ALPAO Deformable Mirrors (DMs) feature large strokes, high dynamic motion and an excellent optical quality. ALPAO DMs are providing state-of-the-art performances which will meet and exceed your requirements for fast and accurate wavefront corrections.

Key features

- **LARGE DEFORMATION**
  - Up to 80µm PV for tip-tilt
  - (>120µm optional)

- **HIGH DYNAMIC MOTION**
  - Settling time as low as 500µs at +/-10%

- **EXCELLENT OPTICAL QUALITY**
  - Active best flat <7nm RMS
  - (<3nm RMS optional)
Using ALPAO DMs, you can correct large aberrations and shape wavefronts with high precision, including high-order Zernike modes.

Such large amplitudes of deformation allow to use adaptive optics as never before. You can, for example, skip the separate tip-tilt mirror (astronomy), use the large defocus capability for fast z-scan (microscopy) or correct large eye-aberrations (ophthalmology).

The settling times of ALPAO DMs are as low as 500μs (at ±10%) with very low overshoot.

Consequently, the deformable mirror provides excellent correction because adaptive optics temporal errors are drastically reduced.

Additional typical features and benefits:
- Operating temperature: -10/35°C \(^1\)
- Protected Silver coating (other coatings available)
- Vacuum compatibility
- Sub-nm resolution
- No protective glass
- Surface roughness <15Å RMS
- LIDT for protected silver coating: 880mj/cm\(^2\) (@12ns,10Hz, 1064nm) / 50W (CW @ 1064nm)
- Wavefront inter-actuator stroke (waffle mode) >5.0μm PV
- M\(^2\)BF: 10\(^{11}\) cycles
- Few W average power dissipation
- <10nm RMS open loop stability over hours\(^2\)
- Thin and flexible cables
- Square grid-pattern except for large size DM (hexagonal pattern)\(^3\)

ALPAO DM have almost no hysteresis (<2%), as well as high linearity (>97%) and great stability.

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

ALPAO DM include software drivers (SDK) for Labview\(^®\), Matlab\(^®\), C/C++ and Python.

Our hardware and software are compliant with Microsoft Windows\(^®\) XP (32bit), 7, 8.1, 10 (32/64bit) and many Linux\(^®\) (32/64bits) operating systems.
All ALPAO DMs feature non-linearity below 3%, hysteresis as low as 2% for DM and 6% for DMX.

### LOW-VOLTAGE ELECTRONICS

<table>
<thead>
<tr>
<th>Protocol / Resolution</th>
<th>16/14 bit</th>
<th>Less than 100 actuators electronics</th>
<th>More than 100 actuators electronics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PC connection</strong></td>
<td>USB / Ethernet</td>
<td>PC card (included)</td>
<td>&lt;150W / &lt;200W from 110 to 250V AC, 50 to 60Hz</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>Power supply</td>
<td></td>
<td>10kg (22 pounds)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>31.5 x 23.5 x 13.5 cm</td>
<td>37.1 x 45 x 17.5 cm</td>
<td>0 to 35°C</td>
</tr>
<tr>
<td><strong>Dimensions (L x W x H)</strong></td>
<td>12.4 x 9.3 x 5.3 inches</td>
<td>14.6 x 17.7 x 6.9 inches</td>
<td>2m - 6.5 foot</td>
</tr>
<tr>
<td><strong>Cable length</strong> (power supply, PC to drive electronics, drive electronics to DM)</td>
<td>Analogue response time</td>
<td></td>
<td>&lt; 10 µs</td>
</tr>
</tbody>
</table>

**Notes:**
3: preliminary specifications
4: longer cable available upon request
**Optional Items**

- Large stroke, High speed or High optical quality options provide additional specific features:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Large stroke</th>
<th>High speed</th>
<th>High optical quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base line (mm)</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Stroke evolution</td>
<td>x1.5</td>
<td>/2</td>
<td>-</td>
</tr>
<tr>
<td>Stepping type</td>
<td>x2</td>
<td>x2</td>
<td>-</td>
</tr>
<tr>
<td>Lens to lens</td>
<td>/2</td>
<td>/2</td>
<td>-</td>
</tr>
</tbody>
</table>

- Rotation stage for precise tip-tilt and alignment adjustment.
- Motorized rotation stage
- Trigger-IN and trigger-OUT to synchronise sharply the hardware of your system.
- Alignment static mirrors which use the same housing and mirror positionning. It replaces your ALPAO DM for alignment or when you must move the DM to a different optical bench.
- LEDBOX: 64 LEDs on the LEDBOX represent your DM (one LED per actuator). This device helps advanced users to develop and test their control software prior to any optical installation.

**High stability option** provides increased open-loop performances.

**Other coatings:** gold, aluminium or dielectric for higher LIDT.

**ALPAO custom DM** are available upon request. No matter what your needs are: OEM versions, custom pitch or diameters, custom number of actuators (up to several thousand), contact us to build the DM that will suit your needs.

---

**Order Today**

Need more information?

Fitting simulation, open loop control, LIDT, MTBF, software compatibility, cryogenic environment, external size drawings, 3D files or any other requests, we have more information to share.

Contact us for one-to-one guidance and technical support.

- [www.alpao.com](http://www.alpao.com)
- [contact@alpao.fr](mailto:contact@alpao.fr)
- [+33 476 890 965](tel:+33-476-890-965)