

SPT1 - February 18, 2021

Item # SPT1 was discontinued on February 18, 2021. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

XY TRANSLATION MOUNTS FOR 30 MM CAGE SYSTEMS

- ▶ Mount Ø1/2" or Ø1" Optics
- ▶ Compatible with Our Lens Tubes
- ▶ Mounts with ±0.25 mm, ±1.0 mm, or ±3.0 mm of X and Y Adjustment

Application Idea

ST1XY-D and SM1ZM
 Zoom Housing for a
 Confocal Microscope
 Detector (See the
Application Tab)



ST1XY-S
 Mount with 6 mm X and Y
 Travel for Ø1" Optics



CP1XY
 Stainless Steel Flexure
 Mount for Ø1/2" Optics



SPT1
 Slip Plate Positioner
 for Ø1" Optics



CXY1Q
 Quick-Release Mount
 for Ø1" Optics



[Hide Overview](#)

OVERVIEW

Features

- Compatible with 30 mm Cage Systems
- SM05 (0.535"-40) or SM1 (1.035"-40) Threading

For Ø1/2" or Ø1" optical components mounted in a 30 mm cage system, Thorlabs offers several options for XY adjustment (orthogonal to the mechanical axis of the cage system). For experimental setups requiring fine adjustment, consider using our CP1XY Flexure Adjustment Plate, CXY1 Cage Mount, or CXY1Q Cage Mount with Quick-Release Plate. Our ST1XY Translation Mounts offer up to ±3.0 mm of XY translation controlled by either 100 TPI adjuster screws, micrometer drives, or differential drives. In cases where coarse adjustment is sufficient, the SPT1, SPT1CT, SPT1C/M, and SPT1CT/M Slip Plate Mounts provide ±1 mm of manual XY adjustment.

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

Alternative Size Options

16 mm Cage XY Translators
30 mm Cage XY Translators
60 mm Cage XY Translators

[Hide Application](#)

APPLICATION

ST1XY XY Translation Mounts - Optic Alignment in a Confocal Microscope Detection Module

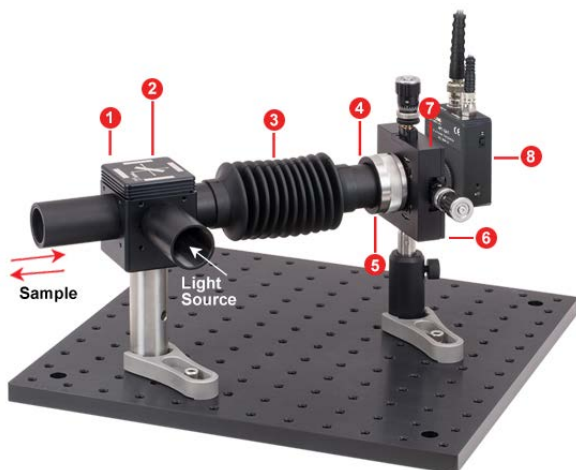
Thorlabs' ST1XY-A, ST1XY-S, and ST1XY-D XY Translation Mounts are useful when precise alignment of optics is necessary. In the following example of a

#	Product Description	Qty.	Photo (Click to Enlarge)

partial confocal microscope, a light-tight connection is created between a DFM1 Dichroic Filter Cube (denoted by 1 in the image below) containing a Microscopy Filter Set (2) and an APD130A(/M) Photodetector (8). A lens (5) located inside the SM1ZM High-Precision Zoom Housing (4) focuses the beam onto a precision pinhole (7) located just before the avalanche photodetector's detector element. The SM1ZM zoom housing is mounted directly onto the ST1XY-D XY Translation Mount with Differential Adjusters (6), creating a compact XYZ mount. SM1 Lens Tubes and the SM1B3 Lens Tube Bellows (3) allow for a light-tight connection without inhibiting the free movement of the XYZ mount.

Components used in the configuration pictured below are listed in the table to the right. These parts, along with SM1 Lens Tubes and 1" Post Assemblies, are sold separately.

1	DFM1 - Kinematic Dichroic Filter Cube	1	
2	Microscopy Filters	1 Set	
3	SM1B3 - Lens Tube Bellows	1	
4	SM1ZM - Non-Rotating SM1 Zoom Housing	1	
5	Focusing Lens Inside Zoom Housing	1	
6	ST1XY-D - XY Translator with Differential Drives	1	
7	Precision Pinhole Between XY Translator and Photodetector	1	
8	Photodetector SM1-Compatible Photodetector	1	



[Hide Cage Overview](#)

CAGE OVERVIEW

Cage System Overview

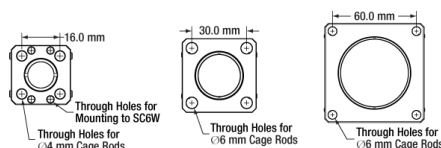
The Cage Assembly System provides a convenient way to construct large optomechanical systems with an established line of precision-machined building blocks designed for high flexibility and accurate alignment.

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 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.

[Hide XY Flexure Translation Mount, 30 mm Cage Compatible](#)

XY Flexure Translation Mount, 30 mm Cage Compatible

- ▶ Flexure Design for Maximum Stability
- ▶ Stainless Steel Construction
- ▶ SM05 (0.535"-40) Compatible

- ▶ ± 0.25 mm Range in X and Y Directions
- ▶ Resolution: 200 $\mu\text{m}/\text{rev}$

The CP1XY offers ± 0.25 mm of XY travel manipulated by M2.5 x 0.20 fine pitch adjusters. The stainless steel flexure design provides excellent long-term stability and is ideal for fiber coupling applications or experiments that use spatial filters or pinholes, which require fine positioning. The 0.35" (8.89 mm) long center bore is tapped through with an SM05 (0.535"-40) thread to allow the integration of our extensive SM05-threaded family of products. The CP1XY is vacuum compatible to 10^{-5} Torr. We recommend using two POLARIS-SM05RR vacuum-compatible, stainless steel retaining rings (sold separately) to secure an optic in the bore while under vacuum conditions. Alternatively, for non-vacuum applications, we offer SM05RR anodized aluminum retaining rings.

Item #	Travel	Drive	Optic Mounting	ER Cage Rod Connection
CP1XY	± 0.01 " (± 0.25 mm)	M2.5 x 0.20 Fine Pitch Adjusters	SM05 (0.535"-40) Thread	4 Through Holes with Side-Located Locking Screws

Part Number	Description	Price	Availability
CP1XY	30 mm Cage XY Flexure Adjustment Plate	\$403.63	Today

[Hide 30 mm Cage XY Translator for \$\varnothing 1\$ " Optics](#)

30 mm Cage XY Translator for $\varnothing 1$ " Optics

- ▶ Accepts $\varnothing 1.00$ " ($\varnothing 25.4$ mm) Optics up to 0.39" (10.0 mm) Thick
- ▶ ± 1 mm Travel in X and Y via 3/16"-100 Adjusters
- ▶ Compatible with 30 mm Cage Systems
- ▶ SM1 (1.035"-40) Threading for Compatibility with Our Extensive Line of SM1 Lens Tubes

The CXY1 XY Translator provides ± 1 mm of travel perpendicular to the optical axis of a 30 mm cage system. This translation is actuated by two 3/16"-100 adjusters, which are lockable via a 0.035" hex key. The movable carriage is internally SM1 (1.035"-40) threaded and directly accepts $\varnothing 1$ " optics up to 0.39" (10.0 mm) thick when secured using the included SM1RR retaining ring. The fixed back side is also threaded to allow SM1 lens tubes to be attached. The center carriage has been designed to offer pure X and Y translation. The mount features engraved vertical and horizontal tick marks to use as an alignment aid for the mounting carriage.

The translation mount also features four through holes for use with our ER cage rods. Each cage rod is secured with one side-located 4-40 locking setscrew using a 0.05" (1.3 mm) hex key.

For applications requiring a greater travel range, we offer XY translators with ± 2.5 mm travel.

Item #	Travel	Drive	Optic Mounting	ER Cage Rod Connection
CXY1	± 1 mm	100 Threads per Inch (TPI) Adjusters	SM1 (1.035"-40) Thread	Through Holes with Side-Located Locking Screws

Part Number	Description	Price	Availability
CXY1	30 mm Cage System, XY Translating Lens Mount for $\varnothing 1$ " Optics	\$187.20	Today

[Hide 30 mm Cage XY Translator for \$\varnothing 1\$ " Optics with Quick-Release Mounting Carriage](#)

30 mm Cage XY Translator for $\varnothing 1$ " Optics with Quick-Release Mounting Carriage

- ▶ Accepts $\varnothing 1.00$ " ($\varnothing 25.4$ mm) Optics
- ▶ ± 1 mm Travel in X and Y via 3/16"-100 Adjusters
- ▶ Magnetically Coupled, Quick-Release Mounting Carriage (Extra Carriages Sold Separately)
- ▶ Compatible with 30 mm Cage Systems
- ▶ SM1 (1.035"-40) Threading for Compatibility with Our Extensive Line of SM1 Lens Tubes

The CXY1Q XY Translation Mount is similar to the CXY1 mount sold above, but features a quick-release mounting carriage for easy exchange of components within a 30 mm Cage System. This mount provides ± 1 mm of travel perpendicular to the optical axis of a 30 mm cage system. This translation is actuated by two 3/16"-100 lockable adjusters. The movable center carriage and magnetically coupled mounting carriage are internally SM1 (1.035"-40) threaded and directly accept $\varnothing 1$ " optics up to 0.39" (10.0 mm) and 0.20" (5.0 mm) thick, respectively, when secured using the included SM1RR retaining ring. The fixed back side is also threaded to allow SM1 lens tubes to be attached. The center carriage has been designed to offer pure X and Y translation.



Click to Enlarge
[APPLIST]
[APPLIST]
CXY1 Coupled to CT1 Z-Axis Translation Mount
Using SM1S15 Lens Tube



Click to Enlarge
[APPLIST]
[APPLIST]
The CXY1QF integrated into a cage system. A Frosted Glass Alignment Disk in the quick release plate helps line up the beam with the optical axis.

The mount features engraved vertical and horizontal tick marks to use as an alignment aid for the movable carriage. A dot is engraved on both pieces of the mount to indicate the correct orientation of the quick-release carriage. Aligning the dots ensures the quick-release carriage is properly secured. The quick-release carriage also features a dedicated white space for denoting the optic that has been mounted within it (see the photo to the right). This allows for easy identification if more than one carriage is being used in a setup, as extra CXY1QF quick-release carriages can be purchased separately.

The translation mount also features four through holes for use with our ER cage rods. Each cage rod is secured with one side-located 4-40 locking setscrew using a 0.05" (1.3 mm) hex key.

To remove the quick-release carriage from the mount when in a closed cage system, detach the carriage, rotate it 90°, and then take it out of the system. There must be at least 1.60" (40.6 mm) separating the edge of the quick-release carriage and the next component in the system to provide enough clearance during removal.

Item #	Travel	Drive	Optic Mounting	Torque Applied to CXY1QF	ER Cage Rod Connection
CXY1Q	±1 mm	100 Threads per Inch (TPI) Adjusters	SM1 (1.035"-40) Thread	0.58 in-lb (0.0655 N·m) ^a	Through Holes with Side-Located Locking Screws

a. Torque is relative to the plane of the magnets. We do not recommend using a lens tube longer than 3" with this mount.

Part Number	Description	Price	Availability
CXY1Q	30 mm Cage System, XY Translating Mount for Ø1" Optics with Quick Release Plate	\$248.89	Today
CXY1QF	Quick-Release Plate for the CXY1Q Translation Mount	\$38.69	5-8 Days

[Hide 6 mm Travel XY Translation Mounts](#)

6 mm Travel XY Translation Mounts

- ▶ Accepts Ø1.00" Optics up to 0.48" (12.2 mm) Thick
- ▶ Compact Design; ±0.12" (3.0 mm) Travel
- ▶ Compatible with Our Ø1" SM1 Lens Tubes
- ▶ 4-40 Taps on Front and Back Provide 30 mm Cage Compatibility

ST1XY-D(/M) Operation

The ST1XY translation mounts offer ±3.0 mm of travel provided by one of three drive types: adjuster screw, micrometer, or differential drive. They utilize hardened tool steel components on all moving parts to ensure long-term, drift-free operation. The ST1XY is designed to connect with our extensive line of Ø1" SM1 Lens Tubes as well as our 30 mm cage assemblies to offer great flexibility when building optical systems.

The translating SM1-threaded carriage accepts optics up to 0.48" (12.2 mm) thick when using two SM1RR retaining rings (included). A stationary internal SM1 thread with 0.14" (3.5 mm) depth is present on the other side of the mount that allows for coupling to stationary SM1 Lens Tubes. Three 8-32 (M4) tapped holes are provided on the bottom surface to allow direct mounting on our Ø1/2" Posts.

Thorlabs also offers the CXY1 XY Translator, which has Ø6 mm through holes for cage rods, as opposed to the 4-40 taps on the ST1XY translation mounts. These through holes permit the CXY1 to slide along the optic axis.

The ST1XY-D(/M) features DM22 differential drives. For more information about this drive, including operation and adjustment knob reattachment, please visit our DM22 differential drive page.

Item #	Travel	Drive Type	Drive Mechanism	Optic Mounting	Post Mounting	ER Cage Rod Connection
ST1XY-A(/M)	±0.12" (3.0 mm)	100 TPI	0.01" (0.25 mm) per Revolution and 100 Threads per Inch Adjusters (Locking Set Screw on Each Adjuster Uses 0.035" Hex Key)	SM1 (1.035"-40) Thread	Three 8-32 (M4) Tapped Holes on Bottom Surface	4-40 Tapped Holes or Counterbored Mounting Using ST1CP
ST1XY-S(/M)		Micrometer	0.5 mm per Revolution and 10 µm per Graduation Micrometer Screws			
ST1XY-D(/M)		Differential	0.4 mm per Revolution Coarse and 25 µm per Revolution Fine Control with 0.5 µm per Graduation Differential Micrometers			

Part Number	Description	Price	Availability
ST1XY-A/M	XY Translator with 100 TPI Drives, Metric	\$363.59	5-8 Days
ST1XY-S/M	XY Translator with Micrometer Drives, Metric	\$400.38	5-8 Days
ST1XY-D/M	XY Translator with Differential Drives, Metric	\$517.26	Lead Time

ST1XY-A	XY Translator with 100 TPI Drives	\$363.59	Today
ST1XY-S	XY Translator with Micrometer Drives	\$400.38	Today
ST1XY-D	XY Translator with Differential Drives	\$517.26	Lead Time

[Hide Cover Plate with Clearance Holes](#)

Cover Plate with Clearance Holes

- ▶ Designed Specifically for Use with the ST1XY Series of XY Translators (Featured Above)
- ▶ Connect Two Internally Threaded Cage Components with ER Rods
- ▶ SM1 (1.035"-40) Threaded Through Hole
- ▶ Four 4-40 Screws Included

The ST1CP is a bolt-on adapter designed specifically for use with the ST1XY-series of XY translators. Like our ERSCA adapter, this plate can be used to connect two internally threaded cage components with ER rods. First thread the four included 4-40 screws through the ST1CP through hole and into the internally bored side of the ER rod (as shown in the figure to the left). Then, remove the back plate on an ST1XY stage and secure this adapter plate in its place using the four outer 2-56 counterbored through-holes. Once attached, this adapter plate keeps the cage and any SM1-threaded component attached to the adapter plate stationary, while enabling an optic inside the ST1XY stage to move relative to these fixed components.

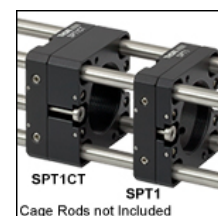
Alternatively, this adapter can also be attached to the front side (i.e., the side without the removable mount) of an ST1XY stage using the included 4-40 screws. In this case, the front side of the ST1XY stage will no longer be cage compatible (although the back side still is). However, the advantage of this configuration is that two SM1-compatible components can be attached to the ST1XY stage (one on each side) and an optic inside the stage can be moved relative to these fixed components.

Part Number	Description	Price	Availability
ST1CP	Cover Plate with Clearance Holes	\$32.20	Today

[Hide XY Slip Plate Positioners, 30 mm Cage Compatible](#)

XY Slip Plate Positioners, 30 mm Cage Compatible

- ▶ $\pm 0.04"$ (± 1 mm) of Adjustment in Both X and Y Directions
- ▶ Center-Located SM1 (1.035"-40) Threaded Hole in Front Slip Plate and Smooth Bore in Fixed Back Plate
- ▶ Position Front Plate by Hand and Lock in Place by Tightening Locking Screws
- ▶ Secure Back Plate to Four Cage Rods via Side-Located Setscrews
- ▶ 8-32 (M4) Threaded Hole in Base of Back Plate for Post Mounting



The SPT1, SPT1CT, SPT1C/M, and SPT1CT/M Slip Plate Positioners are designed to provide coarse XY positioning of optical components within our 30 mm Cage Assembly System. This design provides for manual adjustment only and is best utilized in conjunction with an alignment laser to monitor centricity. The front plate can be locked into position against the fixed plate via two locking screws, which can be tightened using a 5/64" (2 mm) hex key.

Click to Enlarge
The SPT1CT and SPT1 Slip Plates assembled in a cage system using the ER series cage rods.

The SPT1 and SPT1C/M slip plates accommodate $\varnothing 1"$ optics up to 0.08" (2.0 mm) thick, while the thicker front plate on the SPT1CT(M) can hold $\varnothing 1"$ optics up to 0.34" (8.6 mm) thick. Unmounted optics can be secured with SM1RR Retaining Rings, two of which are included with the SPT1CT(M). The center-located SM1 (1.035"-40) tapped through hole also directly accepts externally SM1-threaded components. Four through holes in the back plate of each mount with side-located locking screws accept ER series cage rods for compatibility with our 30 mm cage systems.

Item #	Travel	Slip Plate Thickness	Maximum Optic Thickness	Optic Mounting	Post Mounting	ER Cage Rod Attachment
SPT1	$\pm 0.04"$ (± 1 mm)	0.23" (5.8 mm)	0.08" (2.0 mm)	SM1 (1.035"-40) Thread	8-32 Tap on Bottom Surface	4 Through Holes with Side-Located Locking Screws, 0.05" (1.3 mm) Hex
SPT1CT		0.50" (12.7 mm)	0.34" (8.6 mm)			
SPT1C/M		0.23" (5.8 mm)	0.08" (2.0 mm)	SM1 (1.035"-40) Thread	M4 x 0.7 Tap on Bottom Surface	4 Through Holes with Side-Located Locking Screws, 5/64" (2 mm) Hex
SPT1CT/M		0.50" (12.7 mm)	0.34" (8.6 mm)			

Part Number	Description	Price	Availability
SPT1C/M	NEW! Coarse ± 1 mm XY Slip Plate Positioner, 30 mm Cage Compatible, Metric	\$66.55	5-8 Days
SPT1CT/M	NEW! Coarse ± 1 mm XY Thick Slip Plate Positioner with 2 SM1RR Retaining rings, 30 mm Cage Compatible, Metric	\$77.91	Lead Time

SPT1	Coarse ± 1 mm XY Slip Plate Positioner, 30 mm Cage Compatible	\$66.55	Lead Time
SPT1CT	NEW! Coarse ± 1 mm XY Thick Slip Plate Positioner with 2 SM1RR Retaining Rings, 30 mm Cage Compatible	\$77.91	Lead Time

[Hide Alignment Plates for 30 mm Cage Systems](#)

Alignment Plates for 30 mm Cage Systems



- ▶ Quick, Drop-In Beam Alignment Tool
- ▶ Small Through Hole Aligned at Center of 30 mm Cage Assembly



The CPA1 and CPA2 Alignment Plates are convenient tools for aligning cage-based optical systems. These drop-in plates feature a small through hole at the exact center of the 30 mm cage assembly that is used for aligning visible beams. For easy alignment, the through hole is surrounded by engraved rings, which indicate $\varnothing 4$ mm, $\varnothing 7$ mm, $\varnothing 10$ mm, and $\varnothing 13$ mm. The CPA1 provides a $\varnothing 0.9$ mm through hole, while the CPA2 provides a $\varnothing 5$ mm through hole.

The VRC4CPT and VRC6SCPT Alignment Plates are specifically designed to align IR or MIR beams in a cage-based optical assembly. Both plates are identical to the CPA1 (shown to the left) on the front. The back (shown to the right) of the VRC4CPT includes a $\varnothing 1/2$ " ($\varnothing 12.7$ mm), non-rotating IR-sensitive fluorescing alignment disk made of the same material used in our VRC4 Viewing Card. Alternatively, the back of the VRC6SCPT includes a $\varnothing 0.39$ " ($\varnothing 10.0$ mm), non-rotating MIR alignment disk is made of the same thermochromic liquid crystal material used in our VRC6S Viewing Card, which reacts to laser sources over the 1.5 to 13.2 μm wavelength range, and has a minimum detectable power density of 0.05 mW/mm^2 at 1550 nm (22 $^{\circ}\text{C}$). The VRC4CPT plate has a $\varnothing 1.5$ mm hole centered on the plate's $\varnothing 0.9$ mm hole, and the VRC6SCPT has a $\varnothing 2.0$ mm hole centered on the plate's $\varnothing 0.9$ mm hole.

Item #	Wavelength Range	Emission Band	Minimum Detectable Power Density	Active Region Diameter	Alignment Features
VRC4CPT	790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm	~ 520 to 580 nm	N/A	1/2" (12.7 mm)	$\varnothing 0.9$ mm Hole in Plate $\varnothing 1.5$ mm Hole in Disk Center
VRC6SCPT	1.5 to $>13.2 \mu\text{m}$	N/A	0.05 mW/mm^2 @ 1550 nm (22 $^{\circ}\text{C}$)	0.39" (10.0 mm)	$\varnothing 0.9$ mm Hole in Plate $\varnothing 2.0$ mm Hole in Disk Center

Part Number	Description	Price	Availability
CPA1	30 mm Cage Alignment Plate with $\varnothing 0.9$ mm Hole	\$13.52	Today
CPA2	30 mm Cage Alignment Plate with $\varnothing 5$ mm Hole	\$13.52	Today
VRC4CPT	30 mm Cage System Alignment Plate with IR Disk (790 - 840 nm, 870 - 1070 nm, 1500 - 1590 nm)	\$32.74	Today
VRC6SCPT	30 mm Cage System Alignment Plate with MIR Disk, 1.5 to $>13.2 \mu\text{m}$	\$38.19	Today