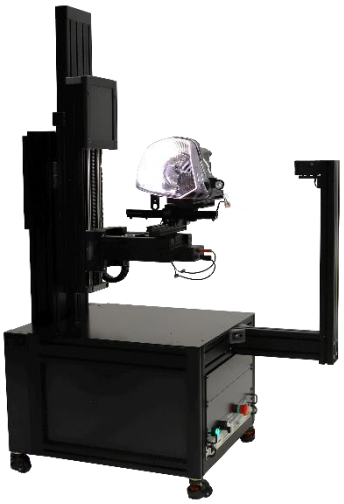
SSL
RESOURCE
Photometric Testing Efficiency

SSL Resource

Goniophotometer

Catalogue 2023/I



Content

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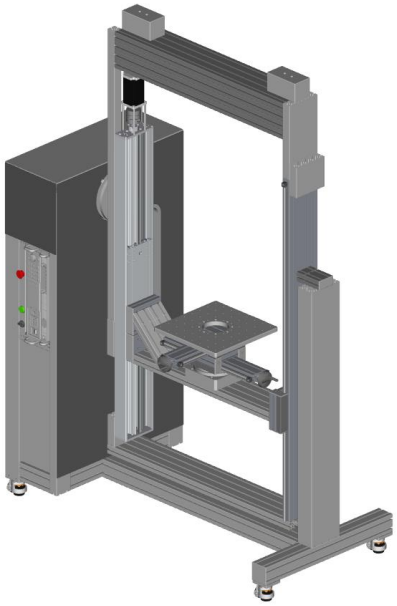
Type C Goniophotometers

Model	Length (cm)	Thickness (cm)	Mass (kg)	Lamps, E27/E14...	Tube Lamps	LED modules	Flash lights	LED strip	Down lights	LED Panel	Large Linear	Heavy Flood	Street lights	Automotive	Decorative	CIE S025 compatibility	Option: SSL-ALI	Option: SSL-BPC	Option: B type
SSL LAMP 30	30	30	3	X			X												X
SSL LAMP 200	200	10	4		X	X		X	(X)	X						(X)		X	
SSL LEDI 70	70	15	3			X			X	X									
SSL UNI 170	170	30	16	X	X	X	X	X	X	X	X			X	(X)	(X)	X	X	X
SSL HEVI 170	200	1000	50	X	X	X	X	X	X	X	X		X	X	(X)	(X)	X	X	X
SSL LUMI 90	90	30	9	X		X	X	X	X	X						(X)		X	
SSL LUMI 120	120	80	15	X	X	X	X	X	X	X		X		X		(X)		X	X
SSL LUMI 180	180	60	25	X	X	X	X	X	X	X	X		X	X	(X)	(X)	X	X	X
SSL DECO 27	27	30	6	X		X	X		X						X	X			

Type B/A Goniophotometers

Model	Type	Length (cm)	Thickness (cm)	Height (cm)	Mass (kg)	Automotive	Marine lights	Airfield Lights	Torch lights	Bicycle lights	Traffic lights	Warning Lights	VMS	Railway Lights	Street lights	Flood Lights
SSL LAMP 30.B	B*	30		20	3	x			x	x						
SSL LUMI 90.B	B*	60		50	9	x			x	x	x	x	x	x		
SSL LUMI 120.B	B*	180		80	20	x		(x)	x	x	x	x	x	x		
SSL LUMI 180.B	B*	100		100	25	x		(x)	x	x	x	x	x	x		
SSL AUTO 50.A	A	60		50	5	x	x	x			x	x				
SSL AUTO 100	B	60		50	10	X		(x)	x	x	x	x	x	x		
SSL AUTO 140.B	B	140		60	20	x		(x)	x	x	x	x	x	x		
SSL AUTO 1000	A	100		170	50	x	x	x			x	x	x	x	x	x



SSL **LUMI series**

ALL INCLUSIVE MEASUREMENT SYSTEM

- ✓ Accurate characterization of spatial photometric, colorimetric and spectrometric features of luminaires by C or B type goniophotometer
- ✓ Luminous flux and efficacy
- ✓ Input power and power factor
- ✓ Spatial color uniformity (SDCM)
- ✓ Total correlated color temperature (CCT), color rendering index (CRI) and spectral radiant flux distribution
- ✓ Camera based UGR measurements

SAVE TIME, SPACE AND MONEY

- ✓ Fast sample mounting by a motorized sample holder and remote control
- ✓ Automatic luminous area measurements and turning axis adjustment
- ✓ Reliable LDT/IES measurements in standard height rooms
- ✓ User-friendly and versatile test software
- ✓ Sample holders, installation and training service, etc.
- ✓ Fast colorimetric measurements

SSL RESOURCE
Photometric Testing Efficiency

SSL **LUMI series**

Solution for testing any size of luminaires for general lighting, street lighting or automotive lighting.

B Type Measurement for Automotive Lights
(photo: SSL LUMI 120)

Innovative Mechanical Structure (photo: SSL LUMI 180)

- Integrated electrical device rack for space saving solution
- Leveling castors for easier moving and installation
- Motorized vertical arm and camera for automatic adjustment of the turning axis

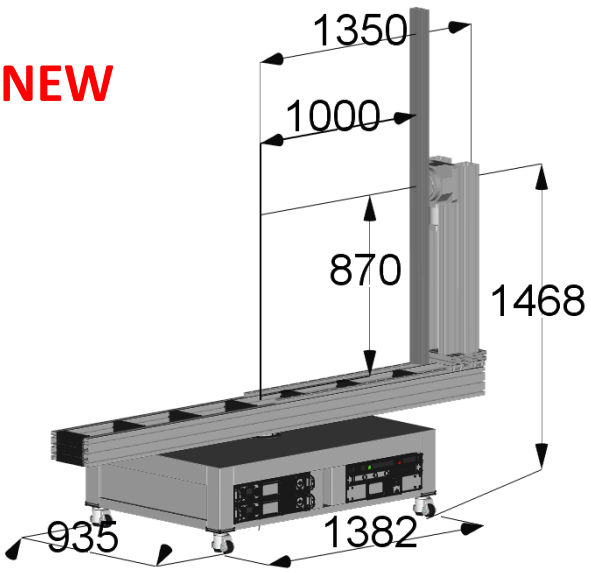
Burning position correction for B and C type measurement to meet CIE S025 standard.

Burning Position Correction Setup for B type (photo: SSL LUMI 120)

Burning Position Correction Setup for C type (photo: SSL LUMI 90)

SSL LUMI series

NEW

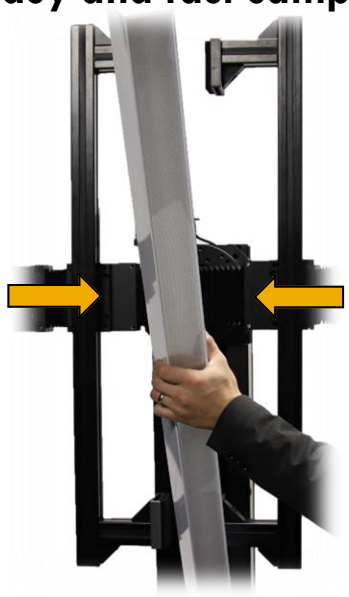


Heavy-duty Mechanical Structure (image: SSL HEVI 1700)

- For widest and heaviest lighting fixtures
- Wide adjustment range for thickness

Up to four photometers

Easy and fast sample mounting



Mounting of a luminaire in 5 seconds using 2-handed linear sample holder.

Camera

1. Luminous area
2. UGR
3. Photograph
4. Turning axis adjustment
5. Setup alignment

SSL-GSM Spectroradiometer

1. Spatial color uniformity
2. Total spectral radiant flux
3. Total color parameters
4. CCT/CRI as a function of angle

Secondary photometer

1. Measurement of low luminous intensities
2. Automated flicker measurements

Datasheet
SSL **LUMI series**

PRODUCT	SSL **LUMI 90**	SSL **LUMI 120**	SSL **LUMI 180**	SSL **HEVI 1700**
Application area	up to small-medium sized SSL luminaires (LED panels / downlights)	long automotive headlamps, general lighting fixtures	long automotive headlamps, general lighting fixtures	long automotive headlamps, general lighting fixtures
Goniometer type	C type (B type) with horizontal optical axis one column (two columns) arrangement			
Gonio controller	3 axis Stepper controller (19" 1U, RS-232) Worm gear drive system with deep groove ball bearings			
Arrangement	Goniometer station with electrical device 19" rack integration			
19" Rack space	6U in one column	4U in one column	8U in two columns	6U (700mm depth), 16U (350mm depth)
Gonio dimensions	1.2m, 0.63m, 0.6m, 50kg	1.3 m, 0.6 m, 0.8 m, 120kg	1.6 m, 1.3 m, 0.9 m, 160kg	1.6 m, 1.4 m, 0.94 m, 250kg
Height of optical axis	1.1 m	1.3 m	1.5 m	1.5 m
B-DUT[1]: L x H x T, m	0.6m x 0.5m x 0.1m, 10kg	1.6m x 0.8m x 0.3m, 20kg	1m x 1m x 0.3m, 40kg	1.7m x 1m x 0.5m, 50kg
C-DUT[1]: D x T, m	0.9m x 0.3m, 9kg	1.2m x 0.8m, 20kg	1.8m x 0.6m, 25kg	1.7m x 1m, 50kg
Minimum space for lab room (WxH, Length L)[2]	1.1 m x 1.7 m, L: 5.5 m (C), 10 m (B)	3.5 m x 2.2 m, L: 8 m (C), 20 m (B)	2.7 m x 2.5 m L: 10 m (C), 17 m (B)	3 m x 2.5 m L: 10 m (C), 17 m (B)
Angular range	±175° (γ axis), 0-360° (C plane axis)			
Resolution / Accuracy	<0.006° / <0.1° (γ and C axes)			

[1]Maximum dimensions of the luminaire under test (DUT): L=Length, W=Width, T=Thickness (B type), Diagonal D = $(L^2+W^2)^{½}$, T=Thickness (C type). m = mass (kg)
[2]On the basis of the photometric distances: 15 x "luminous area length" for automotive lamps (B type), 5 x "luminous area length" for C type measurements

SSL **DECO 27**

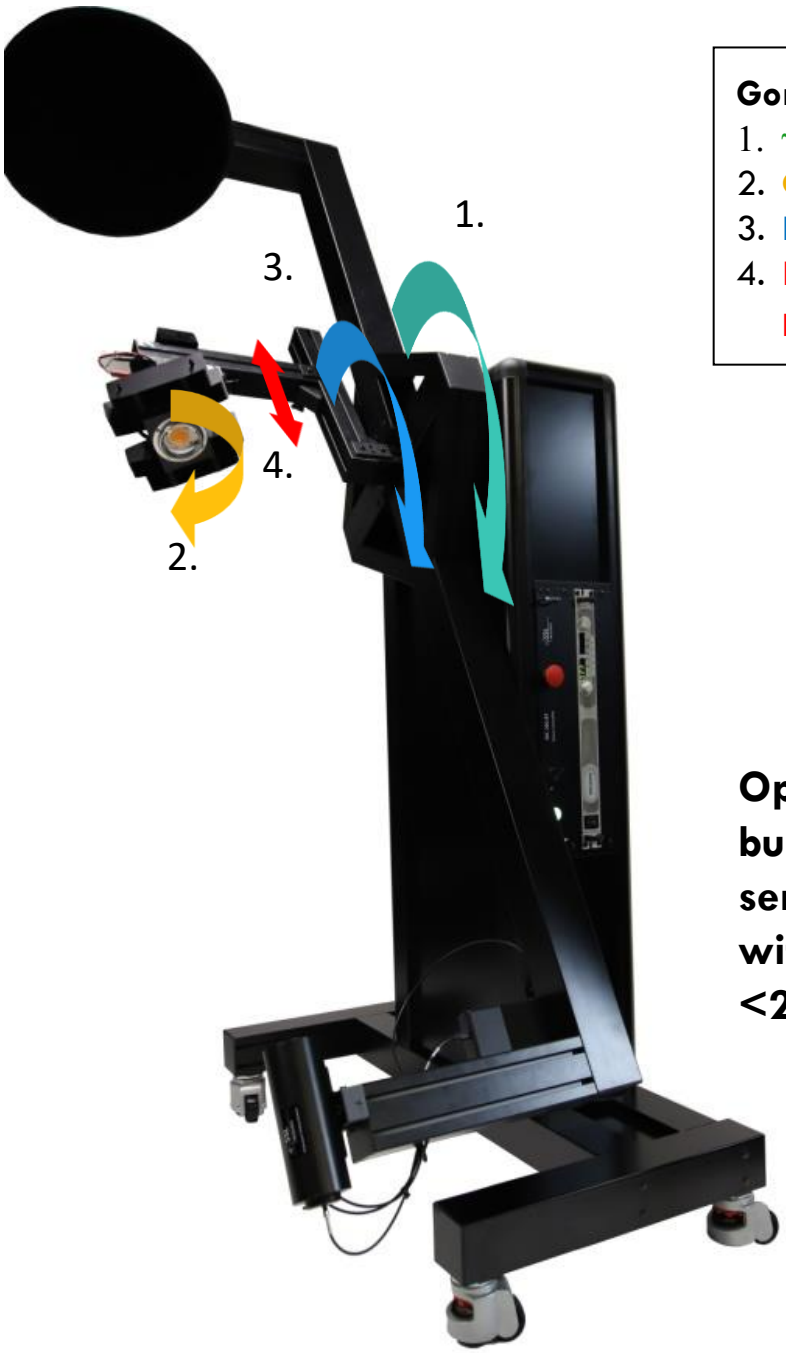
ALL INCLUSIVE MEASUREMENT SYSTEM

- ✓ Spatial photometric, colorimetric and spectrometric characterization
- ✓ LDT, IES, text and pdf reports
- ✓ Completely meets the CIE S025 requirements for unchanged burning positions.
- ✓ Opportunity to measure photometricals of lighting fixtures with movable parts.
- ✓ Motorized axis for setting any burning position
- ✓ No separate lamp holder stand needed.

SAVE TIME, SPACE AND MONEY

- ✓ Compact setup saves even 70% room footprint size
- ✓ Mobile and stable
- ✓ Ready to use in your office.
- ✓ No need for dark room.
- ✓ Suitable also for production tests.

SSL **DECO 27 - Axes**



Goniometric axes:

1. γ axis
2. C plane axis
3. Burning position axis
4. Photometric center position

Optimal for testing burning position sensitive luminaires with a luminous area <270 mm.

SSL **DECO 27 - Specification**

Goniometer model	SSL **DECO 27**	
Product code	SSL C-2.270	SSL C-2.custom
Application area	Small and medium sized LED modules and luminaires, burning position sensitive luminaires,	
Goniometer type	C type with vertical optical axis. Floor mount goniometer of type 2.1 (EN13032-1:2004 clause 6.1.1.2) with the turning detector (γ axis) and luminaire (C axis) features. Completely meets the requirements of unchanged burning positions stated in IES LM79-08 Clause 9.3.1.	
Gonio driver and controller	3 axis Stepper motor controller with RS-232 / USB interface, Worm gear drive system with deep groove ball bearings	
Goniometer arrangement	Goniometer station with electrical device 19" rack integration (unoccupied 5U for AC/DC power supply / meter)	
Height, Width, and Length	1.5 m, 1.2 m, 0.8 m	
Measurement distance	1.3 m	
Max luminaire size for LID[1] (or flux)	27 cm (45 cm)	
Max total length, depth and mass of DUT[2]	50 cm, 30 cm, 6kg	
Minimum space requirement (WxHxL)	1 m x 2.7 m x 2.7 m	Room height 2.5-5m
Luminous intensity range	0.002 – 130 000 cd	
Resolution	<0.01° (C and γ axis), <0.05° (Burning position axis)	
Reproducibility / Accuracy	<0.1° (C and γ axis), <0.5° (Burning position axis)	

[1]LID - Luminous Intensity Distribution,
[2]DUT - Device under test

SSL LAMP 30

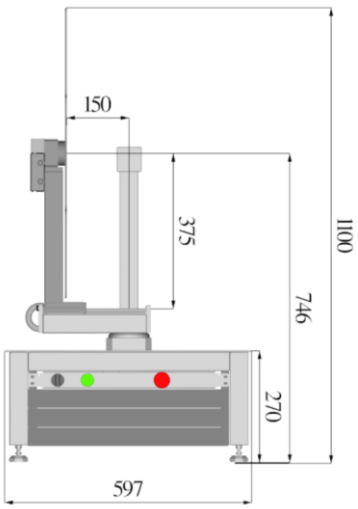
For flash/torch lights, LED lamps, small LED modules <300 mm.

C type configuration

B type configuration (B type option, SSL C-1.30.B)

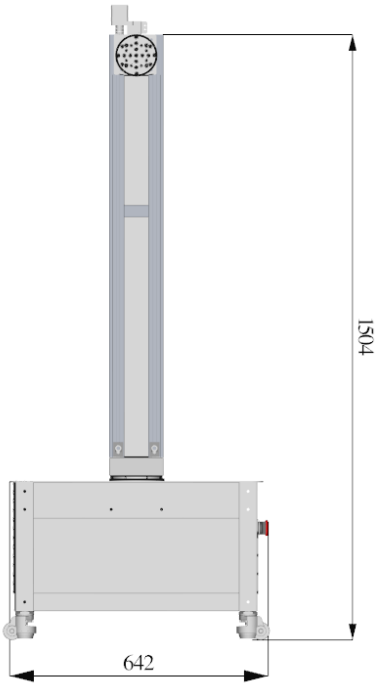
SSL LEDi 70

For LED modules and thin luminaires <700 mm.



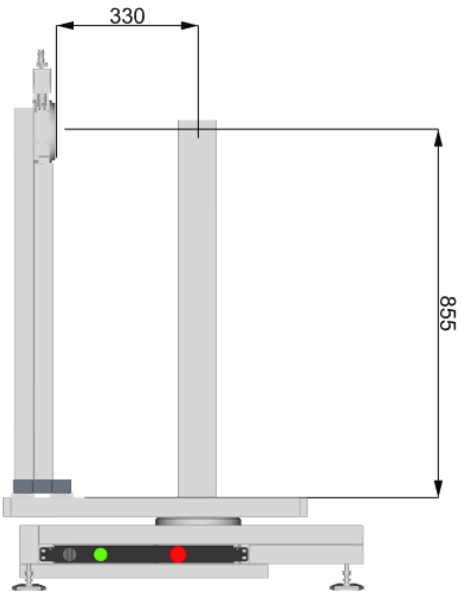
SSL **LAMP 200**

For LED strips and tubes < 2 m, <13cm thick



SSL **UNI 170**

For luminaires <1.7 m and <10kg



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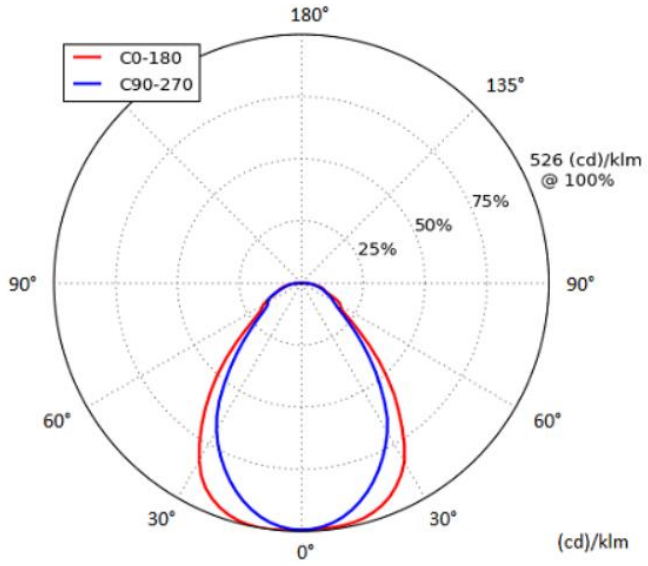
Datasheet
SSL **C-1 Goniometer family**

Goniometer	SSL **LAMP 30**	SSL **LAMP 200**	SSL **LEDI 70**	SSL **UNI 170**
Product code	C-1.3-34-30	C-1.4-200-12	C-1.3-70-15	C-1.16-170-30
Goniometer type	C type with horizontal optical axis.			
Gonio driver and controller	2 axis Stepper motor controller with RS-232 / USB interface, Worm gear drive system with deep groove ball bearings. Emergency stop switch.			
Goniometer arrangement	Goniometer station and the electrical device rack holder are in separate units.			
Alignment laser	Red cross-line laser (1mW, 635 nm)			
Gonio Height x Width x Length (cm)	52 x 75 x 60	235 x 65 x 65	110 x 75 x60	200 x 100 x 120
Height of optical axis (Appr.)	0.36 m	1.5 m	0.75 m	1.1 m
Max length, depth and mass of DUT	34cm, 30cm, 3kg	200cm, 12cm, 4kg	75cm, 15cm, 3kg	170cm, 30cm, 10kg
Resolution	<0.01° (C and γ axis)			
Reproducibility / Accuracy	<0.1° (C and γ axis)			
Minimum room space Width x height x length (m)	0.8 x 0.8 x 3	2.5 x 2.5 x 12	0.8 x 0.8 x 6	2.5 x 2.5 x 10
Photometer	**SSL LC-800.1**			
Photometer measuring head	SSL LH-1010-f3, Silicon photodiode with V(λ) filter. The spectral match to CIE photopic sensitivity curve f_1'<3% (class A)			
Min. luminous intensity accuracy	>± 2.5% (k=2), depends on the angular beam shape of DUT			
Luminous flux accuracy	± 3% (k=2)			
Luminous intensity range (measurement distance)	0.001 – 100 000 cd (1 m) 0.009 – 900 000 cd (3 m) 0.0025 – 2 500 000 cd (5 m) 0.06 – 6 000 000 cd (8 m)		0.10 – 10 000 000 cd (10 m) 0.23 – 23 000 000 cd (15 m) 0.40 – 40 000 000 cd (20 m) 2.50 – 250 000 000 cd (50 m)	
Luminous flux range	Sample type / Test distance	Isotropic radiation (uniform over the γ range ±180°)	Lambertian radiation, γ range ±90°	Narrow beam radiation with 40° beam angle [$\cos^n(\theta)$ type beam], γ range ±90°
	1 m 5 m 10 m 15 m 20 m 50 m	0.012 – 1 200 000 lm 0.3 – 30 000 000 lm 1.2 – 120 000 000 lm 2.8 – 270 000 000 lm 5.0 – 490 000 000 lm 31 – 3 000 000 000 lm	0.031 – 300 000 lm 0.8 – 7 500 000 lm 3.1 – 30 000 000 lm 7.1 – 70 000 000 lm 13 – 120 000 000 lm 79 – 780 000 000 lm	0.006 – 51 000 lm 0.15 – 1 200 000 lm 0.6 – 5 100 000 lm 1.2 – 11 000 000 lm 2.0 – 20 000 000 lm 13 – 120 000 000 lm

C Type Goniophotometer
- Luminous intensity Parameters

- ✓ File converter (e.g.IES>LDT)
- ✓ IES, LDT, TM-33 XML file output
- ✓ LDT editor
- ✓ Up & Down combination tool
- ✓ Beam symmetrization tool

Wide range of spatial illumination related analysis parameters, some examples below:



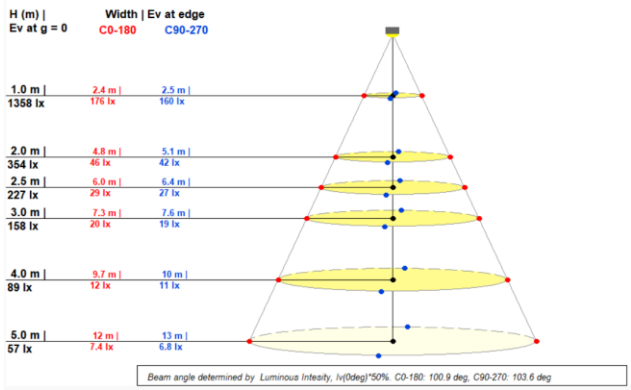


Fig. **Dynamic cone diagram.**

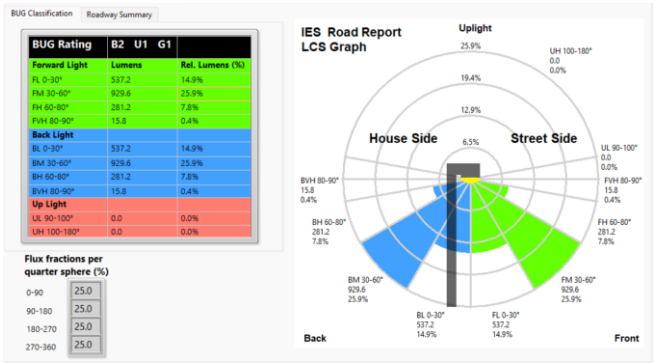


Fig. **BUG (back,up, glare) diagram.**

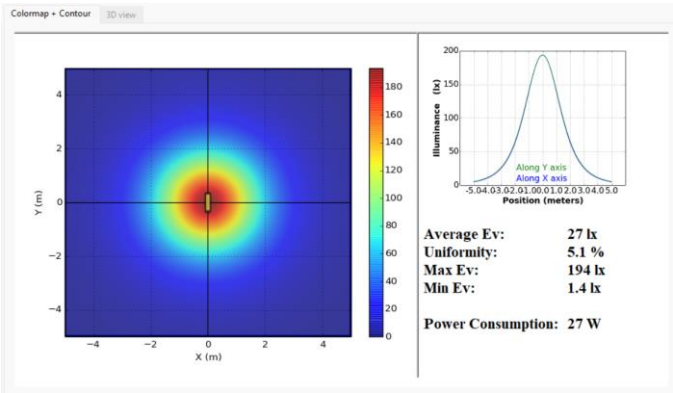


Fig. **Spatial Illumination tool. Units: umol/s/m2, mW/m2 and lx. Distances, nr of lamps etc. can be changed.**

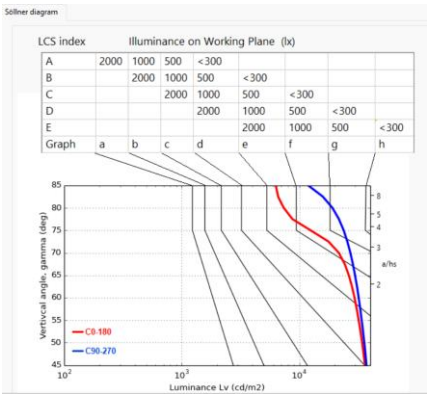
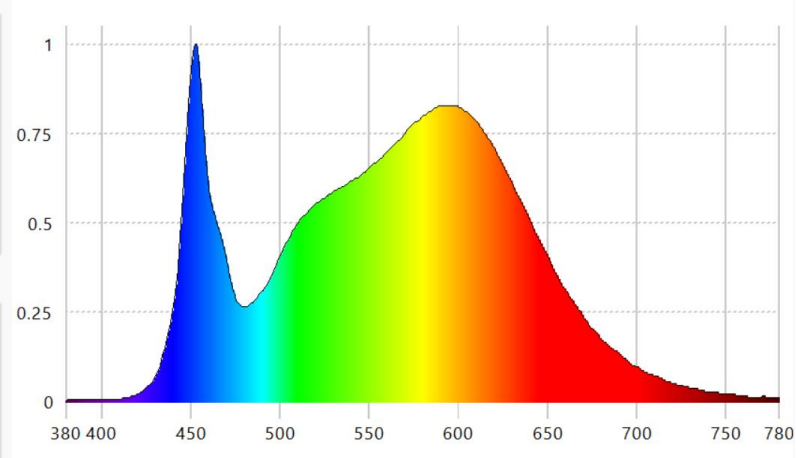


Fig. **Söllner diagram for luminance.**

C Type Goniophotometer
- Color Measurement Features

- ✓ Total angularly integrated values:
  - ✓ CCT, CRI, TM30-18
  - ✓ CIE1976,CIE1931
  - ✓ Peak WL, WL Bandwidth analysator
  - ✓ Optical power
- ✓ Angular dependent values:
  - ✓ CIE 1976, CCT, CRI-Ra
  - ✓ Peak WL, Bandwidth
  - ✓ Relative/absolute spectrum

Wide range of analysis parameters available, some examples are shown here:



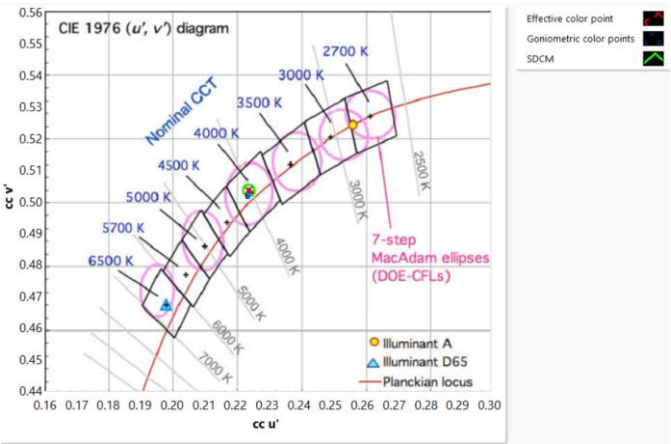


Fig. **Spatial color unuformity (SDCM).**

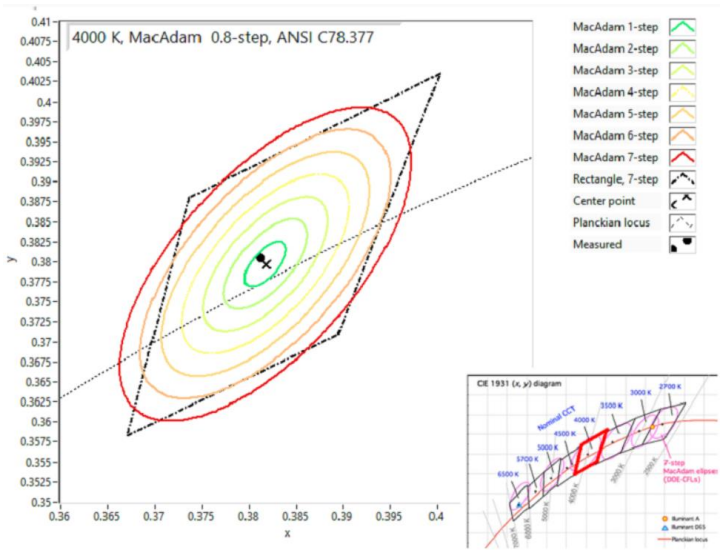


Fig. **Color class SDCM value of target color point.**

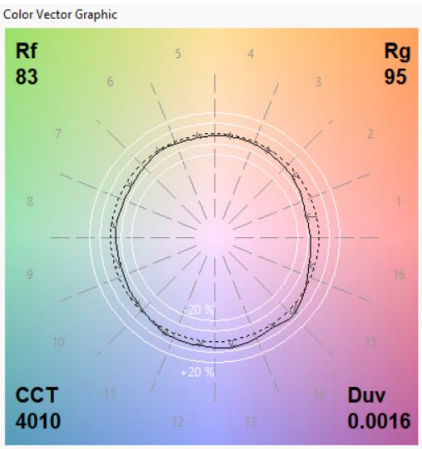


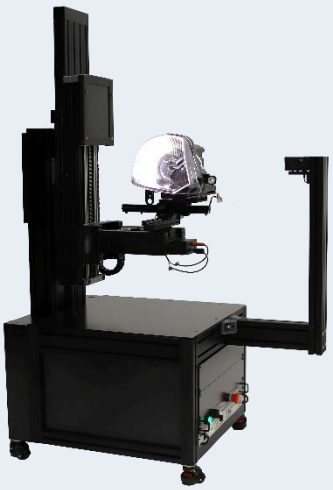
Fig. **Color vector figure of TM-30-18 color rendering metrics,**

Measuring Ranges - Goniophotometer

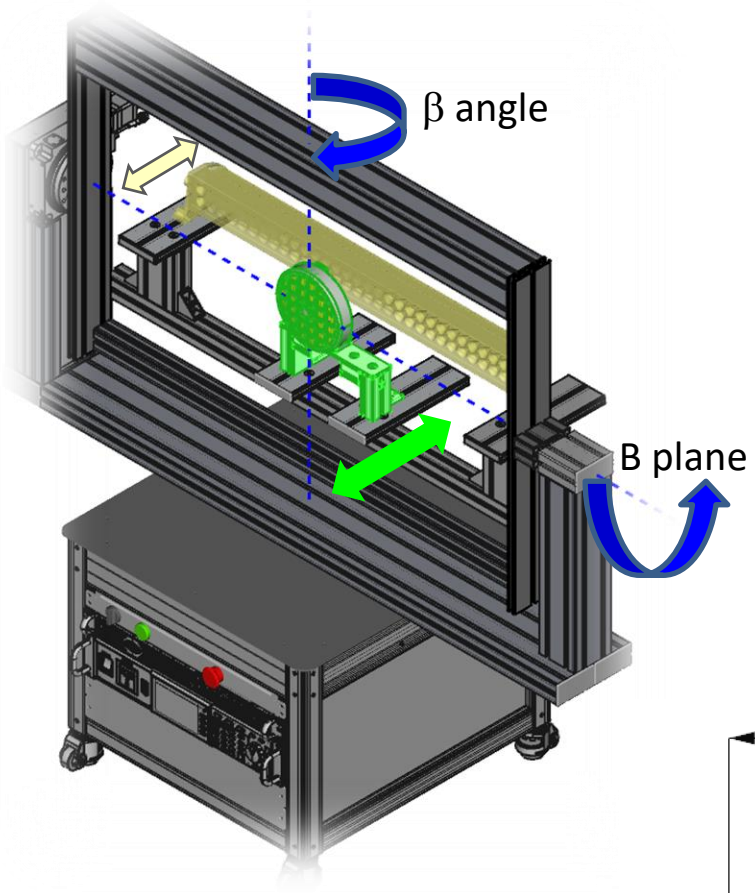
Photometer		**SSL LC-800.1**		
Measuring head		SSL LH-1010-f3, Silicon photodiode with V(λ) filter. The spectral match to CIE photopic sensitivity curve f_1'<3% (class A)		
Min. luminous intensity accuracy		>± 2.5% (k=2), depends on the angular beam shape of DUT		
Luminous flux accuracy		± 3% (k=2)		
Luminous intensity range (measurement distance)		0.001 – 100 000 cd (1 m) 0.009 – 900 000 cd (3 m) 0.0025 – 2 500 000 cd (5 m) 0.06 – 6 000 000 cd (8 m) 0.10 – 10 000 000 cd (10 m) 0.23 – 23 000 000 cd (15 m) 0.40 – 40 000 000 cd (20 m) 2.50 – 250 000 000 cd (50 m)		
Luminous flux range	Test distance	Isotropic radiation (uniform over the γ range ±180°)	Lambertian radiation, γ range ±90°	Narrow beam radiation with 40° beam angle [$\cos^n(\theta)$ type beam], γ range ±90°
	1 m	0.012 – 1 200 000 lm	0.031 – 300 000 lm	0.006 – 51 000 lm
	5 m	0.3 – 30 000 000 lm	0.8 – 7 500 000 lm	0.15 – 1 200 000 lm
	10 m	1.2 – 120 000 000 lm	3.1 – 30 000 000 lm	0.6 – 5 100 000 lm
	15 m	2.8 – 270 000 000 lm	7.1 – 70 000 000 lm	1.2 – 11 000 000 lm
	20 m	5.0 – 490 000 000 lm	13 – 120 000 000 lm	2.0 – 20 000 000 lm
	50 m	31 – 3 000 000 000 lm	79 – 780 000 000 lm	13 – 120 000 000 lm

Goniophotometer types

Summary table of different types of goniophotometers

Goniometer type	Type A	Type B	Type C
Fixed axis (angle name)	Horizontal axis: (Vertical α angle)	Vertical axis: (Horizontal β angle)	Vertical axis: (Vertical γ angle)
Moving axis (angle name)	Vertical axis: (Horizontal "A plane" angle)	Horizontal axis: (Vertical "B plane" angle)	Horizontal axis: (Horizontal "C plane" angle)
Example application	Automotive, Airfield lighting Maritime	Auxiliary car lights, Railway lights	General lighting Street lights
Example product			

Type B GONIOPHOTOMETER
SSL **AUTO 100**



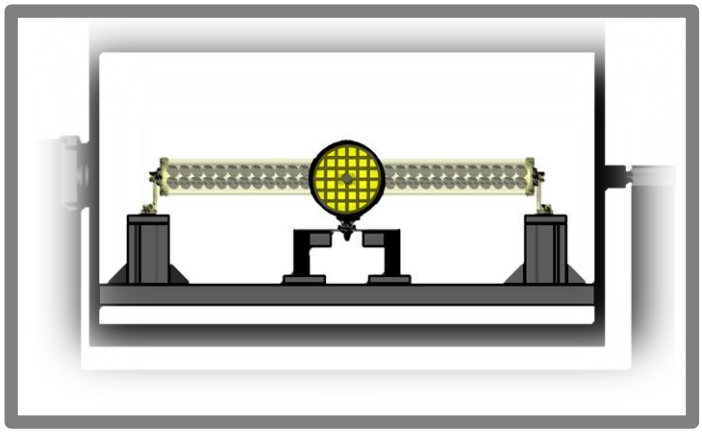
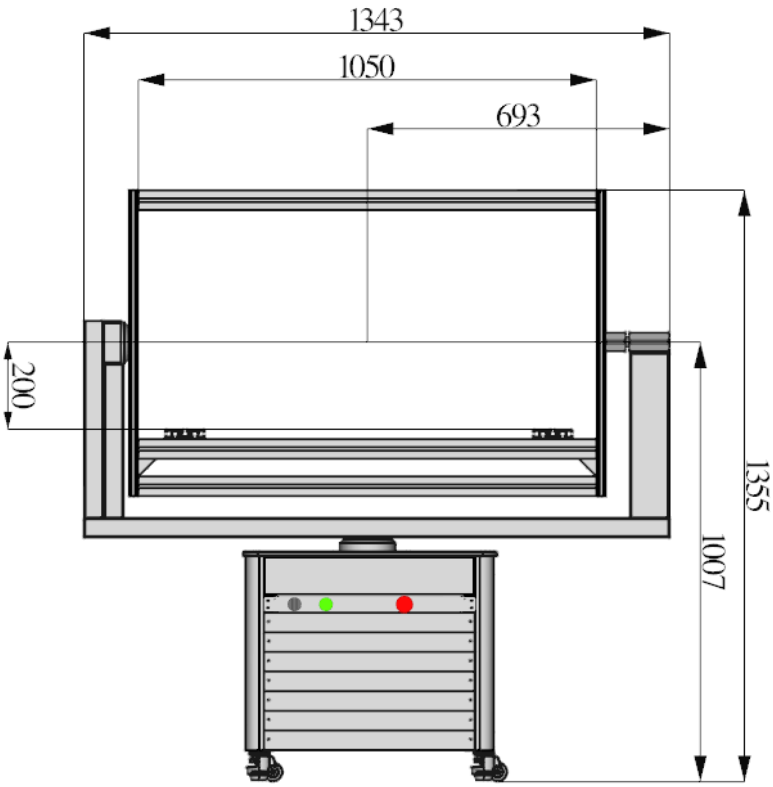
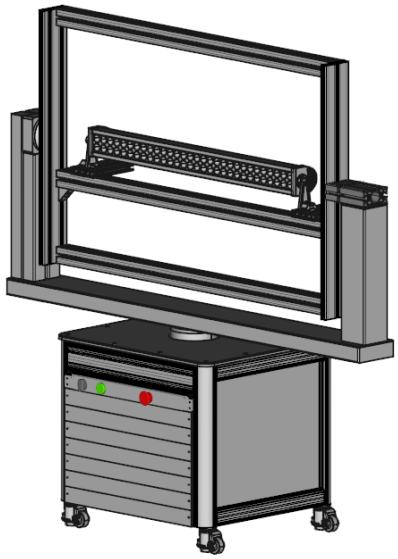


Fig. **Dedicated sample holder enables simultaneous usage for round and linear lights .**





AUTO 100

- B type goniophotometer
- For Samples up to 1m, 10kg

AUTO 100 - Specification

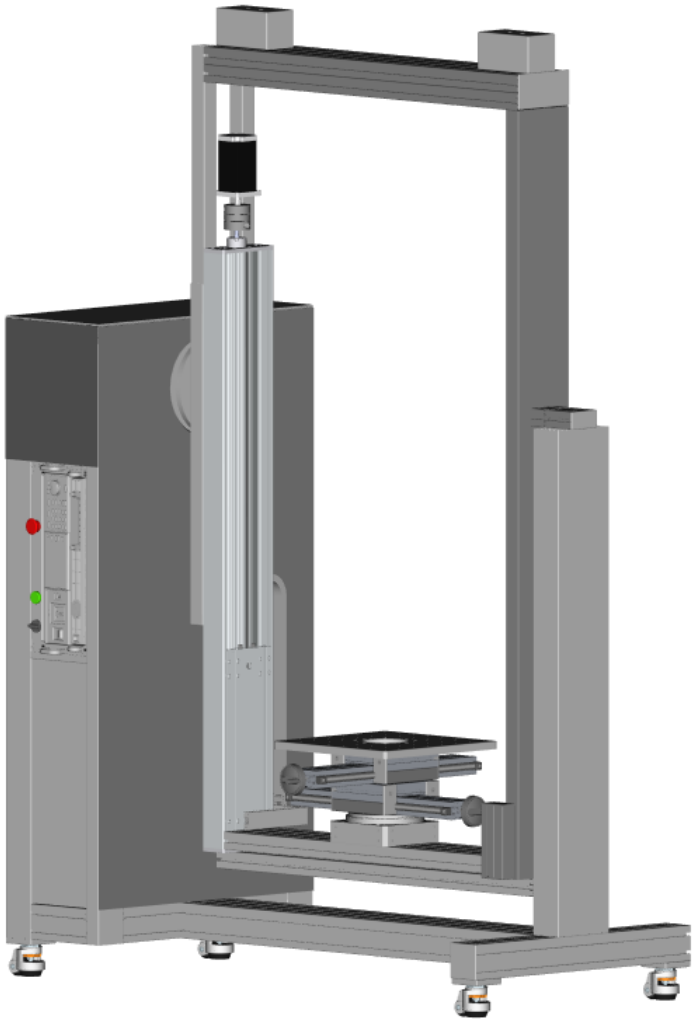
Goniometer	**SSL AUTO 100** (Product code SSL B.**100**)
Application area	For Railway and automotive lights
Goniometer type	B type
Gonio driver and controller	2 axis Stepper motor controller with RS-232 / USB interface, Worm gear drive system with deep groove ball bearings. Emergency stop switch.
Goniometer arrangement	Electrical devices are integrated into Goniometer station. It has 8U spaces for 19" rack devices.
Alignment laser	Red cross-line laser (1mW, 635 nm),
Height, diameter of rotation	1.4 m, D=1.4 m
Height of optical axis	Approximately 1.0 m
Max total length, width and mass of DUT[2]	600 mm, 500 mm, 10kg
Resolution	<0.01° (B and β axis)
Reproducibility / Accuracy	<0.1° (B and β axis)
Turning range, B plane	±90° (Vertical plane / Horizontal measurement axis) *)
Turning range, β angle	±90° (Horizontal plane / Vertical measurement axis)
Movement range, Z-direction	None
Minimum room space (WxHxL)	2.0 m x 2.0 m x 10 m
Photometer	**SSL LC-800**
Photometer measuring head	SSL LH-1010-f3, Silicon photodiode with V(λ) filter. The spectral match to CIE photopic sensitivity curve f_1'<3% (class A)
Luminous intensity range (measurement distance)	0.01 – 5 000 000 cd (3.16 m), 0.1 – 50 000 000 cd (10 m), 0.3 – 170 000 000 cd (18.3 m), 0.6 – 310 000 000 cd (25 m) 0.9 – 470 000 000 cd (30.5 m)
Viewing angle of stray light tube	±8°

*) *For heavy loads, a counterweight is needed.*

SSL
RESOURCE
Photometric Testing Efficiency

Type A GONIOPHOTOMETER
SSL **AUTO 1000**

TESTING SYSTEM FOR MEASURING ANGULAR LUMINOUS INTENSITY DISTRIBUTION in H,V AXIS COORDINATES



- ✓ **A-type**
- ✓ **Maritime navigation lights**
- ✓ **Automotive lights**
- ✓ **Railway lights**
- ✓ **Traffic lights (VMS)**
- ✓ **Airport taxiway/runway lights**

SSL **AUTO 1000**

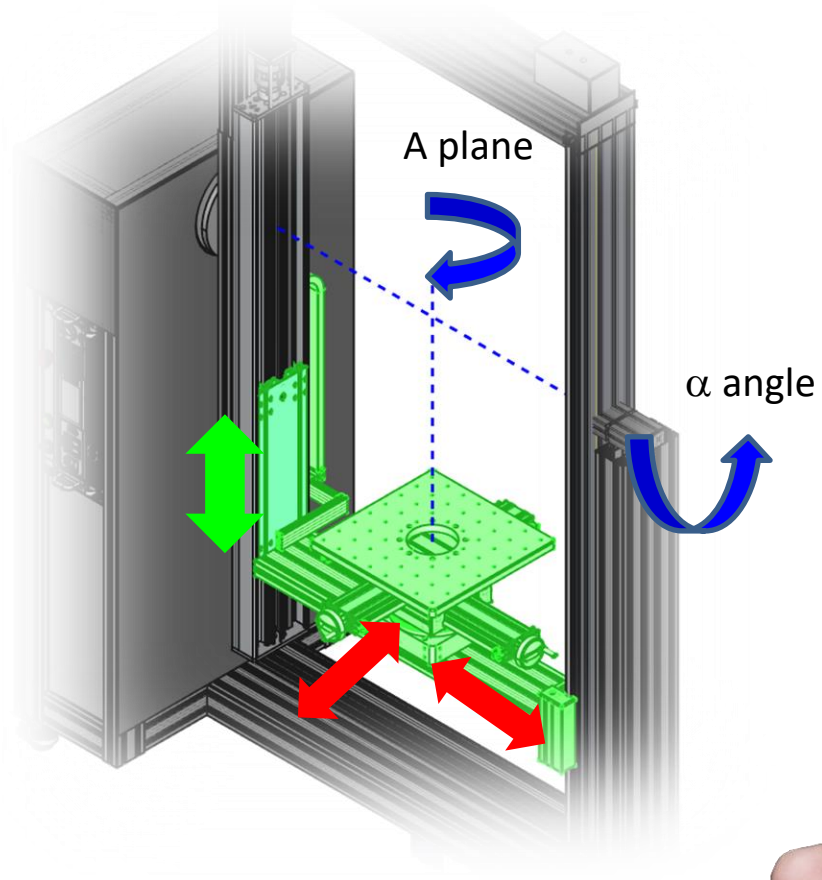


Fig. **3-axis Motorized Control:**
- **α horizontal axis** for vertical angles
- **A plane vertical axis** for horizontal (V) angles
- **Z linear vertical axis** for positioning to the turning axis of A plane

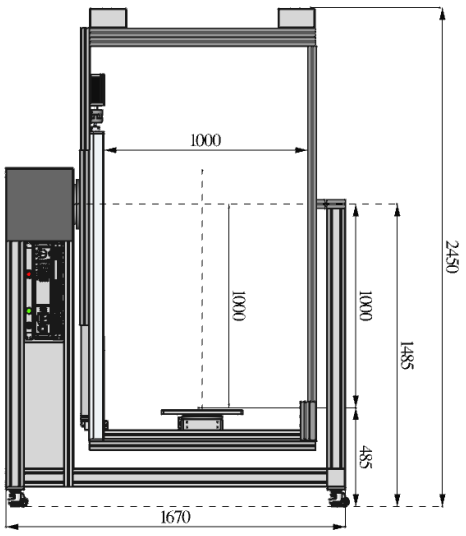
Optional 2-axis Manual control:
- **X and Y linear horizontal axes** for positioning to the turning axis of α axis

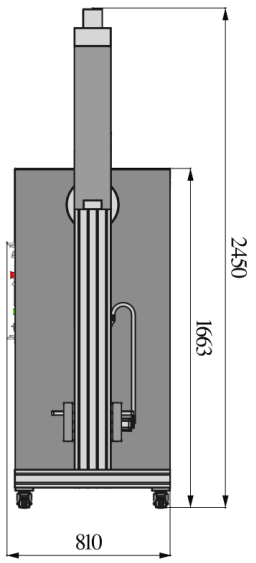
Fig. **Remote control of motorized axes through the Android app via Bluetooth**

SSL **AUTO 1000 - Specification**

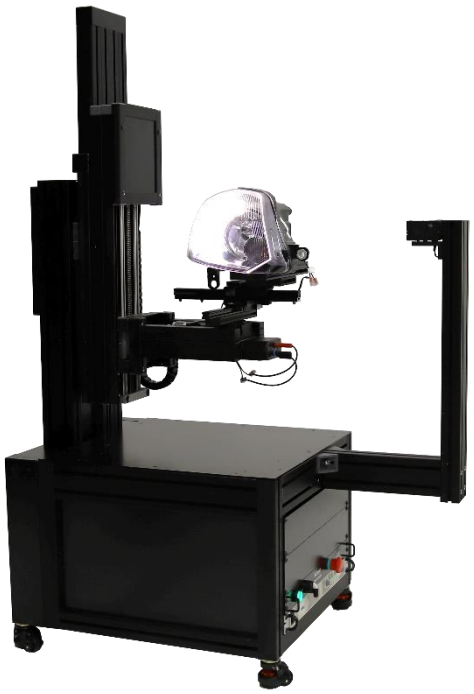
Goniometer	**SSL AUTO 1000** (Prodcut code SSL **A.1000)**
Goniometer type	A type
Gonio driver and controller	3 axis Stepper motor controller with RS-232 / USB interface, Worm gear drive system with deep groove ball and crossed roller bearings. Emergency stop switch.
Goniometer arrangement	Electrical devices are integrated into Goniometer station. It has 8U spaces for 19" rack devices.
Alignment laser	Red cross-line laser
Height, diameter of rotation	2.5 m, D=1.2 m
Height of optical axis	Approximately 1.5 m
Max total length, height and mass of DUT[2]	1 m, 1 m (0.85m with XY linear axis), 50kg
Resolution	<0.01° (A and α axis)
Reproducibility / Accuracy	<0.1° (A and α axis)
Turning range, α angle[1)]	±30° at maximum load, ±100° at adjusted load with counterweight
Turning range, A plane[2)]	±180°
Movement range	Z-direction (Motorized axis): 1 m, Optional X and Y axis: 0.3 m.
Minimum room space (WxHxL)	2 m x 2.5 m x (12 – 37) m
Photometer	**SSL LC-800**
Photometer measuring head	SSL LH-1010-f3, Silicon photodiode with V(λ) filter. The spectral match to CIE photopic sensitivity curve f_1'<3% (class A)
Luminous intensity range (measurement distance)	0.01 – 5 000 000 cd (3.16 m), 0.1 – 50 000 000 cd (10 m), 0.3 – 170 000 000 cd (18.3 m), 0.6 – 310 000 000 cd (25 m) 0.9 – 470 000 000 cd (30.5 m)
Viewing angle	±4.5° (SSL tube-270-32)

[1)] A plane = Horizontal angle / Vertical (moving) axis
[2)] α angle = Vertical angle / Horizontal (fixed) axis





AUTO series
- Custom models

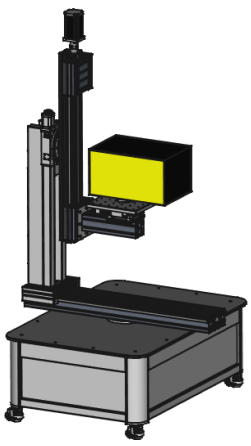


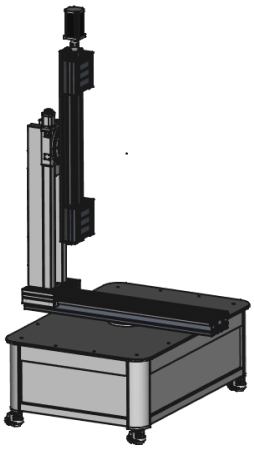
AUTO 50.A

- A type goniophotometer
- For Samples up to Diam. 0.6m, height 0.25m, 5 kg
- Motorized Z movement

AUTO 100.custom

- B type goniophotometer
- For Samples up to 0.6m, 10kg
- External interlock compatible



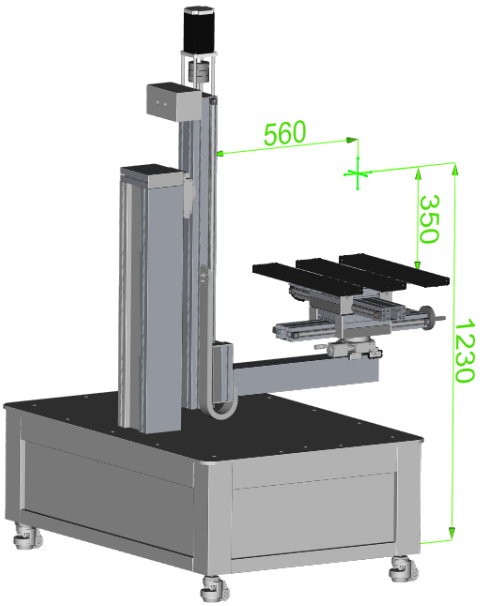


AUTO 150.A.C

- A type: 0.3m, 25kg
- C type: 1.5m, 10kg

AUTO 90.A

- A type goniophotometer
- For Samples up to 1m, 15kg
- Motorized vertical linear axis



A/B Type Goniophotometer - Software Features

- ✓ PASS / FAIL Test according to the different standards such as ICAO, CAP437, ECE, FVMSS108, FAA..
  - Candela tool for Elevation and Azimuth angles
  - Candela tool for Horizontal and Vertical angles
  - Editor of Candela Test Specification
- ✓ Analysis tool for Road surface illumation and at transversal plane
- ✓ Isolux analysator

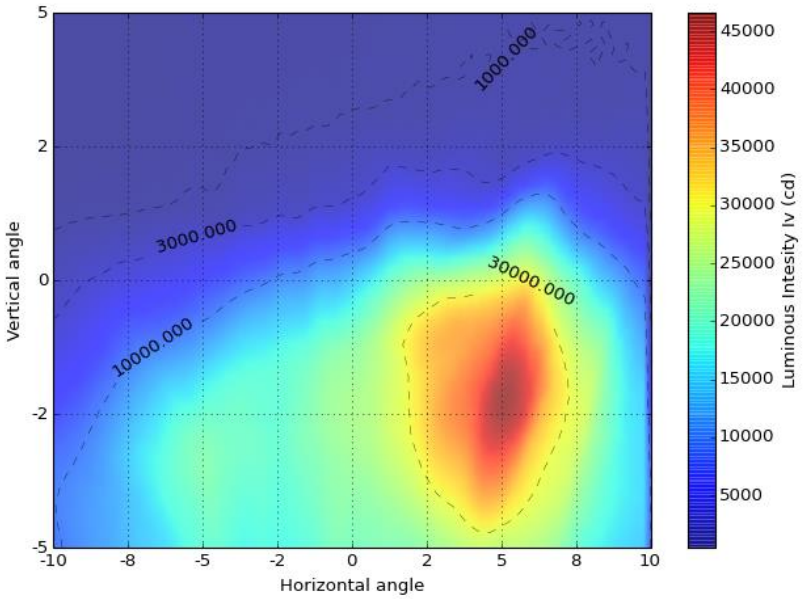


Fig. **2D luminous intensity beam –presentation.**

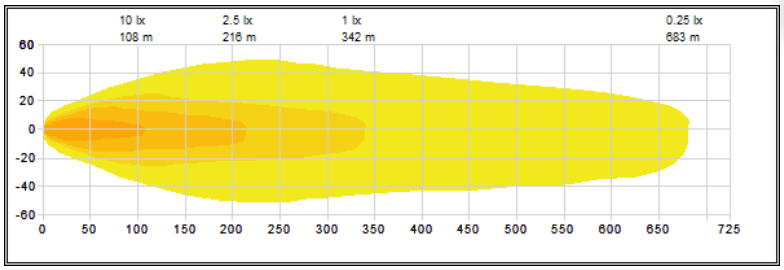


Fig. **Simulation of horizontal isolux of auxiliary car light.**

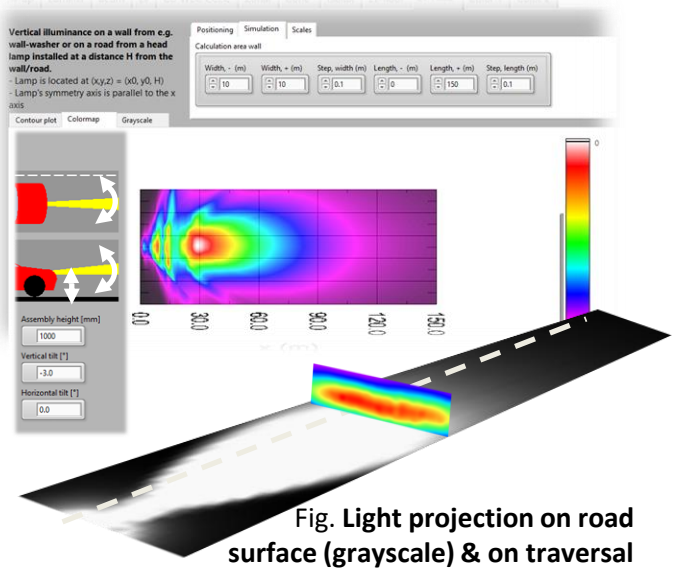


Fig. **Light projection on road surface (grayscale) & on traversal plane at 50m distance (color).**

A/B Type Goniophotometer - Software Features

Candela tool for Elevation and Azimuth angles

- ✓ PASS/FAIL Test according to different standards such as ICAO, CAP437, FAA, HMS where luminous intensity specification is given as a function of elevation angle being identical at all azimuth angles.
- ✓ Useful test tool for checking standard compliance of photometric performance of rotation-symmetric signal lights such as aeronautical, helideck lights
- ✓ The angular luminous intensity distribution of luminaire/lamp is measured with normal IES/LDT angular scan using an angular range required in the standard.
- ✓ The GPM software includes some pre-defined test specifications e.g. CAP437 and ICAO omnidirectional lights.
- ✓ A test specification editor allows a user to create new test specifications (see Fig.).
- ✓ Compatible with A and C type goniophoto-meters

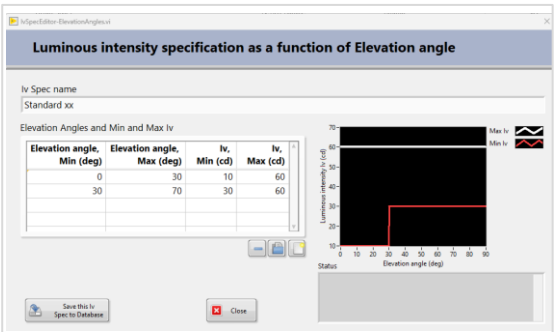


Fig. **Test specification editor.**

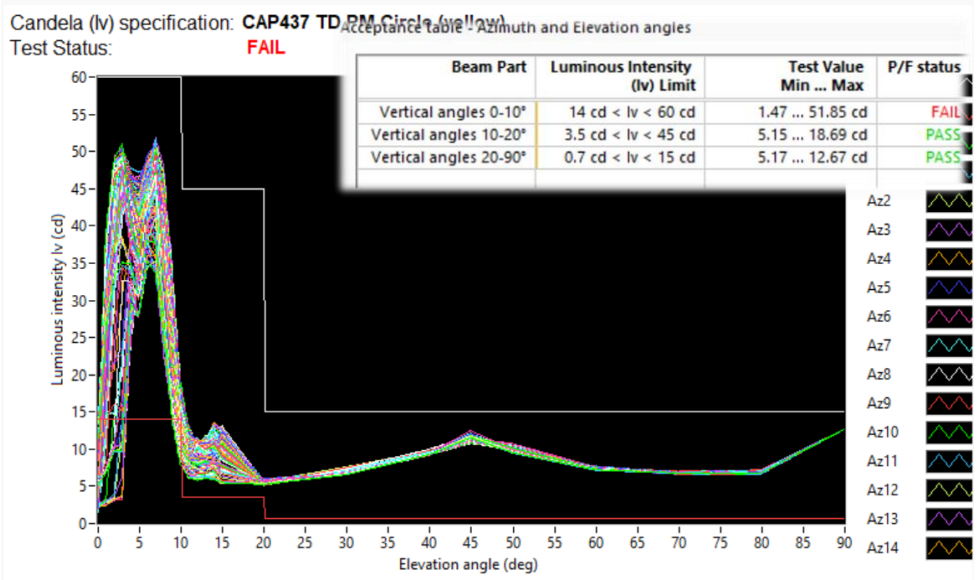


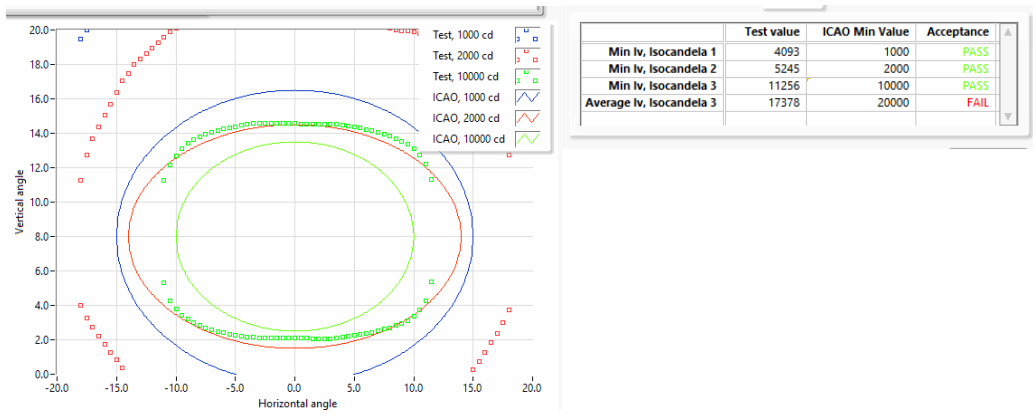
Fig. **Pass-fail results of luminous intensity in elevation/azimuth angles in test standards of e.g. ICAO, CAP, HMS.**

A/B Type Goniophotometer - Software Features

Candela tool for horizontal and vertical angles (Iv-Spec-sw)

- ✓ PASS/FAIL Test according to test standards such as ICAO, FAA, ECE, FVMSS108…
- ✓ Luminous intensity specification is defined in horizontal and vertical angles.
- ✓ **Editor of Candela test specification** (see next page) is add-on sw tool for both GPM sw (turning goniometer) and BTC sw (camera+screen based goniometer).

1. ***Test by Candela tool -sw***:
   a. Luminous intensity is measured only in the places (e.g. single test points, zones…) where the luminous intensity specification is defined.
   b. Test Time: typically <10 minutes.
2. ***Test with a Full-scan***:
   a. The complete angular luminous intensity distribution of luminaire/lamp is measured in an angle range required by the standard.
   b. The test produces the overall beam information such as beam shape, beam angle, maximum luminous intensity, iso-lux curves...
   c. The angle position of the lamp can be fine-adjusted for reaching Pass result.
   d. Test time: from several tens of minutes up to 10 hours.



	Test value	ICAO Min Value	Acceptance
Min Iv, Isocandela 1	4093	1000	PASS
Min Iv, Isocandela 2	5245	2000	PASS
Min Iv, Isocandela 3	11256	10000	PASS
Average Iv, Isocandela 3	17378	20000	FAIL

Fig. **Pass-fail results of luminous intensity in specified H,V angles stated in test standards of e.g. FVMSS108, ECE, ICAO, FAA.**

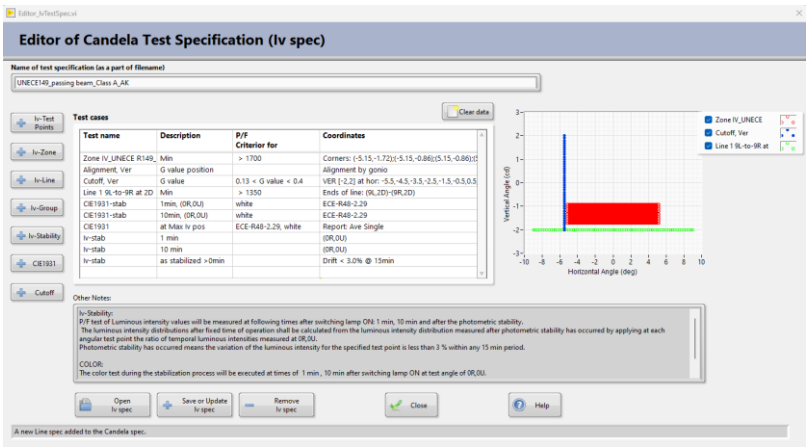
A/B Type Goniophotometer - Software Features

Editor of Candela Test Specification

Using this editor the sub-test specifications (e.g. Groups, Zones) cab be created, removed and edited. The overall Candela Test Specifications can be created by combining these sub-test specifications.

Different sub-test specifications:

- ✓ *Single test point*: Min and Max luminous intensity (Iv)
- ✓ *Group of test points*: Min/Max Iv of Any test point, Min/Max of Sum Iv of all test points, and Min/Max of Average Iv of all test points.
- ✓ *Line or Segment*: Min/Max Iv of Any test point in the line, and Min/Max of Average Iv of all test points in the line.
- ✓ *Zone or Area*: Min/Max Iv of Any test point in the zone, Min/Max of Average Iv of all test points in the zone, Min/Max of Maximum Iv, and Min/Max of Minimum Iv.
- ✓ *Cutoff (R149 specific)*: Vertical and horizontal cutoff sharpness of automotive lights according to UN ECE R149.
- ✓ *Stability*: Defines criteria when the luminous intensity values are measured.
- ✓ *CIE1931*: Color coordinate test specification. User-defined parameters:
  - **Color specification** for CIE1931 color diagram (e.g. ICAO, IALA).
  - **Color class** defines the chosen color area defined in the Color specification.
  - Color spec can be tested at different **angles** and **stability times**



LABORATORY SETUP

LABORATORY SETUP

The arrangement of the goniometer station, photometer and spectrometer (option) is shown in figure below. The software has feature to setup the angles and distances of each sensor, then the measurements are made automatically with both sensors.

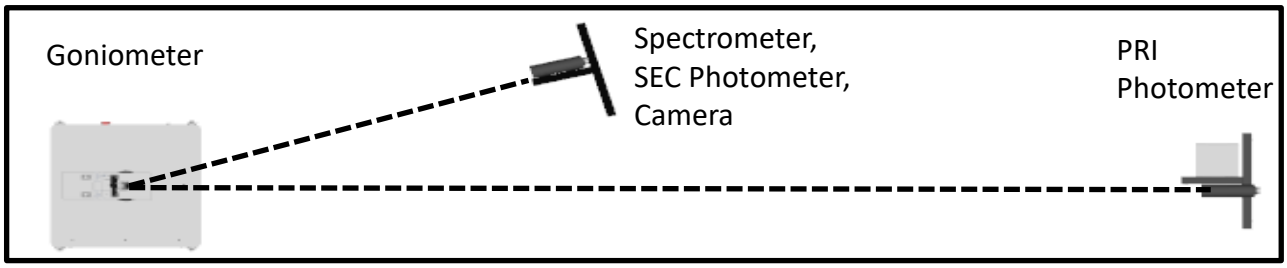


Fig. **Top view of typical type B or C goniophotometer laboratory.**

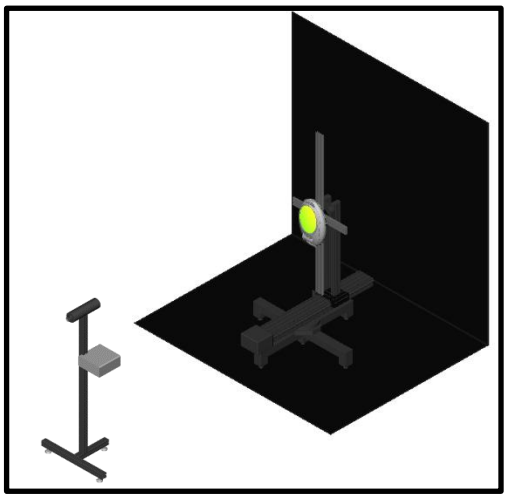
EQUIPMENT HOLDER

SSL RACK-1 is equipped by a separate small device rack having an 8U space for all devices including gonio controller and DC / AC power sources.

EQUIPMENT HOLDER and PC TABLE

Goniometer peripherials (powering equipment and gonio controller) and test computer with display can be installed onto the SSL RACK-2 which has a 19" rack equipment. It is easily movable using castor with a wheels and adjustable foots.

LABORATORY SETUP



STRAY LIGHT TUBE and PREPARING LABORATORY

With attaching the photodetector to a stray light tube, the laboratory preparation is much easier. The stray light from the side wall, ceiling and floor is eliminated by a stray light tube having a couple of apertures with a knife edge land. The photometer can see reflections only from the back-wall behind the goniometer station, so it is the only that needs to be covered by a special black surface. The stray light tube also allows use of roof lighting in the photometer end of the gonio lab making more more comfortable working area in the lab. The stray light tube is assembled at a fixed photometric distance according to the largest possible test sample. This reduces the risk of erroneous distance setting.

Stray light tube with several equipment for large goniometer stations

Stray light tube stand for small goniometer stations

Usage position

Transportation position

LABORATORY SETUP

Photometering versions	
Far field photometer	The goniometer can be equipped by any SSL photometer for luminous intensity (I_V) distribution measurements. The photometer has a range of measuring heads for choice of illuminance measurement range.
Far field colorimeter	The goniometer can be equipped by any SSL colorimeter for measurements of I_V, color temperature (CCT) and color coordinates, and angular color uniformity (SDCM). The SSL colorimeter has a range of measuring heads for choice of illuminance measurement range and CIE 1931 XYZ spectral match accuracy.
Near field photometer	Secondary photometer for measuring low luminous intensity levels / flicker at a shorter distance
Spectro-radiometer	The goniometer can be equipped by any SSL spectroradiometer for measurements of spectral radiant flux, CCT, CRI, TM30-18 indeces, SDCM and many other spectral related parameters. The SSL product range contains spectroradiometers with different wavelength ranges, spectral irradiance detectivity and the optical bandwidth.

SAVE TIME, SPACE AND MONEY

- ✓ Straightforward setup (no measurement rail needed)
- ✓ User-friendly and versatile test software
- ✓ Easy-to-use Sample holder, installation and training service, etc.
- ✓ Fast colorimetric measurements

Gonio System Delivery

OPTION 1: Standard package

Description: The goniometer station and accessories are tightly packed into a relatively small transport wooden box. The laboratory room is prepared by black before the gonio delivery.

Advantages:

– Cheaper transportation costs.

Disadvantages:

– More unpacking and assembly work.
– Roof, floor and walls of Gonio Laboratory room needs to be covered by low reflectance diffuse black material.
– Laboratory lighting needs to be constructed.

OPTION 2. SSL Gonio-nest (Figures below)

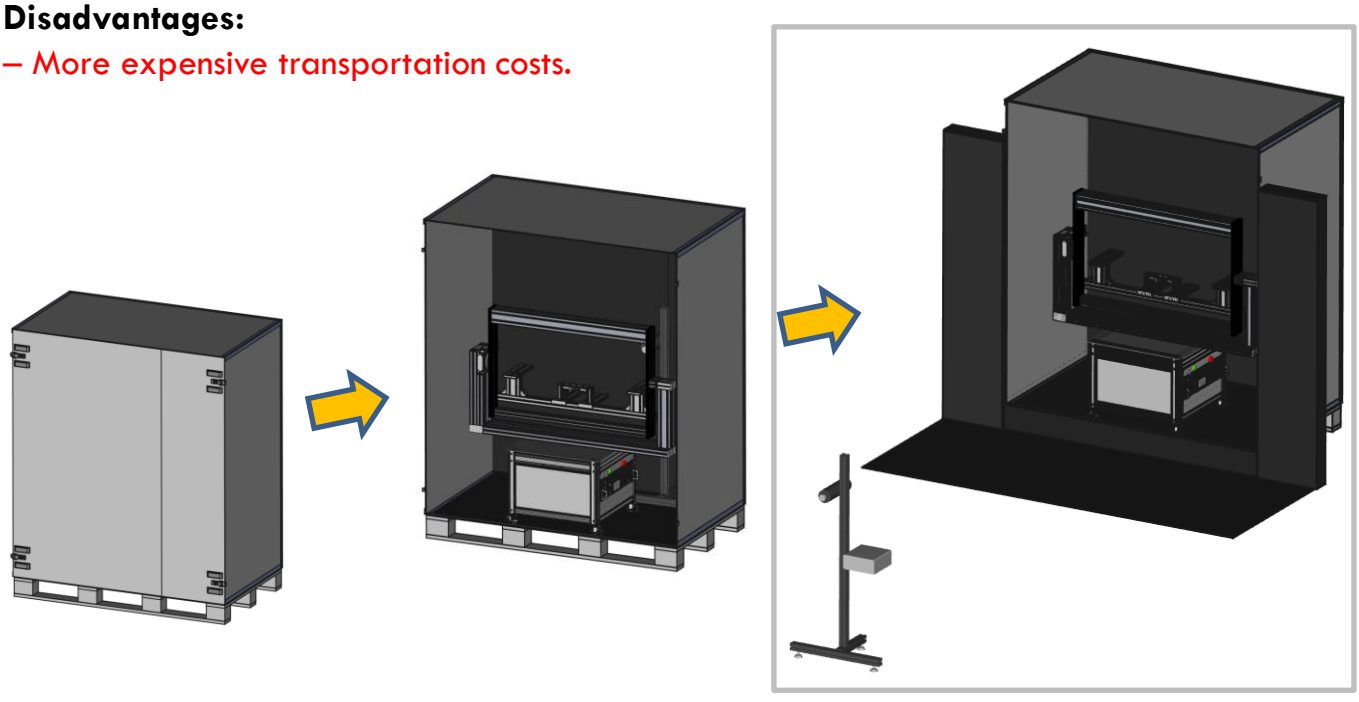
Description: The goniometer station and accessories are transported inside SSL Gonio-nest. When setuping the SSL Gonio-nest, its front wall is removed and the additional side walls and carpet are installed around the dark chamber.

Advantages:

– No need for separate transportation box and additional unpacking work.
– No need for black laboratory room or building illumination to the laboratory room
– Automatic switch on/off of ambient lighting during measurements

Disadvantages:

– More expensive transportation costs.



SSL Goniometers
Ordering information

Goniometers	
SSL LAMP 30	2-axis Goniometer station (C, γ). GPM-sw-full, Stray light tube and stand, Alignment laser, GPM full sw
SSL LAMP 30.B	2-axis C and B-type Goniometer station (C, γ) . GPM full sw with B-type options and Candela sw. Stray light tube and stand. Alignment laser.
SSL LAMP 200 SSL LEDI 70 SSL UNI 170	2-axis Goniometer station (C, γ. GPM-sw-full, Stray light tube and a stand, Alignment laser, GPM full sw, SSL RACK-1
SSL LUMI 90.2 SSL LUMI 180.2	2-axis Goniometer station (C, γ), GPM-sw-full, Stray light tube and stand, Alignment laser
SSL LUMI 90 SSL LUMI 120 SSL LUMI 180	3-axis Goniometer station (C, γ), motorized vertical arm, GPM-sw-full, Stray light tube and stand, Alignment laser
SSL DECO 27	SSL C-2.270, a floor mounted C type goniometer with vertical optical axis, Stray light tube, GPM-full-sw
SSL AUTO-100	2-axis Goniometer station (B, β), GPM-sw, Stray light tube and stand, Alignment laser
SSL AUTO 50.A SSL AUTO 1000	3-axis Goniometer station (A plane, α, Z), GPM-sw, Stray light tube and Al-profile stand, Alignment laser, Iv-spec sw

Sample holders	
SSL SH-lin-2.2	2-handed linear sample holder with trapezoidal screw for LUMI 120/LUMI 180
SSL SH-lin-2.1	2-handed linear sample holder with trapezoidal screw for LUMI 90
SSL SH-linear__xxx	Sample holder of linear LUT (xxx specified by the gonio model, e.g. LUMI 120, xxx=120): two attaching mechanisms: (1) by squeezeing the LUT with four angle brackets (2) by screwing the LUT using square nuts (M4/M6/M8) in the grooves (angle brackets removed)
SSL SH-park	Sample holder of park lights: Mounting by squeezing a park light from its edges, max. Ø70 cm, a top of the park light can be located into center hole diameter 12 cm
SSL SH-panel	Sample holder of panel lights and down lights : Mounting by squeezing a LED panel from its edges, compatible for different sizes LED panels with thicknesses of >7.5 mm
SSL SH-street 20	Sample holder of street luminaires with pole mounting system: 60mm tube, fixation by two screws in radial orientation, max. distance between mounting hole and the roof of the LUT 20cm
SSL SH-down	Sample holder of recessed down lights:A Long angle brackets for a spring fixation of a down light, max. Ø40cm, thickness 30 cm
SSL SH-flood	Sample holder of floodlights, high bay lights, etc., solid mounting of heavy luminaires, asymmetric installation. Two alternatives attaching mechanisms: Horizontal/ vertical mounting

SSL Goniometers - Options
Ordering information

Options	
SSL LUMI.B-xxx	B type goniometer option to be connected onto a goniometer station. Including mechanical adapters and sw add-on. xxx specified by the base gonio model.
SSL Iv-Spec-sw	Luminous intensity specification editor for candela sw tool add-on of GPM sw. - User can create the candela specifications for standards such as ECE, FVMSS108 to meet different type of specifications like Zone, Line, Group of Test points, Single test points…
SSL BPC-B	Burning position corrector setup of B type gonio including L-50 photometer (Bluetooth communication) and a related software tool
SSL-BPC-c	Setup for burning position corrector including L-50 photometer (Bluetooth communication) and a related software tool
SSL IMG-2	Add-on Imaging setup for goniometer LUMI: Typical installation distance 3m at the secondary Al profile stand. 2.3Mpix USB3.0 camera & 25mm lens. Camera sw add-on.
SSL-black	Special low reflectance black material for a back wall and floor of gonio laboratory room
SSL Gonio-nest_xxx	Dark chamber for easy installation of the goniophotometer. It is also used for goniophotometer transportation box. “xxx” specifies the gonio model.
SSL-PC	Measurement computer with needed communication cards and installation work (drivers and software)
SSL rack-2	Mobile device rack and computer table. Space for 8U 19" rack device
Training	
SSL-service	Goniometer system first installation and basic training including example measurements on customer site (1-3 days)

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SSL Goniophotometer Catalogue

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SSL RESOURCE
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