

## PRM1Z8 Motorized Rotation Stage User Guide



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# Contents

<b>Chapter 1 For Your Safety</b> .....	<b>3</b>
1.1 <i>Safety Information</i> .....	3
1.2 <i>General Warnings</i> .....	3
<b>Chapter 2 Overview</b> .....	<b>4</b>
2.1 <i>Introduction</i> .....	4
<b>Chapter 3 Installation</b> .....	<b>5</b>
3.1 <i>Unpacking</i> .....	5
3.2 <i>Mounting</i> .....	5
3.3 <i>Transportation</i> .....	6
3.4 <i>Dimensions</i> .....	7
<b>Chapter 4 Operation</b> .....	<b>8</b>
4.1 <i>Introduction</i> .....	8
<b>Chapter 5 Specifications</b> .....	<b>10</b>
5.1 <i>Stage Specifications</i> .....	10
5.2 <i>Motor Specification</i> .....	10
<b>Chapter 6 Pin Out Details &amp; Associated Products</b> .....	<b>11</b>
6.1 <i>Motor Connector Pin Out</i> .....	11
6.2 <i>Associated Products</i> .....	11
<b>Chapter 7 Regulatory</b> .....	<b>12</b>
7.1 <i>Declarations Of Conformity</i> .....	12
7.2 <i>Waste Electrical and Electronic Equipment (WEEE) Directive</i> .....	13
<b>Chapter 8 Thorlabs Worldwide Contacts</b> .....	<b>15</b>

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# Chapter 1 For Your Safety

## 1.1 Safety Information

For the continuing safety of the operators of this equipment, and the protection of the equipment itself, the operator should take note of the **Warnings, Cautions** and **Notes** throughout this handbook and, where visible, on the product itself.

The following safety symbols may be used throughout the handbook and on the equipment itself.



### Shock Warning



Given when there is a risk of injury from electrical shock.



### Warning



Given when there is a risk of injury to users.



### Caution



Given when there is a risk of damage to the product.

### Note

Clarification of an instruction or additional information.

## 1.2 General Warnings



### Warnings



If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. In particular, excessive moisture may impair operation.

Spillage of fluid, such as sample solutions, should be avoided. If spillage does occur, clean up immediately using absorbant tissue. Do not allow spilled fluid to enter the internal mechanism.

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## Chapter 2 Overview

### 2.1 Introduction

The PRM1Z8 is a precision motorized rotation mount for 1" optics.

Rotation is driven via a DC servo motor equipped with high ratio gearbox (67:1) and rotary encoder for accurate closed loop position control. The TDC001 DC servo controller is the ideal companion for achieving smooth continuous motion which can be measured both through the software interfaces and by using the Vernier dial and 1° engraved graduation marks on the rotating plate. The precision DC motor actuator provides 1 arcsecond resolution over the 360° rotation. This rotation stage is also equipped with a precision home limit switch to facilitate automated rotation to the zero datum position, allowing absolute angular positioning thereafter.

The limit switch is designed to allow continuous rotation of the stage over multiple 360° cycles. For complete flexibility the stage can be mounted either vertically on a post or horizontally using an adapter plate - see Section 3.2

For attachment to other stages or fittings, please contact Tech Support..



Fig. 2.1 Typical PRM1Z8 stage

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## Chapter 3 Installation

### 3.1 Unpacking

#### Note

Retain the packing in which the unit was shipped, for use in future transportation.



#### Caution



Once removed from its packaging, the stage is easily damaged by mishandling. The unit should only be handled by its base, not by the motor or any attachments to the moving platform.

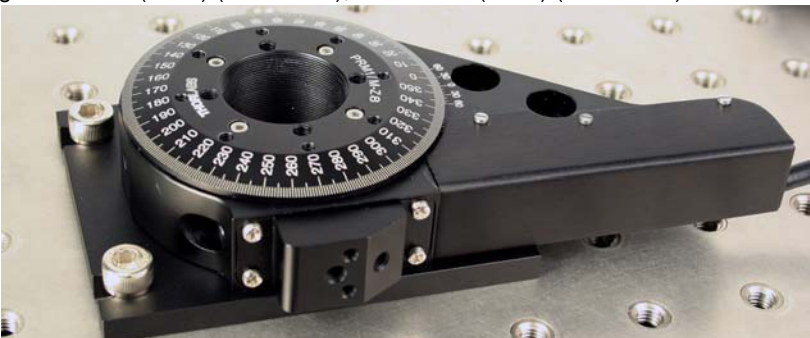
### 3.2 Mounting

The stage can be mounted to a standard 1/2" post, with an option to mount in a vertical or an inclined orientation (as shown in Fig. 2.1.). The stage can also be fixed directly to the worksurface in a horizontal (flat) orientation using the counter-bored holes in the main body.

The rotating platform features several options for mounting accessories. The central aperture has a standard SM1 internal thread, for compatibility with a range of optics. Accessories can also be fixed using the series of threaded mounting holes (see Fig. 3.3).

Standard 'tongue and groove' accessories can be mounted using the PRM1SP1/(M) grooved adapter plate, which raises the deck height to 29mm (1.14").

Adapter plates are available which allow more stable installation and raise the deck height to 34mm (1.34") (PRM1SP2), or 62.5mm (2.46") (PRM1SP3)..



#### Caution



When mounting components, or fitting the stage within an application, do not apply excessive pressure to the moving platform.

Fig. 3.1 PRM1Z8 mounted on a PRM1SP2 Adapter Plate

### 3.2.1 Connecting The Motor Driver



#### Caution



It is recommended that the PRM1Z8 series stages be driven by the Thorlabs TDC001 DC Servo Motor Driver. If the stage is being driven by any other driver or controller, consult Section 6.1. for motor pin out details and Chapter 5 for details of the motor specification.

The stage is supplied with 0.5m (1.6 ft) of cable and is terminated in a 15 pin Male D-Type connector. This is compatible with the MOTOR drive terminal of the TDC001 T-Cube DC driver unit - see Fig. 3.2 below. A 3m (9.8 ft) extension cable (PAA632) is available on request.

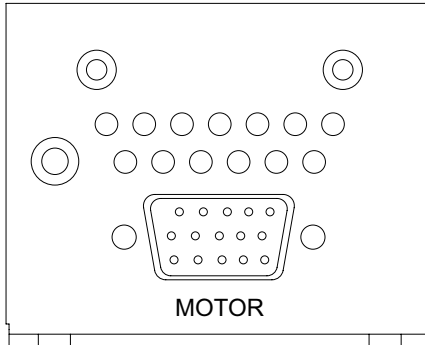


Fig. 3.2 TDC001 rear panel

### 3.3 Transportation



#### Caution



When packing the unit for shipping, use the original packing. If this is not available, use a strong box and surround the unit with at least 100 mm of shock absorbent material.

### 3.4 Dimensions

#### 3.4.1 PRM1Z8 Dimensions

all dimensions in mm (inches)

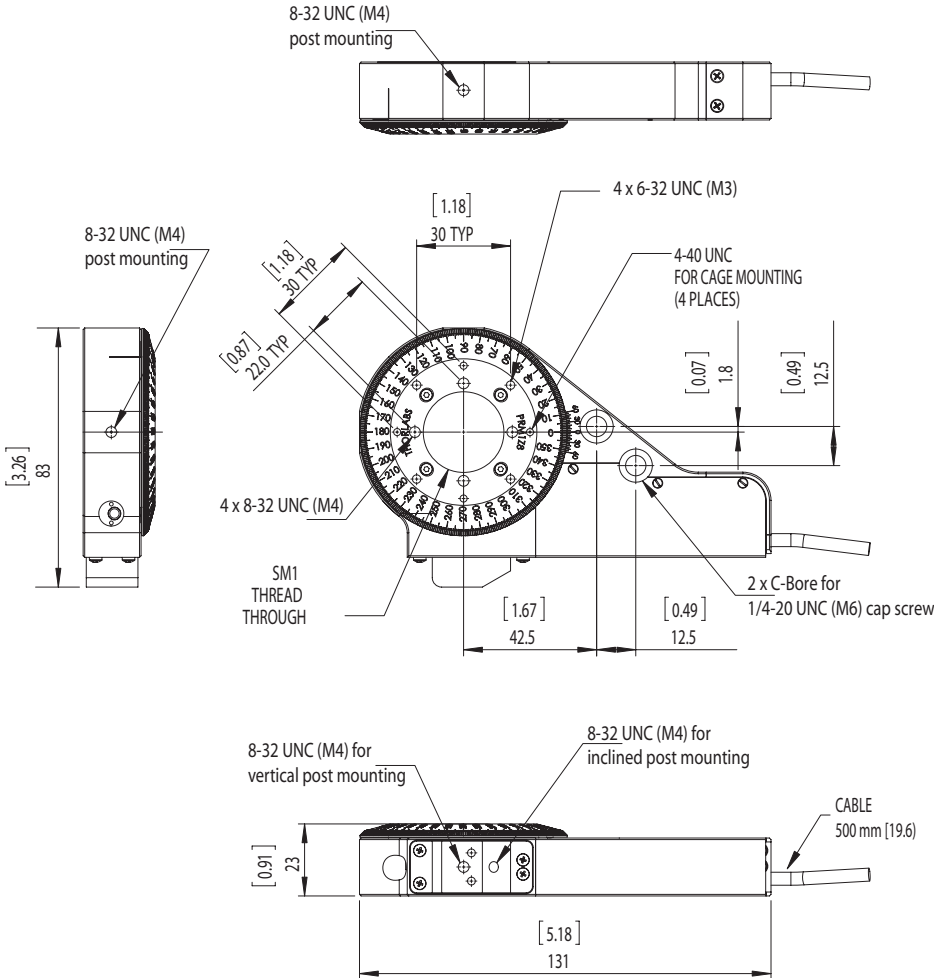


Fig. 3.3 Dimensions

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# Chapter 4 Operation

## 4.1 Introduction



### Caution



The PRM1Z8 series stages form part of the Thorlabs Nanopositioning system. We recommend they are driven by the Thorlabs TDC001 T-Cube DC Servo Motor Driver. If the stage is being driven by any other driver or controller, consult the Section 6.1. for motor pin out details.

The stages are connected to the controller via a flying lead terminated in a D-type connector.



### Warning



The controller must be switched OFF before the stages are plugged in or unplugged. Failure to switch the controller off may result in damage to either the controller, the stage, or both.

- 1) Connect the stage to the DC motor driver and power up the unit.

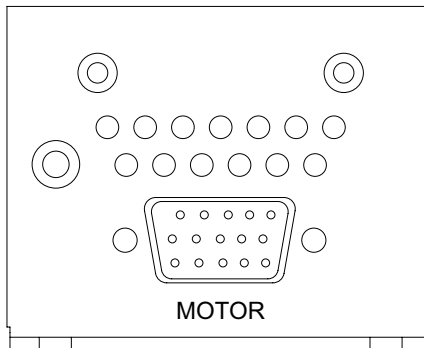


Fig. 4.1 TDC001 Rear Panel

- 2) Connect the driver to the control PC.



- 3) Start the APTUser utility - Start/Programs/Thorlabs/APT User/APT User  
The APT server reads in the stage and controller information on boot up and the GUI panel shown below is displayed..



Fig. 4.1 APTUser GUI screen

When the APTUser utility was run up, default settings applicable to the PRM1Z8 stage were loaded. These settings can now be tailored to your particular application.

- 4) Check that the PRM1Z8 stage type is displayed as shown above.
- 5) Click the Settings button on the GUI to display the Settings panel.
- 6) Click each tab in turn, and make parameter changes as necessary. If in doubt, run your application with the default settings unchanged until performance data is available.
- 7) After the parameter changes have been performed, click the 'Persist Settings to Hardware' box on each tab, then click 'OK'. This will ensure that the same parameter settings will be loaded next time the unit is powered up - even in the absence of a PC.
- 8) On the GUI panel, click the 'HOME' button to move the stage to its home position. This will establish a zero datum from which future moves can be measured.

See the manual supplied with the controller unit for more information.

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## Chapter 5 Specifications

### 5.1 Stage Specifications

<b>Bidirectional Repeatability</b>	$\pm 0.1^\circ$
<b>Backlash</b>	$\pm 0.3^\circ$
<b>Max Rotation Velocity</b>	25 deg/sec
<b>Horizontal On-Axis Load Capacity</b>	1.5 kg
<b>Vertical On-Axis Load Capacity</b>	0.5 kg
<b>Min Achievable Incremental Motion</b>	25 arcsec
<b>Min Repeatable Incremental Motion</b>	0.03°
<b>Absolute On-Axis Accuracy</b>	0.1%
<b>Max Percentage Accuracy</b>	0.08%
<b>Home Location Accuracy</b>	$\pm 0.2^\circ$
<b>Range</b>	360° Continuous
<b>Software Compatibility:</b>	APT Server CDM621 V2.9.0

### 5.2 Motor Specification

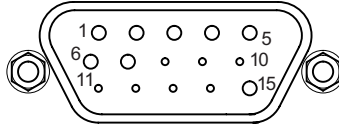
<b>Motor Type:</b>	DC Servo
<b>Motor Drive Voltage:</b>	12V
<b>Feedback:</b>	Hall Effect Encoder
<b>Encoder Counts per Revolution of the Output Shaft:</b>	34,304
<b>Terminal Resistance:</b>	95Ω
<b>Output Power:</b>	0.36W
<b>Efficiency:</b>	68%
<b>No Load Speed:</b>	16,500rpm
<b>No Load Current:</b>	0.004A
<b>Stall Torque:</b>	0.82mNm
<b>Friction Torque:</b>	0.03mNm
<b>Speed Constant:</b>	1419 rpm/V
<b>Back EMF Constant:</b>	0.705 mV/rpm
<b>Torque Constant:</b>	6.73 mNm/A
<b>Current Constant:</b>	0.149 A/mNm
<b>Rotor Inductance:</b>	310μH

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## Chapter 6 Pin Out Details & Associated Products

### 6.1 Motor Connector Pin Out

The Motor cable is terminated in a 15 way D-type connector, which provides connection to the DC motor controller. The pin functions are detailed in Fig. 6.1.



Pin	Description	Pin	Description
1	Ground/Return	9	
2	Reverse Limit Switch	10	Vcc
3	Forward Limit Switch	11	Encoder B
4		12	
5	Motor +	13	Encoder A
6		14	
7	Motor -	15	Braid/Screen
8			

Fig. 6.1 Motor Connector Pin Descriptions

### 6.2 Associated Products

Product Name	Part Number
Grooved Adapter Plate Imperial	PRM1SP1
Grooved Adapter Plate Metric	PRM1SP1/M
Raiser plate (34mm (1.34") deck height)	PRM1SP2
Raiser plate (62.5mm (2.46") deck height)	PRM1SP3

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# Chapter 7 Regulatory

## 7.1 Declarations Of Conformity

### 7.1.1 For Customers in Europe

This equipment has been tested and found to comply with the EC Directives 89/336/EEC 'EMC Directive' and 73/23/EEC 'Low Voltage Directive' as amended by 93/68/EEC.

Compliance was demonstrated by conformance to the following specifications which have been listed in the Official Journal of the European Communities:

Safety	EN61010: 2001 Installation Category II, Pollution Degree II.
EMC	EN61326: 1997

### 7.1.2 For Customers In The USA

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the company could void the user's authority to operate the equipment.

## 7.2 Waste Electrical and Electronic Equipment (WEEE) Directive

### 7.2.1 Compliance

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

This offer is valid for electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out "wheelie bin" logo (see Fig. 1)
- 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



**Fig. 7.1** Crossed out "wheelie bin" symbol

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 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 unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

### **7.2.2 Waste treatment on your own responsibility**

If you do not return an "end of life" unit to the company, 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.

### **7.2.3 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

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## Chapter 8 Thorlabs Worldwide Contacts

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