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KCH301 - August 20, 2025

Item # KCH301 was discontinued on August 20, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

K-CUBE® AND T-CUBE™ USB CONTROLLER HUBS

- **Provide Power and Communication for up to Three or Six K-Cubes® or T-Cubes**
- **Install T-Cubes Using KAP101 or KAP102 Adapter Plate**
- **USB 2.0 Interface**

Application Idea
CH301 Mounted Vertically with K-Cubes Installed (AP90 Bracket Not Included)

KCH601
Controller Hub

OVERVIEW

Features

- Enables Communication between K-Cubes®, T-Cubes™, and Host Control PC
- Supports up to Three (KCH301) or Six (KCH601) K-Cube or T-Cube Controllers
- Compact USB 2.0 Platform
- Horizontal or Vertical Mounting to Optical Tables
- Single USB Cable and Single Power Cable for all Connected K-Cubes and T-Cubes
- Second USB Port for Connecting Multiple Controller Hubs
- Fully RoHS Compliant

These USB Controller Hubs have been designed specifically with multiple K-Cube and T-Cube operation in mind. They simplify issues such as cable management, power supply routing, and multiple USB device communications. In addition, they make it possible to mount the electronic drivers on the optical table, next to all of the other mechanical components required to build an automated optomechanical application.

Table 1.1 Specifications

Item #	KCH301	KCH601
K-/T-Cube Bays[a]	Three	Six
Housing Dimensions (without Mounting Brackets)	193.5 mm x 70.0 mm x 24.0 mm (7.62" x 2.76" x 0.94")	376.5 mm x 70.0 mm x 24.0 mm (14.82" x 2.76" x 0.94")
Weight	0.3 kg	0.5 kg
Input Power Requirements	15 V, 10 A (Max)	
Output Power	+15 V, 6 A (Max) -15 V, 1 A (Max) +5 V, 5 A (Max)	
USB Hub Circuit	Fully Compliant USB 2.0 Hub	
Finish	Black Anodized	

a. Double-wide K-Cubes and T-Cubes use two bays.

K-Cube® Motion Control Modules

Each USB Controller Hub comprises a slim base-plate type carrier with electrical connections located on the upper surface. It contains a fully compliant USB 2.0 hub circuit and provides all communications and power distribution for up to three (KCH301) or six (KCH601) K-Cubes or T-Cubes, using only a single power connection. The hub draws a maximum current of 10 A; please verify that the cubes being used do not require a total current of more than 10 A. See Table 1.1 for output power specifications. The hubs are shipped complete with the power supply and horizontal mounting brackets.

Brushed DC Servo Motor Controller
Brushless DC Servo Motor Controller
Fiber Alignment Controllers
Four-Channel Piezo Inertia Actuator Controller
PSD Auto Aligner
Single-Channel Piezo Controller and Strain Gauge Reader
Solenoid Controller
Stepper Motor Controller
Compact Light Source & Driver Modules
Laser Sources
Laser Diode Driver
LED Driver
Compact Temperature Control Module
Temperature Controller

The hub vastly reduces the number of USB and power cables required when operating multiple K-Cubes or T-Cubes. Furthermore, a USB output connector can be connected to the USB input on another unit, allowing multiple controller hubs to be connected together while still only using a single USB cable from the host control PC. As an added feature, the controller hub, when combined with devices that work in a closed loop such as the K-Cube Piezo Controller and Strain Gauge Reader paired with the K-Cube Position Sensing Detector, provides closed-loop control without the need for additional cabling.

Click to Enlarge
[APPLIST]
[APPLIST]
Figure 1.2 The controller hubs contain M6 taps on the bottom, allowing them to be mounted vertically using the AP90(/M) Right Angle Bracket (sold separately).

A KAP101 or KAP102 Adapter Plate (sold separately below) is required for each T-Cube to operate on the controller hub. The KAP101 is designed to adapt 60 mm wide T-Cubes to the hubs, while the KAP102 is designed to adapt 120 mm wide T-Cubes to the hubs.

Mounting Options

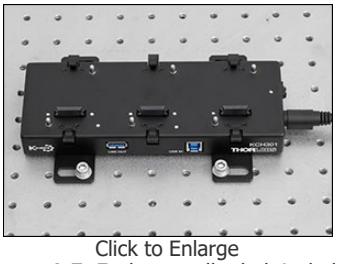
An array of mounting holes on the bottom of the USB Controller Hubs enables them to be mounted in multiple configurations to both imperial and metric tables. The hubs are shipped complete with mounting brackets that allow horizontal mounting; these brackets are compatible with both imperial and metric screws and allow the hub to be mounted flat on the optical table, much like the mounting plates of the individual cubes.

Alternatively, the AP90(/M) Right Angle Brackets, sold separately, can used to mount a hub vertically, thus saving space on the optical table. Two M6 cap screws (16 or 20 mm long) are required to attach the right angle bracket to the hub.

The hubs also have two (KCH301) or three (KCH601) magnets on the bottom to temporarily secure the hubs in place on the table.

Click to Enlarge
Figure 1.3 The KAP101 Adapter Plate (sold separately below) is required for mating 60 mm wide T-Cubes with KCH series hubs.

Click to Enlarge
Figure 1.4 The KAP102 Adapter Plate (sold separately below) is required for mating 120 mm wide T-Cubes with KCH series hubs.

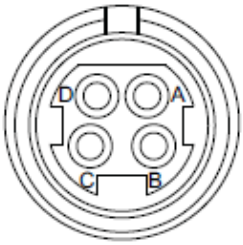


Click to Enlarge
Figure 1.5 Each controller hub includes horizontal mounting brackets for securing the hub to an optical table or breadboard.

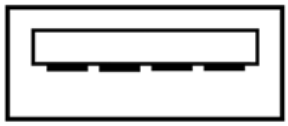
PIN DIAGRAMS

Power Connector

USB OUT

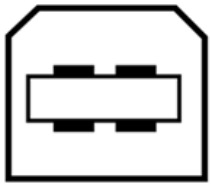


Pin	Description	Minimum	Maximum	Max Operating Current
A	15 V	14 V	16 V	10 A
B	15 V Return	-	-	-
C	15 V Return	-	-	-
D	15 V	14 V	16 V	10 A



This port can be connected to the USB IN on another Hub or other USB device, allowing multiple Controller Hubs to be connected together, thereby requiring only a single USB cable from the host control PC.

USB IN



Provides communication to the host controller PC.

KINESIS AND XA SOFTWARE

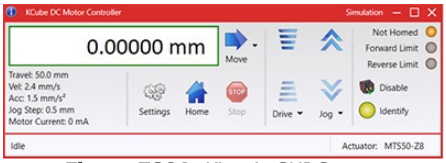


Figure 789A Kinesis GUI Screen

Thorlabs offers two platforms to drive our wide range of motion controllers: our XA software package and our Kinesis software package, which is being phased out. The Kinesis software supports most of Thorlabs' motion control products. The XA software is an improved platform for developers that currently supports some of our most popular motion control products (see the full list of supported products here). The software is undergoing continuous, intensive development and will eventually add support for our entire line of motion control products. The XA software application will be fully supported through the year 2040.

Kinesis Motion Control Software

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.

Software

Kinesis Version 1.14.53

XA Version 1.2.7

The Kinesis and XA Software Packages, which include a GUI for control of Thorlabs' motion controllers.

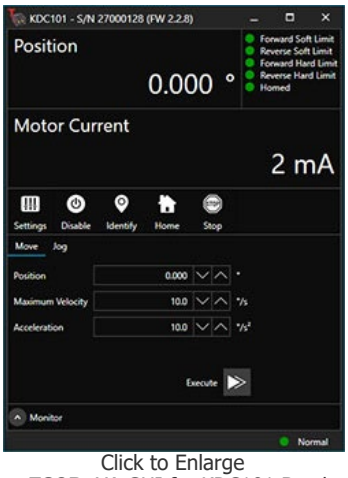
Also Available:

- Communications Protocol

Software

By providing a common software platform, Thorlabs has ensured that users can easily mix and match any of the Kinesis 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 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.



Click to Enlarge
Figure 789B XA GUI for KDC101 Brushed DC Servo Controller

XA Motion Control Software: Improved Platform for Developers

Designed from the ground up to be straightforward to understand, XA provides a thread-safe and language-paradigm-agnostic set of application programming interfaces in C, C++, and C#/.NET with language wrappers available to allow for easy integration into your native, .NET language, Python, or LabVIEW applications. This enables the same functionality as mentioned for the Kinesis software development kit (SDK) while providing a more streamlined toolkit for developers. Coupled with the included developer guides and code examples in the SDK, this software is tailored toward users interested in creating complex, customized applications and interfaces. Full API documentation is provided for the native C library, and the .NET wrapper documentation is currently under development. Please contact Tech Support for more details on using the .NET wrapper.

XA also features a comparable GUI to Kinesis while adding improvements to the user experience, like the ability to save device states and a more consistent interface across devices of different types. In addition, further improvements are planned as XA will be fully supported through the year 2040, whereas the Kinesis software is being phased out. The current version of the XA software can only drive select Thorlabs motion controllers. However, the software is undergoing continuous, intensive development and will eventually add support for our entire line of motion control products. Information on software compatibility can be found in the XA User Guide, and additional details about the software, including a list of compatible devices, can be found here.

KINESIS TUTORIALS

Thorlabs' Kinesis® software features new .NET controls which can be used by third-party developers working in the latest C#, Visual Basic, LabVIEW™, or any .NET compatible languages to create custom applications.

C#

This programming language is designed to allow multiple programming paradigms, or languages, to be used, thus allowing for complex problems to be solved in an easy or efficient manner. It encompasses typing, imperative, declarative, functional, generic, object-oriented, and component-oriented programming. By providing functionality with this common software platform, Thorlabs has ensured that users can easily mix and match any of the Kinesis 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 the low-powered, single-axis to the high-powered, multi-axis systems and control all from a single, PC-based unified software interface.

The Kinesis System Software allows two methods of usage: graphical user interface (GUI) utilities for direct interaction 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.

For a collection of example projects that can be compiled and run to demonstrate the different ways in which developers can build on the Kinesis motion control libraries, click on the links below. Please note that a separate integrated development environment (IDE) (e.g., Microsoft Visual Studio) will be required to execute the Quick Start examples. The C# example projects can be executed using the included .NET controls in the Kinesis software package (see the Kinesis Software tab for details).

Click Here for the Kinesis with C# Quick Start Guide
Click Here for C# Example Projects
Click Here for Quick Start Device Control Examples

LabVIEW

LabVIEW can be used to communicate with any Kinesis-based controller via .NET controls. In LabVIEW, you build a user interface, known as a front panel, with a set of tools and objects and then add code using graphical representations of functions to control the front panel objects. The LabVIEW tutorial, provided below, provides some information on using the .NET controls to create control GUIs for Kinesis-driven devices within LabVIEW. It includes an overview with basic information about using controllers in LabVIEW and explains the setup procedure that needs to be completed before using a LabVIEW GUI to operate a device.

Click Here to View the LabVIEW Guide
Click Here to View the Kinesis with LabVIEW Overview Page

Part Number	Description	Price	Availability
AP90/M	Right-Angle Mounting Plate, M6 x 1.0 Compatible	$101.37	Today
KCH301	USB Controller Hub and Power Supply for Three K-Cubes or T-Cubes	$640.53	Lead Time
KCH601	USB Controller Hub and Power Supply for Six K-Cubes or T-Cubes	$775.24	Lead Time
KAP101	Adapter Plate for KCH Series Hubs and 60 mm Wide T-Cubes	$74.29	Today
KAP102	Adapter Plate for KCH Series Hubs and 120 mm Wide T-Cubes	$80.89	Today
AP90	Right-Angle Mounting Plate, 1/4"-20 Compatible	$101.37	Today