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THORLABS

KC1-S/M - December 21, 2022

Item # KC1-S/M was discontinued on December 21, 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**

KC1XY
SM1 (1.035"-40)
Tap in Front Slip
Plate

KC1T
SM1 (1.035"-40)
Tap in Front Plate

Application Idea

KC1XY Retroreflector Cage
(Components Sold Separately)

Hide Overview

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 piezo-driven options with the same optic mounting features and cage compatibility. 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.

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

Click to Enlarge
The KC1T kinematic mount can be combined with a CRM05 rotation mount to create a 30 mm-cage-compatible kinematic rotation mount.

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.

Hide Cage Overview

CAGE OVERVIEW

Cage System Overview

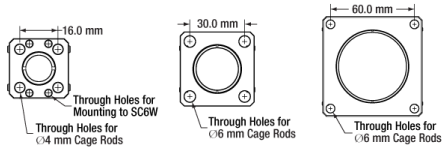
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

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 accomodate 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	These rods are used to connect cage plates, optic mounts, and other components in the cage system. The SR Series Cage Rods are compatible with our 16 mm cage systems, while the 30 mm and 60 mm cage systems use ER Series Cage Rods.
Cage Plates	16 mm 30 mm 60 mm	These serve as the basic building blocks for a cage system. They may have SM-threaded central bores, smooth bores sized for industry standard optics or to accommodate the outer profile of our SM Series Lens Tubes, or specialized bores for other components such as our FiberPorts.
Optic Mounts	16 mm 30 mm 60 mm	Thorlabs offers fixed, kinematic, rotation, and translation mounts specifically designed for our Cage Systems.
Cage Cubes	16 mm 30 mm 60 mm	These cubes are useful for housing larger optical components, such as prisms or mirrors, or optics that need to sit at an angle to the beam path, such as beamsplitters. Our cage cubes are available empty or with pre-mounted optics.
Replacement Setscrews		Replacement setscrews are offered for our 16 mm (SS4B013, SS4B025, and SS4B038) and 30 mm (SS4MS5 and SS4MS4) cage systems products.
Post and Breadboard Mounts and Adapters		Mounting options for cage systems can be found on our Cage System Construction pages. Cage Systems can be mounted either parallel or perpendicular to the table surface.
Size Adapters		Cage System Size Adapters can be used to integrate components from different cage system and threading standards.
Specialized Components		Thorlabs also produces specialized cage components, such as Filter Wheels, a HeNe Laser Mount, and a FiberPort Cage Plate Adapter, allowing a wide range of our products to be integrated into cage-mounted optical systems. Explore our Cage Systems Visual Navigation Guide to see the full range of Thorlabs' cage components.

Hide 30 mm Cage-Compatible Smooth Bore Kinematic Mount

30 mm Cage-Compatible Smooth Bore Kinematic Mount

- ±5º 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 x 0.7) Holes for Post Mounting on Three Sides

Click to Enlarge
KC1L Back View

The KC1L(/M) 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. These kinematic mounts come with three 1/4"-80 adjusters that provide 0.4° (7 mrad) adjustment per revolution and up to ±5° of tip and tilt without cage rods inserted through the mount. Each of the mount's three adjusters can be independently locked using a side-located 5/64" (2.0 mm) hex setscrew.

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 mount has been slid along the cage rods to the desired position, tighten the 2.0 mm (5/64") locking setscrews on the back plate to secure it in place. The back plate of each mount also has 8-32 (M4 x 0.7) mounting holes on three of the four sides, providing compatibility with Thorlabs' Ø1" mounting posts.

Part Number	Description	Price	Availability
KC1L/M	Kinematic 30 mm-Cage-Compatible Mount for Ø1" Optic, Metric	$106.86	Today
KC1L	Kinematic 30 mm-Cage-Compatible Mount for Ø1" Optic	$106.86	Today

Hide 30 mm Cage-Compatible SM1-Threaded Kinematic Mount

30 mm Cage-Compatible SM1-Threaded Kinematic Mount

- ±5º 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 x 0.7) Holes for Post Mounting on Three Sides

Click to Enlarge
KC1T Back View

The KC1T(/M) 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 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 kinematic mount comes with three 1/4"-80 adjusters that provide 0.4° (7 mrad) adjustment per revolution and up to ±5° of tip and tilt without cage rods inserted through the mount. Each of the mount's three adjusters can be independently locked using a side-located 5/64" (2.0 mm) hex setscrew.

Both the front and rear plate 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 mount has been slid along the cage rods to the desired position, tighten the 5/64" (2.0 mm) locking setscrews on the back plate to secure it in place. The back plate also has 8-32 (M4 x 0.7) mounting holes on three of the four sides, providing compatibility with Thorlabs' Ø1" mounting posts.

Part Number	Description	Price	Availability
KC1T/M	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount for Ø1" Optic, Metric	$108.02	Today
KC1T	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount for Ø1" Optic	$108.02	Today

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

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 provide pizeo-driven alternatives to the KC1L(/M) and KC1T(/M) optic mounts 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 ±4 µm and minimum step size of 0.3 µrad, while the KC1-P(/M) and KC1T-P(/M) Mounts offer a piezo linear travel of ±9.7 µm with minimum step size of 0.37 µrad per 0.1 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)
Mechanical Specifications				
Optic Size	Ø1" (Ø25.4 mm)			
Acceptable Optic Thickness	Min: 0.12" (3.0 mm)		Max: 0.12" (3.0 mm)	
Clear Aperture	Ø0.94"		Ø0.90"	
Mounting Hole	Smooth Bore		SM1 (1.035"-40) Threaded	
Mechanical Angular Range	±5° (±87 mrad)			
Mechanical Linear Travel	±3 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 Compatablity	Bores for 30 mm Cage Rods 0.05" (1.3 mm) Hex Locking Screws	Bores for 30 mm Cage Rods 5/64" (2 mm) Hex Locking Screws	Bores for 30 mm Cage Rods 0.05" (1.3 mm) Hex Locking Screws	Bores for 30 mm Cage Rods 5/64" (2 mm) Hex Locking Screws
Piezo Specifications				
Integrated Piezo Item #	AE0505D08F[a]	POLARIS-P20	AE0505D08F[a]	POLARIS-P20
Resonant Frequency	138 kHz	69 kHz	138 kHz	69 kHz
Piezo Angular Range	±73 µrad	±275 µrad	±73 µrad	±275 µrad
Piezo Linear Travel	±4 µm	±9.7 µm	±4 µm	±9.7 µm
Minimum Step Size	0.3 µrad	0.37 µrad per 0.1 V Step	0.3 µrad	0.37 µrad per 0.1 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	**Ø1" Piezoelectric Optic Mount, ±4 µm Travel, Smooth Bore, M4 Taps**	**$740.71**	**Today**
KC1-P/M	**Ø1" Piezoelectric Optic Mount, ±9.7 µm Travel, Smooth Bore, M4 Taps**	**$959.11**	**Today**
KC1-T-PZ/M	**Ø1" Piezoelectric Optic Mount, ±4 µm Travel, SM1 Threaded, M4 Taps**	**$741.87**	**Today**
KC1T-P/M	**Ø1" Piezoelectric Optic Mount, ±9.7 µm Travel, SM1 Threaded, M4 Taps**	**$970.53**	**Today**
KC1-PZ	**Ø1" Piezoelectric Optic Mount, ±4 µm Travel, Smooth Bore, 8-32 Taps**	**$740.71**	**7-10 Days**
KC1-P	**Ø1" Piezoelectric Optic Mount, ±9.7 µm Travel, Smooth Bore, 8-32 Taps**	**$959.11**	**Today**

KC1-T-PZ	Ø1" Piezoelectric Optic Mount, ±4 µm Travel, SM1 Threaded, 8-32 Taps	$741.87	Today
KC1T-P	Ø1" Piezoelectric Optic Mount, ±9.7 µm Travel, SM1 Threaded, 8-32 Taps	$970.53	Today

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

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

- Slip Plate Provides Ñ1 mm of Coarse X and Y Adjustment
- Ñ4ÜTip / Tilt, Ñ3 mm Linear Translation Along the Optical Axis
- Accepts Ï 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
KC1XY Back View

Specifications		
Item #	**KC1XY**	**KC1-S/M**
Locking Screw Hex	5/64" (4 Places)	1.3 mm (4 Places)
Post Mounting	2 8-32 Tapped Holes	M4 Tapped Hole
Angular Drivers	1/4"-80 TPI Adjusters[a]	
XY Travel	Ñ1.0 mm (Ñ0.04") per Axis with Lockable Slip Plate	
Angular Resolution	0.4Árev	
Angular Displacement	Ñ4Á	
Z Travel	Ñ3.0 mm (Ñ0.12")	
Inner Slip Plate XY Travel	Ñ0.04" (1 mm) per Axis	
Optic Thickness (Max)	0.23" (5.8 mm)	
Optic Mounting	Internal SM1 (1.035"-40) Thread 2 SM1RR Retaining Rings	

a. Can be Locked Using a Setscrew and a 5/64" (2 mm) Hex Key

The KC1XY and KC1-S/M Kinematic Mounts are designed with an SM1 (1.035"-40) threaded mounting hole in 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 KC1XY and KC1-S/M Kinematic Mounts features an oversized 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 that can be independently locked.

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 Ñ4Átip 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. These setscrews have a hex of 5/64" on the KC1XY or 1.3 mm on the KC1-S/M. In addition to 30 mm cage compatibility, the KC1XY and KC1-S/M Kinematic Mounts are post mountable. The KC1XY has two 8-32 tapped holes for post mounting, while the KC1-S/M has one M4 tapped hole on the base.

The slip plate feature incorporated into these mounts provides Ñ1 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.

Part Number	Description	Price	Availability
KC1-S/M	Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount with Slip Plate for Ø1" Optic, Metric	$188.67	Lead Time
KC1XY	NEW! Kinematic, SM1-Threaded, 30 mm-Cage-Compatible Mount with Slip Plate for Ø1" Optic	$188.67	Today

Hide Alignment Plates for 30 mm Cage Systems

Alignment Plates for 30 mm Cage Systems

- Drop-In Beam Alignment Tools
- Small Through Hole Aligned at Center of 30 mm Cage Assembly

Click to Enlarge
Front View of VRC1CPT
Drop-In Alignment Plate

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 Ï 4 mm, Ï 7 mm, Ï 10 mm, and Ï 13 mm. The CPA1 provides a Ï 0.9 mm through hole, while the CPA2 provides a Ï 5 mm through hole.

The VRC1CPT, VRC2CPT, VRC4CPT, and VRC6SCPT Alignment Plates are specifically designed to align UV to MIR beams in a cage-based optical assembly. These plates have concentric alignment ring engravings identical to the CPA1 (shown to the left) plate on the back. The fronts of the VRC1CPT, VRC2CPT, and VRC4CPT plates each include a Ï 1/2" (Ï 12.7 mm), non-rotating fluorescing alignment disk made of the same material used in our VRC1, VRC2, and VRC4 Viewing Cards, respectively. Alternatively, the front of the VRC6SCPT plate includes a Ï 0.39" (Ï 10.0 mm), non-rotating MIR alignment disk made of the same thermochromic liquid crystal material used in our VRC6S Viewing Card. The disk on the VRC1CPT, VRC2CPT, or VRC4CPT plate has a Ï 1.5 mm hole centered on the plate's Ï 0.9 mm hole, and the disk on the VRC6SCPT plate has a Ï 2.0 mm hole centered on

the plate's Ø0.9 mm hole.

Item #	Absorption Band	Emission Band	Sensitivity Graph	Minimum Detectable Power Density	Active Region Diameter	Alignment Features
VRC1CPT	250 - 540 nm	450 to 750 nm		N/A	1/2" (12.7 mm)	Ø0.9 mm Hole in Plate Ø1.5 mm Hole in Disk Center
VRC2CPT	400 - 640 nm, 800 - 1700 nm	~580 to 750 nm				
VRC4CPT	790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm	~520 to 580 nm				
VRC6SCPT	1.5 to >13.2 µm	N/A	N/A	0.05 mW/mm^2 @ 1550 nm (22 °C)	0.39" (10.0 mm)	Ø0.9 mm Hole in Plate Ø2.0 mm Hole in Disk Center

Part Number	Description	Price	Availability
CPA1	**30 mm Cage Alignment Plate with Ø0.9 mm Hole**	**$14.55**	**Today**
CPA2	**30 mm Cage Alignment Plate with Ø5 mm Hole**	**$14.55**	**Today**
VRC1CPT	**30 mm Cage System Alignment Plate with UV and Visible Disk (250 - 540 nm)**	**$35.24**	**Today**
VRC2CPT	**30 mm Cage System Alignment Plate with Visible and IR Disk (400 - 640 nm, 800 - 1700 nm)**	**$35.24**	**Today**
VRC4CPT	**30 mm Cage System Alignment Plate with IR Disk (790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm)**	**$35.24**	**Today**
VRC6SCPT	**30 mm Cage System Alignment Plate with MIR Disk, 1.5 to >13.2 µm**	**$41.10**	**Today**