WESTBORO PHOTONICS

WP6E/ES

Imaging Colorimeter/ Imaging Spectral Colorimeter

A full-featured imaging colorimeter with exceptional performance

Great imaging

With 9 or 12 Megapixels of resolution, the WP6E Series provides optimal solutions for luminance and chromaticity measurements of displays, illuminated keyboards, graphics and more. Unique to these instruments is the integration of electronically controlled lens functions with iris and focus control. These motorized lenses offer improved accuracy, precision and convenience for all applications.

Westboro Photonics' Photometrica® software and application packages provide users with the most productive environment for measurement and analysis. In addition, with the included software development kit (SDK), users have the tools to automate their tests efficiently.

Sensitive

Stabilized Peltier-cooling of the CCD detector minimizes measurement noise and drift. With sensitivity below 0.0001 cd/m², ultra-low light signals can be reliably analyzed. Optimization of the optical system has also resulted in quicker measurement times.

Compact

The WP6E is feature-packed, small and lightweight. Mounting the instrument is easy, whether on a tripod, stage, or robot.

Viewing angle display testing

The Conometer® lens enables viewing angle measurements of flat panel displays and backlights. In addition, the system provides 0.05 degrees resolution and 0.0001 cd/m² sensitivity.

AR/VR display testing

The Near-Eye Display (NED) Lens provides optimal test performance for virtual images up to 60 degrees horizontal or vertical field of view (FOV). The periscope design ensures the lens readily fits into the final assemblies of glasses, headsets, and helmets. Under different stimuli, human visual accommodation results in varying pupil diameters. Therefore, the entrance pupil aperture is adjustable from 1.5 to 5.0 mm.

Distortion corrected

A menu-driven registration and distortion correction assistant allows users to correct lens distortions. Once the correction is applied, any distortions in the display under test are revealed and can be analyzed.

Key features

- Optional integrated spectroradiometer
- Electronic focus and iris control
- Multiple EF-mount lens options
- High sensitivity
- Cooled sensor
- Compact

Applications

- Characterization and calibration of displays
- AR/VR
- Viewing angle
- Graphics
- Beam pattern
- Solid-state lighting

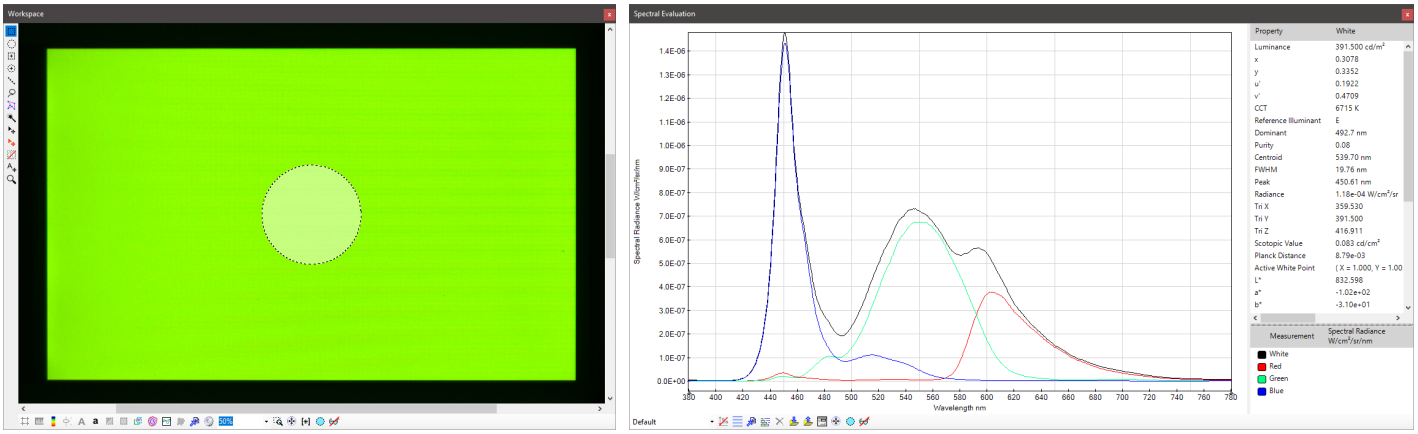
WP6ES Imaging Spectral Colorimeter

Automatic Color Correction

The WP6ES has the benefit of a spot spectroradiometer and a tristimulus imaging colorimeter in the same instrument. The imaging colorimeter's accuracy is improved to the level of the spectroradiometer by automatic correction. The spectral data also provides radiometric information and other measurement insights.

Sensitive

Using a simple moving mirror and a large fiber guide, a circular area in the center of the lens' focal plane is directly coupled to the spectrometer. Compared to beamsplitter designs, this setup has higher image quality, better throughput and minimal polarization dependence.



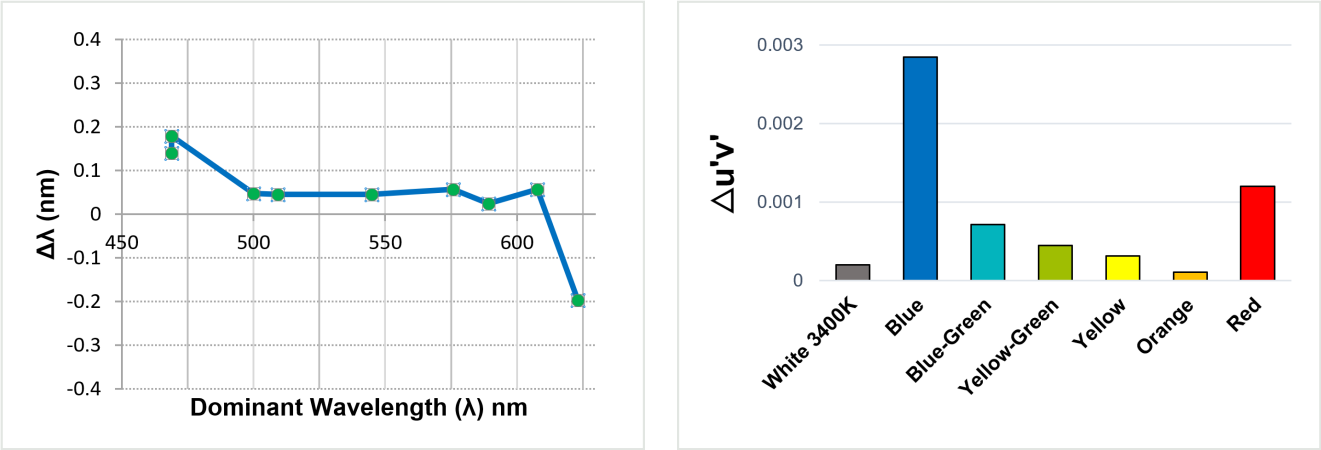
Partial screenshot of Photometrica software displaying the spectral measurement spot centered in the 2-D image and the corresponding spectral analysis for any measurements in the document; red, green and blue display settings in this case.

Reliable and Simplified

As compared to using a stand alone spot spectroradiometer and an imaging colorimeter, the integrated functionality of the WP6ES is more reliable and easier to use.

WP6ES Imaging Spectral Colorimeter	VS	Spot Spectroradiometer and Separate Imaging Colorimeter
✔ The imaging paths for both the colorimeter and spectroradiometer match, thereby assuring the **compared measurement locations and geometries precisely correlate.**		✘ Spot sizes, locations and measurement angles can differ, making correlation problematic.
✔ The spectral measurement is acquired immediately following the colorimeter and thus **minimizes sample luminance and chromaticity drift.**		✘ Measurements cannot be closely sequenced in time as one instrument needs to be mechanically replaced by the other in the imaging path.
✔ **All measurements are fast with automatic corrections.**		✘ Correction method is time consuming and is done infrequently.

To fulfill the measurement requirements of modern displays and lighting, Westboro Photonics offers the S3 high performance spectroradiometer with excellent dynamic range, linearity, stray light suppression and signal-to-noise ratio. Westboro Photonics can also work with other fiber optic spectroradiometers; contact us for details.



Deviation of the dominant wavelength (left) and delta u'v' (right) for different test LED sources using the S3 spectroradiometer.

SPECTRORADIOMETER MODEL	S3
Detector	Back-thinned CCD
Number of Pixels	1024 x 58
Wavelength Range	380-1100 nm
Optics	Symmetrical Czerny-Turner, 100 mm focal length
Digital Resolution	16 bit
Fiber diameter	1000 µm standard; 400 µm available
Data Interval and Spectral Bandwidth	0.7 nm, 2.9 nm
Wavelength Accuracy	± 0.5 nm
Stray Light (150 nm to the left of red LED peak, unweighted spectrum)	0.000 04
Integration Time	5.2 ms - 65 s
Linearity	0.8 %
Cooling	TE Cooled, stabilized at 5°C
Luminance Range*	0.004 to 75 000 cd/m^2
Luminance Accuracy (vs. NIST luminance standard)	3 %
Luminance Repeatability	0.2 %
Measurement Capabilities	Luminance, Illuminance, Luminous Intensity, Chromaticity, Correlated Color Temperature, Dominant Wavelength
PC Interface	USB 3.0
Dimensions (H, W, D)	185 x 161 x 185 mm
Power Consumption	12 VDC, 1.5 A
Weight	3.5 kg
Compliance	RoHS, CE

Specifications are for 1mm fiber guide, typical lenses at f/2.8 and illuminant A, light sources unless noted otherwise
* Low level of luminance range represents 10X signal to noise level at 8s exposure. High level represents maximum level using f/11.

TECHNICAL SPECIFICATIONS†

		WP690E/ES	WP6120E/ES
Sensor Model, Diagonal Size, Pixel Pitch		Sony ICX814, 16.0 mm, 3.69 µm	Sony ICX834, 15.8 mm, 3.1 µm
Sensor Type		16-bit, interline transfer CCD image sensor with microlens	
Sensor Megapixels		9.2	12
Pixel Array		3388 x 2712	4250 x 2838
Dynamic Range		75 db	75 db
High Dynamic Range (multi-exposure)		> 1 000 000:1	> 1 000 000:1
Luminance Minimum (cd/m^2)*	Limit of Detection	0.000 01	0.000 02
	SNR = 60	0.000 1	0.000 2
	SNR = 100	0.000 2	0.000 3
Luminance Maximum (cd/m^2)**		13 000	13 000
Luminance Maximum with ND Filters (cd/m^2)		> 10 000 000	> 10 000 000
System Accuracy***		Luminance (Y) ± 3 % CIE Chromaticity Coordinates (x,y) ± 0.003	
Short-Term Repeatability		Luminance (Y) ± 0.03 % CIE Chromaticity Coordinates (x,y) ± 0.000 05	
Minimum Measurement Time at 40 cd/m^2 – Native, 2x2 Binned, 4x4 Binned (s)		Luminance: 3.1, 1.6, 1.0 Color: 13.5, 7.3, 5.2	Luminance: 3.8, 1.8, 1.1 Color: 16.5, 8.2, 5.7
Spatial Measurement Capabilities		Luminance, Radiance, Illuminance, Irradiance, Luminous Intensity, Radiant Intensity, CIE Chromaticity Coordinates, Correlated Color Temperature (CCT), Dominant Wavelength, L*a*b*, Gamma, Gamut, Uniformity, ΔE*, User Defined	
Units		cd/m^2, fL, $W/sr/m^2$, lux, fc, W/m2, cd, W/sr, CIE (x,y), CIE (u',v'), K (CCT), nm	
Optional Filters		Scotopic, Radiometric, Circadian, IR, Custom	
Communication Interface		USB2	
Power		12 V, 24 W max.	
Dimensions Excluding Lens (H x W x D)		160 mm x 146 mm x 78 mm	
Weight		3.1 kg with typical lens, 2.8 kg without lens	
Operating Temperature		5°C to 35°C	
Operating Humidity		10% to 90% (no condensation)	

ORDERING SPECIFICATIONS	
OPTIONS	
E - No spectroradiometer	
ES - Integrated spectroradiometer	
ELECTRONIC LENSES	
LS-24-1.4L-EF	24 mm
LS-35-2.0-EF	35 mm
LS-50-1.2L-EF	50 mm
LS-100-2.8L-EF	100 mm
MANUAL LENSES	
LS-2X-EF	2x microscope
LS-5X-EF	5x microscope
LS-10X-EF	10x microscope
LS-Cono-EF	160° Conometer
LS-NED-EF	60° NED

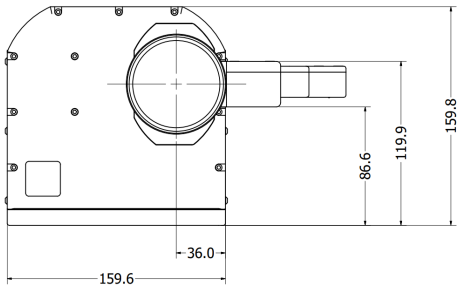
Refer to website for detailed field of view (FOV) information.

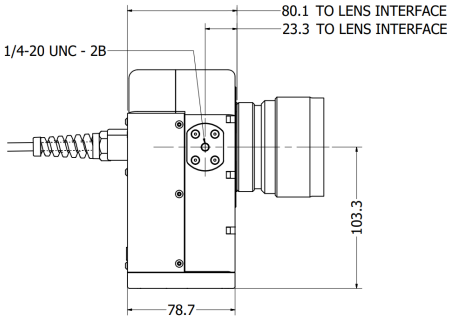
† Specifications are subject to change
* Using 7x7 pixel area
** Typical values for 24 mm lens using iris f/11
*** Based on measurements of illuminant A, 20x20 pixel area

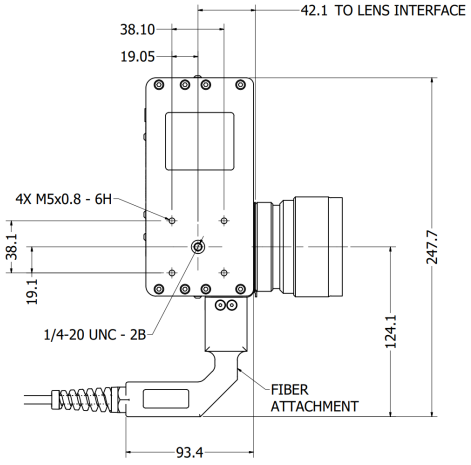
Westboro Photonics is an ISO/IEC 17025:2017 accredited calibration laboratory for 2D imaging photometers and imaging colorimeters. This accreditation has been granted by the National Voluntary Laboratory Accreditation Program (NVLAP, Lab Code 600285-0)

Westboro Photonics continually pursues improvements to the instruments. Specification adjustments, errata or omissions do not constitute grounds for compensation.

Dimensions are in millimeters







WESTBORO PHOTONICS
Suite 301, 1505 Carling Ave
Ottawa, Ontario
K1Z 7L9 Canada
Phone: +1.613.729.0614
Email: info@wphotonics.com
www.wphotonics.com

09/22