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30 mm Cage Rotation Mounts

60 mm Cage Rotation Mounts

LCRM2/M - May 28, 2024

Item # LCRM2/M was discontinued on May 28, 2024. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

60 mm CAGE ROTATION MOUNTS



- Mount Ø1" (25.4 mm) Optics, Ø2" (Ø50.8 mm) Optics, SM1-Threaded Components, or SM2-Threaded Components
- LCP16R Series Rotation Mounts Include Removable Rotation Rings
 - Additional Rotation Rings Available Separately
- Compatible with 60 mm Cage System

Thorlabs offers rotation mounts for integrating optics and mechanical assemblies with 60 mm cage systems. The LCRM2A and LCRM2/M Rotation Mounts are designed to provide 360° of continuous rotation for Ø2" (50.8 mm) optics. Alternatively, other optomechanical components can be mounted in the SM2-threaded (2.035"-40) rotation carriage to integrate other optic sizes and shapes with a 60 mm cage system, as shown in the photo above (see the *Application* tab for details).

The LCP16R series rotation mounts provide 360° of coarse and $\pm 8^{\circ}$ of fine rotation for optics or components mounted in a 60 mm cage system. Each mount includes a removable rotation ring with an SM1- (1.035"-40) or SM2- (2.035"-40) threaded bore. The rotation rings are also available separately, allowing the user to switch the internal bore of an LCP16R mount from SM1- to SM2-threaded, or vice versa.

APPLICATION

LCRM2A - Creating a Rotating 30 mm Cage Assembly Within a 60 mm Cage System

Thorlabs' versatile cage system can be used to create complex optical systems with elements that are aligned along a common optical axis. The cage system is available in three different sizes (16 mm, 30 mm, and 60 mm rod spacings), with a wide selection of accessories available as well as cage size adapters that allow for

interoperability of different cage sizes. Smaller cage assemblies may be mounted within larger ones where clearances allow, as in the Application Idea above.

Design & Construction

In the Application Idea above, a 30 mm cage assembly is mounted on a CP38T SM2-Threaded Round Cage Plate, which is threaded into an LCRM2A 60 mm Cage Rotation Mount (available below). The 30 mm cage assembly consists of a TO-can laser diode and collimation optics. Rotating the laser diode in conjunction with its collimation optics allows the polarization axis of the TO can laser diode to be rotated while maintaining a collimated, approximately Gaussian beam.

The Ø9 mm TO can laser diode is mounted in an LDH9-P2 30 mm Cage Collimation Mount and SR9 ESD Protection/Strain Relief Cable. The collimated elliptical output of the laser diode is corrected for using cylindrical lenses mounted in CYCPA Cylindrical Lens Mounts. ER1.5 Cage Assembly Rods must be substituted for the ER2 rods that are included with each CYCPA mount. This provides the necessary clearance for the 30 mm cage assembly to rotate unobstructed within the 60 mm cage assembly.



Click to Enlarge Rotating 30 mm Cage Assembly Within 60 mm Cage System

	60 mm Cage System Components								
#	Produc	Item #	Item Qty.						
1	60 mm Cage Rota	tion Mount for Ø2" Optics	LCRM2A	1					
2	SM2-Threaded R	ound 30 mm Cage Plate	CP38T	1					
3	60 mm Thr	eaded Cage Plate	LCP34	1					
4	60 mm Cage (Clamp for Ø1.5" Posts	CH1560	1					
5	Cage Assembly	y Rod, 8" Long, 4 Pack	ER8-P4	1					
6	Ø1.5"	Mounting Post	-	1					
	30 mm Cage Assembly Components								
#	Produc	Item #	Item Qty.						
7	Ø5.6 mm, Ø9 mm, c	-	1						
8	ESD Protection	-	1						
	30 mm Cage Plate	For Ø5.6 mm TO Can LD	LDH56-P2						
9	Laser Diode	For Ø9 mm TO Can LD	LDH9-P2	1					
	Collimation Mount ^a	For TO3 Laser Diode	LDH3-P1						
10	Mounted M9 x	0.5 mm Aspheric Lens	-	1					
11	30 mm Cage Mou	unt for Cylindrical Lenses	CYCPA	2					
12	Plano-Conca	ave Cylindrical Lens	-	1					
13	Plano-Conv	ex Cylindrical Lens	-	1					
14	Cage Assembly	Rod, 1.5" Long, 4 Pack	ER1.5-P4	1					
15	Cage Assembly	y Rod, 4" Long, 4 Pack	ER4-P4	1					

 a. Choose the passive laser diode (LD) mount compatible with the laser diode package (Mounting options for Ø5.6 mm or Ø9 mm TO can as well as TO3 laser diodes are available).

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 \emptyset 1/2", \emptyset 1", and \emptyset 2" 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 (2.80")				

		Cage Components				
	16 mm					
Cage Rods	30 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.				
nouo	60 mm					
•	16 mm	These serve as the basic building blocks for a cage system. They may have SM-threaded central bores, smooth bores sized for industry				
Cage Plates	30 mm	standard optics or to accommodate the outer profile of our SM Series Lens Tubes, or specialized bores for other components such as our				
	60 mm	FiberPorts.				
o //	16 mm					
Optic Mounts	30 mm	Thorlabs offers fixed, kinematic, rotation, and translation mounts specifically designed for our Cage Systems.				
	60 mm					
-	16 mm					
Cage Cubes	30 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.				
	60 mm					
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 Breadboar Mounts an 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 Adap	ters	Cage System Size Adapters can be used to integrate components from different cage system and threading standards.				
Specialize Componer		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.				

Rotation Mount and Stage Selection Guide

Thorlabs offers a wide variety of manual and motorized rotation mounts and stages. Rotation mounts are designed with an inner bore to mount a Ø1/2", Ø1", or Ø2" optic, while rotation stages are designed with mounting taps to attach a variety of components or systems. Motorized options are powered by a DC Servo motor, 2 phase stepper motor, piezo inertia motor, or an Elliptec[™] resonant piezo motor. Each offers 360° of continuous rotation.

Manual Rotation Mounts

Rotation Mounts for Ø1/2" Optics								
Item #	MRM05(/M)	RSP05(/M)	CRM05	PRM05(/M) ^a	SRM05	KS05RS	CT104	
Click Photo to Enlarge	Ø	Ø	Ø	6	Ø		Ø	
Features	Mini Series	Standard	External SM1 (1.035"-40) Threads	Micrometer	16 mm Cage- Compatible	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Compatible with 30 mm Cage Translation Stages and 1/4" Translation Stages ^b	
Additional Details	5							

Additional Details

a. This mount is available in the PRM05GL5 bundle, which includes the PRM05 rotation mount with the SM05PM5 polarizing prism mount.

- b. The CT104 is complatible with the 1/4" translation stages using our MS103(/M) adapter plate.
- c. The CT104 is compatible with the CT1A(/M) cage translation stage, which is designed for use with 30 mm cage systems.

	Rotation Mounts for Ø1" Optics									
Item #	RSP1(/M)	LRM1	RSP1D(/M)	DLM1(/M)	CLR1(/M)	RSP1X15(/M)	RSP1X225(/M)	PRM1(/M) ^a		
Click Photo to Enlarge	Ø	Ø	Ø	Ø	Ø	0	0	6		
Features	Standard	External SM1 (1.035"-40) Threads	Adjustable Zero	Two Independently Rotating Carriages	Rotates Optic Within Fixed Lens Tube System	Continuous 360° Rotation or 15° Increments	Continuous 360° Rotation or 22.5° Increments	Micrometer		
Additional Detail	s									

a. This mount is available in the PRM1GL10 bundle, which includes the PRM1 rotation mount with the SM1PM10 polarizing prism mount.

		Rota	ation Mounts for Ø1" O	ptics		
Item #	LM1-A & LM1-B(/M)	CRM1T(/M)	CRM1LT(/M)	RM1LT(/M) CRM1PT(/M)		K6XS
Click Photo to Enlarge	0 Ò			0	Ó	200
Features	Optic Carriage Rotates Within Mounting Ring	30 mm Cage- Compatible ^a	30 mm Cage- Compatible for Thick Optics ^a	30 mm Cage- Compatible with Micrometer ^a	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Six-Axis Kinematic Mount ^a
Additional Details		·			· · · · · ·	

a. This mount also features four 4-40 (M3) holes on the rotation dial for use with the K6A1(/M) prism platform.

			Rotatio	on Mounts	s for Ø2" Opt	tics			
Item #	RSP2(/M)	RSP2D(/M)	PRM	2(/M)	LM2-A LM2-B(/		LCRM2A & LCRM2/M	KS2RS	K6X2
Click Photo to Enlarge	0	0	Č	5	Ċ		Ø	Ø	Ő
Features	Standard	Adjustable Zero	Micror	meter	Optic Can Rotates W Mounting	/ithin	60 mm Cage- Compatible	±4° Kinematic Tip/Tilt Adjustmen Plus Rotation	t Six-Axis Kinematic Mount
Additional Details		1							
Rotation Drive Mechanism and Adjustment Range	Manual, 360	Coarse: 360° Con Fine: Micror	tinuous; ±7°	Manual, 360° Continuous					
Optic Mounting	Interna	ally SM2-Threaded (Carriage		Internal SM2 Threads Internally SM2-Threaded Carriage in LM2-A				Carriage
Maximum Accepted Optic Thickness	0.51" (13 mm)	0.54" (13.7 mm)	0.48" (12	2.2 mm)) 0.46" (11.7 mm) 0		0.52" (13.2 mn	n) 0.47" (12 mm)	0.53" (13.4 mm)
Post Mounting		8-32 (M4) Tap			8-32 (M4) Tap in		Four Counterbore for 8-32 (M4) Cap Screws	-	
Cage System Compatibility N/A		Four 4-40 (M3) Taps on Rotation Dial with 60 mm Spacing		N/A		Four Bores for Ø6 mm Cage Rods with 60 mm Spacing		N/A	
Manual Rotation	Stages							· · · · · · · · · · · · · · · · · · ·	
			Ма	nual Rota	ation Stages				
Item #	RP005(/	M) PR0	05(/M)	MSF	RP01(/M)	F	RP01(/M)	RP03(/M)	QRP02(/M)
Click Photo to Enlarge									

Additional Details

Features

Manual Rotation Stages XRNR1(/M) XRR1(/M) PR01(/M) CR1(/M) Item # XYR1(/M) OCT-XYR1(/M) **Click Photo** to Enlarge Fine Rotation Fine Rotation Fine Rotation Adjuster and Adjuster and Adjuster and Fine Pitch Worm Features Rotation and 1/2" Linear XY Translation 2" Wide Dovetail 3" Wide Dovetail SM1-Threaded Gear **Quick Connect Quick Connect** Central Aperture Additional Details

Standard

Two Hard Stops

a. The stage profile is higher when it is mounted using the screw slots rather than stacked on another stage or accessory with mating dovetails.

b. The OCT-XYR1(/M) stage includes the XYR1A solid sample plate. This plate can be detached from the stage to reveal the same mounting features present on the XYR1(/M) stage.

Motorized Rotation Mounts and Stages

Motorized Rotation Mounts and Stages with Central Clear Apertures								
Item #	DDR25(/M)	PDR1C(/M)	PDR1(/M)	PDR1V(/M)	PDXR1(/M)			
Click Photo to Enlarge	10 F		and an	0.4				
Features	Compatible with SM05 Lens Tubes, 16 mm Cage System, & 30 mm Cage System	Compatible with 16 mm Cage System	Compatible with SM05 Lens Tubes & 30 mm Cage System	Vacuum-Compatible; Also Compatible with SM05 Lens Tubes & 30 mm Cage System	Compatible with SM05 Lens Tubes & 30 mm Cage System			

Motorized Rotation Mounts and Stages with Central Clear Apertures								
Item #	K10CR1(/M)	PRM1Z8(/M) ^a	DDR100(/M)	ELL14	HDR50(/M)			
Click Photo to Enlarge				Q				
Features	Compatible with SM1 Lens Tubes & 30 mm Cage System		Compatible with SM1 Lens Tubes, 16mm Cage System, 30mm Cage System	Compatible with SM1 Lens Tubes, Open Frame Design for OEM Applications	Compatible with SM2 Lens Tubes			

a. This stage is available in the KPRMTE(/M), which includes the PRMTZ8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.

Motorized Rotation Mounts and Stages with Tapped Platforms							
Item #	PRMTZ8(/M) ^a	ELL18(/M) ^b					
Click Photo to Enlarge							
Features	Tapped Mounting Platform for Mounting Prisms or Other Optics	Tapped Mounting Platform, Open Frame Design for OEM Applications					
Additional Details							

a. This stage is available in the KPRM1E(/M), which includes the PRMT1Z8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.

b. This stage is available in the ELL18K(/M), which includes an interface board, mounting brackets, and connectors for PC control.

60 mm Cage Rotation Mount with SM2-Threaded Bore, 360° Continuous

- Mounts Ø2" (Ø50.8 mm) Optics or SM2-Threaded Components Ø48.3 mm Clear Aperture
 - 360° of Continuous Rotation

LCRM2A

- 1° Engraved Graduations on Dial, Labeled Every 10°
- Setscrew Locking Mechanism
- SM2-Compatible Rotation Carriage
- 8-32 (M4 x 0.7) Hole for Post Mounting

Thorlabs.com - 60 mm Cage Rotation Mounts

The LCRM2A and LCRM2/M Rotation Mounts are designed to mount \emptyset 2" (50.8 mm) optics up to 0.52" (13.2 mm) thick in an SM2-threaded (2.035"-40) rotation carriage. The optic is secured using the included SM2RR retaining ring (the SPW604 spanner wrench is ideal for tightening this retaining ring). For thicker optics, any of our SM2 series of lens tubes can be threaded into the carriage. The smooth rotation mechanism allows for precise positioning of the rotation carriage. The mount is compatible with the 60 mm cage system and can be mounted on a \emptyset 1/2" optical post using the 8-32 (M4 x 0.7) tapped mounting hole on the bottom side of the rotation mount.

The LCRM2A and LCRM2/M mounts are also compatible with the CP38T SM2-Threaded Round Cage Plate which allows 30 mm cage assemblies to be used inside a 60 mm cage system. This is illustrated in the Application Idea above. For more details, please see the *Application* tab.

Part Number	Description	Price	Availability
LCRM2/M	Customer Inspired! 60 mm Cage Rotation Mount for Ø2" Optics, M4 x 0.7 Tap	\$155.62	Lead Time
LCRM2A	NEW! 60 mm Cage Rotation Mount for Ø2" Optics, 8-32 Tap	\$155.62	Today

60 mm Cage Rotation Mount with SM1-Threaded Bore, ±8° Fine Rotation Adjustment

Mount Ø1" (Ø25.4 mm) Optics or SM1-Threaded Components



LCP16R1



Click to Enlarge The recessed area in the back of the mount provides clearance for the camera's input aperture.

a range of ±8°.

- Ø0.95" (Ø24.1 mm) Clear Aperture
- ▶ ±8° of Fine Rotation; 360° of Manual Coarse Rotation
- 1° Engraved Graduations, Labeled Every 2° up to ±8°
- Setscrew Locking Mechanism
- Suitable for Cantilevered Loads up to 0.5 ft-lbs (0.68 N•m) Torque
- Includes LCP16RP1 Removable Rotation Ring
 - Additional SM1- and SM2-Threaded Rotation Rings Available Below
- One 8-32 (M4 x 0.7) Hole for Post Mounting

Thorlabs' LCP16R1(/M) 60 mm Cage System Rotation Mount with SM1 Threads provides ±8° of fine and 360° of coarse rotation angle adjustment for SM1-threaded components integrated with a 60 mm cage system. A nylon-tipped setscrew secures the included LCP16RP1 rotation ring; this setscrew can be loosened using a 5/64" (2 mm) hex key to allow for 360° of manual rotation (see the image to the right). Once this screw is tightened, fine rotation adjustment is achieved via a 3/16"-100 threaded adjuster. A fine adjustment scale engraved on the top of the mount has graduations every 1° with



Click to Enlarge

This mount offers 360° of coarse rotation via the rotation ring and $\pm 8^{\circ}$ of fine rotation via the threaded adjuster. The coarse and fine rotation are independent of each other and both positions can be locked using the respective 5/64" (2 mm) hex locking screws.



Click to Enlarge The LCP16R1(/M) rotation mount includes the LCP16RP1 rotation ring.



Click to Enlarge The LCP16R1 rotation mount in a 60 mm cage system with the CS2100M-USB Quantalux[®] camera and the LCP4S cage plate adapter.

This mount features four through holes for ER cage rods that are compatible with Thorlabs' 60 mm cage system or cameras that use this hole pattern, such as our scientific CCD cameras. The removable rotation ring on the

front of the mount has 0.40" (10.1 mm) deep internal SM1 (1.035"-40) threads, allowing Ø1" (Ø25.4 mm) optics, Ø1" lens tubes, or other externally SM1-threaded components to be integrated with the rotation mount. Internally C-mount threaded components, such as Thorlabs' USB C-Mount CCD, Quantalux[®] sCMOS, or Kiralux[™] CMOS cameras, can be attached to the rotation ring using an

SM1A39 adapter; alternatively, the SM1T2 coupler can be used to connect internally SM1-threaded components, such as Zelux[®] CMOS cameras or a selection of our microscope port adapters. Note that the back of the SM1-threaded bore has a retaining lip, so SM1-threaded components can only be mated to the front side.

Users can switch out the included SM1-threaded LCP16RP1 rotation ring with the SM2-threaded LCP16RP2 rotation ring, sold below, to integrate SM2-threaded components into the LCP16R1(/M) mount.

Part Number	Description	Price	Availability
LCP16R1/M	60 mm Cage System Rotation Mount with SM1-Threaded Bore, M4 x 0.7 Tap	\$411.67	Today
LCP16R1	60 mm Cage System Rotation Mount with SM1-Threaded Bore, 8-32 Tap	\$411.67	Today

60 mm Cage Rotation Mount with SM2-Threaded Bore, ±8° Fine Rotation Adjustment

- Mount Ø2" (Ø50.8 mm) Optics or SM2-Threaded Components
- Ø1.90" (Ø48.3 mm) Clear Aperture
- ±8° of Fine Rotation; 360° of Manual Coarse Rotation
- 1° Engraved Graduations, Labeled Every 2° up to ±8°



This mount features four through holes for ER cage rods that are compatible with Thorlabs' 60 mm cage system or cameras that use this hole pattern, such as our scientific CCD cameras. The removable rotation ring on the front of

the mount has 0.40" (10.1 mm) deep internal SM2 (2.035"-40) threads, allowing Ø2" (Ø50.8 mm) optics, Ø2" lens tubes, or other externally SM2-threaded components to be integrated with the rotation mount. Internally C-mount threaded components, such as Thorlabs' USB C-Mount CCD, Quantalux[®] sCMOS, or Kiralux[™] CMOS cameras, can be attached to the rotation ring using an SM2A55 adapter.

Users can switch out the included SM2-threaded LCP16RP2 rotation ring with the SM1-threaded LCP16RP1 rotation ring, sold below, to integrate SM1-threaded components into the LCP16R2(/M) mount.

Part Number	Description	Price	Availability
LCP16R2/M	60 mm Cage System Rotation Mount with SM2-Threaded Bore, M4 x 0.7 Tap	\$411.67	Today
LCP16R2	60 mm Cage System Rotation Mount with SM2-Threaded Bore, 8-32 Tap	\$411.67	Today

Rotation Rings for LCP16R Series Rotation Mounts

LCP16RP1

LCP16RP2

- Compatible with LCP16R Series Rotation Mounts
- Integrate SM1- or SM2-Threaded Components with Mount

Thorlabs' LCP16RP1 and LCP16RP2 rotation rings are sold separately to allow users the option to switch the internal bore of an LCP16R mount from SM1-threaded to SM2-threaded, or vice versa. The LCP16R1(/M) mount (sold above) includes the LCP16RP1 rotation ring; likewise, the LCP16R2(/M) (sold above) mount includes the LCP16RP2. To switch the rotation ring in a mount, loosen the side-located 5/64" (2 mm) hex setscrew on an LCP16R mount to release the inserted rotation ring; replace it with the desired rotation ring and secure the setscrew.

rotation ring.

LCP34 cage plates.

Part Number	Description	Price	Availability
LCP16RP1	Rotation Ring for LCP16R Series Rotation Mounts, SM1-Threaded Bore	\$82.33	Today
LCP16RP2	Rotation Ring for LCP16R Series Rotation Mounts, SM2-Threaded Bore	\$82.33	Today