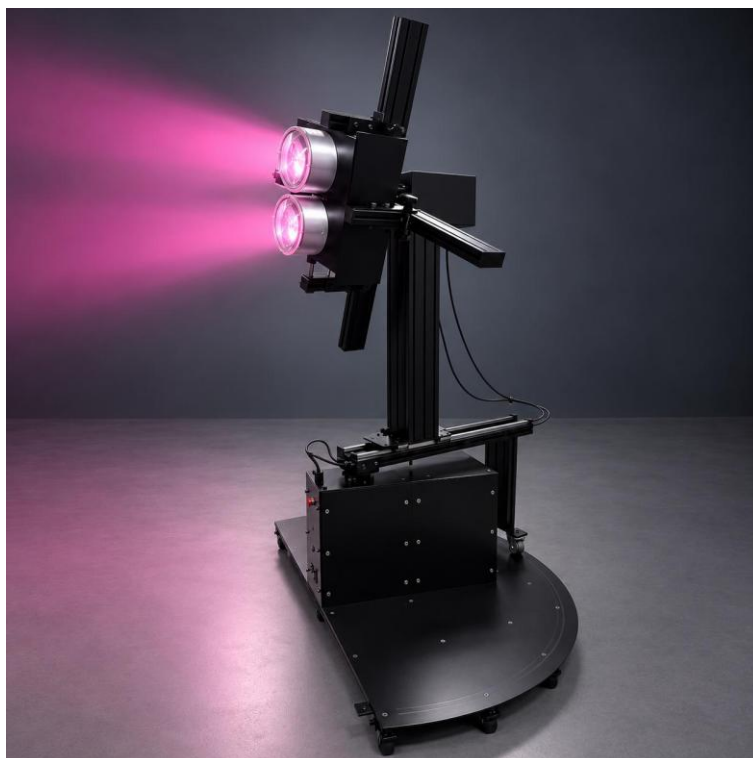


ICCS-SH Type 1

Technical Datasheet



ICCS-SH Type 1 is a far-field goniophotometer with a spectrometric probe designed to measure or calculate:

- Spatial distribution of luminous intensity;
- Luminous flux;
- Spatial distribution of photosynthetic photon flux density (PPFD), in $\mu\text{mol}/\text{m}^2/\text{s}$;
- Total photosynthetic photon flux (PPF), in $\mu\text{mol}/\text{s}$;
- Spectral irradiance in a specific direction and colorimetric parameters, in accordance with CIE and IES TM 30-15 standards;
- Spatially averaged spectral irradiance and colorimetric parameters, in accordance with CIE and IES TM 30-15 standards;
- Directional distribution of colorimetric parameters;
- Angular colour uniformity.

for any type of luminaire or light source.

ICCS-SH Type 1 is classified as:

- Type 1 according to EN 13032-1
- Type D according to IES LM-75-19

This means that

the detector remains fixed throughout the measurement while the luminaire or light source rotates sequentially about two orthogonal axes.

Measurements can be performed in the following coordinate systems:

- C-Gamma
- V-H

ICCS-SH Type 1 consists of:

- A. A fixed detector
- B. A motorised system with two degrees of freedom for sequential movement of the device under test (DUT) about two orthogonal axes

A. Detector

The detector is a high-performance spectrophotometer calibrated to measure spectral irradiance and calculate illuminance and all colorimetric parameters in accordance with CIE and IES TM 30-15 standards.

The spectrophotometer is placed on a dedicated support and remains fixed throughout the measurement.

It can be easily removed from its support and used as a portable instrument.

B. Motorised motion system with two degrees of freedom

The motorised motion system moves the device under test (DUT) with two degrees of freedom. It consists of two stepper motors coupled to two gearboxes.

The motor control boards use dedicated firmware to manage communication between the motors and the measurement system software, converting the position and speed commands issued by the software into controlled movements.

The motors operate independently and do not move simultaneously.

The acquisition method, in which the system stops at each measurement position, ensures a high level of accuracy and repeatability.

The centre of rotation coincides with the photometric centre of the luminaire, as required by the applicable standards.

Data Acquisition Software

The control and data acquisition software is intuitive and easy to use, guiding the operator step by step through the configuration of measurement procedures.

The acquired data are processed fully automatically. Results are saved automatically in an SQL database and can be exported at any time in EULUMDAT (.ldt) or IESNA (.ies) format.

Operation

The operator sets the distance between the detector and the device under test (DUT) in accordance with the applicable standards.

The device under test is secured to a dedicated support mounted on the mechanical motion system and aligned with the detector using two laser pointers.

Rotation in the horizontal plane about the primary (or polar) axis of the luminaire defines a specific C plane. At each stopping position along this rotation, luminous intensity and spectral irradiance are measured at a given Gamma angle.

Rotation in the vertical plane about the secondary axis of the luminaire defines the resolution and sequence of the C planes.

The minimum resolution is 0.1° for C planes and 1° for Gamma angles.

ICCS-SH Type 1: Basic Configuration

- ☐ Absolute photometric measurement of any luminaire, with export in EULUMDAT or IESNA format
- ☐ Relative photometric measurement of any luminaire, with export in EULUMDAT or IESNA format
- ☐ Measurement of the spatial distribution of photosynthetic photon flux density (PPFD), in $\mu\text{mol}/\text{m}^2/\text{s}$, with export in EULUMDAT or IESNA format for horticultural luminaires
- ☐ Luminous flux measurement of any type of light source, with export in EULUMDAT or IESNA format
- ☐ Measurement of total photosynthetic photon flux (PPF), in $\mu\text{mol}/\text{s}$, for horticultural luminaires
- ☐ Symmetrisation of photometric measurement results according to the symmetry axes of the samples under test
- ☐ Measurement of spectral irradiance in a specific direction and calculation of the following colorimetric parameters:
 - (A) Tristimulus values X, Y, Z and the X1 and X2 components of X
 - (B) Chromaticity coordinates x, y (CIE 1931 colour space)
 - (C) Chromaticity coordinates u', v' (CIE 1976 colour space)
 - (D) Correlated colour temperature (CCT)
 - (E) Colour rendering index (CRI)
 - (F) The 14 test colour samples (TCS) used to calculate CRI
 - (G) Chromatic difference (DC)
 - (H) Δuv
 - (I) Fidelity Index
 - (J) Gamut Area Index (GAI)

 - (K) TLCI (Television Lighting Consistency Index)
 - (L) Peak wavelength;
 - (M) Dominant wavelength and complementary wavelength
- ☐ Measurement of spectral irradiance and calculation of the following spatially averaged colorimetric parameters:
 - (A) Tristimulus values X, Y, Z and the X1 and X2 components of X
 - (B) Chromaticity coordinates x, y (CIE 1931 colour space)
 - (C) Chromaticity coordinates u', v' (CIE 1976 colour space)
 - (D) Correlated colour temperature (CCT)
 - (E) Colour rendering index (CRI)
 - (F) The 14 test colour samples (TCS) used to calculate CRI
 - (G) Chromatic difference (DC)
 - (H) Δuv
 - (I) Fidelity Index
 - (J) Gamut Area Index (GAI)

 - (K) TLCI (Television Lighting Consistency Index)
 - (L) Peak wavelength;
 - (M) Dominant wavelength and complementary wavelength;
 - (N) Verification of the colour uniformity of the device under test and plotting of the spatially averaged chromaticity coordinates (u, v) on the Planckian locus.
- ☐ Verification of DUT stabilisation through consecutive illuminance measurements

- ☐ Mathematical correction of the polar curve when the device under test (DUT) has non-uniform light emission due to its physical characteristics
- ☐ Verification of colour uniformity between luminaires using MacAdam ellipses
- ☐ Customised measurement report
- ☐ ZIP file generator for upload to the EPREL portal

ICCS-SH Type 1: Options

- ☐ Software allowing users to recalibrate the detector independently; the reference lamp is not included in the scope of supply.

ICCS-SH Type 1 - Technical Specifications	
Minimum installation space	Length = 2.00 m
	Width = 1.50 m
	Height not specified
Maximum DUT specifications (standard configuration)	Length 1.50 m
	Width 0.50 m
	Height 0.20 m
	Weight 10 kg
Minimum C-plane resolution	0.1°
Minimum Gamma-angle resolution	1°
Detector Performance - Illuminance Measurement	
Measurement range	0.1 - 300,000.00 lux
Resolution	0.01
Measurement uncertainty	< 1.0 %
Deviation from V(λ)	< 1.0 %
UV sensitivity	< 0.12 %
IR sensitivity	< 0.12 %
Directional sensitivity	< 1.5 %
Linearity	< 0.2 %
Fatigue	< 0.1% (measured at 1700 lux)
Temperature dependence	< 0.2 %
Overall performance	Class L (total error < 3%) for laboratory use
Traceability to international standards	
Spectral Irradiance Measurement - Specifications	
Spectral response range	360 nm ÷ 830 nm
Resolution achievable by interpolation	1 nm
Wavelength accuracy	±0.3 nm
Integration time	0.1 ms - 5000 ms
Traceability to international standards	
Colorimetric Measurement - Specifications	
Measurement Range	
Chromaticity coordinates x, y	According to CIE 1931 colour space
Chromaticity coordinates u', v'	According to CIE 1976 colour space
Correlated colour temperature (CCT)	0 - 15,000 K
Measurement Uncertainty	

Chromaticity coordinates x, y	± 0.004
Chromaticity coordinates u', v'	± 0.004
Correlated colour temperature	± 50 K
Traceability to international standards	
Motorised Motion System with Two Degrees of Freedom - Specifications	
Azimuth rotation	+/- 180°
Transverse rotation	0° ÷ 180°
Concentricity precision	0.0015 mm
Minimum angular step	0.1°
Mechanical repeatability	0.006°
Accuracy	0.01°
Response time (coordinate acquisition by the controller with the goniometer stationary)	< 0.3 seconds
Electrical Supply	
Input voltage	Nominal 100 - 240 VAC
AC range (universal input)	85 - 264 VAC
Input frequency	47 - 63 Hz
Environmental Requirements	
Average operating temperature	(25±1) °C
Storage temperature	(10 to 35) °C
Relative humidity	(45 ± 5)% non-condensing