

**CM1-A4ER/M - July 12, 2016**

Item # CM1-A4ER/M was discontinued on July 12, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

**COMPACT CAGE CUBES FOR PRISMS AND BEAMSPLITTERS**

- ▶ SM1-Threaded, 30 mm Cage-Compatible Cubes
- ▶ Mount Prisms and Cubed Optics
- ▶ Options Incorporating 1 or 2 Rotation Mounts

**Application Idea**  
 Cube Connector Connecting  
 Two Cage Cubes



[Hide Overview](#)

**OVERVIEW**

**Features**

- Compatible with 30 mm Cage Systems and SM1 Lens Tubes
- Options for Cubes with 4 Open SM1-Threaded Ports or 1 to 2 Removable Rotation Mounts
- Mounting Adapters Available for Thorlabs' Beamsplitter Cubes
- Additional Ø1/2" Rotation Mounts Available Individually
- 2" Wide 30 mm Cage Cubes with Mounting Accessories are also Available

Alternative Size Options
16 mm Cage Cubes
2" Wide, 30 mm Cage Cubes
1.5" Wide, 30 mm Cage Cubes
60 mm Cage Cubes

Click to Enlarge  
 ERSCA Cage Rod Adapters are Used to Connect the CM1-A4ER Cage Cube to a C4W Cage Cube

These 30 mm cage cubes, which are similar to the cage cubes included with our cube-mounted optics, are designed for holding a 1" or 25 mm prism or cube-shaped optic within a 30 mm cage system. Mounting adapters are available for a 5 mm, 10 mm, 12.7 mm, or 20 mm beamsplitter cube. Additionally, the option for installed Ø1/2" rotation mounts allows for the controlled use of polarization optics such as a polarizing beamsplitter cube and Ø1/2" wave plates. Additional cube-compatible Ø1/2" rotation mounts are offered separately. The compact cubes sold here do not include optics.



[Hide Mounted Optics Guide](#)

**MOUNTED OPTICS GUIDE**

**30 mm Cage-Cube-Mounted Optics Selection Guide**

The table below provides links to all of our 30 mm Cage-Cube-Mounted optics. For our selection of 16 mm Cage-Cube-Mounted Optics, please see our 16 mm Cage Systems guide.

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Non-Polarizing Beamsplitter Cube	Polarizing Beamsplitter Cube	High-Power Polarizing Beamsplitter Cube
		
Pellicle Beamsplitters	Laser Line Polarizing Beamsplitter Cube	Circular / Variable Polarizers
		
Penta Prisms	Turning Mirrors	Variable Beamsplitters / Attenuators

### 30 mm Cage Cube Empty Optic Mounts Selection Guide

	
Rectangular Dichroic Mirrors and Filters	Empty Compact 30 mm Cage Cube

[Hide Cage Overview](#)

## CAGE OVERVIEW

### Cage System Overview

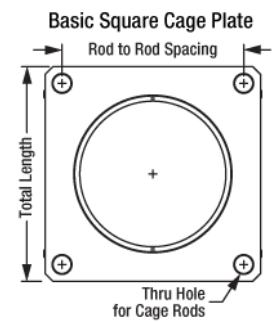
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

### 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 to right). 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. All locking setscrews used in these cage plates are standard 4-40 setscrews, which use a 0.05" hex key.

### 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	16 mm These rods are used to connect cage plates, optic mounts, and other components in the cage system. The SR Series Cage Rods are

<b>Rods</b>	30 mm	compatible with our 16 mm cage systems, while the 30 mm and 60 mm cage systems use ER Series Cage Rods.
	60 mm	
<b>Cage Plates</b>	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 standard optics or to accommodate the outer profile of our SM Series Lens Tubes, or specialized bores for other components such as our FiberPorts.
	30 mm	
	60 mm	
<b>Optic Mounts</b>	16 mm	Thorlabs offers fixed, kinematic, rotation, and translation mounts specifically designed for our Cage Systems.
	30 mm	
	60 mm	
<b>Cage Cubes</b>	16 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.
	30 mm	
	60 mm	
<b>Post and Breadboard Mounts and Adapters</b>		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.
<b>Size Adapters</b>		Cage System Size Adapters can be used to integrate components from different cage system and threading standards.
<b>Specialized Components</b>		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 Compact 30 mm Cage Cube for Prisms and Beamsplitter Cubes](#)

### Compact 30 mm Cage Cube for Prisms and Beamsplitter Cubes

- ▶ Compatible with 30 mm Cage System and SM1 Lens Tubes
- ▶ Directly Accepts 1" Cubes and 25 mm Right-Angle Prisms
- ▶ Mounting Adapters Available Below for Thorlabs' Beamsplitter Cubes Smaller than 25 mm
- ▶ Four SM1-Threaded Ports
- ▶ Base is Post Mountable via 8-32 (M4) Tap
- ▶ 3 Prism Alignment Stops Provide Accuracy of  $\pm 20$  arcmin



Click to Enlarge  
CM1-4ER with Penta Prism (Optic Sold Separately)

These 1.5" wide cage cubes directly accept a 1" square optic, such as a beamsplitter cube or right-angle prism, with adapters available below for mounting a 5 mm, 10 mm, 12.7 mm, or 20 mm beamsplitter cube. The base of the cube has an 8-32 (M4) tap to attach to  $\text{\O}1/2$ " Posts. The M4 tapped hole on the CCM1-4ER/M is located on the base of the cube providing increased mounting stability. Therefore, the optical beam height of the CM1-4ER and CCM1-4ER/M is 0.94" and 0.75", respectively. Two cage cubes can be connected together using ER rods and ERSCA Cage Rod Adapters.

The optic is clamped within the cube by tightening three hex screws of a tension plate (see image above and to the right), allowing the user to replace the optic with any other compatible optic when necessary. The optic must sit flush against the three corners of the cube base. The image to the right shows a penta prism mounted in a CM1-4ER with the outer housing removed.

Part Number	Description	Price	Availability
CCM1-4ER/M	<b>NEW! Customer Inspired! Compact Clamping 4-Port Prism/Mirror 30 mm Cage Cube, M4 Tap</b>	<b>\$127.50</b>	<b>Lead Time</b>
CM1-4ER	<b>Compact Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 8-32 Tap</b>	<b>\$131.00</b>	<b>Today</b>

[Hide Compact Cage Cubes with Rotation Mounts for Prisms and Beamsplitters](#)

### Compact Cage Cubes with Rotation Mounts for Prisms and Beamsplitters

Product Image (Click to Enlarge)			
<b>Item #</b>	CM1-A4ER and CM1-A4ER/M	CM1-B4ER and CM1-B4ER/M	CM1-C4ER and CM1-B4ER/M
<b># of Rotation Mounts</b>	1	2	2
<b>Rotation Mount Geometry</b>	N/A	180°	90°

- ▶ Compatible with 30 mm Cage System and SM1 Lens Tubes
- ▶ Removable  $\text{\O}1/2$ " Rotation Mounts on 1 or 2 Faces
- ▶ Available with 2 or 3 SM1-Threaded Ports
- ▶ Base is Post Mountable via an 8-32 (M4) Tap
- ▶ Directly Accepts 1" Cubes or 25 mm Right-Angle Prisms
- ▶ Mounting Adapters Available for Thorlabs' Beamsplitter Cubes Smaller than 25 mm
- ▶ 3 Prism Alignment Stops Provide Accuracy of  $\pm 20$  arcmin



Click to Enlarge  
CM1-C4ER with Right-Angle Prism (Optic Sold Separately)

These empty 1.5" wide cage cubes come with options for one or two rotation mounts that accept  $\varnothing 1/2"$  wave plates. The clamping base directly accepts any 1" square optic, such as a beamsplitter cube or right-angle prism, with adapters available below for mounting a 5 mm, 10 mm, 12.7 mm, or 20 mm beamsplitter cube. The rotation mounts feature internal SM05 (0.535"-40) threading and may be locked with a setscrew. A witness line is engraved on each cube face containing a rotation mount. The base of these cubes has an 8-32 (M4) tap for mounting to  $\varnothing 1/2"$  Posts. These empty cubes are ideal for constructing variable beamsplitters, variable attenuators, or beam combiners when used with polarizing beamsplitter cubes and half-wave plates. Additional cube-compatible  $\varnothing 1/2"$  rotation mounts are available individually. Thorlabs also offers cube-mounted variable beamsplitters. Two cage cubes can be connected together using ER rods and ERSCA Cage Rod Adapters.

The optic is clamped within the cube by tightening three hex screws of a tension plate (see image to the left), allowing the user to replace the optic with any other compatible optic when necessary. The optic must sit flush against the three corners of the cube base. Do not over tighten the tension plate, this could damage the optic. The image to the left shows a right-angle prism mounted in a CM1-4ER with the outer housing removed.

Part Number	Description	Price	Availability
CM1-A4ER/M	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 1 Rotation Mount, M4 Tap	\$196.00	Today
CM1-B4ER/M	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 2 Rotation Mounts @ 180°, M4 Tap	\$263.00	Today
CM1-C4ER/M	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 2 Rotation Mounts @ 90°, M4 Tap	\$263.00	Today
CM1-A4ER	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 1 Rotation Mount, 8-32 Tap	\$196.00	Today
CM1-B4ER	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 2 Rotation Mounts @ 180°, 8-32 Tap	\$263.00	Today
CM1-C4ER	Customer Inspired!Clamping 4-Port Prism/Mirror 30 mm Cage Cube, 2 Rotation Mounts @ 90°, 8-32 Tap	\$263.00	Today

[Hide Beamsplitter Adapters for use with Compact Cage Cubes](#)

### Beamsplitter Adapters for use with Compact Cage Cubes

- ▶ Beamsplitter Cube Adapters for the Compact Cage Cubes Above
- ▶ Designed for Use with Our 5 mm (0.20"), 10 mm (0.39"), 12.7 mm (0.50"), and 20 mm (0.79") Beamsplitter Cubes
- ▶ Clear Aperture: >80% (of the Area)
- ▶ Center Cubed Optics Within a 30 mm Cage System



Click to Enlarge  
20 mm Beamsplitter Cube Mounted in a CM1-4ER Cage Cube Using a BS20CAM Adapter Mount (Cube, Optic, and Adapter Sold Separately)



Click to Enlarge  
BS127CAM Adapter Mounted in the CM1-4ER Cage Cube (Cube, Optic, and Adapter Sold Separately)

These beamsplitter cube adapters are designed to mount Thorlabs' line of beamsplitter cubes in the compact 30 mm cage cubes shown above on this page. The BS5CAM, BS10CAM, BS127CAM, and BS20CAM are designed for use with 5 mm, 10 mm, 12.7 mm, or 20 mm beamsplitter cube, respectively. Each adapter has an entrance face clear aperture that is greater than 80% of the area and is designed to provide a stable support structure for the optic.

These adapters are comprised of a top and bottom component containing a square recess for mounting a specific cube size. Once the optic is aligned within the recess, the two components will fit together, applying pressure to the optic, holding it in place for use in the CM1-4ER cage cube (as shown to the right).

Part Number	Description	Price	Availability
BS5CAM	5 mm (0.20") Beamsplitter Cube Adapter for Compact 30 mm Cage Cube	\$36.10	Today
BS10CAM	10 mm (0.39") Beamsplitter Cube Adapter for Compact 30 mm Cage Cube	\$36.10	Today
BS127CAM	12.7 mm (0.50") Beamsplitter Cube Adapter for Compact 30 mm Cage Cube	\$39.70	Today
BS20CAM	20 mm (0.79") Beamsplitter Cube Adapter for Compact 30 mm Cage Cube	\$22.20	Today

[Hide SM1-Threaded Continuous Rotation Mount for  \$\varnothing 1/2"\$  Optics](#)

### SM1-Threaded Continuous Rotation Mount for $\varnothing 1/2"$ Optics

- ▶ Mount  $\varnothing 1/2"$  Optics up to 0.26" (6.5 mm) Thick
- ▶ Internal Bore is SM05 (0.535"-40) Threaded for Compatibility with SM05 Lens Tubes
- ▶ External SM1 (1.035"-40) Threads for Mounting in SM1 Lens Tubes or 30 mm Cage Cubes
- ▶ One SM05RR Retaining Ring Included



Click to Enlarge  
CRM05 Mount in a 30 mm Cage System

The CRM05  $\varnothing 1/2"$  Rotation Mount is designed with an external SM1 thread (1.035"-40), allowing the mount to be threaded directly onto any internally SM1-threaded device such as SM1 lens tubes or 30 mm cage cubes. The center aperture is SM05-threaded (0.535"-40) and accepts  $\varnothing 1/2"$  ( $\varnothing 12.7$  mm) optics up to 0.26" (6.5 mm) thick. Optics are held in the mount with a SM05RR retaining ring (one included).

Two notches along the mount's circumference accommodate the SPW801 adjustable spanner wrench to aid in securing the mount into place. The knurled edge of the CRM05 and the 360° laser-engraved scale marked at 2° increments allow for precise, repeatable positioning and fine angular adjustment. Four equally spaced

witness lines are engraved into the mount's perimeter, ensuring there is always a witness line in a convenient and easily readable position. The mount can be locked into position using the 0.035" hex setscrew on the outer edge.

Part Number	Description	Price	Availability
CRM05	Customer Inspired!SM1-Threaded Rotation Mount for Ø1/2" Optics	\$65.00	Today

[Hide Cage Cube Connector](#)

### Cage Cube Connector

- ▶ Connect Two 1.5" Wide Cage Cubes Side by Side
- ▶ Connect a 1.5" Wide Cage Cube to a 2" Wide Cage Cube
- ▶ Compatible with CM1 series Cage Cubes

The CM1-CC Cube Connector allows two or more CM1 style cubes to be connected as shown in the image to the right. The connector can also be used to connect one 1.5" wide 30 mm cage cube, such as our CM1-4ER, with a 2" wide 30 mm cage cube. The current CM1 series of cage cubes, which are all compatible with this connector, include: empty cage cubes (available above), empty dichroic cubes, mounted beamsplitters, and mounted turning mirrors.

Two cage cube-mounted turning mirrors cannot be connected using the CM1-CC due to a lack of Ø6 mm cage rod holes on two sides of the cube.

We also offer the C4W-CC to connect two 2" wide 30 mm cage cubes.

#### Alignment Pins

Please note that because dowel alignment pins are used, the connector requires drilled holes on the cube face between the SM1-threaded (1.035"-40) ports. If you have an older cube and would like it updated to have alignment holes for free, please contact Technical Support. Alternatively, the alignment pins are press-fit inside their mounting holes, and can be pressed out for use with cubes that do not have these alignment holes.



Click to Enlarge  
CM1-CC Connecting Multiple  
1.5" Wide Cage Cubes



Click to Enlarge  
A C4W and C6W Cage Cube  
connected to a 1.5" wide CM1-  
4ER Compact Cage Cube using  
the C4W-CC and  
CM1-CC Cube Connectors,  
respectively.

Part Number	Description	Price	Availability
CM1-CC	Cage Cube Connector for Compact 30 mm Cage Cubes	\$44.10	Today