

LumiTop 4000

Macro lens

Spectrally enhanced imaging colorimeter

Key features at a glance

- ▲ Production grade 3-in-1 test station saves time, space and money
- ▲ Optimized for μ LED applications for highest accuracy
- ▲ Hardware trigger for perfect timing



\\ TECHNICAL SPECIFICATIONS

LumiTop 4000 with macro lens		
Measurement quantities		
2D	Luminance, color	
Spot	Spectrum, luminance, color, flicker	
General specifications		
Operating system	Windows 7/10 (64 bit)	
Dimensions (l x w x h) ¹⁾	334.4 mm x 190 mm x 121 mm	
Weight ²⁾	4.5 kg	
Power supply	24 V	
Operating temperature range	15 – 35 °C	
Lens	100 mm (macro)	
Camera specifications		
Effective resolution (h x v)	4096 x 3000 pixels (12 megapixels, CMOS)	
Pixel size	3.45 µm x 3.45 µm	
AD converter	12 bit	
Size CMOS sensor	1.1" (17.52 mm diagonal)	
Interface camera	Gigabit Ethernet, M12 12-Pin Female	
Measurement range 2D ^{3) 4)}	L = 0.06 cd/m² – 0.8 x 10 ⁶ cd/m²	
Accuracy and precision	Luminance	Color
Accuracy of camera (rel. to CAS) ⁵⁾	±0.4 %	±0.002
Instrumental precision camera ⁶⁾	±0.03 %	±0.0001
Camera uniformity (RNU) ⁷⁾	±0.35 %	±0.0013
Measurement time ⁸⁾		
Measurement time hybrid mode	0.7 s	
Measurement time camera only	0.7 s	

\\ TECHNICAL SPECIFICATIONS

CAS specifications	CAS 140D		CAS 120	
Interface CAS	USB, Gigabit Ethernet		USB	
Measurement range CAS ^{3) 9)}	$L = 0.009 \text{ cd/m}^2 - 1.2 \times 10^8 \text{ cd/m}^2$		$L = 0.30 \text{ cd/m}^2 - 4.5 \times 10^8 \text{ cd/m}^2$	
Accuracy and precision	Luminance	Color	Luminance	Color
Accuracy of CAS	$\pm 3.0 \%$ ¹⁰⁾	± 0.0015 ¹¹⁾	$\pm 4.0 \%$ ¹⁰⁾	± 0.002 ¹¹⁾
Instrumental precision CAS ⁶⁾	$\pm 0.1 \%$	± 0.0001	$\pm 0.1 \%$	± 0.0002
Polarization sensitivity ¹²⁾	$\pm 2.0 \%$	± 0.002	$\pm 2.0 \%$	± 0.002

Flicker specifications	
Flicker range	$5 \text{ cd/m}^2 - 1800 \text{ cd/m}^2$
Modulation frequency range	10 Hz – 150 Hz
Flicker accuracy ¹³⁾	$\pm 1 \text{ dB}$
Flicker instrumental precision ^{13) 14)}	$\pm 0.02 \text{ dB}$

Spot size and field of view at selected working distances for 100 mm lens (f/2.8)			
Working distance ¹⁵⁾ [mm]	257	400	550
Spot size [mm]	1.0	2.8	4.4
Field of view [mm]	14.4 x 10.5	40.2 x 29.5	61.6 x 45.1
Field of view diagonal [in]	0.7	2.0	3.0

¹⁾ Inclusive lens, fiber exit, and back plate connector. At shortest working distance for the 100 mm lens.

²⁾ Without CAS, with mode mixer.

³⁾ External neutral density filters on the lens up to OD 3 are available for increasing the upper measurement limit or measuring modulated light sources.

⁴⁾ Lower measurement limit based on a signal to noise ratio of 10:1 for 10 seconds exposure time. Upper measurement limit based on a signal level < 80 % for a white (non-modulated) LED light source using an exposure time of 27 μs .

⁵⁾ Typical value for maximum deviation over the FOV relative to the CAS spot; calculated for an image with 21 pixels cropped at each edge and 13 by 13 pixel binning (34 averages) immediately after calibration with reference used for flat-field correction.

⁶⁾ 2σ of repeated measurements of one instrument ($L \approx 100 \text{ cd/m}^2$, autoexposure).

⁷⁾ RNU (response non-uniformity) is defined as 99.7 % percentile of the deviation of the mean image value; calculated for an image with 21 pixels cropped at each edge and 13 by 13 pixel binning (34 averages) immediately after calibration with reference used for flat-field correction.

⁸⁾ Time between beginning of two subsequent measurements using the SDK; determined with a camera exposure time of 10 ms and CAS exposure time of 200 ms for a white LED ($L \approx 500 \text{ cd/m}^2$). Depends on PC processing capability.

⁹⁾ Lower measurement limit based on a signal to noise ratio of 10:1 for maximum exposure times 65 s for CAS 140D, 20 s for CAS 120. Upper measurement limit based on a signal level < 80 % for a white (non-modulated) LED light source using a CAS internal optical density filter OD4 and minimum exposure time (4 ms). Values valid for CAS 120 with 100 μm and CAS 140D with 250 μm slit width.

¹⁰⁾ Immediately after calibration relative to calibration standard.

¹¹⁾ Immediately after calibration.

¹²⁾ Maximum deviation from average of repeated CAS measurements with a linear polarized light source and varying polarization angle.

¹³⁾ $L \approx 150 \text{ cd/m}^2$, 30Hz, 10% sine wave.

¹⁴⁾ 2σ of repeated measurements of one instrument.

¹⁵⁾ Distance between DUT and front plate of LumiTop 4000.

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