



CR1-Z7, CR1/M-Z7 Motorized Rotation Stage

Operating Manual



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Chapter 1 Warning Symbol Definitions

Below is a list of warning symbols you may encounter in this manual or on your device.

Symbol	Description
	Direct Current
	Alternating Current
	Both Direct and Alternating Current
	Earth Ground Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	On (Supply)
	Off (Supply)
	In Position of a Bi-Stable Push Control
	Out Position of a Bi-Stable Push Control
	Caution: Risk of Electric Shock
	Caution: Hot Surface
	Caution: Risk of Danger
	Warning: Laser Radiation
	Caution: Spinning Blades May Cause Harm

Chapter 2 Overview

Features

- 360° Continuous Motion Provided by Fine Pitch Worm Gear
- High Torque DC-Servo Motor with Gear Head and Optical Encoder
- High Count Optical Encoder (12,288 pulses/rev)
- Designed for Mounting MS1 and T12X Series Translation Stages (Using the CR1A Adapter Plate)
- Application Tested for Vertical Loads up to 25 lbs.

The CR1-Z7 motorized rotation stage with round strain relief cables offers high-precision continuous 360° motion in a sturdy, compact package. Utilizing a 256:1 gear reduction head, the rotator provides minute movements over the entire travel range. The reduced backlash worm gear design, coupled with a high-resolution optical encoder provides the rotational precision required in optical laboratories. The high torque 12 VDC servomotor supplies ample power for rotating vertical loads up to 25 lbs.

Recommended Driver

Thorlabs' KDC101 K-Cube controller is recommended for this product. The use of this controller ensures optimal performance. All performance specifications are guaranteed only with use of Thorlabs controllers and drivers.

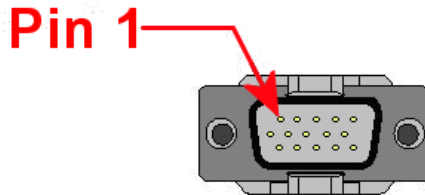


Figure 1 The KDC101 K-Cube Controller with the CR1-Z7

These two products can be purchased together in a kit as CR1-Z7E or CR1/M-Z7E.

Chapter 3 Operation and Wiring

3.1. Connector Wiring Diagram



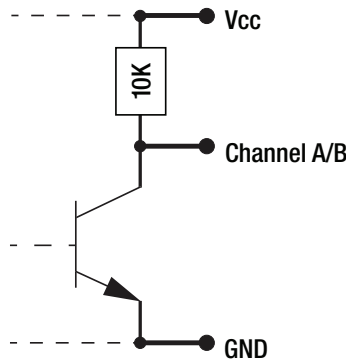
Color	Description	Pin Number
Brown	Motor (+)	5
Red	Vcc	10
Orange	Encoder Channel A	13
Yellow	Encoder Channel B	11
Green	Ground	1
Blue	Motor (-)	7
Shielding	Case Ground	
	39k Identification Resistor	9

3.1.1. Connector Pin Description

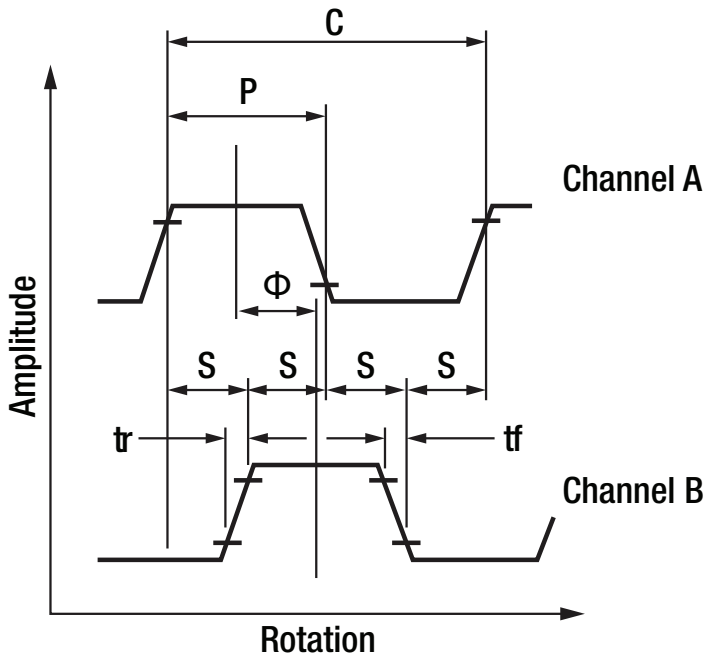
Pin	Description
Motor (+)	This supplies the + voltage supply to the motor of the actuator. The max current should be set to 0.080 A.
Vcc	A connection should be made to a +5 VDC supply to power both channels A and B on the encoder.
Channels A and B	The Z700 series actuators use a Hall Effect encoder. Both channels A and B are supplied by the 5 VDC Vcc connection.
GND	This is the ground connection for the encoder.
Motor(-)	This supplies the - voltage supply to the motor of the actuator. The maximum current should be set to 0.080 A.

3.2. Description of Encoder Output Signal

The following shows the output circuit where Encoder Channels A and B are measured from.



The next figure shows the output signals of Channels A and B, along with a table below of the corresponding operating characteristics. Note that Channel A leads Channel B (this is for clockwise motor shaft rotation as seen from the shaft end.)

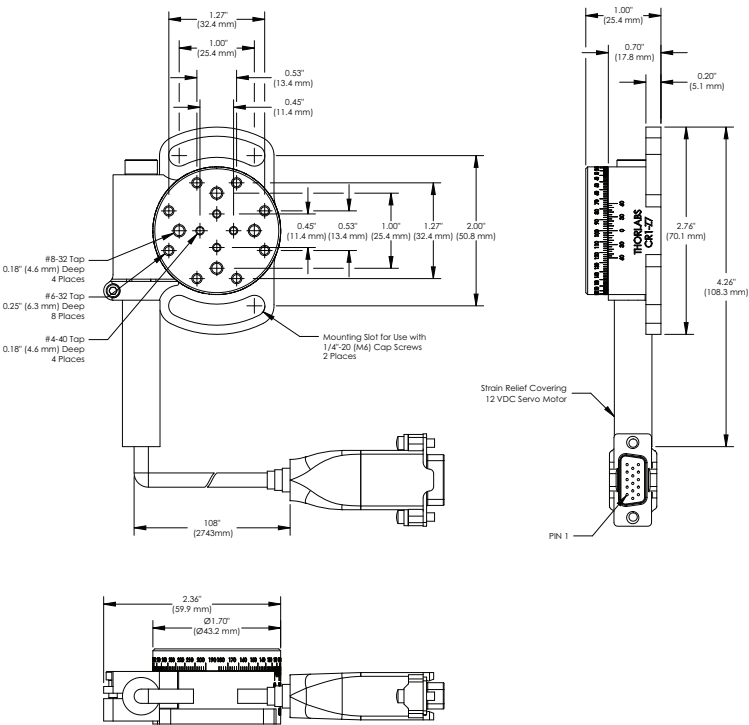


Operating Characteristics of Encoder	Symbol	Typical Values
Signal Output (Quadrature)		2 channels
Supply Voltage	V	4.5 to 15 VDC
Current Consumption, Typical (V _{cc} = 5 V DC)	I _{cc}	5 mA
Pulse width	P	180° ± 45°
Phase shift, channel A to B	Φ	90° ± 45°
Logic state width	S	90° ± 45°
Cycle	C	360° ± 30°
Signal Rise Time, Typical	t _r	5 μs
Signal Fall Time, Typical	t _f	0.2 μs
Frequency range	f	up to 7.2 kHz
Inertia of code disc	J	0.019 gcm ²

Chapter 4 Specifications

Item #	CR1-Z7, CR1/M-Z7
Motor Type	12 VDC Servo
Travel Range	360° Continuous Rotation
Gear Reduction	256:1
Worm Gear	96 teeth
Worm	Double Thread
Feedback	Motor Mounted Rotary Encoder, 48 pts/rev @ the Motor
Min Incremental Motion	2.19 arcsec
Vertical Load Capacity	25 lbs
Speed Range	6 deg/sec to 22 arcsec/sec
Wobble	<2 arcsec
Repeatability	<1 arcmin

Chapter 5 Mechanical Drawing



Chapter 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
- Sold to a company or institute within the
- Currently owned by a company or institute within the EC
- Still complete, not disassembled and contaminated



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.

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.

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 life products will thereby avoid negative impacts on the environment.

Chapter 7 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at www.thorlabs.com/contact for our most up-to-date contact information.



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