

SPECTRORADIOMETER CS-1000A (STANDARD MODEL) CS-10005 (SMALL MEASURING AREA MODEL) (SMALL MEASURING ANGLE MODEL)

The essentials of imaging

www.minolta.com

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Minolta manufactures

reliable optical lens

via integrated

production system



starting from R&D and melting glass to the final production.





High Performance Spectroradiometer

With the increased emphasis on ISO 9001, product quality has become a focal point in many companies. At the same time, in-house production departments are requiring systems that calibrate their measurement instruments. The CS-1000 Spectroradiometer supports these activities.

High-Speed

- Use of polychromator enables high-speed measurements. ^{\$1}
- Fast measurement for the low luminance target. 22
- I Measurement speed varies depending on the luminance of the light

source. ⇒2 Fast Mode

High-Accuracy

- Repeatability of 0.1%+1digit for Luminance, 0.0002 for Chromaticity.
- ⇒3 Nomal Mode. The other measurement conditions : based on Minolta standard test method.
- Measurements can be synchronized with a display device.
- Low polarization error-ideal for measuring LCD's.
- Aperture mirror eliminates misalignment between the finder target and actual measuring spot.

Low Luminance

- Specifications are guaranteed even at 0.5cd/m²
- Sensor cooling improves S/N ratio, enabling measurement of lowluminance subjects.



Measurement area

Measurement Principle

Light energy passes through the objective lens. The light from the measurement area passes through the hole in the center of the aperture mirror, while the remaining light is guided to the finder optics by the aperture mirror. As a result, the part equivalent to the measurement area looks like a black circle when observed through the finder. The light entering the optic fiber is reflected continuously so that, it is mixed and becomes virtually uniform. It then passes through the collimator lens to the plane diffraction grating. After being dispersed by the grating, the light is focused by the condensor lens according to wavelength. An array sensor is located at the focal plane. (This type of spectral separation geometry is called a polychrometer.) The amount of detected energy for each wavelength is then converted to a digital value by a 16-bit A/D converter. The spectral radiant intensity and chromaticity are calculated by the processing section of the instrument.

Display Examples





Standard Lens. Macro Lends, Small Measuring Area Lens Small Measuring Angle Lens



3 Different Models for the various applications

3 different optics achieved precise measurement for the various applications. Optical design technique is developed under the photographic camera engineering.

Standard Model CS-1000A

Measuring area : 1.15mm~ (with macro lens) Measuring angle :1° Measuring distance : 20cm~ (with macro lens) <Applications> General application for the medium or large measuring size Display monitor such as LCD, CRT and EL. Illumination light source and lamps.





Small Measuring Area Model CS-1000S

Measuring area : 0.45mm (by 3 times zoom) ~1.10mm (by 1 time zoom) Measuring distance : 26.5mm (by 3 times zoom)

~42.0mm (by 1 time zoom) (distance from front end the lens)

<Applications>

Very small measuring size.

- Car audio indication lamp
- Indicator panel of the vehicle







Small Measuring Angle Model CS-1000T

Measuring aarea Measuring angle

: 1.2mm~ : 0.14° (in the minimum distance 258mm) (Measuring angle depends on measuring distance) Measuring distance : 258mm~ (distance from front end of the lens) <Applications> Small measuring size with distance

- Small LCD
- Small reflective LCD (Low luminance) (Illumination lamp can be installed
- between the CS-1000 and target)





Standard Accessory

Data Processing Software CS-S1w

Data management software CS-S1w controls CS-1000 through PC and displays measured data in numerical and graphical form. It comes with CS-1000 as the standard accessory. It assists the measurement work with powerful functions such as user calibration, mathematical processing, interval measurement, average measurement and data transfer to the spread sheet software.

- Trimed Measurements :
- Interval measurement, Averaged measurement

Display : XYZ, Lvxy, Lvuv, Lv'u'v', T uv, Le,

- dominant wavelength, stimulus purity
- Display Functions
- Display of spectral graph, Display of color space graph
- Calculation Functions Mathematical operations between spectral data

Mathematical operations between spectral data and numerical values Processing of spectral data

- Computed data can be processed in the same way as measured data. ■ Data Memory :
- Measured data : 500; Reference data : 10 Data Output
 - Can be exported to Microsoft Excel and Lotus 1-2-3.

Measuring Data Display



E. Spe	ctral Data [Spect	al Radiance]			10
WL	+0	•1	•2	+3	
Unit	W/[sr m ² mm]	W/[srafina]	W/[sr m* run]	W/[sr m ² rm]	W/[scm ² nm]
380	1.153E-04	1.204E-04	1.265E-04	1.340E-04	1.4325-04
385	1.487E-04	1.602E-04	1.720E-04	1.816E-04	1.963E-04
390	2.141E-04	2.331E-04	2.476E-04	2.6558-04	2.868E-04
395	3.0686-04	3.301E-04	3.540E-04	3.817E-04	4.0905-04
400	4.3462-04	4.552E-04	4.928E-04	5.277E-04	5.7625-04
405	6.175E-04	6.582E-04	6.952E-04	7.401E-04	7.803E-04
410	8.207E-04	8.594E-04	8.971E-04	9.307E-04	9.7125-04
415	1.015E-03	1.060E-03	1.115E-03	1.177E-03	1.240E-03
420	1.2996-03	1.3586-03	1.421E-03	1.478E-03	1.542E-03
425	1.6136-03	1.687E-03	1.771E-03	1.868E-03	1.956E-03
430	2.041E-03	2.120E-83	2.204E-03	2.291E-03	2.391E-03
435	2.506E-03	2.635E-03	2.768E-03	2.8995-03	3.026E-03
440	3.147E-03	3.2555.03	3.304E-03	3.5021-03	3.6296-03
445	3.761E-03	3.892E-03	4.033E-03	4.174E-03	4.316E-03
450	4.460E-03	4.597E-03	4.718E-03	4.849E-03	4.976E-03
455	5.101E-03	5.2390-03	5.375E-03	5.4968-03	5.6162-03
460	5.7268.03	5.9005.03	5.8775.03	5.540E.00	6.0005.03





Spectral Graph

Chromaticity Diagram



Colorimetric Data

an Geerall	Couler		-1012	d In Spe	ctral Graph [Rela	tive Spectral Distr	fation]		10
No	1	X	2.402E+02		(%)				
Data	Sample	Y	2.624E+02		100-		-		2,300000
Date	1997/02/01	2	3.007E+02						
Time	12:00:00 AM	LV	2.624E+02						
Cmnt.	Sample data	Lo	9.830E-01		80-				
I.T.	AUTO(NORMAL) 3.367(s)	- Contraction			21225				
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Cal		y	0.3267						
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Colorm	etric Light-Source Color Observ	er: 2' Int	ensity Units cd/i	ñ	400	500	600	700	
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0.4				395	3.068E-04	3.301E-04	3.540E-04	3.817E-04	4.1
0.5		02		400	4.345E-04	4.652E-04	4.528E-04	5.277E-04	5.7
			60	405	6.175E-04	6.582E-04	6.952E-04	7.401E-04	7.1
		0-	(4)	410	8.207E-04	8.534E-04	0.9/1E-04	3.397E-04	3.
				415	1 0155 01	1.0006-03	1 1157 03	11776-01	



User-Calibration

00	WL.	Relerence Data	-	0
	300	2.367E-05		Open
	301	2.341254E-05	п	Carro
	382	2.3100096-05		9464
	383	2.238935E-05		
	384	2.235696E-05		Cale
	385	2.279961E-05	11	Calc.
	386	2.233396E-05		1.4
	387	2.23767E-05		CON
	380	2.332445E-US	11	
	309	2.365398E-05		
500 600 700	390	2.376812E-05		
Inten	C 11V	10000107-07	110	
Intern	~ P.E	2.zhošit-os	i h	
	393	2.365719E-05	1.1	

Calculation



Interval Measurement

ile Name for Saving Data	
	Browse
Interval Time 00:01:30 (ht:mm:ss)	Start
No. of Measurements	Cancel
10 (Times)	

Average Measurement



Transferring data to Worksheet Programs

@Pikread	Elect-Stek1						
100	n jime yunt r	ALAN 2000 DES 1	Grate Date				1.00
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13	430	2.01E-03	2. 25-00	2 206-00	2.296-00	2.396-03	
14	4:6	251E03	2.646-03	27/608	2306-08	31036-03	
15	4.50	7.198-00	3.276-03	3.306-03	3 506-03	2.696-03	
36	4.65	3.768 03	3.896 03	+.036 03	 *E CO 	+ 32E 03	6 - B
17	430	× 407-m	4 MAC-00	4.72°-M	4 07Z-00	- x 90°-m	
18	406	6. 0E-03	5.21E-00	6.38E-03	5.50E-03	6.62E-03	
75	4647	5735-03	SBIERR	5 KHE-03	5.94E-03	6 UUE-U	
20	465	6.068-00	6.1E-00	6.00.00	6.206-00	6,2%6-00	
21	470	6.26E.03	6.252 03	6.268.03	6.228 03	6,200,03	8 9
22	475	6.37-00	6:10-00	6.007-00	5.997-00	6.90°-m	
23	480	6.81E-03	6,766-03	6.66E-03	5.56E-03	6.46E-03	
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System Requirement

PC Type : PC/AT compatible, or NEC PC-98 compatible CPU : Pentium 100MHz or higher Memory : 16MB or mjore CRT: 800 X 600 to 1024 X 768 resolution OS MS-DOS + Windows[®] 3.1 / 95 / 2000

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

Specifications

Model CS-1000A		CS-1000S		CS-1000T				
Wavelength range	380 to 78	0nm						
Spectral bandwidth	5nm							
Wavelength resolution	0.9nm/pi>							
Display wavelength bandwidth	ilay wavelength bandwidth 1nm							
Spectral accuracy	±0.3nm(Hg lamp/Mean wavelength)							
Acceptance angle	1° (standard and macro lens) (standard lens : 1°) 0.14° (standard lens : 1°)							
Display	Lvxy, ΔLvxy, Lvu'v', ΔLvu'v', LvTDΔuv, Le (Observer can be switched between 2° and 10°)							
Data memory	Measurement data : 30 sets, Target data : 20 sets							
Minimum manauring distance	450mm (standard lens),		26.5mm*1,		500mm,			
winimum measuring distance	200mm (macro lens)		(standard lens : 450mm)		(standard lens : 450mm)			
Minimum measuring area	Vinimum measuring area 7.9mm (standard lens), 1.15mm (macro lens)			s : 7.9mm)	1.2mm, (standard lens : 7.9mm)			
Luminance display range	0.01 to 80000cd/m ² (for Illuminant A)							
Accuracy (for Illuminant A, Normal Mode)	±2%±1dig x : ±0.001 y : ±0.001	git, 15, 1		/ Luminance range				
	Normal Mode	0.1%+1digit, xy : 0.0002		Standard lens : 1 to 8000cd/m ² Other lens : 10 to 80000cd/m ²				
Popostability (a)	Fast Mode	0.1%+1dig xy : 0.0004	it,					
(for Illuminant A)	Normal Mode	0.1%+1digit, xy : 0.0003		Cuminance range Standard lens : 0.5 to 1cd/m ² Other lens : 5 to 10 cd/m ²				
	Fast Mode	0.1%+1digit, xy : 0.0006						
Polarisation error	Less thar	5% (400nn	n to 780nm)					
Integration time *2	Fast: 40r	msec to 15s	ec, Normal :	40msec to	o 60sec			
Power	AC 100V	/120V/230V	50/60Hz (us	sing AC ad	lapter AC-A12)			
Operating environment	Temperature : 5 to $35^{\circ}C$ (41 to $95^{\circ}F$) ; relative humidity 80% or less (at $35^{\circ}C$ / $95^{\circ}F$) with no condensation, Installation category : II, Pollution degree : 2							
Storage temperature range	0 to 45°C (32 to 113°F) ; relative humidity 80% or less (at 35°C / 95°F) with no condensation							
Interface	RS-232C							
Size (body)	146 × 148	3 × 256mm ((5-3/4 × 5-13	3/16 × 10-1	/16 in.)			
Weight	4.7kg (10 (with star	.38 lb.) ndard lens)	5.9kg (13.01 lb.) (with small measuring area lens)		5.8kg (12.79 IB.) (with small measuring angle lens)			
	Standard Lens, S Macro Lens, S		Standard Lens, Small Measuring Area Lens,		Standard Lens, Small Measuring Angle Lens,			
Standard accessories	Data Processing Software CS-S1w, ND Eyepiece Filter (for finder) CS-A1, AC Adapter AC-A12, RS-232C Cable (2m, 9-pin for IBM PC) CM-A52, Calibration Certificate							
Optional accessories	Tripod CS-A3, Panhead CS-A4, White Calibration Plate CS-A5, ND Filter CS-A6 (10% / for standard or macro lens), ND Filter CS-A7 (1% / for standard or macro lens), RS-232C Cable CM-A53 to CM-A56, Hard Case CS-A2 (Not for small measuring area lens and small measuring and lens)							

System Diagram CS-1000A/S/T Body



Standard accessories

Dimensions (Units : mm)



*1 Distance from front end of the lens

*2 Measurement time is twice integral time plus α (α is 4 to 9sec. and varies with the measuring luminance.

Specifications subject to change without notice.

- · Windows® is a trademark of Microsoft Corporation in the USA and other countries.
- Trademarks referred to are the property of their respective owners.

SAFETY PRECAUTIONS

To ensure correct use of the instrument, please adhere to the following.

Before using the instrument, be sure

to read the instruction manual. • Always use the specified power. Use of inappropriate power may result in afire or electric shock.

Minolta Co., Ltd. Instrument Systems Company Minolta Corporation / ISD





Toyokawa Administrative Center (Aichi Pref., Japan) of Minolta Co., Ltd. was approved by the British certification organization Lloyd's Register Quality Assurance for certification under the ISO 9001:1994 international quality assurance standards on March 3, 1995. Since the Center's establishment in 1990, Radiometric Instruments Operations in Toyokawa Administrative Center has carried out the development and production of precision instruments for the measurement of color, light, and temperature. The ISO 9001:1994 certification was awarded to the Instrument Systems Company quality control system, including the design, development, production, calibration, and servicing of the measuring instruments described above.

3-91, Daisennishimachi, Sakai. Osaka 590-8551, Japan 101 Williams Drive, Ramsey, New Jersey 07446, U.S.A. Phone: 1-888-ISD-COLOR (in USA), 201-529-6060 (outside) FAX: 201-529-6070 Web site: http://www.minoltadisplay.com 369 Britannia Road East Mississauga, Ontario L4Z 2H5, Canada Phone: 905-890-6600 FAX: 905-890-7199 Minoltaring 11, 30855 Langenhagen, Germany Phone: 0511-74040 FAX: 0511-741050 365-367, Route de Saint-Germain, 78424 Carrieres-Sur-Seine, France Phone: 01-30866161 FAX: 01-30866280 Precedent Drive, Rooksley Park, Milton Keynes, MK13 8HF, England Phone: 01-908200400 FAX: 01-908618662 Amalienstrasse 59-61,1131 Wien. Austria Phone: 01-87882-222 FAX: 01-87882-180 Postbus 6000 3600 HA Maarssen, The Netherlands Phone: 00 (31)-30-2470860 FAX: 00 (31)-30-2470861 Riedstrasse 6, 8953 Dietikon, Switzerland Phone: 01-7403727 FAX: 01-7422350 Via Stephenson 37, 20157, Milano, Italy Phone: 02-39011-1 FAX: 02-39011-219 Albygatan 114 P.O.Box 9058 S-17109 Solna, Sweden Phone: 08-627-7650 FAX: 08-627-7685 Room 208, 2/F, Eastern Centre 1065 King's Road, Quarry Bay, Hong Kong, China Phone: 2565-8181 FAX: 2565-5601 Room 511, ChaoDai Business Centre 457 WuLuMuQi Road N. Shanghai, China Phone: 021-62494107 FAX: 021-62494109 10, Teban Gardens Crescent Singapore 608923 Phone: 563-5533 FAX: 561-9879 801, Chung-Jin Bldg., 475-22, BangBae-Dong, Seocho-ku, Seoul, Korea Phone: 02-523-9726 FAX: 02-523-9729