



NFL5 Series

5.0 mm Travel Single Axis Flexure Stages



Original Instructions

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Chapter 1 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.

**Warning: Risk of Electrical Shock**

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

**Warning: Risk of Electrical Shock**

The piezo actuated versions of this product use high voltages and up to 75V may be present at the SMC connectors. This is hazardous and can cause serious injury. Appropriate care should be taken when using this device.

Persons using the device must understand the hazards associated with using high voltages and the steps necessary to avoid risk of electrical shock.

**Warning**

If the device is used in a manner not specified by Thorlabs, the protective features provided by the product 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.

Chapter 2 Operation

2.1 Introduction

When stability really counts, the NanoFlex™ single-axis compound flexure stages provide ultrasmooth translation for applications that are intolerant to the errors inherent in linear bearings. The compound linear flexure design ensures true linear motion over the full range of translation. This is achieved without the use of parts that require controlled contact to maintain their function; all the motion results from the flexing of various structural components within the translator, thereby delivering uncompromised performance even in harsh environments. Potential applications include interferometry, microscopy, and other precision nanopositioning applications. The extra stability offered by these NanoFlex™ stages means that they are suitable for stacking in x-y, and x-y-z configurations where precise planar movement is required.

All models have 5mm of coarse manual adjustment with a resolution of 1µm. The differential adjusters also offer 300µm of fine adjustment at a resolution of 50nm.

The NFL5DP20 open-loop piezo stages have a 20 µm piezo travel with a theoretical resolution of 0.6 nm when driven by one of the Thorlabs 0 to 75V piezo controllers. Please see www.thorlabs.com for complete specification data.

Load capacity for all models is 1kg (2.2 lbs) when mounted horizontally, and 0.5 kg (1.1 lbs) when mounted vertically.



Caution

When mounting devices to the top platform do not use fixing screws that protrude into the internal mechanism. Doing so will damage the stage. The top platform is 5 mm thick.

2.2 Accessories



Caution

When mounting plates and brackets to the bottom face do not use fixing screws that protrude into the internal mechanism. Doing so will damage the stage. The bottom face is 4.5 mm thick.

NFL5P1 - Baseplate for securing the stage to an optical table. NFL5P2 - Angle bracket for mounting X-Y-Z configurations.



Fig. 2.1 Typical XZ Set Up

2.3 Piezo Actuators



Warning

The piezo actuators in this product use high voltages and up to 75V may be present at the SMC connectors. This is hazardous and can cause serious injury. Appropriate care should be taken when using this device.

Persons using the device must understand the hazards associated with using high voltages and the steps necessary to avoid risk of electrical shock.

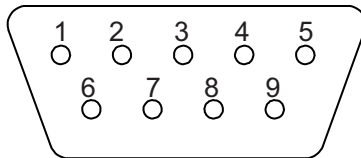
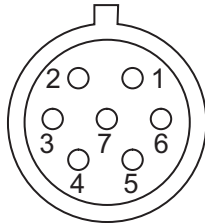
Piezo actuators are used to give nanometric positioning of the top platform over a range of 20 microns. They can also modulate the position of the platform at high frequency.

2.3.1 Piezo Drive Connector

Stages equipped with piezos are fitted with an SMC connector on the front face for connection to the 75 V piezo drive signal.

2.3.2 Piezo Feedback Connector Pin Out

Stages equipped with feedback piezos are fitted with a 7 pin LEMO connector to route the signal to the Strain Gauge Reader (or piezo controller). The pin functions of the LEMO connector, and the D-Type connector on the end of the PAA Feedback cable are detailed below.



Pin	Description
1	Bridge
2	+15 V
3	-15 V
4	0 V
5	Signal
6	0 V
7	Ident
8	Not Connected
9	Not Connected

Chapter 3 Specification

Specification	NFL5D	NFL5DP20	NFL5DP20S
Coarse Adjustment Range	5 mm (0.2")		
Fine Adjustment Range	300 μ m		
Maximum Load Capacity	Horizontal: 1 kg (2.2 lbs) Vertical: 0.5 kg (1.1 lbs)		
Mounting Surface Dimensions	75 mm x 75 mm (2.95" x 2.95")		
Stage Height	30 mm (1.18")		
Manual Drive Specifications			
Drive Type	Differential Micrometer		
Coarse Resolution	1.0 μ m		
Fine Resolution	50 nm		
Coarse Adjustment Pitch	0.5 mm		
Fine Adjustment Pitch	50 μ m		
Piezo Specifications			
Voltage	N/A	0 to 75 V	0 to 75 V
Position Sensor for Closed Loop Operation	N/A	N/A	Strain Gauge
Travel Range	N/A	20 μ m	20 μ m
Theoretical Resolution	N/A	0.6 nm ^a	0.6 nm ^a
Capacitance	N/A	3.6 μ F	3.6 μ F
Piezo Drive Connector/Cable	N/A	SMC to SMC: 3 m (9.84')	
Feedback Connector/Cable	N/A	N/A	LEMO to 9 Pin D-Type, 3 m (9.84')
Compatible Controllers	N/A	MDT694B, MPZ601, KPZ101	BPC301, MPZ601, KPZ101 and KSG101


Notes.

^a When driven by the KPZ101, BPC301 or MPZ601

Chapter 4 Regulatory

4.1 Declarations Of Conformity

4.1.1 For Customers in Europe



THORLABS
www.thorlabs.com

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Ltd.
Of: 1 St. Thomas Place, Ely, CB7 4EX, United Kingdom

in accordance with the following Directive(s):

2006/42/EC	Machinery Directive (MD)
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Use of Certain Hazardous Substances (RoHS)

hereby declare that:

Model: **NF Series**

Equipment: **Single Axis Flexure Stages**

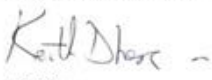
is in conformity with the applicable requirements of the following documents:

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 Laboratory Use - EMC Requirements	2013

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:


does not contain substances in excess of the maximum concentration values tolerated by weight in homogenous materials as listed in Annex II of the Directive

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed:  On: 08 April 2016

Name: Keith Dhese
Position: General Manager

EDC - NF Series -2016-04-08



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, 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.

Chapter 5 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

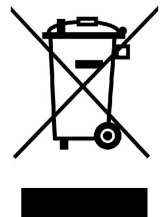
Brazil

Thorlabs Vendas de Fotônicos Ltda.
brasil@thorlabs.com

China

Thorlabs China
chinasales@thorlabs.com

Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return "end of life" Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out "wheelie bin" logo (see right), were sold to and are currently owned by a company or institute within the EC, and are not disassembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. "End of life" units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.



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