KONICA MINOLTA

NEW

2D Color Analyzer CA-2000

CA-2000S (with standard lens)
CA-2000W (with wide lens)
CA-2000T (with telephoto lens)
CA-2000SW (with standard & wide lenses)
CA-2000ST (with standard & telephoto lenses)
CA-2000WT (with wide & telephoto lenses)
CA-2000A (with all lenses)

Easy evaluation of displays using high-resolution data !!

2D Color Analyzer for quick, accurate measurement of luminance and chromaticity distribution

The essentials of imaging

Hardware

CA-2000

2D Color Analyzer for quick, accurate measurement of luminance and chromaticity distribution

The CA-2000 2D Color Analyzer incorporates XYZ filters and a high-resolution CCD to offer sensitivity closely matching that of the human eye. This allows accurate 2D measurement of the luminance and chromaticity distribution of FPDs, projectors, and backlights with high-resolution data. User-friendly, included software enables quick and efficient measurement, data analysis, and evaluation with easy operation. This combination is a powerful tool for development evaluation or inspection.

Sensor with XYZ filters offers high correlation to the sensitivity of the human eye

The instrument features a sensor with XYZ filters to offer spectral response that correlates closely with the CIE1931 color-matching functions, instead of the RGB color-separation filters used in digital cameras or color CCD cameras. This ensures luminance/chromaticity measurements that correlate well with evaluation by human eyes.

High-resolution one-million-pixel CCD

Provides approximately 25 times higher resolution compared with the Konica Minolta CA-1500, our previous model (200 x 200 = 40,000 pixels).

Interchangeable lenses for measurements of various objects

The instrument can be used for various applications by selecting the optimum lens from standard, wide-angle and telephoto lenses (plus two types of macro rings for telephoto lens) according to the size of the object.

Individual lens calibration using multiple focal points

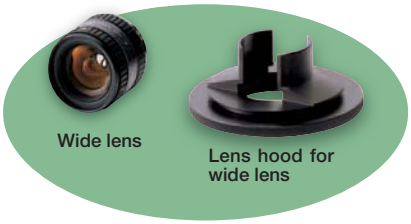
Each lens is individually calibrated for the sensitivity fluctuations caused by sensors, optical filters and the lens itself, using multiple focal points. Accurate measurement of luminance and chromaticity distribution can be started immediately after purchase.

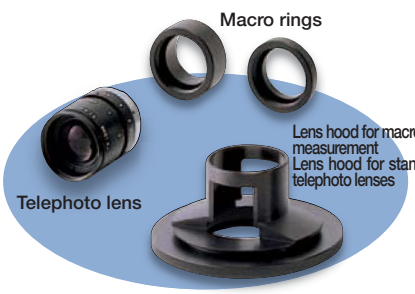
Easy operation with included software

Other functions

- Synchronized measurement is available by numerical input of the sync frequency for the subject display device. (Settable range: 4 to 2,000 Hz)
- Integration of a maximum of 256 measurements ensures accurate measurements of even low luminance.
- User calibration for luminance and chromaticity.
- Backlight cancel function compensates for the effect of backlight variations when performing evaluation.

Compact & lightweight design enables easy setup anywhere!





Model with wide lens

Telephoto Model with telephoto lens

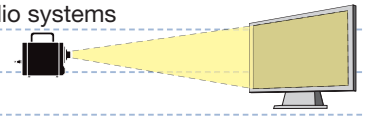
Model with standard lens

Major applications

Standard lens

Versatile for measuring medium- to large-size displays.

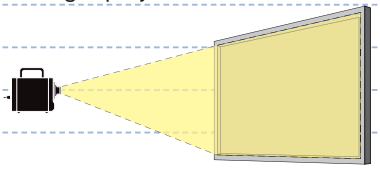
- LCD TVs, monitors, PDP, Projectors
- Automotive instrument panels
- Car navigation systems
- Car audio systems



Wide lens

Short-distance measurement of larger displays

- Large-screen TVs
- Short-focal-length projectors



Telephoto lens

Small displays or long-distance measurement

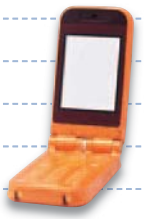
Measurements with reduced influence from the angular characteristics of subjects

- Backlights
- Automotive taillights
- Outdoor-type large displays

Low magnification macro ring (Macro 1) / High magnification macro ring (Macro 2)

Close-up measurements of small areas

- Small LCDs, organic ELs and LEDs of mobile phones and digital cameras



Measurable object size with typical measurement distances

Measurable object size (length of a side of a square)

Distance	Standard lens
250 mm	Approx. 98 mm
500 mm	Approx. 210 mm
1,000 mm	Approx. 440 mm
2,000 mm	Approx. 890 mm

(Reference size)
LCD TV: 13V-inch: Approx. 260 mm (W); 32V-inch: Approx. 700 mm (W)

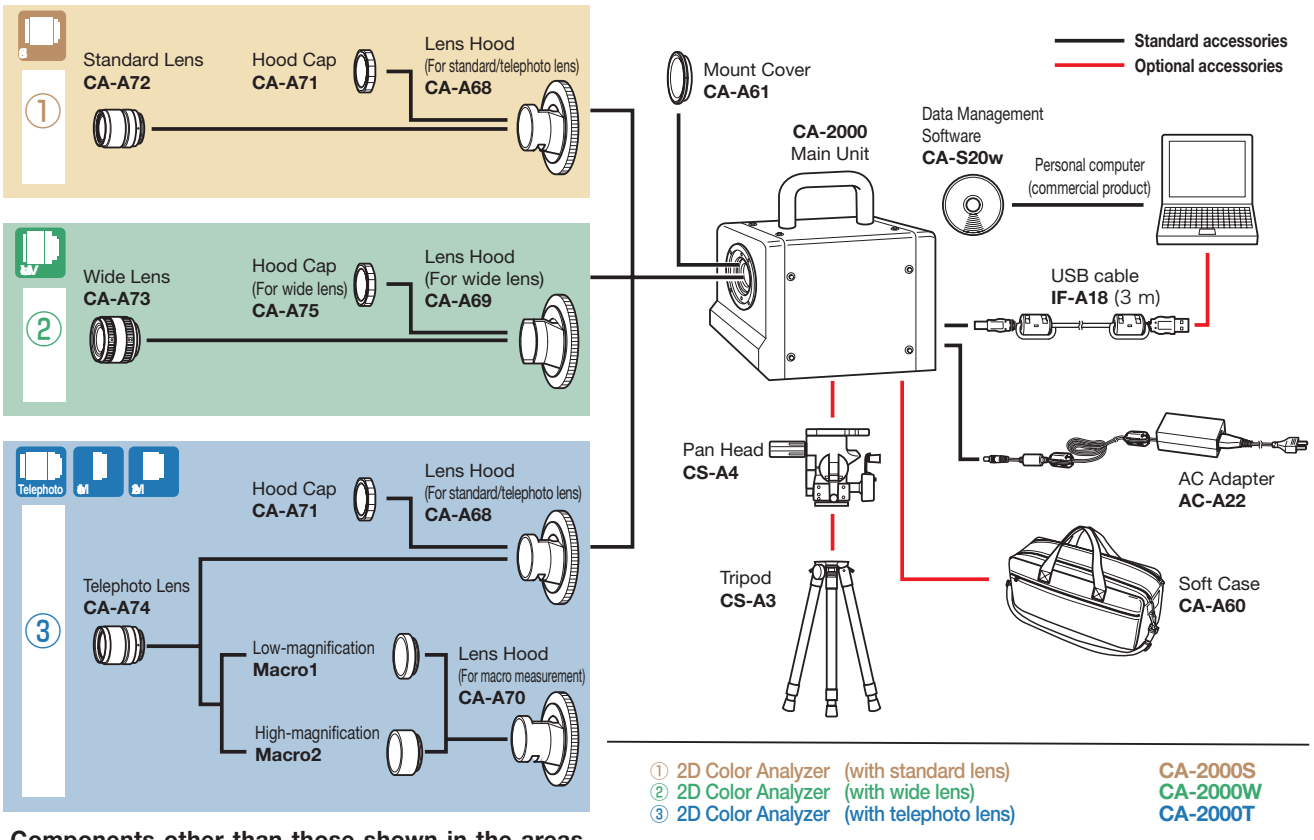
Distance	Wide lens
200 mm	Approx. 145 mm
500 mm	Approx. 410 mm
1,000 mm	Approx. 850 mm
2,000 mm	Approx. 1,770 mm

(Reference size)
PDP TV: 37V-inch: Approx. 820 mm (W); 65V-inch: Approx. 1,440 mm (W)

* The size may vary depending on the measurement distance except when using a macro ring

Distance	Telephoto lens
300 mm	With high-magnification macro ring (Macro2) Approx. 27 mm
500 mm	With low-magnification macro ring (Macro1) Approx. 57 mm
900 mm	Approx. 115 mm
2,000 mm	Approx. 275 mm
3,000 mm	Approx. 420 mm

System Configuration



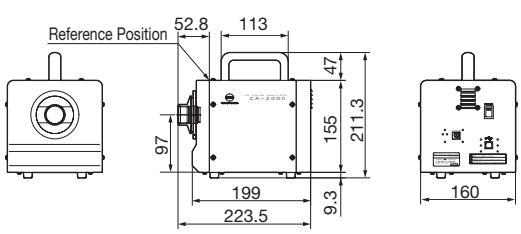
Components other than those shown in the areas shaded ■ ■ ■ are common for all packages.

* Each lens comes with a lens cap, mount cap, and calibration data DVD.

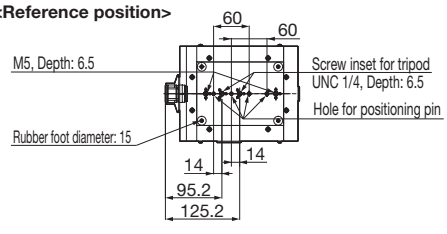
① 2D Color Analyzer (with standard lens)	CA-2000S
② 2D Color Analyzer (with wide lens)	CA-2000W
③ 2D Color Analyzer (with telephoto lens)	CA-2000T
Combination of ① and ② (with standard and wide lenses)	CA-2000SW
Combination of ① and ③ (with standard and telephoto lenses)	CA-2000ST
Combination of ② and ③ (with wide and telephoto lenses)	CA-2000WT
Combination of ①, ② and ③ (with all lenses)	CA-2000A

Dimensions (Unit: mm)

*When standard lens and lenshood are attached



<Reference position>



Software

CA-S20w

Data Management Software CA-S20w (included as a standard accessory)

allows easy operation and significantly shorter working time between measurement and evaluation!

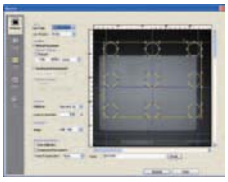
Using this software enables the control of the instrument from a PC for operations such as displaying sample data in various graphs or lists, or sending data to Excel®. This allows quick management, analysis, and evaluation of data, helping research/development, design, and inspection.

Step 1

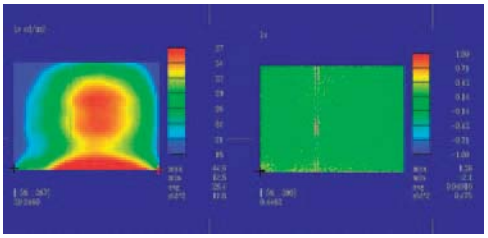
Setting and measurement

Simple setting of measurement area

Measurement area can be easily adjusted while watching the viewfinder image in the screen, without moving the CA-2000.



* Image shows measurement screen and finder view.



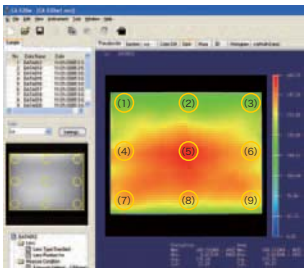
Enhanced nonuniformity display
Spots or streaks of nonuniformity can be enhanced for easier identification of defects.

* The screen shows examples of the pseudocolor display (left) and enhanced nonuniformity display (right) when a display showing streaks of nonuniformity is measured.

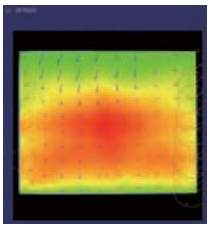
Step 2

Data analysis Screens suitable for the application can be created and saved.

A basic screen for data analysis is provided initially, and can be used immediately after purchase. The screen layout can be changed as necessary with various graphs and data displays, and user-defined layouts can also be saved as templates.



* Image shows screen example of 9-spot measurement.



Color difference display
Graphical display of color difference

* Image shows screen example of 100-spot color difference measurement.

Pseudocolor display
For observation of luminance and chromaticity distribution

Chromaticity diagram display
Clearly shows the variations in chromaticity.

Spot display
Measures multiple spots of user-defined size and quantity, with the measurement values for each spot determined by averaging the area within the spot.

3D graph display
Displays data in a 3D solid for easier understanding of overall conditions.

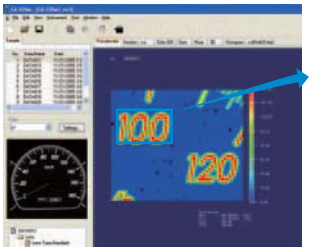
Histogram display
Displays a histogram (frequency distribution) to make it easier to observe variations in luminance and chromaticity.

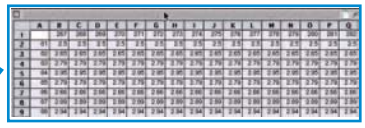
* The figure on the left shows a sample display of spot measurement using spots 1 through 9.

Step 3

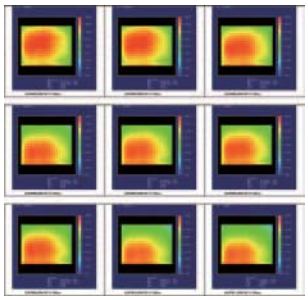
Evaluation and reporting Data transfer to Excel®

The data in a specified range can be transferred to Microsoft Excel®.
Copying and pasting graphs facilitates preparation of reports.

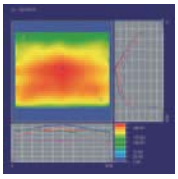




* Excel® is a trademark of Microsoft Corporation in the USA and other countries.



Multi-screen display
Thumbnails of various graphs can be displayed and compared.



Cross-section display
The horizontal and vertical cross-sections at the cursor position can be displayed.

Main Specifications CA-2000

Model		CA-2000S	CA-2000W	CA-2000T		
Light receptor		CCD image sensor (monochrome); 2/3-inch; Effective number of pixels: 1,000 x 1,000 pixels; Equipped with XYZ filter (closely matches CIE 1931 color-matching function) and ND filter				
Lens		Interchangeable Standard, wide, and telephoto lenses; low-magnification and high-magnification macro rings (for use with telephoto lens)				
Measurement points (Resolution)		980 x 980 (Available to select 490 x 490 or 196 x 196 by using Data Management Software CA-S20w)				
Color indication modes		XYZ, $L_v$xy, L_vu'v', TΔuv, Dominant wavelength, Excitation purity, L_v contrast				
Display modes		Pseudocolor, RGB image, Chromaticity diagram, Spot, 3D graph, Histgram, Nonuniformity enhancement, Cross section, Color difference, Multi-screen				
Measurement sizes (length per side of square) (*1)		Standard lens	Wide lens	Telephoto lens	With low-magnification macro ring	With high-magnification macro ring
		Approx. 98 mm or more (depending on the distance)	Approx. 145 mm or more (depending on the distance)	Approx. 115 mm or more (depending on the distance)	Approx. 57mm (Fixed)	Approx. 27mm (Fixed)
Measurable size for typical measurement distances (size/distance)		98 mm / 250 mm mm Approx.	145 mm / 200 mm Approx.	115 mm / 900 mm Approx.	57 mm / 500 mm Approx. (Fixed)	27 mm / 300 mm Approx. (Fixed)
		210 mm / 500 mm Approx.	410 mm / 500 mm Approx.	275 mm / 2,000 mm Approx.		
		440 mm / 1,000 mm Approx.	850 mm / 1,000 mm Approx.	420 mm / 3,000 mm Approx.		
		890 mm / 2,000 mm Approx.	1,770 mm/ 2,000 mm Approx.			
Measurement luminance range (including ND filter use)		0.1 - 100,000 cd/m²	0.1 - 100,000 cd/m²	0.5 - 100,000 cd/m²	0.5 - 100,000 cd/m²	1 - 100,000 cd/m²
Measurement time (*2)		Single : Approx. 5 sec. or more; 4-time integration: Approx. 6 sec. or more; 16-time integration: Approx. 10 sec. or more; 64-time integration : Approx. 28 sec. or more; 256-time integration : Approx. 98 sec. or more				
Accuracy (*3)	Luminance	±3 %	±3 %	±3 %	±3 %	±3 %
	Chromaticity	±0.005	±0.005	±0.005	±0.005	±0.005
		Temperature/humidity drift (within the operating temperature/humidity range) Luminance: ±2% of change compared to reference temperature and relative humidity of 23°C and 40% Chromaticity: ±0.004 of change compared to reference temperature and relative humidity of 23°C and 40%				
Repeatability (*4)	Luminance	0.5 %	0.5 %	0.5 %	0.5 %	0.5 %
	Chromaticity	0.001	0.001	0.001	0.001	0.001
Inter-point error (*5)	Luminance (*6)	±2 %	±2 %	±2 %	±2 %	±2 %
	Chromaticity (*6)	±0.002	±0.002	±0.002	±0.002	±0.002
	Luminance (*7)	±3 %	±3 %	±3 %	±3 %	±3 %
	Chromaticity (*7)	±0.003	±0.003	±0.003	±0.003	±0.003
Other functions		Interval measurement, Measurement sync (Synchronization frequency selectable), Integration function, Enhanced nonuniformity display, Conversion of enhanced nonuniformity image into numerical values (statistical values, etc.), Pixel binning function				
Interface		USB 2.0 or higher				
Operating temperature and humidity range (*8)		10-30°C, Relative humidity 70% or less/No condensation				
Storage temperature and humidity range (*8)		0-30°C, Relative humidity 70% or less/No condensation, 30-35°C, Relative humidity 55% or less/No condensation				
Size	Body only	160 (W) 164 (H) 199 (D) mm (Height including handle: 211 mm)				
	When lens and lens hood are attached	224 (D) mm	219 (D) mm	224 (D) mm	230 (D) mm	237 (D) mm
Weight		3.5 kg approx. (when standard lens and lens hood are attached)				
Power source		AC adapter 100-240 V ∼ , 1.2 A, 50-60 Hz				
Standard accessories	Lens Hood	CA-A68	CA-A69	CA-A68	CA-A70	
	Hood Cap	CA-A71	CA-A75	CA-A71		
	Calibration data DVD	Included with each lens.				
	Other	Mount Cover CA-A61, AC Adapter AC-A22, AC cable, USB Cable IF-A18, Data Management Software CA-S20w				
Optional accessories		Soft Case CA-A60, Tripod CS-A3, Pan Head CS-A4, Calibration certificate				

*1: Error in angle of view: 7%

*2: Measurement time differs depending on brightness of measurement object, PC performance, and data processing contents.
The specifications above were obtained under Konica Minolta's measurement conditions shown below:
PC's CPU : Pentium 4, 2.8GHz
Data processing : Pseudocolor display of luminance data
Resolution : 490 x 490
Shutter speed : Y measurement : 1/64 sec., XZ measurement : 1/32 sec.
Measurement subject brightness: Standard/wide lens: Approx. 80 cd/m², Telephoto lens: Approx. 300 cd/m²
Low-magnification macro ring and telephoto lens: Approx. 400 cd/m²,
High-magnification macro ring and telephoto lens: Approx. 600 cd/m²
* The measurement time becomes longer when the object is dark. The longest measurement time is approx. 10 seconds with 1-time integration, approx. 27 seconds with 4-time integration, approx. 95 seconds with 16-time integration, approx. 6 minutes and 8 seconds with 64-time integration and approx. 24 minutes and 19 seconds with 256-time integration

*3: The specifications above were obtained under Konica Minolta's measurement conditions shown below:
Measurement subject brightness: Standard/wide lens: Approx. 35 cd/m², Telephoto lens: Approx. 140 cd/ m²
Low-magnification macro ring and telephoto lens: Approx. 250 cd/m²,
High-magnification macro ring and telephoto lens: Approx. 250 cd/m²
Distance: Minimum distance of each lens, Evaluation: Based on the average obtained within 10% range at the center of the screen, Temperature: 23°C±2°C, Relative humidity: 40%±10%, Measuring light: White, reference light source, Integration: 64 times (Normal mode)

*4: The specifications above were obtained under Konica Minolta's measurement conditions shown below:
Resolution: 196 x 196, Shutter speed: Y measurement: 1/64 sec., XZ measurement: 1/32 sec. Gain: Normal (x1), Light intensity level: Midpoint of appropriate light intensity range, Evaluation: Based on the maximum repeatability (2 σ) of all pixels, Temperature: 23°C±2°C, Relative humidity: 40%±10%, Measurement subject: White, reference light source, Integration: 64 times (Normal mode)

*5: The specifications above were obtained under Konica Minolta's measurement conditions shown below:
Measurement subject brightness: Standard/wide lens: Approx. 40 cd/m², Telephoto lens: Approx. 160 cd/m²
Low-magnification macro ring and telephoto lens: Approx. 200 cd/m²,
High-magnification macro ring and telephoto lens: Approx. 350 cd/m²
Distance: Calibration distance of each lens, Resolution: 196 x 196
Evaluation (*6) : Based on the maximum/minimum values obtained in a square at the center of the screen measuring 60% of the height and width of the entire screen
(*7) : Based on the maximum/minimum values obtained in the entire screen
Temperature: 23°C±2°C, Relative humidity: 40%±10%, Measurement subject: White, reference light source, Integration: 64 times (Normal mode)

*8: Even if the instrument is stored within the specified usage (or storage) temperature humidity range, the displayed value may change depending on long-period usage or storage conditions.

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.

CA-S20w System Requirements

OS	Windows® XP Professional SP2 (Japanese, English, and Hangul versions)
	Windows® XP Professional x 64 Edition (Japanese, English versions)
CPU	Pentium® 4 2.8 GHz equivalent or higher
Memory	1024 MB or more
Hard Disk	Needs free space of 80 MB at least on system drive (where OS is installed)
	In addition, each lens needs the following free spaces for installing calibration data.
	For standard lens: approx. 540 MB
	For wide lens: approx. 470 MB
	For telephoto lens: approx. 1.3 GB
	Also to save measurement data on hard disk, additional free space is required.
	(approx. 11 GB minimum for 1000 measurement data in resolution of 980 x 980)
Display	Display capable of at least 1280 x 1024 dots/65,536 colors (High color, 16 bit) .
Others	CD-ROM drive (necessary to install software)
	DVD-ROM drive (necessary to install calibration data)
	(A combination drive capable of reading both CD-R and DVD-R media can be used in place of the above 2 drives.)
	USB port: USB ver. 2.0; Type A connector; For connecting measuring instrument
	Excel® 2003 (Necessary for continuous measurements using automation)

The specifications and drawings given here are subject to change without prior notice.
- If you have any questions about specifications, please contact your Konica Minolta representative.
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Certificate No : YKA 0937154
Registration Date : March 3, 1995

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

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http://konicaminolta.com/about/se/contact.html

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