

## C5A - August 12, 2024

Item C5A was discontinued on August 12, 2024. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### 30 AND 60 MM CAGE SYSTEM CONSTRUCTION RODS

- Building Blocks for 30 and 60 mm Cage Systems
- Ø6 mm Precision-Machined Stainless Steel Rods
- Ideal for Complex Optical Structures



#### 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. This page offers cage assembly rods for our 30 and 60 mm Cage Systems. For cage rods to construct a 16 mm cage system, please see our SR construction rods page. Please see the *Cage Overview* tab for more details on this widely adopted construction standard.

#### CONSTRUCTION

##### Cage Rod Adapters



Click to Enlarge ER Rod Adapters

The ERSCB, ERSCB05, and ERSCB1 ER rod adapters allow for the end-to-end joining of two ER rods. They are available in 0.27", 0.50" and 1.00" lengths. The variety of lengths offered allows for extra space between cage components as well as other parts of the system if desired. The deeper adapter internal bores let ER rods to be locked at a variety of locations on the shaft (0.22" minimum depth), allowing greater customization of cage systems. The adapters have an internal bore on one end that accepts Ø6 mm ER series rods. To join two rods, position the end of one rod inside the ER rod adapter of your choice, and lock it into place using the locking setscrews. Thread the other end of the ER rod adapter into the other rod (see photo at right).



Click to Enlarge ERSCB 1D Construction

##### 3D Construction Using Cage Systems

These assembly rods are essential components when configuring cage systems in complex, multi-dimensional structures.



ER90C Right Angle Rod with ER90L Spacer Rod

For 30 and 60 mm cage systems, the ER90C right angle rods offer a fixed 90° connection to a cage system (see photo to left). Using the ER90A spacer rod for 30 mm cage systems and the ER90L spacer rod for 60 mm cage systems will ensure center-to-center spacing. Alternatively, a cage cube can be used to create a rigid 90° connection.



Click to Enlarge C3A Jointed Cage Rods

Our jointed cage rods can be configured to any arbitrary angle before being locked into place. The C3A single-jointed cage rods and C5A double-jointed cage rods are each pictured to the right. We also offer the S3A connector for 16 mm cage systems.

When constructing complex optomechanical cage assemblies, it is sometimes necessary to couple one cage subsystem to another. Between the S1A cross coupler for 16 mm cages, the C1A cross coupler for 30 and 60 mm cage systems, and the C2A swivel coupler with 180° swing, virtually any configuration can be achieved.



Click to Enlarge [APPLIST] [APPLIST]

ERSCB Adapters with ST1XY-S Mount and C4W Cage Cube

The SRSCA SR rod adapters and ERSCB ER rod adapters are also useful for 3D construction in 16 mm cage systems or 30 and 60 mm cage systems, respectively. They can be used to connect two internally threaded cage components with SR (SRSCA) or ER (ERSCB) rods, and allow components to be easily added or removed from setups without causing misalignment. In the application shown to the left, four ERSCB adapters are used with ER rods to connect a 30 mm cage cube to an ST1XY-S micrometer-driven, XY translation mount. The four cage rods are directly threaded into four holes in the cage cube. Since the other end of each cage rod is internally threaded, they cannot be directly threaded into the translation mount. Instead, the threaded side of the ERSCB adapter is connected to the ST1XY-S translation mount. Each cage rod slides



Click to Enlarge C5A Double-Jointed Cage Rods with Two CP33(M) Cage Plates

into the other side of each adapter and is secured in place with the setscrew.

### Application Idea

The cage assembly components offered here can be used to couple 16 mm, 30 mm, and 60 mm cage systems. The following tables correspond to either the imperial or metric item list for the setup below.

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## CAGE OVERVIEW

### Cage System Overview

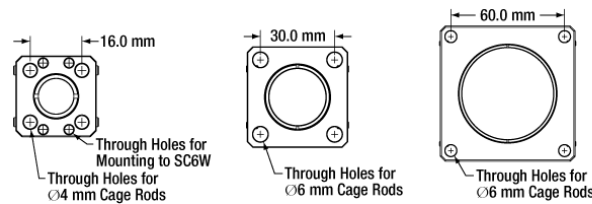
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

### 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 (2.80")

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.

## ER Assembly Rods for 30 mm and 60 mm Cage Systems



- ▶ For use with Our Standard 30 mm and 60 mm Cage Systems
- ▶ Available Individually in Lengths Ranging from 1/4" to 24"
- ▶ Packs of Four Also Available for 1/2" to 8" Lengths
- ▶ Ø6 mm Precision-Ground Stainless Steel
- ▶ 4-40 Removable Setscrew at Both Ends

These 30 and 60 mm cage rods are made from stainless steel. The 4-40 threaded stud at each end of the cage rod can be removed, leaving a 4-40 tapped hole. This allows multiple cage rods to be connected end-to-end. As part of our sustainability initiatives to reduce packaging waste, we offer our

most popular sizes in packs of four.

Replacement setscrews can be purchased in packs of 50.

Part Number	Description	Price	Availability
ER025	Customer Inspired! Cage Assembly Rod, 1/4" Long, Ø6 mm	\$5.46	Today
ER05	Cage Assembly Rod, 1/2" Long, Ø6 mm	\$5.60	Today
ER05-P4	Cage Assembly Rod, 1/2" Long, Ø6 mm, 4 Pack	\$20.76	Today
ER1	Cage Assembly Rod, 1" Long, Ø6 mm	\$5.60	7-10 Days
ER1-P4	Cage Assembly Rod, 1" Long, Ø6 mm, 4 Pack	\$20.76	Today
ER1.5	Cage Assembly Rod, 1.5" Long, Ø6 mm	\$6.33	Today
ER1.5-P4	Cage Assembly Rod, 1.5" Long, Ø6 mm, 4 Pack	\$24.03	Today
ER2	Cage Assembly Rod, 2" Long, Ø6 mm	\$6.59	Today
ER2-P4	Cage Assembly Rod, 2" Long, Ø6 mm, 4 Pack	\$25.07	Today
ER3	Cage Assembly Rod, 3" Long, Ø6 mm	\$7.14	Today
ER3-P4	Cage Assembly Rod, 3" Long, Ø6 mm, 4 Pack	\$27.12	Today
ER4	Cage Assembly Rod, 4" Long, Ø6 mm	\$7.68	Today
ER4-P4	Cage Assembly Rod, 4" Long, Ø6 mm, 4 Pack	\$29.18	Today
ER6	Cage Assembly Rod, 6" Long, Ø6 mm	\$9.36	Today
ER6-P4	Cage Assembly Rod, 6" Long, Ø6 mm, 4 Pack	\$35.55	Today
ER8	Cage Assembly Rod, 8" Long, Ø6 mm	\$12.65	Today
ER8-P4	Cage Assembly Rod, 8" Long, Ø6 mm, 4 Pack	\$48.08	Today
ER10	Cage Assembly Rod, 10" Long, Ø6 mm	\$14.00	Today
ER12	Cage Assembly Rod, 12" Long, Ø6 mm	\$18.53	Today
ER18	Cage Assembly Rod, 18" Long, Ø6 mm	\$28.13	Today
ER24	Cage Assembly Rod, 24" Long, Ø6 mm	\$32.17	Today

### Graduated ER Rods for 30 mm and 60 mm Cage Systems



- ▶ Engraved Scale (Increments of 1 mm) for Accurate Adjustments
- ▶ For Use with Standard 30 mm and 60 mm Cage Systems
- ▶ Available in Two Lengths: 4" and 6"
- ▶ Ø6 mm Precision-Ground Stainless Steel
- ▶ 4-40 Removable Setscrew at Both Ends

These graduated ER rods are identical to the 4" and 6" ER Rods above, but feature an engraved scale along the side. The rods have short tick marks every 1 mm, long tick marks every 5 mm, and a straight vertical line along the rod's entire length. The engraved rods simplify alignment issues, especially in complicated setups with multiple components and integrated cage systems. For custom lengths, please contact Technical Support.



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[\[APPLIST\]](#)  
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 Graduated ER Rods with LCP34 and LCP34T 60 mm Cage Plates

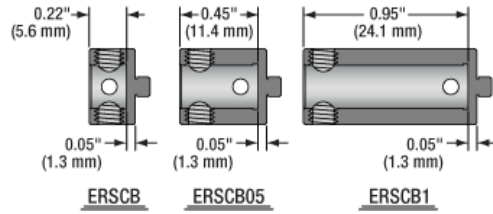
Part Number	Description	Price	Availability
ER4E	Customer Inspired! Engraved Cage Assembly Rod, 4" Long, Ø6 mm, Qty. 1	\$18.89	Today
ER6E	Customer Inspired! Engraved Cage Assembly Rod, 6" Long, Ø6 mm, Qty. 1	\$19.82	Today

### ER Rod Adapters for 30 mm and 60 mm Cage Systems

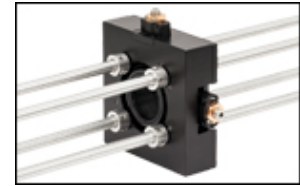
- ▶ Accepts 6.0 mm ER Series Rods
- ▶ For Use with Standard 30 mm and 60 mm Cage Systems



- ▶ Available in Three Lengths: 0.27", 0.5", and 1.00"
- ▶ Adapters Can Hold Rods at a Range of Positions
- ▶ 4-40 Threaded Stud at Closed End of the Adapter
- ▶ Two 5/64" (2.0 mm) Hex Locking Screws to Secure Cage Rods



Click for Details  
ER Rod Adapter Cross-Sections



Click to Enlarge  
[APPLIST]  
[APPLIST]

Item #	Qty	Description
ERSCB-P4	1	Rod Adapter for Ø6 mm ER Rods, L = 0.27", 4 Pack
ST1XY-A/M	1	XY Translator with 100 TPI Drives, Metric
ER6-P4	2	Cage Assembly Rod, 6" Long, Ø6 mm, 4 Pack

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ST1XY-A translator with ERSCB adapters installed.

Our ER rod adapters enable any cage assembly to be easily separated when adding or removing components. The variety of lengths offered allows for extra space between cage components as well as

other parts of the system if desired. These adapters have an internal bore on one end that accepts a Ø6 mm ER series rod with its setscrew removed. Either of the two 8-32 locking setscrews with a 5/64" (2.0 mm) hex must be tightened to hold the ER rod in place. The deeper internal bores of the ERSCB05 and ERSCB1 adapters allow cage rods to be locked at a variety of locations on the shaft (0.22" minimum depth), providing greater customization of cage systems. On the other end of the adapter, there is an externally 4-40 threaded stud that can be threaded into the end of another ER series rod or 4-40 internally-threaded cage component. All adapters are available individually or in packs of four.

Part Number	Description	Price	Availability
ERSCB	Rod Adapter for Ø6 mm ER Rods, L = 0.27"	\$16.47	Today
ERSCB-P4	Rod Adapter for Ø6 mm ER Rods, L = 0.27", 4 Pack	\$64.26	Today
ERSCB05	Customer Inspired! Rod Adapter for Ø6 mm ER Rods, L = 0.50"	\$20.86	Today
ERSCB05-P4	Customer Inspired! Rod Adapter for Ø6 mm ER Rods, L = 0.50", 4 Pack	\$79.48	Today
ERSCB1	Customer Inspired! Rod Adapter for Ø6 mm ER Rods, L = 1.00"	\$23.60	Today
ERSCB1-P4	Customer Inspired! Rod Adapter for Ø6 mm ER Rods, L = 1.00", 4 Pack	\$89.92	Today

### ER Cross Couplers for 30 mm and 60 mm Cage Systems



- ▶ Compatible with 30 mm and 60 mm Cage Systems
- ▶ Couple ER Rods at 90°

These couplers can be used to join multiple 30 mm and 60 mm cage structures at 90°.

The C1A Cross Coupler clamps down onto the cage rods using the included 5/64" hex caphead screws.



Click to Enlarge  
ER90BA Bracket with  
Two ER Rods



Click to Enlarge  
C1A Couplers with ER Rods

The ER90BA/(M) Bracket has one double-bored Ø6 mm hole and 4-40 (M3) taps on the top and bottom. An ER rod can be inserted into the hole and fixed in place using a 5/64" (2.0 mm) hex key. An ER rod may be directly threaded into the 4-40 taps of the ER90BA bracket as well. Our Mini-Series Optical Posts have 4-40 (M3) stescrews that provide compatability with the 4-40 (M3) taps on the ER90BA/(M) brackets.

Part Number	Description	Price	Availability
ER90BA/M	Fixed 90° Bracket, Ø6 mm Bore and M3 Taps	\$16.64	Today
C1A	ER Rod Cross Coupler, Top and Bottom Pieces	\$22.34	Today
ER90BA	Fixed 90° Bracket, Ø6 mm Bore and 4-40 Taps	\$16.64	Today

## Ø1/2" to Ø6 mm Angle Post Clamp



- ▶ Mounts a Ø6 mm Mini-Series Post or Cage Rod to a Ø1/2" Post
- ▶ Right-Angle and 360° Continuous Adjustment Available
- ▶ Imperial and Metric Versions Available

Thorlabs' Ø1/2" to Ø6 mm angle post clamps are used to integrate Ø1/2" posts into mini-series constructions or cage system assemblies. These clamps are available as a fixed right-angle, for perpendicular mounting, or with continuous 360° angle adjustment. Individual locking mechanisms for each post, as well as the rotation

angle, allow for independent adjustment of each component.

The MSWCA(/M) clamp allows a Ø6 mm cage rod or mini-series post to be mounted to a Ø1/2" post with 360° continuous adjustment. The clamp features witness lines marked every 45°, as well as a 3/16" (5 mm) hex thumbscrew to secure the swivel angle. Two additional 3/16" (5 mm) hex thumbscrews are used to secure the posts into place. The center-to-center distance between the two posts is 0.62" (15.7 mm).

The RA90TR(/M) clamp allows a Ø6 mm cage rod or mini-series post to be mounted perpendicularly to a Ø1/2" post. The design combines a highly stable clamp flexure lock for holding the Ø6 mm post that is secured using a 5/64" (2 mm) balldriver. A 3/16" (5mm) thumbscrew locking mechanism is used for attaching the clamp to the Ø1/2" post. The center-to-center distance between the two posts is 1/2" (12.7 mm).



Click for Details  
A Ø6 mm Post  
Mounted to a Ø1/2"  
Post With Continuous  
360° Rotation Using  
the MSWCA Clamp



Click to Enlarge  
A Ø6 mm Post  
Mounted  
Perpendicularly to a  
Ø1/2" Post Using the  
RA90TR Clamp

Part Number	Description	Price	Availability
MSWCA/M	Customer Inspired! Rotating Clamp for Ø1/2" to Ø6 mm Posts, 360° Continuously Adjustable, 5 mm Hex	\$38.45	Today
RA90TR/M	Customer Inspired! Right-Angle Ø1/2" to Ø6 mm Post Clamp, 5 mm Hex Thumbscrew	\$18.18	Today
MSWCA	Customer Inspired! Rotating Clamp for Ø1/2" to Ø6 mm Posts, 360° Continuously Adjustable, 3/16" Hex	\$38.45	Today
RA90TR	Customer Inspired! Right-Angle Ø1/2" to Ø6 mm Post Clamp, 3/16" Hex Thumbscrew	\$18.18	Today

## ER Rod Swivel Coupler for 30 mm and 60 mm Cage Systems



- ▶ Provides 180° of Total Swing
- ▶ Lockable Design for Greater Rigidity
- ▶ Ø6 mm Precision-Ground Stainless Steel

The C2A swivel coupler enables the connection of cage assemblies at arbitrary angles. They are constructed from stainless steel, adhere to close tolerances, and provide an extremely rigid structure.



Click to Enlarge  
C2A Swivel Coupler on ER Rod

Part Number	Description	Price	Availability
C2A	Swivel Coupler, 4 Pack	\$144.84	Today

## Jointed ER Assembly Rods for 30 mm and 60 mm Cage Systems



- ▶ 180° of Total Swing at Each Pivot
- ▶ Lockable Design for Greater Rigidity
- ▶ Ø6 mm Precision-Ground Stainless Steel Rods
- ▶ 5/64" Hex Locking Screw for Each Pivot

These jointed cage assembly rods allow users to introduce angular or translational offsets into a 30 mm or 60 mm cage system. Each consists of two or three Ø6 mm cage assembly rods with one or two pivot joints, respectively. Each joint is capable of swinging 90° in either direction and can be locked using a 5/64" (2 mm) hex key.

The C3A and C4A jointed cage rods allow cage assemblies to be connected at a range of angles up to ±90° from the system normal. The C3A consists of two rods of equal length (1.85" each), while the C4A has one 1.85" long rod and one shorter, 0.52" long rod for setups with strict spatial requirements.

The C5A double-jointed cage rod features a 2.85" long central rod, with a pivot joint and a shorter, 0.52" long rod on each end. This allows two cage plates to be



Click to Enlarge  
C3A Jointed Cage  
Rods with Two CP33(/M)  
Cage Plates

mounted parallel to but off-axis from one another, as shown in the image to the far right.

Part Number	Description	Price	Availability
C4A	Customer Inspired! Jointed Cage Assembly Rod, 2.37" Long, Ø6 mm, 4 Pack	\$96.61	Today
C3A	Jointed Cage Assembly Rod, 3.7" Long, Ø6 mm, 4 Pack	\$78.98	Today
C5A	Customer Inspired! Double-Jointed Cage Assembly Rod, 3.88" Long, Ø6 mm, 4 Pack	\$104.03	Lead Time

### ER Right-Angle Rod and Spacers for 30 mm and 60 mm Cage Systems



- ▶ Build Rigid 3D Structures
- ▶ ER90C Provides Rigid "T" Connection for Cage Assembly
- ▶ ER90A and ER90L Maintain Perfect Rod Separation for Cage Assemblies
- ▶ Increases Structural Rigidity When Used with Inline Applications



Insert the ER90C right-angle rod between two ER rods to form a "T" connection point. To form a complete 90° cage assembly a ER90A or ER90L spacer rod should be used for 30 mm or 60 mm cage systems,

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respectively. The spacer rod is placed between two ER90C right-angle rods to maintain the proper center-to-center spacing of the cage system (see image at right). Alternatively, a 30 mm or 60 mm cage cube can be used to create the rigid right-angle connection.

Part Number	Description	Price	Availability
ER90C	90 Degree "T" Extension, Qty. 1	\$14.14	Today
ER90A	1.131" Spacer for 30 mm Cage Assembly, Qty. 1	\$8.37	Today
ER90L	Customer Inspired! 2.311" Spacer for 60 mm Cage Assembly, Qty. 1	\$10.10	Today

### Cage Plate Stops for ER Rods



- ▶ Marks the Position of Cage Components
- ▶ Flexure Clamping Mechanism
- ▶ Sold in Packs of Four

ERCPS Cage Plate Stops mark the position of a cage plate, allowing it to be reliably moved and repositioned in a cage system. These clamps are 0.14" (3.6 mm) thick and are compatible with our Ø6 mm cage rods for 30 mm and 60 mm cage systems. Utilizing a flexure design, the clamps are secured in place using a 0.05" (1.3

mm) hex key. They can be easily clamped onto the middle of a cage rod without removing other components.



[Click to Enlarge](#)  
ERCPS Cage Rod Stops can mark the position of cage components.



[Click to Enlarge](#)  
ERCPS Cage Plate Stops snap onto cage rods without any disassembly of the cage system.

Part Number	Description	Price	Availability
ERCPS	Customer Inspired! Cage Plate Stops for ER Rods, 4 Pack	\$49.01	Today

