth x Height)	1400 x 1200 x 1600 mm3
Weight	about 90 kg

UKU SERIES

Integrating Sphere

UKU1600



SPECIFICATIONS

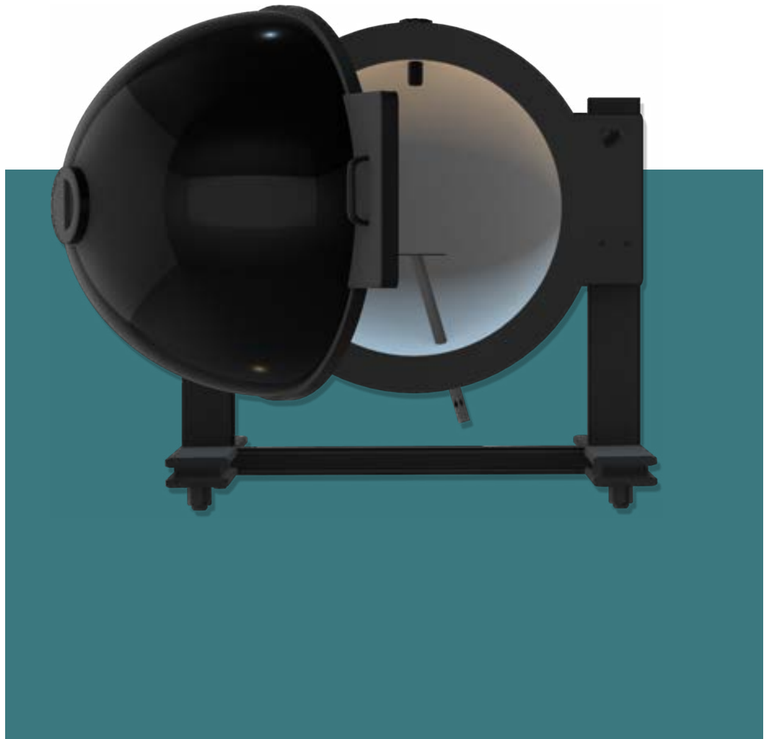
Sphere diameter	1600 mm
Sphere wall thickness	about 4 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 250 mm
Diameter Port 2	@ 10/0 60 mm
Diameter Port 3	@ 45/45 20 mm
Diameter Port 4	@ 45/-45 20 mm
Diameter Port 5	@ 170/0 60 mm
Port fraction f (in the standard configuration)	< 0,69 %
Sphere factor M	about 9.45
Dimensions (Width x Depth x Height)	2500 x 1800 x 2300 mm3
Weight	about 320 kg

ULS SERIES

UNIFORM LIGHT SOURCE

Integrating Sphere

ULS315



SPECIFICATIONS

Sphere diameter	315 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 100 mm
Diameter Port 2	@ 45/45 60 mm
Port fraction f	< 3.5 %
Sphere factor M	about 8.4
Dimensions (Width x Depth x Height)	320 x 435 x 460 mm3
Weight	about 20 kg
Power of the light source(s)	150 W
Correlated color temperature	ca. 2900 - 3000 K
Luminance within the sphere	about 20 kcd/m²
Luminance at diffuse silica glass shutter (optional)	about 2 kcd/m²

ULS SERIES
UNIFORM LIGHT SOURCE

Integrating Sphere

ULS500

SPECIFICATIONS

Sphere diameter	500 mm
Sphere wall thickness	about 3 mm
Internal coating	BaSO4
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 100 mm
Diameter Port 2	@ 45/45 60 mm
Port fraction f	< 1.4 %
Sphere factor M	about 10,3
Dimensions (Width x Depth x Height)	525 x 700 x 800 mm3
Weight	about 28 kg
Power of the light source(s)	150 W
Correlated color temperature	Cca. 2900 ñ 3000 K
Luminance within the sphere	about 9 kcd/m²
Luminance at diffuse silica glass shutter (optional)	about 0,9 kcd/m²

ULS SERIES

UNIFORM LIGHT SOURCE

Integrating Sphere

ULS800

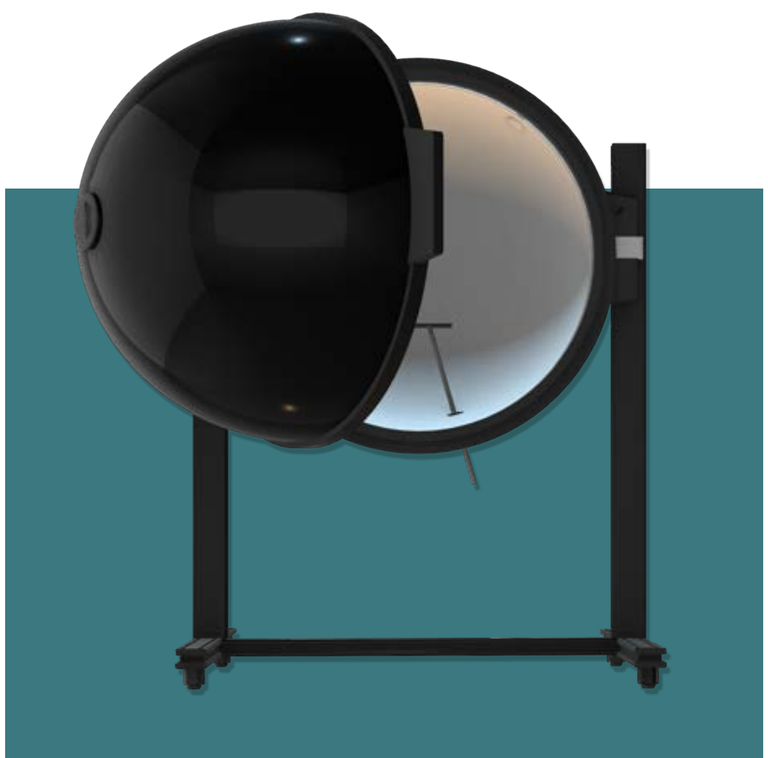
SPECIFICATIONS

Sphere diameter	800 mm
Sphere wall thickness	about 3 mm
Internal coating	$BaSO_4$
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 100 mm
Diameter Port 2	@ 45/45 60 mm
Diameter Port 3	@ 45/-45 60 mm
Port fraction f (in the standard configuration)	< 0,95 %
Sphere factor M	about 11,2
Dimensions (Width x Depth x Height)	850 x 1000 x 1200 mm3
Weight	about 46 kg
Power of the light source(s)	2 x 150 W
Correlated color temperature	about 2900 - 3000 K
Luminance within the sphere	about 8 kcd/m2
Luminance at diffuse silica glass shutter (optional)	about 0,8 kcd/m^2

ULS SERIES
UNIFORM LIGHT SOURCE

Integrating Sphere

ULS1000



SPECIFICATIONS

Sphere diameter	1000 mm
Sphere wall thickness	about 3 mm
Internal coating	BaSO4
Reflection factor of the internal coating	about 93 %
Diameter Port 1	@ 90/0 100 mm
Diameter Port 2	@ 45/45 60 mm
Diameter Port 3	@ 45/-45 60 mm
Port fraction f (in the standard configuration)	< 0,45 %
Sphere factor M	about 9,7
Dimensions (Width x Depth x Height)	850 x 1000 x 1200 mm3
Weight	about 46 kg
Power of the light source(s)	2 x 150 W or 4 x 150 W
Correlated color temperature	about 2900 ñ 3000 K
Luminance within the sphere	about 5 or 10 kcd/m²
Luminance at diffuse silica glass shutter (optional)	about 0,5 or 1 kcd/m²

LUCA

The image resolving luminance measurement system

LUMINANCE CAMERA 04

The luca camera series enables high-resolution measurements of luminance and radiance distributions. luca analyzes the spatially resolved luminance quickly and easily, whether you measure displays, control elements or luminaires. The comfortable control and evaluation software offers a variety of evaluation functions.

The system add-on luca'color allows measurements of up to 10 different spectral weighting functions allowing for the spatially resolved measurement of the CIE 1931 color distribution.

LMS-5

SPECIFICATIONS

Spectral range	monochrome
Spectral weighting	photometric, Vλ
Detector	CMOS Array
Resolution	2464 x 2056 , 5 Megapixel
Interface	GigE with PoE
Lens interface	C-Mount

MEASURING VALUES

Luminance	L(x, y) in cd/m²

LMS-12

SPECIFICATIONS

Spectral range	monochrome
Spectral weighting	photometric, Vλ
Detector	CMOS Array
Resolution	4112 x 2008 , 12 Megapixel
Interface	GigE with PoE
Lens interface	C-Mount

MEASURING VALUES

Luminance	L(x, y) in cd/m²

LMS-5-F

SPECIFICATIONS

Spectral range	polychrome
Spectral weighting	CIE1931 X, Y, Z
Filter	4 (up to 10 filters possible)
Detector	CMOS Array
Resolution	2464 x 2056 , 5 Megapixel
Interface	GigE with PoE
Lens interface	C-Mount

MEASURING VALUES

Luminance	L(x, y) in cd/m²
Color coordinates	x, y / u', v' / L*a*b*
Color temperature	T, Tn
Dominant wavelength	λd

LMS-12-F

SPECIFICATIONS

Spectral range	polychrome
Spectral weighting	CIE1931 X, Y, Z
Filter	4 (up to 10 filters possible)
Detector	CMOS Array
Resolution	4112 x 2008 , 12 Megapixel
Interface	GigE with PoE
Lens interface	C-Mount

MEASURING VALUES

Luminance	L(x, y) in cd/m²
Color coordinates	x, y / u', v' / L*a*b*
Color temperature	T, Tn
Dominant wavelength	λd

SPR'3

The versatile spectroradiometer

05

Spectroradiometer

Detector

spr'3 enables a speedy and easy measurement of spectral power distributions and the respective illuminance and irradiance. The measurement system consists of an array-spectrometer measuring with high wavelength resolution and with electromechanical shutter and filter wheel function.

Therefore, adjustments to weighting functions or measurement areas are possible whenever required. The spectrometer is complemented by a top quality radiometer of high measurement dynamic.

Depending on the application, detectors for the visible region (VIS), the near infrared area (NIR) as well as UV detectors are available. spr'3 provides an excellent linearity over several orders of magnitude.

The spectroradiometer system spr'3 is most suitable for applications within the visible spectral region between 360 and 830 nm and for the measurement of the spectral UV or IR irradiance. Due to the integrated USB interface spr'3 can be easily and directly connected and does not need any external analysis units.

MEASURING QUANTITIES.

Spectral distribution	S(λ)	[W·m-2·nm-1]
Irradiance*1	E_R	[W-m-2]
Illuminance	E_V	[Lux], [lm·m-2]
Chromaticity coordinates (CIE 2° and 10° observer)	X,Y,Z x,y u,v u', v' L*a*b* Lab99	acc. CIE1931 acc. CIE1931 acc. CIE1960 acc. CIE1964 acc. CIE1976 acc. DIN6176:2001-3
Correlated color temperature (CCT)	T,Tn	[K]
Color rendering indices	R_a, R_1 – R_{14}	[%]
Color saturation	S	[%]
Hue angle	h	[°]
Dominant wavelength	λ_d	[nm]
Peak wavelength	λ_p	[nm]

SPECIFICATIONS.

Wavelength band	350 nm – 830 nm typ./ any region from 180 nm to 2500 nm possible, filter wheel with up to 5 filters possible
Number of detector pixels	approx. 2048
AD Converter	16 Bit / 1 MHz (spectrometer), 16 Bit (radiometer)
Wavelength resolution	0,03 nm to 10 nm FWHM
Measuring dynamics	$2 \cdot 10^8$ (spectrometer system), 1300:1 (single measurement) $1 \cdot 10^8$, 100 mLux ≤ EV ≤ 1 MLux (photometer system)
Linearity	>99,92% (spectrometer), >99,7% (radiometer)
Stray light	0.05%@600 nm / 0.10%@435 nm (spectrometer)
Integration times	1 ms to 65 s
Spectral mismatch index*2	Insignificant due to spectrum related mismatch correction

SPEC'3

06

Convenient measurement of spectral distributions

Detector

06 Spectrometer

The spectral measurement system spec'3 allows the measurement of spectral distributions from UV to NIR. Within the visible spectral region the colorimetric values are displayed directly by the spec software package according to CIE.

A continuous live mode display is possible whereby timely changes can easily be observed or adjustments facilitated sensibly. The color rendering values according to CIE are updated permanently in the live mode.

- Measurements of emission, reflection or transmission characteristics round off the extensive spec'3 spectrum. By means of the TCP/IP add-on spec'remote the system can be integrated into any test environment. Furthermore, the operation of several spectrometers simultaneously with the same or even different wavelength bands is possible.

MEASURING QUANTITIES.

Spectral distribution	S(λ)
Chromaticity coordinates	x, y / u', v' / L*a*b*
Correlated color temperature	T, Tn [K]
Color rendering indices	R_1 - R_8, R_a, R_9 - R_{14}
Color saturation	S [%]
Hue angle	h* [°]
Dominant wavelength	λd
Transmission rate	T(λ) [%] (specular, diffuse)
Reflection rate	R(λ) [%] (specular, diffuse)

SPECIFICATIONS.

Wavelength band	any region from 180 nm to 2500 nm possible
Number of detector pixels	approx. 2048
AD converter	16 Bit / 1 MHz
Wavelength resolution	0.03 nm to 10 nm FWHM
Measuring dynamics	2 x 108 (system), 1300:1 (single measurement)
Linearity	>99,8%
Stray light elimination	0.05%@600 nm / 0.10%@435 nm
Integration times	1 ms to 65 s

ACCESSORIES.

- Reflection standard
- Shutter
- Various measurement fibres
- Absolute sensors
- Software add-on spec'remote
- Integrating spheres
- Diffusors (COS-weighting)
- Light sources
- Software Plug-in MED
- USB2LAN Ethernet Interface

07

FRC’3

The universal photometer

Do yu want to measure light in a simple, precise and absolute way? The frc'3 Photometer is the right choice!

Designed for the use in harsh surroundings and equipped with high-precision measurement technique, the photometer frc'3 is able to be used easily in laboratories as well as in production lines or during outside service tasks. The photometer frc'3 measures light sources and radiation sources from UV to IR very quickly and efficiently.

The photometer sensor of the frc'3 series can be equipped with a filter changer allowing a radiometrical and a photometrical weighting in one device. Broadband radiometrical filters as well as V(λ) filters or others are possible, up to 5 filter positions are available.

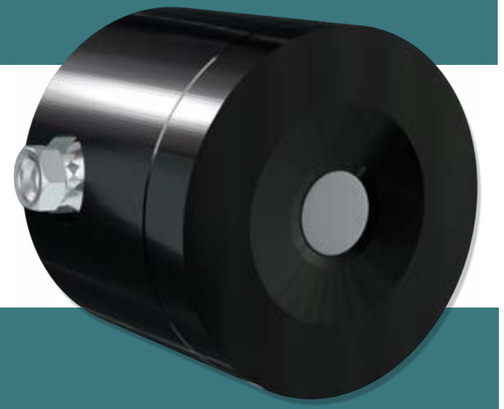
SPECIFICATIONS.

Type	Value
Wavelength band	VIS 360nm – 830nm, NIR up to 1100nm, UV from 200nm filter changer with 5 positions optional
A/D Wandler	16 Bit
Measurement dynamics	1:108, 10mLux ≤ Ev ≤ 1MLux (photometer)
Processing frequency	1,2 Hz
Linearity	99,7%
Spectral adjustment photometrical (f1)	about 4% typical
Temperature region	10°C – 40°C ambient temperature
Temperature stability	500 ppm/K
Shading (f2)	< 0.5 %

Type	Value
Diffusor	opaque silica glass (Ø 18 mm), active plane: 29,8 mm2, Ø 9,5 mm
System class (DIN 5032 Part 7)	B, class A on request
Control	via frc software (included)
Series measurement	yes
Luminous and radiant intensity measurement	yes
Supply voltage	5V via USB
Connecting lead	3m USB cable, USB type A plug
Dimensions	diameter: 68 mm, height: 60 mm
Weight	400 g

MEASURING QUANTITIES.

Photometrical illuminance	[Lux], luminous intensity [cd]
Radiometrical irradiance	[W/m2], radiant intensity [W/sr]
Further quantities	depending on the filter configuration and accessories



ACCESSORIES.

- Optical bench fixture
- USB to LAN Ethernet interface
- Fixing claw for the integrating spheres
- Scattered light tube
- TCP/IP interface frc'remote
- Integrating spheres uku series
- Filter changer with 5v positions
- Additional software licence frc
- Goniophotometer

FRC’3-v

Item number: OTS-FRC-RV-...

Radiometer, only VIS, 350 - 830

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer VIS with diffuser:
OTS-FRC-RV-D

UV VIS NIR

FRC’3-F

Item number: OTS-FRC-F-...

Standard photometer, photometric, 350 - 830

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Standard photometer VIS with diffuser:
OTS-FRC-F-D

UV VIS NIR

FRC’3-f-h

Item number: OTS-FRC-F-H-...

Auxiliary photometer with shouldered head, photometric 350 - 830

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Auxiliary photometer VIS with diffuser:
OTS-FRC-F-H-D

UV VIS NIR

FRC’3-vi

Item number: OTS-FRC-VI-...

Radiometer 350 - 1050

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer VIS-NIR with diffuser:
OTS-FRC-VI-D

UV VIS NIR

FRC’3-i

Item number: OTS-FRC-I-...

NIR radiometer, 800 - 1050

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer NIR with diffuser: OTS-FRC-I-D

UV VIS NIR

FRC’3-i-h

Item number: OTS-FRC-I-H-...

NIR auxiliary radiometer, 800 - 1050

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Auxiliary radiometer NIR with diffuser:
OTS-FRC-I-H-D

UV VIS NIR

FRC’3-r

Item number: OTS-FRC-R-...

Broadband radiometer, without filter, 250 - 1050

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer UV-VIS-NIR with diffuser: OTS-FRC-R-D

UV VIS NIR

FRC’3-uv

Item number: OTS-FRC-UV-...

Radiometer, 250 - 830

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer UV-VIS with diffuser: OTS-FRC-UV-D

UV VIS NIR

FRC’3-u

Item number: OTS-FRC-U-...

UV radiometer, 250 - 400 (280)

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer UV with diffuser: OTS-FRC-U-D

UV VIS NIR

FRC’3-ua

Item number: OTS-FRC-UA-...

UVA radiometer, 315 - 400 (380)

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer UVA with diffuser: OTS-FRC-UA-D

UV VIS NIR

FRC’3-ub

Item number: OTS-FRC-UB-...

UVB radiometer, 280 - 315

Accessory optics available:
- diffusil® quartz glass diffuser (-D)
- quartz glass window (-Q)

Example:
Radiometer UVB with diffuser: OTS-FRC-UB-D

UV VIS NIR

Camera Photometer

08 CAMERA PHOTOMETER

System enhancement with a broad spectrum

LUCA'LUX

Camera Photometer

The software and hardware enhancement luca'lux enables the fast and easy measurement of illuminance and luminous intensity distributions respectively. The measurement is spatially taken in one shot against a reflecting or transmitting screen. The entire measurement of the illuminance distribution of a luminaire or an optical system is carried out within seconds. The software provides a comfortable assistant (calibration wizard) calibrating the system with respect to a traceable transfer standard.

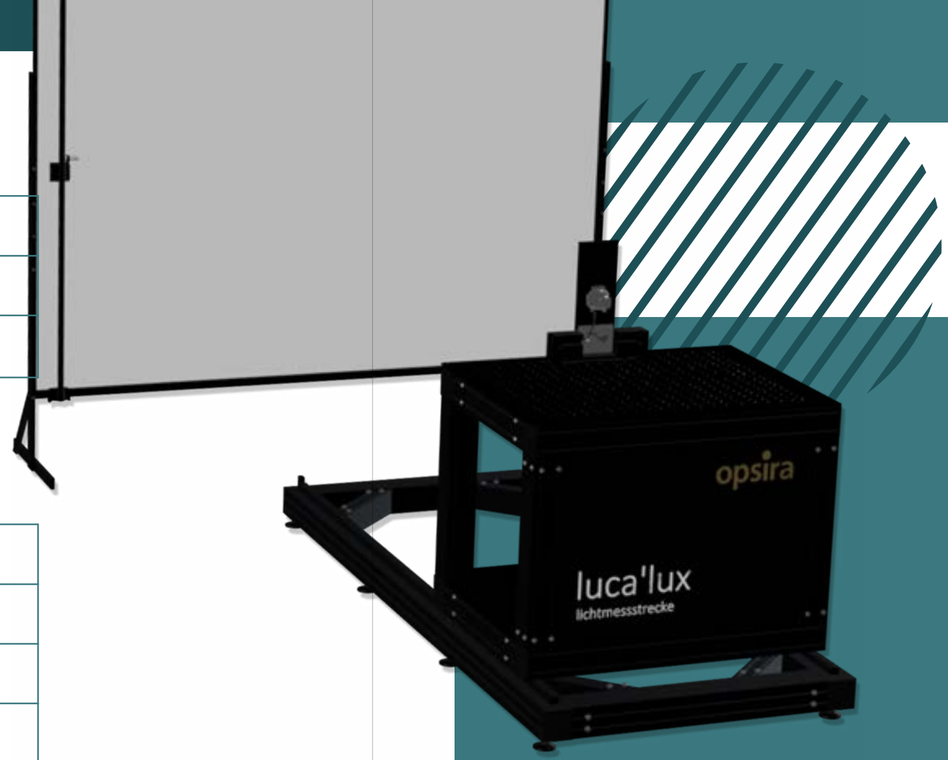
Predefined evaluation masks compare the measuring results with the desired standards, such as ECE, SAE, etc. in lightning speed. The system stands out for significant evaluations and very short measuring times and is most suitable for production control of photometric data and quick development verifications.

MEASURING QUANTITIES

Illuminance and irradiance distribution	E(x,y), E(θ,θ) [lux]
Luminous and radiant intensity distribution	I(θ,θ) [cd]
Luminous flux / light flux	θ[lm]

SPECIFICATIONS

Measuring range of illuminance	0,01 Lux to 1 MLux*1
Measuring range of luminous intensity	0,05 cd to 1 Mcd*1
Measuring dynamics	12 Bit / 18 Bit*2
Measuring time	< 1 s typical*3
Spatial resolution	1300 x 1000 pixel typical*4
Measuring error	< 1%*5



ACCESSORIES

- Software add-on luca'remote
- Turntables/Goniometers
- Spectrometer/Spectroradiometer
- Software client (production control)

*1 depending on measuring object, upper limit is arbitrarily scalable by means of suitable neutral density filters. *2 14, 16 or 18 Bit in the HighDyn mode by multiple exposure. *3 0,1 ms to 60 s possible. *4 further measurement resolutions possible. *5 variation from calibration transfer standard. Typical values of a standard configuration. Changes are possible depending on the system configuration. Variations to the technical data may occur due to the permanent improvement and development of our measurement systems. We do not assume any juristic responsibility or liability whatsoever for such variations or misprints. The General Terms and Conditions of Trade of the opsira GmbH are valid. luca'lux · E · V00080513 · © opsira GmbH · www.koelle-kunter.de

DIFFUSIL DIFFUSERS

The perfect lambertian quartz diffusers

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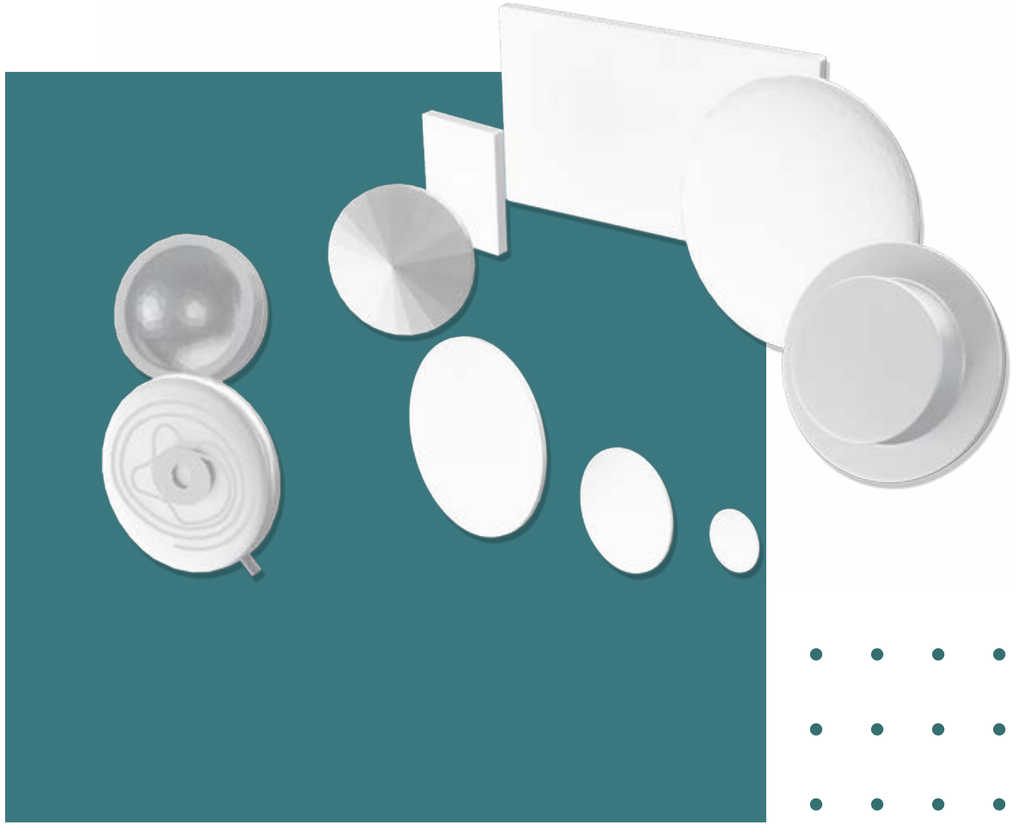
diffusil diffusers are made of a special opaque synthetic fused silica glass (99.999% SiO2).

They are designed to create an almost perfect lambertian light output over a wide wavelength range, regardless if they are used in transmission (diffusil-T) or reflection (diffusil-R) mode. diffusil diffusers are the ideal light scattering element for light sources and optical sensors working in the range of 190 –3200 nm. Millions of tiny little gas bubbles inside the ultra-pure synthetic fused silica glass are the secret of the optical behavior of diffusil diffusers.

Unlike other diffuser materials diffusil diffusers can withstand temperature shocks of several hundred degrees and harsh chemical environments without any damages. Besides the most commonly used shapes such as square or round plane parallel discs, customized diffuser shapes and sizes are available as well. Even special, precisely adjusted scattering profiles can be delivered



SPECIFICATIONS.

Minimum size	2 x 2 mm
Maximum size	160 x 200 mm bzw. 160 x 160 mm
Maximum diameter	160 mm
Thickness	0,3 - 25,0 mm
Surface	honed or polished

Permanent development of the production process in order to realize larger sizes. Customized surface treatment is possible.

ACCESSORIES.

- Incident-angle ind. homogenization of light beams in transmission
- Incident-angle ind. homogenization of light beams in reflection
- Optical power absorber
- Wavelength range from UV to NI
- Applicable up to 1000 °C
- Applicable in strong acids and bases
- Refl ection standards
- Refl ection targets
- Generation of characteristic BSDF data
- Production of customized components

10

Test and Control Systems

ALTS

The test system for airfield and airport lighting

The luca'lux - airfield lighting test system allows fast and easy measurement and test of any airfield lighting system in compliance with the ICAO (FAA, CAP168) regulations and any others. Contrary to the time-consuming goniometer measurement, the luca'lux method realizes a precise measurement of the luminous intensity distribution of the lights within only a few seconds.

It is understood that the measurement is calibrated according to international measurement standards.

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mlts is based on the system add-on luca'lux for fast measurements with high resolution and test of illuminance distributions by a photometrically corrected measuring camera.

mlcs offers a wide range of possibilities to adjust different work items or different light fields.

Test and Control Systems

MLTS/MLCS

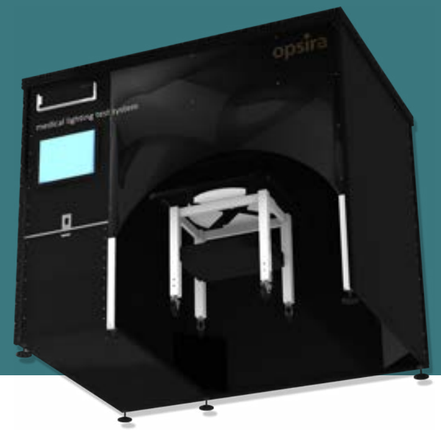
Fast test of medical luminaires

The medical lighting test (mlts) and calibration (mlcs) systems are designed for fast and easy testing and calibration of medical luminaires or luminaire components during their production process. Based on a luminance measurement system the mlts / mlcs is able to measure illuminance distributions with high resolution. The photometric and geometric measurement of the light field is done within seconds and tested against tolerances.

Both systems, the mlts and the mlcs, are easily expandable by a spectrometer element (-spec), which enables the systems to test and calibrate all relevant colorimetric parameters such as color temperature, chromaticity coordinates and color rendering indices.

MEASURING QUANTITIES.

Maximum illuminance Ec
Position of the max. illuminance in Cartesian and / or polar coordinates
D50 illuminance and diameter
D10 illuminance and diameter
Ratio D50 to D10
Color rendering indices Ra, R1 to R14
Correlated color temperature
Color coordinates xy, u'v'
Irradiance Ee
UV-irradiance Euv
Ratio Ee / Ec



DIMENSIONS.

Dimensions	1800 x W 1500 x H 2100 mm
Weight	250 kg

ACCESSORIES.

- Client-Software
- luca Software
- spec'3 software
- Sample holders
- Sample heating
- Sample cooling

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Test and Control Systems

KPS'RETRO

The quick testing system for retroreflectors

The kps'retro compact testing system enables quick yet high-quality testing of retroreflectors while requiring a minimum of space. The test can be performed quickly and easily close to production. Even smaller companies without a complete light lab can reliably test their injection parameters with this system.

This allows fast and direct correction of production parameters (e.g. injection moulding settings) even with partial components, requiring minimal space.

The test specimens are homogeneously illuminated with collimated light emitted by a precise projector. The alignment is performed simply and reliably by an integrated laser.

ILLUMINATION SPECIFICATIONS.

Illumination	Standard illuminant A
Illumination divergence	6' (0.1°)
Illuminance on test specimen	40 lx
Size of the illumination area	250 mm
Homogeneity of the illumination area	> 95 %
Illumination stability	Illumination source is burnt in

FEATURES AND TECHNICAL DATA.

- Alignment laser
- Height-adjustable measuring table for easy positioning of the specimen
- Small space requirement of the compact testing system, starting at 4 m x 1 m x 1.8 m (L x W x H)
- Power supply 230 V/50 Hz
- No darkroom required; can be moved on rollers

DETECTOR SPECIFICATIONS.

Measuring distance	approx. 3 m (5 m and 10 m also possible if required)
Measuring angle	0,333° (ECE) and 1.5° (ECE/SAE), 0,2° (SAE) optional
Photometer	2 x class L photometer according to DIN 5032 Part 6 and CIE publ. no. 69 (1987)
Apertures	Adapted to room angle compliant measurement
Measuring range	1 mcd/lux to 10 kcd/lux, further ranges on request

STANDARDS.

- ECE R 3, R 27, R 69, R 70, R 104 (Automotive)
- DIN EN 12899-3 (Delineator posts and retroreflector)
- SAE J 594, J 774, J 943, J 2041 (Automotive)
- DIN 67520 (Retro-reflecting materials)
- CIE Publication No. 54.2-2001 (Retroreflection)
- EN 471 (High-visibility protective clothing)

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Test and Control Systems

KPS'LID

Fast test system for luminous intensity distributions

The kps'lid compact testing system enables quick and yet high-quality testing of luminous intensity distributions while requiring minimal space. The test can be performed quickly and easily close to production. Even smaller companies without a complete light lab can reliably test their injection parameters with this system.

This system allows fast and direct correction of production parameters (e. g. injection molding settings) even with partial components. The far-field measurement distance required by standards can be reduced to a measurement distance of less than 1.50 m by using an optical system.

MEASURING QUANTITIES.

Illuminance, irradiance distribution E(x,y), E(ϑ,ϕ)	[lux]
Luminous intensity, radiant intensity distributions I (ϑ,ϕ)	[cd]
Test masks and standards	Test according to ECE-R 001, ECE-R 087, ECE-R 098, ECE-R 112, ECE-R 113, ECE-R 123 (amongst others), customised test masks

FEATURES AND TECHNICAL DATA.

- Portable system packed in solid flightcase
- Little space required for the compact test system, only 1.2 m x 0.8 m x 1.0 m (L x W x H)
- Power supply 230V/50Hz
- Darkroom not necessary, portable
- Weight 60 kg only

SPECIFICATIONS.

Measruring range of illuminance	0,01 Lux to 1 MLux
Measuring range of luminous intensity	0,05 cd to 1 Mcd
Measuring dynamics	12 Bit
Measuring time	< 1 s typical
Spatial resolution	1300 x 1000 Pixel typical
Measuring error	< 1%

ACCESSORIES.

- Software add-on luca'remote
- Spectrometer/Spectroradiometer
- Software client (production control)

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