

SSL Resource

LUMI 180 LN.Street

Goniometer Optimized for

- ✓ **GonioNest**
- ✓ **Street Luminaires**
- ✓ **Testing speed (10-14min @EN 13201)**



Datasheet

SSL LUMI 180 LN

PRODUCT NAME	SSL LUMI 180 LN
Item name	SSL LUMI 180, SSL LUMI 180 N
Product code	C-1R.20-180-30.LN
Application area	Street Lights, lightweight medium sized linear lights, LED panels / downlights, LED lamps
Sample holders	The goniometer is designed to be optimal for measurement of street lights. As default it includes the following sample holders: - SSL SH-Linear-180 - SSL SH-Street 20 See p. 15
Goniometer type	C type with horizontal optical axis one column (two columns) arrangement
Gonio controller	2 axis Stepper controller (19" 1U, RS-232) Worm gear drive system with deep groove ball bearings
Alignment laser	Red cross-line laser (5mW)
Arrangement	Goniometer station with electrical device 19" rack integration
19" Rack space	4U in two columns (8U in total). 7U free space for AC/DC power supplies/meters
Gonio dimensions	2.3m, 1.0m, 0.6m, 90kg
Height of optical axis	1.3-1.35 m
C-DUT ¹ : D x T, m	1.8m x 0.3m, 20kg
Minimum space for lab room (WxH, Length L) ²	1.9 m x 2.4 m, L: 8.5 m
Angular range	±175° (γ axis), 0-360° (C plane axis)
Resolution / Accuracy	<0.006° / <0.1° (γ and C axes)

¹Maximum dimensions of the luminaire under test (DUT): L=Length, W=Width, T=Thickness (B type), Diagonal $D = (L^2 + W^2)^{1/2}$, T=Thickness (C type). m = mass (kg)

²On 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

GENERAL FEATURES OF SSL GONIOPHOTOMETERS

ALL INCLUSIVE MEASUREMENT SYSTEM

- ✓ Accurate characterization of spatial photometric, colorimetric and spectrometric features of luminaires by C / B / A 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
- ✓ Luminance camera based UGR measurements according to CIE 232

SAVE TIME, SPACE AND MONEY

- ✓ Fast sample mounting by a 2-handed 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

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:

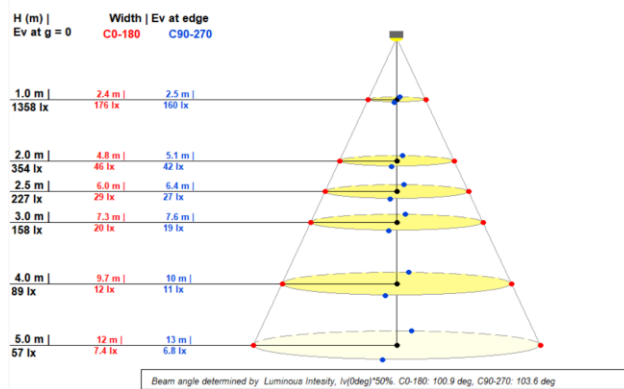


Fig. Dynamic cone diagram.

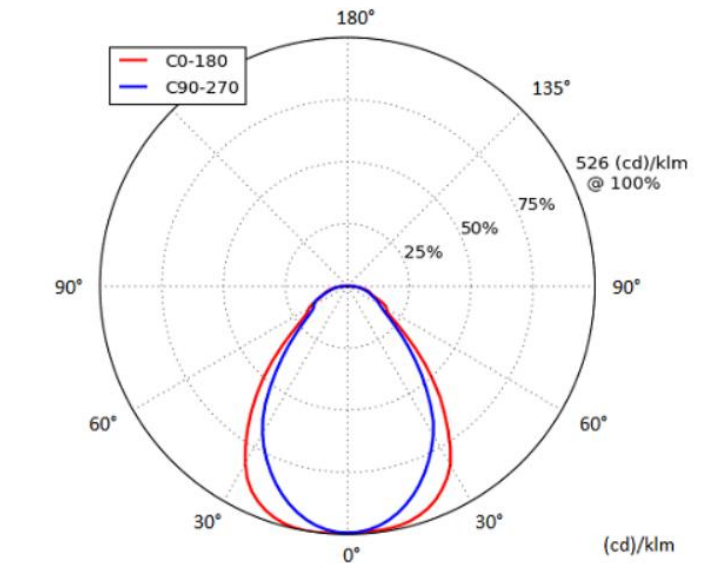


Fig. BUG (back, up, glare) diagram.

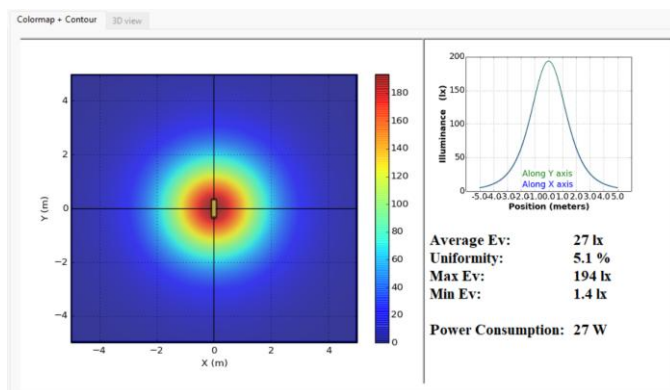


Fig. Spatial Illumination tool. Units: $\mu\text{mol/s/m}^2$, mW/m^2 and lx. Distances, nr of lamps etc. can be changed.

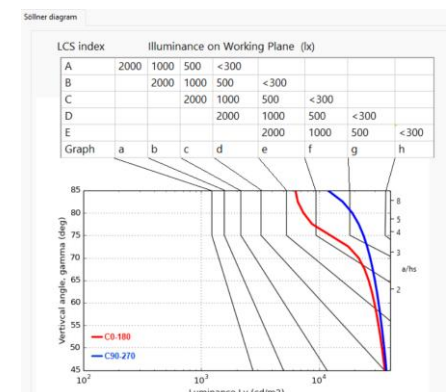


Fig. Söller diagram for luminance.

C Type Goniophotometer - Color Measurement Features

- ❑ Total integrated values:
 - ✓ CCT, CRI, TM30-18
 - ✓ CIE1976, CIE1931
 - ✓ WL Bandwidth analysator
 - ✓ Optical power
- ❑ Angular dependent values:
 - ✓ CIE 1976, CCT, CRI-Ra
 - ✓ Peak WL, Bandwidth
 - ✓ Relative/absolute spectrum
 - ✓ Radiant intensity distribution (LDT/IES files in units of mW/sr or $\mu\text{mol/s/sr}$)

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

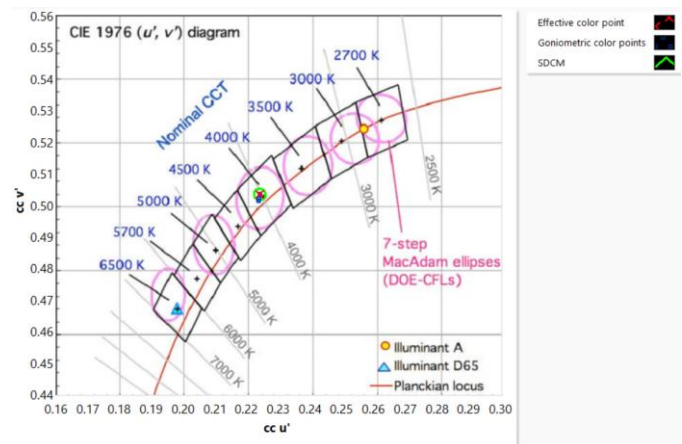
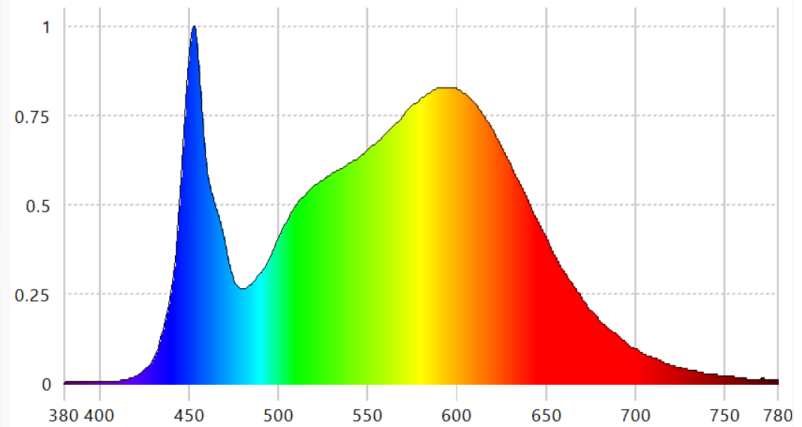


Fig. Spatial color uniformity (SDCM).

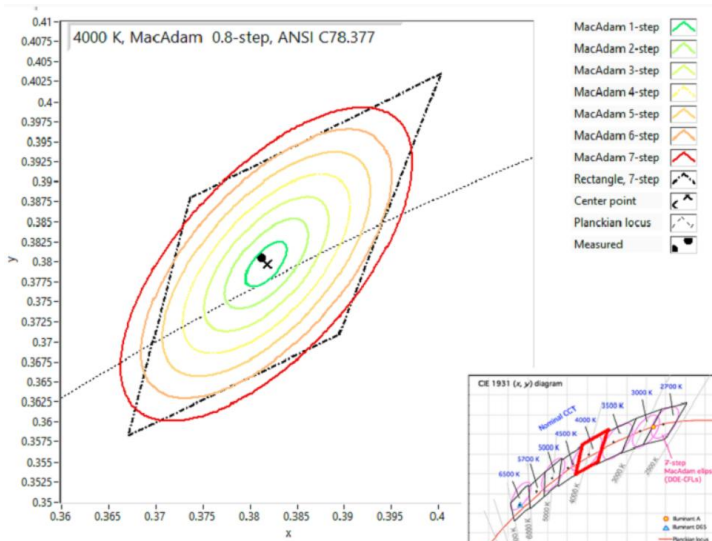


Fig. Color class SDCM value of target color point.

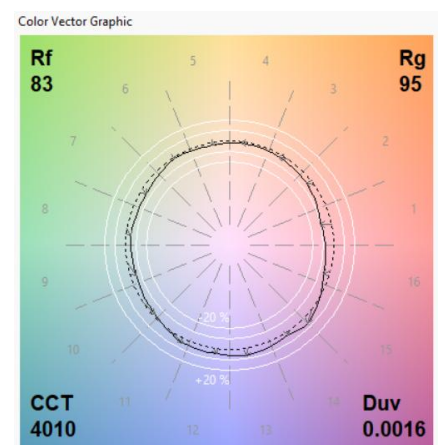


Fig. Color vector figure of TM-30-18 color rendering metrics,

Measurement Ranges - Goniophotometer

Photometer		SSL LC-800.1			
Measuring head		SSL LH-1010-f3, Silicon photodiode with $V(\lambda)$ filter. The spectral match to CIE photopic sensitivity curve $f_1' < 3\%$ (class A)			
Min. luminous intensity accuracy		$> \pm 2.5\%$ ($k=2$), depends on the angular beam shape of DUT			
Luminous flux accuracy		$\pm 3\%$ ($k=2$)			
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 $\pm 180^\circ$)	Lambertian radiation, γ range $\pm 90^\circ$	Narrow beam radiation with 40° beam angle [$\cos^n(\theta)$ type beam], γ range $\pm 90^\circ$	
	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 LABORATORY SETUP

STANDARD 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.

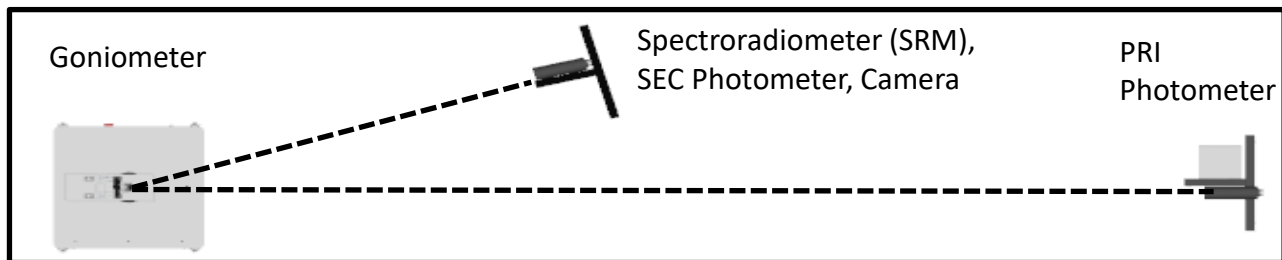


Fig. Top view of typical type B or C goniophotometer laboratory.

DISTANCE EXTENSION MIRROR (DEM) SETUP

In case of limited or relatively small gonio room available, the measurement distance can be extended using a mirror. As a result, the arrangement allows to measure large luminaires in a smaller room as the mirror duplicates the test distance.

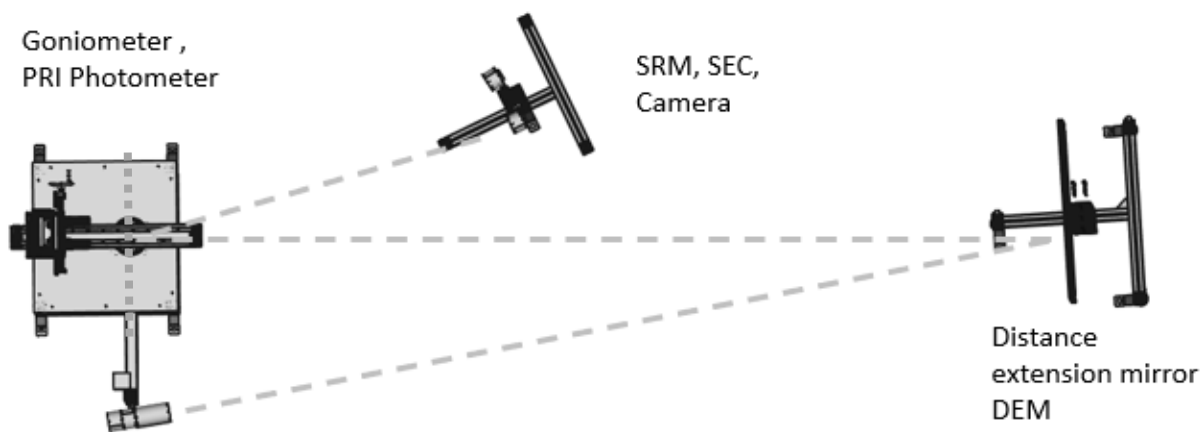
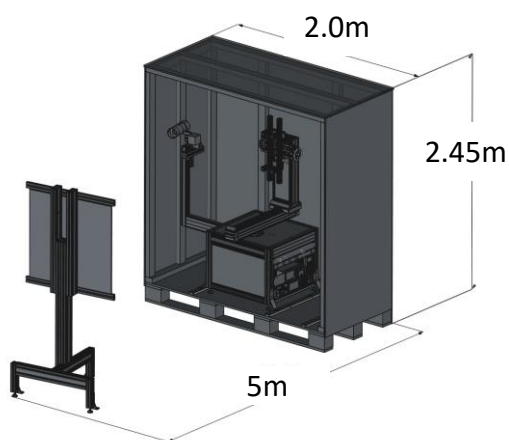


Fig. Mirror goniophotometer setup with the PRI, SRM, SEC and Camera.

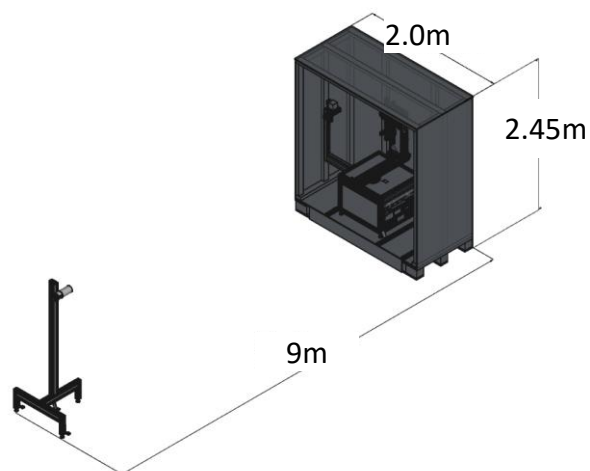
LUMI 180 LN LABORATORY ROOM SIZE

CASE: Room size for measuring street luminaire with 0.5m luminous area at a distance of 7.5m (15 times rule).

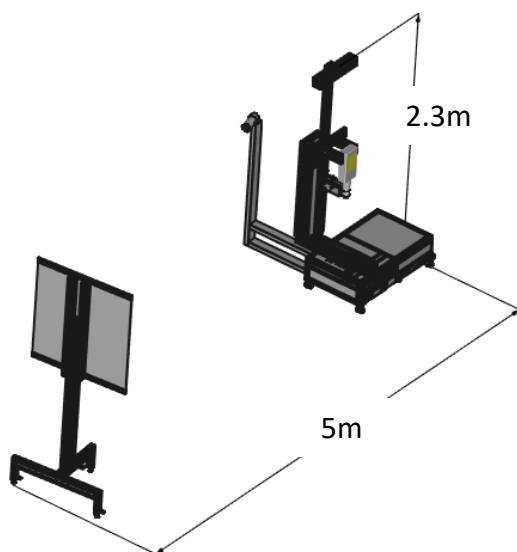
**LUMI 180 LN
+ GonioNest_11x19x24
+ DEM**



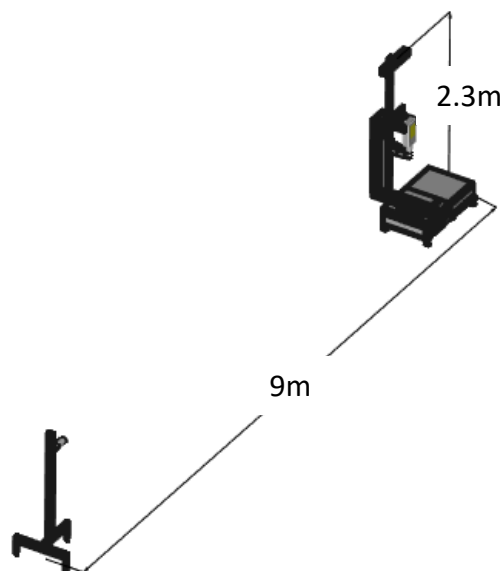
**LUMI 180 LN
+ GonioNest_11x19x24**



**LUMI 180 LN
+ DEM**



LUMI 180 LN



GONIOPHOTOMETER LABORATORY SETUP



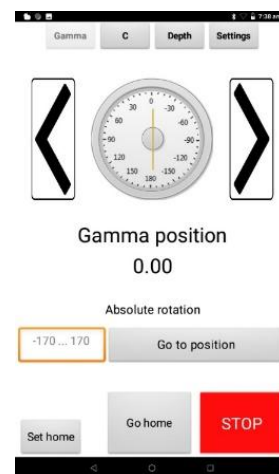
EQUIPMENT HOLDER and PC TABLE

Goniometer peripherals (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 wheel and adjustable foot.

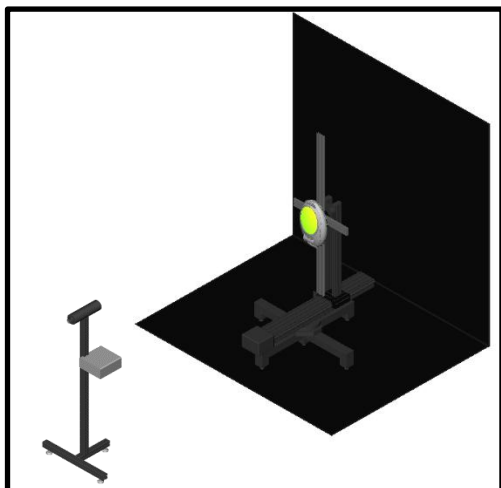


REMOTE CONTROL APP (LUMI series)

The goniometer station can be custom rotated by Remote control MC20x_BT - app. The photometer positions can be stored in the app in similar way as in PC software. There are Advanced view (left) and Basic view (right)

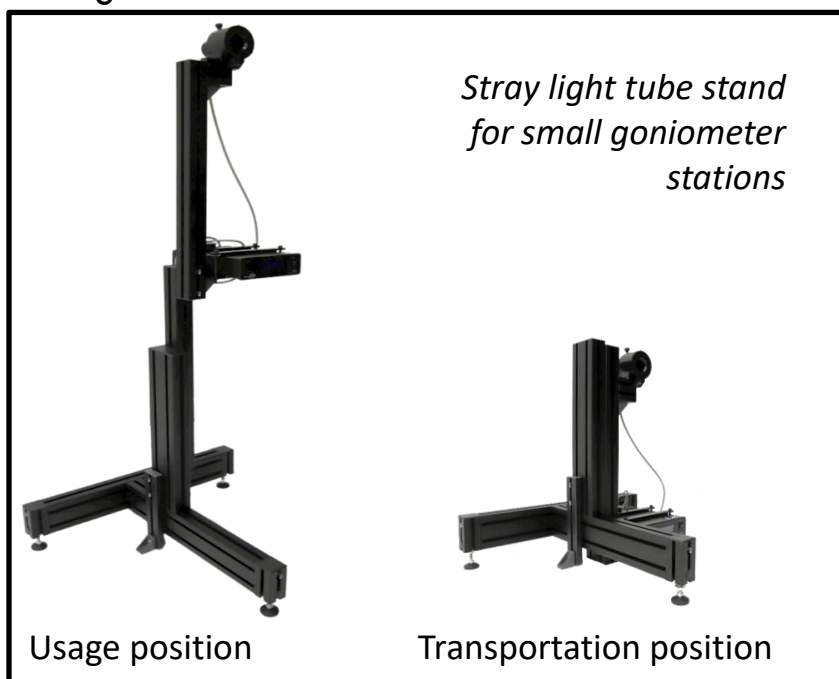


GONIOPHOTOMETER LABORATORY SETUP



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 the working area in the lab more comfortable. 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.



GONIOPHOTOMETER LABORATORY SETUP

Photometering versions

Far field photometer Primary photometer is used for measuring luminous intensity in the far field. The goniometer can be equipped with any SSL photometer for luminous intensity (I_v) distribution measurements. The photometer has a range of measuring heads to suit different illuminance measurement ranges.

Far field colorimeter The goniometer can be equipped with any SSL colorimeter for measuring I_v , color temperature (CCT) and color coordinates, and angular color uniformity (SDCM). The SSL colorimeter has a range of measuring heads to suit different illuminance measurement ranges while meeting CIE 1931 XYZ spectral accuracy standards.

Secondary photometer Secondary photometer is needed for measuring (very) low luminous intensity levels / flicker at a shorter distance.

Spectro-radiometer The goniometer can be equipped with any SSL spectroradiometer for measurements of spectral radiant flux, CCT, CRI, TM30-18 indices, SDCM and many other spectral-related parameters. The SSL product range contains spectroradiometers with different wavelength ranges, spectral irradiance detectivity and 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

SSL GONIOPHOTOMETER

Add-on features

Camera package, IMG-2

Feature	Designator	Minimum Setup add-on ^{*)}
Luminous area (LA)	Manual / simple threshold analysis	IMG-2 ¹⁾
Position of LA center	Up to five (5) directions	IMG-2 ¹⁾
Turning axis adjustment	depth	IMG-2 ¹⁾ + 3 rd axis ³⁾
Turning axis adjustment	C plane	IMG-2 ¹⁾
Camera aligning tool	Positioning of light detectors	IMG-2 ¹⁾
CIE 232 luminous area	Manual / Automatic rotation	IMG-2.Lv ²⁾ + FiLMI.base sw + CIE232 sw
Luminance image	Gonio rotation possible	IMG-2.Lv ²⁾ + FiLMI.base sw

^{*)} Setup needs a stand if it is not yet available for camera or spectroradiometer.

¹⁾ IMG-2 contains CAM2.3 and IMG-2 sw

²⁾ IMG-2.Lv contains CAM2.3.Lv-f3 luminance camera and IMG-2 sw

³⁾ 3rd axis is the motorized vertical arm of goniometer station (LUMI 180.3, LUMI 120.3, HEVI 1700.3)

Secondary photometer

Test parameter	Designator / Application	Minimum Setup add-on ^{*)}
Luminous intensity	Low luminous intensity / standard specified distance	L-51 + LH1010-fx + Tube-55-xx
Flicker	Flicker index/frequency, Percent flicker, SVM, PstLM	L-50 + LH1010-f10 + Tube-55-xx + GPM-Flicker sw
Effective intensity & Flash duration	Modified Allard, Allard, Blondell-Rey, Modified Blondell-Rey	L-50 + LHxx-fx + Tube-55-xx + GPM-El sw

^{*)} Setup needs a stand if it is not yet available for camera or spectroradiometer.

MEASUREMENT SCHEMES

Photometer

- On-the-fly
- Light measurements are taken during the angular rotation without stopping the rotation.
 - Optimized speed and stability.
 - Test time: 15-18s per C plane (0.5° angle step). The test time can be adjusted by user-defined parameters.

- Stop&Go
- Goniometer is turned – stopped – photometer is measured – goniometer is turned – gonio is stopped
 - Useful in case where the slow pulsing lights or astable lights are measured.
 - More stable, slower.

Spectroradiometer

- Auto-range
- Exposure (or integration) time adapts to changing light levels. The optimal integration time is defined in each angular position.
 - Slow, more accurate.

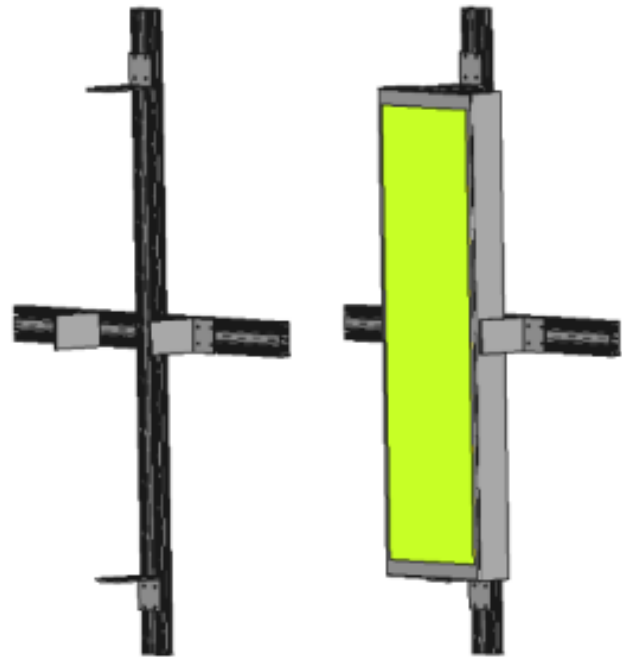
- Fixed-auto
- The fixed integration time is determined at the direction of the maximum intensity is optimal.
 - Is used in case of connected photometer measurement.
 - Faster, reasonably accurate, Automatic operation.'

- Fixed-manual
- The fixed integration time is determined manually by user
 - Is used in pure spectral measurement without photometer measurement.
 - Faster, reasonably accurate, Manual operation.

SAMPLE HOLDERS

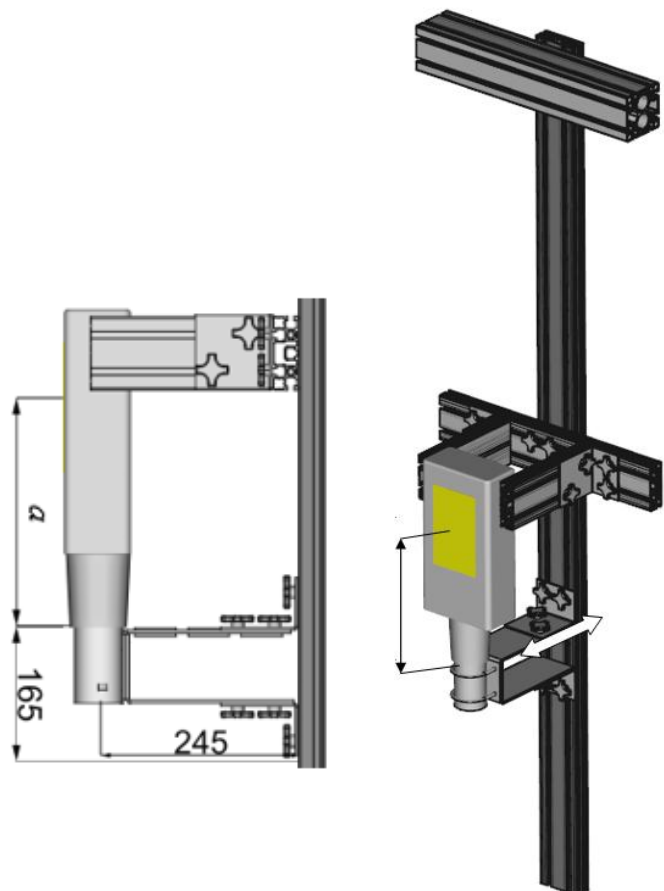
SSL SH-Linear-180

Sample holder for linear
luminaires



SSL SH-Street 20

Sample holder for street
luminaires with 60mm pole
mounting system



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:

- Fits normally through the standard doors

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)

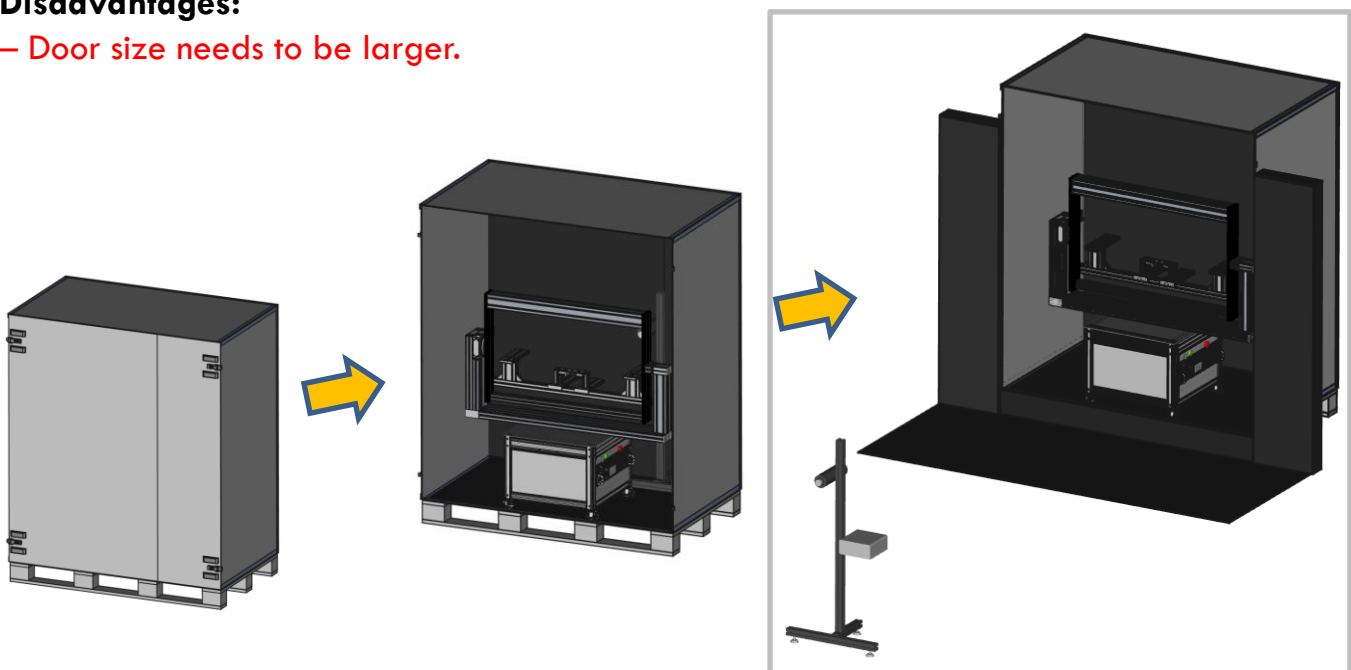
Description: The goniometer station and accessories are transported inside SSL Gonio-nest. When setuping the SSL Gonio-nest, its front wall is removed and the additional side walls and carpet are installed around the dark chamber.

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:

- Door size needs to be larger.



GONIOPHOTOMETER LABORATORY SETUP



SSL Gonio-nest for turn-key solution of gonio lab.

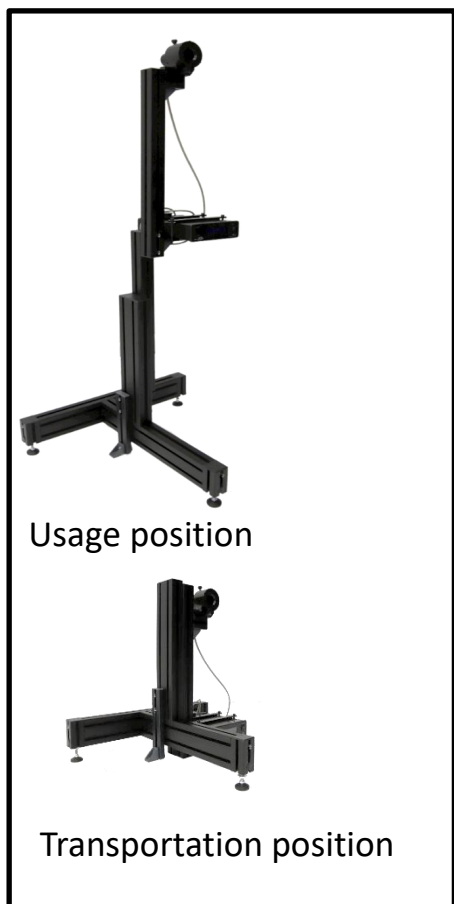
ELIMINATION of STRAY LIGHT

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 comfortable working area in the lab. Additionally, the laboratory lighting can be controlled through the goniometer to further confirm the laboratory lights in the goniometer end are switched off during the measurements (see image below).

GONIO-NEST

Gonio-nest is a turn-key solution for gonio laboratory having the black environment around goniometer station and the laboratory lighting controlled through the gonio software. It further enhance the delivery as it comes on the top of pallet making possible faster installation.



*Stray light elimination
tube (SLET) &
Stand for small
goniometer stations*

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 LUMI 30 P	30	13	3	X			X												
SSL LUMI 90	90	30	9	X		X	X	X	X	X						(X)		X	
SSL LUMI 120	120	80	20	X	X	X	X	X	X	X		X		X		(X)		X	X
SSL LUMI 130 L	130	30	8	X	X	X	X	X	X	X		X		X		(X)		X	
SSL LUMI 180 LN	180	30	20	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 LUMI 180 H*	180	100	50	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			

SSL LUMI 180 LN

Max DUT size :
Length < 1.8m
Depth < 30cm
Weight < 20kg



SSL Goniometers

Ordering information

Optional Sample holders

SSL SH-lin-2	2-handed linear sample holder with trapezoidal screw for LUMI 120 / LUMI 180
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-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

Additional Options (not complete list, ask if you anything else)

SSL Rail-40	Distance rail for automated positioning of Spectroradiometer, length 4.0 m
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-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 AI 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-onsite-service	Goniometer system first installation and basic training including example measurements on customer site (1-3 days)
SSL-online-service	Goniometer system remote installation and training through Teams/Teamviewer (x hours)

Contact Information



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