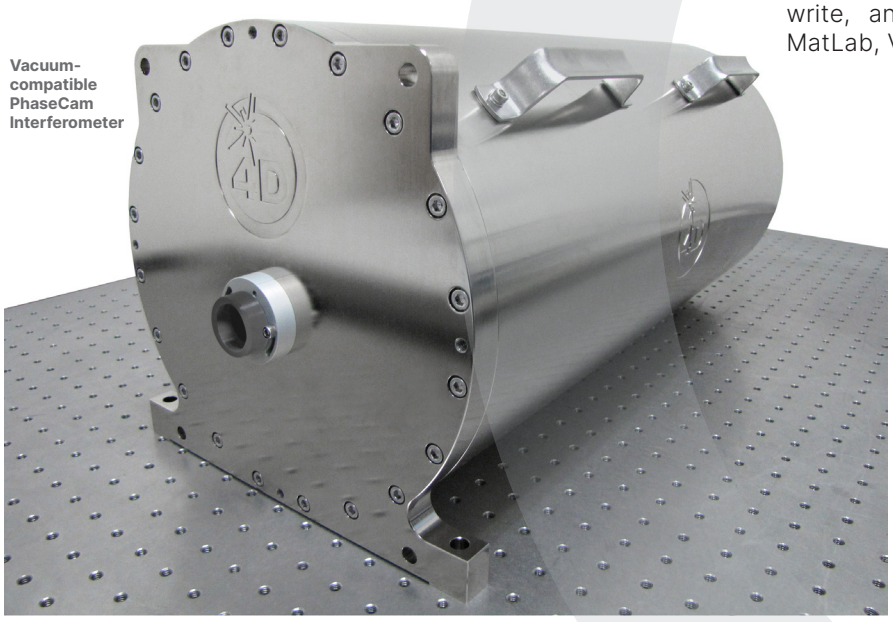
Vacuum Compatible Dynamic Twyman Green Interferometer

Instantaneous Acquisition

The PhaseCam® vacuum-compatible laser interferometer is a remotely operated instrument, contained within a nickel-plated, aluminum pressure vessel, for measuring optics and optical systems in thermal/pressure chambers.

PhaseCam is the industry standard for measuring large, focal optical systems such as concave telescope mirrors and lens systems. The system is equally well suited for testing small aperture afocal components such as flat mirrors and collimators.

The system incorporates patented technology using a single camera, high-speed optical phase sensor to acquire data in less than 30 microseconds—over 5000 times faster than a temporal phase shifting interferometer. Fast acquisition time enables the PhaseCam to measure under almost any conditions, without vibration isolation. This insensitivity to environmental factors makes the PhaseCam ideally suited for use in clean rooms and environmental test chambers, where pump noise and vibration can make testing difficult or impossible with traditional instruments.



Vacuum-compatible PhaseCam Interferometer

Complete Measurement System

The PhaseCam 4030 system includes the interferometer, pressure vessel, electronics box, 4Sight™ Focus advanced wavefront analysis software and a high-speed computer system. Thermal control is provided via integrated nitrogen ports, and a single umbelical provides electronic connections and communication.

Industry Leading Analysis, Standard

4Sight Focus wavefront acquisition and analysis software utilizes a user-friendly interface with unmatched simplicity, analysis features and graphical displays.

4Sight's 64-bit acquisition engine produces rapid analysis and display of single, averaged or burst measurements. Continuous data acquisition and real-time Zernike bar plots provide real-time visual feedback for simplifying optical system or beam train alignment.

The user-friendly interface makes data comparison, manipulation, masking, reference subtraction, filtering and terms removal simple to perform. Zernike, Seidel, geometric and diffraction analyses are standard. Comprehensive data sharing capabilities let you read, write, and save most file types, including Zemax, MatLab, Vision, MetroPro, HDF5 and CodeV.

FEATURES

- Vibration Insensitive Dynamic Operation
- 30 µsec Data Acquisition Time
- Operating Pressure Down to 1 Torr

APPLICATIONS

- Vacuum Chamber Testing
- Thermal and Environmental Testing
- Meter-Class Telescope Optics
- Quality Verification of Optical Components

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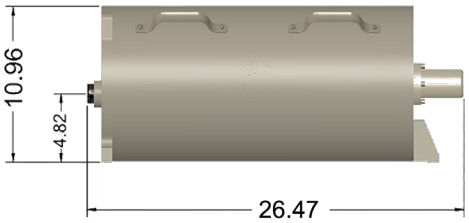
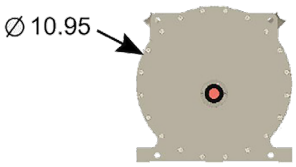
Specifications

Configuration	Model PhaseCam Vacuum-Compatible
Description	Vibration insensitive dynamic Twyman-Green interferometer
Acquisition Mode	Single camera, high-speed optical phase sensor
Laser Source	Stabilized HeNe @ 632.8 nm
Max. Cavity Length	> 100 m
Beam Diameter	8.75 mm collimated FWHM
Polarization	Circular
Divergers	Vacuum-compatible lenses from f/1 to f/32
Focus Range	±12.5 mm, optical magnification dependent
Pupil Magnification	Fixed, 10X digital zoom
Fringe Contrast	User-adjustable for reflectivity from 1–100%
Camera	4 MPx, 12-bit standard
Data Array	User selectable full, half, quarter data arrays
Motorized Controls	Focus, reference and aperture blocks, contrast adjustment
Operating System	Windows® 10
System Software	4Sight™ Focus Analysis Software
	Instantaneous phase shifting data acquisition
	Reference generation, subtraction, data averaging, masking
	2D and 3D surface maps
	Zernike / Seidel / Slope / Geometric / Fourier Analysis
	Fiducial-aided data set mapping
	HDF5 data format standard, others supported
	Analysis of multiple sub-apertures
	Upgrades free during warranty period
Power Consumption	< 750 Watts with computer
Temperature Range	Operational: 16–27° C (60–80° F), non-condensing
	Storage: -1–38° C (30–100° F), non-condensing





System Performance	
Acquisition Rate	> 10 frames/sec live video; 4 interferograms/frame
	> 20 frames/sec max data acquisition with post processing
Minimum Exposure	30 µsec
Sample Reflectivity	1 to 100%
RMS Repeatability	< 0.001 wave*
RMS Precision	< 0.002 wave**
Warranty	One Year, limited, on-site system installation & operator training

Configuration	Pressure Vessel
Material	Nickel plated aluminum
Minimum Pressure	1 torr
Leak Rate	<5 torr/24 hours
Thermal Control	3–6 CFM nitrogen required
Electrical	Gig E and power cables
Physical Envelope	28 × 28 × 67.3 cm (11 × 11 × 26.5 in)
Weight	24 kg (53 lbs)

* One sigma for RMS of 10 data sets of calibration mirror; each data set is an average of 16 measurements.

** Average RMS of the pixel by pixel difference of 10 data sets between measured surface and the calibrated surface. Each data set is an average of 16 measurements. Calibrated surface is the average of all 160 measurements.

Patent 7,230,717. Other patents may apply.

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