

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

# THORLABS

## TCH002 - JAN 28, 2016

Item # TCH002 was discontinued on JAN 28, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### T-CUBE USB CONTROLLER HUB

- ▶ Provides Power and Communication for up to Six T-Cubes
- ▶ Can be Mounted Vertically or Horizontally
- ▶ USB 2.0 Interface

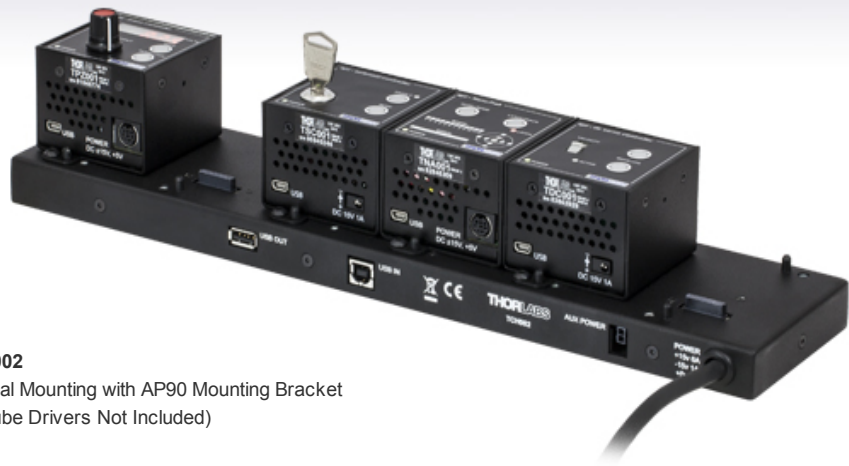
TCH002

Controller Hub (T-Cube Drivers Not Included)



TCH002

Vertical Mounting with AP90 Mounting Bracket  
 (T-Cube Drivers Not Included)



## OVERVIEW

## Features

- Compact USB 2.0 Platform
- Mechanically and Electrically Supports up to Six T-Cube Controllers
- Flexible Mix and Match Control of T-Cube Units
- Horizontal or Vertical Mounting to Optical Tables
- Reduced Cable Management - Single USB Communication and Power Cable
- USB Port for Connecting Multiple Controller Hubs
- Fully RoHS Compliant



Click to Enlarge  
TCH002 USB Hub and Power Supply (Included)

## Do More in Less Space with the T-Cube Controller Hub

As a further level of convenience when using T-Cube controllers and drivers, Thorlabs also offers the T-Cube Hub. This product has been designed specifically with multiple T-Cube operation in mind; it will simplify issues such as cable management, power supply routing, and multiple USB device communications. In addition, several different optical table mounting scenarios are possible as detailed under the *Further Info* tab. It is now possible to combine the electronic drivers with all of the other mechanical components required to build an automated optomechanical application, directly on the optical table.

The T-Cube Controller Hub comprises a slim base-plate type carrier (375 mm x 86 mm x 21.5 mm [14.75" x 3.4" x 0.85"]) with electrical connections located on the upper surface. The Controller Hub contains a fully compliant USB 2.0 hub circuit and provides all communications and power distribution for up to six T-Cubes, using only a single power connection. The Controller Hub is shipped complete with power supply and horizontal mounting brackets (shown to the left).



Click to Enlarge  
AP90 Right Angle Bracket

The Hub vastly reduces the number of USB and power cables required when operating multiple 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. A single PC can support up to 12 individual T-Cube controllers. As an added feature, the Controller Hub, when combined with devices that work in a closed loop such as the T-Cube APT Piezo Controller and the T-Cube APT Strain Gauge Reader, provides closed-loop control without the need for additional cabling.

## Mounting Options

The AP90, pictured to the left, can be used to mount the hub vertically or horizontally on its edge. For more mounting information, see the *Further Info* tab.

Item#	TCH002
USB Hub Circuit	Fully Compliant USB 2.0 Hub
Enclosure	Rigid, Slim-Profile Baseplate Construction
Finish	Black
T-Cube Bays	Six (Double-Wide T-Cubes Use Two Bays)
<b>Table Mounting</b>	
Orientation	Horizontal (Brackets Included) Edge or Vertical (with AP90 Bracket)
Mounting Threads	Universal Metric (M6) or Imperial (1/4"-20) Design
<b>Input Power Requirements</b>	
Voltage (Current)	+15 V (6 A), -15 V (1 A), +5 V (5 A)
<b>General</b>	
Housing Dimensions (W x D x H)	376.5 mm x 86 mm x 21.50 mm (14.82" x 3.40" x 0.85")
Weight	575 g (20 oz)

<b>T-Cube Motion Control Modules</b>
Brushed DC Servo Motor Controller
Brushless DC Servo Motor Controller
Stepper Motor Controller
Single-Channel Piezo Controller
Single-Channel Strain Gauge Reader <sup>a</sup>
Dual-Channel NanoTrak Auto-Aligner <sup>a</sup>
Quadrant Detector <sup>a</sup>
Solenoid Controller
<b>T-Cube Light Source &amp; Driver Modules</b>
Laser Diode Driver
Laser Sources
High Power LED Driver
<b>T-Cube Temperature Control Module</b>
Temperature Controller

- T-Cube Piezo Controller(s) (TPZ001) sold separately

## FURTHER INFO

Thorlabs' T-Cube family of very compact, yet fully featured, electronics controllers cover a variety of functions for a wide range of custom photonics, optomechanical, and motion control applications. They feature controllers for a number of applications, including motor controllers, piezo drivers, autoalignment systems, laser sources quad detector systems, TEC controllers and shutter/flipper controllers.

As a further convenience, Thorlabs offers the T-Cube Controller Hub, which is compatible with our T-Cube Controllers. This product has been designed specifically with multiple T-Cube operation in mind in order to simplify issues such as cable management, power supply routing, multiple USB device communications, and different optical table mounting scenarios.



[Click to Enlarge](#)

Above: TCH002 USB Hub with 6 T-Cubes in a Horizontal Configuration

Right: TCH002 USB Hub with 4 T-Cubes in a Vertical Configuration



[Click to Enlarge](#)

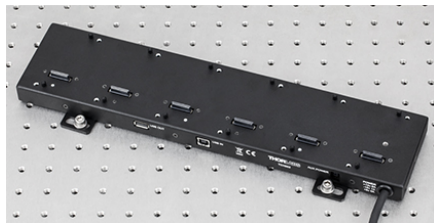
The T-Cube Controller Hub comprises a slim base-plate type carrier [375 mm x 86 mm x 21.50 mm (14.75" x 3.40" x 0.85")] with electrical connections located on the upper surface to accept up to six T-Cubes. Mix and match any combination of T-Cube Controllers to build your own custom, multi-channel driver arrangement in an extremely compact footprint. Internally, the controller hub contains a fully compliant USB 2.0 hub circuit to provide communications for all six T-Cubes - a single USB connection to the Controller Hub is all that is required for PC control. The controller hub also provides power distribution for up to six T-Cubes. This USB and power routing capability vastly reduces the number of USB and power cables required when operating multiple T-Cubes.

Furthermore, a USB output connector can be connected to the USB input on another hub allowing multiple controller hubs to be connected together while still only requiring a single USB cable from the host control PC. Up to 12 individual T-Cube controllers can be supported on a single PC. The controller hub circuitry also provides a number of internal, flexible digital and analogue interconnect lines for deterministic multiple-cube synchronized operation. This is used to great effect, for example, when operating the Piezo Controller (TPZ001) and Strain Gauge Reader (TSG001) T-Cubes on the hub. They can be configured to operate as a coupled pair allowing closed-loop control of the wide number of Thorlabs piezo actuators. The hub also provides a rigid mechanical mounting platform for carrying the T-Cubes.

### Mounting Options

An array of mounting holes drilled into the bottom of the TCH002 T-Cube Controller Hub enables it to be mounted in multiple configurations to both imperial and metric tables. The hub is shipped complete with mounting brackets that allow horizontal mounting; these brackets are both imperial and metric compatible and allow the hub to be mounted flat to the optical table (shown below left), much like the individual T-Cubes.

Alternatively, AP90 Right Angle Brackets can be purchased and used to mount the hub on its edge (shown below center) or vertically (shown below right). The vertical configuration is particularly advantageous for saving room on the table surface.



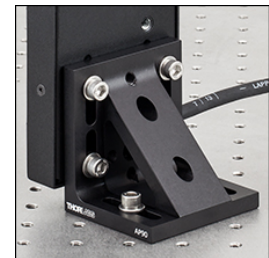
[Click to Enlarge](#)

Hub Horizontally Mounted to Breadboard with Included Brackets



[Click to Enlarge](#)

Hub Shown Mounted on Edge Using AP90 Bracket



[Click to Enlarge](#)

Hub Shown Vertically Mounted Using AP90 Brackets

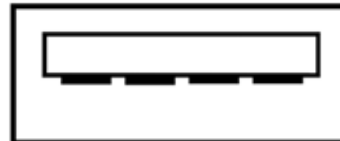
## PIN DIAGRAMS

## USB IN

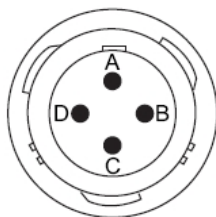


Provides communication to the host controller PC.

## USB OUT



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.



## Power Connector

Pin	Description	Min	Max	Max Operating Current
A	0 V	-	-	-
B	-15 V	-14.5 V	-15.5 V	1 A
C	+15 V	+14.5 V	+15.5 V	6 A
D	+5 V	+4.9 V	+5.1 V	5 A

### MOTION CONTROL SOFTWARE

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

Our legacy APT System Software platform is available by clicking on the link below. It features ActiveX-based controls which can be used by 3rd party developers working on C#, Visual Basic, LabVIEW or any Active-X compatible languages to create custom applications, and includes a simulator mode to assist in developing custom applications without requiring hardware.

The Kinesis Software features new .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.

By providing these common software platforms, Thorlabs has ensured that users can easily mix and match any of the 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 the low-powered, single-axis to the high-powered, multi-axis systems and control all from a single, PC-based unified software interface.



APT GUI Screen

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 are 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 controller connected. Please select the *APT Tutorials* tab above to view these videos, which are also available on the software CD included with the controllers.

### Software

#### APT Version 3.8.0

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

#### Also Available:

- Communications Protocol



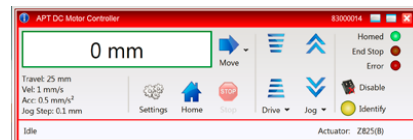
### Software

#### Kinesis Version 1.0.0

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

#### Also Available:

- Commu



Kinesis GUI Screen

## APT TUTORIALS

These videos illustrate some of the basics of using the APT System Software from both a non-programming and a programming point of view. There are videos that illustrate usage of the supplied APT utilities that allow immediate control of the APT controllers out of the box. There are also a number of videos that explain the basics of programming custom software applications using Visual Basic, LabView and Visual C++. Watch the videos now to see what we mean.



[Click here to view the video tutorial](#)



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



[Click here to view the LabView guide](#)



Part Number	Description	Price	Availability
AP90/M	Right-Angle Mounting Plate, M6 x 1.0 Compatible	\$78.00	Today
TCH002	T-Cube Controller Hub and Power Supply Unit	\$749.00	Today
AP90	Right-Angle Mounting Plate, 1/4"-20 Compatible	\$78.00	Today

Visit the *T-Cube USB Controller Hub* page for pricing and availability information:

[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=2424](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=2424)