

Distortion Tester



Measuring instrument for lens manufacturers and labs

In addition to its image quality, the distortion of a lens is a major criterion describing the performance of lenses, e.g. in architectural photos or photogrammetry photos.

The Carl Zeiss distortion measurement device calculates the radial distortion of lenses with an infinite object distance to be determined in compliance with the German standard DIN 58187. Furthermore, the focal length of the lens under test is measured very precisely.

The measuring station consists of a base plate, on which the rotary stage and up to three collimators are mounted. The rotary stage features a precise goniometer. A display unit is connected directly and the angle data can be transferred from the display unit to a PC via a serial interface. A horizontally movable slide with attached lens holder is mounted on the rotary stage. A precise glass scale illuminated by a green LED array is positioned in the image plane of the lens under test. The glass scale is imaged at infinity by the test sample and observed using a collimator.

Value pairs consisting of image height and field angle are determined by turning the test piece around its entrance pupil. This permits the calculation of the lateral magnification in the image field. The difference between the lateral magnification in the image field and the on-axis lateral magnification is referred as distortion.



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Technical Data and Modules

Basic Unit

Collimator lens	300mm focal length 100mm and 1000mm focal length as option
Parallax-free observation	With a CCD-Camera placed on the collimator-ocular and a monitor with cross-line generator.
Rotatable stage	With coarse and fine adjustment Rotation-angle $\pm 90^\circ$
Lens-adaptation	360° rotatable Horizontal position adjustable to place the entrance pupil of the lens under test into the rotation-point.
Computer	Operating system Windows XP Evaluation-software for distortion and focal length
Required space [cm] (WxDxH)	210 x 120 x 65
Power supply	100-240V AC, 50-60Hz / 100VA

Angular Measurement

Goniometer	Accuracy $\pm 1''$
Displayunit	Display-accuracy 0.00005° , with RS-232 data-interface

Scale and Illumination

Scale adjustment	Coarse and fine- adjustment Scale moveable in x- and y-direction for zero-point adjustment Two axis tilt adjustment referred to the image plane
Scale	Chromium glass with 0.25 mm division Length: ± 60 mm
Illumination	Adjustable green LED's with peak wavelength at 568nm (30nm half-width)



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Accuracy of measurement

Depends on Collimator-, lens- focal-length and image field position

Typical Values:

Distortion Measurement (relative)	±0.05%
Focal-length Measurement	±0.002mm

Lens under Test

Mechanical interface for the lens-adaptation	Screw-mount M 82x1
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Length of the lens	max. 550mm
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Diameter of the lens (rear)	90mm
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Weight of the lens	max. 10kg
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Focal length	2-800mm
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Field size (∅)	120mm
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Environmental conditions

Temperature	15°C to 35°C
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Humidity	< 75%
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Options

- Collimator 100mm
- Collimator 1000mm
- Lens adaptation
- Reference lens

Subject to change