

## CHAPTERS

Manual Stages

Motorized Stages

Multi-Axis  
Platforms

Actuators

Controllers

## SECTIONS

T-Cube Overview

Benchtop  
OverviewRack System  
Overview

DC Servo

Stepper Motor

Piezo/Strain  
Gauge

Auto-Alignment

Solenoid

apt Control  
Software

Tutorials

## T-Cube™ Brushed DC Servo Motor Controller (Page 1 of 2)

TDC001  
Compact Housing

The TDC001 T-Cube™ USB DC Servo Motor Driver is a compact, single-channel controller for easy manual and automatic control of DC servo motors. This driver has been designed to operate with a variety of low-powered, DC-brushed motors (up to 15 V/2.5 W operation) equipped with encoder feedback. The TDC001 has been optimized for out-of-the-box operation with Thorlabs' range of Z8 DC motor-equipped optomechanical products (see page 608). The highly flexible software settings and closed-loop tuning also support operation with a wide range of third-party DC servo motors and associated stages and actuators.

USB connectivity provides easy plug-and-play, PC-controlled operation. The TDC001 also includes the user-friendly apt™ software, which allows the user to quickly set up complex moving 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.

For added convenience, multiple units can be connected to a single PC via standard USB hub technology or by using the T-Cube™ Controller Hub (TCH002) for multi-axis motion control applications (see pages 620 - 621 for further details).

## Features

- USB Plug-and-Play Allows Easy Multi-Axis Expansion
- Full apt™ Software Control Suite Supplied
- Differential Encoder Feedback for Closed-Loop Positioning
- Auto-Configure Function for all Thorlabs Z8 DC Servo Motors
- Easy-to-Use Manual Controls with Velocity Slider and Jog Buttons
- Extensive ActiveX® Programming Interfaces
- Fully Software Integrated with Other apt™ Family Controllers

## Specifications

- **Motor Drive Connector (15-Way D-Type):**
  - Motor +15 V and -15 V Drive Outputs
  - Quadrature Encoder (QEP) Input (Single Ended)
  - Forward, Reverse Limit Switch Inputs (+ Common Return)
  - 5 V Encoder Supply
- **Front Panel Controls:**
  - Potentiometer Slider: 4-Speed Bidirectional Velocity Control
  - Dual Buttons: Forward/Reverse Jogging or Position Presets
- **Motor Drive Voltage:** ±10 V to ±12 V Depending on Supply
- **Motor Drive Current:** 150 mA (Cont), >250 mA (peak)
- **Motor Drive Type:** 8-Bit Sign/Magnitude PWM
- **Control Algorithm:** Digital PID Filter (16-bit)
- **Position Feedback:** Quadrature Encoder (QEP) Input, 5 V Single Ended
- **Encoder Feedback Bandwidth:** 750 kHz
- **Position Counter:** 32-bit
- **Operating Modes:** Position, Velocity
- **Velocity Profile:** Trapezoidal
- **Input Power Requirements:** 15 V Regulated DC, 500 mA (Peak)
- **Dimensions (W x D x H):** 2.36" x 2.36" x 1.87" (60.0 mm x 60.0 mm x 47.5 mm)
- **Weight:** 5.5 oz (160 g)



## Compatible Motor Specifications

- **Motor Type:** Brushed DC Servo
- **Drive Voltage (Max):** 12 V
- **Peak Power:** 2.5 W
- **Rated Current (Nominal):** 10 - 200 mA
- **Coil Resistance (Nominal):** 5 - 50 Ω
- **Coil Inductance:** 250 - 1500 μH
- **Position Control:** Incremental Encoder
- **Resolution:** Encoder Specific

## T-Cube™ Brushed DC Servo Motor Controller (Page 2 of 2)

The TDC001 DC Servo Controller easily connects to one of our Z8 DC motor actuators. Motor operations are then controlled by the potentiometer slider and jog buttons located on the top face of the unit. Using the top panel slider, the motor can be driven at predefined speeds in either forward or reverse directions for velocity control. Similarly, the jog buttons can be used to make discrete position increments in either direction enabling precise and repeatable positioning. For full flexibility, the supplied PC software can be used to fully control the TDC001 and alter both the speed response of the slider and the jogging modes for the buttons – saving any changes to the memory within the driver unit allowing the PC to be disconnected once changes have been made.

### TDC001 DC Servo Driver Applications

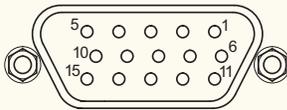
The TDC001 DC Servo Driver T-Cube™ can be used to control our complete range of DC motor-driven, optomechanical products, such as the MT1-Z8 and MT3-Z8 translation stage and the PRM1Z8 rotation stages. For 3-axis control, three DC Driver T-Cubes can be used, either on the TCH002 controller hub (see pages 620 – 621) or bolted directly to the optical table.

### Power Supply Options

Operation	Recommended Power Supply
Stand-Alone or Single-Channel Operation	TPS001 or TPS008
System or Multichannel Operation	TCH002

The TCH002 USB Controller Hub (see pages 620 – 621) provides power for up to six T-Cubes. Furthermore, the controller hub contains a fully USB20 compliant hub to provide communications for up to six T-Cubes with a single USB connector to the controller hub.

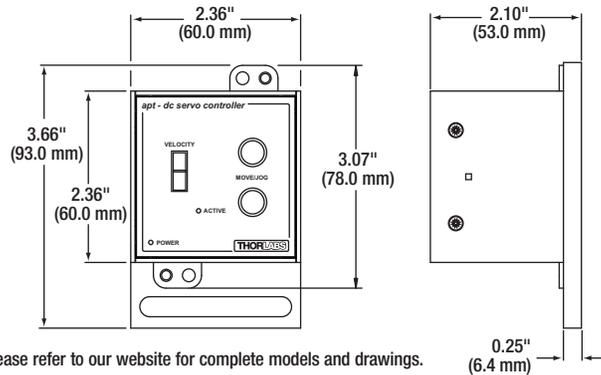
### Motor Connector Pin Out



Pin	Description	Pin	Description
1	Ground	9	Not Connected
2	Forward Limit Switch	10	5 V Encoder Supply
3	Reverse Limit Switch	11	Encoder Channel A
4	Not Connected	12	Not Connected
5	Motor -	13	Encoder Channel B
6	Not Connected	14	Not Connected
7	Motor +	15	Not Connected
8	Not Connected		



TDC001 Connector View



Please refer to our website for complete models and drawings.

ITEM #	\$	£	€	RMB	DESCRIPTION
TDC001	\$ 595.00	£ 428.40	€ 517.65	¥ 4,742.15	T-Cube™ Single Channel USB DC Servo Controller/Driver
TPS001	\$ 25.00	£ 18.00	€ 21.75	¥ 199.25	15 V Power Supply Unit for a Single T-Cube
TPS008	\$ 175.00	£ 126.00	€ 152.25	¥ 1,394.75	15 V Power Supply Unit for up to 8 T-Cubes
TCH002	\$ 726.90	£ 523.37	€ 632.40	¥ 5,793.39	T-Cube™ Controller Hub and Power Supply Unit

## Have you seen our...



1/4"-80 Thread Fitting



3/8" Barrel Fitting

## Z8 Actuators

- ◆ 6, 12, or 25 mm of Travel
- ◆ Compact 12 VDC Servo Motor
- ◆ Maximum Speed of 3 mm/s



See page 608

Our Z8 Series of Motorized Actuators are designed specifically for use with optical positioning devices such as mirror mounts and stages. With two barrels options, the Z8 motors can be used to replace manual actuators when the need to automate one or more axes arises.