Mirror Collimators

Fully aligned Target Projectors
for Testing and Adjusting
Optical Systems in IR, VIS and UV
Mirror Collimators

Fully aligned Target Projectors for Testing and Adjusting Optical Systems in IR, VIS and UV

Key Features

- Fully aligned plug-and-play system
- Mirrors made of low thermal expansion glass-ceramics
- Protected Aluminum coated mirrors
- Certified wave front accuracy and focal length
- Modular target generator with lamp house, filter/target changers and chopper
- Quick mount system for fast exchange of target generator
- Extension kit to convert collimator to autocollimator

- Stable housing for ambient light and air turbulence protection
- Mechanical decoupling of housing to prevent thermal distortion
- Target generator mounts on top or side
- Mounting flange at exit aperture for stable connection of samples
- Leveling mechanism with integrated bubble level indicator

Basic Design

The Davidson Optronics Mirror Collimators project an illuminated test chart to infinity. Typical applications include testing and adjusting cameras used in aviation and space.

Mirror collimators provide plane wave fronts by off-axis parabolic mirrors with unobstructed apertures. As opposed to lens collimators,
that have limited spectral ranges and chromatic aberrations, mirror collimators do not show chromatic aberrations and have a wide applicable spectral range (see table ‘Specification’).

### Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave front distortion</td>
<td>$&lt; \lambda/5$ (at 633 nm)</td>
</tr>
<tr>
<td>Spectral range</td>
<td>0.19 $\mu$m - 14 $\mu$m</td>
</tr>
</tbody>
</table>

### Fully aligned All-In-One System

A distinct feature is the stand-alone mechanical structure, that contains light source, target generator, mirror system and housing completely assembled and aligned for easy installation and commissioning at customer’s site.

### Various Focal Lengths and Apertures

Davidson Optronics has created a family of collimators with different focal lengths and clear apertures (see table ‘Versions’).

### Versions

<table>
<thead>
<tr>
<th>Type</th>
<th>Focal Length (mm)</th>
<th>Clear Aperture (mm)</th>
<th>Dimensions* W x H x L (mm)</th>
<th>Weight* (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mirror Collimator EFL300-D55</td>
<td>300</td>
<td>55</td>
<td>380x250x610</td>
<td>20</td>
</tr>
<tr>
<td>Mirror Collimator EFL600-D100</td>
<td>600</td>
<td>100</td>
<td>400x400x910</td>
<td>30</td>
</tr>
<tr>
<td>Mirror Collimator EFL1500-D150</td>
<td>1500</td>
<td>150</td>
<td>750x780x2080</td>
<td>175</td>
</tr>
<tr>
<td>Mirror Collimator EFL2000-D200</td>
<td>2000</td>
<td>200</td>
<td>750x780x2580</td>
<td>188</td>
</tr>
<tr>
<td>Mirror Collimator EFL3000-D300</td>
<td>3000</td>
<td>300</td>
<td>750x780x3580</td>
<td>200</td>
</tr>
<tr>
<td>Other specifications on request</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Subject to technical changes
**Modular Design**

The target generator contains lamp house, filter changer, target changer and an optional chopper. The three-fold target changer can include the full variety of targets like an USAF target, the Siemens star, a pin hole, cross or slit, etc. The same flexibility applies for the three-fold filter changer. The lamp housing contains one of various light sources for a wide spectral range between LWIR and UV (see table ‘Light Sources’).

**Modules for the Target Generator**

- **Halogen Lamp**
  - 0.4 µm - 2.0 µm

- **LED Lamp**
  - 450 nm - 800 nm

- **Ceramic Globar**
  - 2 µm - 5 µm
**Light Sources**

<table>
<thead>
<tr>
<th>Type</th>
<th>Spectral range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hg(Xe) lamp UV</td>
<td>190 nm - 500 nm</td>
</tr>
<tr>
<td>Xenon lamp UV</td>
<td>300 nm - 500 nm</td>
</tr>
<tr>
<td>LED lamp VIS</td>
<td>450 nm - 800 nm</td>
</tr>
<tr>
<td>Halogen lamp VIS - NIR</td>
<td>0.4 µm - 2.0 µm</td>
</tr>
<tr>
<td>Ceramic Globar MWIR</td>
<td>2 µm - 5 µm</td>
</tr>
<tr>
<td>Ceramic Globar LWIR</td>
<td>7 µm - 14 µm</td>
</tr>
</tbody>
</table>
In addition, the modular design of the target generator allows the collimator to be easily transformed into an autocollimator. For this the target generator will simply be replaced by a module that combines target generator and beam splitter plus sensor. The target generator can be factory-mounted on side or on top of the collimator according to customer’s specification. The side mount is recommended for easy access, the top mount is recommended for a rotatable target generator to minimize gravitational influences.

**Infinite and finite Configuration**

The target generator positioning is controlled through micrometer screws allowing movement out of the focal point to modify the beam from collimated to finite real or virtual image distances. The micrometer range is $z = \pm 25$ mm.

**Mounting Flange for Custom Samples**

A mounting flange located at the exit aperture of the collimator provides stable and repeatable connection of samples (cameras, sensors, objectives etc.).

**Base with adjustable Feet**

The collimator’s base is equipped with height-adjustable feet. This leveling mechanism is supported by an integrated bubble level indicator. Alternatively the collimators can be mounted on a table. For this, an additional internal mechanism is implemented to adjust the collimator axis in y-direction to the optical axis of the sample.
Davidson Optronics is Solution Provider

Davidson Optronics provides overall imaging analysis, and based on know-how could provide proper support to customers to integrate collimators into their specific applications.