

**ALPAO Deformable Modal Mirrors (DMM)** provide an excellent correction of the most common optical aberrations. Each control channel corresponding to one optical mode (e.g. focus or astigmatism), the control is straightforward.



## Key features

### SIMPLE USE

One control channel per mode  
Compact electronics

### OPTIMIZE ZERNIKE CORRECTION

Large deformation (up to 100 $\mu$ m)  
Low fitting error (down to 3%)

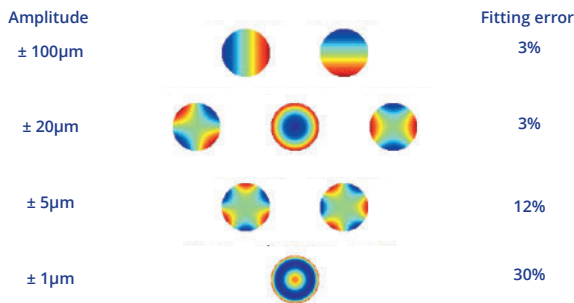
### COST EFFICIENT

Designed for  
OEM applications

## ZERNIKE CORRECTION

Using **ALPAO DMM**, you can correct the first optical aberrations at large amplitude and with high precision.

**DMM** allows to use adaptive optics as never before. You can, for example, correct alignment errors, use the defocus capability for full scan or correct large optical aberrations.



Typical Zernike generation with a DMM

## ALPAO DMM PERFORMANCE

		DMM
Sizing	Number of control channels	8
	Pupil diameter (mm)	13.5
Quality	Active best flat (nm RMS) <sup>1</sup>	$\lambda/10$
Tip-tilt correction	Stroke (µm PV, wavefront)	≥ 100
	Fitting error (%) <sup>2</sup>	≤ 3
Focus / astigmatism	Stroke (µm PV, wavefront)	≥ 20
	Fitting error (%) <sup>2</sup>	≤ 3
Spherical correction	Stroke (µm PV, wavefront)	≥ 1
	Fitting error (%) <sup>2</sup>	≤ 30
Speed <sup>3</sup>	First resonance of the membrane (Hz)	≥ 120
	Settling time (ms at +/-10%, any stroke)	≤ 10
Linearity <sup>4</sup>	Non linearity (%)	≤ 5
	Hysteresis (%)	≤ 5
Mechanical dimensions	Cylinder diameter (mm)	50
	Cylinder length (mm)	50

Note 1: Measured at 633nm

Note 2: Ratio of RMS after and before correction, measured in closed loop

Note 3: Measured on the focus mode

Note 4: Measured on the tilt mode

Note 5: Technical note available upon request

## SIMPLE CONTROL

Each control channel corresponds to a Zernike mode. As simply as you would do an auto-focus, you can now do an auto-astigmatism or an auto-spherical.

Straightforward control of an **ALPAO DMM** results in very low residual wavefront errors.

## FEATURES AND BENEFITS

Typical **ALPAO DMM** characteristics:

- Protected Silver coating
- No protective glass
- Surface roughness <15Å RMS
- LIDT for protected silver coating<sup>5</sup>: 880mJ/cm<sup>2</sup> (@12ns, 10Hz, 1064nm) / 50W (CW @1064nm)

## INTERFACES

**ALPAO DMM** presents a low-voltage and low power consumption compact electronics, with a standard Ethernet interface (or USB using a dongle).

The control and monitoring are easily performed from any web browser. A simple API based on web-services is provided, it is compatible with any language and operating system. No drivers are required.

Thanks to their standard tube packaging, **ALPAO DMM** is easily integrated into systems.

## PRELIMINARY

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