PhaseCam® Model 6000

4D Technology

High Performance Dynamic Twyman-Green Interferometer

Instantaneous Acquisition

The PhaseCam® 6000 is an extremely compact and light-weight dynamic laser interferometer for measurement of optics and optical systems. With an easy-to-position, fiber-coupled measurement head and motorized controls, the PhaseCam 6000 is ideal for measuring large, focal optical systems such as concave telescope mirrors and lens systems, as well as small-aperture, afocal components such as flat mirrors and collimators.

The PhaseCam 6000 incorporates patented technology using a single camera, high-speed optical phase sensor that makes a wavefront measurement in as little as 30 microseconds—over 5000 times faster than a temporal phase shifting interferometer. Because acquisition time is so short, the PhaseCam can be used without vibration isolation or turbulence control, making it ideally suited for use in situ on production equipment, in clean rooms and in environmental test chambers.

Complete Measurement System

The PhaseCam 6000 is a turnkey instrument that includes the interferometer, 4Sight™ advanced wavefront analysis software, and high-speed computer system. Samples with reflectivity from 1% to 100% can be performed with a simple adjustment. Its stabilized HeNe laser (632.8 nm) provides excellent coherence stability.

Industry Leading Analysis, Standard

4Sight wavefront analysis software features a user-friendly interface with unmatched simplicity, analysis features and graphical displays. The Measurement Console display aids alignment and execution of single, averaged, burst or continuous data acquisition. The Measurement Flow interface lets you visualize the entire measurement data flow, from raw acquisition through masking, reference subtraction, terms removal, etc. The unique Measurement Stack enables complex data manipulation and comparison. Zernike, Seidel, geometric and diffraction analyses are easy to perform. Comprehensive data sharing capabilities let you read, write, save and print from most file types, including MetroPro®, IDL®, MatLab®, Opticode®, Vision®, HDF5® and CodeV®. Generating phase movies to characterize deforming surfaces and moving parts is simple and straightforward.

Accessory Optics

Numerous accessories and options are available, including low-reflectivity diverger lenses, beam expanders, wavelength options, and corner cubes for easy alignment.

FEATURES

- Vibration Insensitive Dynamic Operation
- 30 µsec Data Acquisition Time
- 1000 x 1000 Pixel Camera
- Outstanding Data Analysis and Visualization Software

APPLICATIONS

- In Situ Process Control
- Large Telescope Optics
- Quality Verification of Optical Components
- Vacuum and Environmental Chamber Testing
- Focal Optical Systems
- Adaptive Optics and Moving Parts

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Specifications

Configuration	Model 6000
Description	Turnkey vibration insensitive dynamic Twyman-Green interferometer
Acquisition Mode	Single camera, high-speed optical phase sensor
Optical Path	Fiber-coupled head and laser source module; 5 m fiber length
Laser Source	Stabilized HeNe at 632.8 nm
Maximum Cavity Length	>100 m
Beam Diameter	9.0 mm collimated
Polarization	Circular
Pupil Focus Range	±12.5 mm
Pupil Magnification	Fixed, 4X digital zoom
Fringe Contrast	User adjustable for reflectivity from 1–100%
Camera	1K X 1K pixels, 10-bit standard
Data Array	User Selectable full, half, quarter data arrays
Computer System	Minimum Dual Core 2.4 GHz processor 4 GB RAM, 320 GB hard drive
	CDRW, DVDRW, 22 in LCD monitor, keyboard, mouse
Operating System	Windows XP®
System Software	4Sight™ Analysis Software, with User Manual
	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
	HDF4 / HDF5 data format standard, others supported
	Absolute sphere, prism & corner cube analysis
	Multiple sub-aperture analysis
	Upgrades – free during warranty period
Physical Envelope	Measurement Head: < 18.0 x 16.2 x 9.1 cm (7.1 x 6.4 x 3.6 in)
	Laser Source: 48.3 x 20.3 x 11.9 cm (19 x 8.0 x 4.7 in)
Weight	Measurement Head: < 4.5 kg (10 lbs)
	Laser Source: 8.2 kg (18.0 lbs)
Quiescent Heat Dissipation	Interferometer 5W, Source Module 22W
Power Consumption	< 50W at 120 V AC instrument and source module
	< 750W at 120 V AC with computer and monitor
Temperature Range	Operational: 60–80° F, non-condensing
	Storage: 30–100° F, non-condensing
Warranty	One Year, limited, on-site system installation and operator training
Options	
Beam Expanders	22.5 mm or 45 mm (others on request)
Diverging Lenses	Range of lenses from f/1 to f/32; low reflectivity diverging lenses
Stage	5-axis (X, Y, Z, tip and tilt)
Special Analysis	Modal (Vibration) Analysis
Extended Precision Package	2X improvement in RMS precision
System Performance	
Acquisition Rate	> 10 frames/sec display; 4 interferograms/frame
	> 25 framse/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**

PhaseCam 6000 with laser source, hand held controller and optional 5-axis mount

Extended Precision Package Option.

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

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

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All specifications subject to change without notice.

CE

LASER RADIATION
AVOID DIRECT EYE EXPOSURE
CLASS 3R LASER PRODUCT
<1mW at 633nm