WESTBORO PHOTONICS

XR1 Near Eye Display Lens

High fidelity characterization of near eye displays

Characterizing the visual performance of Near Eye Displays (NEDs) requires a special lens that emulates the optics of the human eye. To do this, Westboro Photonics' XR1 NED Lens features an entrance pupil at the front of the lens, and its size can be changed from 1.5 mm to 5 mm — simulating typical users' visual adaptation in bright and dark environments. The XR1 NED Lens design, paired with our imaging colorimeters, enables outstanding measurement and analysis of AR and VR display systems.

Optimized For Augmented Reality Displays

The XR1 NED Lens is specifically designed to provide optimal imaging performance for AR displays with up to 73° diagonal field of view (FOV).

Made to Fit

It is important that the portion of the lens near the NED is narrow and tapered so the entrance pupil (EP) of the lens is positioned at the exit pupil (XP) location of the NED. The XR1 NED Lens is designed to fit the confined eye box spaces of an helmet, headset, or glasses. Three features of the XR1's design enable proper alignment:

- The lens barrel is relatively thin at only a 56 mm diameter
- The lens barrel is tapered near the entrance pupil
- The lens has a folded and rotatable periscope design

Key Features

- 1.5 – 5.0 mm external entrance pupil
- 73° field of view
- Polarization insensitive
- Low distortion
- 0.3 m – ∞ focus range
- Rotating periscope design
- Slim form factor
- 45° approach angle

Applications

- Augmented reality (AR)
- Virtual reality (VR)
- Mixed reality (MR)

Compatible Colorimeters

- WP5
- WP6E
- WP6ES

High Accuracy Measurements from Integrated Spectroradiometer

The NED Lens is compatible with the WP5 and WP6ES imaging colorimeters, which both feature integrated spectroradiometers for the highest accuracy results possible. The WP5 excels at high-speed production whereas the WP6ES is appropriate for R&D, engineering, and lower volume production.

Lens with WP512 Imaging Spectral Colorimeter

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Flexible for Research and Development

Interchangeable external entrance pupils are located at the front of the lens. Standard diameters include 1.5, 2.0, 3.0, 4.0, and 5.0 mm. Custom sizes are also available. The lens can focus from 0.3 m to infinity. Automation of the focus is possible via external motors. Contact Westboro Photonics to discuss options.

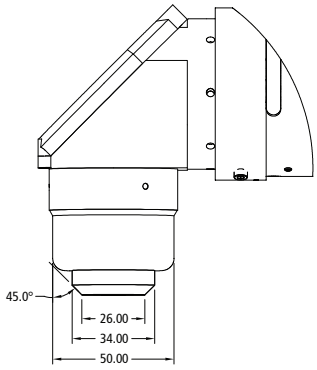
Analysis

All Westboro Photonics imaging systems include our Photometrica® software, which has the tools you need to characterize display performance including:

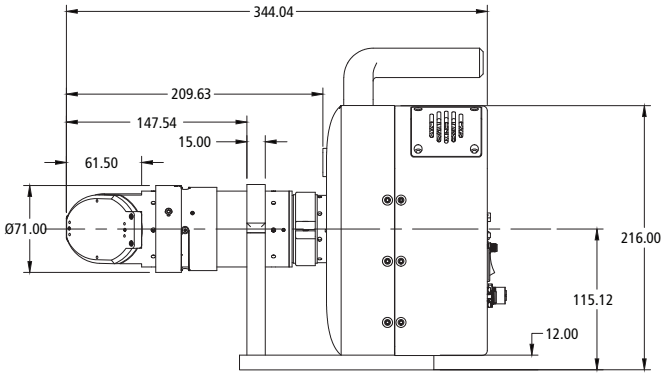
- MTF
- Contrast
- Gamut and white point
- Luminance and color uniformity
- Distortion

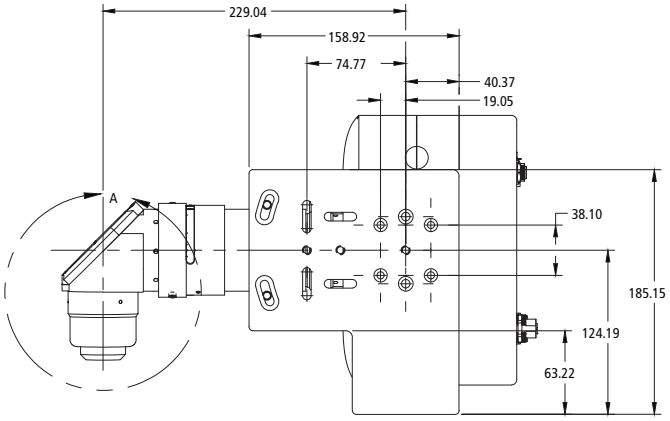
TECHNICAL SPECIFICATIONS

		WP512	WP525	WP690E/ES	WP6120E/ES
Angular Field of View (H° x V°)		60 x 45	56 x 65	43 x 52	38 x 57
Entrance Pupil Sizes (mm)		1.5, 2.0, 3.0, 4.0, 5.0, Custom			
Focus Range (m)		0.3 - ∞			
Luminance Range (cd/m²)* per Entrance Pupil	**1.5 mm**	0.034 – 1 600 000	0.360 – 339 500	0.005 – 6 400	0.006 6 – 8 300
	2.0 mm	0.019 – 910 000	0.200 – 190 400	0.003 – 3 600	0.003 8 – 4 700
	3.0 mm	0.009 – 535 000	0.100 – 85 800	0.001 5 – 2 100	0.001 7 – 2 100
	4.0 mm	0.005 4 – 250 000	0.050 – 48 600	0.001 3 – 1 600	0.001 – 1 200
	5.0 mm	0.003 7 – 170 000	0.035 – 31 900	0.000 77 – 950	0.000 7 – 840
Weight of Lens Only (kg)		1.7			
Weight of Lens, Yoke and Baseplate (kg)		2.7			



* Based on illuminant A source and on-axis. Typical min to max exposures of imager and at signal levels between 2.5% and 95% of saturation. Specifications are subject to change. Westboro Photonics continually pursues improvements to the instruments. Specification adjustments, errata or omissions do not constitute grounds for compensation.





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