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K10CR1 - July 24, 2024

Item K10CR1 was discontinued on July 24, 2024. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

- **Integrated Controller**
- **Continuous 360° Rotation**
- **Rotates Optic Within a 30 mm Cage System**
- **Maximum Speed of 10 Degrees/s**

K10CR1

Application Idea

The 30 mm Cage System Rods are Attached to the Fixed Housing while the SM1 Lens Tube Rotates

Hide Overview

OVERVIEW

Features

- Rotates Optics and SM1 (1.035"-40) Lens Tubes within a 30 mm Cage System
- Full 360° Bidirectional Rotation
- Vernier Scale with 12 Arcminute Graduations
- Unidirectional Repeatability of ±60 µrad
- Built-In Controller Powered using USB 2.0 or USB 3.0 Connection
- Input/Output Port for Control via TTL Signals
- No External Controller Required
- Several Adapters Available:
  - Table Mounting Plate
  - Rotating Platform Adapter
  - 60 mm Cage System Adapter

Key Specifications[a]	
Travel Range	360° Continuous[b]
Maximum Speed	10 Degrees/s
Minimum Speed	0.005 Degrees/s
Maximum Acceleration[c]	20 Degrees/s^2
Unidirectional Repeatability[d]	±60 µrad
Backlash	±200 µrad
Maximum Load Capacity[e]	22 N
Repeatable Incremental Movement (Min)[f]	0.03°
Absolute Accuracy[d]	±0.14°
Home Location Accuracy	±100 µrad
Dimensions (L x W x H)	107 mm x 66.0 mm x 21.5 mm (4.21" x 2.60" x 0.84")
Weight	0.22 kg (0.48 lbs)

a. See the *Specs* tab for complete specifications.
b. After 43 complete revolutions in one direction, the APT software will no longer provide an accurate positional readout; however, the stage will continue to rotate.
c. The acceleration is limited by the motor force and must be reduced for higher loads.
d. Bidirectional repeatability and bidirectional accuracy will be the same as the unidirectional values if Backlash Correction is enabled in the software.
e. This value applies to both vertical and horizontal mounting. For more details on the load capacity, please see the *Specs* tab.
f. The minimum repeatable incremental movement is the smallest controlled movement that the stage can be positioned repeatably where the error is less than 10% of the specified step size at a 99.5% confidence level.

Thorlabs' K10CR1(/M) Rotation Mount, part of our growing Kinesis® line of motorized optomechanics, stages, and controllers, is a compact stage designed to rotate Ø1" optics or SM1 Lens Tubes within a fixed 30 mm Cage System. Unlike our other rotation mounts, where the cage rods are threaded into the rotating dial, the K10CR1(/M) has four, 4-40 tapped holes for the cage rods on each side of the fixed housing. This allows optics, such as wave plates and cylindrical lenses, to be rotated while leaving the other optics in the cage system fixed. The rotating SM1 bore passes through the mount; optics up to 0.67" (17.0 mm) thick may be secured inside the bore using the two included SM1RR retaining rings.

Rotation is driven via a stepper motor equipped with a high ratio worm gear (120:1), providing a unidirectional repeatability of ±60 µrad and a maximum speed of 10 degrees/s. The integrated controller is USB 2.0 and 3.0 compatible; a USB 3.0 cable is provided for compatibility with most computers. The mount is powered by the host PC via the USB cable, minimizing the number of cables needed during operation. In addition, the mount settings can be adjusted using the software, allowing the mount to be used without a PC; in this case power is provided by a USB hub or charger. A jack is provided for TTL input / output signals, which allows for custom timing control and eases synchronization with other components. For more details on these connections, please see the *Pin Diagrams* tab.

Click to Enlarge
The K10CR1 can be mounted horizontally using adapters sold separately (see below for details).

The mount can be operated with the user friendly APT™ software or Kinesis software, which allow the user to quickly set up complex move sequences. For example, all relevant operating parameters are set automatically by the software for Thorlabs' stage and actuator products. Advanced custom motion control applications and sequences are also possible using the extensive ActiveX® programming environment described in more detail on the *Motion Control Software* and *APT Tutorials* tabs. In addition to software control, pushbutton operation is possible, as shown in the image below and to the left. The button function is software-

selectable and can be set to either jog the stage a set distance or to move the stage to a set position. Pressing both buttons for two seconds zeros the stage to the "home" position, which is facilitated by a precision home limit switch.

Click to Enlarge
Control buttons located on the edge of the K10CR1 rotation mount; the functions are set via the software and persist if the stage is disconnected from the PC and powered via a USB hub or charger.

The thumbscrew on the side of the housing can be used for manual rotation adjustment. An engraved vernier scale, with 2° graduations on the main dial and 12 arcmin graduations on the vernier scale, also aids in manual alignment. While this manual adjustment can be useful for visual alignment of mounted components, please note that the positioning data will be lost and the mount will need to be homed in order to use software control.


Click to Enlarge
Two precision Ø6 mm bores allow our Cage Rods to be used to align multiple mounts along the same axis. Once in position, a side-located set screw on each hole secures the stage to the rod.

The K10CR1(/M) can be directly mounted to a Ø1/2" Post or Ø1" Post via 8-32 (M4) taps on two perpendicular edges. As shown in the image to the right, two Ø6 mm rods, such as our cage rods, can be used to align multiple rotation mounts along the same axis in post mounting applications (note that these two bores are not located at the correct spacing for attaching cage plates). Six 4-40 (M3) taps on the front surface of the moving dial allow components to be mounted, such as our K6A1 or K6A1/M Prism Mounting Adapter.

Alternatively, several mounting adapters are available below. The K10CR1A1 adapter plate facilitates mounting the K10CR1 horizontally, as shown in the image above. Secondly, the K10CR1A2(/M) plate is secured on the rotating dial to provide a variety of taps and a keyway for our flexure stage accessories. Finally, the K10CR1A3 bracket allows the K10CR1(/M) to be inserted within a 60 mm cage system.

SPECS

Specifications	
Mount Specifications	
Travel Range	360° Continuous[a]
Maximum Speed	10 Degrees/s
Minimum Speed	0.005 Degrees/s
Maximum Acceleration[b]	20 Degrees/s^2
Unidirectional Repeatability[c]	±60 µrad
Backlash	±200 µrad
Resolution (Theoretical)	0.0000073° (0.128 µrad)
Maximum Load Capacity[d]	22 N
Minimum Repeatable Incremental Movement[e]	0.03°
Absolute Accuracy[c]	±0.14°
Home Location Accuracy	±100 µrad
Maximum Wobble (Axial)	500 µrad
Motor Specifications	
Motor Type	2-Phase Stepper Motor
Motor Drive Voltage	8 V Nominal
Terminal Resistance	20 Ω
Output Power	2.5 W Nominal
Step Size	1.8°
Rotor Inductance	4.2 mH per Phase
Bearing Type	4-Point Ball Bearing
Drive Mechanism	Worm Gear, Ratio 1:120
Homing Limit Switch	Hall Effect
General Specifications	
Operating Temperature Range	5 to 40 °C (41 to 104 °F)
Dimensions (L x W x H)	107 mm x 66.0 mm x 21.5 mm (4.21" x 2.6" x 0.84")
Weight	0.22 kg (0.48 lbs)

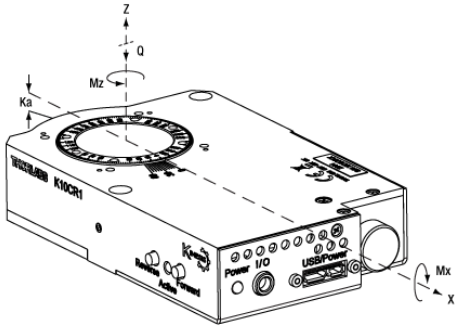
a. After 43 complete revolutions in one direction, the APT software will no longer provide an accurate positional readout; however, the stage will continue to rotate.
b. The acceleration is limited by the motor force and must be reduced for higher loads.
c. Bidirectional repeatability and bidirectional accuracy will be the same as the unidirectional values if Backlash Correction is enabled in the software.
d. This value applies to both vertical and horizontal mounting.
e. The minimum repeatable incremental movement is the smallest controlled movement that the stage can be positioned repeatably where the error is less than 10% of the specified step size at a 99.5% confidence level.

Maximum Load Specification Details

Parameter[a]	Value
Max Load (Q)	22 N (2.25 kg or 5.0 lbs)

Max Torque (Mz)	140 mN•m
Max Transversal Torque (Mx)	1.5 N•m
Typical Stiffness (Ka)	380 µrad/N•m

a. These terms are defined in the diagram below.



Resolution Calculation

For the stepper motor in the K10CR1(/M), there are 200 full steps per revolution of the motor and 2048 microsteps per full step. The output shaft of the motor goes into a 120:1 reduction gearbox.

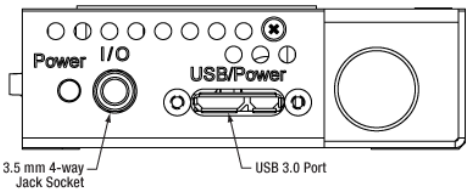
The angular displacement of the rotation mount per encoder count is given by

200 x 2048 x 120 = 49,152,000.0 microsteps per revolution of the top platform

49,152,000.0/360 = 136533.33 microsteps per degree of movement.

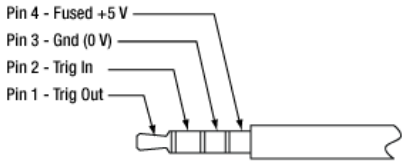
PIN DIAGRAMS

K10CR1(/M) Pin Configurations



The USB 3.0 port is compatible with a USB 2.0 Micro B connector if the Micro B connector is plugged into the shaded region in the photo above. The I/O port requires a user-supplied 3.5 mm 4-way jack plug and cable; the pinout of the mating plug is shown to the right.

Compatible I/O Connector
3.5 mm 4-Way Jack Plug



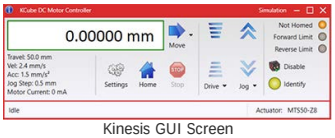
This is the compatible connector for the I/O port; Thorlabs does not provide this connector.

MOTION CONTROL SOFTWARE

Thorlabs offers two platforms to drive our wide range of motion controllers: our Kinesis® software package or the legacy APT™ (Advanced Positioning Technology) software package. Either package can be used to control devices in the Kinesis family, which covers a wide range of motion controllers ranging from small, low-powered, single-channel drivers (such as the K-Cubes™ and T-Cubes™) to high-power, multi-channel, modular 19" rack nanopositioning systems (the APT Rack System).

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

Our legacy APT System Software platform offers ActiveX-based controls which can be used by 3rd party developers working on C#, Visual Basic, LabVIEW™, or any Active-X compatible languages to



Kinesis GUI Screen

APT GUI Screen

create custom applications and includes a simulator mode to assist in developing custom applications without requiring hardware.

By providing these common software platforms, Thorlabs has ensured that users can easily mix and match any of the Kinesis and APT controllers 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 packages allow 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.

A range of video tutorials is available to help explain our APT system software. These tutorials provide an overview of the software and the APT Config utility. Additionally, a tutorial video is available to explain how to select simulator mode within the software, which allows the user to experiment with the software without a controller connected. Please select the *APT Tutorials* tab above to view these videos.

Software

Kinesis Version 1.14.47

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

Also Available:

- Communications Protocol Software

Software

APT Version 3.21.6

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

Also Available:

- Communications Protocol Software

APT TUTORIALS

The APT video tutorials available here fall into two main groups - one group covers using the supplied APT utilities and the second group covers programming the APT System using a selection of different programming environments.

Disclaimer: The videos below were originally produced in Adobe Flash. Following the discontinuation of Flash after 2020, these tutorials were re-recorded for future use. The Flash Player controls still appear in the bottom of each video, but they are not functional.

Every APT controller is supplied with the utilities APTUser and APTConfig. APTUser provides a quick and easy way of interacting with the APT control hardware using intuitive graphical control panels. APTConfig is an 'off-line' utility that allows various system wide settings to be made such as pre-selecting mechanical stage types and associating them with specific motion controllers.

APT User Utility

The first video below gives an overview of using the APTUser Utility. The OptoDriver single channel controller products can be operated via their front panel controls in the absence of a control PC. The stored settings relating to the operation of these front panel controls can be changed using the APTUser utility. The second video illustrates this process.

APT User - Overview APT User - OptoDriver Settings

APT Config Utility

There are various APT system-wide settings that can be made using the APT Config utility, including setting up a simulated hardware configuration and associating mechanical stages with specific motor drive channels. The first video presents a brief overview of the APT Config application. More details on creating a simulated hardware configuration and making stage associations are present in the next two videos.

APT Config - Overview APT Config - Simulator Setup APT Config - Stage Association

APT Programming

The APT Software System is implemented as a collection of ActiveX Controls. ActiveX Controls are language-independant software modules that provide both a graphical user interface and a programming interface. There is an ActiveX Control type for each type of hardware unit, e.g. a Motor ActiveX Control covers operation with any type of APT motor controller (DC or stepper). Many Windows software development environments and languages directly support ActiveX Controls, and, once such a Control is embedded into a custom application, all of the functionality it contains is immediately available to the application for automated operation. The videos below illustrate the basics of using the APT ActiveX Controls with LabVIEW, Visual Basic, and Visual C++. Note that many other languages support ActiveX including LabWindows CVI, C++ Builder, VB.NET, C#.NET, Office VBA, Matlab, HPVEE etc. Although these environments are not covered specifically by the tutorial videos, many of the ideas shown will still be relevant to using these other languages.

Visual Basic

Part 1 illustrates how to get an APT ActiveX Control running within Visual Basic, and Part 2 goes on to show how to program a custom positioning sequence.

APT Programming Using Visual Basic - Part 1 APT Programming Using Visual Basic - Part 2

LabVIEW

Full Active support is provided by LabVIEW and the series of tutorial videos below illustrate the basic building blocks in creating a custom APT motion control sequence. We start by showing how to call up the Thorlabs-supplied online help during software development. Part 2 illustrates how to create an APT ActiveX Control. ActiveX Controls provide both Methods (i.e. Functions) and Properties (i.e. Value Settings). Parts 3 and 4 show how to create and wire up both the methods and properties exposed by an ActiveX Control. Finally, in Part 5, we pull everything together and show a completed LabVIEW example program that demonstrates a custom move sequence.

APT Programming Using LabVIEW - Part 1: Accessing Online Help
APT Programming Using LabVIEW - Part 2: Creating an ActiveX Control
APT Programming Using LabVIEW - Part 3: Create an ActiveX Method
APT Programming Using LabVIEW - Part 4: Create an ActiveX Property
APT Programming Using LabVIEW - Part 5: How to Start an ActiveX Control

The following tutorial videos illustrate alternative ways of creating Method and Property nodes:

APT Programming Using LabVIEW - Create an ActiveX Method (Alternative)
APT Programming Using LabVIEW - Create an ActiveX Property (Alternative)

Visual C++

Part 1 illustrates how to get an APT ActiveX Control running within Visual C++, and Part 2 goes on to show how to program a custom positioning sequence.

APT Programming with Visual C++ - Part 1
APT Programming with Visual C++ - Part 2

MATLAB

For assistance when using MATLAB and ActiveX controls with the Thorlabs APT positioners, click here.

To further assist programmers, a guide to programming the APT software in LabVIEW is also available here.

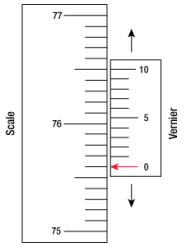
VERNIER SCALES

Reading a Vernier Scale

Vernier scales are typically used to add precision to standard, evenly divided scales (such as the scale on Thorlabs' rotation mounts). A vernier scale has found common use in many precision measurement tools, the most common being calipers and micrometers. The direct vernier scale uses two scales side-by-side: the main scale and the vernier scale. The vernier scale has a slightly smaller spacing between its tick marks (10% smaller than the main). Hence, the lines on the main scale will not line up with all the lines on the vernier scale. Only one line from the vernier scale will match well with one line of the main scale, and that is the trick to reading a vernier scale.

Figures 1 through 3 show a vernier scale system for three different situations. In each case, the scale on the left is the main scale, while the small scale on the right is the vernier scale. When reading a vernier scale, the main scale is used for the gross number, and the vernier scale gives the precision value. In this manner, a standard ruler or micrometer can become a precision tool.

The 0 on the vernier scale is the "pointer" (marked by a red arrow in Figs. 1 - 3) and will indicate the main scale reading. In Figure 1 we see the pointer is lined up directly with the 75.6 line. Notice that the only other vernier scale tick mark that lines up well with the main scale is 10. Since the vernier 0 lines up with the main scale's 75.6, the reading from Figure 1 is 75.60 (in whatever units the tool measures in).



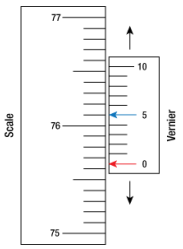
Click to Enlarge

Figure 1: An example of how to read a vernier scale. The red arrow indicates what is known as the pointer. Since the tick mark labeled 10 on the vernier scale aligns with one of the tick marks on the main scale, this vernier scale is reading 75.60 (in whatever units the tool measures).

That is essentially all there is to reading a vernier scale. It's a very straightforward way of increasing the precision of a measurement tool. To expound, let's look at Figure 2. Here we see that the pointer is no longer aligned with a scale line, instead it is slightly above 75.6, but below 75.7; thus the gross measurement is 75.6. The first vernier line that coincides with a main scale line is the 5, shown with a blue arrow. The vernier scale gives the final digit of precision; since the 5 is aligned to the main scale, the precision measurement for Figure 2 is 75.65.

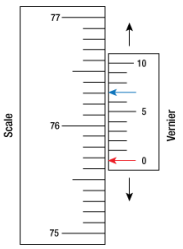
Since the vernier scale is 10% smaller than the main scale, moving 1/10 of the main scale will align the next vernier marking. This asks the obvious question: what if the measurement is within the 1/10 precision of the vernier scale? Figure 3 shows just this. Again, the pointer line is in between 75.6 and 75.7, yielding the gross measurement of 75.6. If we look closely, we see that the vernier 7 (marked with a blue arrow) is very closely aligned to the main scale, giving a precision measurement of 75.67. However, the vernier 7 is very slightly above the main scale mark, and we can see that the vernier 8 (directly above 7) is slightly below its corresponding main scale mark. Hence, the scale on Figure 3 could be read as 75.673 ± 0.002. A reading error of about 0.002 would be appropriate for this tool.

As we've seen here, vernier scales add precision to a standard scale measurement. While it takes a bit of getting used to, with a little practice, reading these scales is fairly straightforward. All vernier scales, direct or retrograde, are read in the same fashion.



Click to Enlarge

Figure 2: An Example of a vernier scale. The red arrow indicates the pointer and the blue arrow indicates the vernier line that matches the main scale. This scale reads 75.65.



Click to Enlarge

Figure 3: An Example of a vernier scale. The red arrow indicates the pointer and the blue arrow indicates the vernier line that matches the main scale. This scale reads 75.67, but can be accurately read as 75.673 ± 0.002.

**ROTATION MOUNTS AND STAGES **

Rotation Mount and Stage Selection Guide

Thorlabs offers a wide variety of manual and motorized rotation mounts and stages. Rotation mounts are designed with an inner bore to mount a Ø1/2", Ø1", or Ø2" optic, while rotation stages are designed with mounting taps to attach a variety of components or systems. Motorized options are powered by a DC Servo motor, 2 phase stepper motor, piezo inertia motor, or an Elliptec™ resonant piezo motor. Each offers 360° of continuous rotation.

Manual Rotation Mounts

Rotation Mounts for Ø1/2" Optics							
Item #	**MRM05(/M)**	**RSP05(/M)**	**CRM05**	**PRM05(/M)[a]**	**SRM05**	**KS05RS**	**CT104**
Click Photo to Enlarge							
Features	Mini Series	Standard	External SM1 (1.035"-40) Threads	Micrometer	16 mm Cage-Compatible	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Compatible with 30 mm Cage Translation Stages and 1/4" Translation Stages[b]
Additional Details							More [+]

a. This mount is available in the PRM05GL5 bundle, which includes the PRM05 rotation mount with the SM05PM5 polarizing prism mount.
b. The CT104 is complatible with the 1/4" translation stages using our MS103(/M) adapter plate.
c. The CT104 is compatible with the CT1A(/M) cage translation stage, which is designed for use with 30 mm cage systems.

Rotation Mounts for Ø1" Optics								
Item #	**RSP1(/M)**	**LRM1**	**RSP1D(/M)**	**DLM1(/M)**	**CLR1(/M)**	**RSP1X15(/M)**	**RSP1X225(/M)**	**PRM1(/M)[a]**
Click Photo to Enlarge								
Features	Standard	External SM1 (1.035"-40) Threads	Adjustable Zero	Two Independently Rotating Carriages	Rotates Optic Within Fixed Lens Tube System	Continuous 360° Rotation or 15° Increments	Continuous 360° Rotation or 22.5° Increments	Micrometer
Additional Details								More [+]

a. This mount is available in the PRM1GL10 bundle, which includes the PRM1 rotation mount with the SM1PM10 polarizing prism mount.

Rotation Mounts for Ø1" Optics						
Item #	**LM1-A & LM1-B(/M)**	**CRM1T(/M)**	**CRM1LT(/M)**	**CRM1PT(/M)**	**KS1RS**	**K6XS**
Click Photo to Enlarge						
Features	Optic Carriage Rotates Within Mounting Ring	30 mm Cage-Compatible[a]	30 mm Cage-Compatible for Thick Optics[a]	30 mm Cage-Compatible with Micrometer[a]	±4° Kinematic Tip/Tilt Adjustment Plus Rotation	Six-Axis Kinematic Mount[a]
Additional Details						More [+]

a. This mount also features four 4-40 (M3) holes on the rotation dial for use with the K6A1(/M) prism platform.

Rotation Mounts for Ø2" Optics							
Item #	**RSP2(/M)**	**RSP2D(/M)**	**PRM2(/M)**	**LM2-A & LM2-B(/M)**	**LCRM2A & LCRM2/M**	**KS2RS**	**K6X2**
Click Photo to Enlarge							
		Adjustable		Optic Carriage	60 mm Cage-	±4° Kinematic	Six-Axis Kinematic

Features	Standard	Zero	Micrometer	Rotates Within Mounting Ring	Compatible	Tip/Tilt Adjustment Plus Rotation	Mount
Additional Details							More [+]
Rotation Drive Mechanism and Adjustment Range	Manual, 360° Continuous		Coarse: Manual, 360° Continuous; Fine: ±7° Micrometer	Manual, 360° Continuous			
Optic Mounting	Internally SM2-Threaded Carriage			Internal SM2 Threads in LM2-A	Internally SM2-Threaded Carriage		
Maximum Accepted Optic Thickness	0.51" (13 mm)	0.54" (13.7 mm)	0.48" (12.2 mm)	0.46" (11.7 mm)	0.52" (13.2 mm)	0.47" (12 mm)	0.53" (13.4 mm)
Post Mounting	8-32 (M4) Tap			8-32 (M4) Tap in LM2-B	8-32 (M4) Tap	Four Counterbores for 8-32 (M4) Cap Screws	Six Counterbores for 8-32 (M4) Cap Screws
Cage System Compatibility	N/A		Four 4-40 (M3) Taps on Rotation Dial with 60 mm Spacing	N/A	Four Bores for Ø6 mm Cage Rods with 60 mm Spacing	N/A	N/A

Manual Rotation Stages

Manual Rotation Stages						
Item #	**RP005(/M)**	**PR005(/M)**	**MSRP01(/M)**	**RP01(/M)**	**RP03(/M)**	**QRP02(/M)**
Click Photo to Enlarge						
Features	Standard					Two Hard Stops
Additional Details						More [+]

Manual Rotation Stages						
Item #	**XRNR1(/M)**	**XRR1(/M)**	**PR01(/M)**	**CR1(/M)**	**XYR1(/M)**	**OCT-XYR1(/M)**
Click Photo to Enlarge						
Features	Fine Rotation Adjuster and 2" Wide Dovetail Quick Connect	Fine Rotation Adjuster and 3" Wide Dovetail Quick Connect	Fine Rotation Adjuster and SM1-Threaded Central Aperture	Fine Pitch Worm Gear	Rotation and 1/2" Linear XY Translation	
Additional Details						More [+]

a. The stage profile is higher when it is mounted using the screw slots rather than stacked on another stage or accessory with mating dovetails.
b. The OCT-XYR1(/M) stage includes the XYR1A solid sample plate. This plate can be detached from the stage to reveal the same mounting features present on the XYR1(/M) stage.

Motorized Rotation Mounts and Stages

Motorized Rotation Mounts and Stages with Central Clear Apertures					
Item #	**DDR25(/M)**	**PDR1C(/M)**	**PDR1(/M)**	**PDR1V(/M)**	**PDXR1(/M)**
Click Photo to Enlarge					
Features	Compatible with SM05 Lens Tubes, 16 mm Cage System, & 30 mm Cage System	Compatible with 16 mm Cage System	Compatible with SM05 Lens Tubes & 30 mm Cage System	Vacuum-Compatible; Also Compatible with SM05 Lens Tubes & 30 mm Cage System	Compatible with SM05 Lens Tubes & 30 mm Cage System
Additional Details					More [+]

Motorized Rotation Mounts and Stages with Central Clear Apertures					
Item #	**K10CR1(/M)**	**PRM1Z8(/M)[a]**	**DDR100(/M)**	**ELL14**	**HDR50(/M)**
Click Photo to Enlarge					
Features	Compatible with SM1 Lens Tubes & 30 mm Cage System		Compatible with SM1 Lens Tubes, 16 mm Cage System, 30 mm Cage System	Compatible with SM1 Lens Tubes, Open Frame Design for OEM Applications	Compatible with SM2 Lens Tubes

Additional Details	More [+]

a. This stage is available in the KPRMTE(/M), which includes the PRMTZ8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.

Motorized Rotation Mounts and Stages with Tapped Platforms		
Item #	**PRMTZ8(/M)[a]**	**ELL18(/M)[b]**
Click Photo to Enlarge		
Features	Tapped Mounting Platform for Mounting Prisms or Other Optics	Tapped Mounting Platform, Open Frame Design for OEM Applications
Additional Details		More [+]

a. This stage is available in the KPRM1E(/M), which includes the PRMT1Z8(/M) Motorized Rotation Stage with the KDC101 K-Cube DC Servo Motor Controller.
b. This stage is available in the ELL18K(/M), which includes an interface board, mounting brackets, and connectors for PC control.

Stepper Motor Rotation Mount

- Full Bidirectional 360° Rotation
- SM1 (1.035"-40) Threading for Mounting Ø1" Lens Tubes
- Four 4-40 Tapped Holes for 30 mm Cage Systems on Each Side of Housing
- Compact Size: 4.21" x 2.60" x 0.84" (107.0 mm x 66.0 mm x 21.5 mm)
- Two SM1RR Retaining Rings Included

Adapters are available that allow the user to mount the K10CR1(/M) directly to a table, add a tapped platform, or integrate it into a 60 mm cage system. These adapters are sold separately below.

Part Number	Description	Price	Availability
K10CR1/M	Customer Inspired! Motorized Rotation Mount for Ø1" Optics, Stepper Motor, Metric	$1,531.23	Today
K10CR1	Customer Inspired! Motorized Rotation Mount for Ø1" Optics, Stepper Motor, Imperial	$1,531.23	Today

Stepper Motor Rotation Stage Adapters

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Table Mounting Adapter
The K10CR1A1 Mounting Plate is designed to mount the K10CR1(/M) rotation mount horizontally to an optical table or breadboard for use as a rotation stage. The plate comes with three 8-32 and three M4 button head screws for attaching an imperial or metric stage, respectively. Four slots accept 1/4" or M6 screws, which are ideal for securing the stage to a breadboard.

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Rotating Platform Adapter
When the stage is mounted horizontally, the SM1 mounting feature may not be needed. In these cases, the K10CR1A2(/M) adapter plate attaches to the surface of the rotating dial with two included 4-40 (M3) button head screws. This Ø1.81" (Ø46.0 mm) plate provides a central 3.0 mm groove and 6-32 (M3) taps for attaching Thorlabs' flexure stage accessories. In addition, an array of six 2-56 (six M2), six 4-40 (two M2.5 and four M3), eight 6-32 (four M3 and four M4), and one 1/4"-20 (M6) taps allow for a variety of optomechanical components to be attached, including GN05 (GN05/M) Goniometers, PM3 (PM3/M) Prism Clamping Arms, and T12X (T12X/M) and MS1 (MS1/M) Translation Stages.


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The K10CR1 attached to a K10CR1A1 Mounting Plate, with a K10CR1A2 adapter plate attached to the moving world.

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60 mm Cage System Adapter
The K10CR1A3 is a bracket that attaches to the edge of the K10CR1(/M) and allows the rotation mount to be integrated into 60 mm Cage Systems. The K10CR1A3 comes with three 8-32 and three M4 button head screws for attaching the bracket to both imperial and metric stages.


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The image on the left shows a K10CR1 mounted in a 60 mm cage system with a K10CR1A3 bracket. The 60 mm cage segment must be built using only three Ø6 mm cage rods. In the image on the right, the setscrews on the bracket are loosened on the two slots and the through hole, allowing the rotation mount to pivot out of the optical path, thereby easing the insertion and removal of optics.

Once the bracket is attached to the stage, one cage rod is slid through the Ø6 mm bore in the bracket. Slots on the other edge of the bracket allow the rotation mount to pivot outside of the cage system for installation of optics or other components, as shown in the photos to the right. The design limits the number of cage rods used in a cage segment containing the rotation mount to three. A 0.050" hex key is included for tightening the locking setscrews onto the cage rods.

Please note that the K10CR1A3 bracket mounts the stage inside the 60 mm cage system at a 7° angle. While a fixed 30 mm cage system can still be attached to the front and back faces of the K10CR1(/M), the 30 and 60 mm cage system rods will not be aligned, although the optic axes will be collinear.

Part Number	Description	Price	Availability

K10CR1A2/M	Rotating Adapter Plate for K10CR1/M, Metric Taps	$97.11	Today
K10CR1A1	Horizontal Mounting Adapter Plate for K10CR1(/M) Rotation Stages	$55.83	Today
K10CR1A3	60 mm Cage System Adapter Bracket for K10CR1 and K10CR1/M	$130.82	Today
K10CR1A2	Rotating Adapter Plate for K10CR1 Rotation Mount, Imperial Taps	$97.11	Today