

**ImageMaster® HR**  
Ultra-accurate, Multi-functional  
MTF Test Station



ImageMaster®  
R&D Line  
Universal Line  
Production Line

## ImageMaster® HR

### Outstanding Level of Accuracy and Flexibility

The ImageMaster® HR is a fully equipped R&D quality test station for medium sized sample lenses. Its modular and upgradeable design enables the measurement of the image quality (MTF) and a wide range of other optical parameters for today and future needs. The instrument is used in the R&D laboratory as well as in the quality assurance or in production. The unique vertical setup of the ImageMaster® HR is space saving and ensures the most convenient and accurate positioning of the sample lens mounts. For the majority of lenses this vertical measurement with the gravitational force along the optical axis is advantageous and easy to handle.



Off-axis measurement with the precise swinging arm



Motorized object generator for finite conjugate systems

With the collimator on the precise swinging arm an ultra-wide field angle up to  $\pm 105^\circ$  can be measured for infinity conjugate samples. An upgrade for finite testing can easily be adapted to the system with an additional motorized stage and object generator.

For the whole product only high quality components are used to ensure the most accurate measurements for MTF testing on the market.

### Measurement Parameter

- MTF on-axis and off-axis
- Effective Focal Length (EFL)
- Distortion
- Field Curvature
- Lateral and longitudinal chromatic aberrations
- Astigmatism
- Relative Illumination
- Field of View
- Chief Ray Angle
- Depth of focus, etc.
- F-Number
- Relative Flange Focal Length
- Veiling Glare

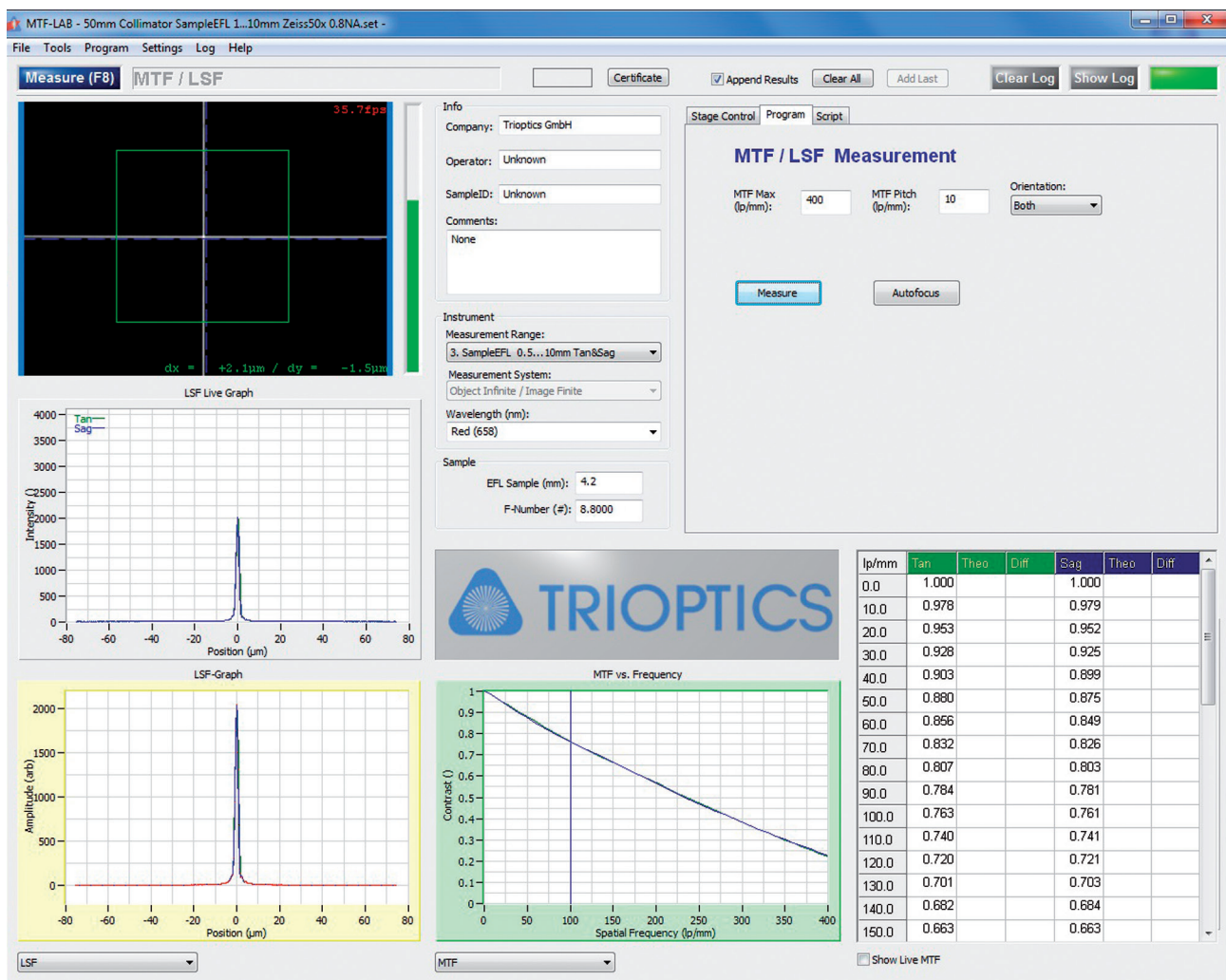
## Software

TRIOPTICS has developed a new forward-looking software package called MTF-Lab. Several useful functions are integrated which help the user in scanning and perceiving the correct image position of the sample under test. Changing the measurement mode is easy and time-saving. All important measurements for the imaging properties have been revised and are quickly accessible. The script language for advanced measurements was improved and extended including a simple programming function for stage controlling, data manipulation, loops and variables. The data export is possible to a variety of file formats. For creating certificates the hypertext language protocol (HTML) is used.

## Options and Upgrades

TRIOPTICS continuously improves the ImageMaster® HR and offers a wide range of possible options and upgrades:

- Motorized high precision sample holder
- Motorized reticle and filter changer
- Motorized finite conjugate stage with manual or motorized object generator
- Various different collimators
- Extensions for the spectral ranges NUV, NIR (MWIR, LWIR)
- Additional filters and reticles
- Extensions of nearly all stages etc.



Simultaneous MTF measurement in the sagittal and tangential planes with a crosshair target

## Specification ImageMaster® HR

Parameter	ImageMaster® HR
Optical set up	Infinity conjugates (finite optional)
Max. off-axis angle	$\pm 105^\circ$
Spectral range	450...750 nm, halogen (NIR/NUV optional)
Azimuth range	$360^\circ$
Max. image height	$\pm 46$ mm opt.
Spatial frequency (in specification) Max. spatial frequency	0 ... 500 lp/mm 1000 lp/mm (depending on sample)
MTF on-axis and off-axis Accuracy Repeatability	2% 0.5
Effective Focal Length Accuracy	From 0.5...3 mm: $\pm 5 \mu\text{m}$ From 3...10 mm: $\pm 0.2\%$
Distortion Accuracy (without / with encoder) Repeatability (without / with encoder)	$\pm 0.7\%$ / $\pm 0.25\%$ $\pm 0.3\%$ / $\pm 0.1\%$
Lateral chromatic aberration Accuracy Repeatability	$\pm 0.5 \mu\text{m}$ $\pm 0.3 \mu\text{m}$
Longitudinal chromatic aberration Accuracy Repeatability	$1 \mu\text{m}$ $\pm 0.2 \mu\text{m}$
Chief Ray Angle Accuracy Repeatability	$\pm 1^\circ$ $\pm 0.4^\circ$
Flange Focal Length (relative) Accuracy Repeatability	$\pm 2 \mu\text{m}$ $\pm 1 \mu\text{m}$
Astigmatism Accuracy Repeatability	$\pm 4 \mu\text{m}$ $\pm 1 \mu\text{m}$
Field curvature Accuracy Repeatability	$\pm 2 \mu\text{m}$ $\pm 1 \mu\text{m}$
Relative Illumination Accuracy Repeatability	$\pm 3\%$ $\pm 2\%$



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