

SSL Resource

Light Measuring Instruments Catalogue 2024-V





SSL Resource

Instruments for light measurements



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Instruments for light measurements

Instruments for light measurement - Content

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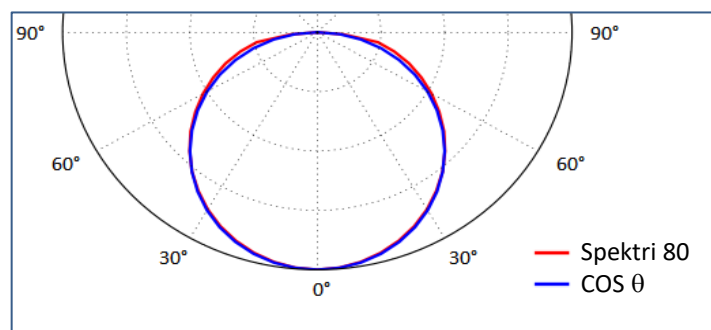
SPECTRORADIOMETER SPEKTRI 80

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SPEKTRI-80 the Spectroradiometer for Field and Laboratory



Calibration	Factory calibration traceable to MIKES / NIST
Meter Class	Directional response conforms to DIN 5032 Part 7 Class B



SPECTRORADIOMETER

SPEKTRI 80 – Android App

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SPEKTRI 80 Android App features

Main	Color evaluation	Spectral radiation	PAR	Conf
- Illuminance Ev [lx] - Correlated color temperature CCT [K] - Chromaticity coordinates CIE1931 (x,y), CIE1964 (u,v), CIE1976 (u',v')	- Color rendering index CRI: Ra, R1 to R14 - Standard deviation color matching SDCM	- Spectral irradiance [W/nm/m²] - Irradiance [mW/cm²] - Effective wavelength λ_{eff} [nm] - Peak wavelength λ_p [nm]	- unit: [$\mu\text{mol}/\text{m}^2/\text{s}$] - PPFD 400-700nm - PFD-B 400-500nm - PFD-G 500-600nm - PFD-R 600-700nm - PFD-UV 380-400nm - PFD-FR 700-780nm	- Measuring mode Lv/Ev/Φ_v - WL range selection - Result comparison - Test name edition - Data saving



SPECTRORADIOMETER

SPEKTRI 80 Selection Guide

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Product family	SPEKTRI 80 (SSL S-80)					
Product Code	S-80.PAR	S-80.Ee	S-80.Color	S-80. Colorlux	S-80.Lv_L1 S-80.Lv_L2	S-80.Lab
Product Name	SPEKTRI 80. Horti	SPEKTRI 80. Irradiance	SPEKTRI 80. Color	SPEKTRI 80. Colorlux	SPEKTRI 80. Luminance probe L1 / L2	SPEKTRI 80. Laboratory
Application Areas	Horticulture, Agriculture	Medical, Dental	General lighting	General lighting	Display, Automotive	General spectroscopy
Measuring Parameters						
Illuminance Ev	✓		✓	✓		✓
Irradiance Ee	✓	✓	✓	✓		✓
Radiance Le					✓	✓
Luminance Lv					✓	✓
Flicker (MI, FI, f)				✓		
CCT, ccxy, ccu'v'	✓		✓	✓	✓	✓
SDCM			✓	✓	✓	✓
CRI / TM30			✓	✓	✓	✓
Spectrum	✓	✓	✓	✓	✓	✓
PAR	✓		✓	✓		✓
Battery operated	✓	✓	✓	✓	✓	✓
BT connection	✓	✓	✓	✓	✓	✓
USB readout						✓
Android App	✓	✓	✓	✓	✓	✓
PC software *	Optional	Optional	Optional	Optional	Optional	✓
Export to Excel	✓	✓	✓	✓	✓	✓

*(SSL SRM sw)

SPECTRORADIOMETER SPEKTRI 80.Horti

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Application examples:

- ✓ Horticultural and Agricultural Lighting

SPECTRORADIOMETER

SPEKTRI 80.Horti

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DEVICE CODE		S-80.PAR	
Measurement scope	Main	PAR	
Parameters	- Illuminance Ev - Correlated color temperature CCT - CIE Chromaticity coordinates (x,y) - Total PPFD - Spectrum graph - PPFD graph as a function of time	unit: [μmol/m²/s] - PPFD 400-700nm - PFD-B 400-500nm - PFD-G 500-600nm - PFD-R 600-700nm - PFD-UV 380-400nm - PFD-FR 700-780nm - Chrolophyll A/B - Betacarotene - Phytochrome red / far red	
SPECTRAL SENSOR			
Ev range	65 – 250 000 lx	Optical Bandwidth	9 – 11 nm
PPFD range	1 – 5000 μmol/s/m² (white LEDs) 0.2 – 1000 μmol/s/m² (single color LEDs)	WL resolution	1 nm
Sensor	CMOS diode array	Wavelength (WL) range	380-780 nm
Signal to noise	1000 : 1	Integration time	10 ms – 30 s
Accuracy	Ev 3%, CCT 3%, PPFD 4%	Digital resolution	16 bits
OTHER			
Measuring head	Outer diameter 42mm, height 10mm, PTFE diffuser 2mm thick		
Data readout	Android app through Bluetooth, PC software through USB-B 2.0		
Dimensions	118mm x 78mm x 42mm		
Weight	230 g		

SPECTRORADIOMETER SPEKTRI 80.Irradiance

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Application examples:

- ✓ Medical, Dental
- ✓ Occupational health

SPECTRORADIOMETER

SPEKTRI 80.Irradiance

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DEVICE CODE	S-80.Ee		
Measurement scope	Main	Spectral radiation	
Parameters	- Irradiance Ee - Measurement statistics	- Spectral irradiance [W/nm/m²] - Irradiance [mW/cm²] - Effective wavelength λ_{eff} [nm] - Peak wavelength λ_{p} [nm]	
SPECTRAL SENSOR			
Ee range	0.0001 – 18 mW/cm² (*)	Optical Bandwidth	9 – 11 nm
		WL resolution	1 nm
Sensor	CMOS diode array	WL range	380 - 780 nm
Signal to noise	1000 : 1	Integration time	10 ms – 30 s
Accuracy	Ee 3%	Digital resolution	16 bits
OTHER			
Measuring head	Outer diameter 42mm, height 10mm, PTFE diffuser 2mm thick		
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)		
Dimensions	118mm x 78mm x 42mm		
Weight	230 g		

(*) Depending on the analyzing wavelength.

SPECTRORADIOMETER SPEKTRI 80.Color

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SPEKTRI 80 spectroradiometer for colorimetry



Application examples:

- ✓ General lighting
- ✓ Colorimetry

SPECTRORADIOMETER

SPEKTRI 80.Color

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DEVICE CODE S-80.Color				
Measurement scope	Main	Color evaluation	Spectral radiation	PAR
Parameters	- Ev [lx] - CCT [K] - CIE Chromaticity coordinates (x,y) CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color rendering index CRI: Ra, R1 to R14 - Standard deviation color matching SDCM	- Spectral irradiance [W/nm/m²] - Irradiance [mW/cm²] - λ _{eff} [nm] - λ _p [nm]	unit: [μmol/m²/s] - PPFD - PFD-B - PFD-G - PFD-R - PFD-UV - PFD-FR
SPECTRAL SENSOR				
Measurement range	Illuminance (lx)	PPFD (μmol/s/m²)	Optical Bandwidth	9 – 11 nm
	25 – 100 000	0.5 – 2000		
Sensor	CMOS diode array		WL resolution	1 nm
Signal to noise	1000 : 1		WL range	380 – 780 nm
Accuracy	Illuminance 3%, CCT 3%, CRI, Ra 2%, WL 1nm	Integration time	10 ms – 30 s	
		Digital resolution	16 bits	
OTHER				
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)			
Dimensions	118mm x 78mm x 42mm			
Weight	230 g			

SPECTRORADIOMETER SPEKTRI 80.ColorLux

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SPEKTRI 80 spectroradiometer + Flicker sensor



Application examples:

- ✓ General lighting
- ✓ Colorimetry
- ✓ Flicker

SPECTRORADIOMETER

SPEKTRI 80.ColorLux

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DEVICE CODE		S-80.ColorLux			
Measurement scope	Main	Color evaluation	Flicker	Spectral radiation	PAR
Parameters	- Ev [Ix] - CCT [K] - CIE Chromaticity coordinates (x,y) CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color rendering index CRI: Ra, R1 to R14 - Standard deviation color matching SDCM	- Percent flicker (%) - Flicker Index - Flicker Frequency - Flicker risk IEEE1789	- Spectral irradiance [W/nm/m²] - Irradiance [mW/cm²] - λ _{eff} [nm] - λ _p [nm]	unit: [μmol/m²/s] - PPFD - PFD-B - PFD-G - PFD-R - PFD-UV - PFD-FR
SPECTRAL SENSOR					
Measurement range	Illuminance (Ix)	PPFD (μmol/s/m²)	Optical Bandwidth	9 – 11 nm	
	25 – 100 000	0.5 – 2000			
Sensor	CMOS diode array		WL resolution	1 nm	
Signal to noise	1000 : 1		WL range	380 – 780 nm	
Accuracy	Illuminance 3%, CCT 3%, CRI, Ra 2%, WL 1nm		Integration time	10 ms – 30 s	
			Digital resolution	16 bits	
FLICKER SENSOR					
Digital Resolution		12 bits	Sampling rate	200 000 samples/s	
Illuminance range		100-200 000 lx	Frequency range	0 – 10 kHz	
OTHER					
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)				
Dimensions	118mm x 78mm x 42mm				
Weight	230 g				

SPECTRORADIOMETER SPEKTRI 80.Luminance probe

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SPEKTRI 80 spectroradiometer + Luminance probe



Application examples:

- ✓ Displays
- ✓ Control buttons and illuminated signs
- ✓ Outdoor illumination

SPECTRORADIOMETER

SPEKTRI 80.Luminance probe

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DEVICE CODE		SSL S-80.Lv_L1	
Measurement scope	Main	Color evaluation	Spectral radiation
Parameters	- L_v [cd/m^2] - CCT [K], - Color coordinates (x,y) CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color rendering index CRI: R_a, R_1 to R_{14} - TM-30-18: R_f, R_g, color vector graphic (SRM sw), - Standard deviation color matching SDCM	- Spectral radiance [$\text{W}/\text{nm}/\text{m}^2$] - Radiance [$\text{mW}/\text{cm}^2$] - Effective wavelength λ_{eff} [nm] - Peak wavelength λ_p [nm]
SPECTRAL SENSOR			
WL range	380 – 780 nm	Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	Integration time	10 ms – 30 s
Accuracy	L_v 3%, CCT 3%, CRI 2%, WL 1 nm	Digital resolution	16 bits
LUMINANCE PROBE L1			
Luminance range (cd/m^2)	40 – 100 000	Field of view	1.5°
Spot size (diam.)	20mm @ 0.5m	Fiber	2m, core 0.4mm, NA:0.22
OTHER			
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)		
Dimensions	118mm x 78mm x 42mm		
Weight	230 g + probe 100g		

SPECTRORADIOMETER SPEKTRI 80.Luminance L2

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SPEKTRI 80 spectroradiometer + Luminance optics



Application examples:

- ✓ Displays
- ✓ Control buttons and illuminated signs
- ✓ Outdoor illumination

SPECTRORADIOMETER

SPEKTRI 80.Luminance L2

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DEVICE CODE		SSL S-80.Lv_L2	
Measurement scope	Main	Color evaluation	Spectral radiation
Parameters	- L_v [cd/m^2] - CCT [K], - Color coordinates (x,y) CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color rendering index CRI: R_a, R_1 to R_{14} - TM-30-18: R_f, R_g, color vector graphic (SRM sw), - Standard deviation color matching SDCM	- Spectral radiance [$\text{W}/\text{nm}/\text{m}^2$] - Radiance [$\text{mW}/\text{cm}^2$] - Effective wavelength λ_{eff} [nm] - Peak wavelength λ_p [nm]
SPECTRAL SENSOR			
WL range	380 – 780 nm	Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	Integration time	10 ms – 30 s
Accuracy	L_v 3%, CCT 3%, CRI 2%, WL 1 nm	Digital resolution	16 bits
LUMINANCE PROBE L2			
Luminance range (cd/m^2)	10– 50 000	Field of view	2°
Spot size (diam.)	17mm @ 0.5m	Laser accessory	Red spot alignment laser
OTHER			
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)		
Dimensions	118mm x 78mm x 42mm		
Weight	280 g		

SPECTRORADIOMETER SPEKTRI 80.Laboratory

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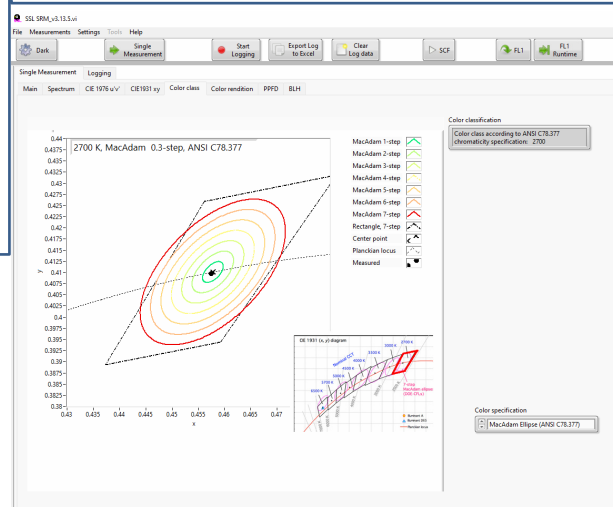
SPEKTRI 80 spectroradiometer + probe + advanced software



Illuminance probe



Luminance probe L1



Application examples:

- General spectroscopy
- Displays
- General lighting

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SSL SRM_v3.13.5.vi

File Measurements Settings Tools Help

Dark Single Measurement Start Logging Export Log to Excel Clear Log data

Single Measurement Logging

Main Spectrum CIE 1976 u'v' CIE 1931 xy Color class Color rendition PPFD BLH

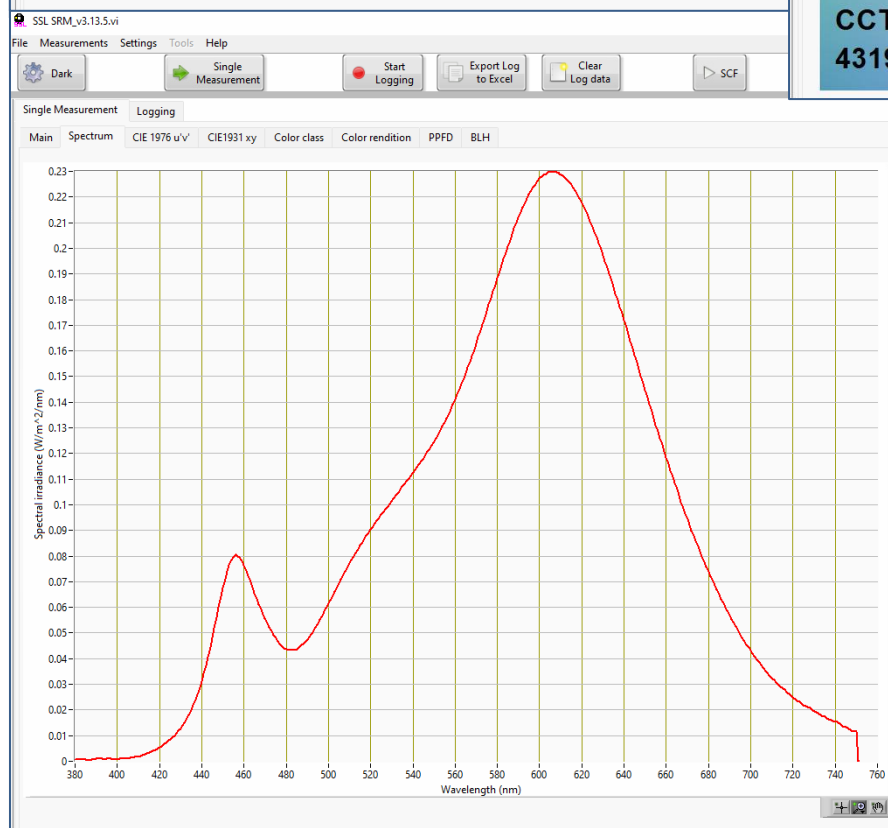
CRI TM30 - Rf of 16 Hue bins Rf by sample type TM30 - Color vector TM30 - Rf of all 99 test samples TM30 - Rf of all 99 test samples

Rf
84

Rg
102

CCT
4319

Duv
0.0092



Band nr	Peak WL (nm)	Peak Intensity	FWHM Bandwidth (nm)	Effective WL (nm)
Full	606.1	229.82E-3	119.2	589.6
Band 1	456.5	80.33E-3	NA	NA
Band 2	606.1	229.82E-3	119.0	603.1

SPECTRORADIOMETER

SPEKTRI 80.Laboratory

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DEVICE CODE		SSL S-80.Lab		
Parameters	- Ev [lx] / Lv [cd/m2]	- Color rendering index CRI: Ra, R1 to R14	- Spectral irradiance [W/nm/m²]	unit: [μmol/m²/s]
	- CCT [K]	- TM-30-18: Rf, Rg, color vector graphic	- Irradiance [mW/cm²]	- PPFD
	- CIE Chromaticity coordinates (x,y)	- Standard deviation color matching SDCM	- λ _{eff} [nm]	- PFD-B
	CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color class	- λ _p [nm]	- PFD-G
				- PFD-R
				- PFD-UV
				- PFD-FR
SPECTRAL SENSOR				
Sensor	CMOS diode array	WL resolution	1 nm	
Signal to noise	1000 : 1	WL range	380 – 780 nm	
Accuracy	Ev/Lv 3%, CCT 3%, CRI 2%, WL 1nm	Integration time	10 – 30 000 ms	
Optical Bandwidth	9 – 11nm	Digital resolution	16 bits	
ILLUMINANCE PROBE E1				
Measurement range	Ev (lx)	PPFD (μmol/s/m²)		
	25 – 100 000	0.5 – 2000		
LUMINANCE PROBE L1				
Luminance range Lv (cd/m²)	40 – 100 000	Field of view	1.5°	
Spot size (diam.)	20mm @ 1m	Fiber	2m, Core 0.4mm, NA: 0.22	
OTHER				
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)			
Dimensions	118mm x 78mm x 42mm			
Weight	200 g + 100g (probe)			

SPECTRORADIOMETER

SPEKTRI 80.Sphere accessory

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SPEKTRI 80 spectroradiometer + AUX lamp



Application examples:

- ✓ Measurements with small spheres
- ✓ Luminous flux / Spectral radiant flux

SPECTRORADIOMETER

SPEKTRI 80.Sphere Accessory

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DEVICE CODE		SSL S-80.Phi	
Measurement scope	Main	Color evaluation	Spectral radiation
Parameters	- Φ_v [lm] - CCT [K] - Color coordinates (x,y) CIE 1931, (u,v) CIE 1964, (u',v') CIE 1976	- Color rendering index CRI: Ra, R1 to R14 - TM-30-18: Rf, Rg, color vector graphic (SRM sw), - Standard deviation color matching SDCM	- Spectral radiant flux [W/nm] - Radiant flux [mW] - Effective wavelength λ_{eff} [nm] - Peak wavelength λ_p [nm]
SPECTRAL SENSOR			
WL range	380 – 780 nm	Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	Integration time	10 ms – 30 s
Accuracy	Φ_v 4%, CCT 3%, CRI 2%, WL 1 nm	Digital resolution	16 bits
ILLUMINANCE PROBE E3			
PTFE diffuser	Diam. 10 mm	Fiber	Bifurcated fiber 2m, core 0.6mm, NA:0.39
AUX Light source			
Type: external LED light MH42	Color: Neutral white	Power: 1 W	USB powered (USB A connector)
OTHER			
Data readout	Android app through Bluetooth, PC software through USB 2.0 (type B USB)		
Dimensions	118mm x 78mm x 42mm		
Weight	230 g + probe 100g		

BENCHTOP SPECTRORADIOMETER

SPEKTRI 90

Product family	SPEKTRI 90 (SSL S-90)		
Product Code	S-90.Lab	S-90.Probe	S-90.Adv
Product Name	SPEKTRI 90, Laboratory	SPEKTRI 90, Probe	SPEKTRI 90, Advanced
Device photo			
Optical fiber		✓	✓ Bifurcated fiber
Illuminance/ Irradiance E_v/E_e		✓	✓
Luminous/ radiant flux Φ_v/Φ_e	✓	✓	✓
Aux light source			✓
USB readout	✓	✓	✓
Integrated display 16x2	✓	✓	✓
PC software (SSL SRM.Ee sw)	Optional	Optional	Optional

SPECTRORADIOMETER SPEKTRI 90.Laboratory

DEVICE CODE	S-90.Lab		
SPECTRAL SENSOR			
		Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	WL range	380 – 780 nm
Accuracy	Luminous flux 4%, CCT 3%, CRI, Ra 2%, WL 1nm	Integration time	35 ms – 2 000 ms
		Digital resolution	16 bits
OTHER			
Powering	USB 5V		
Data readout	16x2 Display Option: SSL SRM sw, PC software through USB 2.0		
Dimensions	170mm x 175mm x 56mm		
Weight	710 g		



SPECTRORADIOMETER

SPEKTRI 90.Probe 2

DEVICE CODE	S-90.Probe2		
SPECTRAL SENSOR			
Illuminance measurement range	20 – 50 000 lx	Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	WL range	380 – 780 nm
Accuracy	Luminous flux 4%, CCT 3%, CRI, Ra 2%, WL 1nm	Integration time*	35 ms – 30 000 ms
		Digital resolution	16 bits
Fiber	Core: 0.8mm, length 2m, NA: 0.39, long term radius of curvature: 110mm		
OTHER			
Powering	USB 5V		
Data readout	16x2 Display Option: SSL SRM sw, PC software through USB 2.0		
Dimensions	170mm x 175mm x 56mm		
Weight	710 g		

*The maximum time is user-defined parameter.

SPECTRORADIOMETER SPEKTRI 90.Advanced

DEVICE CODE	S-90.Adv		
SPECTRAL SENSOR			
Illuminance measurement range	40 – 100 000 lx	Optical Bandwidth	9 – 11 nm
Sensor	CMOS diode array	WL resolution	1 nm
Signal to noise	1000 : 1	WL range	380 – 780 nm
Accuracy	Luminous flux 4%, CCT 3%, CRI, Ra 2%, WL 1nm	Integration time*	35 ms – 30 000 ms
		Digital resolution	16 bits
Fiber	Bifurcated fiber. Core: 0.6mm, length 2m, NA: 0.39, long term radius of curvature: 96 mm		
AUX light source	Neutral white LED, power 1W, integrated inside S-90.Adv		
OTHER			
Powering	USB 5V		
Data readout	16x2 Display Option: SSL SRM sw, PC software through USB 2.0		
Dimensions	170mm x 175mm x 56mm		
Weight	710 g		



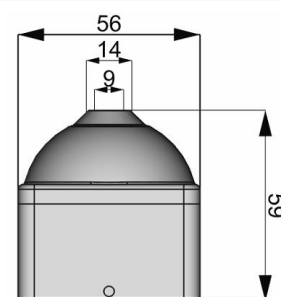
*The maximum time is user-defined parameter.

Luminous flux meter SSL SPHERE 5 F



TEST SYSTEM for Single LEDs and Miniature Light Sources

Product Code	SSL IS-50					
Application area	Spectral radiant flux, luminous flux					
Dimensions	59mm, 56mm, 56mm, 185 g					
Inner diameter	5 cm					
Surface coating	BaSO4 (inner surface), Black (outer surface)					
Test port opening	9 mm					
Auxiliary light source (optional)	integrated into S-80.xxx (optional), S-90.Adv (standard) S-80.Lab / S-90.Probe: External light source with bifurcated optical fiber					
Spectroradiometer	Compatible with SPEKTRI 80/90 models.					
Luminous flux range (lm)	S-80.PAR	S-80.Color	S-90.Lab	S-90.Probe	S-90.Adv	S-80.Phi
	0.3 – 450	0.1 – 200	0.5 – 200	15 – 8 000 ¹ 0.5 – 200 ²	2 – 1 000	2 – 5 000



SPHERE 5 F dimensions

¹Probe 1, ²Probe 2



SPHERE 5 F with S-90.Probe



SPHERE 5 F with SPEKTRI 80 & Android app



SPHERE 5 F with S-90.Lab

SPECTRORADIOMETERS

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High resolution & High Sensitivity Spectroradiometer



Luminance mode



Illuminance mode

Application examples:

- General spectroscopy
- Displays
- General lighting

SPECTRORADIOMETER

SSL S-680 - SPECIFICATION

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DEVICE CODE	SSL S-680
Detector	3648 pixel CCD spectrometer of type Toshiba TCD1304 (UV enhanced coating)
Wavelength range	Full range version: 200-1050nm (calibrated range 250-1050 nm) S-680.VSM: 380 - 760 nm S-680.VRW: 350 - 1050 nm S-680.UVM: 250 - 450 nm S-680.URW: 250 - 1050 nm
Measurement ranges ¹	0.5 – 5 000 000 lx [S-680.VRW_5_D0.5] 2 – 15 000 000 lx [S-680.VRW_5_D2.0] 0.04 – 3 700 000 cd/m ² [S-680.VRW_5_L1] 0.02 – 1 800 000 cd/m ² [S-680.VRW_10_L1]
Bandwidth	3-5 nm (standard), customizable between 0.3-10nm
Signal to noise	>300:1
Stray light	<0.1%
Accuracy ²	Radiometric quantities: 7% (280-330nm), 4.5% (330-400nm), 3.5% (400-900 nm), 4.5% (900-1050nm)
Min Int. time	8 ms (standard), 0.01 ms (CCD shutter mode)
Dimensions	90 mm X 70 mm X 44 mm
Weight	420 g
PC Interface	USB 1.1/2.0
Features	Automatic integration time, Automatic filtering of noise peak, Wavelength calibration, Spectral irradiance responsivity calibration
Measuring head	See next page.
Measurement sw	Measurement software add-on to SSL GPM Gonio, SSL SRM.IS sphere sw. SRM.Ee sw

¹ Example ranges for S-680.VRW model. Measurement range is dependent on light source spectrum shape. The indicated dynamic range is for standard illuminant A (CCT 2856K).

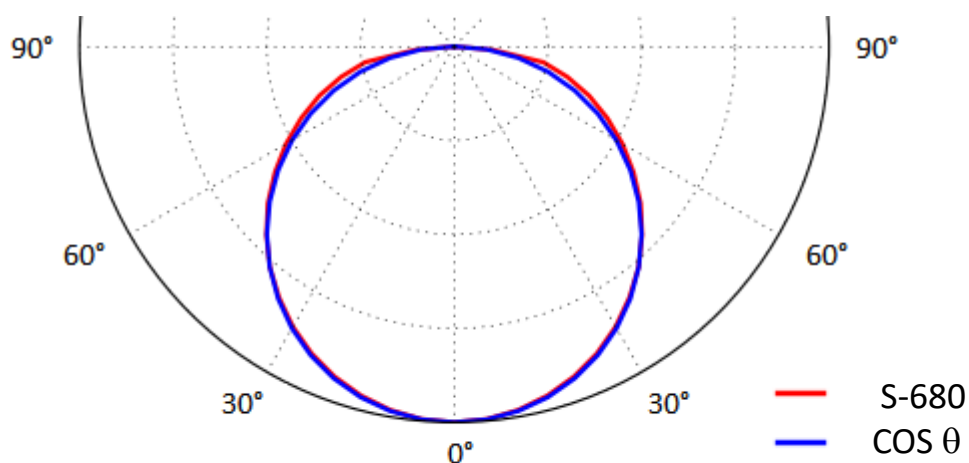
² Accuracy is a typical expanded measurement uncertainty of calibration with the coverage probability of 95% (k=2).

S-680

Ordering Codes

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Order code	S-680.XYZ_WL_MH
S-680	Toshiba TCD1304 CCD
XYZ	Measurement wavelength range URW: 250-1050nm VRW: 350-1050 VSM: 380-760 UV: 250-450
WL	Wavelength bandwidth, Optical resolution (nm) 1 = 1nm 5 = 5nm 10 = 10nm
MH	Measuring head type D0.5 = Irradiance probe with 0.5mm PTFE diffuser D2.5 = Irradiance probe with 2.5mm PTFE diffuser L1 = Radiance probe with 1.5° FOV
Example:	
S-680.VRW_5_D2.5	Spectroradiometer with 350-1050nm calibrated measuring range with the wavelength bandwidth of 5nm and irradiance probe with 2.5mm PTFE diffuser



High Resolution Spectrometers

UV-Vis-NIR Spectrometers



NIR-MIR Spectrometers



SPECTROMETERS

Spectral Products, UV-VIS-NIR

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Code	Type	WL range (nm)	Auto Shutter	SNR	Dark noise (counts)	Resolution (nm) *)	Dimensions / weight (mm/Kg)
SM245	Low-noise compact CCD spectrometer	200-1050		300:1	< 35	0.25-10	90x70x44 / 0.4
SM303	High performance TE-cooled backthinned spectrometer	200-1100	x	1000:1	2	0.2-7	173x120x80 / 2.0
SM303-HRS	High-resolution TE-cooled backthinned spectrometer	200-1100	x	300:1	9	0.2-7	235x177x96 / 3.7
SM445	High Speed, High-resolution spectrometer	200-1050	x	>300:1	< 50	0.1-10	90x70x44 / 0.4
SM540	High-resolution spectrometer	200 - 1050		250:1	< 50	0.1-10	178x172x77 / 0.2
SM642	Low-noise non TE-cooled Backthinned spectrometer	200-1050	x	450:1	< 7	0.25-7	235x177x80 / 1.2

*) depending on the slit and grating choices

SPECTRORADIOMETERS

Spectral Products NIR-MIR

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Code	Type	WL range (nm)	Auto Shutter	SNR	Dark noise (counts)	Resolution (nm) *)	Dimensions / weight (mm/Kg)
SM241	Low-cost Infrared Spectrometer	900-1700		250:1	< 60	1.0-10	121x121x54 / 0.7
SM301	PbS / PbSe NIR/MIR spectrometer	1000-5000	x		~ 20	10-30	173x120x98 / 2.5
SM304	Near Infrared spectrometer	900-2500	x	>7500:1	~ 20	3-9	173x120x75 / 2.0

*) depending on the slit and grating choices

SSL Broadband Photometers

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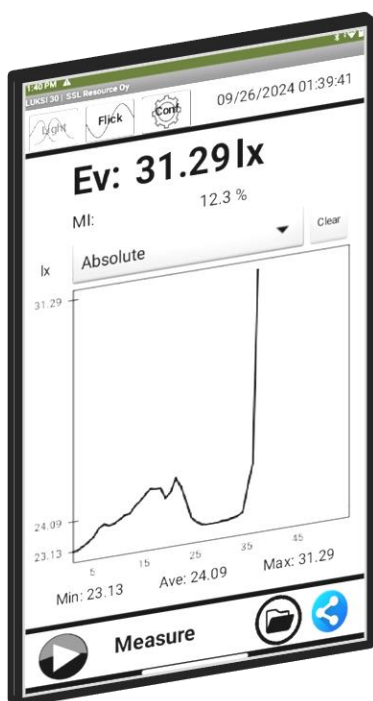
Photometers



SSL LUKSI 30

Hand-held Luxmeter

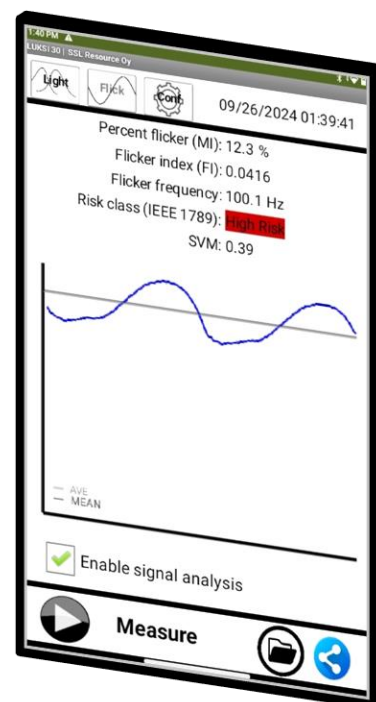
Portable light meter for measuring temporal behavior of light intensity



Light tab



➤ Measurement through Bluetooth using Android app



Flicker tab

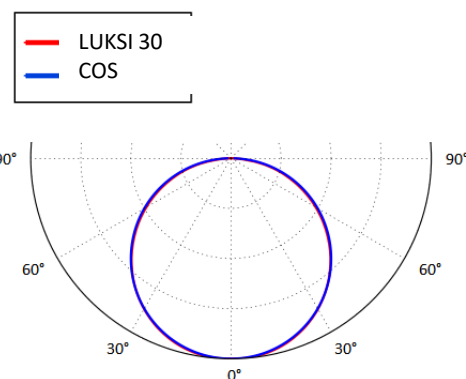
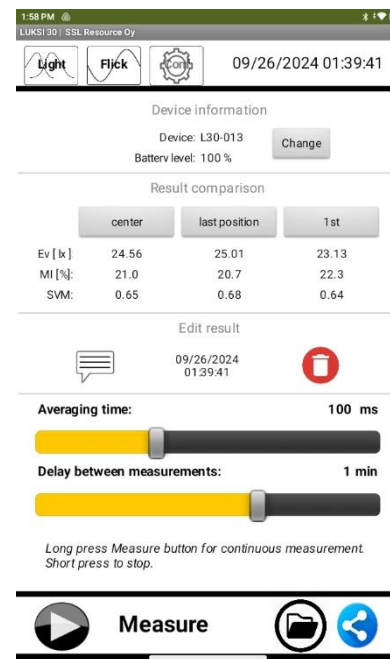
Measurement parameter	LUKSI 30	LUKSI 30 + LTA.FL sw	LUKSI 30 + LTA.El sw	LUKSI 30 + LTA.PRO sw
Illuminance Ev (lx)	✓	✓	✓	✓
Effective Intensity (cd)			✓	✓
Flicker Index FI	✓	✓	✓	✓
Percent Flicker MI (%)	✓	✓	✓	✓
Flicker Frequency (Hz)	✓	✓	✓	✓
Stroboscopic Visual Measure SVM	✓	✓	✓	✓
Short-term Perceptibility Light Modulation P_{st}^{LM}		✓		✓

SSL LUKSI 30 C2

Hand-held Luxmeter

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DEVICE CODE	L-30.2-f10
Measurement range	5 – 1 000 000 lx
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Data communication	USB, BT
Battery	1 150mAh
Data storage capacity	1 E+8 samples
Measuring head	PTFE diffuser (diam. 20mm) with $V(\lambda)$ filter
Data readout	Bluetooth (Android app) USB 2.0 (Optional: PC software)
Spectral quality factor f_1'	10 %
UV response u	0.1 %
IR response r	2.5 %
Directional response f_2	2 %
Linearity response f_3	0.2 %
Display unit f_4	0.2 %
Fatigue response f_5	0.2 %
Temperature response f_6	
Lower frequency limit for f_7	10 Hz (f_7 : 5%)
Upper frequency limit for f_7	20 kHz (f_7 : 5%)
Modulated light f_7	0.1 %
Spatial response f_9	12 %
Range change f_{11}	0.1 %
Dimensions	118mm x 78mm x 42mm
Weight	220 g

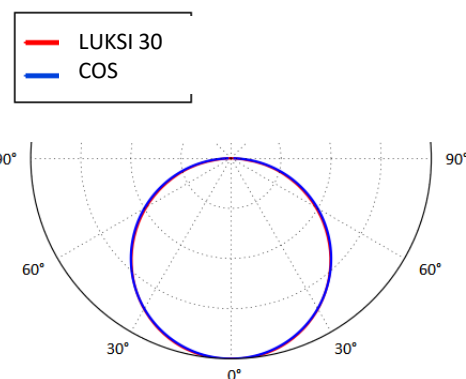
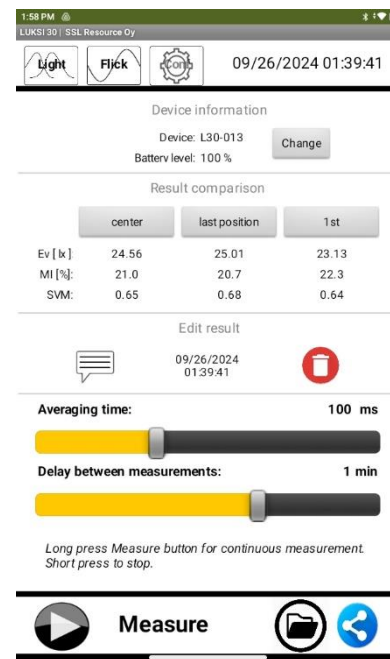


SSL LUKSI 30 C6

Hand-held Luxmeter

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DEVICE CODE	L-30.6-f10
Measurement range	1 – 200 000 lx
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Data communication	USB, BT
Battery	1150mAh
Data storage capacity	1E+8 samples
Measuring head	PTFE diffuser (diam. 20mm) with $V(\lambda)$ filter
Data readout	Bluetooth (Android app) USB 2.0 (Optional: PC software)
Spectral quality factor f_1'	10 %
UV response u	0.1 %
IR response r	2.5 %
Directional response f_2	2 %
Linearity response f_3	0.2 %
Display unit f_4	0.2 %
Fatigue response f_5	0.2 %
Temperature response f_6	
Lower frequency limit for f_7	10 Hz (f_7 : 5%)
Upper frequency limit for f_7	20 kHz (f_7 : 5%)
Modulated light f_7	0.1 %
Spatial response f_9	12 %
Range change f_{11}	0.1 %
Dimensions	118mm x 78mm x 42mm
Weight	220 g

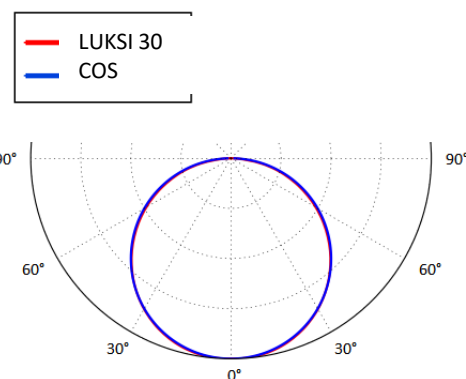
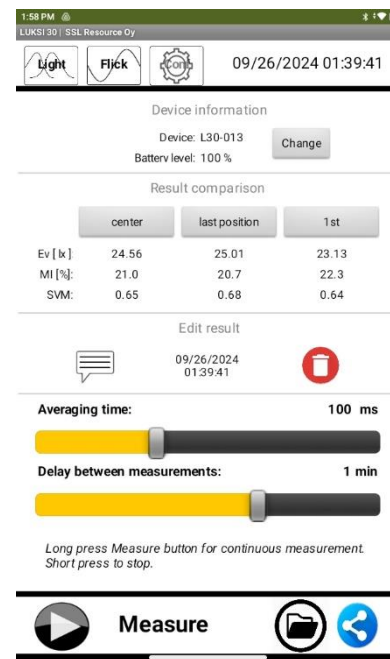


SSL LUKSI 30 A3

Hand-held Luxmeter

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DEVICE CODE	L-30.3-f3
Measurement range	5 – 1 000 000 lx
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Data communication	USB, BT
Battery	1 150mAh
Data storage capacity	1 E+8 samples
Measuring head	PTFE diffuser (diam. 20mm) with $V(\lambda)$ filter
Data readout	Bluetooth (Android app) USB 2.0 (Optional: PC software)
Spectral quality factor f_1'	3 %
UV response u	0.1 %
IR response r	2.5 %
Directional response f_2	2 %
Linearity response f_3	0.2 %
Display unit f_4	0.2 %
Fatigue response f_5	0.2 %
Temperature response f_6	
Lower frequency limit for f_7	10 Hz (f_7 : 5%)
Upper frequency limit for f_7	20 kHz (f_7 : 5%)
Modulated light f_7	0.1 %
Spatial response f_9	12 %
Range change f_{11}	0.1 %
Dimensions	118mm x 78mm x 42mm
Weight	220 g

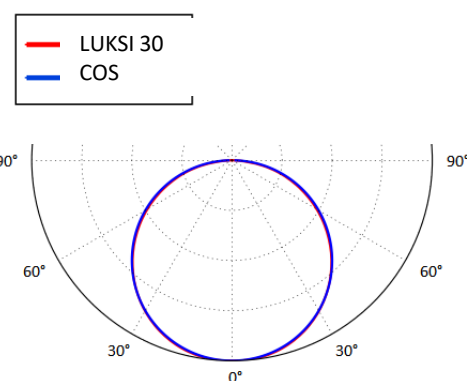
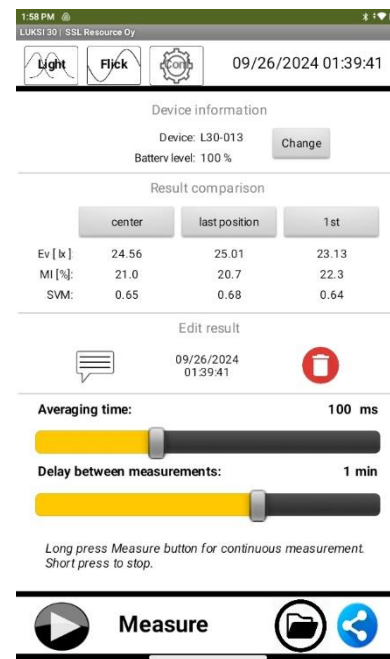


SSL LUKSI 30 A6

Hand-held Luxmeter

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DEVICE CODE	L-30.6-f3
Measurement range	1 – 200 000 lx
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Data communication	USB, BT
Battery	1 150mAh
Data storage capacity	1 E+8 samples
Measuring head	PTFE diffuser (diam. 20mm) with $V(\lambda)$ filter
Data readout	Bluetooth (Android app) USB 2.0 (Optional: PC software)
Spectral quality factor f_1'	3 %
UV response u	0.1 %
IR response r	2.5 %
Directional response f_2	2 %
Linearity response f_3	0.2 %
Display unit f_4	0.2 %
Fatigue response f_5	0.2 %
Temperature response f_6	
Lower frequency limit for f_7	10 Hz (f_7 : 5%)
Upper frequency limit for f_7	20 kHz (f_7 : 5%)
Modulated light f_7	0.1 %
Spatial response f_9	12 %
Range change f_{11}	0.1 %
Dimensions	118mm x 78mm x 42mm
Weight	220 g



SSL MOOLI 30 C2

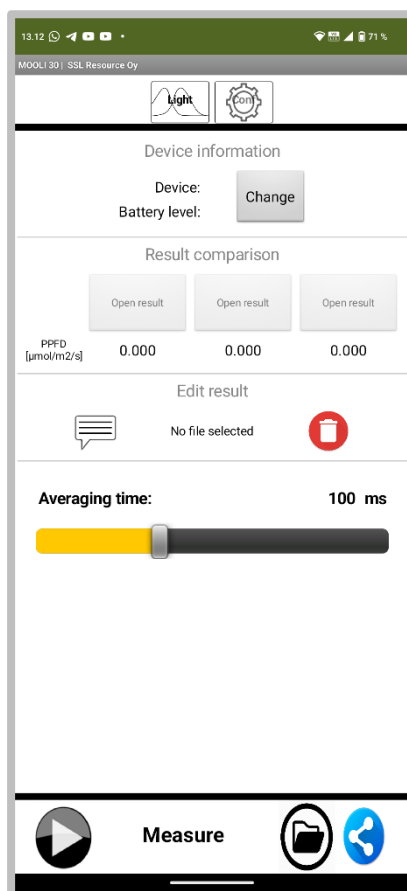
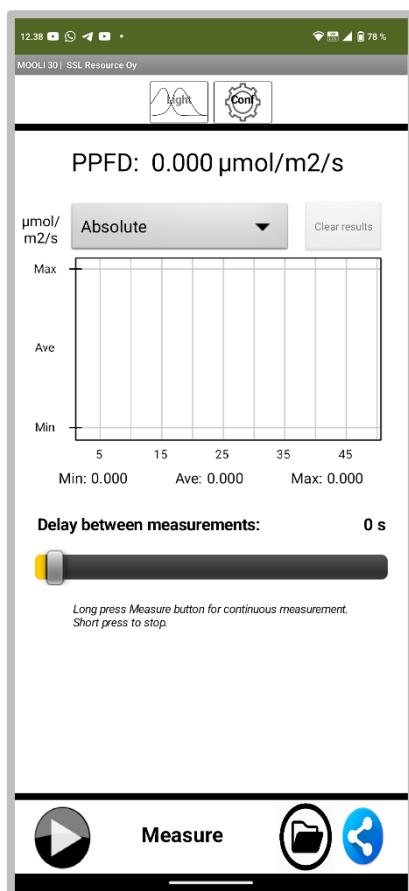
Hand-held PPFD meter

Portable light meter for measuring Photosynthetic photon flux density PPFD ($\mu\text{mol/s/m}^2$)



Features

- Measurement readings through Android app.
- Datalogging storing to memory.



SSL MOOLI 30 C2

Hand-held PPFD meter

Portable light meter for horticultural applications to measure

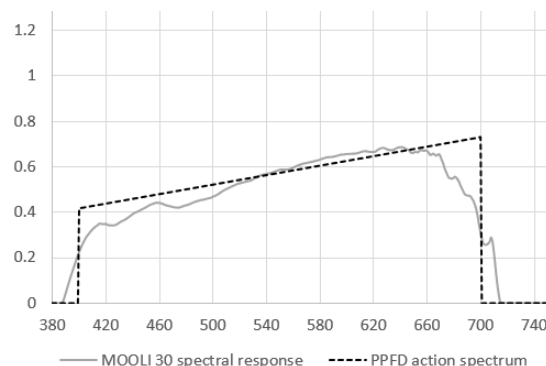
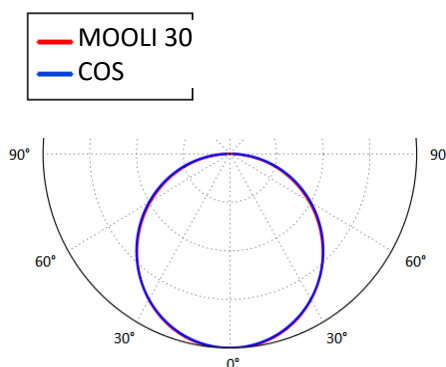
- ✓ Photosynthetic photon flux density PPFD ($\mu\text{mol/s/m}^2$)

Features

- Measurement readings through Android app.
- Datalogging storing to memory.



DEVICE CODE	L-30.3-PPFD
Measurement range	0 – 50 000 $\mu\text{mol/s/m}^2$
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Linearity	<0.1%
Battery	1150mAh
Data storage capacity	1E+8 samples
Measuring head	PMMA diffuser (diam. 20mm) with PPF filter
Data readout	Android app through Bluetooth
Directional response f_2	2%
Dimensions	118mm x 78mm x 42mm, 220 g



Package content of MOOLI 30: MOOLI 30, Carrying case, 7" Android tab

SSL WATTI 30

Hand-held Irradiance Radiometer

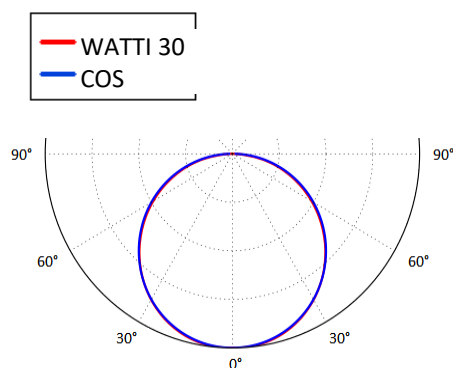
Features

- ✓ Measurement quantity: Irradiance
- ✓ Measurement units: mW/m^2 , W/m^2 , mW/cm^2 , $\mu\text{W}/\text{m}^2$
- Wavelength selection of test light as an input.
- Choose WATTI 30 with your required wavelength range

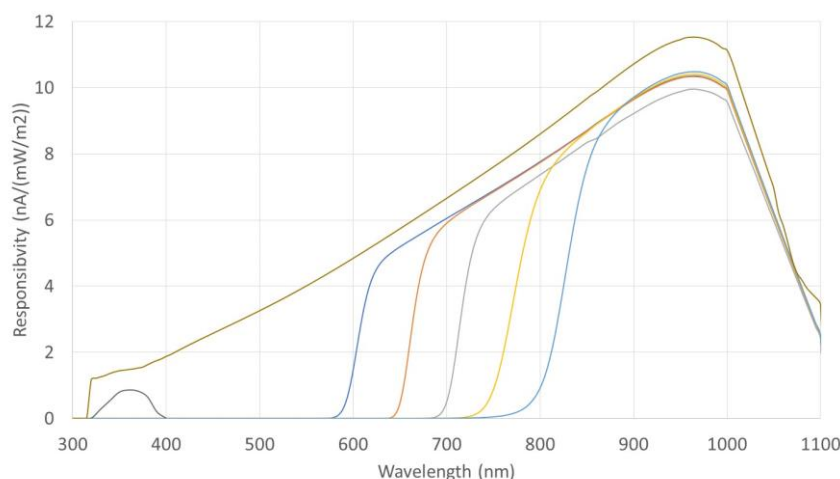


DEVICE CODE	L-30.6-xxx
Measurement range	(10nA – 1mA) / Responsivity
Signal bandwidth	4 kHz
Sampling rate	20 kHz
Linearity	<0.1%
Battery	1150mAh
Data storage capacity	1E+8 samples
Measuring head	Silicon photodiode with PTFE diffuser (Ø 20mm) and filter
Data readout*	Android app through BT/USB
Directional response f_2	2%
Dimensions	118mm x 78mm x 42mm, 220 g

*Optional: LTA-sw PC software with flicker/ Effective intensity



Order code	WL range (nm)
L-30.6-610	610 – 1050
L-30.6-665	665 – 1050
L-30.6-715	715 – 1050
L-30.6-780	780 – 1050
L-30.6-830	830 – 1050
L-30.6-UVA1	320 – 400
L-30.6-na	320 – 1000



— L-30.6-610 — L-30.6-665 — L-30.6-715 — L-30.6-780 — L-30.6-830 — L-30.6-UVA1 — L-30.6-na

Catalogue of SSL Broadband Photometers

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Comprehensive Product Family for photometers and tristimulus colorimeters

- ❑ The photocurrent meters contain high-quality transimpedance amplifiers (TIA)
 - ✓ Communication bus: Bluetooth, USB or RS232
 - ✓ 5 to 9 measurement decades
- ❑ Photopic X,Y,Z measuring heads for different dynamic ranges and spectral quality
 - ✓ SSL LH for $V(\lambda)$ match CIE1924, for PPFD, NIR irradiance, and UVA irradiance
 - ✓ SSL CH for X,Y,Z match CIE1931
 - ✓ SSL UVH for UVC measurements



SSL Photocurrent Meters

- Product List

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Item	Channel	Bus	Photocurrent Measuring Ranges	Example Applications
SSL LC-800.1	1	RS-232	30 pA – 30 mA	Goniophotometer, Flicker, LightTester
SSL LC-800.2	2	RS-232	30 pA – 30 mA	Goniophotometer, LightTester
SSL LC-800.3	3	RS-232	30 pA – 30 mA	Goniophotometer, LightTester
SSL LC-800.4	4	RS-232	30 pA – 30 mA	Goniophotometer, LightTester
SSL L-200 Discontinued	1	RS-232	50 pA – 20 mA	Goniophotometer
SSL L-40 Discontinued	1	USB	0.5 nA – 30 μ A	Goniophotometer
SSL L-40.2 Discontinued	1	USB	5 nA – 300 μ A	LightTester
SSL L-50	1	RS-232, USB, BT*	5 nA – 30 mA	Flicker, Gonio-BPC, LightTester
SSL L-51	1	RS-232, USB, BT*	30 pA – 30 μ A	Goniophotometer
SSL C-400	3	USB	0.5 nA – 30 μ A	Goniophotometer
SSL C-400.2	3	USB	5 nA – 300 μ A	Flicker, LightTester
SSL LC-multibox	Adapter box for combining of up to 4 pcs of LH measuring heads to LC-800			Simultaneous measurement with several LH

* Optional

SSL LC-800.x

Photocurrent meter



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Advantages of new version for multichannel photocurrent meter

- Wider dynamic range of 9 decades
 - 4-channels for separation of X channel to X_{red} and X_{blue}
 - Larger bandwidth at smaller photocurrents
 - Improved sampling rate
 - On-the-fly measurement compatible
-
- ☐ 1-4 Channel Transimpedance amplifier (TIA)
 - ☐ Measurement quantities:
 - ✓ Illuminance E_v (lx)
 - ✓ Effective Luminous Intensity
 - ✓ Flicker Index FI, Percent Flicker MI (%), Flicker Frequency (Hz)
 - ✓ Stroboscopic Visual Measure SVM
 - ✓ Short-term Perceptibility Light Modulation P_{st}^{LM}
 - ✓ CCT (K), CIE1931 xy, CIE1976 u'v'
 - ☐ 12V power supply
 - ☐ Data communication: RS-232 (DB9), USB B 2.0
 - ☐ Compatible with CH and LH measuring heads



Fig. Rear panel.

SSL LC-800.x

Photocurrent meter

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Signal bandwidth*	Photocurrent range
15 kHz	200 nA – 18 mA
6 kHz	15 nA – 200 nA
700 Hz	1 nA – 15 nA
50 Hz	30 pA – 1 nA
SVM requirement: > 2 kHz	15 nA – 18 mA

* Optional: Bandwidth filter of 4kHz can be setup separately.

- ☐ Photocurrent measurement range:
 - ✓ 30 pA – 18 mA (high sensitivity acquisition mode)
 - ✓ 30 nA – 18 mA (on-the-fly acquisition mode)
- ☐ Linearity <0.1%
- ☐ Sampling rate
 - ✓ Timed sampling: 100 kHz (10μs)
 - ✓ Maximum: ~200 kHz (5μs)
 - ✓ SVM: 36 kHz (1s measuring time)
 - ✓ P_{st}^{LM} : 2 kHz (1-5min)
- ☐ Package includes: LC-800, 12V power supply, 1.8m USB cable, 1.8m RS-232 cable.

SSL L-50

Photocurrent meter



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- ☐ Transimpedance amplifier (TIA)
- ☐ Measurement quantities:
 - ✓ Illuminance E_v (lx)
 - ✓ Effective Luminous Intensity
 - ✓ Flicker Index FI, Percent Flicker MI (%), Flicker Frequency (Hz)
 - ✓ Stroboscopic Visual Measure SVM
 - ✓ Short-term Perceptibility Light Modulation P_{st}^{LM}



Parameter	Designator	Value
Photocurrent i_p measurement range		5 nA – 30 mA
Signal bandwidth	$i_p > 100$ nA	15 kHz
	$i_p = 5 - 100$ nA	4kHz, (SVM requirement >2 kHz)
Sampling rate	Maximum	100 kHz
	SVM (1s measuring time)	36 kHz
	P_{st}^{LM} (1-5 min)	2 kHz
Linearity		$<0.1\%$

- ☐ Data communication: RS-232, USB, BT
- ☐ USB powered by PC or external 5V battery
- ☐ Compatible with SSL photopic measuring heads (LH)
- ☐ Package includes:
 - ✓ Standard: L-50, 1.8m RS-232/USB cable
 - ✓ Bluetooth: L-50.BT, external 5V battery, 1.8m RS-232/USB cable

SSL L-51

Photocurrent meter



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- ☐ Transimpedance amplifier (TIA)
- ☐ Measurement quantities:
 - ✓ Illuminance E_v (lx)
 - ✓ Effective Luminous Intensity
 - ✓ Flicker Index FI, Percent Flicker MI (%), Flicker Frequency (Hz)
 - ✓ Stroboscopic Visual Measure SVM
 - ✓ Short-term Perceptibility Light Modulation P_{st}^{LM}



Parameter	Designator	Value
Photocurrent i_p measurement range		30 pA – 30 μ A
Signal bandwidth	$i_p > 100$ nA	15 kHz
	$i_p > 10$ nA	>2kHz, (SVM requirement >2 kHz)
Sampling rate	Maximum	100 kHz
	SVM (1s measuring time)	36 kHz
	P_{st}^{LM} (1-5 min)	2 kHz
Linearity		<0.1%

- ☐ Data communication: RS-232, USB, BT
- ☐ USB powered by PC or external 5V battery
- ☐ Compatible with SSL photopic measuring heads (LH)
- ☐ Package includes:
 - ✓ Standard: L-51, 1.8m RS-232/USB cable
 - ✓ Bluetooth: L-51.BT, external 5V battery, 1.8m RS-232/USB cable

SSL C-400

Photocurrent meter

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- ☐ 3-channel photocurrent meter
- ☐ Measurement quantities: Illuminance E_v (lx), Correlated Color temperature CCT (K), color coordinates CIE1931 xy , CIE1976 $u'v'$, Flicker Index, Percent flicker, Flicker frequency, SVM, PstLM
- ☐ 4 measuring ranges in decades
- ☐ Self-color correction algorithm for xy , CCT and E_v based on initial integrated XYZ values
- ☐ Measurement range: 0.3 lx – 10 klx (C-400) / 3 lx - 100 klx (C-400.2)
- ☐ Photocurrent measurement range:
 - ✓ 0.5 nA – 30 μ A (C400)
 - ✓ 5 nA – 300 μ A (C400.2)
- ☐ Signal bandwidth:
 - ✓ Maximum: 15 kHz @ photocurrent > 10 μ A
 - ✓ SVM requirement: > 2 kHz @ photocurrent > 100 nA
- ☐ Accuracy: $E_v \pm 4\%$, CCT ± 100 K
- ☐ Repeatability: $E_v < 0.3\%$, CCT < 20K
- ☐ USB powered (drivers installed automatically in Win 8)
- ☐ Measuring head CH22-3, Spectral match < 12%
- ☐ Standalone Executable testing software (.exe) and LabVIEW drivers for using C-400 in customer's own testing systems

SSL Measuring Heads

- Product List

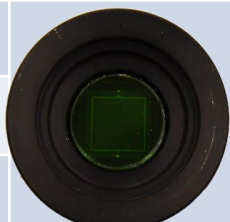
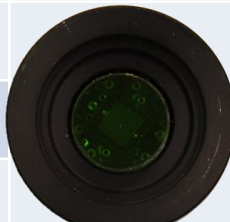
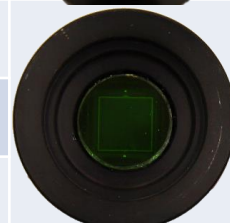
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Item	Channels	E_V (lx)	CCT (K)	CIE1931 xy	PPFD ($\mu\text{mol/s/m}^2$)	E_e (mW/m ²)	WL range (nm)	Active area (mm ²)
SSL LH1010-fx ^{*)}	1	x					360 – 830	100
SSL LH66-fx ^{*)}	1	x					360 – 830	34
SSL LH33-fx ^{*)}	1	x					360 – 830	5.8
SSL LH22.2-f10	1	x					400 – 750	6.7
SSL LH1010-f10	1	x					400 – 750	100
SSL CH22-3	3	x	x				400 – 750	6.7
SSL CH33-3	3	x	x	x			360 – 830	5.8
SSL CH66-3	3	x	x	x			360 – 830	34
SSL CH33-4	4	x	x	x			360 – 830	5.8
SSL CH66-4	4	x	x	x			360 – 830	34
SSL LH1010- μmol 10	1				x		400 – 700	100
SSL LH66- μmol 10	1				x		400 – 700	34
SSL LH33- μmol 10	1				x		400 – 700	5.8
SSL LH66-Irrad_610	1					x	610 – 1050	34
SSL LH66-Irrad_665	1					x	665 – 1050	34
SSL LH66-Irrad_715	1					x	715 – 1050	34
SSL LH66-Irrad_780	1					x	780 – 1050	34
SSL LH66-Irrad_830	1					x	830 – 1050	34
SSL UVH-220	1					x	215 – 225	13
SSL UVH-254	1					x	249 – 259	13
SSL UVH-275	1					x	270 – 280	13
SSL UVCH-3	3					x	215 – 280	13

^{*)} 'x' denotes the spectral quality f1' for two options 1.5% and 3%

SSL LH

Photopic Measuring Heads

SSL LH	S_{Ev} (nA/ lx)	f_1'	FOV (1)	Min. $D^{(2)}$ (m)	TIA	Illuminance Measuring Range (lx)	Back to Contents
LH1010- f1.5	30	<1.5 %	24°	8	L-51	3 E-3 – 1 E+3	
					L-50	5 E-1 – 1 E+5	
					LC-800	1 E-3 – 5 E+5	
LH66- f1.5	10	<1.5 %	62°	5	L-51	1 E-2 – 3 E+3	
					L-50	2 E+0 – 3 E+5	
					LC-800	3 E-3 – 1.5 E+6	
LH33- f1.5	1.7	<1.5 %	85°	2	L-51	6 E-2 – 1 E+4	
					L-50	1 E+1 – 1 E+6	
					LC-800	2 E-2 – 5 E+6	
LH1010- f3	30	<3%	24°	8	L-51	3 E-3 – 1 E+3	
					L-50	5 E-1 – 1 E+5	
					LC-800	1 E-3 – 5 E+5	
LH66-f3	10	<3%	62°	5	L-51	1 E-2 – 3 E+3	
					L-50	2 E+0 – 3 E+5	
					LC-800	3 E-3 – 8 E+5	
LH33-f3	1.7	<3%	85°	2	L-51	6 E-2 – 1 E+4	
					L-50	1 E+1 – 1 E+6	
					LC-800	2 E-2 – 5 E+6	

(1) FOV = Detection field-of-view.

(2) Min. D = Minimum distance to cover all sensors into the angular full field-of-view of 0.1°
(corresponding angular accuracy in goniometric measurements).

SSL LH

Photopic Measuring Heads

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SSL LH	S_{Ev} (nA/ lx)	f_1'	FOV (¹)	Min. D ⁽²⁾ (m)	TIA	Illuminance Measuring Range (lx)	
LH22.2- f10	3.6	<10 %	106°	2	L-51	1 E-2 – 8 E+3	
					L-50	2 E+0 – 8 E+5	
					LC-800	8 E-3 – 8 E+6	
LH22.2- f10-TD2	0.08	<9%	180°	2	L-51	4 E-1 – 4 E+5	
					L-50	7 E+1 – 4 E+7	
					LC-800	5 E-1 – 4 E+8	
LH1010- f10	50	<10 %	24°	8	L-50	3 E-1 – 6 E+4	
LH66- f10	17	<10 %	62°	5	L-50	9 E-1 – 2 E+5	
LH33- f10	2.8	<10 %	85°	2	L-50	5 E+0 – 1 E+6	

⁽¹⁾ FOV = Detection field-of-view.

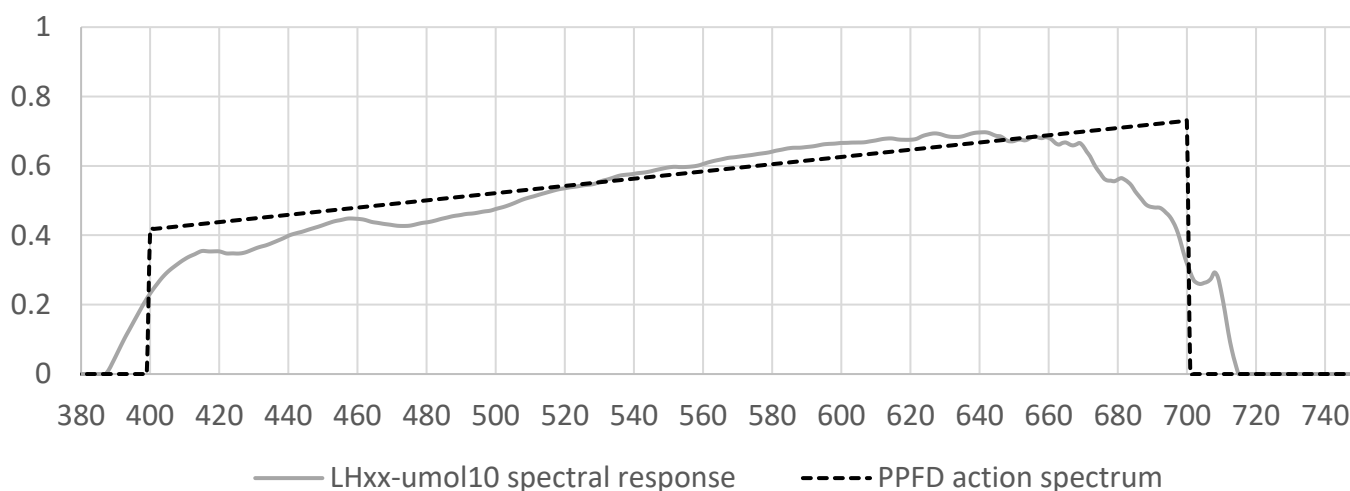
⁽²⁾ Min. D = Minimum distance to cover all sensors into the angular full field-of-view of 0.1°
(corresponding angular accuracy in goniometric measurements).

SSL LH PPFD Measuring Heads

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LH	Sensitivity [$\mu\text{A}/(1000 \mu\text{mol/s/m}^2)$]	TIA	Measuring range ($\mu\text{mol/s/m}^2$)	
SSL LH1010- μmol10	400	L-51	7.5 E-5 – 7.5 E+1	
		L-50	1.3 E-2 – 7.5 E+3	
		LC-800	7.5 E-5 – 7.5 E+4	
SSL LH66- μmol10	130	L-51	2.3 E-4 – 2.3 E+2	
		L-50	3.8 E-2 – 2.3 E+4	
		LC-800	2.3 E-4 – 2.3 E+5	
SSL LH33- μmol10	23	L-51	1.3 E-3 – 1.3 E+3	
		L-50	2.2 E-1 – 1.3 E+5	
		LC-800	1.3 E-3 – 1.3 E+6	

Options: PTFE diffuser for cosine corrector



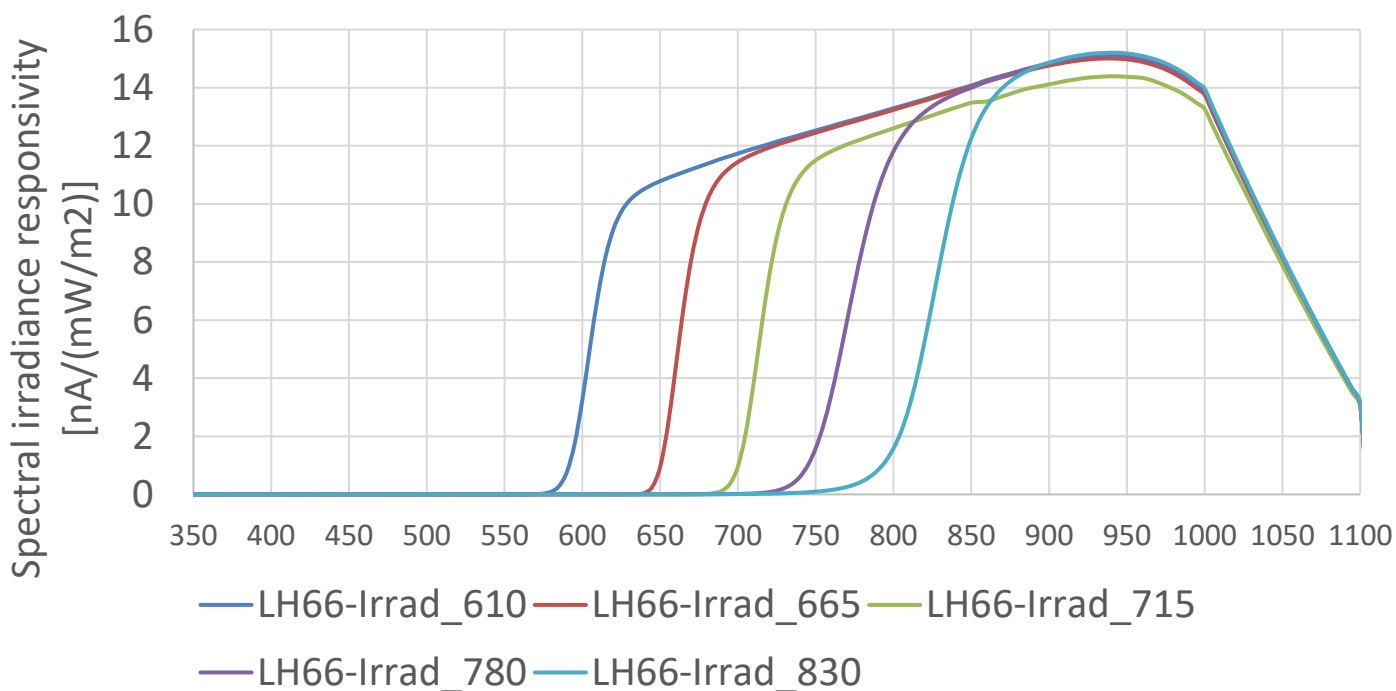
SSL LH

IR Irradiance Measuring Heads

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LH	Wavelength range (nm)	Peak Sensitivity [nA/(mW/m ²)]	Measurement range (mW/m ²)	
SSL LH66-Irrad_610	610 – 1050	15	L-51	2.0E-3 – 2.0E+3
SSL LH66-Irrad_665	665 – 1050	15		
SSL LH66-Irrad_715	715 – 1050	14	L-50	3.3E-1 – 2.0E+5
SSL LH66-Irrad_780	780 – 1050	15		
SSL LH66-Irrad_830	830 – 1050	15	LC-800	2.0E-3 – 2.0E+6

Options: PTFE diffuser for cosine corrector



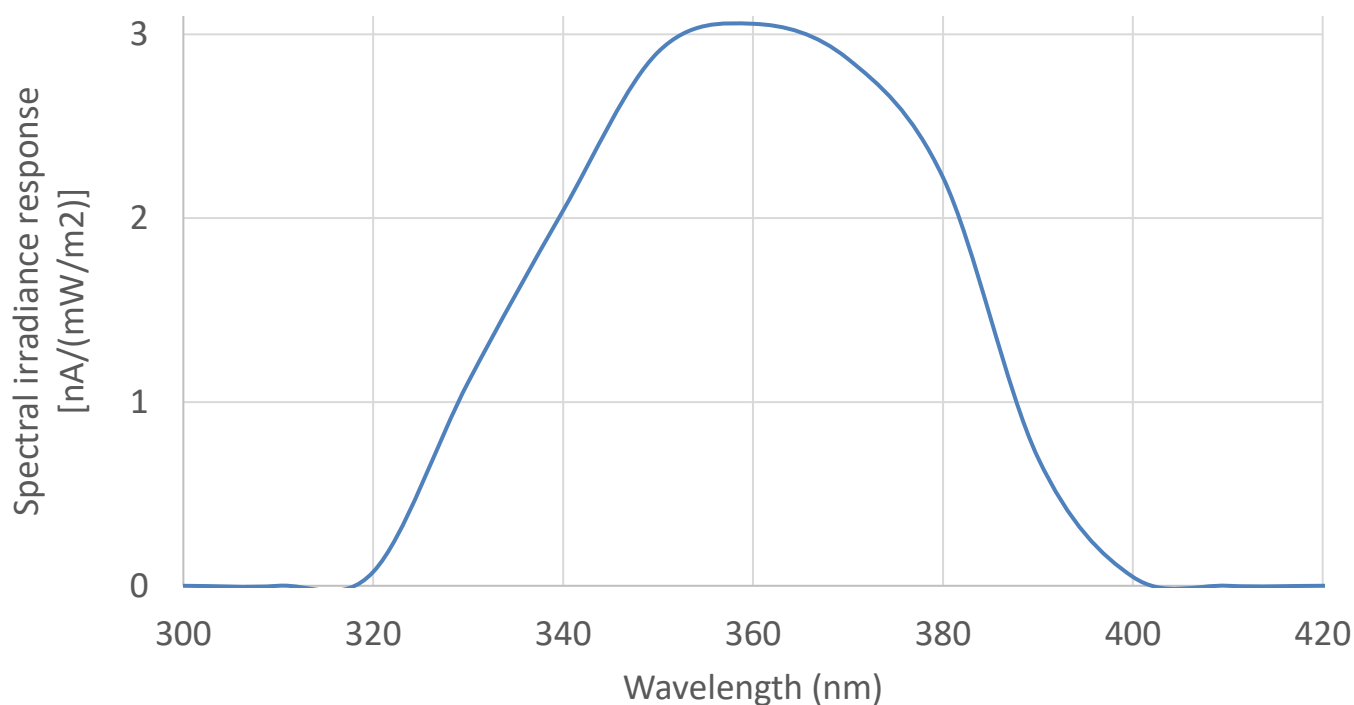
SSL LH

UV Irradiance Measuring Heads

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LH	Wavelength range (nm)	Peak Sensitivity [nA/(mW/m ²)]	Measurement range (mW/cm ²)	
SSL LH66-UVA1	320 – 400	3	L-51	1E-6 – 1E+0
			L-50	2E-4 – 1E+3
			LC-800	1E-6 – 1E+3

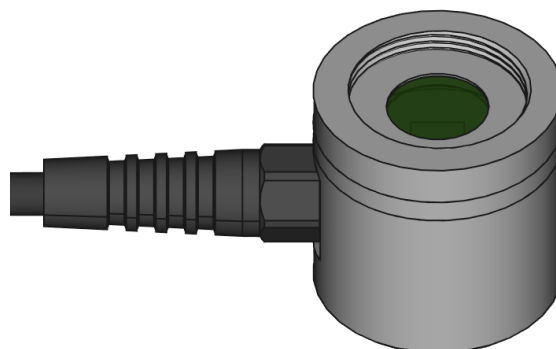
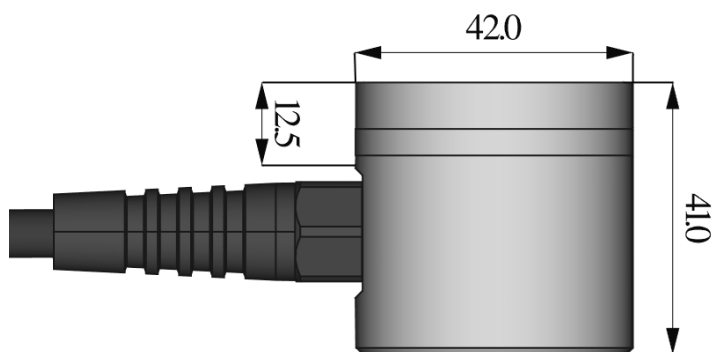
Options: PTFE diffuser for cosine corrector



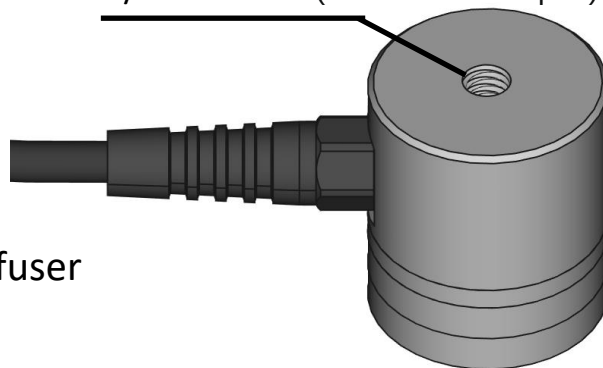
LH Measuring Heads - Dimensions

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LHxx measuring heads without diffuser

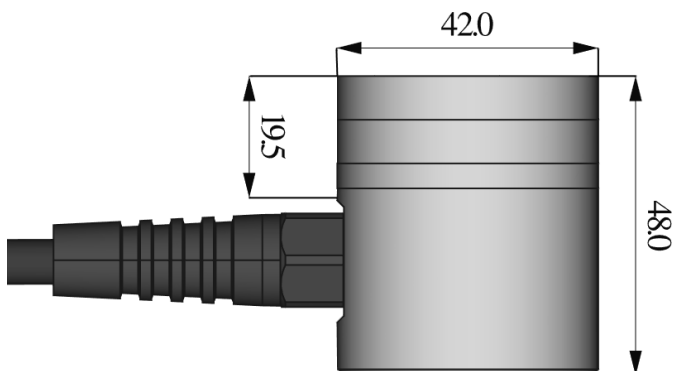


3/8"-16 UNC (1/4"-20 with adapter)



LHxx measuring heads with PTFE cosine diffuser

1-channel UV measuring heads.



SSL UVH

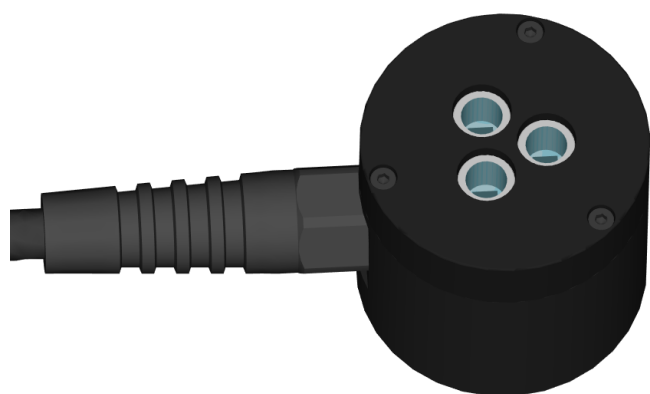
UV-C Irradiance Measuring Heads

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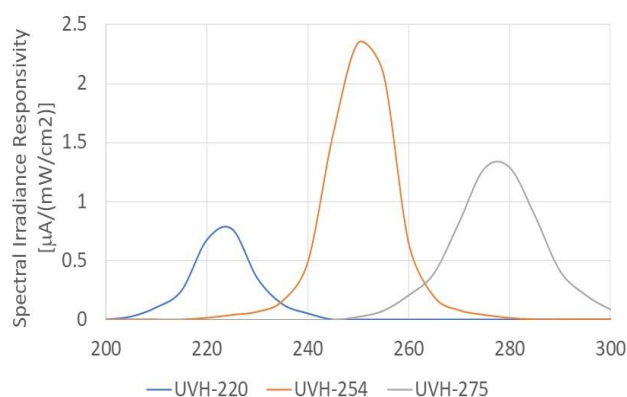
UVH	Center Wavelength (nm)	Bandwidth, FWHM (nm)	Peak Sensitivity [$\mu\text{A}/(\text{mW}/\text{cm}^2)$]	Active area
SSL UVH-220	216 – 224	10 ± 3.5	0.8	13 mm ²
SSL UVH-254	252 – 256	10 ± 2	2.4	13 mm ²
SSL UVH-275	271 – 279	10 ± 3.5	1.3	13 mm ²
SSL UVCH-3	216 – 279	Appr. 80	2.4	Ø16mm



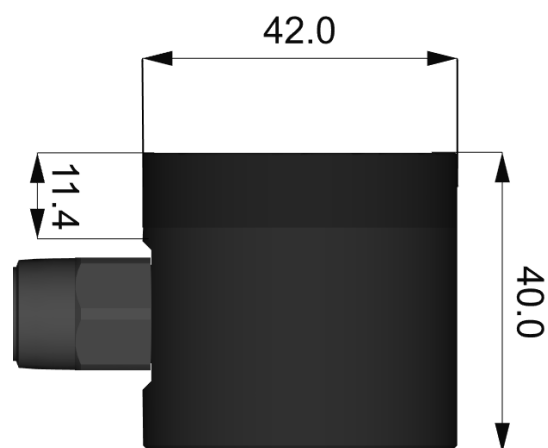
1-channel UV-C measuring heads.



3-channel UV-C measuring head (UVCH-3).



Typical spectral irradiance responsivity.



Dimensions of UVH measuring heads.

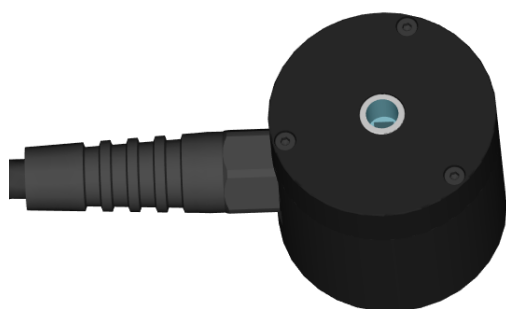
SSL IRH

Infrared Irradiance Heads

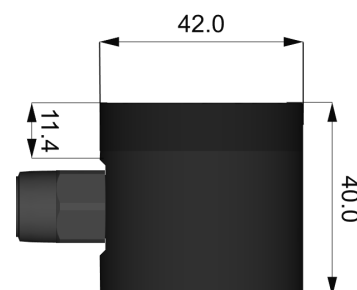
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IRH*	Channels	WL range	Active area
SSL IRH-1700-30_xx	1	900 – 1700	Ø 3 mm
SSL IRH-1700-10_xx	2	350 – 1700	Ø 1 mm (IR) 2.4x2.4 mm ² (VIS)

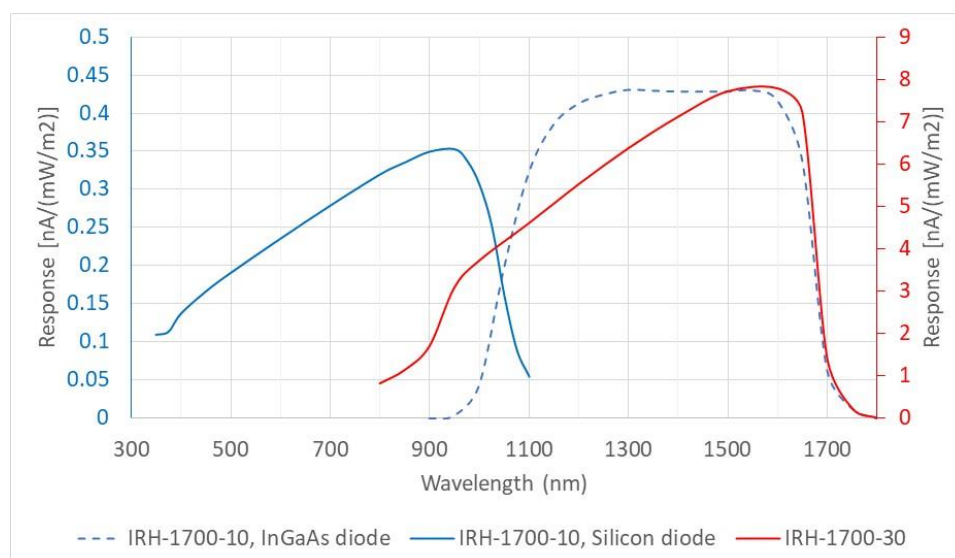
*Two optional bodies (xx=42 or 34): xx denotes the diameter of the measuring head body in mm.



IRH measuring heads (xx=42)



Dimensions of IRH measuring heads (x=42).

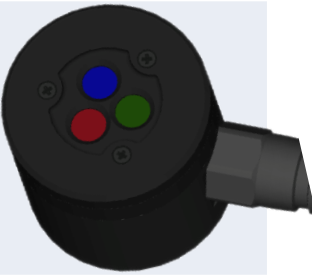
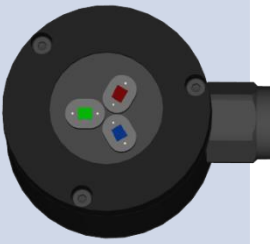


Spectral irradiance responsivity.

SSL CH

Color Measuring Heads

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CH	S_{Ev} (nA/ lx)	f_1'	FOV ⁽¹⁾	Min. D ⁽²⁾ (m)	Illuminance range(lx)	
CH66-4	10	Y, X _r , X _b : 3% Z: 3.5%	15°	15	3 E-3 – 8 E+5	
CH66-4_YL		Y: 1.5% X _r , X _b : 3% Z: 3.5%				
CH66-3	10	Y, X _r : 3% Z: 3.5%	15°	13	3 E-3 – 8 E+5	
CH66-3_YL		Y: 1.5% X _r : 3% Z: 3.5%				
CH33-4	1.7	Y, X _r , X _b : 3% Z: 3.5%	22°	9	2 E-2 – 5 E+6	
CH33-4_YL		Y: 1.5% X _r , X _b : 3% Z: 3.5%				
CH33-3	1.7	Y, X _r : 3% Z: 3.5%	22°	8	2 E-2 – 5 E+6	
CH33-3_YL		Y: 1.5% X _r : 3% Z: 3.5%				
CH22-3	3.6	<12%	60°	4	8 E-3 – 8 E+6	

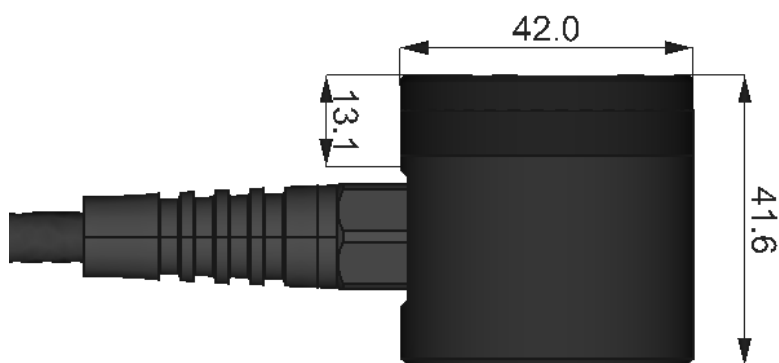
⁽¹⁾ FOV = Detection field-of-view of each sensors.

⁽²⁾ Min. D = Minimum distance to cover all sensors into the angular full field-of-view of 0.1°
(corresponding angular accuracy in goniometric measurements).

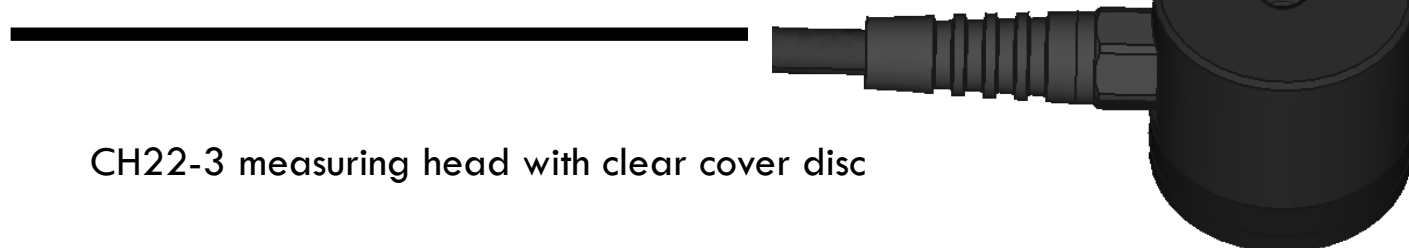
CH Measuring Heads - Dimensions

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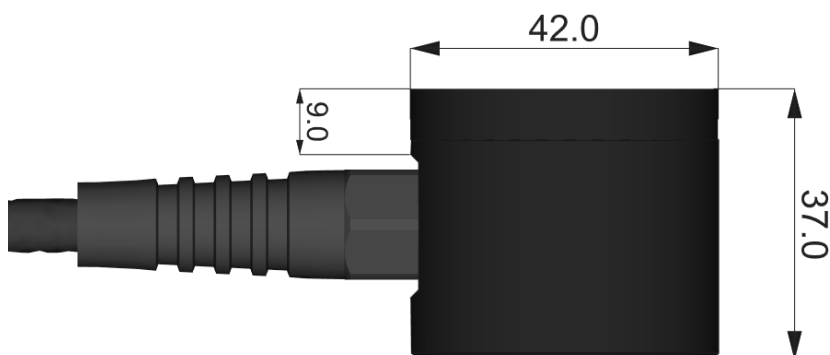
CH33-x and CH66-x measuring heads



3/8"-16 UNC (1/4"-20 with adapter)



CH22-3 measuring head with clear cover disc

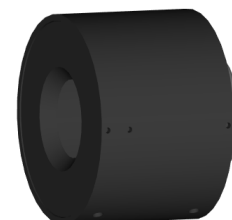


Accessories

- Stray light tube

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Item	Aperture	FOV(*)
Tube-55-58	Round_58_5	42...48°
Tube-55-32	Round_32_5	20...27°
Tube-55-48x30	Rect_48x30_5	34...40° x 18...25°
Tube-55-58x36	Oval_58x36_5	24...30° x 42...48°
Tube-190-58	Round_58_5	14...16°
Tube-190-32	Round_32_5	6.4...8.6°
Tube-190-48x30	Rect_48x30_5	11...13° x 5.8...8.0°
Tube-190-58x36	Oval_58x36_5	14...16° x 7.6...9.7°
Tube-270-58	Round_58_5	9.9...12°
Tube-270-32	Round_32_5	4.5...6.1°
Tube-270-48x30	Rect_48x30_5	7.8...9.4° x 4.1...5.7°
Tube-270-58x36	Oval_58x36_5	9.9...12° x 5.4...6.9°
Tube-Lv-3deg	Round_4.5_5	1.4° - 3.2°



(*) Depending on the measuring head

(*) All Stray light tubes are directly compatible with the SSL measuring heads and irradiance spectroradiometers.

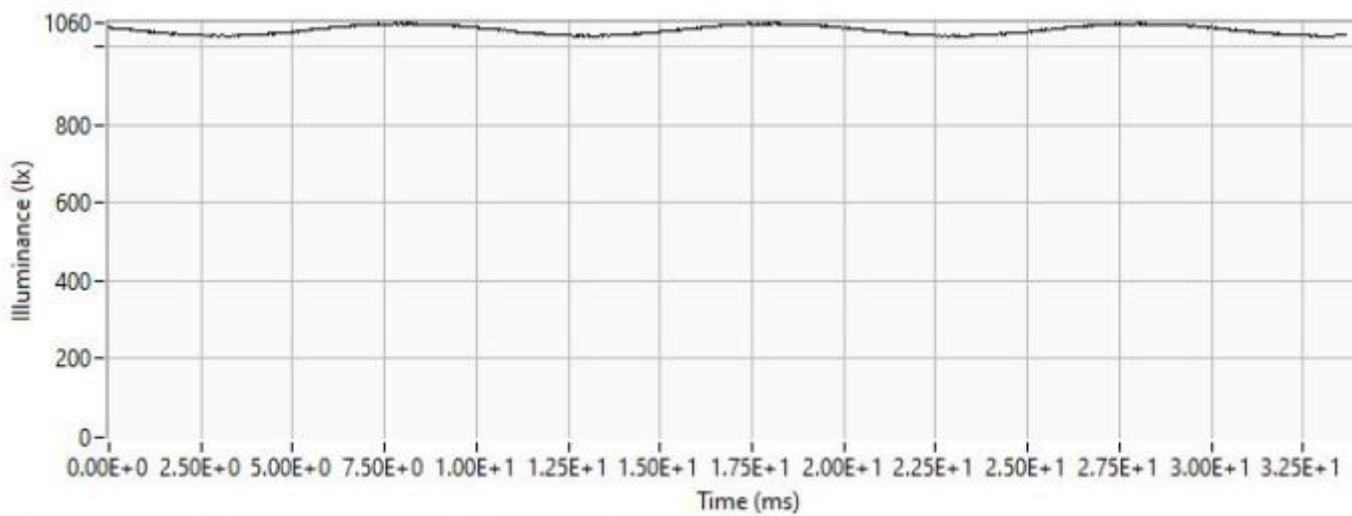
SSL LTA sw

Light Temporal Analyzer software

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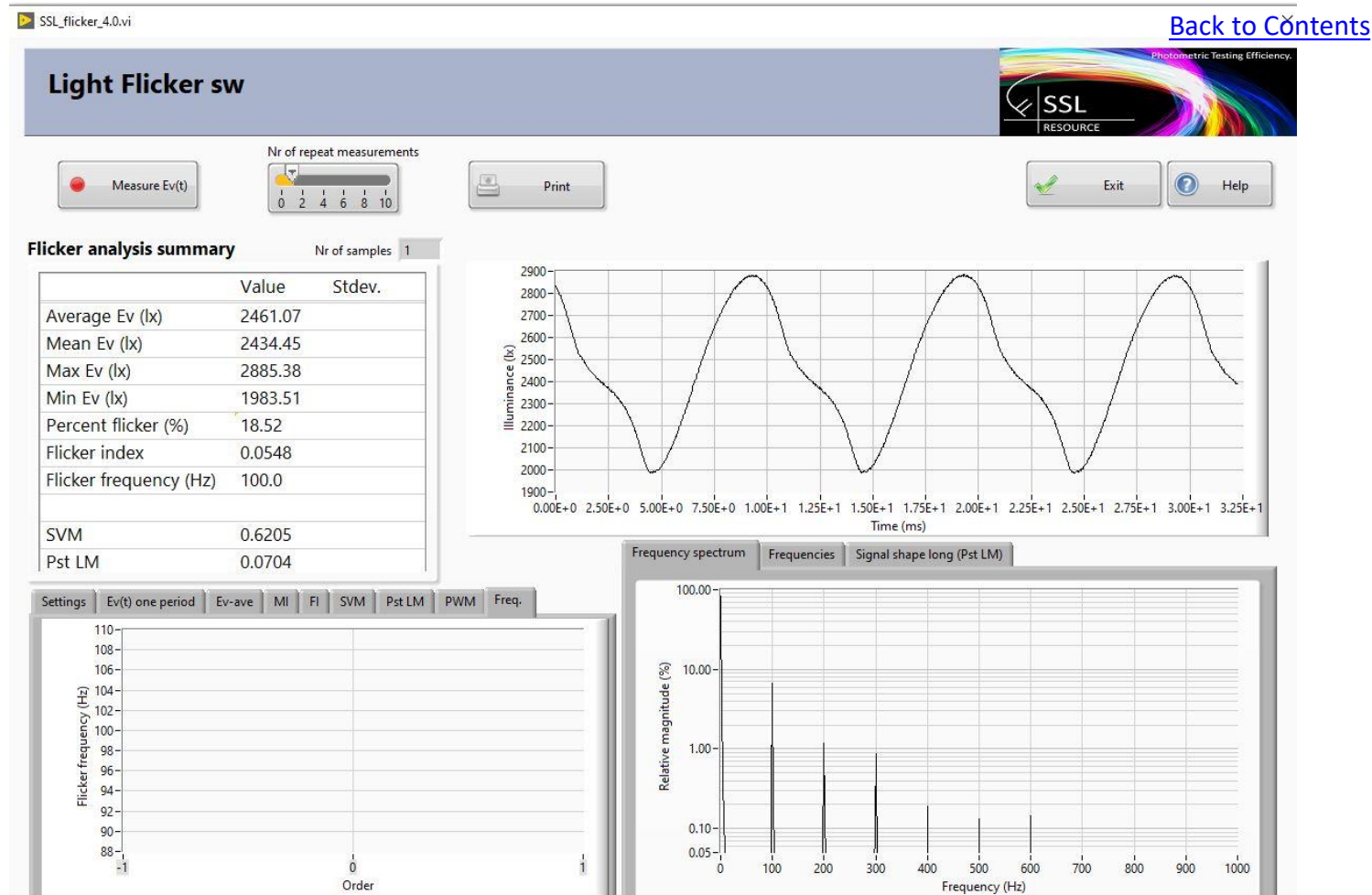
Analyzes the temporal behaviour of light

- ☐ Flicker analysis
- ☐ Effective intensity measurement



- ☐ SSL Photocurrent meters L-30 (LUKSI 30), L-50, L-51, and LC-800 are compatible with the LTA sw
- ☐ Editable Reports in pdf/html formats
- ☐ Exporting of individual graphs into Excel/Clipboard/image file

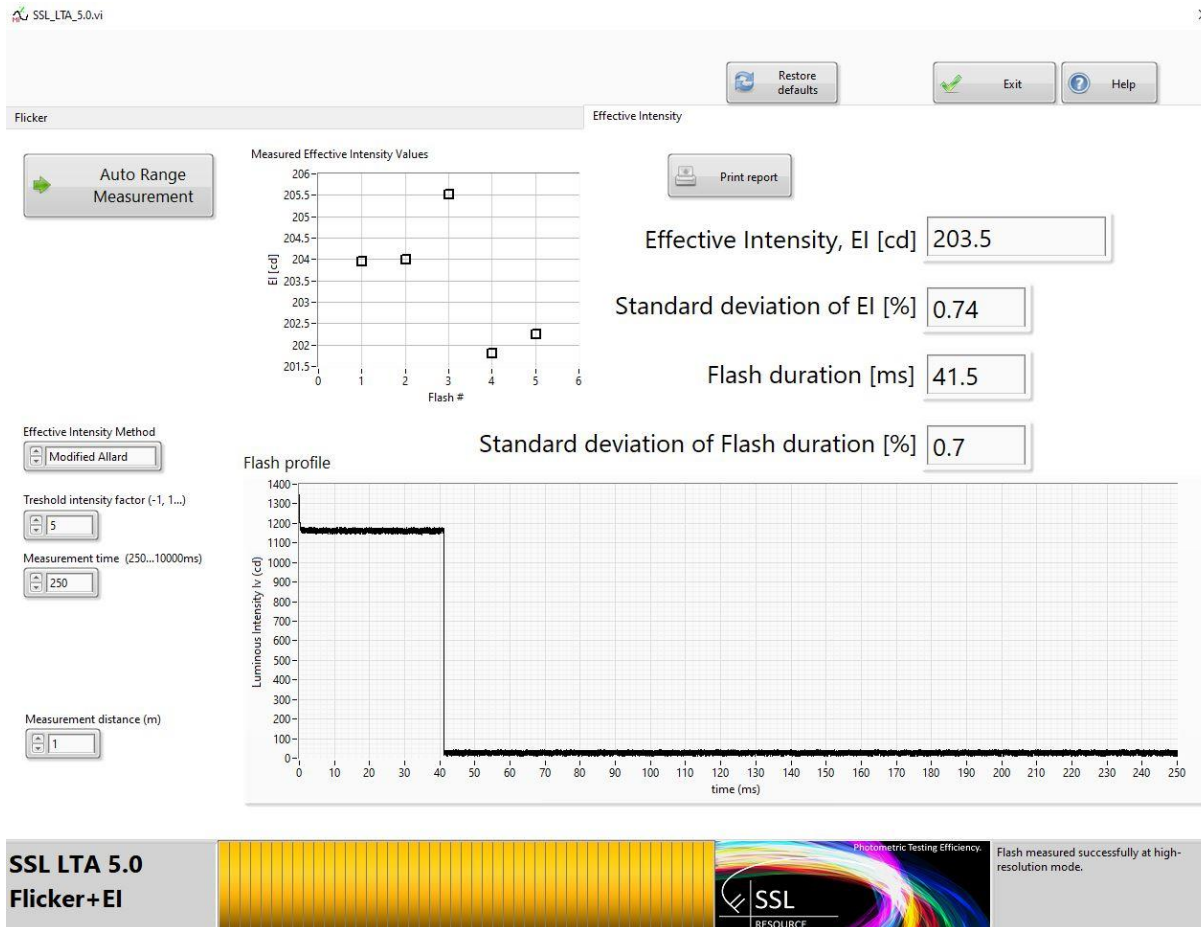
SSL LTA Light Temporal Analyzer - Flicker



- ☐ Measuring time: SVM 1s, PstLm 1-5min.
- ☐ Average values and standard deviation of repeat measurements
- ☐ Graphical representation of repeat measurements for each parameter
- ☐ Single time period signal waveform
- ☐ SVM: Frequency Harmonics in a graph and in a table
- ☐ Detects automatically if PWM is in use and shows its duty cycle (%) in the summary table.
- ☐ Pass/Fail analysis for SVM / P_{st}^{LM} (IEC TR 63158) and flicker risk classification (IEEE 1789)

SSL LTA Light Temporal Analyzer - Effective Intensity

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- ☐ Automatic Measurement of Effective Luminous Intensity (EI) and Flash duration
- ☐ Methods:
 - ✓ Peak value (non-standard effective intensity)
 - ✓ Modified Allard
 - ✓ Allard
 - ✓ Blondell-Rey
 - ✓ Modified Blondell-Rey
- ☐ Two Modes: Auto Range and High-Resolution
- ☐ Measuring time: 0.25s .. 10 s
- ☐ Measurable pulses 0.3 ms.. 10 s
- ☐ Graphical representation of the flash profile and EI as function of repeats
- ☐ Average values and standard deviation of repeat measurements

FAS 21 Flicker Analyzing System

- Setup Accesories

FAS 21.Basic

- ✓ LUKSI 30 C1 Flicker meter ⁽¹⁾
 - ✓ Illuminance measuring range: 5 lx – 1 Mlx ⁽¹⁾
- ✓ PC Software: SSL LTA.Flicker-sw⁽²⁾
- ✓ Transportation box: 20cm x 30cm x 40 cm, 2kg

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FAS 21.Standard

FAS 21. Basic + following items:

- ✓ Stray light tube with an aperture ⁽³⁾
- ✓ Aluminum plate thread adapter for tripod (3/8"-16 UNC and 1/4"-20)
- ✓ Black anodized Al profile 20x20 - length 35cm
- ✓ Transportation box: 20cm x 30cm x 40 cm, 3kg

Note: The tripod is not included

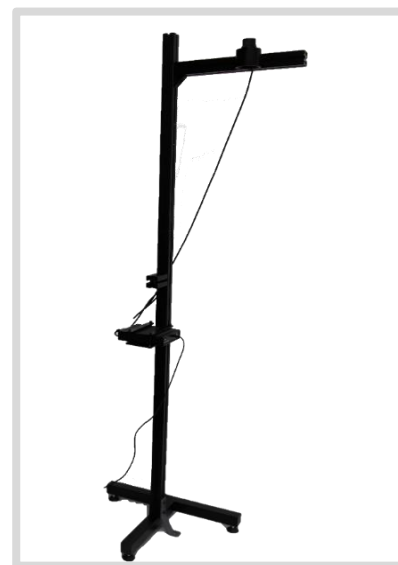


FAS 21.Premium

- ✓ L-50 Photocurrent meter & LH22.2-f10 Photopic head ⁽¹⁾
 - ✓ Range: 2 lx – 800 klx ⁽¹⁾
- ✓ Stray light tube by an aperture ⁽³⁾
- ✓ Software: SSL LTA.Flicker-sw⁽²⁾
- ✓ Al profile stand with larger 60cm extender for measuring in horizontal and vertical direction
- ✓ Photocurrent meter holder.
- ✓ Transportation box: 40cm x 40cm x 130 cm, 15kg



Horizontal measurement direction



Vertical measurement direction
e.g. from a lamp on the top of the table

⁽¹⁾ Standard set of flicker photometer, can be replaced by other photocurrent meter and photopic measuring head.

⁽²⁾ Optional: AC Power supply integration for Flicker-sw for power-line flicker simulation (IEC TR 61547-1)

⁽³⁾ Field-of-view (FOV) depends on the chosen aperture and its mount direction in the stray light tube.

SSL FiLMI 2.3

Measures luminance by imaging

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SSL FiLMI 2.3 creates a luminance map over an area by one mouse click. This data can be used to determine the level and variation of luminance in the measurement area.

Example Application Areas

- Street lighting, EN 13201
- Tunnel lighting, EN14380, CIE 088
- Glare (UGR) measurements CIE 232:2019
- Emergency lighting, EN-60598-2-22, ISO 30061:2007
- Displays, ST 431-1, ISO 2910
- Automotive

SSL FiLMi.base sw Basic software

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The Luminance and contrast measurements of the lights can be measured by choosing the suitable measurement area:

- Polygon
- Circle
- Rectangular

Open: Open the saved data image for post-process analysis.

Save: Saves data image

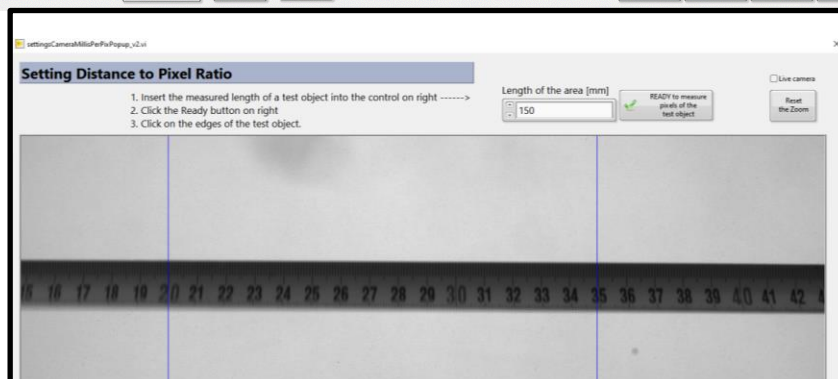
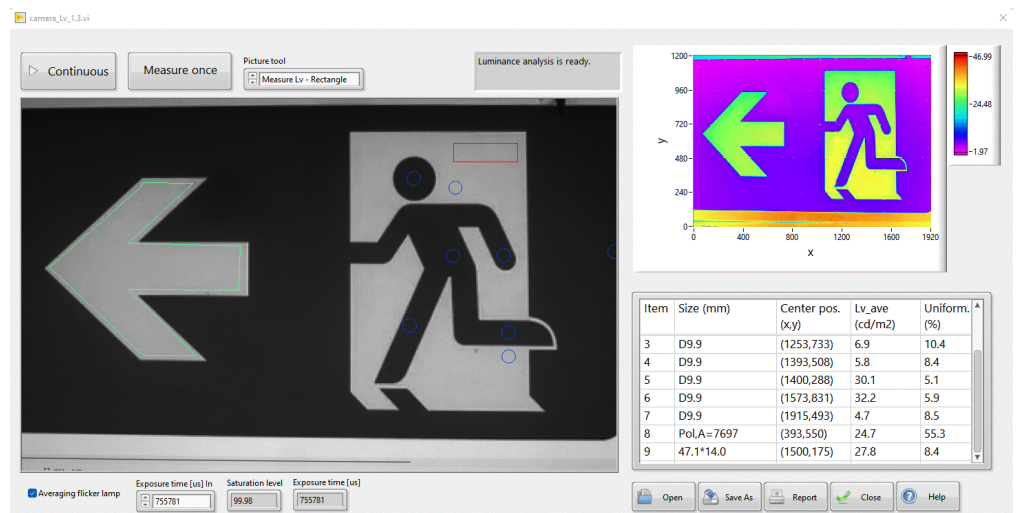
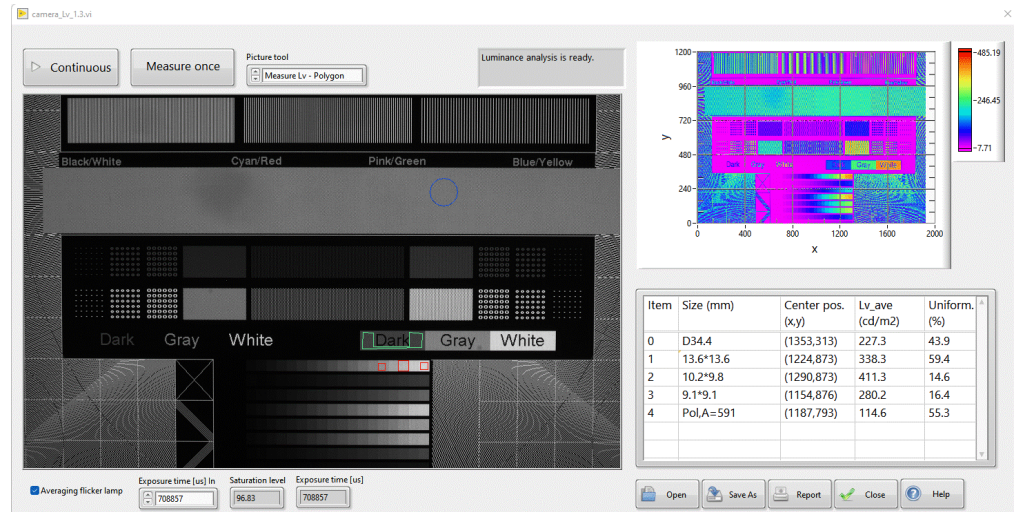
Report: Makes the report in word/pdf/html formats.

Continuous: Live camera

Measure Once: Measures a single image and auto-adjust the exposure time.

Averaging flicker: Removes a flickering effect to get the stable data.

Options: Semi-automated PASS/FAIL results according to the customer standard requirements.



The distance scale of the image can be calibrated by a Define mm/pixel –button. The diameter of circle can be user-defined and its coordinates is chosen by mouse-clicking.

SSL FiLMI.Road sw

SW module of Road Measurements

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SSL FiLMI.Road-sw measurement parameters for road lighting standards like CIE 088 and EN 13201, EN14380

- ✓ L_{av} (average luminance)
- ✓ U_o overall uniformity
- ✓ U_{ow} (overall uniformity wet)
- ✓ U_l (longitudinal uniformity)
- ✓ Glare analysis

The dedicated test routines includes

- ✓ required illumination at the tunnel entrance: L20 and perceived contrast methods
- ✓ Illumination inside the tunnel
- ✓ Illumination at the street / road

An automatic report is saved or printed after the measurement. The report includes identification data for the measured object, the measured parameter values and pass/fail criteria if such exist.

SSL FiLMI.Road sw. Measurements on the Road, inside the Tunnel, at Tunnel Entrance

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Illumination at the Street / Road

can be measured either at the grid points set according to the EN13201-3 or from the luminance map of the selected street area. L_{av} , U_o and U_l are then analyzed. Pass-Fail criteria are calculated according EN13201-2. Glare analysis with Threshold Increment and Glare Index.



Illumination inside the tunnel is measured by selecting the area on the road or walls. Longitudinal uniformity is measured by selecting a narrow area in the left side / middle / right side of the lane or road. When the measuring area is manually chosen

1. Measurement can be easily adapted to all kind of roads
2. Many situations causing errors can be eliminated



Illumination at the beginning of the tunnel has to be designed using the luminance of the surrounding of the tunnel entrance. SSL FiLMI 2.3 can determine this with L20 method and Perceived contrast method described in CIE 088.

The measuring procedure with both methods is the same.

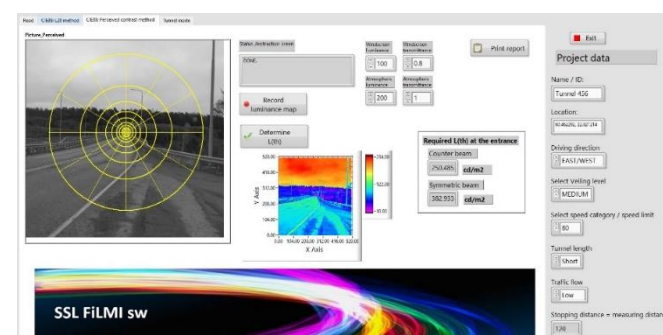
1. Record the luminance map surrounding the tunnel entrance.
2. Mouse-click at the center of the tunnel entrance. The required luminance at the beginning of the tunnel is calculated.

Driving direction, veiling level and speed category are user-defined parameters.

L20 method



Perceived contrast method



SSL FiLMI 2.3

- SPECIFICATION

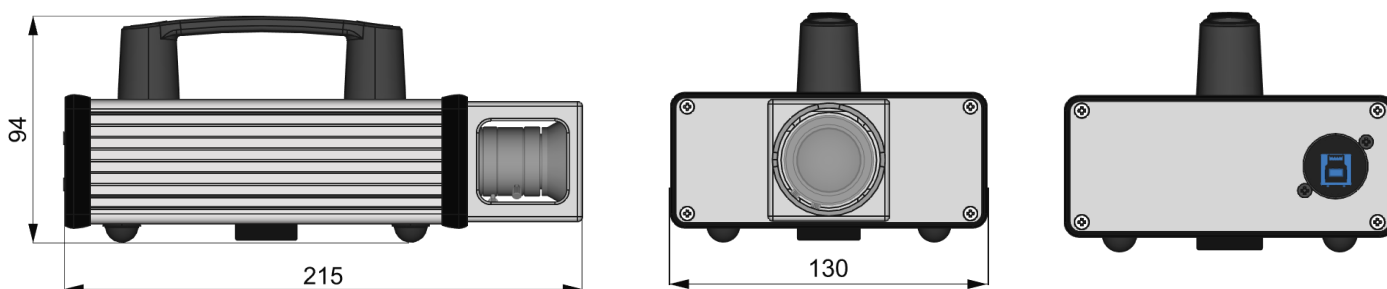
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DEVICE CODE*	SSL FiLMI 2.3-xx
Application range	Versatile test applications in the field, production and lab environments.
Detector	CMOS imaging luminance meter, 1920 x 1200 pixels (2.3Mpix), 12-bit A/D conversion
Measurement range ¹⁾ (cd/m ²)	0.002 – 5 000 000 (f-25, f-35, f-50mm) 0.0002 – 400 000 (f-8mm)
Field-of-view FOV (hor&ver)	f-50mm: 12.9°&8.2°, f-35mm: 18.3°&11.6°, f-25mm: 25.5°&16.2°, f-16mm: 38.9°&25.0°, f-12mm: 50.4°&33.0°, f-8mm: 70.5°&47.9°
Dynamic range	1E+9
Min. Focusing distance	0.1 m (f8-25mm), 0.2 m (f-35mm), 0.3 m (f-50mm)
Integration time	40 μs – 10 s
Spectral response	Class A (f_1' <3%)
Dim.s (WxDx H, m)	130 mm x 215 mm x 94 mm, 1.2 kg
PC Interface	USB 3.0
Package ²⁾	FiLMI 2.3, Case, 5m USB 3.0 cable, Factory calibration, Tripod adapter. SSL FiLMI.base sw.

*xx specifies the lens

¹⁾ Defined with the smallest lens aperture. Depends on the gain, binning, and focus.

²⁾ Dedicated accessories for field measurements separately available.



SSL CAM 2.3

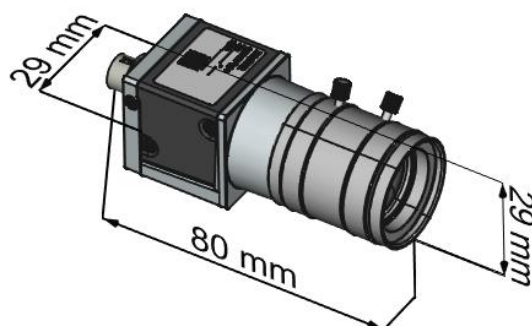
- SPECIFICATION

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DEVICE CODE	CAM2.3.Lv-f3-25
Application range	Integration to photometric test systems such as Goniophotometer, Integrating sphere, LightTester, ...
Detector	CMOS imaging luminance meter, 1920 x 1200 pixels (2.3Mpix), 12-bit A/D conversion
Measurement range ¹⁾	0.05 – 6 200 000 cd/m ²
Focal length	25 mm
Field-of-view FOV	25.5° (hor), 16.2° (ver)
Dynamic range	1E+8
Focusing distance	0.1 m - ∞
Integration time	40 μs – 10 s
Spectral response ²⁾	Class A (f_1' <3%)
Dim.s (WxDx H, mm)	29 mm x 82 mm x 29 mm, 137 g
PC Interface	USB 3.0
Package	Camera, 5m USB 3.0 cable, Factory calibration, adapter to be attached to the Al-profile. ²⁾

¹⁾ Depends on the lens aperture.

²⁾ Note: Camera must be mounted to an Al profile using the adapter for a better thermal management.



SSL Resource

Instruments for light measurements



SSL Resource

Instruments for light measurements



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