HASO R.FLEX2

FROM 400 TO 1100 nm
WITH λ/200 RMS ACCURACY

COMPACT AND ROBUST
FOR EASY INTEGRATION

UP TO 21000
SAMPLING POINTS

UP TO 1 kHz
ACQUISITION FREQUENCY

Wavefront and MTF measurements for characterizing optical components, such as lenses, filters, waveplates, telescopes and complex optical systems

A UNIQUE SET OF ADVANTAGES

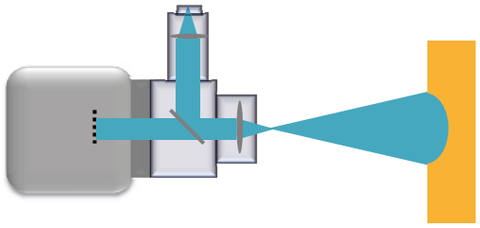
- λ/200 rms measurement accuracy in double-pass configuration
- Patented technology, which allows simultaneous and independent measurement of phase and intensity
- Insensitive to vibrations and atmospheric turbulences
- Platform compatible with fibered light sources in 400-1100 nm wavelength range
- Delivered with WaveView metrology software
- Collimated or diverging exit beam with several standard focusing modules from F/0.9
- Removable wavefront sensor for using it as a stand-alone unit
- Highly accurate wavefront analysis even with central obscuration and spider-beam types
- Several accessories available , such as laser diode light sources, reference mirrors for calibration, translation stages, *etc*
- Latest generation of HASO Shack-Hartmann wavefront sensors included

imagine optic

HASO R.FLEX2 Examples of measurement configuration

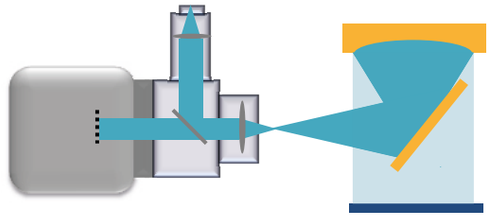
Measuring large concave mirrors

HASO R-Flex has been optimized using proprietary designs that enable manufacturers to accurately measure large uncoated concave mirrors by positioning the unit to measure at the center of curvature.



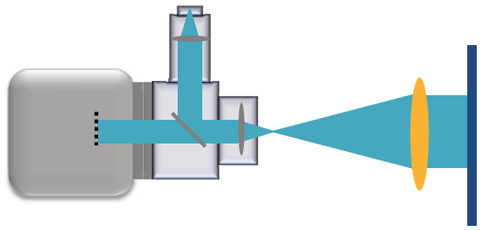
Characterizing complex optical systems

Complex optical systems such as telescopes and collimators can be readily characterized by HASO R-Flex. The best focal point can be found using wavefront error whereas, if the focus point is defined mechanically, optics can be aligned for that point.



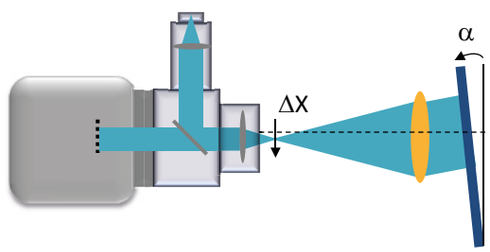
Measuring lenses on-axis

Any diameter lenses are easily measured with HASO R-Flex by using a coated or uncoated flat reference mirror to reflect the beam back to the wavefront sensor without adding any aberrations.



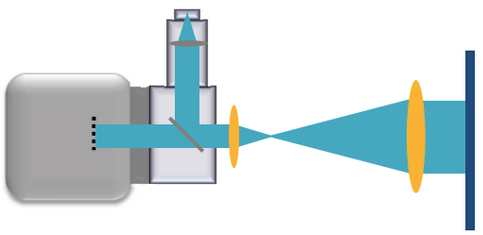
Characterizing lenses in the field

By mounting the HASO R-Flex onto a translation stage and orienting the flat reference mirror correspondingly, you can qualify lenses at any point in the field.



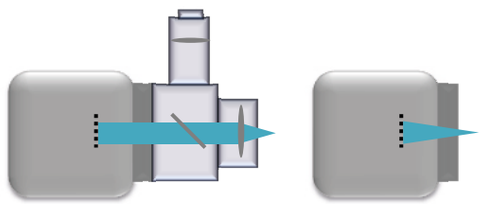
Characterizing & aligning beam expanders

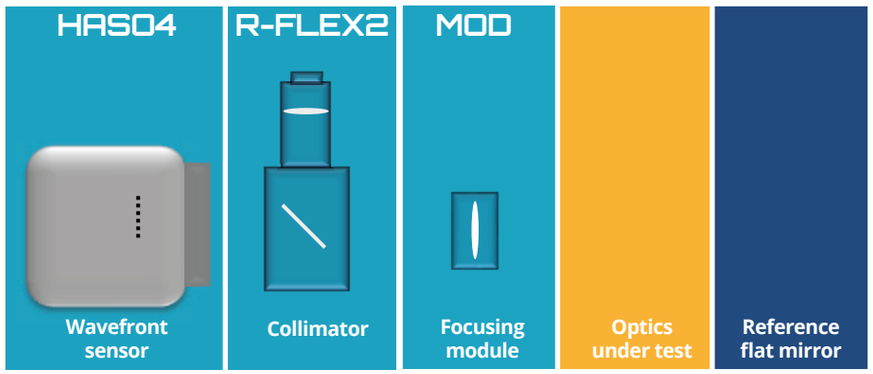
HASO R-Flex's modularity is particularly useful since its focusing unit dismounts quickly and therefore a collimated beam can be used as an illumination source to characterize the beam expander without adding any aberrations.



Working with external sources

High N/A external sources can be accurately measured because the optical head can be completely characterized (left image). Dismount it, and you can use the wavefront sensor as a stand-alone unit (right image).





FOCUSING MODULES

Compatibility with HASO wavefront sensors and F/#

	HASO4 126 *	HASO4 BROADBAND	HASO4 FIRST	HASO4 FAST
Number of microlenses	**Up to 21420 (126x170)**	**Up to 3400 (50 x 68)**	**Up to 1280 (32 x 40)**	**Up to 256 (16 x 16)**
Maximum acquisition frequency (Hz)	**30**	**20**	**99**	**1000**
Module name	**F number / WFE (nm RMS)****			
MOD F20	-	**4.0 / 160**	**5.6 / 40**	**17.2 / 5**
MOD F31	**3.0** /250	**5.9 / 20**	**8.4 / 10**	**25.5 / 5**
MOD F40	**4.1 / 150**	**8.1 / 15**	**11.5 / 10**	**35.1 / 5**
MOD F50	**5.1 / 100**	**10.0 / 10**	**14.2 / 5**	**43.5 / 5**
MOD F60	**5.9 / 30**	**11.7 / 8**	**16.5 / 5**	**50.5 / 5**
MOD F75	**7.4 / 20**	**14.6 / 5**	**20.6 / 5**	**63.1 / 5**
MOD F4.5 AFOx1 + MOD50-1	-	**0.9 / 120**	**1.3 / 30**	**3.8 / 5**
MOD F9 AFOx1 + MOD50-2	-	**1.8 / 40**	**2.5 / 10**	**7.5 / 5**
MOD F9 HR AFOx0.5 + MOD50-1	**0.9 / 130**	-	-	-
MOD F18 HR AFOx0.5 + MOD50-2	**1.8 / 50**	-	-	-

* ***HASO4 126 VIS*** *for 400-800nm and* ***HASO4 126 Broadband*** *for 400-1100nm wavelength range*
*** WaveFront Error (WFE) at the output of the module for a circular pupil corresponding to the nominal F/#*

Focusing module specifications

	Focal length (mm)	Required back power (%)	Working distance* (mm)	Module length** (mm)
MOD F20	20.4	3	10.4	50.3
MOD F31	30.3	3	-0.7	66.6
MOD F40	41.7	3	8	40.8
MOD F50	51.7	3	3.6	103.1
MOD F60	60.1	3	15.2	42.5
MOD F75	75.1	3	12.8	73.6
MOD F4.5	4.5	50	0.6	205.9
MOD F9	8.9	50	1.2	250.0
MOD F9 HR	9	50	0.6	247.8
MOD F18 HR	17.8	50	1.2	247.2

All focusing modules have pupil imaging. In other words, the microlens array of the wavefront sensor is imaged at infinity by the focusing module.
** Distance between the focal plane and the first mechanical interface (with centering tool removed)*
*** Distance from the module mounting surface to the first mechanical interface (with centering tool removed)*

HASO4 126 | HASO4 BROADBAND | HASO4 FIRST | HASO4 FAST

Accessories

Translation stages

Our ΘXΘY rotation stage for angular alignment or the 5-axis stage that provides 2-way rotation around X and Y axes as well as 3-way translation along X, Y and Z axes is a perfect complement to the HASO R-Flex system.

Software add-on

HASO R-Flex2 is delivered with WaveView software, which is a leading wavefront metrology software providing 180 independent features. We also offer optional software modules including MTF (Modulation Transfer Function) and PSF (Point Spread Function) that increase the functionality of HASO R-Flex system.

Reference mirrors

Spherical reference mirror (ø20mm useful pupil, R=15mm, F/0.75) for the calibration of HASO R-Flex in double-pass measurement configuration.
Flat reference mirror for autocollimation. Several options are available in diameter and flatness.

Single-Mode Laser Source (SMLS)

For those who want to use their HASO R-Flex2 at different wavelengths, we provide additional single-mode diode lasers with a FC/APC - FC/PC fiber patch cord to further expand the versatility of the system. Please contact us if you prefer to use your own light source.

NEW: R-Flex Kit

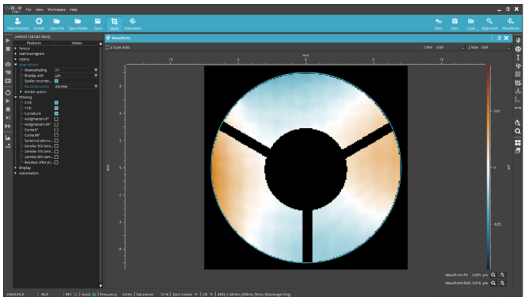
Kit for R-Flex calibration check and maintenance. It includes a light source for pre-alignment and fiber checking, a dust remover, a telescopic mirror, a torch lamp, a plane mirror, a retroreflector, and the instruction for R-Flex calibration check.

Available SMLS wavelengths:

Model name	Wavelength (nm)	Maximum power (mW)
SMLS 405-S	405	4.5
SMLS-488-S	488	4.5
SMLS 520-S	520	4.5
SMLS 635-S	635	4.5
SMLS 785-S	785	4.5
SMLS 830-S	830	4.5
SMLS 1064-S	1064	4.5
SMLS 1550-S	1550	4.5
SMLS custom	Ask	Ask

SMLS

HASO R-FLEX2 with MOD F31 focusing module


Screenshot of WaveView software showing a wavefront map of a spider-type beam

www.imagine-optic.com