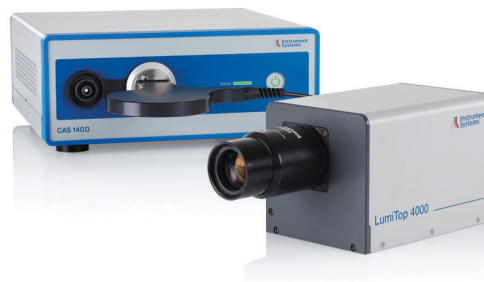


LumiTop 4000

Spectrally enhanced imaging colorimeter

Key features at a glance

- ▲ Production grade 3-in-1 test station saves time, space and money
- ▲ 2D measurements with unprecedented accuracy enabled by the high-end reference spectroradiometer CAS 140D
- ▲ Hardware trigger for perfect timing



\\ TECHNICAL SPECIFICATIONS

LumiTop 4000		
Measurement quantities		
2D	Luminance, color	
Spot	Spectrum, luminance, color, flicker	
General specifications		
Operating system	Windows 10/11 (64 bit)	
Dimensions (l x w x h) ¹⁾	286 mm x 190 mm x 121 mm	
Weight ²⁾	4.1 kg	
Power supply	24 V	
Operating temperature range	15 – 35 °C	
Lens	29 mm	
Camera specifications		
Effective resolution (h x v)	4096 x 3000 pixels (12 megapixels, CMOS)	
Pixel size	3.45 μm x 3.45 μm	
Dynamic range	70 dB	
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 = 0.02 cd/m ² – 270,000 cd/m ²	
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 = 0.003 cd/m ² – 4 x 10 ⁷ cd/m ²			L = 0.10 cd/m ² – 1.5 x 10 ⁸ cd/m ²			
Accuracy and precision	Luminance	Color		Luminance	Color		
Accuracy of CAS	±3.0 % ¹⁰⁾	±0.0015 ¹¹⁾		±4.0 % ¹⁰⁾	±0.002 ¹¹⁾		
Instrumental precision CAS ⁶⁾	±0.1 %	±0.0001		±0.1 %	±0.0002		
Polarization sensitivity ¹²⁾	±2.0 %	±0.002		±2.0 %	±0.002		
Flicker specifications							
Flicker range	5 cd/m ² – 600 cd/m ²						
Modulation frequency range	10 Hz – 150 Hz						
Flicker accuracy ¹³⁾	±1 dB						
Flicker instrumental precision ^{13) 14)}	±0.02 dB						
Spot size and field of view at selected working distances for 29 mm lens (f/2.8)							
Working distance ¹⁵⁾ [mm]	385	400	500	700	800	1000	1200
Spot size [mm]	11.0	11.5	14.9	21.7	25.1	31.9	38.6
Field of view [mm]	156 x 114	163 x 119	211 x 155	307 x 225	355 x 260	450 x 330	546 x 400
Field of view diagonal [in]	7.6	8.0	10.3	15.0	17.3	22.0	26.6

Instrument Systems is continually working to develop and improve products. Technical changes, errors or misprints do not constitute grounds for compensation. The company's terms of delivery and payment apply in all other respects.

¹⁾ Inclusive lens and fiber exit.

²⁾ Without CAS, with mode mixer.

³⁾ External neutral density filters on the lens (OD 0.3/0.6/0.9) 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 maximum exposure time (10 seconds). Upper measurement limit based on a signal level < 80 % for a white (non-modulated) LED light source using for minimum exposure time (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 pixels binning (34 averages) immediately after calibration with reference used for flat-field correction.

⁶⁾ 2σ of repeated measurements of one instrument (L ≈ 100 cd/m², 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 pixels 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 20 ms and CAS exposure time of 200 ms for a white LED (L ≈ 500 cd/m²). Depends mainly 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 and 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 ≈ 150 cd/m², 30 Hz, 10 % sine wave.

¹⁴⁾ 2σ of repeated measurements of one instrument.

¹⁵⁾ Distance between DUT and front plate of LumITop.

Sales & Support (North America)

Radiant Vision Systems | 18640 NE 67th Court | Redmond, WA 98052 USA | ph: +1 (425) 844-0152
 fax: +1 (425) 844-0153 | info@RadiantVS.com | www.radiantvisionsystems.com

Design & Manufacturing

Instrument Systems GmbH | Kastenbauerstr. 2 | 81677 Munich, Germany | ph: +49 (0)89 45 49 43-58
 fax: +49 (0)89 45 49 43-11 | info@instrumentsystems.com | www.instrumentsystems.com

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 μ m x 3.45 μ m	
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/m ² – 0.8 x 10 ⁶ cd/m ²	
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 cd/m ² – 1.2 x 10 ⁸ cd/m ²		L = 0.30 cd/m ² – 4.5 x 10 ⁸ cd/m ²	
Accuracy and precision	Luminance	Color	Luminance	Color
Accuracy of CAS	±3.0 % ¹⁰⁾	±0.0015 ¹¹⁾	±4.0 % ¹⁰⁾	±0.002 ¹¹⁾
Instrumental precision CAS ⁶⁾	±0.1 %	±0.0001	±0.1 %	±0.0002
Polarization sensitivity ¹²⁾	±2.0 %	±0.002	±2.0 %	±0.002

Flicker specifications	
Flicker range	5 cd/m ² – 1800 cd/m ²
Modulation frequency range	10 Hz – 150 Hz
Flicker accuracy ¹³⁾	±1 dB
Flicker instrumental precision ^{13) 14)}	±0.02 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 ≈ 100 cd/m², 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 ≈ 500 cd/m²). 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 ≈ 150 cd/m², 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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Sales & Support (North America)

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fax: +1 (425) 844-0153 | info@RadiantVS.com | www.radiantvisionsystems.com

Design & Manufacturing

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LumiTop 5300 VR

Spectrally enhanced imaging colorimeter

Key features at a glance

- ▲ Production grade 3-in-1 test station saves time, space and money
- ▲ Optimized for VR near-eye display (NED) testing
- ▲ Large FOV, various pupil sizes and adjustable focus distances



\\ TECHNICAL SPECIFICATIONS

LumiTop 5300 with VR lens (preliminary)	
Measurement quantities	
2D	Luminance, color
Spot	Spectrum, luminance, color, flicker
General specifications	
Operating system	Windows 10 (64 bit)
Dimensions (l x w x h) ¹⁾	With periscope lens: 452 mm x 190 mm x 180 mm With straight lens: 527 mm x 190 mm x 180 mm
Weight ²⁾	5.4 kg
Power supply	24 V
Operating temperature range	15 – 35 °C
Camera specifications	
Effective resolution (h x v)	5312 x 4600 pixels (24 megapixels, CMOS)
AD converter	12 bit
Interface camera	Gigabit Ethernet, M12 12-Pin Female
Measurement range 2D ^{3) 4)}	L = 0.012 cd/m ² – 170,000 cd/m ²
Angular resolution	> 40 px/deg (average over FOV)
Lens specifications	
Field of View (FOV) (H x V)	120° x 105°
Adjustable focus distance	0.5 m – 1.5 m (other on request)
Entrance Pupil ¹⁵⁾	1.0 – 3.6 mm
Measurement time ⁸⁾	
Measurement time hybrid mode	0.7 s
Measurement time camera only	0.7 s

\\ TECHNICAL SPECIFICATIONS

Camera specifications		
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
CAS specifications		
CAS specifications	CAS 140D	
Interface CAS	USB, Gigabit Ethernet	
Measurement range CAS ⁹⁾	L = 0.003 cd/m ² – 4 x 10 ⁷ cd/m ²	
Accuracy and precision	Luminance	Color
Accuracy of CAS	±3.0 % ¹⁰⁾	±0.0015 ¹¹⁾
Instrumental precision CAS ⁶⁾	±0.1 %	±0.0001
Polarization sensitivity ¹²⁾	±2.0 %	±0.002
Flicker specifications		
Flicker range	5 cd/m ² – ca. 600 cd/m ²	
Flicker accuracy ¹³⁾	±1 dB	
Flicker instrumental precision ^{13) 14)}	±0.02 dB	

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¹⁾ Inclusive lens and fiber exit.

²⁾ Without CAS, with mode mixer.

³⁾ Contact us for extended measurement range options.

⁴⁾ Lower measurement limit based on a signal to noise ratio of 10:1 for maximum exposure time of 10 seconds. Upper measurement limit based on a Y channel signal level < 80 % for a white (non-modulated) LED light source using a minimum exposure time of 28 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 binning (34 averages).

⁶⁾ 2σ of repeated measurements of one instrument (L ≈ 100 cd/m², 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 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 20 ms and CAS exposure time of 200 ms for a white LED (L ≈ 500 cd/m²). Depends mainly 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. 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 of 4 ms (CAS 140D). Values valid for 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 ≈ 150 cd/m², 30 Hz, 10 % sine wave.

¹⁴⁾ 2σ of repeated measurements of one instrument.

¹⁵⁾ The entrance pupil is exchangeable. Standard sizes are: 1.0 mm, 1.5 mm, 2.0 mm, 2.5 mm, 3.0 mm and 3.6 mm.

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Design & Manufacturing

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LumiTop 5300

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 5300 with macro lens (preliminary)		
Measurement quantities		
2D	Luminance, color	
Spot	Spectrum, luminance, color, flicker	
General specifications		
Operating system	Windows 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)	5320 x 4600 pixels (24 megapixel, CMOS)	
Pixel size	2.74 μ m x 2.74 μ m	
AD converter	12 bit	
Size CMOS sensor	1.2" (19.3 mm diagonal)	
Interface camera	Gigabit Ethernet, M12 12-Pin Female	
Measurement range 2D ^{3) 4)}	L = 0.06 cd/m ² – 0.8 x 10 ⁶ cd/m ²	
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 cd/m ² – 1.2 x 10 ⁸ cd/m ²		L = 0.30 cd/m ² – 4.5 x 10 ⁸ cd/m ²	
Accuracy and precision	Luminance	Color	Luminance	Color
Accuracy of CAS	±3.0 % ¹⁰⁾	±0.0015 ¹¹⁾	±4.0 % ¹⁰⁾	±0.002 ¹¹⁾
Instrumental precision CAS ⁶⁾	±0.1 %	±0.0001	±0.1 %	±0.0002
Polarization sensitivity ¹²⁾	±2.0 %	±0.002	±2.0 %	±0.002
Flicker specifications				
Flicker range	5 cd/m ² – 1800 cd/m ²			
Flicker accuracy ¹³⁾	±1 dB			
Flicker instrumental precision ^{13) 14)}	±0.02 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]	14.9 x 12.8	41.5 x 35.9	63.6 x 55.0	
Field of view diagonal [in]	0.8	2.2	3.3	

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 ≈ 100 cd/m², 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 ≈ 500 cd/m²). 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 ≈ 150 cd/m², 30Hz, 10 % sine wave.

¹⁴⁾ 2σ of repeated measurements of one instrument.

¹⁵⁾ Distance between DUT and front plate of LumITop 5300.

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fax: +49 (0)89 45 49 43-11 | info@instrumentsystems.com | www.instrumentsystems.com