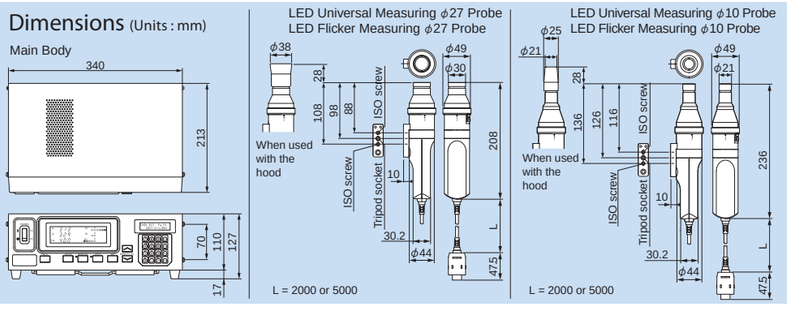
Specifications

Item		CA-310(LED Universal Measuring Ø27 Probe)	CA-310(LED Universal Measuring Ø10 Probe)	CA-310 (LED Flicker Measuring Ø27 Probe)	CA-310 (LED Flicker Measuring Ø10 Probe)
Receptor		Detector: Silicon photo cell			
Measurement area		Ø27mm	Ø10 mm	Ø27 mm	Ø10 mm
Acceptance angle		±2.5°	±5°	±2.5°	±5°
Measurement distance		30±10 mm	30±5 mm	30±10 mm	30±5 mm
Display range	Luminance	0.0001 to 1000 cd/m²	0.0001 to 3000 cd/m²	0.0001 to 1000 cd/m²	0.0001 to 3000 cd/m²
	Chromaticity	Displayed in 4 or 3-digit value (Can be chosen)			
Luminance	Measurement range	0.0050 to 1000 cd/m²	0.0150 to 3000 cd/m²	0.0050 to 1000 cd/m²	0.0150 to 3000 cd/m²
	Accuracy (for white)*1	0.0050 to 0.0999 cd/m² ±4%±0.0015 cd/m² 0.1000 to 9.999 cd/m² ±3%±0.0010 cd/m² 10.00 to 1000 cd/m² ±2%±0.0010 cd/m²	0.0150 to 0.2999 cd/m² ±4%±0.0045 cd/m² 0.3000 to 29.99 cd/m² ±3%±0.0030 cd/m² 30.00 to 3000 cd/m² ±2%±0.0030 cd/m²	0.0050 to 0.0999 cd/m² ±4%±0.0015 cd/m² 0.1000 to 9.999 cd/m² ±3%±0.0010 cd/m² 10.00 to 1000 cd/m² ±2%±0.0010 cd/m²	0.0150 to 0.2999 cd/m² ±4%±0.0045 cd/m² 0.3000 to 29.99 cd/m² ±3%±0.0030 cd/m² 30.00 to 3000 cd/m² ±2%±0.0030 cd/m²
	Repeatability(2σ) *1	0.0050 to 0.0999 cd/m² 1% + 0.0010 cd/m² 0.1000 to 0.9999 cd/m² 0.2% + 0.0010 cd/m² 1.000 to 1000 cd/m² 0.1%+0.0010 cd/m²	0.0150 to 0.2999 cd/m² 1% + 0.0030 cd/m² 0.3000 to 2.999 cd/m² 0.2% + 0.0030 cd/m² 3.000 to 3000 cd/m² 0.1% + 0.0030 cd/m²	0.0050 to 0.0999 cd/m² 1% + 0.0010 cd/m² 0.1000 to 0.9999 cd/m² 0.2% + 0.0010 cd/m² 1.000 to 1000 cd/m² 0.1%+0.0010 cd/m²	0.0150 to 0.2999 cd/m² 1% + 0.0030 cd/m² 0.3000 to 2.999 cd/m² 0.2% + 0.0030 cd/m² 3.000 to 3000 cd/m² 0.1% + 0.0030 cd/m²
Chromaticity	Measurement range	0.0500 to 1000 cd/m²	0.1500 to 3000 cd/m²	0.0500 to 1000 cd/m²	0.1500 to 3000 cd/m²
	Accuracy *1 (temperature:23°±2°, relative humidity: (40±10)%))	0.0500 to 4.999 cd/m² ±0.005 for white 5.000 to 19.99 cd/m² ±0.004 for white 20.00 to 1000 cd/m² ±0.003 for white 120 cd/m² ±0.002 for white (±0.004 for monochrome)*2	0.1500 to 14.99 cd/m² ±0.005 for white 15.00 to 59.99 cd/m² ±0.004 for white 60.00 to 3000 cd/m² ±0.003 for white 120 cd/m² ±0.002 for white (±0.004 for monochrome)*2	0.0500 to 4.999 cd/m² ±0.005 for white 5.000 to 19.99 cd/m² ±0.004 for white 20.00 to 1000 cd/m² ±0.003 for white 120 cd/m² ±0.002 for white (±0.004 for monochrome)*2	0.1500 to 14.99 cd/m² ±0.005 for white 15.00 to 59.99 cd/m² ±0.004 for white 60.00 to 3000 cd/m² ±0.003 for white 120 cd/m² ±0.002 for white (±0.004 for monochrome)*2
	Repeatability(2σ) *1	0.0500 to 0.0999 cd/m² 0.010 0.1000 to 0.1999 cd/m² 0.004 0.2000 to 0.4999 cd/m² 0.002 0.5000 to 1000 cd/m² 0.001	0.1500 to 0.2999 cd/m² 0.010 0.3000 to 0.5999 cd/m² 0.004 0.6000 to 1.499 cd/m² 0.002 1.500 to 3000 cd/m² 0.001	0.0500 to 0.0999 cd/m² 0.010 0.1000 to 0.1999 cd/m² 0.004 0.2000 to 0.4999 cd/m² 0.002 0.5000 to 1000 cd/m² 0.001	0.1500 to 0.2999 cd/m² 0.010 0.3000 to 0.5999 cd/m² 0.004 0.6000 to 1.499 cd/m² 0.002 1.500 to 3000 cd/m² 0.001
Flicker Contrast method	Measurement range	-		5 cd/m² or higher	15 cd/m² or higher
	Display range	-		0.0 ~ 999.9 %	
	Accuracy	-		±1 % (Flicker frequency: 30 Hz AC/DC 10% sine wave) ±2 % (Flicker frequency: 60 Hz AC/DC 10% sine wave)	
	Repeatability(2σ)	-		1 % (Flicker frequency: 20 to 65 Hz AC/DC 10% sine wave)	
Flicker JEITA method *3	Measurement range	-		5 cd/m² or higher	15 cd/m² or higher
	Accuracy	-		±0.5 dB (Flicker frequency: 30 Hz AC/DC 10% sine wave)	
	Repeatability(2σ)	-		0.3 dB (Flicker frequency: 30 Hz AC/DC 10% sine wave)	
Measure-ment speed*4	xyL$_v$	0.0050 to 0.0999 cd/m² 4(3.5) times/sec. 0.1000 to 1.999 cd/m² 5(4.5) times/sec. 2.000 to 1000 cd/m² 20(17) times/sec.	0.0150 to 0.2999 cd/m² 4(3.5) times/sec. 0.3000 to 5.999 cd/m² 5(4.5) times/sec. 6.000 to 3000 cd/m² 20(17) times/sec.	0.0050 to 0.0999 cd/m² 4(3.5) times/sec. 0.1000 to 1.999 cd/m² 5(4.5) times/sec. 2.000 to 1000 cd/m² 20(17) times/sec.	0.0150 to 0.2999 cd/m² 4(3.5) times/sec. 0.3000 to 5.999 cd/m² 5(4.5) times/sec. 6.000 to 3000 cd/m² 20(17) times/sec.
	Flicker Contrast	-		16(16) times/sec.	
	Flicker JEITA *3	-		0.5 (0.3)times/sec. *5	
Display	Digital	xyL$_v$, TΔuvL$_v$, RGB analyze, XYZ, u'v'L$_v$		xyL$_v$, TΔuvL$_v$, RGB analyze, XYZ, u'v'L$_v$, Flicker (Contrast method) *3	
	Analog	$\Delta x\Delta y\Delta L_v$, R/G B/G ΔG, ΔR B/R G/R		$\Delta x\Delta y\Delta L_v$, R/G B/G ΔG, ΔR B/R G/R, Flicker (Contrast method) *3	
	LCD	16 characters by 2 lines (with backlight)			
SYNC mode		NTSC, PAL, EXT, UNIV, INT			
Object under measurement		Vertical synchronization frequency: 40 to 200 Hz		Vertical synchronization frequency: 40 to 200 Hz (Luminance or chromaticity measurement), 40 to 130 Hz (Flicker measurement)	
Memory channel		100 channels			
Analyzer function		Standard function			
Interface		USB; RS-232C (38,400 bps or below)			
Multi-point Measurement		Max. 5 points (Use 4-Probe Expansion Board CA-B15)			
Operating temperature/humidity range		Temperature: 10 to 28°C ; relative humidity 70% or less with no condensation Luminance change: ±2% of reading for white Chromaticity change ±0.002 for white, ±0.006 for monochrome from reading of Konica Minolta's standard LCD *1, 120 cd/m², with 23°C 40%			
Storage temperature/humidity range		0 to 28°C : relative humidity 70% or less with no condensation 28 to 40°C : relative humidity 40% or less with no condensation			
Input voltage range		100-240V~, 50-60 Hz, 50 VA			
Size/weight	Main body	340(W)×127(H)×216(D) mm/3.58 kg			
	Probe	Ø49×208 mm / 530 g	Ø49×236 mm / 550 g	Ø49×208 mm / 530 g	Ø49×236 mm / 550 g

*1 The chromaticity and luminance are measured under Konica Minolta's condition (standard LCD(6500K, 9300K) is used). *2 The luminance for monochrome is measured when the reading of luminance for white is 120 cd/m² .
*3 Measurement of flicker (JEITA method) is supported by SDK software. *4 Measuring probe connected to probe connector P1 only, used USB(used RS-232C Baud rate: 38400 bps) *5 Measured by Konica Minolta's PC (P3-600 MHz)

Dimensions (Units : mm)



- Select the desired type of LED Universal Measuring type probe or LED Flicker Measuring type probe.
- Contains mercury in the backlighting of LCD used for display. Dispose of according to local, state or federal laws.
- KONICA MINOLTA and the Konica Minolta logo and the symbol mark, and "Giving Shape to Ideas" are registered trademarks or trademarks of KONICA MINOLTA HOLDINGS, INC.
- Screens shown are for illustration purpose only. The specifications and drawings given here are subject to change without prior notice.
- Some lamp control methods may make accurate measurements difficult. For details, please contact your nearest Konica Minolta sales office or dealer.

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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http://konicaminolta.com/instruments/about/network

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KONICA MINOLTA

Display Color Analyzer CA-310

Support for LED backlights

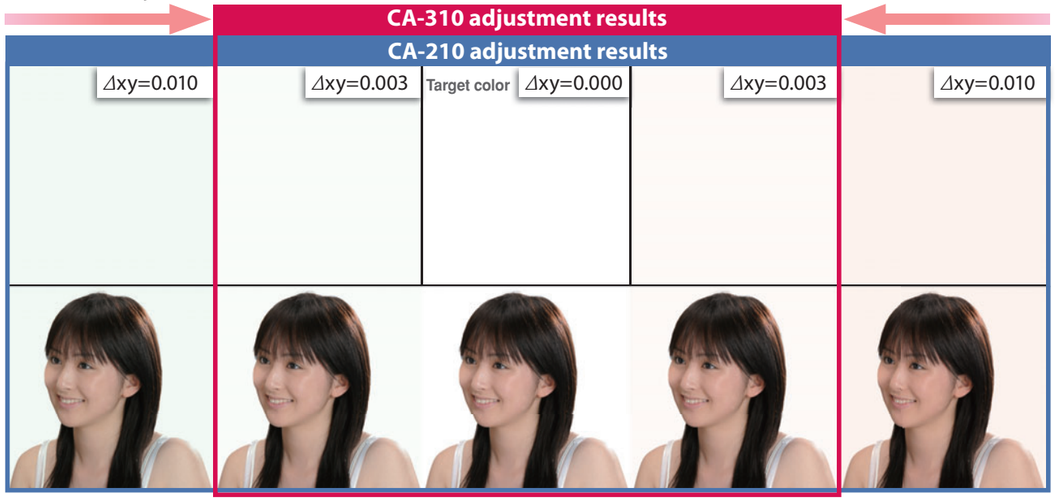
Giving Shape to Ideas

Enables high-accuracy adjustment of EL/LED-backlit LCD TV gamma/white balance to greatly improve efficiency.

White balance adjustment has advanced even further!

Our previous Display Color Analyzer CA-210 could adjust the white balance of LED-backlit LCD TVs to Δxy=0.010, but the new Display Color Analyzer CA-310 enables adjustment to Δxy=0.003 so colors are even more true, as can be seen below.

White balance adjustment of LED -backlit LCD TVs



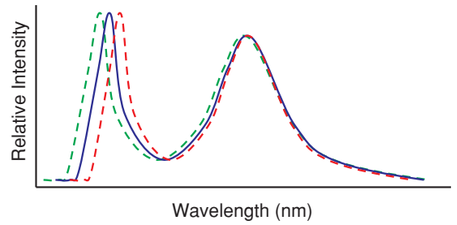
Enables high-speed measurement of even extremely low luminances down to 0.005 cd/m²

Sensor noise reduction technology has been used to enable measurements even in the extremely low luminance region around 0.005 cd/m² at speeds as fast as 4 times per second. This allows the high-speed high-accuracy measurement essential for manufacturing high-grade displays. In addition, at luminances higher than 2.0 cd/m², 20 measurements per second are possible.

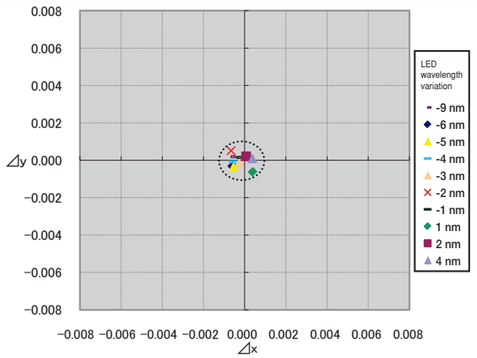
Reduces errors due to LED emission distribution variations to less than 1/3.

Variations in the emission distribution of LED backlights result in individual differences of about 10nm in peak intensity wavelength. If LED-backlit LCD TVs with such individual differences are adjusted using conventional color analyzers, color differences of close to 0.010 on the xy chromaticity diagram may occur. But the CA-310 has sensor sensitivities that more closely match the CIE 1931 color-matching functions, enabling the color difference in the same case to be reduced to around 0.003, suppressing errors to less than 1/3.

Variations in the emission distribution of LED backlights



Measurement errors for LED backlights

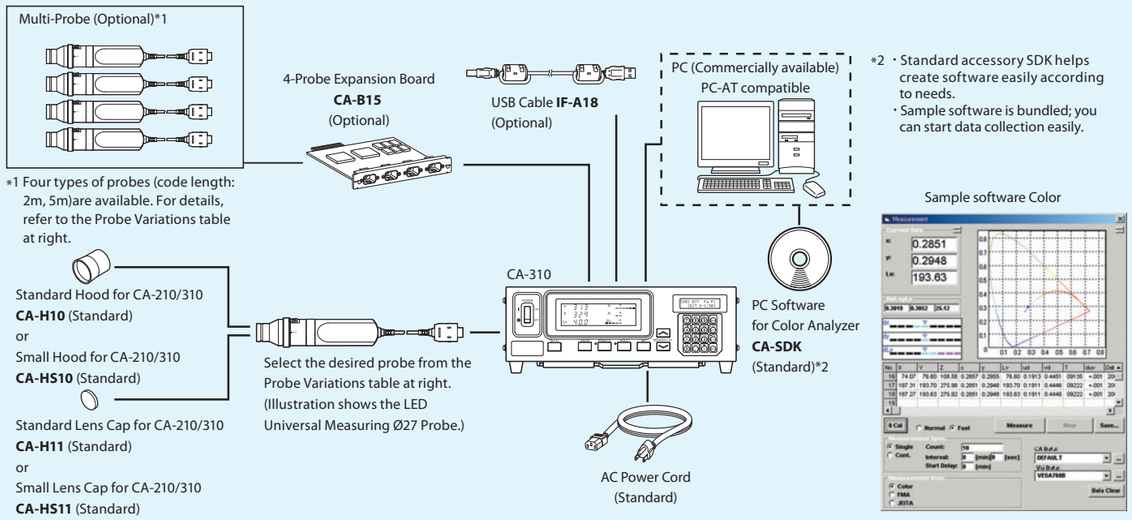


*Errors (differences from true values) for white LEDs with different peak wavelengths when measured using CA-310.
User calibration to standard LED performed.

Number of digits for luminance display increased, enabling display to 0.0001 cd/m².

Expandable up to 5 measuring probes. (Requires expansion board CA-B15)

System Diagram



Probe variations

This table is based on the most popular method for controlling emission intensity for each display type.

*Measurements of displays using certain control methods are not possible. For details of measurement compatibility, contact your nearest Konica Minolta representative.
Examples for which measurement is not possible:
- Displays which use PWM, etc. for control of emission intensity.
- Displays with backlights which emit intermittently.
- Displays which write black for each frame, etc.

○ Recommended
△ Measurement possible with restrictions, but probes marked with ○ are recommended
× Measurement not possible

Applicability for different display types			CA-310 Probe			
			LED Universal Measuring Probe		LED Flicker Measuring Probe	
			Ø27 Probe CA-PU32 (2m) CA-PU35 (5m)	Ø10 Probe CA-PSU32 (2m) CA-PSU35 (5m)	Ø27 Probe CA-P32 (2m) CA-P35 (5m)	Ø10 Probe CA-PS32 (2m) CA-PS35 (5m)
Transmissive / semi-transmissive LCD		Active Matrix Driven	○	○	○*	○*
		Passive Matrix Driven	○	○	×	×
OLED		Active Matrix Driven	○	○	○*	○*
		Passive Matrix Driven	○	○	×	×
PDP			○	△	×	×
FED			○	○	×	×
Rear Screen Projector	LCD	Active Matrix Driven	○	△	○*	△*
		Passive Matrix Driven	○	△	×	×
	DLP		○	△	×	×
	CRT		○	△	×	×

(LED Flicker Measuring Probes are unsuitable for measurements of CRTs.)