56 Sparta Avenue • Newton, New Jersey 07860
(973) 300-3000 Sales • (973) 300-3600 Fax
www.thorlabs.com

THORLABS

C6W - August 5, 2021

Item # C6W was discontinued on August 5, 2021. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

---

30 mm CAGE CUBES

► **Build 2D and 3D Cage Systems with Cage Cubes**
► **Integrates into 30 mm Cage Systems**
► **Compatible with 30 mm Optics Holders, Platforms, and Accessories**

Application Idea

C6W

CPG3

C4W-CC

C4W
4-40 Tapped Holes for ER Rods

OVERVIEW

Features

- 30 mm Cage System- and SM1 Lens Tube-Compatible Cubes
- Build 2D and 3D Cage and Lens Tube Systems

The 30 mm cage cubes offered here are ideal for building optical setups involving prisms, beamsplitters, and other optics that cause a 90° deviation of the beam path. They are compatible with the accessories sold below, those featured in the table below, as well as our selection of 30 mm Cage Accessories and Cage Components. The *Application Ideas* tab shows how to use our cage cubes and accessories to construct a beam combiner with a dichroic mirror as well as a variable attenuation beamsplitter with a polarizing beamsplitting cube. Shown to the right, the C4W 30 mm Cage Cube is connected to a VBA05-780 Variable Beamsplitter Cube using cage rods and four ERSCB Rod Adapters. The ERSCB Rod Adapters are required when trying to connect any two cage cubes.

Click to Enlarge
[APPLIST]
[APPLIST]
ERSCB Cage Rod Adapters are Used to Connect the C4W Cage Cube to a VBA05-780 Variable Beamsplitter Cube

Thorlabs offers a wide and growing complement of accessories for 30 mm cage cubes, including optic mounts, platforms, rotating platforms, and cover plates. These tools provide a complete family of versatile building blocks suited for virtually any 30 mm cage cube optomechanical setup.

We also offer smaller 1.5" cage cubes that are ideal for mounting prisms and cube-shaped optics, as well as a dichroic cage cube with a built-in FFM1 mount.

30 mm Cage Cubes and Accessories				
Cage Cubes	Optic Mounts	Platforms	Rotating Platforms	Cover Plates

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

A P P L I C A T I O N   I D E A S

Combining Two Beams

Our cage system can be used to build an easily adjustable beam combiner. This setup is based on the use of an appropriate dichroic mirror for the wavelengths that need to be combined. One beam needs to be in the transmission band of the dichroic mirror, while the other needs to be in the reflection band. For this application the reflection band laser is 405 nm and the transmission band laser is 635 nm. The DMLP567 is an appropriate dichroic mirror for the two selected wavelengths.

The dichroic mirror is mounted in a B5CT1 threaded Ø1" optic mount and attached to a B4C kinematic platform. The kinematic platform allows for positioning of the beam that is within the reflection band of the dichroic mirror. This assembly is placed within a C4W cage cube with ER cage rods attached to two adjacent faces. One set of cage rods holds a collimator for the reflection band's fiber coupled laser, while the other set of cage rods holds a collimator for the transmission band's fiber coupled laser.

A more complex setup can be built to combine more than two beams by using multiple dichroic mirrors together.

[APPLIST] [APPLIST]
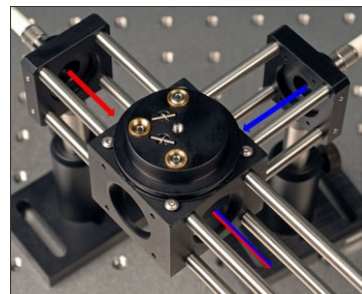
Variable Attenuation Beamsplitter

In normal operation, the variable beamsplitter/attenuator utilizes a half-wave plate to rotate the polarization of a previously linearly polarized beam of light. At the beamsplitter interface, p-polarized light will be transmitted, while s-polarized light will be reflected. By choosing the correct orientation with the half-wave plate, one can determine the amount of p-polarized and s-polarized light incident upon the interface (as shown in Figure 1 below).
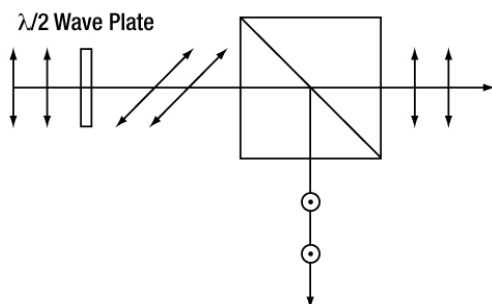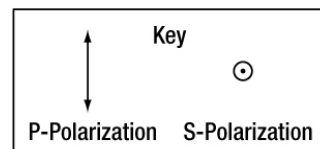

Figure 1. Normal Variable Beamsplitter Operation

The variable attenuation beamsplitter is a common component in many large optical systems and can serve as the basic building block for various applications just as; beam sampling, beam combining, beam splitting, power balance, and reflection isolation. Due to the modular design of the 30 mm cage cube system, this device can be easily integrated into a larger cage cube system. A variable attenuation beamsplitter can function at any wavelength supported by the optics of the system. For this application the optics were chosen for a 670 nm variable beamsplitter.

The polarization beamsplitting cube sits upon a B4CRP precision rotation platform and is held in place with a B6C cage cube clamp. The precision rotation platform allows for precise alignment of the polarization beamsplitting cube relative to the incident laser beam and also yields control over output beam alignment. This assembly is mounted within a C6W 30 mm cage cube with ER cage rods attached to hold a half-wave plate and rotation mount. The rotation mount is a CRM1P which is designed for integration into a 30 mm cage system. The precision control over the rotation is particularly useful when attempting to maximize or minimize a beam throughput. The zero-order mounted half-wave plate threads directly onto this rotation mount.

APPLIST] [APPLIST]

Click to Enlarge

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.
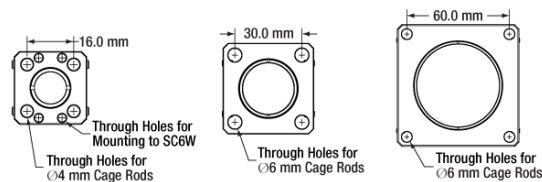
An example of the standard cage plate measurements determining cage system compatibility.

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	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 Cubes	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	
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.

30 mm Cage Cube

- Designed for 30 mm Cage Systems
- Top and Bottom Faces Feature Ø1.75" (44.5 mm) Through Holes
- Sides have Four 4-40 Tapped Holes Around an SM1-Threaded Hole
- Compatible with Ø6 mm Cage Rods

Click to Enlarge
[APPLIST]
[APPLIST]

The C4W 30 mm Cage Cube offers four planar cube faces with 4-40 tapped holes, which directly accept cage rods, arranged around an SM1-threaded (1.035"-40) hole. The top and bottom faces of the cube are machined with a centrally located Ø1.75" (44.5 mm) hole surrounded by four 4-40 tapped holes designed for mounting our Cage Cube Plates and Platforms. Since this cube features tapped holes on all sides, it cannot be translated along cage rods. For applications that would require the ability to slide the cube along the cage rods, please consider the C6W 30 mm Cage Cube featured below.

The C4W cage cube is compatible with a range of 30 mm Cage Components and Accessories, including port hole covers and cage cube platforms.

Part Number	Description	Price	Availability
C4W	30 mm Cage Cube	$64.12	Today

30 mm Cage Cube with ER Clearance Holes
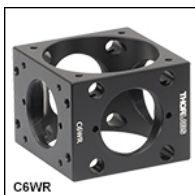
- Designed for 30 mm Cage Systems
- Top and Bottom Faces Feature Ø1.75" (44.5 mm) Through Hole
- SM1-Threaded Hole Centered on Each Side Face
- Clearance Slots for Ø6 mm Cage Rods on Two Opposing Sides
- Four 4-40 Tapped Holes on Each of Other Two Opposing Sides
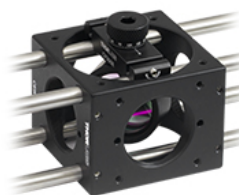
Click to Enlarge
[APPLIST]
[APPLIST]
The CP360R Quick-Release Mount for Ø1" Optics Being Used Within the C6W Cube

Click to Enlarge
[APPLIST]
[APPLIST]
B3CR Rotating Platform and the FFM1 Filter Holder Mounted Within the C6W Cube

The C6W 30 mm Cage Cube offers the same features as our C4W cage cube featured above except that it has two opposing faces with 4-40 tapped holes and two opposing faces with Ø6 mm through holes for mounting cage system rods centered on an SM1 (1.035"-40) threaded hole. The Ø6 mm through holes allow cage rods to pass through the cube, rather than be fastened to it. This feature allows the cube to be translated along the cage rods and then locked in place with the eight included 4-40 setscrews [0.050" (1.3 mm) hex]. The top and bottom faces of the cube are each machined with a centrally located Ø1.75" (44.5 mm) hole surrounded by four tapped holes designed for mounting our 30 mm Cage Cube Plates and Platforms.

This cage cube is compatible with a range of 30 mm Cage Components and Accessories, including port hole covers and cage cube platforms. Please note that the cage cube platforms will block the lower two cage rod holes of the C6W unless mounted using the C6WA adapter plate.

Part Number	Description	Price	Availability
C6W	30 mm Cage Cube, Ø6 mm Through Holes	$67.63	Today

30 mm Cage Cube Connector

C4W-CC

- Connect Two 2" Wide Cage Cubes Side by Side
- Connect a 2" Wide Cage Cube to a 1.5" Wide Cage Cube
- Compatible with C4W and C6W Cage Cubes
- Connect Two 1.5" Wide Cage Cubes with CM1-CC
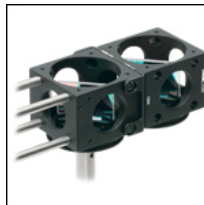
Click to Enlarge
[APPLIST]
[APPLIST]
C4W-CC Connecting Two 2"
Wide Cage Cubes

Click to Enlarge
[APPLIST]
[APPLIST]
A C4W and C6W Cage Cube connected to a 1.5" wide CCM1-4ER Compact Cage Cube using the C4W-CC and CM1-CC Cube Connectors, respectively.

The C4W-CC cage cube connector allows our 2" wide 30 mm cage cubes to be connected together as shown in the image to the right. Our C4W and C6W cubes are both compatible with this connector. The C4W-CC includes four 4-40 button-head screws, two 4-40 flat-head screws, four washers, and 1/16" hex key.

We also offer the CM1-CC to connect two 1.5" wide cage cubes. Both CM1-CC and

C4W-CC cage cube connectors can be used to connect one 2" wide 30 mm cage cube, such as our C4W or C6W, with a 1.5" wide 30 mm cage cube.

Alignment Pins
Please note that this connector requires drilled holes on the cube face next to the SM1-threaded ports, as the cube connector has alignment pins. If you have an older cube and would like it updated 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 un-drilled cubes.

Part Number	Description	Price	Availability
C4W-CC	Customer Inspired! 30 mm Cage Cube Connector for C4W and C6W Series Cubes	$54.65	Today

Optical Cage Plate Gasket

CPG3

- Highly Compressible Material Blocks Light Between Mating Optical Mounts
- Perfect for use with Light-Sensitive Instrumentation
- Typically used in a 30 mm Cage Assembly

This optical gasket is used to create a light-tight interface between two mating optical mounts. The highly compressible foam, measuring 0.25" (6 mm) thick in an uncompressed state, can easily adapt to uneven surfaces to maintain a light-tight seal between mating parts.

Most commonly used in cage assemblies, these gaskets are perfect for highly sensitive instrumentation such as CCD cameras and amplified photodiodes where ambient lighting is sufficient to saturate detection equipment or degrade signal-to-noise ratios.

Part Number	Description	Price	Availability
CPG3	30 mm Cage Plate Gasket	$6.87	Today