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## KC1-T/M - September 7, 2022

Item # KC1-T/M was discontinued on September 7, 2022. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### KINEMATIC MOUNTS FOR 30 MM CAGE SYSTEMS

- ▶ Precision Angular Adjustment of Optics
- ▶ Ideal for Retroreflection Mirror or Collimation Lens
- ▶ 30 mm Cage System Compatible

Application Idea



**KC1-S**  
 SM1 (1.035"-40) Tap  
 in Front Slip Plate



SM1 (1.035"-40)  
 Tap in Front Plate



KC1-S Retroreflector Cage  
 (Components Sold Separately)

#### OVERVIEW

##### Features

- Ø1" (Ø25.4 mm) Optic Mount
- Compatible with 30 mm Cage System
- 8-32 (M4) Tapped Hole for Post Mounting

Thorlabs offers five 30 mm-cage-compatible kinematic mounts that are designed for easy integration into our cage assembly system. They are ideal for holding retroreflecting mirrors or collimated light sources, enabling precise angular alignment of a beam along the axis of a 30 mm cage system. In addition to mounts with manual adjusters, we also offer versions of our K1C and K1C-T with piezo-driven adjusters. Accurate center axis alignment with the 30 mm cage system is made easier using one of the cage system alignment plates offered at the bottom of this page.

The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment. Our mounts featured here have been designed to allow for the precise angular positioning of optics within a cage system. Thorlabs offers 16 mm, 30 mm, and 60 mm cage systems designed for Ø1/2", Ø1", and Ø2" optical components, respectively. The parts on this page are compatible with our 30 mm cage system and utilize Ø6 mm ER cage rods.

##### Alternative Size Options

16 mm Kinematic Cage Mounts
30 mm Kinematic Cage Mounts
30 mm Right-Angle Kinematic Cage Mounts
60 mm Kinematic Cage Mounts



Click to Enlarge  
 This 30 mm cage-compatible kinematic rotation mount consists of a CRM05 rotation mount threaded into a KC1-T cage-compatible kinematic mount.



Click to Enlarge  
 Our KC1-PZ Smooth Bore Kinematic Mount with Piezo-Driven Adjusters

CAGE OVERVIEW

### Cage System Overview

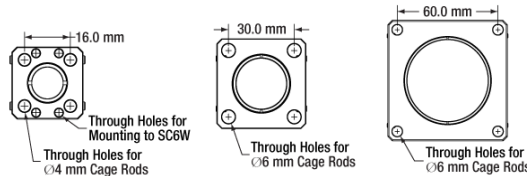
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

### 16 mm, 30 mm, and 60 mm Cage System Standards

Thorlabs offers three standards defined by the center-to-center spacing of the cage assembly rods (see image below). The 16 mm cage, 30 mm cage, and 60 mm cage standards are designed to accommodate Ø1/2", Ø1", and Ø2" optics, respectively. Specialized cage plates that allow smaller optics to be directly inserted into our larger cage systems are also available.

### Standard Threads

The flexibility of our Cage Assembly System stems from well-defined mounting and thread standards designed to directly interface with a wide range of specialized products. The three most prevalent thread standards are our SM05 Series (0.535"-40 thread), SM1 Series (1.035"-40 thread), and SM2 Series (2.035"-40 thread), all of which were defined to house the industry's most common optic sizes. Essential building blocks, such as our popular lens tubes, directly interface to these standards.



An example of the standard cage plate measurements determining cage system compatibility.

Standard Cage System Measurements			
Cage System	16 mm	30 mm	60 mm
Thread Series	SM05	SM1	SM2
Rod to Rod Spacing	16 mm (0.63")	30 mm (1.18")	60 mm (2.36")
Total Length	25 mm (0.98")	41 mm (1.60")	71.1 mm (2.8")

Cage Components	
Cage Rods	16 mm
	30 mm
	60 mm
Cage Plates	16 mm
	30 mm
	60 mm
Optic Mounts	16 mm
	30 mm
	60 mm
Cage Cubes	16 mm
	30 mm
	60 mm
Post and Breadboard Mounts and Adapters	
Size Adapters	
Specialized Components	

### 30 mm Cage-Compatible Smooth Bore Kinematic Mount



- ▶ ±5° Tip / Tilt, ±3 mm Linear Translation Along the Optical Axis
- ▶ Accepts Ø1" (25.4 mm) Optics
- ▶ Minimum Optic Thickness: 0.12" (3 mm)
- ▶ Compatible with 30 mm Cage System
- ▶ 8-32 (M4) Tapped Hole for Post Mounting



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KC1 Back View

The KC1 Kinematic Mount is designed with a smooth, double-bored mounting hole that can accommodate a Ø1" optic that is at least 0.12" (3 mm) thick; the optic is held in place with a top-located, nylon-tipped locking screw. This kinematic mount comes with three 1/4"-80 adjusters that offer an adjustment per revolution of 7 mrad/rev. In addition, each adjuster has independently locking setscrews.

Both the front and rear plates have been machined with four clearance holes designed for direct compatibility with our 30 mm cage system standard. The cage rod holes in the front plate are sufficiently oversized to allow ±4° tip and tilt adjustment without cage rod interference. Once the desired position is achieved, locking setscrews on the rear plate can be used to secure the rods in place. In addition to 30 mm cage compatibility, the KC1 Kinematic Mount is post mountable via an 8-32 (M4) tapped hole.

Part Number	Description	Price	Availability
KC1/M	Kinematic 30 mm-Cage-Compatible Mount for Ø1" Optic, Metric	\$101.77	Lead Time
KC1	Kinematic 30 mm-Cage-Compatible Mount for Ø1" Optic	\$101.77	Today

### 30 mm Cage-Compatible SM1-Threaded Kinematic Mount



- ▶ ±5° Tip / Tilt, ±3 mm Linear Translation Along the Optical Axis
- ▶ Accepts Ø1" (25.4 mm) Optics
- ▶ Maximum Optic Thickness: 0.23" (5.8 mm)
- ▶ Compatible with 30 mm Cage System
- ▶ 8-32 (M4) Tapped Hole for Post Mounting



Click to Enlarge  
KC1-T Back View

The KC1-T Kinematic Mount is designed with an SM1-threaded (1.035"-40) mounting hole that can directly hold optics up to 5.8 mm (0.23") thick using the two included SM1RR Retaining Rings. Thicker optics can be accommodated by housing the optic in one of our SM1-Series Lens Tubes and then threading the lens tube into the front plate of the mount. Alternatively, since the back plate of the KC1-T Kinematic Mount features an oversized Ø1.32" bore, SM1 lens tubes can also be attached to the front plate from the rear of the mount without sacrificing angular adjustment. This threaded, kinematic mount comes with three adjusters with independently locking setscrews.

Both the front and rear plates have been machined with four clearance holes designed for direct compatibility with our 30 mm cage system standard. The cage rod holes in the front plate are sufficiently oversized to allow ±4° tip and tilt adjustment without cage rod interference. Once the desired position is achieved, locking setscrews on the rear plate can be used to secure the rods in place. In addition to 30 mm cage compatibility, the KC1-T Kinematic Mount is post mountable via an 8-32 (M4) tapped hole.

Part Number	Description	Price	Availability
KC1-T/M	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount for Ø1" Optic, Metric	\$102.88	Lead Time
KC1-T	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount for Ø1" Optic	\$102.88	Lead Time

### 30 mm Cage-Compatible Kinematic Mounts with Piezo-Driven Adjusters



- ▶ Smooth Bore or SM1-Threaded Versions Available
- ▶ Manual and Piezo Adjusters in Series
- ▶ Accepts Ø1" (Ø25.4 mm) Optics
- ▶ Compatible with 30 mm Cage Systems
- ▶ 8-32 (M4) Taps for Post Mounting



Click to

Enlarge  
KC1-P Optic Mount

These kinematic mirror mounts incorporate piezo-driven fine adjustment into our KC1 and KC1-T Optic Mounts (available above). Each of the three adjustable axes consists of a manual and piezo adjuster in series. The smooth bore versions secure the mirror with a nylon-tipped 8-32 (M4) setscrew, while the SM1-threaded versions secure the mirror with two included SM1RR Retaining Rings.

The KC1-PZ(/M) and KC1-T-PZ(/M) offer a piezo linear travel of  $\pm 4 \mu\text{m}$  and minimum step size of  $0.3 \mu\text{rad}$ , while the KC1-P(/M) and KC1T-P(/M) Mounts offer a piezo linear travel of  $\pm 9.7 \mu\text{m}$  with minimum step size of  $0.37 \mu\text{rad}$  per  $0.1 \text{ V}$  step.

The piezo adjusters connect to a controller using the included 3' (91.4 cm) cables, and the maximum control voltage is 150 V. The KC1-PZ(/M) and KC1-T-PZ(/M) Mounts include permanently attached BNC cables, while the KC1-P(/M) and KC1T-P(/M) Mounts include detachable cables. The KC1-PZ(/M) and KC1-T-PZ(/M) Mounts are also sold bundled with the MDT693B Three-Channel Piezo Controller, providing all the components needed for open-loop control of the mount.

These mounts are 30 mm cage system compatible; the cage rods can be locked into place using their locking screws. They are also post mountable using one of the three 8-32 (M4) mounting taps.

Item #	KC1-PZ(/M)	KC1-P(/M)	KC1-T-PZ(/M)	KC1T-P(/M)
<b>Mechanical Specifications</b>				
Optic Size	$\text{Ø}1''$ ( $\text{Ø}25.4 \text{ mm}$ )			
Acceptable Optic Thickness	Min: $0.12''$ ( $3.0 \text{ mm}$ )		Max: $0.12''$ ( $3.0 \text{ mm}$ )	
Clear Aperture	$\text{Ø}0.94''$		$\text{Ø}0.90''$	
Mounting Hole	Smooth Bore		SM1 ( $1.035''\text{-}40$ ) Threaded	
Mechanical Angular Range	$\pm 5^\circ$ ( $\pm 87 \text{ mrad}$ )			
Mechanical Linear Travel	$\pm 3 \text{ mm}$			
Adjusters	80 TPI Screws w/ Piezos	100 TPI Screws w/ Piezos	80 TPI Screws w/ Piezos	100 TPI Screws w/ Piezos
Post Mounting Features	8-32 (M4) Mounting Taps			
Cage System Compatibility	Bores for 30 mm Cage Rods $0.05''$ ( $1.3 \text{ mm}$ ) Hex Locking Screws	Bores for 30 mm Cage Rods $5/64''$ ( $2 \text{ mm}$ ) Hex Locking Screws	Bores for 30 mm Cage Rods $0.05''$ ( $1.3 \text{ mm}$ ) Hex Locking Screws	Bores for 30 mm Cage Rods $5/64''$ ( $2 \text{ mm}$ ) Hex Locking Screws
<b>Piezo Specifications</b>				
Integrated Piezo Item #	AE0505D08F <sup>a</sup>	POLARIS-P20	AE0505D08F <sup>a</sup>	POLARIS-P20
Resonant Frequency	138 kHz	69 kHz	138 kHz	69 kHz
Piezo Angular Range	$\pm 73 \mu\text{rad}$	$\pm 275 \mu\text{rad}$	$\pm 73 \mu\text{rad}$	$\pm 275 \mu\text{rad}$
Piezo Linear Travel	$\pm 4 \mu\text{m}$	$\pm 9.7 \mu\text{m}$	$\pm 4 \mu\text{m}$	$\pm 9.7 \mu\text{m}$
Minimum Step Size	$0.3 \mu\text{rad}$	$0.37 \mu\text{rad}$ per $0.1 \text{ V}$ Step	$0.3 \mu\text{rad}$	$0.37 \mu\text{rad}$ per $0.1 \text{ V}$ Step
Piezo Control Voltage	0 to 150 V			
Piezo Connectors	Integrated BNC Cables (Click for Cable Diagram)	Male SMB (Three Detachable PAA236R SMB-to-BNC Cables Included)	Integrated BNC Cables (Click for Cable Diagram)	Male SMB (Three Detachable PAA236R SMB-to-BNC Cables Included)

a. This previous generation item is not available for individual purchase.

Part Number	Description	Price	Availability
KC1-PZ/M	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 4 \mu\text{m}$ Travel, Smooth Bore, M4 Taps	\$705.44	Today
KC1-P/M	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 9.7 \mu\text{m}$ Travel, Smooth Bore, M4 Taps	\$913.44	Today
KC1-T-PZ/M	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 4 \mu\text{m}$ Travel, SM1 Threaded, M4 Taps	\$706.54	Today
KC1T-P/M	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 9.7 \mu\text{m}$ Travel, SM1 Threaded, M4 Taps	\$924.31	Today
KC1-PZ	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 4 \mu\text{m}$ Travel, Smooth Bore, 8-32 Taps	\$705.44	Today
KC1-P	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 9.7 \mu\text{m}$ Travel, Smooth Bore, 8-32 Taps	\$913.44	Today
KC1-T-PZ	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 4 \mu\text{m}$ Travel, SM1 Threaded, 8-32 Taps	\$706.54	Today
KC1T-P	$\text{Ø}1''$ Piezoelectric Optic Mount, $\pm 9.7 \mu\text{m}$ Travel, SM1 Threaded, 8-32 Taps	\$924.31	Today

### 30 mm Cage-Compatible SM1-Threaded Kinematic Mount with Slip Plate



KC1-S

- ▶ Slip Plate Provides  $\pm 1$  mm of Coarse X and Y Adjustment
- ▶  $\pm 4^\circ$  Tip / Tilt,  $\pm 3$  mm Linear Translation Along the Optical Axis
- ▶ Accepts  $\varnothing 1$ " Optics
- ▶ Maximum Optic Thickness: 0.23" (5.8 mm)
- ▶ Compatible with Our 30 mm Cage Systems
- ▶ 8-32 (M4) Tapped Hole for Post Mounting



Click to Enlarge KC1-S Back View

The KC1-S Kinematic Mount is designed with a SM1 (1.035"-40) threaded mounting hole with a front slip plate that enables direct mounting of optics up to 5.8 mm (0.23") thick using the included SM1RR Retaining Rings. Thicker optics can be accommodated by housing the optic in one of our SM1-Series Lens Tubes and then threading the lens tube into the front plate of the mount. Alternatively, since the back plate of the KC1-S Kinematic Mount features an oversized  $\varnothing 1.32$ " bore, SM1 lens tubes can also be attached to the front plate from the rear of the mount without sacrificing angular adjustment. This threaded, kinematic mount comes with three adjusters with independently locking setscrews.

Both the front and rear plates have been machined with four clearance holes designed for direct compatibility with our 30 mm cage system standard. The cage rod holes in the front plate are sufficiently oversized to allow  $\pm 4^\circ$  tip and tilt adjustment without cage rod interference. Once the desired position is achieved, locking setscrews on the rear plate can be used to secure the rods in place. In addition to 30 mm cage compatibility, the KC1-S Kinematic Mount is post mountable via an 8-32 (M4) tapped hole.

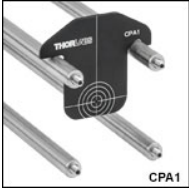
The KC1-S Kinematic Mount slip plate feature incorporated into this mount provides  $\pm 1$  mm of coarse travel in X and Y with respect to the front plate, which enables additional freedom when setting an optic's position within a cage system. Three locking screws allow the user to lock the slip plate down once the desired location has been reached. The user should note, however, that loosening the locking screws may result in excessive coarse movement (slop) in the slip plate. For best performance, tighten the locking screws, and then release them only enough to allow for smooth operation of the slip plate.

Specifications	
Angular Drivers	1/4"-80 TPI Adjusters <sup>a</sup>
XY Travel	$\pm 1.0$ mm ( $\pm 0.04$ " ) per Axis with Lockable Slip Plate
Angular Resolution	0.4°/rev
Angular Displacement	$\pm 4^\circ$
Z Travel	$\pm 3.0$ mm ( $\pm 0.12$ " )
Inner Slip Plate XY Travel	$\pm 0.04$ " (1 mm) per Axis
Optic Thickness (Max)	0.23" (5.8 mm)
Optic Mounting	Internal SM1 (1.035"-40) Thread
Post Mounting	8-32 (M4) Tapped Hole

a. Can be Locked Using the Provided Setscrew and 0.035" Hex Key

Part Number	Description	Price	Availability
KC1-S/M	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount with Slip Plate for $\varnothing 1$ " Optic, Metric	\$179.69	Lead Time
KC1-S	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount with Slip Plate for $\varnothing 1$ " Optic	\$179.69	Today

### Alignment Plates for 30 mm Cage Systems



- ▶ Quick, Drop-In Beam Alignment Tool
- ▶ Small Through Hole Aligned at Center of 30 mm Cage Assembly



Back View of VRC4CPT

The CPA1 and CPA2 Alignment Plates are convenient tools for aligning cage-based optical systems. These drop-in plates feature a small through hole at the exact center of the 30 mm cage assembly that is used for aligning visible beams. For easy alignment, the through hole is surrounded by engraved rings, which indicate  $\varnothing 4$  mm,  $\varnothing 7$  mm,  $\varnothing 10$  mm, and  $\varnothing 13$  mm. The CPA1 provides a  $\varnothing 0.9$  mm through hole, while the CPA2 provides a  $\varnothing 5$  mm through hole.

The VRC4CPT and VRC6SCPT Alignment Plates are specifically designed to align IR or MIR beams in a cage-based optical assembly. Both plates are identical to the CPA1 (shown to the left) on the front. The back (shown to the right) of the VRC4CPT includes a  $\varnothing 1/2$ " ( $\varnothing 12.7$  mm), non-rotating IR-sensitive fluorescing alignment disk made of the same material used in our VRC4 Viewing Card. Alternatively, the back of the VRC6SCPT includes a  $\varnothing 0.39$ " ( $\varnothing 10.0$  mm), non-rotating MIR alignment disk is made of the same thermochromic liquid crystal material used in our VRC6S Viewing Card, which reacts to laser sources over the 1.5 to 13.2  $\mu\text{m}$  wavelength range, and has a minimum detectable power density of 0.05 mW/mm<sup>2</sup> at 1550 nm (22 °C). The VRC4CPT plate has a  $\varnothing 1.5$  mm hole centered on the plate's  $\varnothing 0.9$  mm hole, and the VRC6SCPT has a  $\varnothing 2.0$  mm hole centered on the plate's  $\varnothing 0.9$  mm hole.

Item #	Wavelength Range	Emission Band	Minimum Detectable Power Density	Active Region Diameter	Alignment Features
VRC4CPT	790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm	~520 to 580 nm	N/A	1/2" (12.7 mm)	$\varnothing 0.9$ mm Hole in Plate $\varnothing 1.5$ mm Hole in Disk Center
VRC6SCPT	1.5 to >13.2 $\mu\text{m}$	N/A	0.05 mW/mm <sup>2</sup> @ 1550 nm (22 °C)	0.39" (10.0 mm)	$\varnothing 0.9$ mm Hole in Plate $\varnothing 2.0$ mm Hole in Disk Center

Part Number	Description	Price	Availability
CPA1	30 mm Cage Alignment Plate with $\varnothing 0.9$ mm Hole	\$13.86	Today
CPA2	30 mm Cage Alignment Plate with $\varnothing 5$ mm Hole	\$13.86	Today
VRC4CPT	30 mm Cage System Alignment Plate with IR Disk (790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm)	\$33.56	Today
VRC6SCPT	30 mm Cage System Alignment Plate with MIR Disk, 1.5 to >13.2 $\mu\text{m}$	\$39.14	Today