



## Z600 Series Motorized Actuator Owners Manual



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### Safety Precautions

- \* These Motorized Actuators can generate high forces. If handled improperly, they may cause injury. Be aware that failure of the motor controller may drive the unit into a hard stop and cause damage to the unit.
- \* To avoid injury never put anything in the gap between the Actuator and any rigid structure.

### Warranty

Thorlabs warrants the Z600 Series of Motorized Actuators to be free from defects in material and workmanship for a period of one year from the date of shipment. This warranty does not apply to any defects or damage resulting from misuse, abuse or problems that may arise from improper wiring.

### Caution

If the actuator encounters a hard stop while still in the middle of its range (i.e. a translation stage at the end of its travel range), the motor should be stopped as soon as possible to prevent damage to the gear head or motor and to keep the unit from overheating. When storing these units, be sure to fully retract the lead screw to protect the threads from damage. Improper connection of the motor will result in permanent damage. All power supplied to the motor should be turned off before altering any connections to the motor. Check all connections before supplying power to the motor.

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# 1. Overview

Thorlabs Incorporated has developed this series of high-resolution motorized actuators for use in high precision applications. From drop-in replacements to custom mounts, these motorized actuators will satisfy even the most demanding requirements. Three different travel lengths are offered in two alternate versions depending on the application.

The two versions offered are a threaded version (6mm & 12mm travel) for use in applications where a normal micrometer or adjustment screw threads into a mount and a 3/8" barreled version (12mm & 25mm travel) for applications where a setscrew is used to lock the micrometer in place. Both of these versions will suit most any application.

The Z600 series Motorized Actuators utilize a 12V DC servomotor that provides sufficient torque for high load capabilities. Utilizing a 256:1 gear reduction head, the actuators provide very small movements over the entire travel range, allowing greater flexibility with negligible backlash and fine resolution. The DC servomotor allows for continuously variable speeds while an optical encoder allows closed loop operation. The actuators use integrated hard stops that automatically cut the power when they have reached their mechanical limits\*. Unlike most small actuators, Thorlabs utilizes internal limit switches to prevent overdriving.

The Z600 series Motorized Actuators are light, compact and extremely durable. They are ideal for use in mirror mounts, translation stages, microscopes, OEM applications and a wide variety of other components that require higher precision than most standard drive mechanisms allow. These actuators are especially convenient for compact laboratory setups that are difficult to adjust by hand. With sub-micron minimum incremental movement, the Z600 series Motorized Actuators are suitable for all high precision applications.

Thorlabs Motorized Actuators are compatible with a wide array of controllers, therefore, making it easy for you to incorporate them into existing setups. When using these actuators, performing complex tasks or complicated alignment procedures will take less time than before. They provide more effective and precise control over instrumentation. Plus, the high repeatability of these actuators means faster overall performance of complex scanning.

**\*Note: The limit switches are wired to be normally open.**

## **2. Model Specifications**

### **2.1 Z606 Motorized Actuator Specifications**

Z606	6mm motorized micrometer
Travel range	6mm
Gear reduction	256:1
Lead screw pitch	0.5mm
Feedback	Motor mounted rotary encoder, 48pts/rev @ the motor
Limit switches	Electromechanical
Motor type	12V DC Servo
Backlash	<8 $\mu$ m
Axial load capacity	9Kg
Speed range	50-425 $\mu$ m/s
Resolution*	40nm

### **2.2 Z612/Z612B Motorized Actuator Specifications**

Z612/Z612B	12mm motorized micrometer
Travel range	12mm
Gear reduction	256:1
Lead screw pitch	0.5mm
Feedback	Motor mounted rotary encoder, 48pts/rev @ the motor
Limit switches	Electromechanical
Motor type	12V DC Servo
Backlash	<8 $\mu$ m
Axial load capacity	9Kg
Speed range	50-425 $\mu$ m/s
Resolution*	40nm

### **2.3 Z625B Motorized Actuator Specifications**

Z625B	25mm motorized micrometer
Travel range	25mm
Gear reduction	256:1
Lead screw pitch	0.5mm
Feedback	Motor mounted rotary encoder, 48pts/rev @ the motor
Limit switches	Electromechanical
Motor type	12V DC Servo
Backlash	<8 $\mu$ m
Axial load capacity	9Kg
Speed range	50-425 $\mu$ m/s
Resolution*	40nm

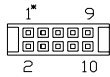
\*Calculated Resolution. Actual resolution will depend on the applied load.

### 3. Mechanical Drawings

Please visit Thorlabs on the web at [www.thorlabs.com](http://www.thorlabs.com) for the most recent drawings for the Z600 series Motorized Actuators, as well as the Thorlabs product line. All drawings and models are available in .PDF , .DXF, SLDPRT, and HTML format. While on the Thorlabs website, please feel free to browse through frequently asked questions and answers on all of the products.

### 4. Wiring Diagrams

#### 4.1 Connector Pin Assignments



PIN1	Motor(+)
PIN2	Vcc
PIN3	Channel A
PIN4	Channel B
PIN5	GND
PIN6	Motor(-)
PIN7	Limit Ground
PIN8	Reverse Limit
PIN9	Forward Limit
PIN10	No connection

Note: Limit switches are wired to be normally open.

#### 4.2 Description of connections

##### Motor (+)

This supplies a +12V DC supply to the motor of the actuator. The maximum current should be set to 0.080A.

##### Vcc

A connection should be made to a +5V DC supply to power both channels A and B on the encoder.

##### Channels A and B

The Z600 series actuators use a hall effect encoder. Both channels A and B are supplied by the 5V DC Vcc connection.

##### GND

This is the ground connection for the encoder.

### **Motor(-)**

This supplies a -12V DC supply to the motor of the actuator. The maximum current should be set to 0.080A.

### **Limit ground**

This is a common ground for both the forward and reverse limit switches.

### **Reverse limit**

The forward limit prevents over driving of the actuator at its minimum extension. No resistor is supplied in the actuator. A pull-up resistor may be necessary to function with a non Thorlabs inc. controller. This limit switch is wired to be normally open. These switches are not intended for homing applications.

### **Forward limit**

The forward limit prevents over driving of the actuator at its full extension. No resistor is supplied in the actuator. A pull-up resistor may be necessary to function with a non Thorlabs inc. controller. This limit switch is wired to be normally open. These switches are not intended for homing applications.

## **5. Recommended Drivers**

Thorlabs inc. optocube controllers are recommended for this product. The use of these controllers ensures optimal performance. All above performance specifications are guaranteed only with use of Thorlabs inc. controllers and drivers.

**Supplier**  
Thorlabs

**Model#**  
ODC001