

# CS-2000

## Технические характеристики

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# Spectroradiometer CS-2000

A high end spectroradiometer for light sources and displays that measures spectral data, luminance and chromacity. Fast measurement times with high repeatability ideal for the low luminance blacks and contrast measurements on modern displays.



## Introduction

### World's top level capability to analyze extremely low luminance

Many recent FPD models are designed for better black level representation or better contrast in order to provide higher quality images. The CS-2000 is a spectroradiometer which enables accurate luminance/chromaticity measurement even of blacks (from a low luminance of  $0.003 \text{ cd/m}^2$ ).

### Principal applications

The CS-2000 can be used for luminance and chromaticity measurement of various optical devices such as displays like LCDs, PDPs, organic ELs and FEDs, as well as light sources such as LEDs and lamps.

## Features

### 1. Reliable low-luminance measurement

Konica Minolta's accumulated optical technologies and state-of-the-art signal processing technologies are combined to achieve a 100,000 : 1 contrast measurement<sup>\*1</sup> using a spectral-type spectroradiometer.

Low-luminance measurement: From  $0.003 \text{ cd/m}^2$  (Measuring angle:  $1^\circ$ )

Measurement accuracy:  $\pm 2\%$  (Luminance)

<sup>\*1</sup> When the peak luminance is  $300 \text{ cd/m}^2$

## 2. Short measurement time even at low luminance

Fast measurement with good repeatability is possible even at low luminance levels. Measurement time: Approx. 4 sec. (NORMAL mode: 4 cd/m<sup>2</sup>; FAST mode: 0.5 cd/m<sup>2</sup>) Easy operation with a color LCD screen and simple key arrangement

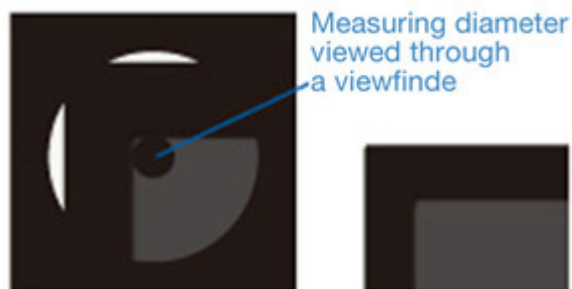


## 3. Easy operation with a color LCD screen and simple key arrangement

1° is suitable for

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

- LCD, PDP, or EL display panels
- LCD panels for 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 an LED

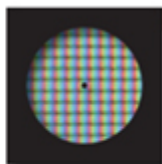
- Car audio systems
- Instrument panels for automobiles
- Lamps, fluorescent tube backlight, and other light sources



#### **0.1° is suitable for**

Extremely small light sources or distant light

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



LCD pixels

#### **4. Selecting the best-suited measuring angle enables measurements of various objects.**

The selectable measuring angle enables a single machine to measure large to small diameters.

Measuring angle: 1°, 0.2°, 0.1°

Minimum measuring area: Ø 0.1 mm (when a close-up lens is attached)

#### **5. Quality control based on the dominant wavelength**

"Data Management Software CS-S10w Professional", included as a standard accessory, enables acceptance judgments\* based on the dominant wavelength. The CS-2000 is thus optimal for quality control of LEDs, which are hailed as the next generation in lighting, and various other new lighting devices.

\* Acceptance judgment based on dominant wavelength: Judges whether the primary wavelength (dominant wavelength) of the respective color is within the standard range in the chromaticity evaluation of LEDs or other illuminating light sources.

#### **6. Accurate measurement of illuminance**

Attaching a diffuser adapter for illuminance measurement (optional accessory) enables the CS-2000 to accurately perform spectroscopic measurements of illuminance and chromaticity of irradiated light.

Areas of application

Light sources of all types can be measured under Laboratory conditions with the CS-2000, for example signal, traffic lights, airport lighting, lamps, LEDs, picture tubes, LCDs, PDPs, etc., simply anything that emits light. With the ever-growing demand for diversified media, stimulated by the growth of information-technology business and full-scale service of digital broadcasting, research and development has accelerated for various display devices centring on plasma displays and LCDs. Innovations in LED technology have led to remarkable breakthroughs in the development of LED products including traffic lights, backlights for reflective LCDs, and large outdoor display screens.

Specifications

Principal Specifications CS-2000

Model	Spectroradiometer CS-2000	
Measurement angel	0.1°, 0.2°, 1° selectable	
AMeasurement wavelength range	380 to 780nm	
Wavelength resolution	0.9nm / pixel	
Display wavelength pitch	1.0 nm	
Median wavelength precision	±0.3nm (at 435.8nm, 546.1nm, and 643.8nm)	
Half bandwidth	5nm or less	
Luminance measurement range (for Standard illuminant A)	0.1° measurement angle: 0.3 to 500,000 cd/m <sup>2</sup> 0.2° measurement angle: 0.075 to 125,000 cd/m <sup>2</sup> 1° measurement angle: 0.003 to 5,000 cd/m <sup>2</sup>	
Accuracy	Luminance	±2%
	Chromaticity (1° measurement angle)	x,y: ±0.003 (0.003 to 0.005 cd/m <sup>2</sup> ) x,y: ±0.002 (0.005 to 0.05 cd/m <sup>2</sup> ) x,y: ±0.0015 (0.05 cd/m <sup>2</sup> or more)
Repeatability	Luminance (1°C measurement angle)	0.4% (0.003 to 0.05 cd/m <sup>2</sup> ) 0.3% (0.005 to 0.1 cd/m <sup>2</sup> ) 0.15% (0.1 to 5,000 cd/m <sup>2</sup> )
	Chromaticity (1° measurement angle)	x: 0.001 y: 0.0015 (0.003 to 0.1 cd/m <sup>2</sup> ) x: 0.0006 y: 0.0006 (0.1 to 0.2 cd/m <sup>2</sup> ) x: 0.0004 y: 0.0004 (0.2 to

	5,000 cd/m <sup>2</sup> )
<b>Polarization error</b>	0.1°, 0.2° measurement angle: 3% or less 1° measurement angle: 2% or less
<b>Measurement time</b>	Approx. 1 sec. (Manual mode) to 243 sec.
<b>Colour space mode</b>	Lv x y, Lv u' v', Lv TΔuv, XYZ, spectral waveform, dominant wavelength, excitation purity scotopic luminosity (with CS-S10w Professional)
<b>Interface</b>	USB 1.1
<b>Operating temperature/humidity range</b>	5 to 35°C; Relative humidity 80% or less with no condensation
<b>Power supply</b>	AC adapter (100 to 240V~, 50/60 Hz)
<b>Dimensions (W × H × D)</b>	158 × 200 × 300mm (Main unit) Ø70 × 95mm (Lens)
<b>Weight</b>	6.2kg (including lens)

- Measurement conditions for accuracy/repeatability: Measurement subject: Standard Illuminant A; Ambient temperature: 23°C±2°C;
- Relative humidity: 65% or less
- Specifications and appearance subject to change without notice

## Optional Accessories for CS-2000

### Tripod 475B Manfrotto product

Very stable Tripod

*Item Order Code: B027801*



### Pan Head MA-400

Pan Head for Tripod 475B

*Item Order Code: 9970-1801*



### CS-A30 Storage Case

*Item Order Code: A0E3-600*

### CS-A33 ND-Filter 1/10

*Item Order Code: A0E3-702*

### CS-A34 ND-Filter 1/100

*Item Order Code: A0E3-703*

## CS-A35 Close-up lens

*Item Order Code: A0E3-704*

## CS-A36 Adapter for CCD Camera

*Item Order Code: A0E3-705*

## CS-A5 White Calibration Plate

*Item Order Code: 1890-705*

*(no calibration data)*

*Item Order Code: 1890-706*

*(with calibration data)*

*Item Order Code: 1890-707*

*(with calibration data and certificate)*

## Custom illuminance adapter incl. calibration data

*Item Order Code: A0E3-904*

## Custom attachment for luminous flux

*Item Order Code: A0E3-905*

## Custom attachment for luminous intensity

*Item Order Code: A0E3-906*

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