

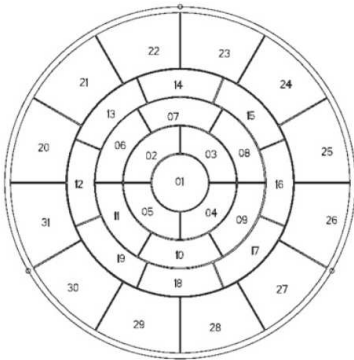
MONOMORPH DEFORMABLE MIRROR FOR HIGH POWER LASER APPLICATIONS

A BREAKTHROUGH IN ADAPTIVE OPTICS FOR HIGH INTENSITY LASER BEAMS

MONO 31 DEFORMABLE MIRROR



FRONT VIEW



31 ELECTRODES

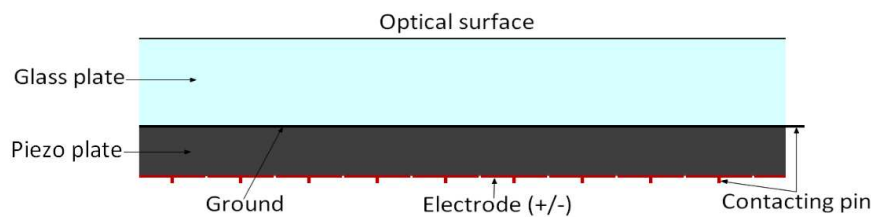


BACK VIEW

CILAS is a pioneer in the field of Adaptive Optics. We have developed and manufactured performant deformable mirrors (Stacked array, Bimorph, Monomorph mirrors) notably for astronomy and laser applications, for more than twenty years. With our experience and our know-how, we have increased the number of actuators, the mirror sensitivity as well as we have improved the optical quality. Our DMs represent a breakthrough in Adaptive Optics and their reliability has been fully demonstrated.

Principle and advantages

CILAS monomorph mirror is a deformable mirror (DM) made of the assembly of one plate of piezoelectric material and one glass plate which is polished and coated (see figure below).



This simple design allows to reduce the usual "print through effect" of DMs which is due to discontinuities (electrodes, actuators ...) at the backside of the optical plate. High spatial frequencies on the residual wavefront of the laser beam are minimized. This DM gives an optimal correction of the wavefront distortions without creating energy modulations in the propagation of the laser beam.

Main specifications

	MONO 63	MONO 31
Useful aperture (mm)	85	85
Number of electrodes	63	31
Inside pupil	47	19
Outside pupil	16	12
Correction ability (μm WF PV)		
Defocus	20	20
Astigmatism about 0°	10	10
Astigmatism about 45°	10	10
Coma x	8	4
Coma y	8	4
Primary spherical	4.5	2.3
Mechanical housing (d x l)	~ 140mm diam / 60mm depth	
Driver	ED64	ED32

Customized mirrors :

- Useful aperture : 50 to 115mm (other on special request)
- Number of electrodes : up to 100 and more

MORE SPECIFICATIONS

The typical curvature radius ranges from flat to +/- 50m

High performance optical coatings are proposed : metallic + multielectric with high resistance, wideband, LIDT : for instance 2J/cm² for 600ps pulses at 10Hz rep. rate

Hysteresis : < 6 % for a +/- 400V cycle

Flatness after removal of static defects : < 16nm rms wavefront

Surface roughness : < 1nm rms mechanical (standard)

Operating environment :

- Operating temperature : 20-25°C
- Operating orientation : any
- Atmospheric pressure : compatible with vacuum conditions

APPLICATIONS

CILAS monomorph DMs are particularly designed for the correction of high intensity or ultra fast laser beams in the visible or near IR wavelength : femtosecond to nanosecond laser pulses duration.

CUSTOMERS / USERS

Several large facilities of the terawatt or petawatt class are using adaptive optics with CILAS monomorph DM. For example, we can mention : Osaka University (Japan), NTF (USA), AWE (UK), LOA (France), LULI (France) and others.

ELECTRONIC DRIVER SPECIFICATIONS



Two electronics drivers are available (ED32 and ED64)

Number of channels : 32 or 64

32 and 64 channel electronic drivers are available with RS 232 numerical interface (USB or Ethernet on request)

Output voltage : +/- 400 V

Operating frequency : 50 Hz

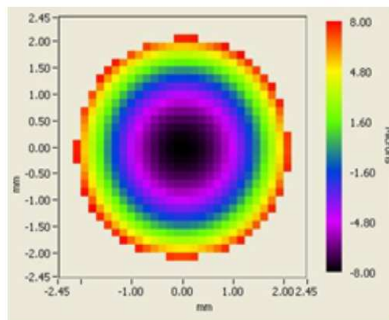
Operating temperature : 10-30°C

Cable length between EDXX and MONOXX : 20m standard

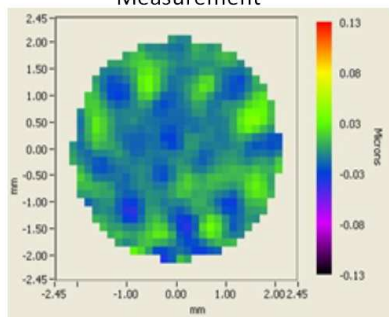
Power supply : 110/220V, 50/60 Hz

OPTICAL PERFORMANCES

Correction stroke and accuracy: Z4 defocus

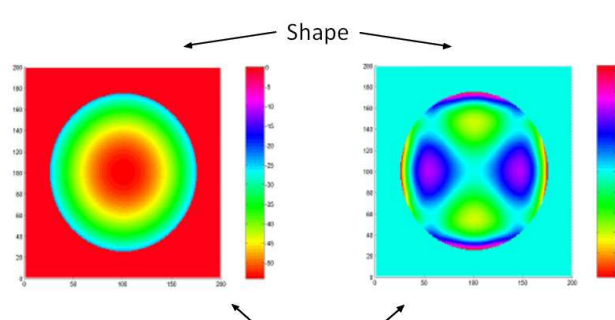


Measurement

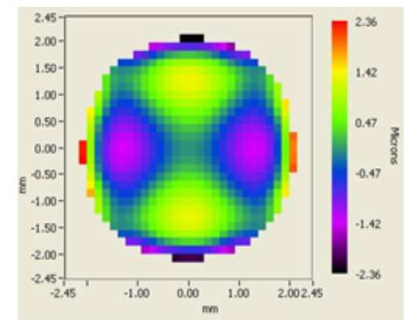


WFE: 12 nm rms for 16 μm PV wavefront correction

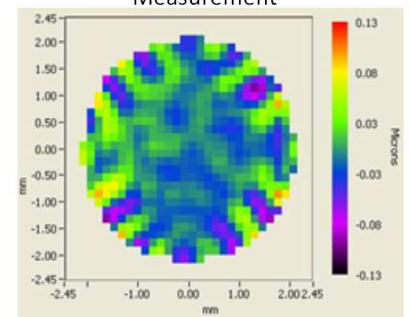
Correction stroke and accuracy: Z12 secondary astigmatism



Simulation



Measurement



WFE: 29 nm rms for 4.7 μm PV wavefront correction

Quotation upon your specifications - Contact: optics@cilas.com