About the Company

Thorlabs has been an active member of the Photonics community for over 25 years.

We strive to be the ultimate resource for the photonics community-a place to find the products you need to enable your experiments, as well as the information you need to get your application working.

Thorlabs designs, develops, and manufactures building blocks for the photonics industry including equipment for opto-mechanics, motion control, nano-positioning, alignment, optical components, laser diodes, tunable lasers and vibration isolation systems. In addition to core photonics building blocks, we now provide system level solutions including complete OCT and imaging systems.

Trademarks

Technical Support

Thorlabs provide a comprehensive after sales service. Contact us through your local representative, or at the address below:

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Product Warranty

All Thorlabs products are covered by a manufacturers warranty against faulty workmanship and materials, valid for 12 months from the date of original purchase. All products returned under warranty must be returned in their original packaging.

Prior to installation, the equipment referred to in this handbook must be stored in a clean, dry environment, in accordance with any instructions given. Periodic checks must be made on the equipment's condition.

Customer Feedback

It is always helpful to have detailed and accurate information about any problems encountered by customers

We welcome comments or suggestions about any aspect of the equipment and instruction handbooks.

PZS001 Bare Piezo Stacks with Strain Gauge

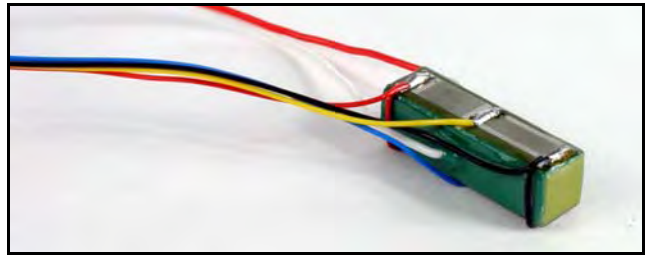
1.1 Introduction

Piezo-electric actuators transform electrical energy into precisely controlled mechanical displacements. The PZS001 actuators incorporate full bridge strain gauges which can be used to monitor this displacement. This strain gauge feedback and fast response time make them ideal for use in applications that require precise nanometer positioning. They are designed to be incorporated into OEM products to form a tightly controlled high speed closed loop actuator.

Caution

It is the responsibility of the end user to ensure the application is CE compliant.

The piezos can be driven by a Thorlabs Piezo Controller (see www.thorlabs.com for details on the range of controllers available) or any third party device - see Section 1.6 for electrical connection details.



1.2 Coupling of Piezo Actuator to External Mechanics

Cautions

Poor piezo-mechanical coupling design can lead to local mechanical stress concentration around the edges of the piezo stack, which in turn can generate cracks and may lead to a failure of the stack due to electrical short-circuit.

The ceramics must be mechanically coupled and mounted via the end-faces of the stack. Mechanical contact to the side-faces should be avoided because this will affect the strain gauge performance and/or piezo travel.

To ensure play and backlash is eliminated, only compressive mechanical coupling should be employed between the actuator and the mechanics.

To avoid local stress concentration, the coupling joint should offer homogeneously distributed compressive stress over the actuator's end faces, with a resulting force vector along the actuator's central axis within a virtual cylinder of ± 10% of actuator's cross-section.

The Strain gauge sensors are covered with a thin transparent polyurethane coating to minimize damage when handling. Avoid unnecessary contact in this area.

1.3 Specification

Drive Voltage:	150V
Displacement:	17.4µm ±2µm
Bridge Arm Resistance:	350 ohm
Piezo Capacitance:	1.4µF
Resonant Frequency:	69kHz
Gauge Factor:	2

1.4 Storage Precautions

Piezos can store and release large amounts of energy and should be handled with caution.

Caution

To prevent charge build up, piezos must be stored with the high voltage wires (red and white) short circuit.

1.5 Dimensions

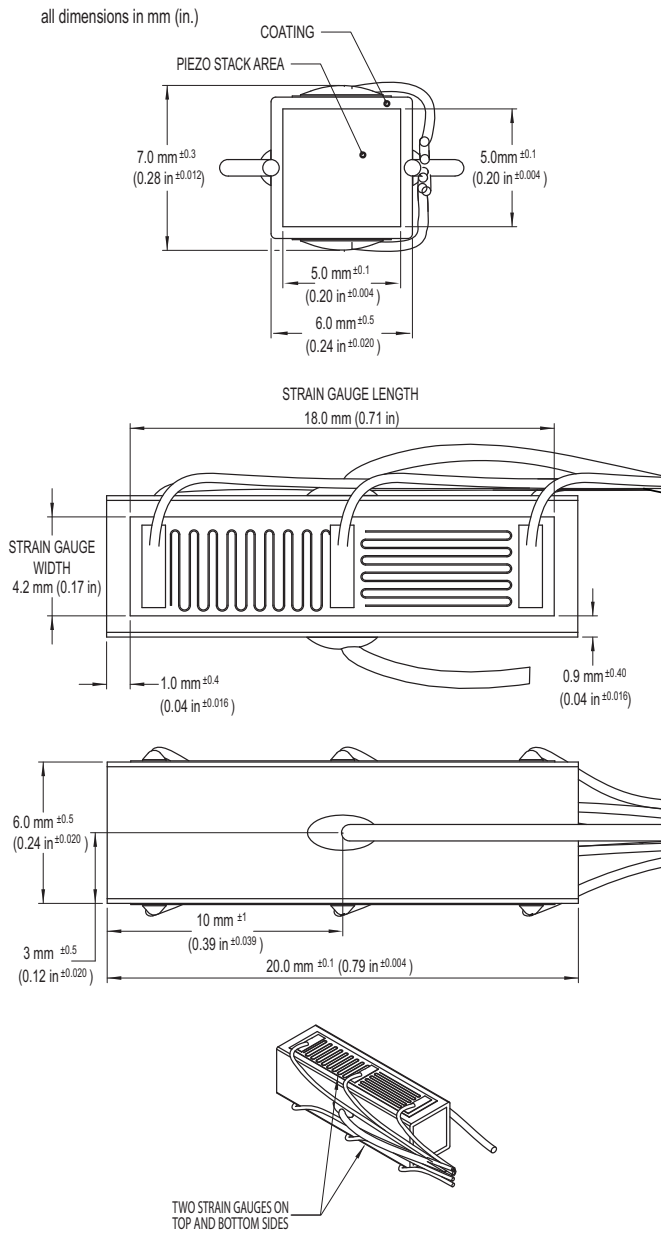
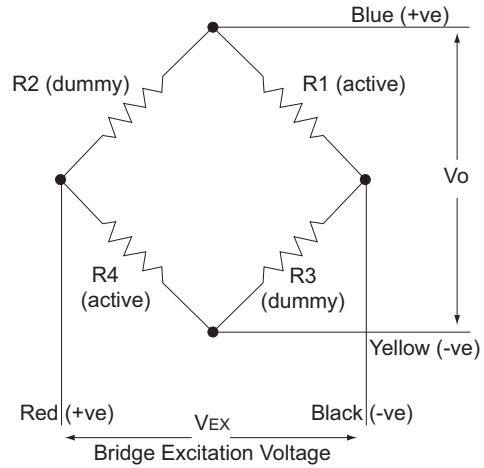


Fig. 1.1 Dimensions

1.6 Electrical Connections

1.6.1 Strain Gauge Connections

The connections to the bridge circuit are detailed in Fig. 1.2.



Note

The maximum recommended excitation voltage is 4.5 V rms.

The dummy gauges are arranged at 90° to the active gauges, and therefore only temperature changes affect these arms of the bridge.

V_0	Output Voltage of Full Bridge
V_{EX}	Excitation Voltage (4.5V rms MAX)

Fig. 1.2 Bridge Connection Descriptions

1.6.2 Piezo Connections

The piezo connections are identified by the larger diameter red and white wires as follows:

RED	Piezo Drive Positive Volts
WHITE	Piezo Drive Negative Volts

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