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THORLABS

Z706, Z712, Z712B, Z725B

Z700 Series Motorized DC Servo Actuator

Operating Manual



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Part 1. Product Warnings

Safety Warning

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.

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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Part 2. Overview

Thorlabs 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: a 1/4"-80 and a 3/8".

The threaded version, available in the 6 mm and 12 mm travel units, for use in applications where a normal micrometer or adjustment screw threads into a mount and a 3/8" barreled version, available in the 12 mm and 25 mm travel units, for applications where a setscrew is used to lock the micrometer in place.

The Z700 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[1].

The Z700 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.

[1] *The limit switches are wired to be normally open.*

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Part 3. Specifications

Item #	Z706	Z712/Z712B	Z725B
Travel Range	6 mm	12 mm	25 mm
Gear reduction	256:1		
Lead screw pitch	0.5 mm		
Feedback	Motor mounted rotary encoder, 48pts/rev @ the motor		
Limit switches	Electromechanical		
Motor type	12 V DC Servo		
Backlash	<8 µm		
Axial load capacity	9 kg		
Speed range	50 – 425 µm/s		
Resolution*	40 nm		
Cable Length	9 ft (274.32 cm)		
Connector	HDDB15		
** Calculated Resolution. Actual resolution will depend on the applied load.*			

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Part 4. Wiring Diagrams

4.1. Connector Pin Assignments

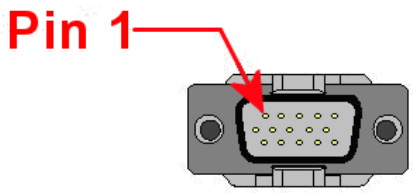


Figure 1: Output connector

Pin	Description	Pin	Description
1	Ground (Limit and V_{cc})	9	Reserved For Future Use
2	Forward Limit	10	12 – 15 VDC
3	Reverse Limit	11	Encoder Channel A
4	Reserved For Future Use	12	Reserved For Future Use
5	Motor (-)	13	Encoder Channel B
6	Reserved For Future Use	14	Reserved For Future Use
7	Motor (+)	15	Reserved For Future Use
8	Reserved For Future Use		

4.2. Description of connections

Motor (+)

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

Vcc

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

Channels A and B

The Z700 series actuators use a Hall Effect encoder. Both channels A and B are supplied by the 5 VDC connection.

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GND

This is the ground connection for the encoder.

Motor (-)

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

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 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 controller. This limit switch is wired to be normally open. These switches are not intended for homing applications.

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Part 5. Compatible Drivers

The Thorlabs combatable controller for this product is the T-Cube Single Channel DC Servo Controller TDC001. The use of these controllers ensures optimal performance. All above performance specifications are guaranteed only with use of Thorlabs controllers and drivers.

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Part 6. Regulatory

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return "end of life" units without incurring disposal charges.

- This offer is valid for Thorlabs electrical and electronic equipment:
- Sold after August 13, 2005
- Marked correspondingly with the crossed out "wheelie bin" logo (see right)
- Sold to a company or institute within the EC
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and not contaminated



Wheelie Bin Logo

As the WEEE directive applies to self contained operational electrical and electronic products, this end of life take back service does not refer to other Thorlabs products, such as:

- Pure OEM products, that means assemblies to be built into a unit by the user (e.g. OEM laser driver cards)
- Components
- Mechanics and optics
- Left over parts of units disassembled by the user (PCB's, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

6.1. Waste Treatment is Your Own Responsibility

If you do not return an "end of life" unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

6.2. Ecological Background

It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.

The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of live products will thereby avoid negative impacts on the environment.

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