

## High Performance Dynamic Twyman Green Interferometer

### **Instantaneous Acquisition**

The PhaseCam<sup>®</sup> 6000 is an extremely compact and lightweight 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 Dynamic Interferometry<sup>®</sup> technology, using a single camera, high-speed optical phase sensor to make wavefront measurements in less than 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<sup>™</sup> advanced wavefront analysis software, and a high-speed computer system. Samples with reflectivity from 1% to 100% can be measured with a simple adjustment. Choose a stabilized HeNe (632.8 nm), 1053 nm or 1064 nm laser source to measure optics at their functional wavelength.



PhaseCam Model 6000

### Industry Leading Analysis, Standard

4Sight wavefront analysis software features a user-friendly interface with unmatched simplicity, analysis features and graphical displays. The Measurement Screen aids alignment and execution of single, averaged, burst or continuous data acquisition. The Measurement Flow interface lets you visualize the entire measurement process, from raw acquisition through masking, reference subtraction, terms removal, etc. 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<sup>®</sup>, MatLab<sup>®</sup>, Opticode<sup>®</sup>, Vision<sup>®</sup>, HDF5<sup>®</sup> and CodeV<sup>®</sup>. Generating phase movies to characterize deforming surfaces and moving parts is simple and straightforward.

## **Accessory Optics**

Numerous accessories and options are available, including a 5-axis mounting stage, low-reflectivity diverger lenses, beam expanders and a visible alignment laser to speed test setup.

# **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
- Optical Testing of Moving Parts



## **Specifications**

### Configuration

Description
Acquisition Mode
Optical Path
Laser Source
Maximum Cavity Leng
Beam Diameter
Polarization
Field of View
Focus Range
Magnification
Fringe Contrast
Camera
Data Array

Computer System Operating System System Software

Physical Envelope

Weight

Quiescent Head Dissipation Power consumption

Temperature Range

#### **Options**

Beam Expanders Divergers Stage Special Analysis Alignment Laser

#### System Performance

Acquisition Rate Minimum Exposure

Sample Reflectivity **RMS** Repeatability **RMS** Precision

## Model 6000

Vibration insensitive dynamic Twyman-Green interferometer Instantaneous Phase Shifting with pixelated phase sensor Fiber-coupled head and laser source module; 5 m fiber length Stabilized HeNe @ 632.8 nm; optional 1053 nm or 1064 nm >100 m 9 mm collimated FWHM Circular 8.95 mm ±12.5 mm Fixed, 4X digital zoom User adjustable for reflectivity from 1-100% 1k x 1k pixels, 10-bit standard User selectable full, half, quarter data arrays High performance PC Windows® 7 4Sight<sup>™</sup> 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 HDF4 / HDF5 data format standard, others supported Absolute sphere, prism & corner cube analysis Multiple sub-aperture analysis Upgrades free during warranty period

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) Measurement Head: < 4.5 kg (10.0 lbs) Laser Source: < 8.2 kg (18.0 lbs) Interferometer 5 Watts; Laser Source 22 Watts < 50 Watts at 120 V AC Measurement Head and Laser Source <750 Watts at 120 V AC with computer and monitor Operational: 16-27° C (60-80° F), non-condensing Storage: -1-38° C (30-100° F), non-condensing

Optional 22.5 mm, 45 mm (others on request) Range of lenses from f/1 to f/32; low reflectivity diverging lenses 5-axis (X, Y, Z, tip and tilt) Modal (Vibration) Analysis Visible 532 nm laser for faster alignment of test setups

> 10 frames/sec display; 4 interferograms/frame (camera dependent) > 25 frames/sec max data acquisition with post processing 30 µsec 1-100%

< 0.001 wave\* < 0.002 wave\*\*

Warranty

One Year, limited, on-site system installation and operator training

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

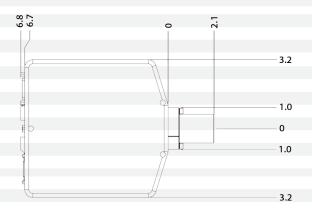
\*\* Average RMS of the pixel by pixel difference of 10 data sets between measured surface and the calibrated surface. Each data set is an average of 16 measurements. Calibrated surface is the average of all 160 measurements. 10.30.2015 Corporation

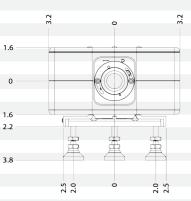
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Patent 7,230,717. Other patents may apply.



PhaseCam 6000 with laser source, hand held controller and optional





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