

TSG001- October 27, 2016

Item # TSG001 was discontinued on October 27, 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 STRAIN GAUGE READER

- ▶ High Resolution Strain Gauge Reader
- ▶ Position Voltage or Force Sensing Modes
- ▶ Operation via Local Panel Controls or USB

Application Idea

KPZ101 Piezo Controller Used with a TSG001 Strain Gauge Reader for Closed-Loop Operation of One of Our 3-Axis Nanopositioning Flexure Stages



TSG001
Power Supply
Sold Separately



MAX311D



TSG001

KPZ101
K-Cube Piezo
Controller (Sold Separately)

[Hide Overview](#)

OVERVIEW

Features

- Compact Footprint
- Manual or PC Controlled Operation
- Range of PSU Options Available Separately
- Strain Gauge AC Bridge Signal Input
- Clear Reading Display with 5 Digit LED
- Position, Force, or Voltage Strain Gauge Reading
- Nanometer-Level Position Resolution with Thorlabs Actuators
- Low Voltage Monitor Output (Custom Closed Loop Apps)
- Zero Calibration Button
- USB Interface - Multi-Axis Expansion
- User Friendly Software Control Suite
- Extensive ActiveX® Programming Interfaces
- Software Compatible with Other APT™ Controllers (Integrated Systems Development)



Click to Enlarge
 Back View of the TSG001 T-Cube
 (See the *Pin Diagrams* Tab for
 More Information)

The T-Cube Strain Gauge Reader (TSG001) is a compact single channel reader designed to measure, condition (rectify and filter), and display the feedback signal derived from AC bridge strain gauge systems. The TSG001 provides immediate 'out of the box' operation with the complete Thorlabs range of strain-gauge-equipped bare piezo stacks, actuators, stages, and force sensors. For convenience, the footprint of the TSG001 reader has been kept to a minimum, measuring only 60.3 mm x 60.3 mm x 47.5 mm (2.37" x 2.37" x 1.87"). It can be mounted directly to the optical table using the 1/4" (M6) clearance slot in the base plate.

This T-Cube unit can be used for position, force, or voltage strain-gauge reading. When used in isolation, the TSG001 can measure the deflection/extension in

Compact Motion Controllers

K-Cube Control Modules^a

Brushed DC Servo Motor Controller

Brushless DC Servo Motor Controller

Stepper Motor Controller

Single-Channel Piezo Controller

Solenoid Controller

T-Cube Control Modules^a

Single-Channel Strain Gauge Reader

Dual-Channel NanoTrak Auto-Aligner

Quadrant Detector

- K-Cube and T-Cube Modules are Fully Compatible with One Another

a strain gauge with nanometer level resolution; alternatively, it can be used with Thorlabs' force sensor products (FSC102 and FSC103) for high-sensitivity force sensing down to mN levels. Closed loop positioning can be achieved by using the TSG001 and TPZ001 together with the CA2906 SMA to SMA cable, which is not supplied with the TSG001 but is available separately.

For ease of use, all manual controls are located on the top face of the unit. A 'Mode' button allows the readout display mode to be changed between position, force, and voltage (Feedback Signal). Pressing and holding the 'Mode' button also initiates a self-calibration sequence allowing the TSG001 unit to set a zero position point. The TSG001 T-Cube is also equipped with a low-voltage monitor output (0-10 V) that is proportional to the strain gauge extension, thus providing a conditioned feedback/monitoring signal for third party systems.

USB connectivity provides easy 'Plug-and-Play' PC-controlled operation. The TSG001 also includes the very user-friendly APT™ software which allows the user to quickly set up complex control 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, such as strain-gauge reading, closed-loop operation, and force sensing are also possible using the extensive ActiveX® programming environment described in more detail on the *Motion Control Software* and *APT Tutorials* tabs.

Power Supply Options

The preferred power supply (single channel, multi-channel, or hub-based) depends on the end user's application and whether you already own compatible power supplies. To that end and in keeping with Thorlabs' green initiative, we do not ship these units bundled with a power supply. This avoids the cost and inconvenience of receiving an unwanted single-channel supply if a multi-cube or hub-based system would be more appropriate. The compatible power supply for the TSG001 Strain Gauge Reader is available below.

Other Strain Gauge Controllers		
T-Cube Single-Channel Strain Gauge Reader	Piezo + Strain Gauge Benchtop Controller 1- and 3-Channel	Piezo + Strain Gauge Modular 2-Channel Rack System Module

[Hide Specs](#)

S P E C S

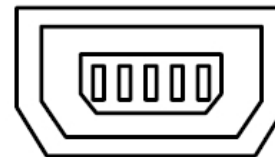
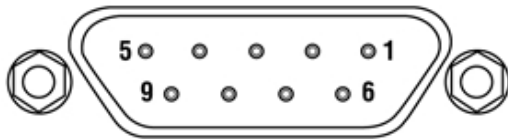
Specification	Value
Strain Gauge Input, 9-Pin D-Type	
Bridge Type	AC
Excitation Frequency	18 kHz
Supply Voltage	±15 V
Monitor Output	0 - 10 V (SMA Connector)
Reading Resolution	
Position Mode	1 nm
Force Mode	1 mN
Voltage Mode	1 mV
Bandwidth	500 Hz (320 mS Rolling Average Applies)
Position Output Monitor	0 - 10 V (SMA)
Comms	USB 1.1 (mini)
Reading Display	5 Digit, 7 Segment LED
Input Power Requirements	
Voltage (Current)	+15 V (80 mA), -15 V (80 mA), +5 V (250 mA)
General	
Housing Dimensions (W x D x H)	60.3 mm x 60.3 mm x 47.5 mm (2.37" x 2.37" x 1.87")
Weight	160 g (5.5 oz)

[Hide Pin Diagrams](#)

P I N D I A G R A M S

Strain Gauge I/P Connector
D-type Female

Computer Connection
USB Mini-B*

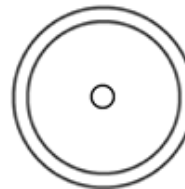


*USB type Mini-B to type A Included

Pin	Description	Pin	Description
1	Wheatstone Bridge Excitation	5	AC Feedback IN
2	+15 V out ^a	6	Ground
3	-15 V out ^a	7	Actuator ID signal ^b
4	Ground	8 & 9	Reserved for future use

- Power supply for the piezo actuator feedback circuit. It must not be used to drive any other circuits or devices.
- This signal is applicable to Thorlabs piezo actuators fitted with an ID resistor. It enables the system to identify the piezo extension associated with the actuator.

Monitor - SMA Female



(0 - 10 V) This output can be connected to an oscilloscope, allowing the strain gauge output to be monitored.

[Hide Motion Control Software](#)

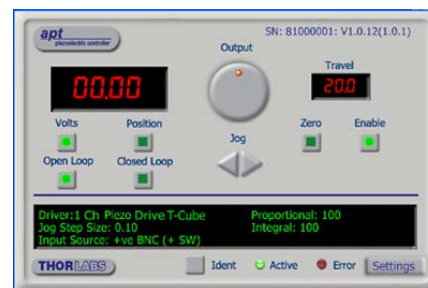
MOTION CONTROL SOFTWARE

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 or 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).

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 and 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.



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 a 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

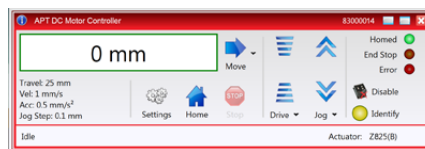
APT Version 3.16.0

Software

Kinesis Version 1.7.0

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

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



Kinesis GUI Screen

Also Available:

-  Communications Protocol

Also Available:

-  Communications Protocol

[Hide APT Tutorials](#)

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



[Hide T-Cube Strain Gauge Reader](#)

T-Cube Strain Gauge Reader

Power supplies sold separately below.

Part Number	Description	Price	Availability
TSG001	T-Cube Strain Gauge Reader (Power Supply Not Included)	\$561.00	Today

[Hide Compatible Power Supplies](#)

Compatible Power Supplies

- ▶ ±15 V/5 V Power Supply
 - ▶ TPS002: For up to Two K-Cubes or T-Cubes
- ▶ USB Controller Hubs Provide Power and Communications
 - ▶ KCH301: For up to Three K-Cubes or T-Cubes
 - ▶ KCH601: For up to Six K-Cubes or T-Cubes
 - ▶ KAP101: Adapter Plate for Connecting 60 mm Wide T-Cubes to KCH Series Hubs
 - ▶ KAP102: Adapter Plate for Connecting 120 mm Wide T-Cubes to KCH Series Hubs



Click to Enlarge

The TPS002 supplies power for up to two K-Cubes or T-Cubes. The cubes still need to be connected to a computer individually via a USB cable.

The KCH301 and KCH601 USB Controller Hubs each consist of two parts: the hub, which can support up to three (KCH301) or six (KCH601) K-Cubes or T-Cubes, and a power supply that plugs into a standard wall outlet. 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. In addition, the hub provides USB connectivity to any docked K-Cube or T-Cube through a single USB connection.

A KAP101 or KAP102 Adapter Plate (sold separately) is required for each T-Cube to operate on the KCH301 or KCH601 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.

For more information on the USB Controller Hubs, see the full web presentation.

Please note that our KPS101 Power Supply is not compatible with the controller on this page since it does not offer reversible polarity.

Part Number	Description	Price	Availability
TPS002	±15 V/5 V Power Supply Unit for up to Two K-Cube or T-Cubes	\$105.00	Today
KCH301	USB Controller Hub and Power Supply for Three K-Cubes or T-Cubes	\$475.00	Lead Time
KCH601	USB Controller Hub and Power Supply for Six K-Cubes or T-Cubes	\$575.00	Today
KAP101	Adapter Plate for KCH Series Hubs and 60 mm Wide T-Cubes	\$55.00	Today
KAP102	Adapter Plate for KCH Series Hubs and 120 mm Wide T-Cubes	\$60.00	Today