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DRV001
Stepper Motor Actuator

User Guide

Original Instructions

Contents

Chapter 1   Overview

1.1   Introduction

These Stepper Motor Actuators were designed for use with Thorlabs stages compatible with modular drives (such as our NanoMax300 and 600 series). However, they can be fitted to other stages by using a Modular Quick Connect Adapter (MCA1 for Ø3/8" mounting or MCA2 for Ø10mm mounting).

When driven by a Thorlabs BSC20x series stepper motor controller, this actuator is capable of speeds as high as 4mm/sec and offers 8mm of travel. The powerful stepper motor is capable of handling a load capacity of up to 21.8 Kg (48lb). Bidirectional repeatability of 0.5μm.

Chapter 2   Operation and Maintenance

2.1   Initial Set Up

To ensure that a particular stage is driven properly by the system, a number of parameters must first be set. These parameters relate to the physical characteristics of the stage being driven (e.g. min and max positions, leadscrew pitch, homing direction etc.).

To assist in setting these parameters correctly, it is possible, using the APT Config utility, to associate a specific stage type and axis with the motor controller channel. Once this association has been made, suitable default parameter values are applied automatically on boot up of the APT software.

To ensure correct operation, it is important to select the correct stage type for your controller. If using a BSC20x series controller, select the appropriate 'HS NanoMax' option. If using a legacy BSC0xx or BSC10x controller, choose an option without the 'HS' prefix.

1) Shut down all applications using the APT s erver (e.g. APT User or y our own custom application).
2) Run the APT Config utility - Start/All Programs/Thorlabs/APT Config/APT Config.
3) From the 'APT Configuration Utility' window, click the 'Stage' tab.

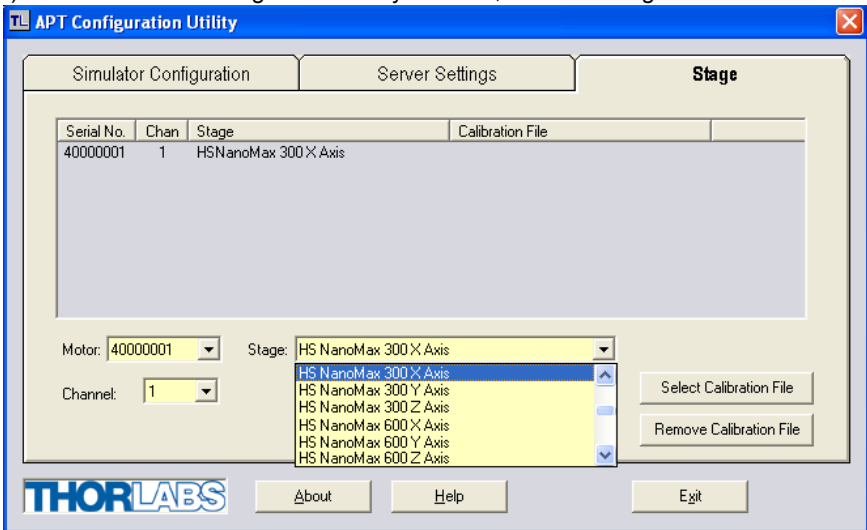
Fig. 2.1   APT Configuration Utility - Stage Tab

4) In the 'Motor' field, select the serial number of the stepper motor controller to be configured (this number can be found on the rear panel of the controller unit).

Note
To ensure correct operation, it is important to select the correct stage type for your controller. If using a BSC20x series controller, select the appropriate 'HS NanoMax' option. If using a legacy BSC0xx or BSC10x controller, choose an option without the 'HS' prefix.
Selecting an incompatible stage type could result in reduced velocity and resolution. Furthermore, joystick functionality may be lost.

5) In the 'Stage' field, select your actuator type from the list displayed (e.g. HS NanoMax 300 X Axis).

6) Click the 'Add Stage Association' button.

7) A default configuration is set at the factory and stored in the non-volatile memory of the motor controller. The server reads in the stage and controller information on start up. See the handbook supplied with the stepper motor controller for further information.
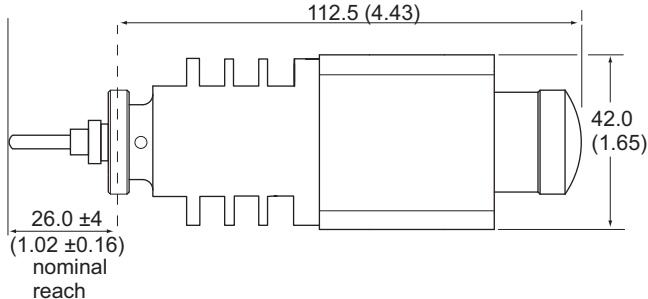
2.2 Dimensions

all dimensions in millimetres (inches)

Fig. 2.2   Dimensions

2.3 Maintenance

After prolonged use, and particularly in applications where small movements are continually repeated, the grease on the drive shaft may build up in ridges. This may cause rough or noisy movement, vibration and excessive heating.

It is good practise to run the motor periodically from one end of travel to the other several times in order to redistribute the grease.

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2.4   Using the MCA Modular Quick Connect Adapters

Modular quick connect adapters allow the DRV001 actuators to be fitted to stages with standard mounting clamps (MCA1 for Ø3/8" mounting or MCA2 for Ø10mm mounting).
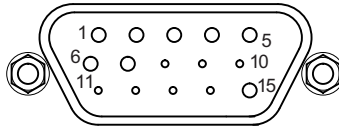
Simply remove the circlip from the end of the drive rod, remove the washers, then screw on the adapters.

Fig. 2.3   Circlip and Washers

2.5   Motor Connector Pin Out

The 'Motor' connector provides connection to the stepper motor controller. The pin functions are detailed in Fig. 2.4.

Pin	Description	Pin	Description
1	Limit Switch Ground	9	
2	Not Connected	10	
3	CW Limit Switch	11	
4	Phase B -ve	12	
5	Phase B +ve	13	Not Connected
6	Phase A -ve	14	
7	Phase A +ve	15	Ground
8			

Fig. 2.4   Motor Connector Pin Descriptions

Chapter 3   Specification

Specification	DRV001
Travel Range	8 mm
Lead Screw Pitch	0.5 mm
Bidirectional Repeatability	0.5 µm
Max Load Capacity	21.8 kg (48 lbs)
Velocity Range	40.0 µm/s to 4 mm/s
Full Step Angle	1.8°
Step Angle Accuracy	5%
Rated Phase Current	1 A
Phase Resistance	4.6 Ω
Phase Inductance	0.6 mH
Holding Torque	23.1 N•cm
Detent Torque	1.7 N•cm
Rotor Inertia	32 g•cm2
Insulation	Class B
Feedback	None
Limit Switches	Ceramic-Tipped Mechanical
Lead Screw Pitch	0.5 mm
Microsteps per Revolution of Leadscrew	409,600
Motor Type	2-Phase Stepper
Minimum Incremental Movement	60 nm
Compatible Controllers	BSC201 MST602

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Chapter 4   Regulatory

4.1   Declarations Of Conformity

4.1.1   For Customers in Europe
In accordance with the following Directive(s):

2006/42/EC Machinery Directive (MD)

2004/108/EC Electromagnetic Compatibility (EMC) Directive

2011/65/EU Restriction of Use of Certain Hazardous Substances (RoHS)

this equipment has been tested and is in conformity with the applicable requirements of the following documents:

EN ISO 12100 Safety of Machinery. General Principles for Design, Risk Assessment and Risk Reduction 2010

EN 61326-1   Electrical Equipment for Measurement, Control and Laboritory Use - EMC Requirements 2013

4.1.2   For Customers In The USA
This equipment has been tested and found to comply with the limits for a Class A digital device, persuant 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.

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.

USA, Canada, and South America
Thorlabs, Inc.
sales@thorlabs.com
techsupport@thorlabs.com

Europe
Thorlabs GmbH
europe@thorlabs.com

France
Thorlabs SAS
sales.fr@thorlabs.com

Japan
Thorlabs Japan, Inc.
sales@thorlabs.jp

UK and Ireland
Thorlabs Ltd.
sales.uk@thorlabs.com
techsupport.uk@thorlabs.com

Scandinavia
Thorlabs Sweden AB
scandinavia@thorlabs.com

Brazil
Thorlabs Vendas de Fotônicos Ltda.
brasil@thorlabs.com

China
Thorlabs China
chinasales@thorlabs.com

THORLABS

Thorlabs Inc.
56 Sparta Ave
Newton, NJ07860
USA
Tel: +1 973 579 7227
Fax: +1 973 300 3600
www.thorlabs.com

Thorlabs Ltd.
1 Saint Thomas Place, Ely
Cambridgeshire CB7 4EX,
UK
Tel: +44 (0) 1353 654440
Fax: +44 (0) 1353 654444
www.thorlabs.com