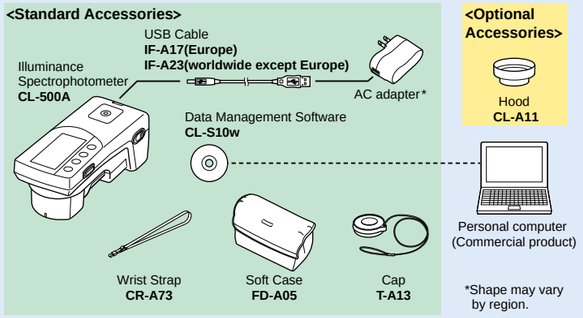
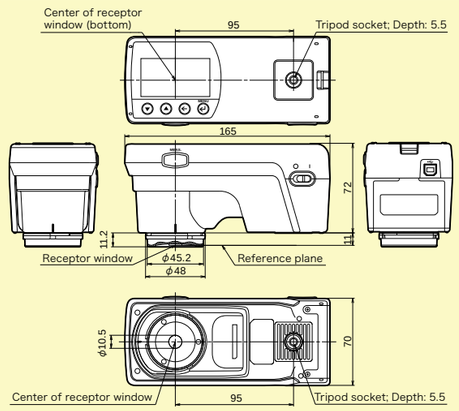
System diagram



Dimension diagram (Units: mm)



Main Specifications of CL-500A

Model	Illuminance Spectrophotometer CL-500A
Illuminance meter class	Conforms to requirements for Class AA of JIS C 1609-1: 2006 "Illuminance meters Part 1: General measuring instruments"*1 Conforms to DIN 5032 Part 7 Class B
Spectral wavelength range	360 to 780 nm
Output wavelength pitch	1 nm
Spectral bandwidth	Approx. 10 nm (half bandwidth)
Wavelength precision	±0.3 nm (Median wavelengths of 435.8 nm, 546.1 nm, and 585.3 nm*2 as specified in JIS Z 8724)*3
Measuring range	0.1 to 100,000 lx (chromaticity display requires 5 lx or more)
Accuracy*4, 5 (Standard Illuminant A)	E_v (Illuminance) : ±2%±1 digit of displayed value
	xy: ±0.0015 (10 to 100,000 lx) xy: ±0.002 (5 to 10 lx)
Repeatability (2σ) (Standard Illuminant A)	E_v: 0.5%+1 digit
	xy: 0.0005 (500 to 100,000 lx) xy: 0.001 (100 to 500 lx) xy: 0.002 (30 to 100 lx) xy: 0.004 (5 to 30 lx)
Visible-region relative spectral response characteristics (f_1')	Within 1.5% of spectral luminous efficiency V (λ)
Cosine response (f_2)	E_v: Within 3%
Temperature drift (f_T)	E_v: ±3% of displayed value; xy: ±0.003
Humidity drift (f_H)	E_v: ±3% of displayed value; xy: ±0.003
Measurement time	Super Fast mode: Approx. 0.2 sec. (when connected to computer); Fast mode: Approx. 0.5 sec.; Slow mode: Approx. 2.5 sec.; Automatic exposure time setting (high accurary) mode: Approx. 0.5 to 27 sec.
Display modes	XYZ; $X_{10}Y_{10}Z_{10}$; E_vxy; $E_vu'v'$; E_v; Dominant wavelength, Excitation purity; Correlated color temperature, Δuv; General color-rendering index (Ra); Special color-rendering indexes (Ri (i=1~15)); Spectral graph; Peak wavelength; Δ (XYZ); Δ ($X_{10}Y_{10}Z_{10}$); Δ (E_vxy); Δ ($E_vu'v'$); Rank display
Other functions	Data memory: 100 data; User calibration function (when connected to computer); Continuous measurement (when connected to computer); Auto off function
Display languages	English, Japanese, Chinese (Simplified)

Interface	USB 2.0
Power	Rechargeable internal lithium-ion battery (Operating time per charge: Approx. 6 hours when new); AC adapter; USB power bus
Operating temperature/humidity range	-10 to 40°C, relative humidity of 85% or less (at 35°C) with no condensation
Storage temperature/ humidity range	-10 to 45°C, relative humidity of 85% or less (at 35°C) with no condensation
Dimensions (W × D × H)	70 × 165 × 83 mm
Weight	350 g

*1 For Section 7.6.3 Response Time, when measurement speed mode is set to FAST mode.
*2 For 585.3 nm, evaluation performed using substitute wavelength of 587.5 nm.
*3 Based on Konica Minolta test standards (change in temperature of 2°C or less after zero calibration.)
*4 Automatic exposure time setting (high accuracy) mode
*5 Linear for E_v (Illuminance)

Main specifications of Data Management Software CL-S10w

Type	Add-in for Excel® (Excel® is required to use this add-in.)
Operating environment	One of the following environments with Excel® installed: * Languages in parenthesis ( ) are the OS language. Windows® XP + Excel® 2003 (English, Japanese, or Simplified Chinese) Windows® 7 + Excel® 2010 (English, Japanese, or Simplified Chinese) * For details on system requirements for above versions of Windows® and/or Excel®, refer to their respective specifications.
Compatible instruments	CL-500A, CL-200A, CL-200

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.

Certificate No : LRQ 0960094/A
Registration Date : March 3, 1995

Certificate No : JQA-E-80027
Registration Date : March 12, 1997

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9242-4876-13 BBMAPK ①

KONICA MINOLTA

Ideal for evaluating CRI (color rendering index)

NEW

Illuminance Spectrophotometer CL-500A

For evaluation of high-class next-generation lamps such as LED illumination and EL illumination

Giving Shape to Ideas

Use the CL-500A for CRI (color rendering index) evaluation!

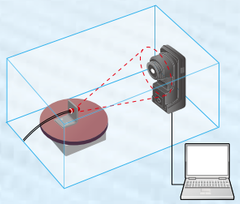
Illuminance measurements (JIS AA Class) also possible

Handheld illuminance spectrophotometer conforms to both DIN and JIS standards.

The CL-500A conforms to DIN 5032 Part 7 Class B and JIS C 1609-1:2006 General Class AA, making it the first compact, lightweight, handheld illuminance spectrophotometer to conform to both DIN and JIS standards.

Can be easily mounted on inspection jigs, etc.

The CL-500A is equipped with standard tripod sockets on both the top and bottom surface, so it can be easily mounted on a jig facing either downwards or upwards. In addition, the SDK for the CL-500A can be downloaded free of charge from the Konica Minolta website, making it easy for customers to create their own software.



The CL-500A can be a sensor for systems that use an integrating sphere for total flux measurements of light sources and lamps.

Compact, light-weight, handheld

The CL-500A weighs only 350g, making it easy to take along or to hold in your hand for measurements.

All-in-one type. No PC needed.

The CL-500A can be used by itself for measuring CRI or color temperature of lamps. In addition, the spectral irradiance waveform and peak wavelength can also be checked.

High-speed measurement possible

Using the SDK, high-speed measurements at 5 times/ sec. can be taken.

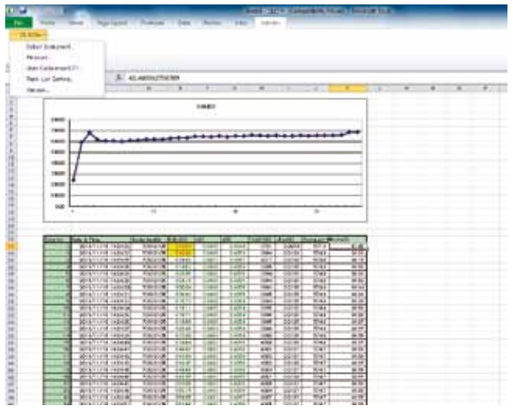
Can be operated with USB bus power.

Ø10.5 mm receptor size

Includes Excel® add-in software as standard accessory.

Convenient, easy-to-use Excel® add-in software

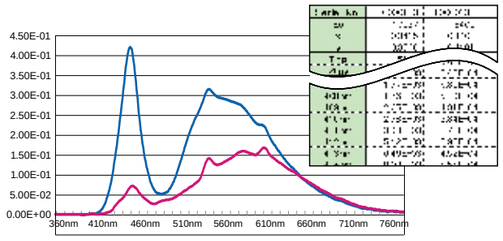
Reads measurement data from the CL-500A directly into Excel®. Further processing of data can then be performed easily using the various functions of Excel®.



Data Management Software CL-S10w (Standard accessory)

Spectral irradiance waveform display

Since peak wavelengths can be seen easily, classification and grading of light sources can be performed easily at high accuracy. In addition, numerical data at 1 nm can also be viewed in list form.

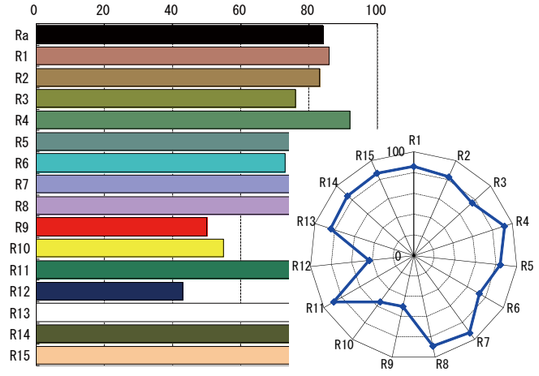


Multi-point measurement possible using multiple CL-500A units

Data Management Software CL-S10w can be used to control up to 10 CL-500A units for multi-point measurements. Using the SDK, this can be further expanded. Please contact our sales person for further information.

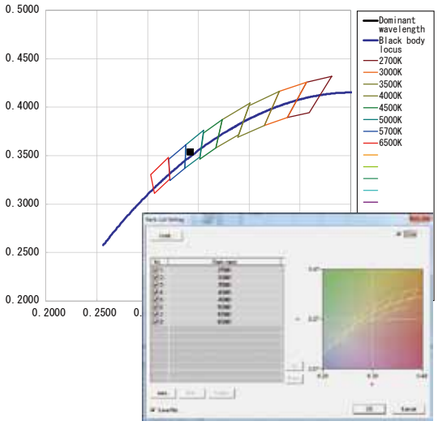
Informative color-rendering index display

Color-rendering indexes are shown visually for easy understanding. The shifts between a test light source and a standard light source can be seen at a glance, with bar graphs showing the general color-rendering index Ra (the average of special color-rendering indexes R1 to R8) and the special color-rendering indexes for a total of 15 colors (R1 to R15).



Equipped with LED binning function

In addition to quantifying the color variations which are a major problem in the LED industry, the software is also equipped with function to enable easy binning.



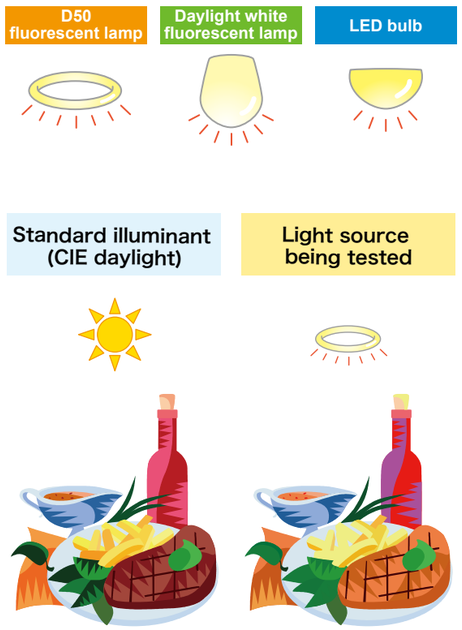
What is color-rendering property?

Since long ago, man has compared colors by arranging objects side-by-side and looking at them under natural light (sunlight). Although torches, candles, incandescent lamps and other light sources are also used for illumination, it has always been the standard practice to compare colors under natural light.

In addition to fluorescent lamps, LEDs (light emitting diodes) have recently been adopted as illuminating lamps. When comparing how these new types of lamps make objects look against how natural light makes them look, how closely the appearances match is called the “color-rendering property” of the lamp. A lamp that produces a hue similar to that of natural light is said to have a good (high) color-rendering property.

The color-rendering index is a quantification of the color-rendering properties of a lamp or other light source, and was defined to provide objective criteria. The color-rendering index expresses the comparison between the light source being tested and a standard illuminant*. The maximum value is 100, with the value decreasing as the color-rendering difference increases, indicating how far the appearance under the test light source is from the natural color under sunlight.

* Standard illuminant with the same color temperature as the light source being tested. (Light along the blackbody locus corresponds to sunlight.)



Color-rendering indexes include the general color rendering index (Ra) and special color-rendering indexes (R1 to R15)

Test - color samples

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Red	Yellow	Green	Blue	Average Caucasian skin color	Tree-leave green	Average Asian skin color	

The general color-rendering index uses low-chroma colors with a Munsell Value of 6 and Chroma between 4 and 8.

No. 9 to No. 15 are realistic colors. No. 15 is the average skin color of Asian women.

Smaller index values indicate larger color shifts.

General color-rendering index (Ra)	The average of the color-rendering indexes for test colors No. 1 to 8.
Special color-rendering indexes (Ri)	The individual color-rendering index for test colors No. 1 to 15 (The index for each individual color is evaluated.)

To learn more about the theory and practice of light and color measurement, please visit
http://www.konicaminolta.com/instruments/knowledge/index.html

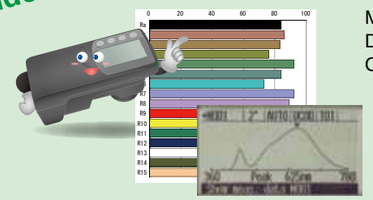
Konica Minolta Measurement Fundamentals

Konica Minolta Sensing's Illuminance Measurement Trio

Konica Minolta Sensing's line of instruments for measuring illuminance includes not only the new CL-500A that can measure color-rendering properties, but also the Illuminance Meter T-10A which can measure PWM-controlled light sources and the Chroma Meter CL-200A which can measure color temperature.

Measures color-rendering properties

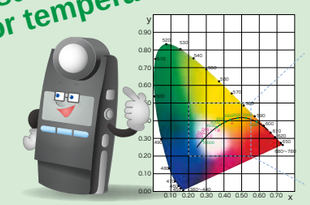
Illuminance Spectrophotometer CL-500A - The newest addition



Measures color-rendering properties as well as illumination.
Displays spectral waveform using included CL-S10w software.
Conforms to DIN and JIS standards.

Measures color temperature

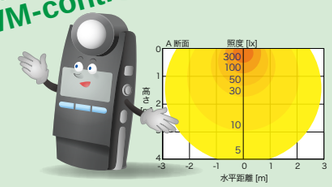
Chroma Meter CL-200A



A de facto industry standard for color-temperature measurement. Can also perform illuminance measurements (JIS AA Class).
Compact and lightweight with removable receptor connectable with extension cables.
Includes simple, convenient PC software as standard accessory.

Illuminance meter that can handle PWM-controlled lighting

Illuminance Meter T-10A



Conforms to DIN Class B and JIS AA Class. An illuminance meter capable of accurately measuring next-generation lamps including PWM-controlled lighting.
Multiple receptors can be used for easy, low-priced, multi-point measurement.
A miniature receptor T-10MA is also available for easily measuring illuminance in narrow spaces.

Illuminance-modified Spectroradiometer CS-2000A

Measurements of spectral irradiance are made possible by using the illuminance adapter. This makes it ideal for illuminance evaluation of projectors and LED or EL lighting.
This single instrument can be used for measuring both spectral radiance and spectral irradiance.
Our top-of-the-line CS-2000 is used for measuring various types of high-definition displays, and received the 13th Advanced Display of the Year 2008 Grand Prize in the Display Testing Equipment Category.

Spectral bandwidth: 5 nm or less (half bandwidth)
Measurable illuminance range:
1° measuring angle: 0.01 to 75,000 lx
0.1° measuring angle: 1.00 to 7,500,000 lx

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