X4

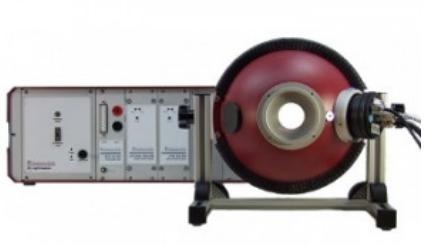
https://www.gigahertz-optik.com/en-us/product/x4/

Product tags: VIS , NIR

Description

X4 Light Analyzer Bi-Technology Sensor

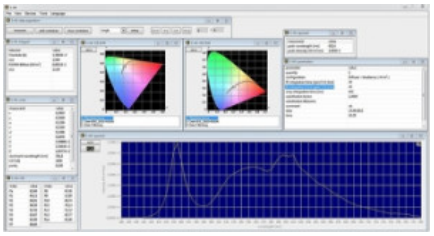
The X4 Light Analyzer measures photometric illuminance, radiometric irradiance and spectral irradiance in absolute light measurement units. Its Bi-Tech sensor technology includes both filter detectors and a spectrometer working together for lowest measurement uncertainty.



Bi-Technology Sensor Lightmeter

Integral Detectors

The broadband filtered detectors match the CIE photopic, scotopic or radiometric UV-A, VISIBLE and NIR spectral sensitivities. The solid state photodiodes feature a wide dynamic measurement range with superior linearity.



S-X4 Software

Diode-Array Spectrometer

The diode array spectrometer provides spectral data in the wavelength range from 315 to 1050nm. The relative spectral data is used for:

- on-line correction of the broadband detectors spectral mismatch uncertainty
- spectrum, peak wavelength, half-band width, peak wavelength intensity
- color temperature, xy and u'v' chromaticity values, color rendering index

Accessory Components

The X4's capabilities can be extend for luminous/radiance intensity, luminous/radiant flux and luminous/radiant intenstity spatial distribution measurement using optional accessory components.

X4 Detector head on integrating sphere

Software

The supplied S-X4 software supports complete control of the X4 and any accessory equipment included with the system. This includes Gigahertz-Optik's LED and Lamp Power Supplies (LPS), goniometer (GBD) and integrating spheres (IS). Different routines for data acquisition, several numerical and graphical displays for visualization and different export options (ASCII and Microsoft Excel) are available.

Electronics

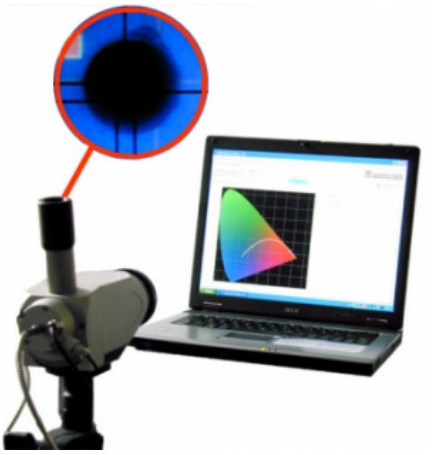
The X4-DE electronics unit contains the diode array spectrometer and detector electronics. The X4-DE devices are remote controlled via USB interface.

Front Lens Adapter SRT of the X4

Bi-Technology Sensor Design

The diode array spectrometer is a compact Czerny Turner design equipped

with a 2048 pixel CCD array.A SMA fiber optic input with collimating, focusing mirror and diffraction grating enable low light level and high resolution light measurement. A flexible light guide with 1m length connects the diode array spectrometer to the X4-BTS or LDM-9812 detector head.The four channel broadband detector electronics consists of a high sensitivity analog amplifier with switchable gain over a 0.1pA to 200µA measurement range.



LDM 9812 on X4

X4 Detector

Bench-Top or Rack-Mount Housing

The X4-DE is available in two versions. The X4-DE-UN in its own bench-top housing is designed for stand-alone applications. The X4-DE-UN-RM is designed for installation into a 19” rack or bench-top housing where it can be combined with other electronic devices like LED power supplies to form one complete electronics unit.

PC or Laptop Operation

To operate the X4-DE and display results a laptop or PC with USB interface is needed. The X4-DE is powered through the USB interface (5VDC operating voltage).

S-X4 Software

The software supplied supports PC remote control operation of the X4-DE including its set-up, measurement routine, data displayed as well as documentation.

Traceable Calibration of Spectroradiometer

Calibration and certification is done by Gigahertz-Optik’s calibration laboratory for light measurement quantities against calibration standards traceable to national and international metrology laboratories.

Broadband Detectors for Absolute Measurements and Diode Array for Spectral Measurements

The X4-BTS light sensor contains a SMA fiber connector for the light guide of the diode array spectrometer and up to four X4-ID type broadband detectors. A shared diffuser window for cosine correction ensures uniform illumination of the light guide and each of the sensor.

Trouble Free Light Guide Exchange

The use of broadband detector mounting design in the sensor housing ensures absolute measurements independent of influences by the exchangeable light guide.

Diode Array Spectrometer

The X4-BTS sensor is connected by a SMA fiber optic cable to the X4-DE diode array spectrometer for spectral irradiance measurements.. The fiber is placed behind the cosine diffuser. Offset compensation for the diode array detector is performed using a manually operated shutter between the diffuser and the fiber. A manually operated OD2 neutral density filter increases the diode array dynamic range when measuring low and high signal level light sources. The switch positions of both shutter and attenuator are fed back to the X4-DE-UN.

Traceable Calibrations of Detectors

The X4-DE with X4-BTS is calibrated for photometric and radiometric sensitivity of the integral detector(s) and the absolute spectral sensitivity of the diode array spectrometer within the wavelength range from 315nm to 1050nm. Calibration is performed by Gigahertz-Optik's calibration laboratory for light measurement quantities against calibration standards traceable to national and international metrology laboratories.

Optional Accessory Components

Optional components can be ordered for the X4-BTS detector to expand measurement capabilities:

- Integrating spheres for luminous flux and radiant power measurements
- Goniometric bench for luminous intensity spatial siatribution
- Front tubes with LED adapters for CIE 127 Averaged LED Intensity measurements
- Front lens adapter for luminance and radiance measurements

The sensor head with 45mm diameter and V-groove fits onto the available Gigahertz-Optik accessory parts with 45mm diameter detector mount.

X4-ID1 Photopic Detector

Photometric measurements require a light detector that simulates the CIE photopic response. The X4-ID1 offers an accurate simulation of the daylight visual response. Measurement uncertainty is further reduced for narrow band type light sources by on-line correction using the diode spectrometer data.

X4-ID3 400-800nm Detector
Besides qualification of light sources in photometric quantities, measurements in other units such as W, W/m², W/(m²sr) and W/sr are also required for light sources emitting in the visible

range. The X4-ID3 sensor covers the visible range radiometrically.

X4-ID5 800-1050nm Detector The X4-ID5 sensor covers the NIR spectral range from the visible to 1050 nm. Common applications include measurement of the NIR spectrum of cool fluorescent lamps to check the effectiveness of their short pass filtering and the qualification of NIR LEDs.

X4-ID2 350-650nm Detector Light sources used in photo curing applications emit in the long wave UV and Blue light range. The X4-ID2 covers this particular wavelength range. For high intensity 'Blue' light sources a typical measurement setup includes a 150 mm diameter integrating sphere (X4 -BTS-UV4 required).

X4-ID4 315-400nm Detector

The UV-A wavelength range is specified by DIN and CIE from 315 to 400 nm. UV-A type light sources are commonly found in UV curing and phototherapy applications. The X4-ID4 sensor covers the UV-A range of optical radiation (X4-BTS-UV4 required).

X4-ID7 Scotopic Detector The CIE specifies a dark adapted scotopic eye response. For scotopic measurements the X4-ID7 offers a V'(λ) spectral response. Combined with the X4-ID1 photopic detector light sources can be evaluated under both aspects of daylight and dark adapted human eye responses.

Specifications

Integral Detector Electronics	Detector Input	-4 type connector
	Signal amplifier	Current to Voltage
	Signal range	200.0 pA to 200.0 µA with 7 gain ranges
	Max. resolution	0.1 pA in 200.0 pA Range
	Gain linearity error	0.2 % of reading;+ 0.05 % of range; 23° +/- 5°C; with offset compensation
	Rise time 10 - 90 %	30 ms (gain 1 to 2), 3 ms (gain 3 to 6)
	AD converter	12 bit
Array & Electronic Device	X4-DE-UN	For use with X4-BTS and LDM-9812. Bench-top housing
	X4-DE-UN-RS	For use with X4-BTS-RS. Bench-top housing
	X4-DE-UN-RM	For use with X4-BTS and LDM-9812. Rack-mount housing
	X4-DE-UN-RM-RS	For use with X4-BTS-RS. Rack-mount housing
Sensor	Optical Input	SMA connector
	Geometrical design	Symmetrical Czerny-Turner, 75 mm focal length
	Wavelength Range	300 to 1050nm (UVNIR)
	Optical Resolution	4.1nm (FWHM)
	Pixel Resolution	Approximate 0.6 nm
	Stray Light	< 0.1%
	Detector	CCD linear array, 2048 pixels
	Signal/Noise	250 : 1
	Integration time	2 to 10000 millisecond
	AD converter	14 bit, 2 MHz
General	Remote Interface	USB version 1.1, 12 Mbit
	Operating Temperature	10 to 40° C (50 to 104° F) (75 % rel. H, non-condensing). Storage Temperature: 0 to 50°C (32 to 122° F).
	Dimensions/Weight	X4-DE-UN bench-top version 170 x 110 x 71 mm X4-DE-UN-RM rack-mount version 3HE
	Power	5VDCUSB power

Typical responsivity	Measurement Quantity		Unit	Broadband Detector				Diode Array	Source Type
				Model	E min	E 50	E max	E min	
								tbc	Illuminant A
	Illuminance Ev	V(λ)	lx	X4-ID1	1 mlx	50 mlx $I_{v\,50} - I_{v\,min}$ = 50	2E+6	tbc	LED green @520nm
								tbc	LED red @630nm
	Irradiance E_e	UV-A 315-400nm	W/m²	X4-ID4	30E-03	1.3E-03	50E+03	tbc	Xenon
	Irradiance E_e	$VIS_{400-800nm}$	W/m²	X4-ID3	1.7E-06	80E-06	3E+03	tbc	Illuminant A
	Irradiance E_e	NIR 800-1050nm	W/m²	X4-ID5	0.5E-06	25E-06	1E+03	tbc	Illuminant A
	Irradiance E_e	UVB $LE_{350-650nm}$	W/m²	X4-ID2	4E-06	20E-05	8.5E+03	tbc	Illuminant A

Typical responsivity	Measurement Quantity		Unit	Broadband Detector[1)]				Diode Array[1)]	Source Type
				Model	Iv min	Iv 50	Iv max	Iv min	
								20 cd	Illuminant A
	Illuminance Iv	V(λ)	cd	X4-ID1	0.6 cd	30 cd $I_{v\,50} - I_{v\,min}$ = 50	120E+6 cd	130 cd	LED green @520nm
								30 cd	LED red @630nm

1) Measured at 10 m distance between source and X4-BTS Sensor Head

Detector Devices:	
X4-BTS-4	380 - 1050 nm with manual shutter
X4-BTS-UV-4	300 - 1050 nm with manual shutter
X4-BTS-RS-4	380 - 1050 nm with remote control shutter
Measurement Aperture:	
Diameter	12 mm
Field-of-View	Cosine Diffuser for spot source applications
Integral Detector Options:	
X4-ID1	Photodiode; CIE V(λ) fine photometric correction
X4-ID2	Photodiode; 350 to 650 nm radiometric correction
X4-ID3	Photodiode; 400 to 800 nm radiometric correction
X4-ID4	Photodiode; 315 to 400 nm radiometric correction
X4-ID5	Photodiode; 800 to 1050 nm radiometric correction
X4-ID7	Photodiode; CIE V(λ) fine scotopic correction
Others	
Sensor Diameter	45 mm
Attenuation	OD2 with manual selection; feedback signal to X4-DE
Offset Compensation	Shutter with manual or remote selection; feedback signal to X4-DE
Integral Detector	Cable 1m
Position Feedback	Cable 1m
Diode Array	Light Guide 1 m; SMA connectors

Configurable with

Product Name	Product Image	Description	Go to product
S-SDK-X4		Software Development Kit for X4 and variants.	https://www.gigahertz-optik.com/en-us/product/s-sdk-x4/
S-X4		Application software for X4 variants.	#

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