

## LCP01 - February 1, 2023

Item # LCP01 was discontinued on February 1st, 2023. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### STANDARD 60 mm CAGE PLATES

- ▶ **Compatible with 60 mm Cage Systems**
- ▶ **Designed for Use with Ø6 mm ER Cage Rods**
- ▶ **Side-Located Setscrews to Secure Plates to Rods**



[Hide Overview](#)

#### OVERVIEW

The Cage Assembly System provides a convenient way to construct large optomechanical systems using an established line of precision-machined building blocks designed for high flexibility and accurate alignment; see the *Cage Overview* tab for details. The 60 mm cage plates featured below provide a means for mounting Ø1", Ø1.5", Ø2", and Ø30 mm optical components within a cage system. Each cage plate includes four Ø6 mm bores for use with 60 mm cage rods. Additional quick-release cage plates for the 60 mm cage system are also available for applications that require elements to be inserted or removed from closed off cage structures.

#### Alternative Size Options

16 mm Cage Plates
30 mm Cage Plates
60 mm Cage Plates

**Cage System Compatibility:** Thorlabs offers 16 mm, 30 mm, and 60 mm cage systems designed for Ø1/2", Ø1", Ø30 mm, Ø1.5", or Ø2" optical components. The parts on this page are compatible with our 60 mm cage system and utilize Ø6 mm ER cage rods.

#### Selection Guide

Item #	Product Description	Inner Bore	Post Mounting Hole
LCP01 (LCP34/M)	0.5" Thick Cage Plate	SM2 Threaded	8-32 (M4)
LCP34T (LCP01T/M)	0.9" Thick Cage Plate	SM2 Threaded	8-32 (M4)
LCP08 (M)	0.5" Thick Cage Plate with Enhanced Clamping	SM2 Threaded	8-32 (M4)
LCP10(M)	0.5" Thick Cage Plate for Ø1.5" Optics	SM1.5 Threaded	8-32 (M4)
LCP11(M)	1.15" Thick Cage Plate with External and Internal Threads	SM2 Threaded	8-32 (M4)
LCP6S	6 mm Thick Cage Plate	SM2 Threaded	None
LCP8S	8 mm Thick Cage Plate	SM2 Threaded	None

LCP06(/M)	Cage Plate with Ø2" Bore for Optics	Ø2" Double Bore with Setscrew	8-32 (M4)
LCP09	Cage Plate with Ø2.2" Bore for Lens Tubes	Ø2.2" Double Bore with Setscrew	None
LCPN1, LCPN2, LCPN3, and LCPY2	Cage Plates with Dovetails for Ø30 mm Optics	SM30 Threaded	None
LCP4S	30 mm to 60 mm Cage Plate Adapter, 0.16" Thick	SM1 Threaded	None
LCP6X	30 mm to 60 mm Cage Plate Adapter, 0.24" Thick	SM1 Threaded	None
LCP33(/M)	30 mm to 60 mm Cage Plate Adapter, 0.5" Thick	SM1 Threaded	8-32 (M4)
LCP31(/M)	Blank Cage Plate	None	8-32 (M4)
LCPA1	Alignment Guide for the 60 mm Cage System		

[Hide Cage Overview](#)

## CAGE OVERVIEW

### Cage System Overview

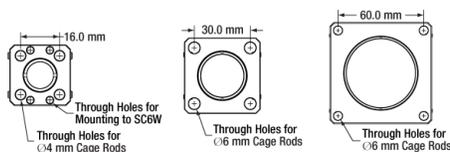
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

### 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 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	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.
	30 mm	
	60 mm	
Cage Plates	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	
Optic Mounts	16 mm	Thorlabs offers fixed, kinematic, rotation, and translation mounts specifically designed for our Cage Systems.
	30 mm	
	60 mm	
Cage	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

<b>Cubes</b>	30 mm	beam path, such as beamsplitters. Our cage cubes are available empty or with pre-mounted optics.
	60 mm	
<b>Replacement Setscrews</b>	Replacement setscrews are offered for our 16 mm (SS4B013, SS4B025, and SS4B038) and 30 mm (SS4MS5 and SS4MS4) cage systems products.	
<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 Microscope Dovetails](#)

## MICROSCOPE DOVETAILES

### Introduction to Microscope Dovetails

Dovetails are used for mechanical mating and optical port alignment of microscope components. Components are connected by inserting one dovetail into another, then tightening one or more locking setscrews on the female dovetail. Dovetails come in two shapes: linear and circular. Linear dovetails allow the mating components to slide before being locked down, providing flexible positioning options while limiting unneeded degrees of freedom. Circular dovetails align optical ports on different components, maintaining a single optical axis with minimal user intervention.



Click to Enlarge  
This photo shows the male 95 mm dovetail on the microscope body and the female 95 mm dovetail on the CSA1002 Fixed Arm.



Click to Enlarge  
This photo shows the male D1N dovetail on the trinoculars next to the female D1N dovetail on the epi-illumination arm.

Thorlabs manufactures many components which use dovetails to mate with our own components or those of other manufacturers. To make it easier to identify dovetail compatibility, we have developed a set of dovetail designations. The naming convention of these designations is used only by Thorlabs and not other microscope manufacturers. The table to the right lists all the dovetails Thorlabs makes, along with their key dimensions.

In the case of Thorlabs' Cerna<sup>®</sup> microscopes, different dovetail types are used on different sections of the microscope to ensure that only compatible components can be mated. For example, our WFA2002 Epi-Illuminator Module has a male D1N dovetail that mates with the female D1N dovetail on the microscope body's epi-illumination arm, while the CSS2001 XY Microscopy Stage has a female D1Y dovetail that mates with the male D1Y dovetail on the CSA1051 Mounting Arm.

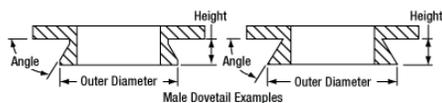
To learn which dovetail type(s) are on a particular component, consult its mechanical drawing, available by clicking on the red Docs icon (📄) below. For adapters with a female dovetail, the drawing also indicates the size of the hex key needed for the locking setscrew(s). It is important to note that mechanical compatibility does not ensure optical compatibility. Information on optical compatibility is available from Thorlabs' web presentations.

For customers interested in machining their own dovetails, the table to the right gives the outer diameter and angle (as defined by the drawings below) of each Thorlabs dovetail designation. However, the dovetail's height must be determined by the user, and for circular dovetails, the user must also determine the inner diameter and bore diameter. These quantities can vary for dovetails of the same type. One can use the intended mating part to verify compatibility.

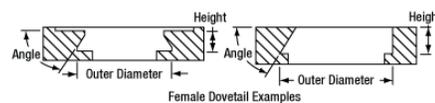
In order to reduce wear and simplify connections, dovetails are often machined with chamfers, recesses, and other mechanical features. Some examples of these variations are shown by the drawings below.

Thorlabs Dovetail Reference <sup>a</sup>			
Type	Shape	Outer Dimension	Angle
95 mm	Linear	95 mm	45°
D1N	Circular	Ø2.018"	60°
D2N <sup>b</sup>	Circular	Ø1.50"	90°
D2NB <sup>b</sup>	Circular	Ø1.50"	90°
D3N	Circular	Ø45 mm	70°
D5N	Circular	Ø1.58"	90°
D6N	Circular	Ø1.90"	90°
D7N	Circular	Ø2.05"	90°
D1T	Circular	Ø1.50"	60°
D3T	Circular	Ø1.65"	90°
D1Y	Circular	Ø107 mm	60°
D2Y	Circular	Ø2.32"	50°
D3Y	Circular	Ø1.75"	90°
D4Y	Circular	Ø56 mm	60°
D5Y	Circular	Ø46 mm	60°
D6Y	Circular	Ø41.9 mm	45°
D1Z	Circular	Ø54 mm	60°
D2Z	Circular	Ø57 mm	60°
D3Z	Circular	Ø54 mm	45°

- These dovetail designations are specific to Thorlabs products and are not used by other microscope manufacturers.
- D2N and D2NB dovetails have the same outer diameter and angle, as defined by the drawings below. The D2N designation does not specify a height. The D2NB designation specifies a dovetail height of 0.40" (10.2 mm).



Click to Enlarge  
Two examples of how circular male dovetails can be manufactured.



Click to Enlarge  
Two examples of how circular female dovetails can be manufactured.

[Hide SM2-Threaded Cage Plate, 0.5" Thick](#)

### SM2-Threaded Cage Plate, 0.5" Thick

- ▶ Directly Accepts Ø2" Optics up to 0.35" (8.9 mm) Thick
- ▶ Mount Optics Within a 60 mm Cage System Assembly
- ▶ Tapped with our Standard SM2 (2.035"-40) Thread
- ▶ 8-32 (M4) Tapped Hole for Mounting to Ø1/2" Posts

The LCP01 and LCP34/M SM2-Threaded Cage Plates are among our most popular 60 mm cage plates. They each provide a center-located SM2 (2.035"-40) threaded bore that accepts a Ø2" optic up to 0.35" (8.9 mm) thick. Two SM2RR retaining rings, providing a Ø1.90" clear aperture, are included to hold an optic within the cage plate. The cage rod through holes have side-located locking setscrews for securing the position of the LCP01 or LCP34/M within the cage; use a 0.05" hex key (for Item # LCP01) or a 2.0 mm hex key (for Item # LCP34/M) to lock the cage plate in place. For additional convenience, an 8-32 (M4) tapped hole is provided for post mounting and OEM-mounting applications. As shown in the image at the top of the page, the LCP34/M has a small dimple to indicate that it is a metric part.

Part Number	Description	Price	Availability
LCP34/M	NEW! Customer Inspired!&nbsp;60 mm Cage Plate, SM2 Threads, 0.5" Thick, M4 Tap (Two SM2RR Retaining Rings Included)	\$44.26	Today
LCP01	60 mm Cage Plate, SM2 Threads, 0.5" Thick, 8-32 Tap (Two SM2RR Retaining Rings Included)	\$44.26	Lead Time

[Hide SM2-Threaded Cage Plate, 0.9" Thick](#)

### SM2-Threaded Cage Plate, 0.9" Thick

- ▶ Directly Accepts Ø2" Optics up to 0.70" (17.8 mm) Thick
- ▶ Mount Optics Within a 60 mm Cage System Assembly
- ▶ Tapped with Our Standard SM2 (2.035"-40) Thread
- ▶ 8-32 (M4) Tapped Hole for Mounting to Ø1/2" Posts

The LCP34T and LCP01T/M 0.9" Thick Cage Plates are designed for cage mounting of Thorlabs' thickest Ø2" optics. The center-located SM2-threaded (2.035"-40) bore is designed to hold optics up to 0.70" (17.8 mm) thick. Two SM2RR retaining rings, providing a Ø1.90" clear aperture, are included to hold an optic within the cage plate. The cage rod through holes have side-located locking setscrews for securing the position of the LCP34T or LCP01T/M plate within the cage; use a 5/64" hex key (for Item # LCP34T) or a 1.3 mm hex key (for Item # LCP01T/M) to lock the cage plate in place. Additionally, an 8-32 (M4) tapped hole is provided for post-mounting applications. Like the LCP34/M, the LCP01T/M has a small dimple to indicate that it is a metric part (see the image at the top of the page).

Part Number	Description	Price	Availability
LCP01T/M	Customer Inspired!&nbsp;60 mm Cage Plate, SM2 Threads, 0.9" Thick, M4 Tap (Two SM2RR Retaining Rings Included)	\$43.67	Today
LCP34T	NEW! Customer Inspired!&nbsp;60 mm Cage Plate, SM2 Threads, 0.9" Thick, 8-32 Tap (Two SM2RR Retaining Rings Included)	\$43.67	Today

[Hide SM2-Threaded Cage Plate with Flexure Clamps, 0.5" Thick](#)

### SM2-Threaded Cage Plate with Flexure Clamps, 0.5" Thick

- ▶ Directly Accepts Ø2" Optics up to 0.35" (8.9 mm) Thick
- ▶ Mounts Optics Within a 60 mm Cage System Assembly
- ▶ Tapped with Our Standard SM2 (2.035"-40) Thread



Click to Enlarge  
View of the Flexure Clamping  
Mechanism

- ▶ 8-32 (M4) Tapped Hole for Mounting to  $\text{\O}1/2$ " Posts

The LCP08(/M) Cage Plate with Enhanced Clamping improves upon the popular LCP01(/M) design, providing the same center-located SM2-threaded (2.035"-40) bore and 8-32 (M4) mounting hole, but offering a more stable flexure clamping mechanism for our standard ER rods. Four cap screws, each with a 5/64" (2.0 mm) hex, activate the flexure clamp, which increases the surface area in contact with the ER rods. The center-threaded bore of the LCP08(/M) can directly accept a  $\text{\O}2$ " optic up to 0.35" (8.9 mm) thick. One SM2RR retaining ring is included, providing a  $\text{\O}1.90$ " clear aperture; for direct mounting of optics, a second SM2RR must be purchased. Thicker optics may be mounted in an SM2 Lens Tube, which can be threaded onto the cage plate. As with the LCP34/M shown at the top of the page, the LCP08/M also features a small dimple indicating it is a metric part.

Part Number	Description	Price	Availability
LCP08/M	60 mm Cage Plate, SM2 Threads, Enhanced Clamping, 0.5" Thick, M4 Tap (One SM2RR Retaining Ring Included)	\$63.91	Today
LCP08	60 mm Cage Plate, SM2 Threads, Enhanced Clamping, 0.5" Thick, 8-32 Tap (One SM2RR Retaining Ring Included)	\$63.91	Today

[Hide SM1.5-Threaded Cage Plate, 0.5" Thick](#)

### SM1.5-Threaded Cage Plate, 0.5" Thick

- ▶ Directly Accepts  $\text{\O}1.5$ " Optics up to 0.3" (7.6 mm) Thick
- ▶ Mount Optics Within a 60 mm Cage System Assembly
- ▶ Tapped with our Standard Internal SM1.5 (1.535"-40) Thread
- ▶ 8-32 (M4) Tapped Hole for Mounting to  $\text{\O}1/2$ " Posts

The LCP10(/M) SM1.5-Threaded Cage Plate provides a center-located SM1.5 (1.535"-40) threaded bore that accepts a  $\text{\O}1.5$ " optic up to 0.3" (7.6 mm) thick. Two SM1.5RR retaining rings, providing a  $\text{\O}1.37$ " clear aperture, are included to hold an optic within the cage plate. Each cage rod through hole has a side-located locking setscrew that can be tightened to hold a cage rod in place using a 5/64" (2.0 mm) hex key. For additional convenience, an 8-32 (M4) tapped hole is provided for post mounting. As with the LCP34/M cage plate shown at the top of the page, the LCP10/M cage plate has a small dimple next to the threaded hole to indicate that it is a metric part.

Part Number	Description	Price	Availability
LCP10/M	60 mm Cage Plate, SM1.5 Threads, 0.5" Thick, M4 Tap (Two SM1.5RR Retaining Rings Included)	\$37.67	Today
LCP10	60 mm Cage Plate, SM1.5 Threads, 0.5" Thick, 8-32 Tap (Two SM1.5RR Retaining Rings Included)	\$37.67	Today

[Hide Internal and External SM2-Threaded Cage Plate, 1.15" Thick](#)

### Internal and External SM2-Threaded Cage Plate, 1.15" Thick

- ▶ Directly Accepts  $\text{\O}2$ " Optics up to 0.65" (16.5 mm) Thick
- ▶ Mount Optics Within a 60 mm Cage System Assembly
- ▶ Internal and External SM2 (2.035"-40) Threading
- ▶ 8-32 (M4) Tapped Hole for Mounting to  $\text{\O}1/2$ " Posts
- ▶ Add or Remove SM2-Threaded Components Independent of the Mounted Optic

The LCP11(/M) Cage Plate provides cage mounting of  $\text{\O}2$ " optics along with SM2-threaded components. It features an internally SM2-threaded (2.035"-40) bore on one side with an externally SM2-threaded bore on the other side, providing a clear aperture of  $\text{\O}1.75$ ". One SM2RR retaining ring is provided and can be used to secure an optic against the internal lip of the cage plate; thicker retaining rings are available for high-curvature lenses. The cage rod through holes have side-located locking 8-32 setscrews, each with a 5/64" (2 mm) hex, for securing the position of the LCP11(/M) within the cage system. Additionally, an 8-32 (M4) tapped hole is provided for post-mounting applications. As with the LCP34/M shown at the top of the page, the LCP11/M also features a small dimple indicating it is a metric part.

Part Number	Description	Price	Availability
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LCP11/M	Customer Inspired!&nbsp;60 mm Cage Plate, Internal and External SM2 Threads, M4 Tap (One SM2RR Retaining Ring Included)	\$113.27	7-10 Days
LCP11	Customer Inspired!&nbsp;60 mm Cage Plate, Internal and External SM2 Threads, 8-32 Tap (One SM2RR Retaining Ring Included)	\$113.27	Today

[Hide SM2-Threaded Cage Plates, Not Post Mountable](#)

### SM2-Threaded Cage Plates, Not Post Mountable

- ▶ Directly Accept  $\varnothing 2$ " Optics up to 0.12" (3 mm) Thick
- ▶ 2 Thicknesses Available: 6 mm and 8 mm
- ▶ Tapped with Our Standard SM2 (2.035"-40) Thread
- ▶ Not Post Mountable

The LCP6S and LCP8S Cage Plates provide cage mounting of  $\varnothing 2$ " optics along with SM2-threaded components. At 6 mm and 8 mm thick, they have a thinner profile than most other 60 mm cage plates we offer. Each plate has a center-located, SM2-threaded bore that is compatible with our SM2-threaded optomechanical components. One SM2RR retaining ring is provided for the LCP6S and can be used to secure an optic against the internal lip of the cage plate. The SM2RR retaining ring has a clear aperture of  $\varnothing 1.90$ " ( $\varnothing 48.5$  mm) and a thickness of 0.1" (2.5 mm). The LCP8S has threads that go all the way through the part for an 8 mm thread depth. Retaining rings are not included with the LCP8S, but may be purchased separately. The thinness of these plates allows the close spacing of optical components within a cage system. The cage rod through holes have side-located locking M4 setscrews, which can be secured using a 5/64" (2.0 mm) hex key. Unlike the LCP01 (LCP34/M) and the LCP34T (LCP01T/M) sold above, these cage plates do not offer a tapped hole for post mounting.

Part Number	Description	Price	Availability
LCP6S	Customer Inspired!&nbsp;60 mm Cage Plate, SM2 Threads, 6 mm Thick (One SM2RR Retaining Ring Included)	\$48.32	Today
LCP8S	Customer Inspired!&nbsp;60 mm Cage Plate, SM2 Threads, 8 mm Thick	\$50.61	Today

[Hide Double-Bore Cage Plate for  \$\varnothing 2\$ " Optics](#)

### Double-Bore Cage Plate for $\varnothing 2$ " Optics

- ▶ Directly Accepts a  $\varnothing 2$ " ( $\varnothing 50.8$  mm) Optic at Least 0.27" (6.9 mm) Thick
- ▶ Mounts Optics Within a 60 mm Cage System Assembly
- ▶ Nylon-Tipped Setscrew Secures Optic
- ▶ 8-32 (M4) Tapped Hole for Mounting to  $\varnothing 1/2$ " Posts

The LCP06(/M) Cage Plate features a  $\varnothing 2.00$ " double bore which centers the optic. A nylon-tipped locking setscrew provides a third point of contact and secures optics at least 0.27" (6.9 mm) thick. Each cage rod through hole includes a side-located 4-40 locking setscrew (compatible with a 0.05" (1.3 mm) hex key) for securing the position of the LCP06(/M) within a 60 mm cage system. For additional convenience, an 8-32 (M4) tapped hole is provided for post mounting and OEM mounting applications. As with the LCP34/M shown at the top of the page, the LCP06/M also features a small dimple indicating it is a metric part.

Part Number	Description	Price	Availability
LCP06/M	Customer Inspired!&nbsp;60 mm Cage Plate with $\varnothing 2$ " Double-Bore Optic Mount, M4 Tap	\$39.90	Today
LCP06	Customer Inspired!&nbsp;60 mm Cage Plate with $\varnothing 2$ " Double-Bore Optic Mount, 8-32 Tap	\$39.90	Today

[Hide Cage Plate with  \$\varnothing 2.2\$ " Double Bore](#)

### Cage Plate with $\varnothing 2.2$ " Double Bore

- ▶  $\varnothing 2.2$ " ( $\varnothing 56.0$  mm) Bore Supports Outside Diameter of SM2 Lens Tubes
- ▶ Compatible with 60 mm Cage Systems
- ▶ Nylon-Tipped Setscrew and Double Bore Securely Hold Lens Tubes
- ▶ Not Post Mountable



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The LCP09 Cage Plate is designed to allow our SM2 lens tubes to slide into the cage plate and be locked in position with a nylon-tipped setscrew. This cage plate is ideal for situations where it is not desirable to thread the lens tube into one of our threaded cage plates. A double-bore design gives three points of contact for stable and secure mounting. Each cage rod through hole is accompanied by two side-located locking 4-40 setscrew, which can be secured using a 0.05" (1.3 mm)

hex key.

Please note that this plate does not feature a tapped mounting hole, unlike many of our other cage plates. Due to the bore size, there would be interference between the threaded stud on our  $\varnothing 1/2$ " posts and the clear aperture of the bore. Therefore, this cage plate cannot be used directly with  $\varnothing 1/2$ " Posts, and a cage system utilizing this plate must be supported using a different method.

Part Number	Description	Price	Availability
LCP09	Customer Inspired! 60 mm Cage Plate with $\varnothing 2.2$ " ( $\varnothing 56.0$ mm) Double Bore for SM2 Lens Tube Mounting	\$49.20	Today

[Hide SM30-Threaded Cage Plates with Dovetails for  \$\varnothing 30\$  mm Optics](#)

### SM30-Threaded Cage Plates with Dovetails for $\varnothing 30$ mm Optics

- ▶ Internal SM30 (M30.5 x 0.5) Threading for SM30 Lens Tubes and  $\varnothing 30$  mm Optics
- ▶ Mount Optics Within a 60 mm Cage System Assembly
- ▶ Dovetail for Attachment to Cerna<sup>®</sup> and Select Nikon and Olympus Microscopes
- ▶ Not Post Mountable



Click to Enlarge  
The LCPN3 Adapter with the D5Y Dovetail

Our SM30-Threaded Cage Plates provide cage mounting of  $\varnothing 30$  mm optics along with SM30-threaded components, such as SM30 lens tubes. All four cage plates feature an internally SM30-threaded (M30.5 x 0.5) bore: the LCPN1 bore is 0.96" (24.4 mm) thick, the LCPN2 bore is 0.76" (19.3 mm) thick, the LCPN3 bore is 0.48" (12.2 mm) thick, and the LCPY2 bore is 0.80" (20.2 mm) thick. Two SM30RR retaining rings are provided to secure an optic in each cage plate, providing a clear aperture of  $\varnothing 1.10$ " ( $\varnothing 27.9$  mm).

Each cage plate has four  $\varnothing 6$  mm cage rod through holes with side-located locking setscrews (5/64" [2 mm] hex) to secure it within a 60 mm cage system. The LCPN1, LCPN2, and LCPY2 have four 4-40 taps on 30 mm centers on one side to mount 30 mm cage systems.

Additionally, each cage plate features a dovetail to connect to certain Cerna microscope components as well as certain upright and inverted Nikon, and Olympus IX and BX microscopes. The LCPN1 has a male D3N dovetail that connects to the condenser holder on a Cerna, inverted Nikon Eclipse Ti, or upright Nikon Eclipse microscope. The LCPN2 and LCPN3 both have a male D1N dovetail that connects to certain Cerna components, an inverted Nikon Eclipse Ti trinocular port, or an upright Nikon Eclipse trinocular port. Additionally, the LCPN3 has a female D5Y dovetail to be used with Olympus trinoculars that have a male D5Y dovetail. The LCPY2 has a male D5Y dovetail that connects to the trinocular port of an Olympus BX or IX microscope. For complete compatibility information, see the microscope-specific presentations.

The dovetail designations are specific to Thorlabs products; see the *Microscope Dovetails* tab for details.

Part Number	Description	Price	Availability
LCPN1	Nikon Eclipse or Cerna Microscope Condenser Adapter, Male D3N Dovetail, Internal SM30 Threads, 30 and 60 mm Cage Compatibility	\$114.18	7-10 Days
LCPN2	Nikon Eclipse or Cerna Microscope Trinocular Adapter, Male D1N Dovetail, Internal SM30 Threads, 30 and 60 mm Cage Compatibility	\$119.88	Today
LCPN3	Customer Inspired!&nbsp;Nikon Eclipse or Cerna Microscope Trinocular Adapter, Male D1N Dovetail, Female D5Y Dovetail, Internal SM30 Threads, 60 mm Cage Compatibility	\$112.92	Today
LCPY2	Olympus BX or IX Microscope Trinocular Adapter, Internal SM30 Threads, 30 mm Cage Compatibility	\$115.19	Today

[Hide SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.16" Thick](#)

### SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.16" Thick

- ▶ Couples 30 mm and 60 mm Cage Systems
- ▶ Centered SM1 (1.035"-40) Tapped Hole
- ▶ Counterbore Holes for 30 mm Cage Mounting
- ▶ Through Holes for 60 mm Cage Mounting
- ▶ Not Post Mountable



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The LCP4S Cage Plate Adapter provides a convenient means for coupling 30 mm and 60 mm cage assemblies via our  $\varnothing 6$  mm ER

cage rods. The thin 4 mm (0.16") profile of this adapter is ideal for situations where axial space is limited. The centered SM1 (1.035"-40) tapped hole is compatible with our SM1-threaded lens tubes. Each of the outer through holes for 60 mm cage rods is accompanied by a side-located locking 4-40 setscrew, which can be secured using a 0.05" (1.3 mm) hex key. The inner holes for 30 mm cage compatibility are counterbored for use with 4-40 x 3/16" cap screws which are sold separately (SH4S019 recommended). Unlike the LCP33(/M) cage plate adapter sold below, this cage plate adapter does not have a tapped hole for post mounting due to the thin profile.

Additionally, this cage plate adapter facilitates the mounting of our compact scientific cameras on 60 mm cage components (see image to the right). For example, our 2CM2 Two-Camera Mount for Microscopes incorporates two LCP4S adapters. The thin profile of the adapter is required to position the image plane of the cameras within the adjustable focus range of the mount.

LCP4S Adapter Mounted to Quantalux<sup>®</sup> sCMOS Camera for Compatibility with 60 mm Cage Components. Note the LCP4S adapter has counterbored holes for 30 mm cage compatibility and through holes for 60 mm cage compatibility.

Part Number	Description	Price	Availability
LCP4S	Customer Inspired!&nbsp;30 mm to 60 mm Cage Plate Adapter, 4 mm Thick	\$43.05	Today

[Hide SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.24" Thick](#)

### SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.24" Thick

- ▶ Couples 30 mm and 60 mm Cage Systems
- ▶ Centered SM1 (1.035"-40) Tapped Hole Accepts Ø1" Optics up to 0.08" (2 mm) Thick
- ▶ Through Holes for 30 mm and 60 mm Cage Mounting
- ▶ Not Post Mountable

The LCP6X Cage Plate Adapter provides a convenient means for coupling 30 mm and 60 mm cage assemblies via our Ø6 mm ER cage rods. The centered SM1-threaded (1.035"-40) hole is compatible with SM1-threaded lens tubes or Ø1" optics up to 0.08" (2 mm) thick (SM1RR retaining rings sold separately). Each cage rod through hole is accompanied by a side-located locking M4 x 0.7 setscrew that can be adjusted using a 5/64" (2 mm) hex key. These setscrews provide improved stability for attaching cage rods compared to the 4-40 setscrews used in the LCP4S cage plate adapter (sold above). Unlike the LCP33(/M) cage plate adapter, this cage plate adapter does not have a tapped hole for post mounting due to the thin profile.

Similar to the LCP4S adapter, the LCP6X adapter can facilitate the mounting of our compact scientific cameras on 60 mm cage components, as seen to the right.



Click to Enlarge LCP6X Adapter Mounted to a Zelux<sup>®</sup> CMOS Compact Camera for Compatibility with 60 mm Cage Components

Part Number	Description	Price	Availability
LCP6X	30 mm to 60 mm Cage Plate Adapter, 6 mm Thick	\$43.05	7-10 Days

[Hide SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.5" Thick](#)

### SM1-Threaded 30 mm to 60 mm Cage Plate Adapter, 0.5" Thick

- ▶ Couples 30 mm and 60 mm Cage Systems
- ▶ Centered SM1 (1.035"-40) Tapped Hole Directly Accepts Ø1" Optics up to 0.35" (9 mm) Thick
- ▶ 8-32 (M4) Tapped Hole for Mounting to Ø1/2" Posts

The LCP33(/M) Cage Plate provides a convenient means for coupling 30 mm and 60 mm cage assemblies via our Ø6 mm ER cage rods. The centered SM1 (1.035"-40) tapped hole directly accepts optics up to 0.35" (9 mm) thick (SM1RR retaining rings sold separately). Each cage rod through hole in this cage adapter is accompanied by one side-located M4 x 0.7 locking setscrew which can be secured with a 5/64" (2.0 mm) hex key. The LCP33(/M) cage adapter also has an 8-32 (M4) tapped hole for Ø1/2" post mounting. The surface with the 8-32 (M4) tap is not wide enough to support Ø1" posts.

Additionally, two of these cage plates can be used to contain a 30 mm cage subassembly that can slide along the 60 mm cage rods as a single optomechanical unit. A 16 mm cage assembly can also be easily integrated using an SP15(/M) cage plate adapter.

Part Number	Description	Price	Availability
LCP33/M	30 mm to 60 mm Cage Plate Adapter, M4 Tap	\$45.42	Today
LCP33	30 mm to 60 mm Cage Plate Adapter, 8-32 Tap	\$45.42	Today

[Hide Blank Cage Plate](#)

## Blank Cage Plate

- ▶ Ideal for Custom Machining to Mount Non-Standard Components
- ▶ Contains Four Corner-Located Through Holes
- ▶ Post Mountable with an 8-32 (M4) Tapped Hole
- ▶ Black-Anodized Aluminum

Blank cage plates are ideal when standard threads and hole sizes are insufficient for custom mounting and OEM-level requirements. Custom hole sizes and threads can be machined using any size drill bits and taps. These LC Series blank cage plates for 60 mm cage systems are ideal for use in optical systems that are based upon Ø2" optical components. Each cage plate contains four through holes machined for a precision slip fit with ER cage rods, which can be locked in place using 5/64" (2.0 mm) hex side-located locking setscrews. The LCP31/M has a small dimple to indicate that it is a metric part.

Part Number	Description	Price	Availability
LCP31/M	NEW! 60 mm Blank Cage Plate, M4 x 0.7 Tap	\$41.64	Today
LCP31	NEW! Customer Inspired!&nbsp;60 mm Blank Cage Plate, 8-32 Tap	\$41.64	Today

[Hide Cage Alignment Plate](#)

## Cage Alignment Plate

- ▶ Quick Drop-In Visual Beam Alignment Tool
- ▶ Small Through-Hole Aligned at Center of 60 mm Cage Assembly

The LCPA1 alignment plate provides a convenient tool for aligning 60 mm cage-based optical systems. This drop-in plate locates a Ø1 mm through-hole at the exact center of a cage assembly, providing a convenient visual target to assist in beam alignment.

Part Number	Description	Price	Availability
LCPA1	60 mm Cage Alignment Plate with Ø1 mm Hole	\$20.84	Today