

Advanced Test Equipment Rentals www.atecorp.com 800-404-ATEC (2832)



Spectroradiometer CS-2000/2000A

The world's top-level capability spectroradiometers make further advances with addition of second model to lineup.

15



World's top level capability to detect extremely low luminance

* As a polychromator type spectroradiometer (As of March 2014)

1,000,000:1 contrast measurement is now possible!

* When the peak luminance is 500 cd/m²

CS-2000A

Opening the curtain on a new age in which people can experience theater ambiance with their home televisions. The Spectroradiometer CS-2000A enables high-accuracy mega-contrast measurements of the extremes from delicate shadows to glittering wavefronts which are key to image reproduction performance.

This newest addition to the Konica Minolta lineup will contribute greatly to research and development as well as quality control of the most advanced FPDs.

\square 0.0005 cd/m² opens new worlds

With an additional decimal place of performance in measuring low luminosity even compared to our CS-2000, which was awarded the ADY 2008 grand prize, the CS-2000A helps open up a new stage of display development by enabling the measurement of contrast ratios up to 1 million to 1*1 which is being targeted by the latest FPD technology.

*1 Maximum luminance 500 cd/m²



Measurement example:

Measurement of an organic EL illumination panel during development

Instruments that push the extreme boundaries of practical application and cost performance to support design and development work.

Highly accurate measurement of luminances as low as 0.003 cd/m²

Konica Minolta's original optical design and signal-processing technologies provide accurate measurement of luminance/chromaticity down to extremely low luminances of 0.003 cd/m².

Low-luminance measurements: From 0.003 cd/m² Measurement accuracy: ±2% (Luminance)

Quick measurements even at low luminance

Designed to thoroughly eliminate mechanical and electrical noise factors, the CS-2000 makes quick measurements with good repeatability possible even at low luminance levels.

Measurement time for 1 cd/m²: Approx. 5 sec. (FAST mode)

* Konica Minolta's previous model CS-1000: Approx. 123 sec.

Low polarization error

The polarization error generated when using a reflection-type diffraction grating has been minimized to 2% (measuring angle: 1°). This ensures more stable measurements of display devices that use polarization, such as LCDs.

Half bandwidth of 5 nm

A half bandwidth of 5 nm, which is required for colorimetry (JIS Z 8724-1997, CIE122-1996), is ensured for the entire wavelength range, allowing accurate chromaticity measurements.

Selectable measuring angle for measurement of tiny areas

The CS-2000 enables you to select the optimum measuring angle according to the application.

Measuring angle selection: 1°, 0.2°, 0.1°

Minimum measuring area: Ø0.1 mm (when the optional closeup lens is attached)

Practical design

- The operating temperature range of 5 to 35°C ensures reliable operation at temperatures in actual work environments.
- Measurement can be started after a warm-up time of only 30 seconds. (Measuring angle: 1°; Target luminance: 5 cd/m² or more; 23°C)

Stable measurement even of periodic light sources

1. Internal synchronization measurement

Measurement at numerically-input frequency

2. External synchronization measurement

Measurement with line input of vertical synchronization signal to instrument

3. Multi-integration mode measurement

Measurement for reducing variations due to unsynchronized measurements or synchronized measurements of sources having irregular light-emission cycles

Measurements of various objects are possible by selecting the best-suited measuring angle.

1° is suitable for

Typical targets such as middle- and large-size display units

- · LCD, PDP, or EL display panels
- · LCD panels of cellular phones and digital cameras
- · Radar and other instrument panels used in airplane cockpits
- · Large outdoor display screens

0.2° is suitable for

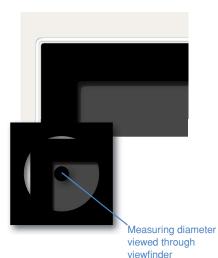
Small light sources such as LEDs

- · Car audio systems
- Instrument panels for automobiles
- · Lamps, fluorescent tube backlights, and other light sources

0.1° is suitable for

Extremely small light sources or distant lights

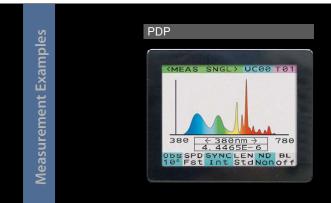
- PDP or LCD pixels
- Cold-cathode tubes
- · Brake lamps of automobiles
- Traffic signals

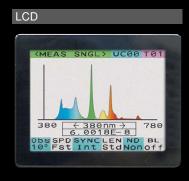


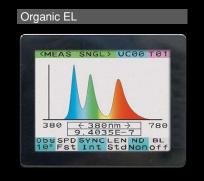




LCD pixels







Close-up lens for measurement of even tinier areas

(Optional accessory)

Optional close-up lens allows measurements of areas as tiny as ø0.1 mm. Not only general display units but also small targets can be measured.



Measuring distance vs. measuring area

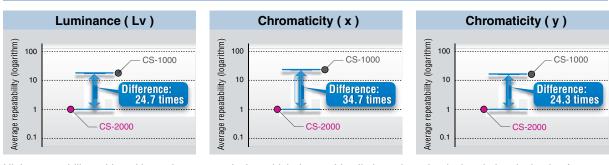
■ Measuring distance vs. measuring area (Units: mm)								
Measuring distance		Measuring angle						
		1°	0.2°	0.1°				
When a close-up lens	55.0	ø1.00	ø0.20	ø0.10				
is attached	70.9	ø1.39	ø0.28	ø0.14				
350		ø5.00	ø1.00	ø0.50				
500		ø7.78	ø1.56	ø0.78				
1,000		ø16.66	ø3.33	ø1.67				
2,000		ø34.18	ø6.84	ø3.42				

^{*} The measuring distance is the distance from the objective lens or the end of the metal frame of the close-up lens.

Comparison of repeatability

* Comparison with Konica Minolta's previous model CS-1000 for target luminance of 0.1 cd/m²

* The y-axis indicates the logarithm when the average of the CS-2000 measured values is assumed to be 1



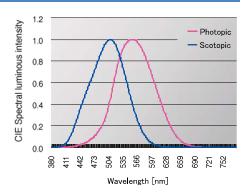
High repeatability achieved by an instrument design which thoroughly eliminated mechanical and electrical noise factors.

Scotopic vision measurement

It is known that the sensitivity of human vision shifts to blue region in dark environments, but past instruments did not have scotopic measurement function. CS-2000A achieves sufficient capability to make it possible with CS-S10w Professional (standard accessory).

Scotopic vision

In the human eye, there are 2 types of photoreceptor cells, which are cone cells and rod cells. Cone cells are sensitive to color and rod cells are sensitive to only brightness. As brightness decreases, the activity of rod cells becomes stronger, and the condition in which only rod cells are working is called scotopic vision. The peak of spectral luminous efficiency of scotopic vision is shifted toward blue from the green peak of photopic vision (vision under brighter conditions) and thus blue objects are perceived to be brighter.



Measured luminance vs. Measurement times

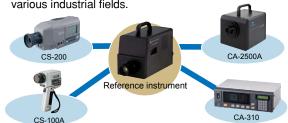
NORMAL mode	FAST mode	
243	35	
243	35	
155	27	
19	5	
4	4	
3.7	3.7	
	243 243 155 19 4	

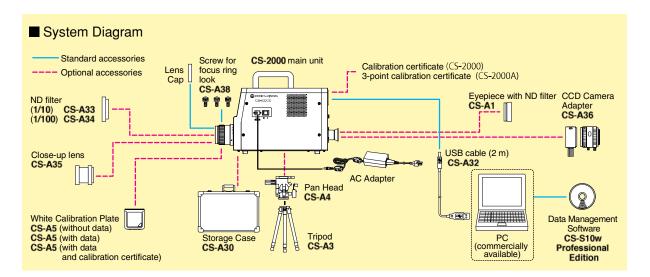
Measurement subject: Standard light source A

* All time indications are approximate values.

Using as a reference instrument

CS-2000/CS-2000A can be used as a reference instrument for Konica Minolta's Illuminance Meters in various industrial fields.





Easy operation with color LCD screen and simple operation panel

The color LCD screen and operation panel are located at the rear of the instrument. The simply arranged operation panel enables intuitive selection of necessary functions.





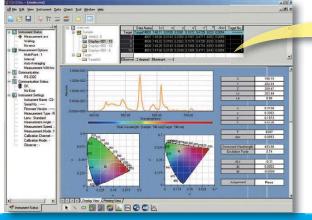




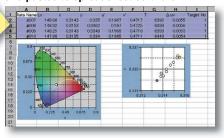
Data Management Software CS-S10w Professional (Standard accessory)

With this software, the CS-2000 and CS-2000A can be controlled from a personal computer to display measured data in various graphs or lists, to transfer data to spreadsheet software, or to copy-and-paste data. CS-S10w offers various data management, analysis and evaluation options to assist in research and development or quality control.

Template showing xy and u'v' chromaticity diagrams



Multiple data objects can be copied and pasted to spreadsheet software.



- Windows® is a trademark or registered trademark of Microsoft Corporation in the USA and other countries.
- Pentium® is a trademark of Intel Corporation in the USA and other countries.

Spectral graph, spectral data list, chromaticity diagram L,xy, L,u'v', L,T uv, XYZ, dominant wavelength,

excitation purity, scotopic luminosity Four basic arithmetic operations and function processing of spectral data

Mode selection Normal mode, contrast mode, RGB mode, RGB &

contrast mode, object color mode

Instrument control Averaging measurement, interval measurement, user calibration **Data management** Reading/saving files; managing data by using folders;

creating, saving and reading templates with various graphs designed and laid-out by users; displaying data with graphs

Data evaluation

Calculation

Observer/illuminant setting, color rendering property evaluation, statistic value display for each folder, box tolerance setting, multiple point setting for display evaluation, non-uniformity (mura) display, contrast display, polygonal tolerance setting

System requirements

OS Windows® XP Professional 32 bit SP3, 64 bit SP2

Windows® 7 Professional 32 bit, 64 bit Windows® 8 Pro 32 bit, 64 bit

CPU Pentium® III 600 MHz equivalent or faster

Memory 128 MB or more

(256 MB or more recommended)

Hard disk 60 MB or more of free space for installation **Display** 1,024 x 768, 256 colors minimum

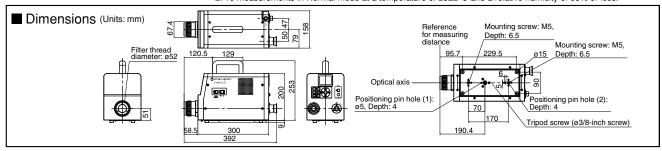
Other CD-ROM drive for installation, USB port

for instrument connection

Main specifications of CS-2000/2000A

Mod	1el		CS-2000/2000A				
Wavelength range		380 to 780 nm					
Wavelength resolution		0.9 nm/pixel					
Display wavelength bandwidth		0.9 nm/pixei 1.0 nm					
	velength precision	±0.3 nm (Median wavelength: 435.8 nm, 546.1 nm, 643.8 nm; Hg-Cd lamp)					
	ectral bandwidth	5 nm or less (half bandwidth)					
	asuring angle (selectable)	1° 0.2° 0.1°					
		0.003 to 5.000 cd/m ²	0.075 to 125.000 cd/m ²	0.3 to 500.000 cd/m ²			
Measurement luminance range (Standard light source A) CS-2000A		0.003 to 5,000 cd/m²	0.0125 to 125,000 cd/m²	0.05 to 500,000 cd/m²			
		Ø5 mm	0.0125 to 125,000 cd/III-	Ø0.5 mm			
Minimum measuring area		(ø1 mm when using close-up lens)		(ø0.1 mm when using close-up lens)			
Minimum measuring distance		350 mm (55 mm when using close-up lens)					
Minimum spectral radiance display		1.0x10 ⁹ W/sr, m ² , nm					
Accuracy: Luminance		, i					
(Standard light source A)*1		±2%					
CS-2000	Accuracy: Chromaticity (Standard light source A)*1	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	x,y : ±0.003 (0.3 to 0.5 cd/m²) x,y : ±0.002 (0.5 to 5 cd/m²) x : ±0.0015 y : ±0.001 (5 cd/m² or more)			
	Repeatability: Luminance (2 σ) (Standard light source A)*2	0.4% (0.003 to 0.05 cd/m²) 0.3% (0.05 to 0.1 cd/m²) 0.15% (0.1 to 5,000 cd/m²)	0.4% (0.075 to 1.25 cd/m²) 0.3% (1.25 to 2.5 cd/m²) 0.15% (2.5 to 125,000 cd/m²)	0.4% (0.3 to 5 cd/m²) 0.3% (5 to 10 cd/m²) 0.15% (10 to 500,000 cd/m²)			
	Repeatability: Chromaticity (20) (Standard light source A)*2	x,y:0.002 (0.003 to 0.005 cd/m²) x,y:0.001 (0.005 to 0.1 cd/m²) x,y:0.0006 (0.1 to 0.2 cd/m²) x,y:0.0004 (0.2 to 5,000 cd/m²)	x,y : 0.002 (0.075 to 0.125 cd/m²) x,y : 0.001 (0.125 to 2.5 cd/m²) x,y : 0.0006 (2.5 to 5 cd/m²) x,y : 0.0004 (5 to 125,000 cd/m²)	x,y : 0.002 (0.3 to 0.5 cd/m²) x,y : 0.001 (0.5 to 10 cd/m²) x,y : 0.0006 (10 to 20 cd/m²) x,y : 0.0004 (20 to 500,000 cd/m²)			
CS-2000A	Accuracy: Chromaticity (Standard light source A)*1	x,y :±0.002 (0.001 to 0.05 cd/m²) x :±0.0015 y :±0.001 (0.05 cd/m² or more)	x,y:±0.002 (0.025 to 1.25 cd/m²) x:±0.0015 y:±0.001 (1.25 cd/m² or more)	x,y:±0.002 (0.1 to 5 cd/m²) x:±0.0015 y:±0.001 (5 cd/m² or more)			
	Repeatability: Luminance (2σ) (Standard light source A)*2	1.5% (0.0005 to 0.001 cd/m²) 0.7% (0.001 to 0.003 cd/m²) 0.25% (0.003 to 0.05 cd/m²) 0.15% (0.05 to 5,000 cd/m²)	1.5% (0.0125 to 0.025 cd/m²) 0.7% (0.025 to 0.075 cd/m²) 0.25% (0.075 to 1.25 cd/m²) 0.15% (1.25 to 125,000 cd/m²)	1.5% (0.05 to 0.1 cd/m²) 0.7% (0.1 to 0.3 cd/m²) 0.25% (0.3 to 5 cd/m²) 0.15% (5 to 500,000 cd/m²)			
	Repeatability: Chromaticity (20) (Standard light source A)*2	x: 0.003 y:0.0035 (0.001 to 0.003 cd/m²) x: 0.001 y:0.0015 (0.003 to 0.1 cd/m²) x,y: 0.0006 (0.1 to 0.2 cd/m²) x,y: 0.0004 (0.2 to 5,000 cd/m²)	x: 0.003 y: 0.0035 (0.025 to 0.075 cd/m²) x: 0.001 y: 0.0015 (0.075 to 2.5 cd/m²) x,y: 0.0006 (2.5 to 5 cd/m²) x,y: 0.0004 (5 to 125,000 cd/m²)	x: 0.003 y: 0.0035 (0.1 to 0.3 cd/m²) x: 0.001 y: 0.0015 (0.3 to 10 cd/m²) x,y: 0.0006 (10 to 20 cd/m²) x,y: 0.0004 (20 to 500,000 cd/m²)			
Polarization error		1°: 2% or less (400 to 780 nm); 0.1° and 0.2°: 3% or less (400 to 780 nm)					
Inte	gration time	Fast: 0.005 to 16 sec.; Normal: 0.005 to 120 sec.					
Measurement time		CS-2000 : Approx. 2 sec. minimum (M. sec. maximum (Normal mode)	anual mode) to 243 CS-2000A : Appro 247 sec. maximum	ox. 2 sec. minimum (Manual mode) to a (Normal mode)			
Color space		Lxxy, L,uV, L,T\u00e5uv, XYZ, spectral graph, dominant wavelength, excitation purity, scotopic luminosity (with CS-S10w Professional)					
Interface		USB 1.1					
Operation temperature/ humidity range		CS-2000 : 5 to 35°C, relative humidity 80% or less with no condensation CS-2000A : 5 to 30°C, relative humidity 80% or less with no condensation					
Storage temperature/humidity range		0 to 35°C, relative humidity 80% or less with no condensation					
Pow		AC Adapter (100 - 240 V 10, 50/60 Hz)					
	rent consumption	Approx. 20 W					
	e (W x H x D)	158 x 200 x 300 mm (Main unit), ø70 x 95mm (Lens)					
	Weight 6.2 kg						
*1. Average of 10 measurements in Normal mode at a temperature of 22±2°C and a relative hymidity of 65% or loss							

*1: Average of 10 measurements in Normal mode at a temperature of 23±2°C and a relative humidity of 65% or less. *2:10 measurements in Normal mode at a temperature of 23±2°C and a relative humidity of 65% of less.





SAFETY PRECAUTIONS

For correct use and for your safety, be sure to read the instruction manual before using the instrument. Always connect the instrument to the specified power supply

voltage. Improper connection may cause a fire or electric shock

- The specifications and appearance shown herein are subject to change without notice
- · Some lamp control methods may make accurate measurements difficult. For details, please contact your nearest Konica Minolta sales office or dealer.

Phone: 888-473-2656 (in USA), 201-236-4300 (outside USA)





KONICA MINOLTA, INC. Konica Minolta Sensing Americas, Inc. Konica Minolta Sensing Europe B.V.

Konica Minolta (CHINA) Investment Ltd.

Osaka, Japan New Jersey, U.S.A. European Headquarter /BENELUX German Office UK Office UK Office Italian Office Swiss Office

Nordic Office Nordic Office
Polish Office
SE Sales Division
Beijing Office
Guangzhou Office
Chongqing Office
Qingdao Office
Withdoo Office Wuhan Office

Konica Minolta Sensing Singapore Pte Ltd. Konica Minolta Sensing Korea Co., Ltd. Sensing Business

Cinisello Balsamo, Italy Dietikon, Switzerland Västra Frölunda, Sweden Wroclaw, Poland Shanghai, China Beijing, China Guangdong, China Chongqing, China Shandong, China Hubei, China Singapore Goyang-si, Korea Bangkok, Thailand

Nieuwegein, Netherlands München, Germany Roissy CDG, France

Warrington, United Kingdom

Phone: +31(0)30 248-1193 Phone: +49(0)89 4357 156 0 Phone: +33(0)180 11 10 70 Phone: +33(0)180111070 Phone: +44(0)1925 467300 Phone: +39 02849488.00 Phone: +41(0)43 322-9800 Phone: +46(0)31 7099464 Phone: +48(0)71 73452-11 Phone: +86-(0)21-5489 0202 Phone: +86-(0)10-8522 1551 Phone: +86-(0)20-3826 4220 Phone: +86-(0)23-6773 4988 Phone: +86-(0)532-8079 1871 Phone: +65 6563-5533 Phone: +82(0)2-523-9726 Phone: +66-2361-3730

Fax: +39 02849488.30 Fax: +41(0)43 322-9809 Fax: +48 (0)71 734 52 10 Fax: +86-(0)21-5489 0005 Fax: +86- (0)10-8522 1241 Fax: +86- (0)20-3826 4223 Fax: +86- (0)23-6773 4799 Fax: +86-(0)532-8079 1873 Fax: +86-(0)27-8544 9991 Fax: +65 6560-9721 Fax: +82(0)31-995-6511 Fax: +66-2361-3771

Fax: +31(0)30 248-1280 Fax: +49(0)89 4357 156 99 Fax: +33(0)1 80 11 10 82 Fax: +44(0)1925 711143

Fax: 201-785-2482

http://konicaminolta.com/instruments/network