THORLABS
43 Sparta Avenue
Newton, NJ 07860 | Sales: (973) 300-3000 | www.thorlabs.com

CT1A - March 13, 2025

Item # CT1A was discontinued on March 13, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

Z-AXIS TRANSLATION STAGES AND ACCESSORIES FOR 30 mm CAGE SYSTEMS

- 1/2" (13 mm) or 12 mm Manual Travel Along Optic Axis
- Version with 160 µm Piezo-Driven Fine Adjustment
- Modular Design with Interchangeable Optic Mounts

CT1P
12 mm Travel with M6 x 0.25 Screw,
160 µm Closed-Loop Piezo Travel

CT1A
1/2" Travel,
Micrometer Drive

CT104
Ø1/2" Rotation Mount

CT102
Ø1/2" XY
Translation Mount

CT101
Ø1" (Ø25 mm) Optic Mount

CT103
Blank Plate for
Custom Machining

OVERVIEW

Features

- Translation of Components Along 30 mm Cage System Optical Axis
- CT1P(/M) Stage Offers 12 mm Manual Travel and 160 µm Closed-Loop Piezo Travel (Min)
- CT1A(/M) Stage Includes 1/2" (13 mm) Travel Micrometer and CT101 Optic Mount
- Interchangeable Optic Mounts Sold Separately

Thorlabs' Z-Axis Translation Stages can be fixed to two cage rods in a 30 mm cage system while allowing the translation along the optical axis of a component secured to the moving world of the stage. The CT1P(/M) translation stage with integrated piezo actuator features 12 mm of manual travel as well as at least 160 µm of piezo travel with 0.5 µm resolution in closed-loop operation. The CT1A(/M) manual translation stage includes a CT101 optic mount and features a 1/2" (13 mm) travel micrometer with 0.001" (10 µm) graduations. These stages are fully compatible with all the optic mounts sold on this page.

Click to Enlarge
[APPLIST]
[APPLIST]
Gold Mirror Mounted in CT101 Optic Mount
Secured to CT1P Translation Stage

We offer optic mounts that are specifically designed for both the CT1A(/M) and the CT1P(/M) stages, as well as our 1/4" Translation Stages. These mounts include a fixed optic mount, an XY translation mount, a rotation mount, and a blank plate for custom machining. See below for details.

SPECS

Manual Stage with Integrated Piezo Actuator		
Item #	**CT1P**	**CT1P/M**
Travel Range	Coarse: 12.0 mm (250 µm per Revolution) Fine (Piezo): 160 µm (Closed Loop)[a]	
Moving World Load Capacity (Max)	40 g	
Coarse Adjustment Screw	M6 x 0.25 mm	
Piezo Fine Resolution (Closed Loop)	0.5 µm	
Theoretical Open Loop Resolution[b]	8.0 nm	
Piezo Drive Voltage[c]	-10 V to 140 V, 6 mA Max	
Power Consumption	5 V, 500 mA Max (270 mA Typical)	
EXT IN	MMCX Connector 0 to 10 VDC, 1.6 Hz Low Pass Filter	
MONITOR Out	MMCX Connector 0 to 10 V (Max Load 20 kOhm)	
I/O (Trigger)	MMCX Connector 0 to 5 V (TTL)	
Drive Output Update Rate	10 Hz	
Control Loop	Dual PID	
Thermal Stability	144 nm/°C (Typical)	
Bearing Type	Crossed-Roller Bearings	
Moving World Mounting	Six 4-40 Mounting Holes, 4 mm Keyway	Six M3 Mounting Holes, 4 mm Keyway
Fixed World Mounting	Two 8-32 Mounting Holes	Two M4 Mounting Holes
Operating Temperature	10 to 40 °C (50 to 104 °F)	
Stage Outer Dimensions (L x W x H)	3.35" x 2.36" x 1.69" (85.0 mm x 60.0 mm x 43.0 mm)	
Cable Length	1 m (3.3')	
Weight (Including Cable)	305 g (10.75 oz)	
Compatible Accessories	CT101, CT102, CT104, CT103	

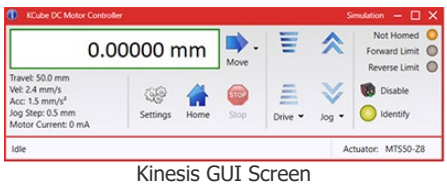
a. This is the minimum fine travel achievable. Depending on mounting, load, and orientation, the user may achieve more than this.
b. Theoretical Value, Not Measured
c. These voltages are nominal values. The actual voltage applied to the piezo will vary dependent on temperature, resistance, etc.

Manual Stage		
Item #	**CT1A**	**CT1A/M**
Travel Range	1/2"	13 mm
Micrometer Drive	0.001" per Graduation	10 µm per Graduation
Bearing Type	Linear Ball Bearings	
Moving World Mounting	Six 4-40 Mounting Holes, 4 mm Keyway	
Included Accessory	CT101	
Other Compatible Accessories	CT102, CT104, CT103	
Stage Outer Dimensions (L x W x H)[a]	2.35" x 2.54" x 1.25" (59.7 mm x 64.5 mm x 31.6 mm)	
Weight	250 g (8.82 oz)	

a. These dimensions describe the stage without the CT101 mount and micrometer.

KINESIS SOFTWARE

Thorlabs offers the Kinesis® software package to drive our wide range of motion controllers. The software can be used to control devices in the Kinesis family, which covers a wide variety of motion controllers ranging from small, low-powered, single-channel drivers (such as the K-Cubes™) to high-power, multi-channel benchtop units and modular 19" rack nanopositioning systems (the MMR60x Rack System).



Kinesis GUI Screen

The Kinesis Software features .NET controls which can be used by 3rd party developers working in the latest C#, Visual Basic, LabVIEW™, or any .NET compatible languages to create custom applications. Low-level DLL libraries are included

Software

Kinesis Version 1.14.52

The Kinesis Software Package, which includes a GUI for control of Thorlabs' Kinesis system controllers.

Also Available:

for applications not expected to use the .NET framework and APIs are included with each install. A Central Sequence Manager supports integration and synchronization of all Thorlabs motion control hardware.

- Communications Protocol

Software

By providing this common software platform, Thorlabs has ensured that users can mix and match any of our motion control devices in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from single-axis to multi-axis systems and control all from a single, PC-based unified software interface.

The software package allows two methods of usage: graphical user interface (GUI) utilities for direct interaction with and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.

Z-Axis Translation Stage: 12 mm Manual Travel & 160 µm Piezo Travel (Closed Loop)

- Integrated Piezo Actuator and Driver
  - 160 µm Closed Loop Piezo Travel Range
  - 0.5 µm Resolution (Closed Loop)
- M6 x 0.25 Screw for Coarse Adjustment
  - 12 mm Travel
  - 250 µm Adjustment per Revolution
- Precision Crossed-Roller Bearings
- Control Piezo with Knob, Kinesis® GUI, or External Voltage
- Adapter Plate for Secure Mounting (Sold Separately)
- Accessories Available for Mounting Optics (Sold Separately)


Click to Enlarge
CT1P Mounted to Optical Table Using CT1PA Adapter Plate

Click to Enlarge
Adapter Plate for Mounting CT1P(/M) Stage


Click to Enlarge
CT1P Adjusters and Connectors

The CT1P(/M) 12 mm Manual Travel Translation Stage with Integrated Piezo Actuator is designed to be used in 30 mm cage systems that require translating a component along the optical axis of the cage system. This stage incorporates precision crossed-roller bearings to ensure smooth, high-resolution motion. The stage can be roughly positioned using the "COARSE ADJUST" knob, which provides 250 µm of travel per revolution and can be locked using the included 1.5 mm hex key. The piezo actuator integrated in this stage must have power supplied using the included micro USB to USB A cable. The USB cable should be connected to a PC directly or via a powered USB hub. Turning the "FINE ADJUST" knob provides an adjustment of 0.5 µm resolution through 160 µm of travel in closed-loop operation. The piezo can be toggled between open- and closed-loop modes via the "OPEN/CLOSE" button on the front. Holding this button homes the piezo, putting it in the middle of its travel range. The coarse and fine adjustment knobs can be operated using a 2 mm (5/64") balldriver (not included); they should not be operated simultaneously.

The piezo actuator can also be controlled remotely using the Kinesis® software or by applying an external voltage to the EXT IN port (MMCX, 0 to 10 VDC). The default parameters of the CT1P(/M) stage can be altered using the Kinesis software, and settings such as jog step, PID parameters, and Trigger I/O can be persisted to the hardware as well. The two bidirectional I/O ports (MMCX) are disabled on default, but can be enabled using Kinesis and allow the user to use them either as input or output. Input mode uses TTL logic, while output mode provides a push-pull drive of 5 V, with a maximum current limit of 8 mA. There is also a MONITOR output port (MMCX, 0 to 10 V) which provides a digital representation of the piezo voltage. To download the software, see the *Kinesis Software* tab.

The moving world of the stage features six 4-40 (M3) holes and a center 4 mm keyway, allowing the accessories sold below to be easily mounted to the CT1P(/M) and exchanged depending on the application. Two 30 mm cage rods can be attached to the fixed world of the stage by positioning them in the slots on each side. The rods can then be secured by tightening the four included cone-ended M4 setscrews using a 2 mm (5/64") hex key or balldriver. If the stage is only mounted to the cage system, the cage rods should be supported near the stage using cage system mounts.

The CT1P(/M) stage features two 8-32 (M4) holes on the bottom which can be used to mount the stage in a variety of configurations. The CT1PA adapter plate, sold separately, offers a quick, low-profile solution to securing the stage, as shown in the image above to the right. Alternatively, the stage can be mounted using our Ø1/2" optical post assemblies or Ø1" optical post assemblies, although care should be taken to accomodate the non-standard hole spacing of 3.11" (79.0 mm). This can be achieved using pedestal posts with clamping forks, pedestal post holders with clamping forks, or a variety of post holder bases.

For more information on purchasing a custom stage with an imperial adjustment screw, contact Tech Support.

Part Number	Description	Price	Availability
CT1P/M	12 mm Travel Translation Stage for 30 mm Cage System, M6 x 0.25 Adjuster and 160 µm Travel Piezo Actuator, Integrated Driver, M3 Mounting Holes	$2,524.89	Today

CT1PA	Adapter Plate for Mounting CT1P(/M) Stage	$109.78	Today
CT1P	12 mm Travel Translation Stage for 30 mm Cage System, M6 x 0.25 Adjuster and 160 µm Travel Piezo Actuator, Integrated Driver, 4-40 Mounting Holes	$2,524.89	Today

Z-Axis Translation Stage: 1/2" Manual Travel

- Includes 1/2" (13 mm) Travel Micrometer with 0.001" (10 µm) per Graduation
- Comes with CT101 Ø1" Optic Mount for Optics up to 0.27" (6.9 mm) Thick
- Precision Linear Ball Bearings
- Lockable Design

The CT1A(/M) Manual Translation Stage is designed to be used in 30 mm cage systems that require translation along the optical axis of the cage. This translation stage includes a CT101 Ø1" optic mount, which is also available separately below. Precision linear ball bearings are used to ensure smooth, high-resolution motion. The CT1A(/M) features a graduated micrometer that provides 1/2" (13 mm) of linear translation with 0.001" (10 µm) graduations. A 5/64" (2 mm) hex on the micrometer allows for actuation in space-constrained environments. The smallest incremental movement of the carriage is approximately 1 µm.

Click to Enlarge
[APPLIST]
[APPLIST]
CXY1A XY Translator Coupled to a CT1A Z-Axis Translation Mount Using an SM1S15 Lens Tube

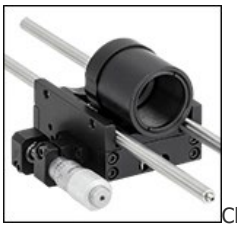
The modular design allows the accessories sold below to be mounted to the movable carriage of the CT1A(/M) translation stage. The included CT101 Ø1" Optic Mount has internal SM1 threading (1.035"-40) for mounting Ø1" optical components up to 0.27" (6.9 mm) thick, or externally SM1-threaded components, such as our SM1 lens tubes. One SM1RR retaining ring, two 4-40 cap screws for securing the mount, a 1/16" and a 5/64" (2 mm) hex key, and two removable dowel pins for alignment are also included with the mount.

Part Number	Description	Price	Availability
CT1A/M	13 mm Travel Manual Translation Stage for 30 mm Cage Systems	$507.25	3 Weeks
CT1A	Customer Inspired! 1/2" Travel Manual Translation Stage for 30 mm Cage Systems	$507.25	3 Weeks

Ø1" Optic Mount

- SM1 (1.035"-40) Threaded Bore Directly Accepts Ø1" Optics up to 0.27" (6.9 mm) Thick
- Compatible with Our Line of SM1 Lens Tubes
- Finger Groove Recess Allows for Ease of Alignment
- Compatible with Our Z-Axis Translation Stages for 30 mm Cage Systems and Our 1/4" Translation Stages

The CT101 provides a means to mount SM1-threaded (1.035"-40) devices as well as Ø1" optics to the CT1A(/M) or CT1P(/M) stages. It is also compatible with our 1/4"-travel translation stages using our MS103 or MS103/M Adapter Plate. One SM1RR retaining ring, two 4-40 and two M3 cap screws, and two removable dowel pins for alignment are included with each unit.



Click to Enlarge
CT101 Optic Mount with SM1L10 Lens Tube Attached to the CT1A Cage Translation Stage in a 30 mm Cage System

Part Number	Description	Price	Availability
CT101	Ø1" Optic Mount for Use with CT1A(/M), CT1P(/M) or MS Stages	$52.28	Today

Ø1/2" Optic XY Translation Mount

- Provides ±0.04" (±1.0 mm) of Travel in X and Y Directions
- SM05 (0.535"-40) Threaded Bore Directly Accepts Ø1/2" Optics up to 0.39" (9.9 mm) Thick
- Wobble: <100 µrad
- Resolution: 250 µm/rev

- Compatible with Our Z-Axis Translation Stages for 30 mm Cage Systems and Our 1/4" Translation Stages

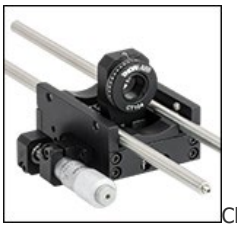

Click to Enlarge
The CT1A Cage Translation Stage Combined with a CT102 Translating Lens Mount to Create an XYZ Configuration

The CT102 has an internal SM05 (0.535"-40) threading for mounting Ø1/2" optics up to 0.39" (9.9 mm) thick or externally SM05-threaded components. The CT102 allows for ±1 mm of travel in the X and Y direction using M3 x 0.25 fine adjusters. The mount is directly compatible with the CT1A(/M) and CT1P(/M) stages. It is also compatible with our 1/4"-travel translation stages using our MS103 or MS103/M Adapter Plate. One SM05RR retaining ring, which secures a component by sandwiching it between the ring and the back lip on the mount, and two 4-40 and two M3 cap screws for securing the mount are included with each unit.

Part Number	Description	Price	Availability
CT102	XY Translating Lens Mount for Use with CT1A(/M), CT1P(/M), or MS Stages	$226.89	Today

Ø1/2" Optic Rotation Mount

- Coarse Rotation: 360° Continuously Adjustable
- Graduations: 2° Increments
- Mount Ø1/2" Optics up to 7.3 mm (0.29") Thick
- Runout: <0.0001" (25 µm) Along Optical Axis
- Max. Clear Aperture: 0.43"
- Lockable Design
- Compatible with Our Z-Axis Translation Stages for 30 mm Cage Systems and Our 1/4" Translation Stages

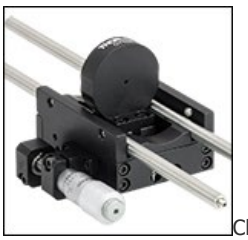

Click to Enlarge
CT104 Rotation Mount Shown with the CT1A Cage Translation Stage in a 30 mm Cage System

The CT104 rotation mount provides 360° of continuous rotation for Ø1/2" (Ø12.7 mm) optics and SM05 threaded components. The 2° graduation allows for precise positioning of components, such as linear polarizers and waveplates. A top-mounted nylon-tip setscrew is used to lock the freedom of rotation when the mount has been set in the correct orientation. The mount is directly compatible with the CT1A(/M) and CT1P(/M) stages. It is also compatible with our 1/4"-travel translation stages using our MS103 or MS103/M Adapter Plate. One SM05RR retaining ring, which secures a component by sandwiching it between the ring and the back lip on the mount, and two 4-40 and two M3 cap screws for securing the mount are included with each unit.

Part Number	Description	Price	Availability
CT104	Rotation Mount for Ø1/2" Optics to Use with CT1A(/M), CT1P(/M), or MS Stages	$107.21	Today

Blank Mount

- Ideal for Custom Machining
- Center-Drilled Dimple Allows for User to Precisely Align Along the Cage's Optical Axis
- Finger Groove Recess Allows for Ease of Alignment
- Compatible with Our Z-Axis Translation Stages for 30 mm Cage Systems and Our 1/4" Translation Stages


Click to Enlarge
CT103 Blank Mount Shown on the CT1A Cage Translation Stage

The CT103 blank device mount has a solid surface to allow the end user to tailor the mount for custom applications. Custom hole sizes and threads can be machined using any size drill bits and taps. A center-drilled dimple is provided to help in aligning with the optical axis during the machining process. The mount is directly compatible with the CT1A(/M) and CT1P(/M) stages. It is also compatible with our 1/4"-travel translation stages using our MS103 or MS103/M. Two 4-40 and two M3 cap screws for securing the mount are included with each unit.

Part Number	Description	Price	Availability

CT103	**Blank Mount to Use with CT1A(/M), CT1P(/M), or MS Stages**	**$46.04**	**Today**