TOPCON

SPECTRORADIOMETER

SR-UL2／SR-UL1R／SR-3AR／SR-NIR

Spectroradiometer series

Measuring more deep black with high speed!!

Topcon SR series are suited for measuring high-contrast, high-reproducibility and high-quality display with high accuracy

As the quality of the flat Panel Display (FPD) and the light source have been increasing, there has been a growing demand for more accurate measuring instrument.
Additionally, the demand for measurement with high contrast from low and high luminance has been increasing, and not only luminance and chromaticity data but also spectral power distribution data with high accuracy have been increasing.
Spectroradiometer SR-3A,SR-UL1R, SR-UL2 are designed to meet that demand and achieve high usability and stable measurement.
Spectroradiometer for Near-infrared SR-NIR is suited for measuring very faint near-infrared light emitted from LCD/PDP and measuring near-infrared light emitted from LED with spectroradiometry.

Spectroradiometer

SR-3AR

- The SR-3A can measure as low as 0.1cd/m^2
- Measuring CCFL and Back light unit
- Measuring Light source Lamp

Topcon SR series is equipped with the ability of high accuracy and multifunctional calculation with spectroradiometry.

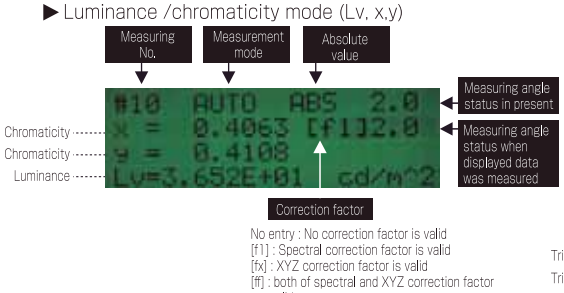
■Reference for Topcon measuring instruments.

You can use measured data by using SR-3AR, SR-UL1R and SR-UL2 as standard, and you can correct other instruments based on the data.

■Computing (common with SR-UL2, SR-UL1R and SR-3AR)

Not only spectral distribution but also chromaticity, Tristimulus value, luminance and correlated color temperature can be determined by calculation immediately.
Tristimulus value X,Y,Z, at 10 degree observers can be determined also.

▶ Luminance /chromaticity mode (Lv, x,y)



No entry : No correction factor is valid
[f1] : Spectral correction factor is valid
[fx] : XYZ correction factor is valid
[ff] : both of spectral and XYZ correction factor are valid

▶ Radiance/Luminance mode (Le, Lv)

▶ Correlated color temperature/ Deviation mode (Tc, duv, Lv)

▶ Tristimulus value mode(XYZ)

▶ Luminance/Chromaticity mode (Lv, u' ,v')

Spectroradiometer for ultra-low luminance

SR-UL1R

- The SR-UL1R can measure as low as 0.001cd/m^2
- Measuring high contrast display
- Measuring instrument panel

Spectroradiometer for ultra-low luminance

SR-UL2

- The SR-UL2 can measure as low as 0.0005cd/m^2
- Measuring Mega contrast display
- Measuring instrument panel

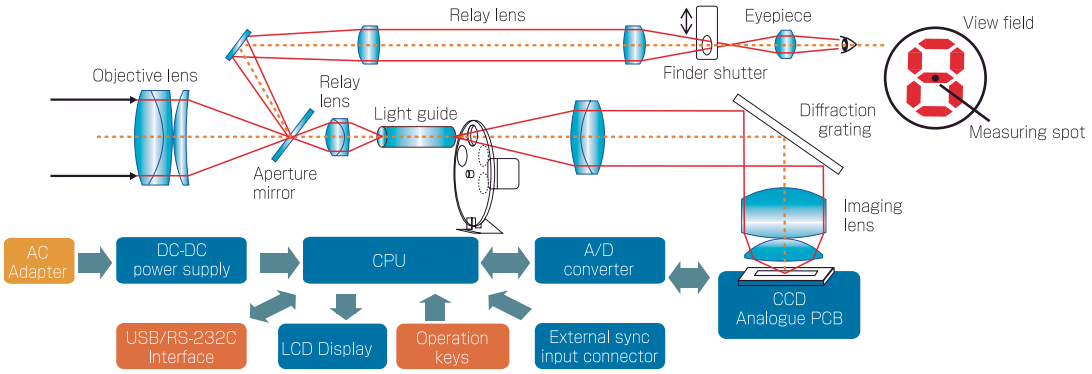
Near Infrared Spectroradiometer

SR-NIR

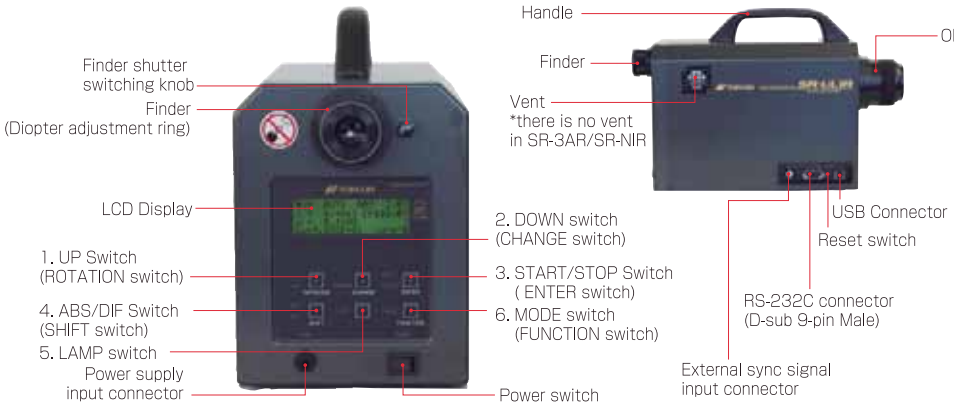
- Measuring Near-infrared light emitted from FPD
- Measuring Hg bright line emitted from CCFL lamp at 1013nm
- Measuring bright line of Ne, Ar

■Block diagram (SR-3AR / SR-UL1R / SR-UL2 / SR-NIR in common)

Telescopic system makes it possible to measure the absolute value of the spectral radiance of light sources or objects without coming in contact with them. This optics also make it possible to verify the object to measure through a finder.



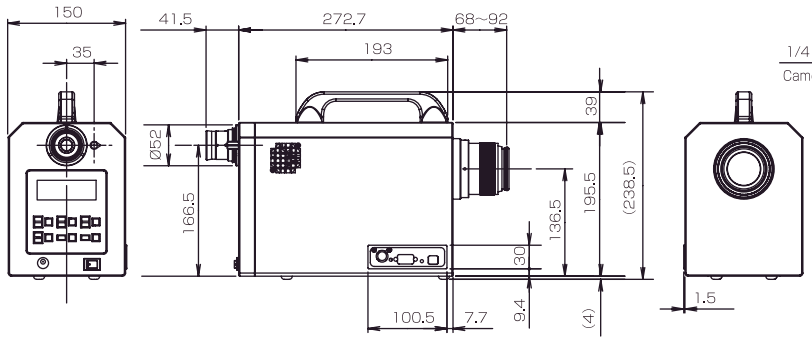
■Component Names (SR-3AR / SR-UL1R / SR-UL2 / SR-NIR in common)

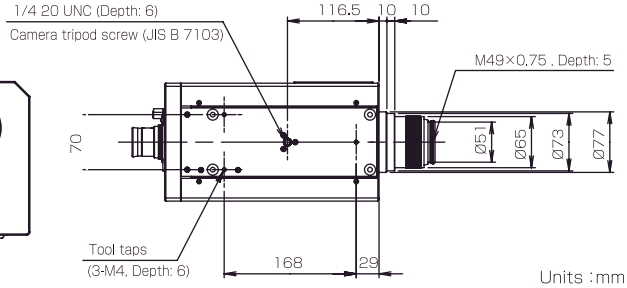


1. UP switch : Increment the measurement number (ROTATION switch : Selects the parameter to input)
2. DOWN switch : Decrease the measurement number (CHANGE switch : Changes the memory content)
3. START/STOP switch : Starts/Stops measurement (ENTER switch : Switches the display screen and saves changes)
4. ABS/DIF switch: Switches between display of absolute value (ABS) and differential (DIF) (SHIFT switch: Shifts the digits of input value)
5. LAMP switch: Switches LCD display backlight on/off
6. MODE switch: Switches display mode (FUNCTION switch :entering / returning to function mode)

*The switches in parentheses are enabled while in function mode

■Dimension (SR-3AR / SR-UL1R / SR-UL2 / SR-NIR in common)





Units : mm

For measuring of Spectral distribution, Luminance, Chromaticity and Correlated color temperature of the light emitted from display device and lamp, SR series Spectroradiometer is suited.

Measuring High definition FPD
Optical system in the SR-series matches Spectroradiometry measurement, and ISO,VESA, JEITA standard with high repeatability.

High contrast measurement
High S/N, high sensitive sensor, and Dark noise manipulation technology are adopted.

Contrast ratio, Gamma characteristics measurement
High accuracy (lineality, repeatability).

Spectroradiometer
SR-3AR

Spectroradiometer for ultra-low luminance
SR-UL1R

■Feature (SR-3AR , SR-UL1R and SR-UL2)

●Ultra-low luminance measurement

	SR-3AR	SR-UL1R	SR-UL2
2°	0.1 - 3,000cd/m²	0.001 - 3,000cd/m²	0.0005 - 3,000cd/m²
1°	0.3 - 9,000cd/m²	0.003 - 9,000cd/m²	0.0015 - 9,000cd/m²
0.2°	7.5 - 70,000cd/m²	0.075 - 70,000cd/m²	0.0375 - 70,000cd/m²
0.1°	30 - 300,000cd/m²	0.3 - 300,000cd/m²	0.15 - 300,000cd/m²

*The SR-UL1R and SR-UL2 is suited for the measuring of very low level luminance and very small area such as Interior panel in automobile, Audio monitor and high-contrast display.

●High speed mode

New added High speed mode provide high speed measurement even at low level luminance.
Measuring time : About 1 – 17 sec.

Measurable luminance range in High speed mode

SR-3AR : 0.1 - 3,000cd/m²
Luminance : ±5%(0.1 - 0.5cd/m²), ±2%(0.5 - cd/m²)
Chromaticity: xy±0.005(0.1 - 0.5cd/m²), xy±0.002(0.5 - cd/m²)

SR-UL1R : 0.01 - 3,000cd/m²
Luminance : ±2%(0.01 - 3,000cd/m²)
Chromaticity: xy±0.003(0.01~0.05cd/m²), xy±0.002(0.05~cd/m²)

SR-UL2 : 0.005 - 3,000cd/m²
Luminance : ±2%(0.005 - 3,000cd/m²)
Chromaticity: xy±0.003(0.005~0.05cd/m²), xy±0.002(0.05~cd/m²)

*measuring angle 2°

●High accuracy

The SR-UL2/SR-UL1R/SR-3AR achieves high accuracy in luminance of ±2%, chromaticity of ⊿x⊿y±0.002

(SR-UL2 : 0.0005cd/m² or more at measuring angle 2° for standard illuminant A)
(SR-UL1R : 0.001cd/m² or more at measuring angle 2° for standard illuminant A)
(SR-3AR : 0.1cd/m² or more at measuring angle 2° for standard illuminant A)
*Normal Speed mode.

●Measuring flicker light with high accuracy

Synchronous measurement / Integral time delay
For periodic light measurement, SR-UL2 / SR-UL1R / SR-3AR automatically detects and measures the frequency of light once you enter a sync signal.
You can obtain stable measured data for measuring the display which is insert black signal between lighting.

●No need of warm-up

●Spectral observation

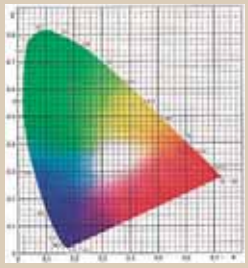
SR series conduct spectral radiance measurement and so that spectral distribution and spectral radiance can be observed.

●Useful software CS-900A

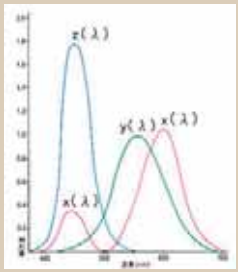
Colorimetry software CS-900A for Windows is standard accessory. The CS-900A can control the SR-UL2/ SR-UL1R/ SR-3AR, and collect measured data and plot the spectral distribution graphs and chromaticity diagram

		SR-3AR / SR-UL1R / SR-UL2		
LCD	LCD Module	· Luminance/Chromaticity · Uniformity · Build-up characteristic · Spectral power distribution	· γ characteristics · Viewing angle characteristics · Temperature characteristics	· Contrast ratio · Reflectivity · NTSC ratio
	Backlight Unit	· Luminance/Chromaticity · Temperature characteristics	· Uniformity · Spectral power distribution	· Build-up characteristic
	CCFL	· Luminance/Chromaticity · Spectral power distribution	· Luminance/Chromaticity Mura	· Build-up characteristic
	LED	· Luminance/Chromaticity	· Build-up characteristic	· Spectral power distribution
	Film	· Luminance/Chromaticity · Spectral power distribution	· Spectral reflectivity	· Spectral transmission ratio
	Diffusing plate	· Luminance/Chromaticity · Spectral power distribution	· Spectral reflectivity	· Spectral transmission ratio
PDP	PDP module	· Luminance/Chromaticity · Uniformity · Build-up characteristic · Spectral power distribution	· γ characteristics · Viewing angle characteristics · Temperature characteristics	· Contrast ratio · Reflectivity · NTSC ratio
	Filter	· Luminance/Chromaticity · Spectral power distribution	· Spectral reflectivity	· Spectral transmission ratio
OLED		· Luminance/Chromaticity · Uniformity · Build-up characteristic · Spectral power distribution	· γ characteristics · Viewing angle characteristics · Temperature characteristics	· Contrast ratio · Reflectivity · NTSC ratio
Automotive	Instrument panel	· Luminance/Chromaticity	· Luminance/Chromaticity Mura	
	Meter	· Luminance/Chromaticity	· Luminance/Chromaticity Mura	

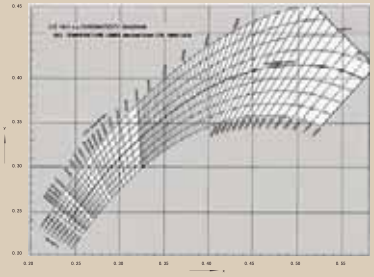
◎CIE CHROMATICITY DIAGRAM



◎COLOR MATCHING FUNCTIONS



◎ISO TEMPERATURE LINES derived from CIE 1960 UCS



The SR-NIR achieves high accuracy measurement of very faint Near infrared.

Spectroradiometer for ultra-low luminance

SR-UL2

Near Infrared Spectroradiometer

SR-NIR

■Usage(SR-3AR , SR-UL1R and SR-UL2)


Large Television


Car Navigation


Monitor of mobile phone


Speed meter in automobile

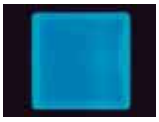

LED


CCFL


Traffic signal


Stop lamp

Guide light


Next-generation illumination

Optical characteristic evaluation of Flat Panel Display, Fluorescent material, Large Television, Mobile phone, Plasma Display Panel, Automobile (Component, Interior panel and various type of lamp), Indicator (Large Panel LED, Traffic light, mobile phone), Parts for display (LCD module, Cold cathode fluorescence light, LED and Optical filter), Material (Back light, Fluorescent material, Optical filter, Organic EL and LED.

■Feature (SR-NIR)

●The SR-NIR can measure spectral distribution in near infrared range(600-1030nm)with high accuracy. Combine with SR series

●Very slight near-infrared light emitted from LCD and PDP can be measured.
Near-infrared light from Mercury-free Cold cathode fluorescent lamp and transmittance of near-infrared absorption filter can be measured.

●Combine with SR series, Spectral distribution can be measured from visible tonear infrared range(380-1030nm).

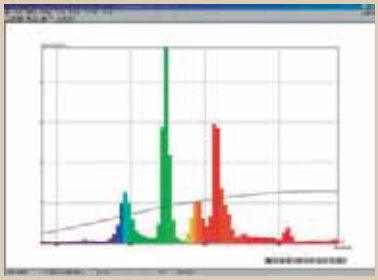
■Usage(SR-NIR)

●Measuring of near-infrared emitted from FPD such as LCD and PDP
●Measuring of energy of blight line of Hg (1013nm) in CCFL
●Measuring of energy of blight line of Ne. Ar
●Evaluation for near-infrared absorption filter
●Measuring of near-infrared from various type of light

Color Rendering evaluation

Spectral distribution data obtained by SR-UL1R / SR-3AR / SR-UL2 and Colorimetry software CS-900A allow you to evaluate color rending.

Color rendering is defines how well colors are rendered by different illumination.



Spectroradiometer SR-LEDseries

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

1～4,500,000cd/m^2
(High cost performance model)

Spectroradiometer

SR-LEDW

0.0005～5,000,000cd/m^2
(Flagship model)

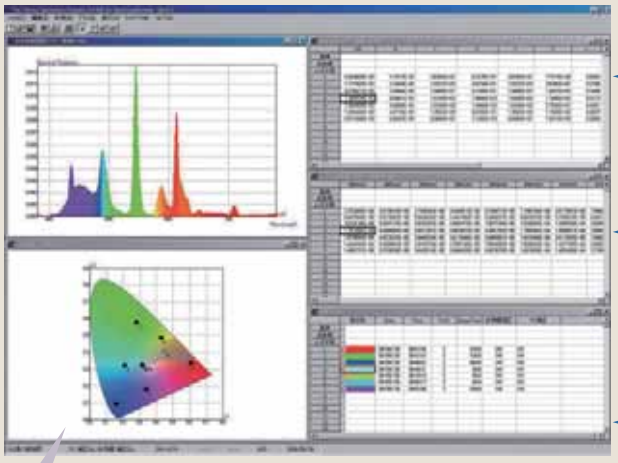
Spectroradiometer

SR-LEDH

10～4,500,000cd/m^{2}の測定対応
(In-line model)

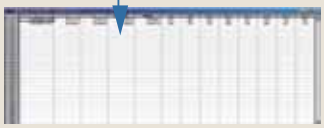
Standard accessories software supports control of instrument and data collection

SR-3AR / SR-UL1R / SR-UL2 / SR-NIR colorimetry software CS-900A (standard accessory)



Application software CS-900A for Windows supports Spectroradiometer SR-3AR / SR-UL1R / SR-UL2. / SR-NIR You can control SR-3AR / SR-UL1R / SR-UL2 / SR-NIR using by the CS-900A, and collect, save, plot on a graph and calculate of the measured data and, use them for many purpose.
On the Colorimetry mode, it can shorten the communication time between the instrument and PC due to omitting spectral data transmission.

Colorimetry data
Spectral radiance data
Measurement conditions/note
Color Rendering Index data



○Chromaticity graph

Hue-Chroma chromaticity graph | xy chromaticity graph | u*v* chromaticity graph | u'v' chromaticity graph | a*b* chromaticity graph

Spectral radiance graph (Color Rendering Index/Standard light) | Colorimetry mode | *Black or white background color can be selected

■Time-Luminance diagram

Displays graph of Time-series data in luminance measurement for continuous measurement (CONTINUUE) or interval measurement (INTERVAL).

Display:	Spectral graph, chromaticity diagram
Color space mode:	L, xy, XYZ, u' v' , u*v*, L*a*b*, Correlated color temperature, Deviation, Dominant wavelength
Calculation:	Four basic ariyhmetic operations and function processing of spectral data
Mode selection:	spectral radiance mode/colorimetry mode
Selects the measurement mode:	Auto mode/Frequency (FREQ Mode)/External Sync. mode/Integral Time mode (MANU Mode), Measuring Speed, Measuring Field, Meas. Times, Single/Interval/Continue
Data evaluation:	field/illumination light sources, color rendering property

System required (recommended)
■OS : Windows® XP Professional Service Pack2 or more
Windows® XP Home Edition Service Pack2 or more
Windows® Vista Ultimate
Windows® 7 Ultimate / Professional
■CPU : Pentium Ⅳ 2.8GHz or more
■HDD : 1GB or more
■Memory : 1GB or more
■Ports : USB2.0(One port)
RS-232C serial port (One port)
*The RS-232C cable (interlink cable for DOS/V PC) must be purchased separately.

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

●Complying with JIS C1609-1:2006 AA class

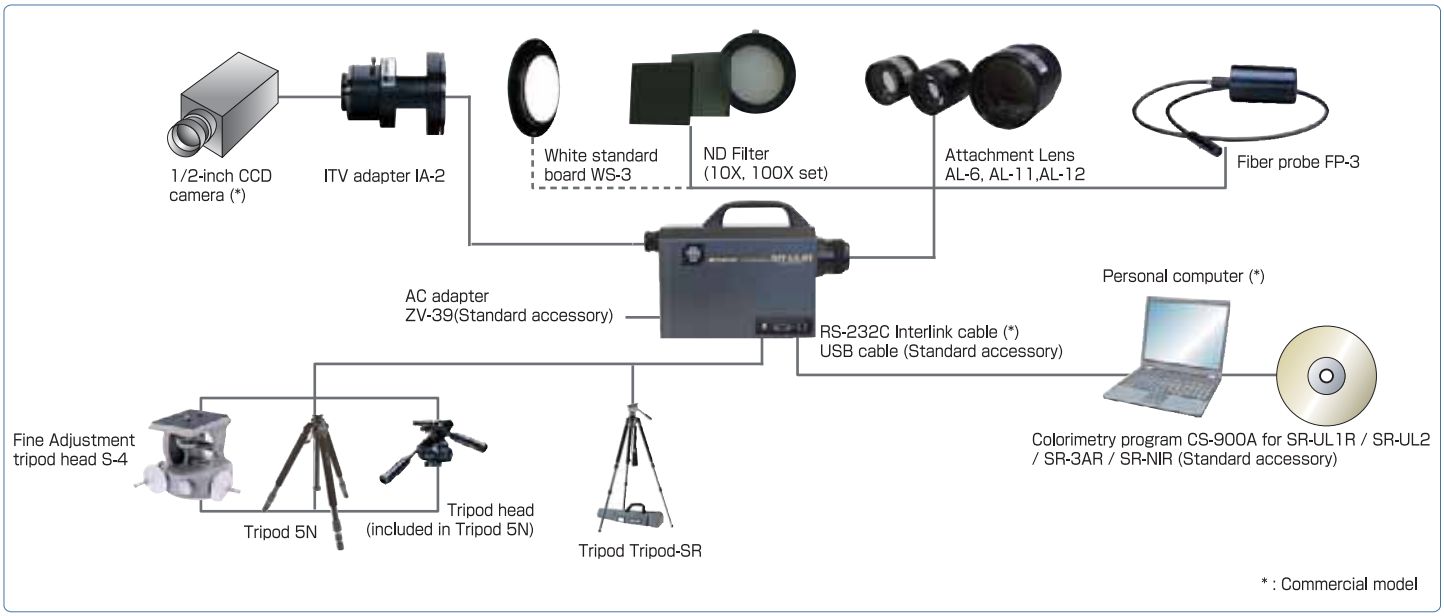
The spectral irradiance and illuminance may be measured by attaching an illuminance adapter to the Spectroradiometer.
*Calibration of your Spectroradiometer and Illuminance adapter is required in Topcon factory before you use the illuminance adapter with your instrument.

●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
0.01 – 30,000,000 lx (SR-LEDW at measuring angle 2° with ZV-30)
0.02 – 60,000 lx (SR-UL1R at measuring angle 2° with ZV-30)
6 – 7,000,000 lx (SR-UL1R at measuring angle 0.1° with ZV-30)
2 – 60,000 lx (SR-3AR at measuring angle 2° with ZV-30)
600 – 7,000,000 lx (SR-3AR at measuring angle 0.1° with ZV-30)
Accuracy Ev: ±2% xy:±0.002 (for standard illuminant A)

Function
■Illuminance :Ev
■Chromaticity : xy, u'v'
■Tristimulus values XYZ
■Spectral irradiance :Ee
■Color Rendering Index:Ra, R9-R15
■Correlated color temperature : Tc, duv
■Dominant wavelength, Purity

■System Diagram (SR-3AR/SR-UL1R/SR-UL2/SR-NIR in common)



* : Commercial model

■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 Measurement distance 51.72 to 68.53mm	AL-11 Measurement distance 19.56 to 24.80mm	AL-12 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.

●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

●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 lengt : 694mm ●Leg sections : 3
●Weight : 3.0Kg including Tripod stand

●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 (BaSO4)
●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)

●ND filter (10x/100x set)

Neutral density filter for measuring higher luminance than the measuring range of instrument.

■SR-3AR/SR-UL1R/SR-UL2/SR-NIR Standard package

●SR-3AR/SR-UL1R/SR-UL2/SR-NIR(main body) 1pce
●AC adapter (ZV-39) 1pce
●Carrying case 1pce
●CD-ROM (Colorimetry software CS-900A/CS-900A CF Tool/Instruction manual) 1pce
●Quick manual 1pce
●USB cable 1pce
●Objective lens cap 1pce

■Specification

		SR-UL2		SR-UL1R		SR-3AR		SR-NIR	
Optical system		Objective lens: f= 82 mm F2.5, Eyepiece lens: 5˚ view field, Diopter adjustment range: ±5diopter							
Dispersing element		Diffraction grating							
Photodetector		Electronically cooled linear CCD							
Measuring angle		2° / 1° / 0.2° / 0.1° Motor drive							
Measuring distance		350 mm to ∞ (distance from metallic tip of objective lens)							
Measuring diameter (mmϕ)	Measuring angle	Measuring distance (mm) (distanc e from metallic tip of objective lens)							
		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						600 to 1030nm	
Spectral accuracy		±0.3nm (on Hg emission line)						±0.5nm (on Hg emission line)	
Spectral band width		5 to 8nm (half width)							
Wavelength resolution		1nm							
Measurement mode		Auto/manual (integral time/frequency), external vertical sync signal input							
Measuring object		Spectral radiance (W, sr $^{-1}$, m $^{-2}$, nm $^{-1}$)							
Calculation function		Radiance (Le; W, sr $^{-1}$, m $^{-2}$), luminance (Lv; cd, m $^{-2}$),							
		CIE1931 chromaticity coordinates xy, CIE1976 chromaticity coordinates u'v', tristimulu s 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)						with in ±7% (600 to 1030nm for Topcon Standard light)	
Repeatability	Luminance ※1	1.5%(0.0005 to 0.005cd/m^2) 0.4%(0.005 to 0.1cd/m^2) 0.3%(0.1cd/m^2 or more)		1.5%(0.001 to 0.005cd/m^2) 0.4%(0.005 to 0.1cd/m^2) 0.3%(0.1cd/m^2 or more)		0.3%(0.1cd/m^2 or more)		2% or less (600 to 1030nm for Topcon Standard light)	
	Chromaticity ※2	0.005(0.0005 to 0.005cd/m^2) 0.0015(0.005 to 0.1cd/m^2) 0.0005(0.1cd/m^2 or more)		0.005(0.001 to 0.005cd/m^2) 0.0015(0.005 to 0.1cd/m^2) 0.0005(0.1cd/m^2 or more)		0.0005(0.1cd/m^2 or more)			
Range of guaranteed luminance accuracy (cd/m^2) (for standard illuminant A) ※3	Measuring angle	SR-UL2		SR-UL1R		SR-3AR		SR-NIR	
	2°	0.0005 to 3,000		0.001 to 3,000		0.1 to 3,000		0.5 to 3,000 ※4	
	1°	0.0015 to 9,000		0.003 to 9,000		0.3 to 9,000		1 to 9,000 ※4	
	0.2°	0.0375 to 70,000		0.075 to 70,000		7.5 to 70,000		20 to 70,000 ※4	
	0.1°	0.15 to 300,000		0.3 to 300,000		30 to 300,000		100 to 300,000 ※4	
Polarization error		Luminance 1% or less, Spectral radiance 2% or less (400nm to 700nm)						Spectral radiance 5% or less	
Measurement time		NORMAL SPEED MODE: About 1 to 248seconds. 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)		NORMAL SPEED MODE: About 1 to 31seconds. HIGH SPEED MODE: About 1 to 17seconds. (excludes communication time with computer)		About 1 to 31seconds. (excludes communication time with computer)	
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							
Power supply		Provided AC adapter AC100V-240V, 50/60Hz, DC12V							
Power consumption		Approx.36W				Approx.34W		Approx.36W	
Operating conditions		Temperature: 5 to 30℃				Temperature:5 to 35℃		Temperature:5 to 35℃	
		Humidity: 80%R.H. and below (No condensation)							
External dimensions		About 406 mm x 150 mm x 239 mm (L x W x D)							
Weight		About 5.5 kg (main unit only)							

※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.
※4 SR-NIR can not measure quantity of luminance. The value is for reference, when measuring standard illuminant A.
*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.

JCSS 0073

JCSS is the logo of the traceability system based on the Japanese Measurement Law.
TOPCON TECHNOHOUSE is a certified provider optical solutions.
The company's certification number is 0073. (JCSS: JAPAN Calibration Service System)

TOPCON TECHNOHOUSE has been certified as a provider of optical solutions, according to the Japanese Measurement Law.

We will issue a calibration certificate bearing the JCSS logo, which guarantees the accuracy of illuminance (illuminance meter), luminosity (lamp), and spectral irradiance (lamp), based on national standards.

※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.

TOPCON TECHNOHOUSE CORPORATION
75-1 Hasunuma-cho, Itabashi-ku, Tokyo 174-8580 JAPAN
Phone: 03-3558-2666 Fax: 03-3558-4661
E-mail: techno-info@topcon.co.jp

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

2013 02 E2