

AR/VR

近眼显示器测量



Discover the next NED dimension!

- » 搭配LumiTop成像色度计的独特AR/VR潜望式镜头
- » 针对AR/VR头戴式装置中的近眼显示器 (NED)
生产测试与设计
- » 模拟人眼的镜头设计, 视野大, 可调瞳孔尺寸
- » 可调焦距, 适合各种测量应用

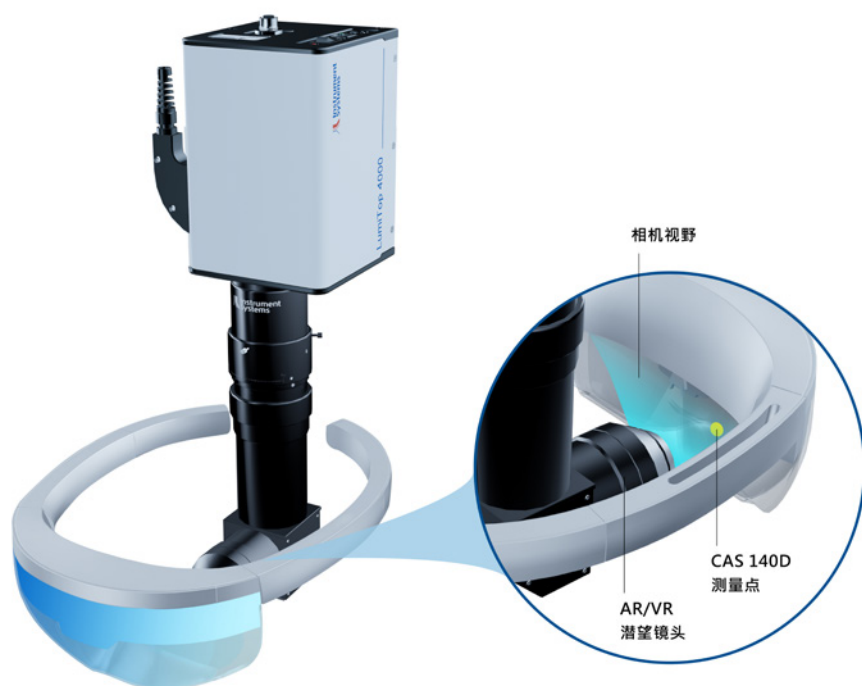
01 \ 增强和虚拟现实 (AR/VR) 显示器量测

使用 LumiTop AR/VR 精确快速地测量近眼显示器！

LumiTop 成像色度计的 AR/VR 潜望式镜头, 是专为虚拟和增强现实设备中近眼显示器 (NED) 的生产测试打造。

模仿人眼设计的镜头, 可以深入头戴式装置内部, 模拟眼睛的实际位置, 测量用户看到的色彩及亮度。

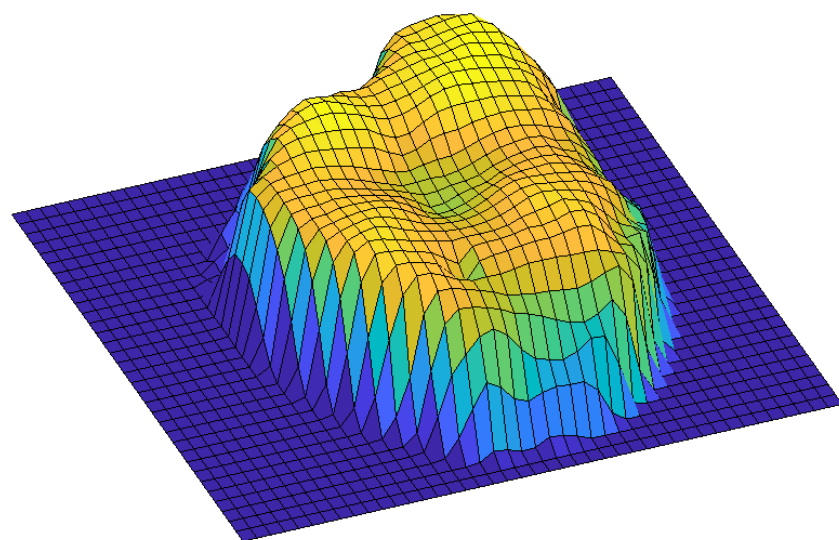
因为拥有大视野范围, 可调节的入射瞳孔尺寸, 并可灵活对焦, 适合用于所有的AR/VR测试应用。



LumiTop 加上 AR/VR 镜头

- ▲ 精确快速的LumiTop成像色度计
- ▲ >120° 大视场范围
- ▲ 可调焦距 0.3 m – ∞
- ▲ 各种瞳孔尺寸
- ▲ 精巧的系统仪器设计, 可同时测量双眼的光学特性

潜望镜头在组装完整的头戴式设备的狭小空间限制下, 也能获得最佳的测量位置。两台LumiTop并行操作, 即可同时测量左右两侧的NED。



▲
AR 眼镜上近眼显示器的对比度

用户所见的色彩及亮度体验

- ▲ 高解析度相机, 避免摩尔纹效应 (Moiré)
- ▲ 最佳化的镜头设计, 精确测量用户所见画面
- ▲ 快速光度计及触发器能够同步和控制调制光源

配备AR/VR镜头的LumiTop提供高度可重复、可追溯及高精度的颜色和亮度量测, 帮助AR/VR设备达到最佳显示效果。其测量结果可追溯至PTB德国国家标准, 保证设备与设备间的一致性。

02 \\ 技术规格

LumiTop 4000 AR/VR (preliminary)							
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⁾	452 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)	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 sensor	1.1" (17.52 mm diagonal)						
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	> 30 px/deg (over entire FOV)						
Lens specifications							
Field of View /FoV)	122° x 87° (H x V)						
Adjustable Focus	0.3 m – infinity						
Entrance Pupil ¹⁶⁾	1.0 – 3.6 mm						
MTF @50LP/mm	> 50%						
Lateral chromatic aberration	~1 px (0.03° or 1.8 arcmin)						
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						
CAS specifications	CAS 140D						
Interface CAS	USB, PCIe, Gigabit Ethernet						
Measurement range CAS ^{3) 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 ⁵⁾	±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						
Spot size and field of view at selected working distances for AR/VR lens							
Working distance ¹⁵⁾ [mm]	300	500	1000	1200	1400	1600	2000
Spot size [mm]	39	64	128	154	180	206	257
LumiTop 2700							
Field of view [mm]	545 x 282	908 x 470	1815 x 941	2178 x 1129	2541 x 1317	2904 x 1505	3630 x 1881
Field of view diagonal [in]	24.1	40.2	80.5	96.6	112.7	128.8	161.0

Instrument Systems is continually working on the further development of its products. Technical changes, errors and misprints do not justify claims for damages.
For all other purposes, our Terms and Conditions of Business shall be applicable.

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 (LumiTop 4000). 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 27 µs (LumiTop 4000).

⁵⁾ Typical value for maximum deviation over the FOV relative to the CAS spot; calculated for an image with 21 pixels (LumiTop 4000) cropped at each edge and 13 by 13 pixels

(LumiTop 4000) 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 (LumiTop 4000) cropped at each edge and 13 by 13 pixels (LumiTop 4000) 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 μ m 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⁾ $L \approx 150 \text{ cd/m}^2$, 30 Hz, 10 % sine wave.

¹⁴⁾ 2σ of repeated measurements of one instrument.

¹⁵⁾ Distance between the object plane (virtual image plane) and the entrance pupil.

¹⁶⁾ 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.

Live Demo: AR/VR Testing with LumiTop Imaging Colorimeter

LIVE DEMO

AR/VR Testing with LumiTop
Imaging Colorimeter




© 2020 Instrument Systems GmbH
All rights reserved.



▲ 掃QR Code看影片

Presentation: LumiTop for AR/VR Testing

Instrument Systems Webinar Series

**LumiTop for
AR/VR Testing**




Speaker: Dr. Tobias Steinel



▲ 掃QR Code看影片



KONICA MINOLTA Group

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

We bring quality to light.