

# CSS-45

<https://www.gigahertz-optik.com/en-us/product/css-45>

**Product tags: VIS**



## Description

Some light measurement applications require the light sensor to be installed within a measurement system or operated remotely. Industrial applications often require integration with PLC systems. Continuous and remote operation requires light measurement sensors to be robust. For such tasks, Gigahertz-Optik offers the compact spectral light sensor CSS-45. It is a precise spectroradiometer covering the wavelength range 360 nm to 830 nm.

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### Spectroradiometer sensor with outstanding light measurement characteristics

- Individual wavelength and linearity correction guarantee precise measurements of light sources irrespective of intensity and spectral distribution.
- Mathematical bandwidth correction according to CIE 214 for accurate colorimetric measurements.
- Another unique feature of the CSS-45 is its electromechanical shutter which enables the remote-controlled dark adjustment of the sensor. This is essential for temperature-independent and long-term operation of array spectrometers.
- Diffuser with a precise cosine adjustment ( $f_2 \leq 1.5\%$ ) for measuring the illuminance and irradiance of extended light sources and lighting equipment.
- Wide range of illuminance measurement from 1 lx to 350.000 lx, covering applications from emergency lighting to broad daylight conditions.

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### Robust and compact

The compact metal housing features an M6 threaded hole and a V-groove around the device for universal attachment of the CSS-45. The dimensions are given in the technical drawing available for download. The housing with its splash-proof electrical connectors meets the requirements of protection class IP62. For IP65 rated protection, a sensor variant with glass dome is required.

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### Interfaces and Software

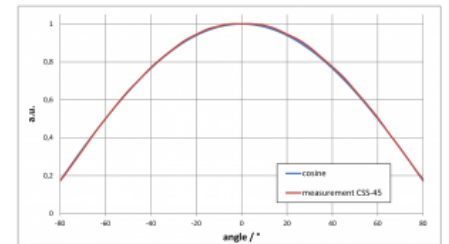
The sensor offers both an RS-485 and a USB interface for remote operation. The addressable RS-485 interface allows very long supply lines. Multiple CSS-45 sensors can be operated together under RS-485 control as well as in USB remote operation. In addition to the provided end-user software, a software development kit (SDK) is optionally available for simplified integration of the sensor into user written software.

*Schematic draft of CSS-45 sensor*

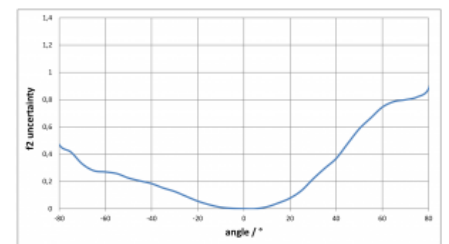
1) Incident light 2) Cosine diffuser 3) electromechanical shutter 4) array spectrometer 5) CPU 6) temperature sensor 7) USB connector 8) RS-485 connector 9) V-groove 10) M6 mounting thread



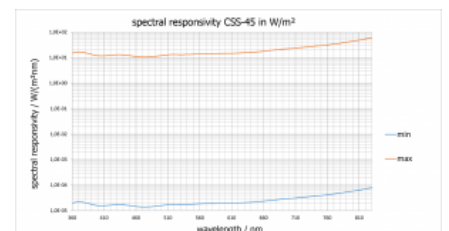
*Spectroradiometer sensor CSS-45*



*CSS-45 cosine field of view.*



*Angle dependent f2 error of CSS-45.*



*Typical spectral responsivity.*



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## Numerous metrics for a wide field of measurement applications

*Use of CSS-45 as a handheld instrument by combining it with the control unit CSS-D*

The CSS-45 includes an integrated processor. It calculates a comprehensive set of radiometric, photometric and colorimetric quantities from the measured spectral measurement data.

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### Additional metrics support further applications:

- Horticultural lighting – PAR measurement Photosynthetic Photon Flux Density (PPFD) in  $\mu\text{mol}/\text{m}^2\text{s}$
- Human Centric Lighting – melanopic irradiance and illuminance (CIE S 026:2018), melanopic daylight equivalent illuminance
- Phototherapy – total irradiance for bilirubin,  $E_{\text{bi}}$ , in  $\text{mW}/\text{cm}^2$  (IEC 60601-2-50) as well as average spectral irradiance in  $\mu\text{W}/\text{cm}^2/\text{nm}$  (American Academy of Pediatrics)

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### Accessories

- The light sensor CSS-45 can be combined with the [control unit CSS-D](#) in order to be used as a handheld light meter.

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### Traceable factory calibration

An essential quality feature of light measuring instruments is their precise and traceable calibration. The calibration laboratory of Gigahertz-Optik GmbH guarantees the high quality and traceability of their factory calibrations. Calibration of the CSS-45 is confirmed by a factory calibration certificate.

## Specifications

### General

|                      |                                                                                                                                                                                                                                                                                        |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short description    | Remote spectroradiometric detector for universal use in radiometric and photometric measurement setups.                                                                                                                                                                                |
| Main features        | Remote operation via USB 2.0 or RS 485. Compact, robust, splashproof housing with universal mounting options. Direct output of radiometric, photometric, colorimetric and specialist functions. Precision cosine diffuser. Remote controlled dark level shutter. Application software. |
| Measurement range    | 1 lx to 350,000 lx (for white LED), 360 nm to 830 nm.                                                                                                                                                                                                                                  |
| typical applications | Photometric and radiometric setups requiring remote positioning of single or multiple detectors. Use with positioning equipment e.g. for mapping. Industrial monitoring, grow lights, blue light phototherapy, human centric lighting.                                                 |
| Calibration          | Factory calibration. Traceable to international calibration standards.                                                                                                                                                                                                                 |

### Product

|                   |                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input optics      | Diffuser window with 10 mm diameter, cosine corrected field of view, $f_2 \leq 1.5 \%$                                                                                                                                                                                                                                                                                             |
| Measured Quantity | Illuminance photopic<br>Illuminance scotopic<br>Spectral Irradiance<br>Color coordinates (x,y)<br>CCT<br>CRI (color rendering index)<br>PAR– PPF<br>Melanopic irradiance<br>Melanopic illuminance (equivalent melanopic lux)<br>Melanopic daylight equivalent illuminance<br>Total irradiance for bilirubin ( $E_{\text{bi}}$ )<br>Average spectral irradiance for bilirubin (AAP) |

CSS-45  
Detector head for illuminance and light color.  
(Class B according DIN 5032-7 or AA according to JIS C 1609-1:2006)

**Spectral Detector**

spectral range (360 - 830) nm  
Optical Bandwidth 10 nm  
optical bandwidth correction applied according to CIE 214

Measurement range typ. white LED (1 - 350,000) lx  
Repeatability  $\Delta x$  and  $\Delta y$   $\pm 0.0002$   
 $\Delta y$   $\Delta x$  uncertainty  $\pm 0.002$  (Standard illuminant A)  
CCT Measurement range (1700 - 17000) K  
 $\Delta$ CCT  $\pm 50$  K (standard illuminant type A)  
 $\pm 4$  % (depending on the LED spectrum)  
Peak wavelength  $\pm 1$  nm

**Calibration**

Calibration uncertainty Illuminance (standard illuminant A)  $\pm 3$  %  
Illuminance (typ. LED)  $\pm 4$  %  
*(Traceable to national standard. Uncertainty of the standard is included)*

**Miscellaneous**


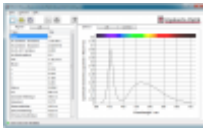
Interface USB 2.0, RS 485  
temperature range Operation: 10°C to +30°C  
Storage: -10°C to +50°C  
Power Supply 5 VDC by USB  
(3.5 - 25) VDC by custom plug  
max. current 500 mA  
Weight 130 g, only sensor without cables  
Dimensions 45 mm diameter  
53 mm height\*  
\* height without WT protection dome

Housing Splashproof/Watertight class:  
CSS-45: IP62  
CSS-45-WT: IP65

## Downloads

| Type                       | Description                                                      | File-Type | Download                                                                                                                                                                                                                    |
|----------------------------|------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| technical drawing          | CSS-45 technical drawing                                         | pdf       | <a href="https://www.gigahertz-optik.com/assets/Uploads/V127682.pdf">https://www.gigahertz-optik.com/assets/Uploads/V127682.pdf</a>                                                                                         |
| CSS-45 Technical datasheet | CSS-45 brochure                                                  | pdf       | <a href="https://www.gigahertz-optik.com/assets/Uploads/Technical-Datasheet-CSS-45-CSS-D-210x297-EN-sheets2.pdf">https://www.gigahertz-optik.com/assets/Uploads/Technical-Datasheet-CSS-45-CSS-D-210x297-EN-sheets2.pdf</a> |
| Brochure                   | Light measurement solutions for general and specialized lighting | pdf       | <a href="https://www.gigahertz-optik.com/assets/Uploads/generallighting-broschuere-DINA4-hoch-v2.pdf">https://www.gigahertz-optik.com/assets/Uploads/generallighting-broschuere-DINA4-hoch-v2.pdf</a>                       |

## Configurable with

| Product Name | Product Image                                                                      | Description                                             | Show product                                                                                                                      |
|--------------|------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| S-SDK-MSC15  |   | Software Development Kit for MSC15 and CSS-45 variants. | <a href="https://www.gigahertz-optik.com/en-us/product/s-sdk-msc15">https://www.gigahertz-optik.com/en-us/product/s-sdk-msc15</a> |
| S-MSC15      |  | Application software for MSC15 and CSS-45 variants.     | <a href="https://www.gigahertz-optik.com/en-us/product/s-msc15">https://www.gigahertz-optik.com/en-us/product/s-msc15</a>         |

## Purchasing information

| Article-Nr            | Modell       | Description                                                                                                                                |
|-----------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>        |              |                                                                                                                                            |
| 15308867              | CSS-45       | Meter, USB cable, software, calibration certificate. Optional carry case BHO-24, control unit CSS-D.                                       |
| 15310128              | CSS-45-HI    | Meter with additional OD1 attenuation, USB cable, software, calibration certificate. Optional carry case BHO-24, control unit CSS-D.       |
| 15308950              | CSS-45-WT    | Splash-proof measurement device, USB cable, software, calibration certificate.                                                             |
| 15309361              | CSS-D        | Control unit for CSS-45. Connector cable.                                                                                                  |
| <b>Calibration</b>    |              |                                                                                                                                            |
| 15310446              | KP-CSS45-E-S | Option: DIN EN ISO/IEC 17025:2018 Test Certificate (DAKKS)<br><br>Spectral irradiance measurement in wavelength range from 360nm to 830nm. |
| <b>Re-calibration</b> |              |                                                                                                                                            |
| 15308903              | K-CSS45-E    | Re-calibration of a CSS-45's spectral irradiance including wavelength adjustment. Calibration certificate.                                 |

| <b>Article-Nr</b>  | <b>Modell</b> | <b>Description</b>                                                                                            |
|--------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| 15309228           | K-CSS45-WT-E  | Re-calibration of a CSS-45-WT's spectral irradiance including wavelength adjustment. Calibration certificate. |
| 15311529           | KKP-CSS45-E-S | Factory Calibration Certificate with DIN EN ISO/IEC 17025:2018 Test Certificate.                              |
| <b>Software</b>    |               |                                                                                                               |
| 15306347           | S-SDK-MSC15   | Software Development Kit for software implementation of the CSS-45 into custom software.                      |
| <b>Accessories</b> |               |                                                                                                               |
| 15308887           | BHO-24        | Carry case for CSS-45 and accessories.                                                                        |
| 15309091           | CSS-45-Z01    | RS-485 interface connector for CSS-45.                                                                        |
| 15309559           | CSS-45-Z02    | 25 m long RS485 cable for CSS-45.                                                                             |