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KC45D - June 22, 2022

Item # KC45D was discontinued on June 22, 2022. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

GIMBAL MIRROR MOUNTS

- ▶ Pure Rotational Motion About Center of Mirror Face
- ▶ Minimal Crosstalk Between Axes
- ▶ Compatible with $\varnothing 1/2"$ Posts or 30 mm Cage Systems

Application Idea
 KC45D Gimbal Mount
 in 30 mm Cage System



GMB1
 Full Gimbal Mount
 for $\varnothing 1"$ Optics
 (Post Not Included)



PGM1SE
 Piezoelectric Gimbal Mount
 (Includes Controller)



GM100
 Gimbal Mount for
 $\varnothing 1"$ Optics

OVERVIEW

Features

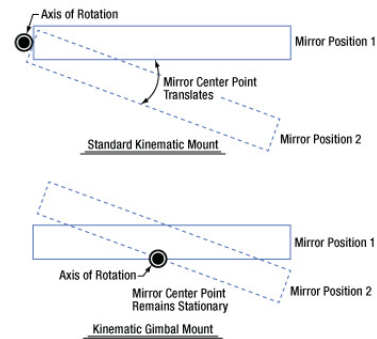
- Manual Gimbal Mirror Mounts with Hardened Steel Inserts
- True Gimbal Rotation About Mirror Center without Translation
- Durable and Stable Design
- Fabricated from Black Anodized Aluminum

Thorlabs offers a series of gimbal mirror mounts that provide rotation without translation; in each case, rotation occurs about the center of the mounted optic's front surface. All of these gimbal mounts are designed to eliminate angular or positional crosstalk when steering a beam of light.

The GMB1(/M) gimbal mirror mount offers coarse 360° adjustment in both axes and fine $\pm 15^\circ$ adjustment, also in both axes. For those working in tight spaces, the GM100(/M) $\varnothing 1"$ gimbal mount and GM200(/M) $\varnothing 2"$ gimbal mount have two adjuster knobs located on the top of the mount for easy access. The final manual option, the KC45D gimbal mirror mount, can be integrated into a 30 mm cage system.

For applications requiring the use of motorized gimbal mirror mounts, the PGM1SE(/M) $\varnothing 1"$ gimbal mount has two axes of rotation. Each axis has a piezoelectric angular range of 30 mrad with a resolution of $0.05 \mu\text{rad}$ in open-loop mode. Built-in strain gauge feedback allows for closed-loop operation, which provides a 20 mrad angular range and $0.14 \mu\text{rad}$ resolution. The gimbal mount is shipped with a factory-calibrated controller that supports Kinesis[®] and APT[™] motion control software.

These gimbal mirror mounts utilize hardened steel inserts to reinforce all key wear points.



Click to Enlarge
 Comparison of Standard Kinematic Mount and Gimbal Mirror Mount

Full Gimbal Mirror Mount for Ø1" Optics



- ▶ True Gimbal Design
- ▶ Maximum Optic Thickness: 0.25" (6.4 mm)
- ▶ Mounts Ø1" (25.4 mm) Optics
- ▶ Fine Adjustment Provides ±15° at 1°/rev
- ▶ Fully Lockable Design
- ▶ Superior Kinematic Performance Without Crosstalk

The GMB1 Gimbal Mirror Mount, which is designed to hold Ø1" (Ø25.4 mm) optics up to 0.25" (6.4 mm) thick, features true gimbal motion in order to eliminate crosstalk when steering a beam of light. The point of rotation for both axes is located at the center of the mounted optic's surface. Utilizing locking thumbscrews and fine pitch adjusters, the GMB1 offers both coarse adjustment and fine tuning. The coarse adjustment allows 360° of manual positioning for both angular degrees of freedom. The fine adjustment allows for ±15° of control, with rotation of the control knob yielding 1° of angular displacement per revolution. The yaw can be adjusted in a similar fashion using the thumbscrew and setscrew closest to the post. After the desired pitch and yaw position is established, the entire mount can be easily locked into place by tightening both thumbscrews and both setscrews. The minimal profile of this mount is ideal for tight beam paths.

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| GMB1/M | Customer Inspired! Ø25.4 mm Full Gimbal Mount, Metric, 360° Adjustable, One Retaining Ring Included | \$303.91 | 7-10 Days |
| GMB1 | Customer Inspired! Ø1" Full Gimbal Mount, 360° Adjustable, One Retaining Ring Included | \$303.91 | Lead Time |

Gimbal Mirror Mounts for Ø1" or Ø2" Optics



- ▶ True Gimbal Design
- ▶ Maximum Optic Thickness: 0.63" (16 mm)
- ▶ GM100 - Mounts Ø1" (25.4 mm) Optics
- ▶ GM200 - Mounts Ø2" (50.8 mm) Optics
- ▶ Designed for Intra-Cavity Use
- ▶ Angular Range of ±2.5° (GM100) or ±2.0° (GM200)
- ▶ Graduated Adjuster Knobs, 100 TPI Adjusters



Click to Enlarge
The photo above shows the front (left) and back (right) of the GM200 gimbal mirror mount.

Thorlabs' Gimbal Mirror Mounts are designed for intra-cavity use, and incorporate a true gimbal design that locates the optical surface directly on the axis of rotation. The design provides pure rotational motion without angular or positional crosstalk.

Two adjustment knobs (graduated with 50 divisions per revolution) are located on the top surface of the mount, making them easily accessible even if the mount is integrated into an optical cavity. They provide excellent angular positioning performance. The GM100 is designed to hold Ø1" (Ø25.4 mm) optics, while the GM200 is meant for Ø2" (Ø50.8 mm) optics. The mounts are SM1- (1.035"-40) or SM2-threaded (2.035"-40), respectively, for compatibility with our lens tubes and accessories, and each mount includes a retaining ring for securing the optic.

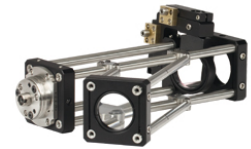
Please Note: Due to the internal drive mechanism, the adjustment knobs on these mounts do not provide perfectly linear motion. For specific measurements, please click here.

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| GM100/M | Ø25.4 mm Gimbal Mirror Mount, Metric, One Retaining Ring Included | \$263.98 | Today |
| GM200/M | Ø50.8 mm Gimbal Mirror Mount, Metric, One Retaining Ring Included | \$433.88 | 7-10 Days |
| GM100 | Ø1" Gimbal Mirror Mount, Imperial, One Retaining Ring Included | \$263.98 | Today |
| GM200 | Ø2" Gimbal Mirror Mount, Imperial, One Retaining Ring Included | \$433.88 | Today |

Ø1" Gimbal Mirror Mount for the 30 mm Cage System



- ▶ True Gimbal Design
- ▶ Maximum Optic Thickness: 0.24" (6 mm)
- ▶ Mounts Ø1" Optics
- ▶ Compatible with Thorlabs' 30 mm Cage System
- ▶ Full 360° Rotation of Optic Holder
- ▶ ±30° Rotation on the Optic Holder Saddle



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The photos above show the KC45D gimbal mirror mount in different 30 mm cage system configurations.

The KC45D Gimbal Mirror Mount is designed to allow a Ø1" optic to be rotated about a point in the center of a 30 mm cage assembly with true gimbal motion.

The optic holder is free to rotate through 360°. Once its coarse angular orientation is set, the fine adjustment mechanism (i.e., two 100 TPI adjusters offering an adjustment per revolution of 13 mrad/rev) can be used for precise alignment, using the HKTS-5/64 hex key thumbscrew or any other 5/64" hex key or balldriver.

The second angular degree of freedom is achieved by rotation of an intermediate saddle. This saddle connects the optic holder to the cage assembly and is free to rotate ±30°. The optic is secured against the back lip of the SM1 (1.035"-40) center tapped region using the included SM1RR Retaining Ring.

| Part Number | Description | Price | Availability |
|-------------|---|----------|--------------|
| KC45D | Ø1" Gimbal Mirror Mount, 30 mm Cage Compatible, One Retaining Ring Included | \$224.05 | Lead Time |

Ø1" Piezoelectric Gimbal Mirror Mount, Controller Included



- ▶ Strain Gauge Feedback Sensors for Closed-Loop Operation
- ▶ Designed for Use with Included Controller
- ▶ True Gimbal Rotation Maintains Stationary Center Point of a Mounted Optic
- ▶ High Angular Range: 30 mrad (Open Loop) or 20 mrad (Closed Loop)
- ▶ SM1-Threaded (1.035"-40) Optic Bore for Ø1" Optics
- ▶ Through Holes for Integration with a 30 mm Cage System

The PGM1SE(/M) Piezoelectric Gimbal Mirror Mount has two axes that each rotate the mounted optic about a gimbal axis, keeping the center of the optic in a fixed position. Each axis is capable of scanning over a high piezoelectric angular range of 30 mrad with a resolution of 0.05 µrad in open-loop mode (20 mrad angular range and 0.14 µrad resolution in closed-loop mode).

A Ø1" optic can be mounted in the SM1-threaded optic bore and secured with the included SM1 retaining ring. The mount can hold optics between 2 mm and 7.5 mm thick; the optic is installed via the back of the mount, which keeps the optic surface coincident with the gimbal axes, regardless of the optic thickness. We do not recommend mounting an SM1 lens tube to the threading as it will apply excessive torque to the gimbal element.

Six 8-32 (M4) tapped holes on the optic mount allow it to be mounted on a Ø1/2" post. Additionally, four 4-40 tapped holes around the optic bore on both sides of the mount provide compatibility with 30 mm cage systems.

The mount is shipped with a piezo controller that has been factory calibrated to the specific mount and supplies a voltage of -25 to +150 VDC. Piezo control is supported through the included Kinesis® and APT™ GUIs, either locally using the paired controller or by using an externally supplied control voltage. See the *Software & External Control* tab for more details. The controller offers USB and RS-232 interfaces for computer control, a BNC input for the addition of external drive signals, and a BNC output that gives either positioning feedback from the mount's built-in capacitive sensors or a signal proportional to the piezo drive voltage. In addition, a DB15 connector provides signals that can be used for synchronization with external equipment. A USB 2.0 (A to B) cable is included.

For more information on the piezoelectric gimbal mount, please see the full web presentation.

| Key Specifications | |
|--|---|
| Piezo Specifications | |
| Resonant Frequency (7.0 g Load) | 360 Hz ± 15% |
| Piezo Angular Range | 30 mrad (Open Loop) 20 mrad (Closed Loop) |
| Angular Resolution | 0.05 µrad (Open Loop) 0.14 µrad (Closed Loop) ^a |
| Piezo Control Voltage | -25 to 150 V |
| Piezo Drive Connectors | Male SMC ^b |
| Strain Gauge Connectors | Male 7-Pin LEMO ^b |
| Mechanical Specifications | |
| Optic Size | Ø1.00" (Ø25.4 mm) |
| Optic Thickness | 2 mm (0.08") Min 7.5 mm (0.30") Max |
| Post Mounting Features | 8-32 (M4) Mounting Taps |
| Cage System Compatibility | Four 4-40 Taps for 30 mm Cage Rods |

- a. With Included Piezo Controller and Defined by Smallest Drive Voltage Step Size
- b. A cable bundle that includes both the piezo drive input and feedback output for both piezo channels is included with the mount.

| Part Number | Description | Price | Availability |
|-------------|---|------------|--------------|
| PGM1SE/M | Ø1" Piezoelectric Gimbal Mount with Strain Gauge Feedback, M4 Tap | \$5,740.00 | Today |
| PGM1SE | Ø1" Piezoelectric Gimbal Mount with Strain Gauge Feedback, 8-32 Tap | \$5,740.00 | 7-10 Days |