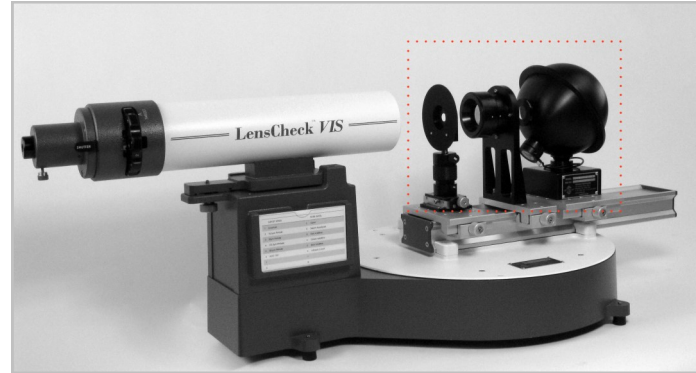


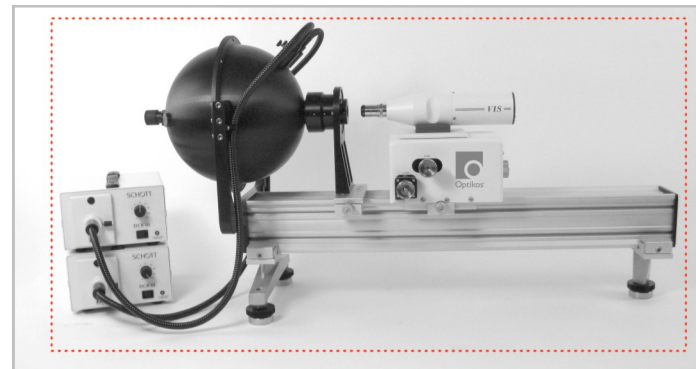
LensCheck™ Options (cont.)

TRANSMISSION KIT (VIS)



- Transmission measurements: measure sphere irradiance with or without UUT
- Accuracy of 0.1% validated using Reference Lens with uncoated window

STRAY LIGHT KIT (VIS)



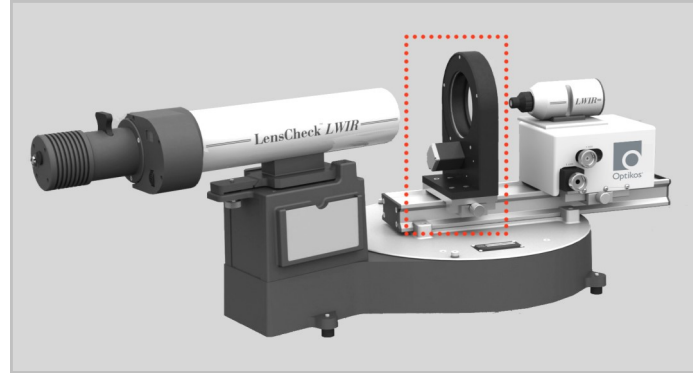
- Stray light measurements per ISO 9358
- For lenses with focal lengths >15mm (standard kit, 15mm)
- Black dot surrounded by uniform bright field
- Validated with reference lens down to 0.1%

APOCHROMATIC OBJECTIVES



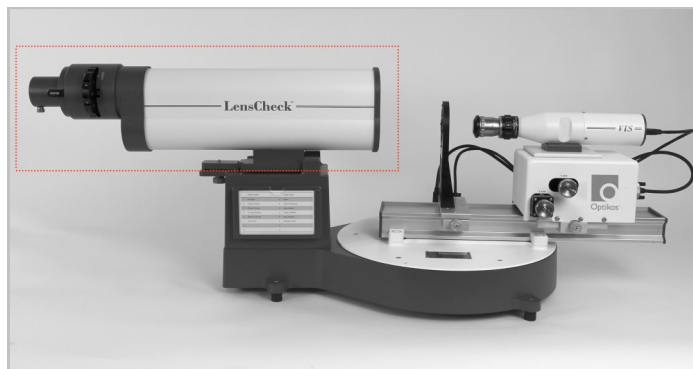
- Infinity corrected 10X, 20X, and 40X objectives with tube lens suitable for spectral broadband testing

ROTARY LENS MOUNT (VIS and LWIR)



- Motorized lens mount accommodates varying diameter lenses
- lens can be measured for centration and optical axis runout

REFLECTIVE COLLIMATOR



- Suitable for testing wide spectral ranges free of chromatic aberration
- Highest precision collimated wavefront quality
- Expanded focal length allows for testing longer focal length lens assemblies



POWERED BY OPTEST® SOFTWARE

LensCheck™ Lens Measurement Systems



LensCheck™ Systems Measure and Assess Image Quality for VIS/NIR and LWIR Lenses, and Feature:

- Patented VideoMTF® technology enables real time MTF measurements
- Flexible platform allows a wide range of measurements (e.g. MTF, EFL, distortion, etc.)
- VIS - industry leading measurement accuracy better than 2% (1% typical); and better than 1% repeatability (0.5% typical) –each validated with 50mm f/5 Audit Lens
- LWIR - industry leading measurement accuracy better than 3% (2% typical) to 40 lp/mm; and better than 2% (1% typical) repeatability –each validated with 50mm f/5 Audit Lens
- Configurable automated measurement routines
- Easily switch between wavebands (VIS/NIR, SWIR, or LWIR)
- Installed in production and R&D facilities around the world

LensCheck™ Lens Measurement Systems

Portable and Precise for VIS/NIR and LWIR Lens Measurements

LensCheck™ Systems are a cost-effective solution to your production and prototype lens qualification needs. Optikos, the leader in image quality test equipment, is pleased to offer this compact, efficient, easy-to-use quality control tool. LensCheck, with patented Optikos® VideoMTF image analysis software, features real-time MTF testing and analysis that allow manufacturers to qualify incoming products quickly and reliably and minimize the risk of sub-standard complete assemblies.

APPLICABLE LENSES FOR TESTING

Specification	VIS	LWIR
Entrance pupil diameter	Up to 50mm	Up to 50mm
Focal length	≤100mm (with appropriate image analyzer objective lens)	5-50mm
f-number of the lens	f/20 – f/1 (with appropriate image analyzer objective); The suitability of fast, non-telecentric lenses at off-axis field angles is determined by whether the image cone falls within the acceptance cone of the image analyzer objective.	f/20–f/1
Image format size	Up to 25mm image diagonal	Up to 25mm image diag.
Max spatial frequency	Up to 500 lp/mm customizable up to 1000	Up to 60 lp/mm

APPLICABLE MEASUREMENTS

- MTF–On/Off axis
 - EFL and f-number
 - Back focal length
 - Astigmatism
 - Field curvature
 - Distortion
 - Transmission (VIS option)
 - Stray light (VIS option)
 - Axial chromatic (VIS option–requires Reflective Collimator and Apochromatic Objective Relay Lens)
 - Lateral chromatic (VIS option-requires Reflective Collimator and Apochromatic Objective Relay Lens)
- Other characteristics that factor into the determination include spatial frequency of interest; chromatic performance of the lens; and departure from telecentricity at off-axis angles. These parameters are seldom independent, making it difficult to place rigid bounds on the space of lenses that may be tested on LensCheck instruments. However, it is generally true that lenses that fall within the bounds described above are usually good candidates for testing with the LensCheck. There may be special cases in which lenses within these bounds may not be suitable for testing, and there are also cases in which lenses outside of these bounds may be tested. Consult an Optikos engineer for advice.

SYSTEM SPECIFICATIONS

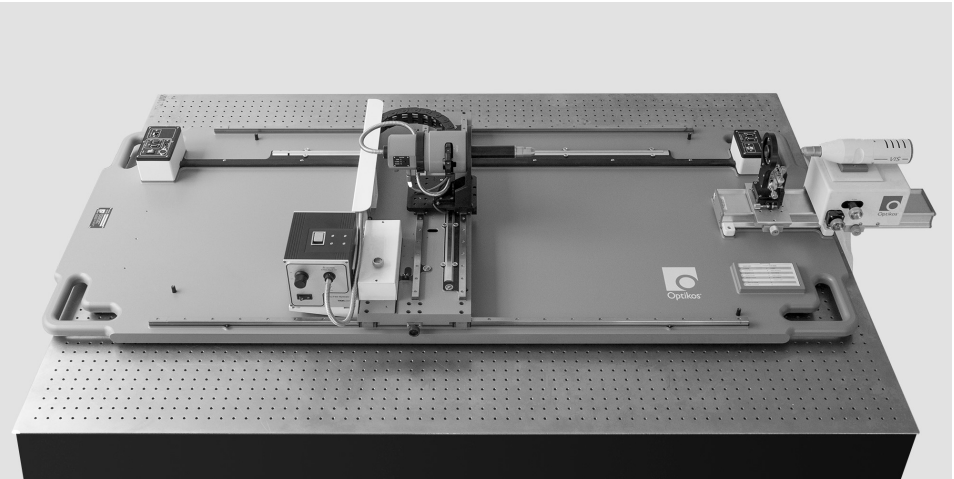
Specification	VIS	LWIR
Physical size	15" (355mm) H; 30" (762mm) W; 48" (1219mm) L	
Power Requirements	100 ~ 240 VAC 60/50 Hz; Computer 8/5A, Monitors 0.6A each, DC Power Supply 1.6A, Light Source 2/1A	
Environmental	Optimal performance is achieved in a dark room	
Refractive Collimator	355mm EFL, 50mm clear aperture; shorter EFL collimators available upon request	
Motorized Z-axis	25mm travel 0.1 μm resolution	
Motorized X-axis	25mm travel with 0.05 μm resolution glass scale encoder	
Manual Y-axis	12.5mm travel	
Motorized Lens Platform	+/- 105° off-axis rotation; 0.0001° resolution glass scale encoder; 0.5m optical rail; self-centering lens mount	
Source Module	Fiber optic light source: 400-1000nm 8-position manual target and filter wheels Target set: pinholes, USAF 1951 and alignment target Filter set: photopic, 546nm bandpass, infrared cutoff, and RGB set	Broadband Emitter: 7-15 microns 12-position high-speed motorized target wheel Target set: slits, pinholes, crosshairs, and alignment target Filter: 8-12 micron bandpass
Image Analyzer	Sony EXview HAD CCD II offers improved sensitivity, dynamic range, and noise characteristics: 2736 x 2192 pixels; Calibrated 40x 0.65NA achromatic objective 14-bit video output	Uncooled Microbolometer 324 x 256 format Spectral sensitivity 7.5-15 microns Calibrated 7.5x 0.70NA relay lens 14-bit video output

LensCheck™ Options

Customized Testing for Your Application

Options	VIS	LWIR
Finite Conjugate Instrument (available as an option or standalone unit)	✓	
Adjustable Conjugate Instrument (available as a standalone unit or by customizing existing LensCheck)	✓	
Stray Light Kit	✓	
Achromatic Objectives	✓	
Apochromatic Objectives	✓	
Transmission Kit / Relative Illumination Kit	✓	
Rotary Lens Mount–360°	✓	✓
Line of Sight (Rotary Lens Mount)	✓	✓
Reflective Collimator	✓	✓
Audit and Reference Lenses	✓	✓
Lens Mounts: Supplied with standard three-jaw caliper lens holder for lenses with diameters in 5-25mm range. For best results, we suggest using available lens mount for specific mounting interfaces. A partial list of available adapters includes the following: M7 through M12; C-Mount; T-Mount; etc. Custom adapter plates available.	✓	✓

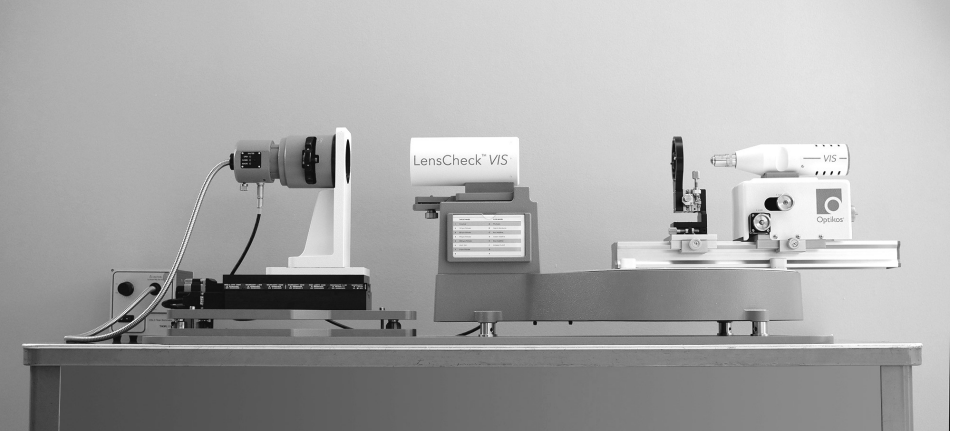
FINITE CONJUGATE INSTRUMENT



The Finite Conjugate Lens Measurement Instrument is available as a *standalone* unit or as a LensCheck™ VIS *option*. When used as a LensCheck option for measuring finite distances, the LensCheck™ Image Analyzer (IA), IA Mount and Lens Mount are removed from the LensCheck unit and mounted to the instrument base. The image may then be moved to a precise location on the rail, and may be moved off axis.

Manual Z-axis: 1000mm travel with 0.01mm resolution encoder; Motorized X-axis:

ADJUSTABLE CONJUGATE INSTRUMENT



The Adjustable Conjugate Lens Instrument is available as a standalone unit or by customizing your LensCheck. It allows you to measure lenses at any object distance—from –1m to infinity to +1.2m for real object distances; and at any field angle within +/- 110°. The negative conjugates are used for applications such as virtual reality, where the image is formed behind the lens you are testing.