

# SPECTRORADIOMETER

Spectroradiometer SR-LEDseries

***SR-LED / SR-LEDW / SR-LEDH***



Suitable for measuring ultra-high intensity LED light

# SR-LED series is best suited for the inspection of High-intensity LED chip and LED module for Illumination and FPD backlight.



Spectroradiometer  
**SR-LED**

Effective measuring range down to 1cd/m<sup>2</sup>  
For measuring LED chip, LED Back light unit, and Illumination lamp  
(High cost performance model)



Spectroradiometer  
**SR-LEDW**

Effective measuring range down to 0.0005cd/m<sup>2</sup>  
For measuring mega-contrast display  
For measuring LED chip and LED Back light unit  
(Flagship model)

## Feature

- Suitable for measuring ultra-high intensity LED light

Ultra-high intensity LED light can be measured without Integrating sphere, Diffusing board, and external ND filter.

Luminance value which is related to luminous flux value can be measured.  
Effective measuring range is up to 4,500,000cd/m<sup>2</sup> at measuring angle of 1° .



- High uniformity of the sensitivity on the measurement area

Uniformity of the sensitivity on the measuring area is within 5% in luminance and within 0.001 in chromaticity at measuring angle of 1° .

- FIX mode

Cutting off about 1.5sec of measuring time when measuring under the stable sample condition.

\* SR-LEDW, SR-LEDH only

- High accuracy Luminance and Chromaticity measurement

Accuracy (Luminance) : ±2%, Accuracy (Chromaticity) : dxdy ±0.002

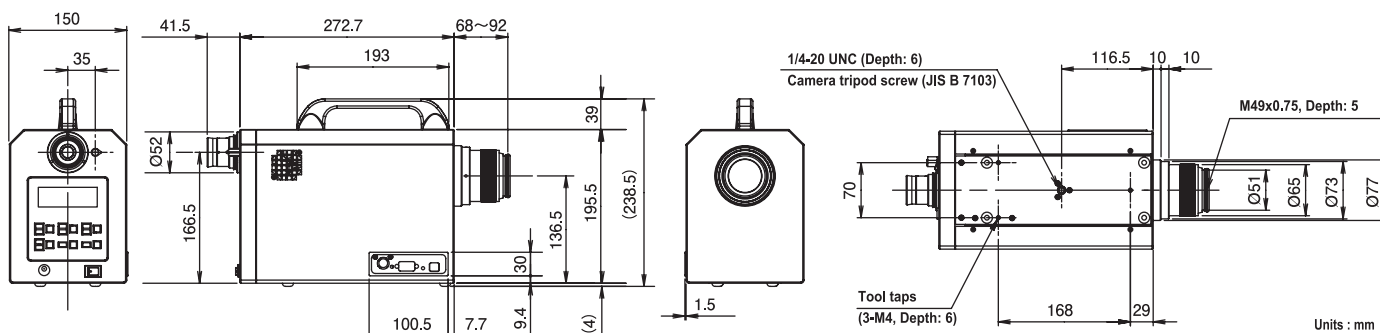
SR-LED : 1cd/m<sup>2</sup>  
SR-LEDW : 0.0005cd/m<sup>2</sup>  
SR-LEDH : 10cd/m<sup>2</sup>

\* In Normal speed mode at measuring angle of 2° for standard illuminant A.

- The measurement range extends to ultra-low luminance region

	SR-LED	SR-LEDW	SR-LEDH
measuring angle 2°	1 to 1,500,000cd/m <sup>2</sup>	0,0005 to 1,500,000cd/m <sup>2</sup>	10 to 1,500,000cd/m <sup>2</sup>
measuring angle 1°	3 to 4,500,000cd/m <sup>2</sup>	0,0015 to 4,500,000cd/m <sup>2</sup>	30 to 4,500,000cd/m <sup>2</sup>
measuring angle 0.2°	75 to 500,000cd/m <sup>2</sup>	0.0375 to 500,000cd/m <sup>2</sup>	—
measuring angle 0.1°	300 to 2,000,000cd/m <sup>2</sup>	0.15 to 2,000,000cd/m <sup>2</sup>	—

## Dimension (SR-LED / SR-LEDW)

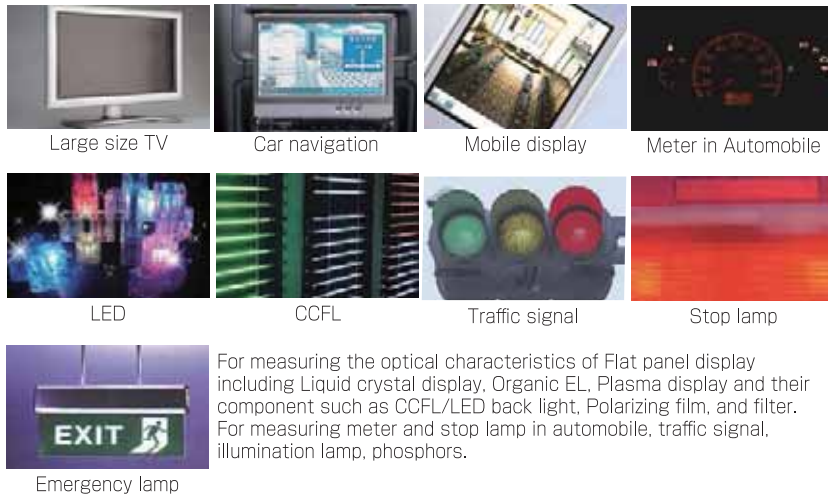




## Spectroradiometer SR-LEDH

Effective measuring range down to 10cd/m<sup>2</sup>  
Designed for high speed measurement to use in-line inspection  
For measuring LED chip and LED Back light unit  
(In-line model)

## Usage



### • High speed measurement of 0.4sec (minimum) to use in-line inspection

LAN (Ethernet 10/100 BASE-TX) communication allows high speed measurement of 0.4sec. \* SR-LEDH only  
\*Under Measurement angle 2° , Integral time 100ms, High speed mode and LAN(STB command).

### • High Speed mode

SR-LED series provide measured data for 1sec - 17sec in High speed mode.  
(Effective measuring range in High speed mode at measuring angle 1° is as follows)

SR-LED	:3 to 4,500,000cd/m <sup>2</sup>
Accuracy (Luminance)	:±2%
Accuracy (Chromaticity)	:dxdy±0.002
SR-LEDW	:0.015 to 4,500,000cd/m <sup>2</sup>
Accuracy (Luminance)	:±2%
Accuracy (Chromaticity)	:dxdy ±0.003(0.015 to 0.15cd/m <sup>2</sup> ), :dxdy ±0.002(0.15cd/m <sup>2</sup> or more)

### • Software Development Kit (SDK)

\*for SR-LEDH only

SDK consists of header file, library, sample program which is need to develop LAN communication software.  
You can develop Network programming (socket communication programming) by calling library function in module.

- Another PC in the network can control the instrument
- A PC can control several instruments

## SPECTRORADIOMETER SR-LEDW-5N <custom-made item>

Spectral band width : 5nm or less (half width)

### • Accurate determination of flashing light

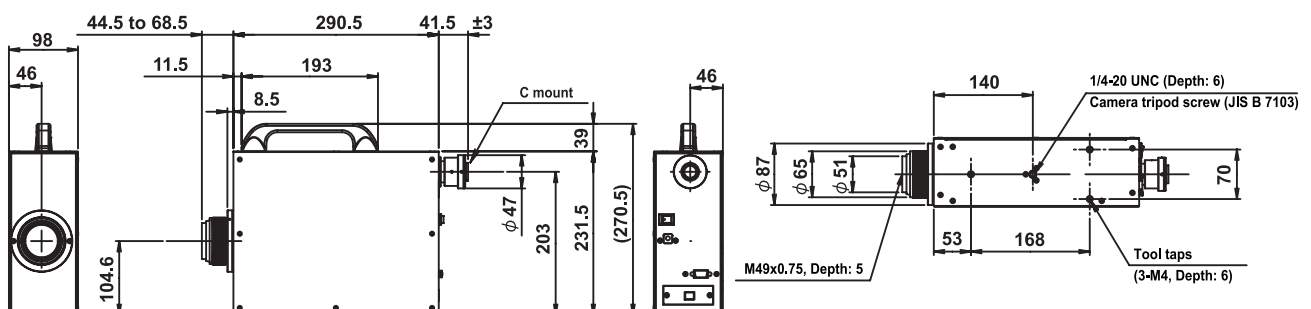
#### Synchronous measurement

The instrument detect and measure frequency of flash by inputting Synchronous signal.  
Arbitrary frequency value can be set manually.

#### Integral time delay function

Following kind of light can be measured with stable;  
Frequency flashing light with black screen inserted, Intermittent light, and Periodic flashing light.

## Dimension (SR-LEDH)



# Illuminance adapter (Cosine receptor) for SR-series ZV-30



## ●Complying with JIS C1609-1:2006 AA class

The spectral irradiance and illuminance may be measured by attaching an illuminance adapter to the Spectroradiometer.

\*Calibration of your Spectroradiometer and Illuminance adapter is required in Topcon factory before you use the illuminance adapter with your instrument.

## ●For measuring illuminance, chromaticity, color temperature, and color rendering index of light from LED, OLED illumination. For measuring illuminance of light from projector.

### Measurement range

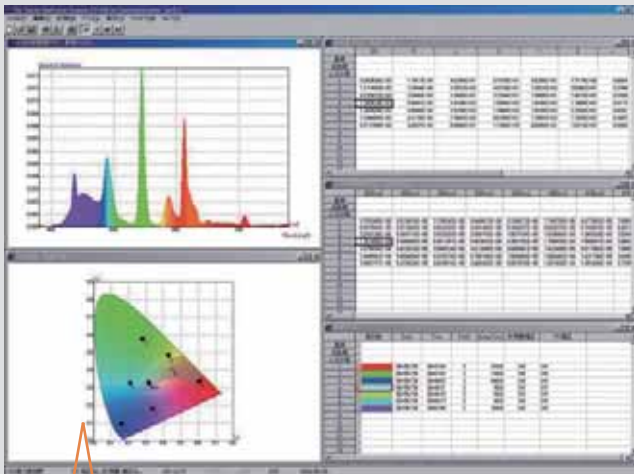
0.001 to 30,000,000 lx	(SR-LEDW at measuring angle 2° with ZV-29)
0.02 to 60,000 lx	(SR-UL1R at measuring angle 2° with ZV-29)
6 to 7,000,000 lx	(SR-ULR at measuring angle 0.1° with ZV-29)
2 to 60,000 lx	(SR-3AR at measuring angle 2° with ZV-29)
600 to 7,000,000 lx	(SR-3AR at measuring angle 0.1° with ZV-29)

### Function

- Illuminance :Ev
- Chromaticity : xy, u'v'
- Tristimulus values XYZ
- Spectral irradiance :Ee
- Color Rendering Index:Ra, R1 to R15
- Correlated color temperature : Tc, duv
- Dominant wavelength, Purity

## Standard accessory software can control Spectroradiometer and can process measured data with simple operation.

### Colorimetry software CS-900A (Standard accessory) SR-LED/SR-LEDW/SR-LEDH



The CS-900A for Windows can control the SR-LED/LEDW/LEDH and collect, save, and graph measured data.

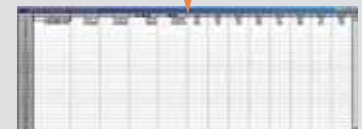
The measurement time can be shortened by selecting Colorimetry mode. In Colorimetry mode, the instrument will omit spectral radiance data and send the measured data of luminance, chromaticity, and color temperature.

Colorimetry data

Color Rendering Index data

Measurement conditions/note

Spectral radiance data



### Chromaticity diagram



Hue-chroma diagram



xy diagram



u\*v\* diagram



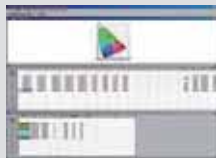
u'v' diagram



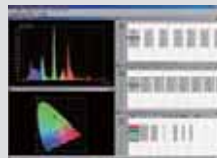
a\*b\* diagram



Spectral radiance



Colorimetry mode



\*Back ground of graph and diagram can be changed between white and black.



### ■Time line graph

Time line graph show measured luminance data in continuous measurement and Interval measurement mode.



Display :	Spectral radiance graph, other graph
Color system :	L, xy, XYZ, Spectral radiance, u'v', u*v*, L*a*b*, Color temperature, Deviation, Dominant wavelength, Excitation purity, Color Rendering Index
Function :	Fundamental operations of Spectral data
Mode :	Spectral mode, Colorimetry mode
Condition setting :	Auto/Frequency/Integral time, Integ. delay mode, Measurement speed, Measurement angle, Average, Single / Interval / Continue
Evaluation :	CIE standard observer, Light source, Color Rendering Index

### Hardware requirement

- OS : Windows®XP Professional Service Pack 2 or later  
Windows®XP Home Edition Service Pack 2 or later  
Windows®Vista Ultimate  
Windows®7 Ultimate/ Professional
  - CPU : Pentium IV 2.8GHz or more
  - HDD : 1GB or more
  - Memory : 128MB or more
  - Port : USB 2.0 (1 pce), RS-232C serial port
- \*use inter-link RS-232C cable for DOS/V

# System Diagram



# Optional accessories



- Attachment lens 3 sets AL-6/AL-11/AL-12
- These lenses make focal length shorten and make measurement area shrink.

(Specifications for Measuring Small Objects)

Measurement area (Diameter mmφ)	Measurement angle	AL-6	AL-11	AL-12
		Measurement distance 51.72 to 68.53mm	Measurement distance 19.56 to 24.80mm	Measurement distance 165 to 197mm
	2°	2.00 to 2.88	1.18 to 1.53	3.23 to 4.00
	1°	1.00 to 1.44	0.59 to 0.76	1.62 to 2.00
	0.2°	0.20 to 0.29	0.15 to 0.19	0.32 to 0.40
	0.1°	0.10 to 0.14	0.06 to 0.08	0.16 to 0.20

\*Measurement distance may differ slightly depending on aperture mirror machining accuracy.  
\*Measurement distance is from metal tip of attachment lens to the object.



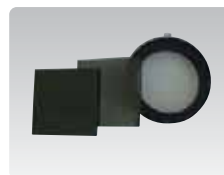
- Reference White Board WS-3
- Used for measurement of object color or light source with directionality.
- Luminance factor : 90% or above (for measurement parameters of 0° incidence and 45° observation)
  - Material: Barium sulfate (BaSO<sub>4</sub>)
  - Dimensions: 78 mm , t = 12.5 mm
  - Effective white surface: 40 mm (at center)



- CCD Adapter IA-2
- Adapter for connecting instrument to the CCD camera.(C mount, 1/2 size)



- Fiber probe FP-3P
- Light guide used for remote detection of light from measurement object.
- Effective measurement angle: 2°
  - Measurement diameter: 3-10 mmφ
  - Measurement distance: 31.0-84.9 mm
  - Fiber length: Approx. 1m



- ND filter (10x/100x set)
- Neutral density filter for measuring higher luminance than the measuring range of instrument.



- Tripod 5N
- Simplifies collimation of measurement object.
- Max height : 1835mm ● Min height : 585mm
  - Folder length : 810mm ● Leg sections : 3
  - Weight : 4.81Kg including Tripod stand



- Fine Adjustment Stand S-4
- Simplifies vertical and lateral collimation.
- Elevation angle : 40° ● Depression angle : 80°
  - Rotation : 360° ● Weight : Approx. 1.7Kg



- Tripod Tripod-SR
- Simplifies collimation with smooth movement.
- Max height : 1614mm ● Min height : 234mm
  - Folder length : 694mm ● Leg sections : 3
  - Weight : 3.0Kg including Tripod stand

## SR-LED/SR-LEDW Standard package

- SR-LED/SR-LEDW(main body) ..... 1 pce
- AC adapter (ZV-18) ..... 1 pce
- Carrying case ..... 1 pce
- CD-ROM (Colorimetry software CS-900A/CS-900A CF Tool/Instruction manual) ..... 1 pce
- Quick manual ..... 1 pce
- USB cable ..... 1 pce
- Objective lens cap ..... 1 pce

## SR-LEDH Standard package

- SR-LEDH(main body) ..... 1 pce
- AC adapter (ZV-18) ..... 1 pce
- CD-ROM (Colorimetry software CS-900A/SDK Sample program /Instruction manual) .. 1 pce
- Quick manual ..... 1 pce
- Objective lens cap ..... 1 pce

## ■ Specification

		SR-LED	SR-LEDW	SR-LEDH					
Optical system		Objective lens: f= 82 mm F2.5, Eyepiece lens: 5° view field, Diopter adjustment range: ±5diopter		Objective lens: f= 82 mm F2.5, Eyepiece lens: 5° view field					
Dispersing element		Diffraction grating							
Photodetector		Electronically cooled linear CCD							
Measuring angle		2° / 1° / 0.2° / 0.1° (motor drive)		2° / 1° / collimation only (motor drive)					
Measuring distance		350 mm to ∞ (distance from metallic tip of objective lens)							
Measuring diameter (mm φ)	Measuring distance (mm) (distance from metallic tip of objective lens)								
	Measuring angle	350	400	500	600	800	1000	2000	5000
	2°	10.0	11.7	15.1	18.6	25.4	32.2	66.4	169
	1°	4.99	5.84	7.55	9.26	12.7	16.1	33.2	84.4
	0.2°	1.00	1.17	1.51	1.86	2.54	3.22	6.64	16.9
	0.1°	0.50	0.59	0.76	0.93	1.27	1.61	3.32	8.44
Wavelength range		380nm to 780nm							
Spectral accuracy		±0.3nm (on Hg emission line)							
Spectral band width		5 to 8nm (half width)		6 to 9nm (half width)					
Wavelength resolution		1 nm							
Measurement mode		Auto/manual (integral time/frequency), external vertical sync signal input	Auto/manual (integral time/frequency), external vertical sync signal input, FIX	Auto/manual (integral time/frequency), FIX					
Measuring object		Spectral radiance (W, sr <sup>-1</sup> , m <sup>-2</sup> , nm <sup>-1</sup> )							
Calculation function		Radiance (Le; W, sr <sup>-1</sup> , m <sup>-2</sup> ), luminance (Lv; cd, m <sup>-2</sup> ),							
		CIE 1931 chromaticity coordinates xy, CIE 1976 chromaticity coordinates u'v', tristimulus value XYZ							
		Correlated color temperature (Tc; K) and deviation (duv), CIE standard observer 2°/10°							
Accuracy		Luminance : ±2% Chromaticity(x,y) : ±0.002 (for standard illuminant A)							
Repeatability	Luminance ※1	0.3%	1.5%(0.0005 to 0.005cd/m <sup>2</sup> ) 0.4%(0.005 to 0.1cd/m <sup>2</sup> ) 0.3%(0.1cd/m <sup>2</sup> or more)	2° 0.3%(10cd/m <sup>2</sup> or more) 1° 0.3%(30cd/m <sup>2</sup> or more)					
	Chromaticity ※2	0.0005	0.005(0.0005 to 0.005cd/m <sup>2</sup> ) 0.0015(0.005 to 0.1cd/m <sup>2</sup> ) 0.0005(0.1cd/m <sup>2</sup> or more)	2° 0.0005(10cd/m <sup>2</sup> or more) 1° 0.0005(30cd/m <sup>2</sup> or more)					
Range of guaranteed luminance accuracy (cd/m <sup>2</sup> ) (for standard illuminant A) ※3	Measuring angle	<b>SR-LED</b>	<b>SR-LEDW</b>	<b>SR-LEDH</b>					
	2°	1 to 1,500,000	0.0005 to 1,500,000	10 to 1,500,000					
	1°	3 to 4,500,000	0.0015 to 4,500,000	30 to 4,500,000					
	0.2°	75 to 500,000	0.0375 to 5,000,000	—					
	0.1°	300 to 2,000,000	0.15 to 2,000,000	—					
Polarization error		Luminance 1% or less, Spectral radiance 2% or less (400nm to 700nm)		Luminance 1% or less, Spectral radiance 5% or less (400nm to 780nm)					
Measurement time		NORMAL SPEED MODE: About 1 to 31seconds. HIGH SPEED MODE: About 1 to 17seconds. (excludes communication time with computer)	NORMAL SPEED MODE: About 1 to 248seconds. HIGH SPEED MODE: About 1 to 17seconds. (excludes communication time with computer)	Fastest : 0.4 seconds Measuring angle 2°, Integral time 100ms, HIGH SPEED MODE LAN (STB commands), by setting in the Colorimetry mode.					
Interface		RS-232C Baud rate: 4800/9600/19200/38400 bps, Parity: Odd/even/none, Date length: 7/8 bits, Stop bit: 1/2 bits USB: USB2.0		RS-232C Baud rate: 9600/19200/38400 bps, Parity: even, Date length: 7 bits, Stop bit: 1 bits LAN: TCP/IP, Ethernet 10/100BASE-TX					
Power supply		Provided AC adapter AC100V-240V, 50/60Hz, DC12V							
Power consumption		Approx.34W	Approx.36W	Approx.33W					
Operating conditions		Temperature: :5°C~35°C	Temperature: :5°C~30°C	Temperature: :5°C~35°C					
External dimensions		Humidity: 80%R.H. and below (No condensation)							
Weight		About 406 mm x 150 mm x 239 mm (L x W x D)		About 413 mm x 98 mm x 231.5 mm (L x W x D)					

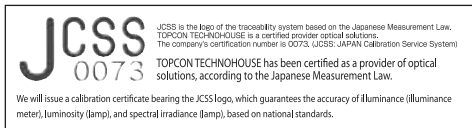
※1 2σ from 10 times continuous measurement at measuring angle 2° in normal speed mode

※2 Max value - Min value from 10 times continuous measurement at measuring angle 2° in normal speed mode

※3 Measurable range in Normal and High speed mode.

\*The measuring distance is the distance from the metallic tip of the objective lens.

\*The values in this table are design reference values and may differ somewhat from the actual diameter.



※Some screens are simulated.

※The specifications and external appearances of product in this catalogue may be changed without prior notice due to improvements.

※The catalogue includes products that are sold separately.

※The actual color of products may differ slightly from the catalogue due to lighting and printing conditions.

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**Note** Make sure to carefully read the "User's Manual" to ensure that you use the product properly and safely.

<http://www.topcon-techno.co.jp>