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THORLABS

TPZNFL5/M - APR 27, 2016

Item # TPZNFL5/M was discontinued on APR 27, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

SINGLE-AXIS FLEXURE STAGES: 5 MM TRAVEL

► Differential Adjusters

► 20 µm Piezo and Closed-Loop Feedback Options

► Mounting Plate & Angle Bracket Accessories



NFL5DP20S
Shown with NFL5P1 Baseplate Fitted



NFL5P1



NFL5P2



Typical XZ Configuration

OVERVIEW

NFL5 Series NanoFlex Translation Stages

- Differential Micrometer Drive
- Open & Closed Loop Piezo Options
- 5 mm Travel
- Compact Size: 3.00" (75 mm) Square, 1.18" (30 mm) Thick
- XYZ-Configurable
- All Cables are Included

Single-Axis Flexure Translation Stages
1.5 mm Travel
5 mm Travel

When stability is of the utmost importance, the NanoFlex™ 5 mm travel single-axis compound flexure stages provide ultra smooth translation for applications that are intolerant to the errors inherent in linear bearings. The compound linear symmetrical flexure design ensures true linear motion with zero cross talk 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. These features provide uncompromised performance, even when used in harsh environments.

These stages can be stacked in XY, XZ, or XYZ configurations using the optional base plate NFL5P1(/M) and angle bracket NFL5P2(/M) described below. A 3 m long piezo drive cable (SMC to SMC) as well as a 3 m long feedback cable (Lemo to Lemo) are supplied where applicable. See the *Pin Diagrams* tab for connector details.

See the *Specs* tab above for more detailed information including compatible controllers. We offer stages bundled with controllers at a discounted price below. Compatible power supplies are sold separately below.

S P E C S

Item #	NFL5D	NFL5DP20	NFL5DP20S
Travel	0.20" (5 mm)	0.20" (5 mm)	0.20" (5 mm)
Max Load	Horizontal: 2.2 lbs. (1 kg) Vertical: 1.1 lbs (0.5 kg)	2.2 lbs. (1 kg) Vertical: 1.1 lbs (0.5 kg)	2.2 lbs. (1 kg) Vertical: 1.1 lbs (0.5 kg)
Drive Type	Differential Drive	Differential Drive & Piezo	Differential Drive & Piezo w. Feedback
Coarse Adjustment Pitch	0.5 mm	0.5 mm	0.5 mm
Fine Adjustment Pitch	50 μm (300 μm Range)	50 μm (300 μm Range)	50 μm (300 μm Range)
Piezo (0 - 75 V)	N/A	Yes (20 μm Range)	Yes (20 μm Range)
Theoretical Resolution	N/A	20 nm (Piezo)	10 nm (Piezo w. Feedback)
Feedback	N/A	N/A	Strain Gauge
Recommended Controllers	N/A	MDT694B, MPZ601, or KPZ101	BPC301, MPZ601, or KPZ101 and TSG001

P I N D I A G R A M S

Displacement Sensor
7 Pin LEMO Male
NFL5DP20S Only



Pin	Designation
1	+15 V
2	Oscillator +
3	0 V
4	Signal Out -
5	Signal Out +
6	-15 V
7	Travel

Piezo Drive Input
SMC Male
NFL5DP20 and NFL5DP20S



Nominal maximum input voltage: 75 V
Absolute maximum input voltage: 100 V

TPZNFL5 (/M)

TPZNFL5(/M) Bundle

The TPZNFL5 (/M) bundle includes the NFL5DP20 stage, the former generation TPZ001 T-Cube piezo controller, piezo drive cable, and NFL5P1 (/M) mounting plate. The stage provides 0.20" (5 mm) of total translation via a micrometer. For finer adjustment, the piezo drive offers 20 μ m of translation with 20 nm resolution.

T-Cube Piezo Controller

The TPZ001 can be controlled by its top panel for standalone operation or through its PC interface. The TPZ001 connects to a PC via a mini USB port and utilizes Thorlabs' APT™ software. The APT™ software features an intuitive graphical user interface (GUI) that allows the unit to be controlled completely a PC. For more demanding applications, customers can utilize ActiveX® programming to create their own software for Thorlabs' line of T-Cubes.

Power Supplies

The TPZ001 comes without a power supply as our customers have varying needs. Please see the recommended power supply below.

Item #	TPZNFL5 (/M)
NFL5DP20	
Travel	0.20" (5 mm)
Max Load	2.2 lbs. (1 kg)
Drive Type	Differential Drive & Piezo
Coarse Adjustment Pitch	0.5 mm
Fine Adjustment Pitch	50 μ m (300 μ m Range)
Piezo (0 - 75 V)	Yes (20 μ m Range)
Theoretical Resolution	20 nm (Piezo)
Feedback	N/A
TPZ001 (T-Cube Piezo Controller)	
Drive Voltage	0 - 150 V
Drive Current, Max, Continuous	7.5 mA
Stability	100 ppm Over 24 hrs (After 30 min Warm-Up)
Noise	<2 mV _{RMS}
Typical Piezo Capacitance	1 - 10 μ F
Bandwidth	1 kHz (1 μ F Load, 1 V _{p-p})
External Input (SMA Male)	0 - 10 V (BNC)
Output Monitor (SMA Male)	0 - 10 V (BNC)
USB Port	Version 1.1 mini

TSGNFL5(/M)

TSGNFL5(/M) Bundle

The TSGNFL5 (/M) bundle includes the NFL5DP20S stage, the former generation TPZ001 T-Cube piezo controller, TSG001 T-Cube strain gauge reader, NFL5P1(/M) base plate, and piezo drive and feedback cables. The stage provides 0.20" (5 mm) of full translation via a micrometer, but a piezo provides finer adjustments over a shorter travel range. The piezo drive offers 20 μm of travel and, when operated in closed loop, provides 10 nm resolution. The same translation stage when used in open-loop is only able to achieve 20 nm resolution, so closed-loop operation is a necessity for more sensitive applications.

T-Cube Piezo Controller

The TPZ001 can be controlled by its top panel for standalone operation or through its PC interface. The TPZ001 connects to a PC via a mini USB port and utilizes Thorlabs' APT™ software. The APT™ software features an intuitive graphical user interface (GUI) that allows the unit to be controlled completely by a PC. For more demanding applications, customers can utilize ActiveX® programming to create their own software for Thorlabs' line of T-Cubes.

T-Cube Strain Gauge Reader

The TSG001 T-Cube strain gauge reader provides feedback to the TPZ001 piezo driver. This allows for closed-loop operation of the stage for increased resolution. Like the TPZ001, the unit can be used with or without a PC. The top of the unit features a digital readout of the strain on the piezo. When connected via USB to a PC, the APT™ software can be used to control the unit.

Power Supplies

The TPZ001 and TSG001 come without power supplies as our customers have varying needs. Please see the recommended power supply below.

Item #	TSGNFL5(/M)
NFL5DP20S	
Travel	0.20" (5 mm)
Max Load	2.2 lbs. (1 kg)
Drive Type	Differential Drive & Piezo with Feedback
Coarse Adjustment Pitch	0.5 mm
Fine Adjustment Pitch	50 μm (300 μm Range)
Piezo (0 - 75 V)	Yes (20 μm Range)
Theoretical Resolution	10 nm (Piezo with Feedback)
Feedback	Yes
TPZ001 (T-Cube Piezo Controller)	
Drive Voltage	0 - 150 V
Drive Current, Max, Continuous	7.5 mA
Stability	100 ppm Over 24 hrs (After 30 min Warm-Up)
Noise	<2 mV _{RMS}
Typical Piezo Capacitance	1 - 10 μF
Bandwidth	1 kHz (1 μF Load, 1 V _{p-p})
External Input (SMA Male)	0 - 10 V (BNC)
Output Monitor (SMA Male)	0 - 10 V (BNC)
USB Port	Version 1.1 mini
TSG001 (T-Cube Strain Gauge Reader)	
Strain Gauge Input	9-Way D-Type
Bridge Type	AC
Excitation Frequency	18 kHz
Reading Resolution	Position Mode: 1 nm Force Mode: 1 mN Voltage Mode: 1 mV
Sampling Bandwidth	500 Hz
Position Output Monitor	0 - 10 V (SMA)
USB Port	Version 1.1 mini

Single-Axis Flexure Stages: 5 mm Travel

The stages are supplied with a differential micrometer drive, which provides coarse and fine adjustment. An optional piezo drive is available, with or without strain gauge feedback for closed- and open-loop operation, respectively. The NFL5 series stage is ideal for a variety of applications, including interferometry, microscopy, and other precision nanopositioning applications.

See the *Specs* tab above for more detailed information including compatible controllers. We offer stages bundled with controllers at a discounted price below. Compatible power supplies are sold separately below.

Part Number	Description	Price	Availability
NFL5D/M	NanoFlex 5 mm Translation Stage with Differential Drive, Metric Taps	\$776.00	Today
NFL5DP20/M	NanoFlex 5 mm Translation Stage with Diff. Drive and Piezo, Metric Taps	\$945.00	Lead Time
NFL5DP20S/M	NanoFlex 5 mm Translation Stage with Diff. Drive and Feedback Piezo, Metric Taps	\$1,270.00	Lead Time
NFL5D	NanoFlex 5 mm Translation Stage with Differential Drive	\$776.00	Today
NFL5DP20	NanoFlex 5 mm Translation Stage with Diff. Drive and Piezo	\$945.00	Today
NFL5DP20S	NanoFlex 5 mm Translation Stage with Diff. Drive and Feedback Piezo	\$1,270.00	Lead Time

NFL5 Series Mounting Adapters



The NFL5P1 and NFL5P2 are adapter plates designed for the NFL5 Series of translation stages. The NFL5P1 is a universal base plate with slots on the side that enable obstruction-free mounting onto an optical breadboard. This base is ideal for XY or XYZ multi-axis configurations where the standard counterbores in the middle of the stages are obstructed.

The NFL5P2 is an angle bracket that allows a NFL5 Series stage to be mounted vertically. This is necessary in some XY and all XYZ configurations.

Part Number	Description	Price	Availability
NFL5P1/M	NanoFlex NFL5D Series Base Plate, Metric Taps	\$46.00	Today
NFL5P2/M	NanoFlex NFL5D Series Angle Bracket, Metric Taps	\$94.90	Lead Time
NFL5P1	NanoFlex NFL5D Series Base Plate	\$46.00	Today
NFL5P2	NanoFlex NFL5D Series Angle Bracket	\$94.90	Today

5 mm Single-Axis Stage & Controller Bundles



The TPZNFL5(/M) bundle includes the former generation TPZ001 T-Cube Piezo Driver, the ideal driver for the NFL5DP20(/M) stage and includes all necessary cable for a complete open-loop piezo positioning system. The TPZNFL5(/M) includes a NF5P1(/M) base plate. Compatible power supplies for the TPZ001 are sold separately below.

Please see the *TPZNF5(/M)* tab for more information on this bundle.

The TSGNFL5(/M) bundle has been designed for customers who require precise, closed-loop control. The NFL5DP20S(/M) stage, together with the former generation TPZ001 T-Cube Piezo Controller and TSG001 Strain Gauge Reader, provides an out of the box, high-precision, closed-loop positioning solution. The TSGNFL5(/M) includes a NFL5P1(/M) base plate. Compatible power supplies for the TPZ001 and TSG001 are sold separately below.

Please see the *TSGNFL5(/M)* tab for more information on this bundle.

Part Number	Description	Price	Availability
TPZNFL5/M	NFL5DP20/M 5 mm Travel Stage with TPZ001 Piezo Driver	\$1,390.00	Lead Time
TSGNFL5/M	NFL5DP20S/M 5 mm Travel Stage with TPZ001 and TSG001 Strain Gauge Reader	\$2,160.00	Lead Time
TPZNFL5	NFL5DP20 5 mm Travel Stage with TPZ001 Piezo Driver	\$1,390.00	Lead Time
TSGNFL5	NFL5DP20S 5 mm Travel Stage with TPZ001 and TSG001 Strain Gauge Reader	\$2,160.00	Today

Compatible Power Supplies



Click to Enlarge

- ▶ ± 15 V/5 V Power Supply
 - ▶ TPS002: For up to Two K-Cubes or T-Cubes
- ▶ USB Controller Hubs Provide Power and Communications
 - ▶ KCH301: For up to Three K-Cubes or T-Cubes
 - ▶ KCH601: For up to Six K-Cubes or T-Cubes
 - ▶ KAP101: Adapter Plate for Connecting 60 mm Wide T-Cubes to KCH Series Hubs
 - ▶ KAP102: Adapter Plate for Connecting 120 mm Wide T-Cubes to KCH Series Hubs

The TPS002 supplies power for up to two K-Cubes or T-Cubes. The cubes still need to be connected to a computer individually via a USB cable.

The KCH301 and KCH601 USB Controller Hubs each consist of two parts: the hub, which can support up to three (KCH301) or six (KCH601) K-Cubes or T-Cubes, and a power supply that plugs into a standard wall outlet. The hub draws a maximum current of 10 A; please verify that the cubes being used do not require a total current of more than 10 A. In addition, the hub provides USB connectivity to

any docked K-Cube or T-Cube through a single USB connection.

A KAP101 or KAP102 Adapter Plate (sold separately) is required for each T-Cube to operate on the KCH301 or KCH601 controller hub. The KAP101 is designed to adapt 60 mm wide T-Cubes to the hubs, while the KAP102 is designed to adapt 120 mm wide T-Cubes to the hubs.

For more information on the USB Controller Hubs, see the full web presentation.

Please note that our KPS101 Power Supply is not compatible with this module since it does not offer reversible polarity.

Part Number	Description	Price	Availability
TPS002	± 15 V/5 V Power Supply Unit for up to Two K-Cube or T-Cubes	\$105.00	Lead Time
KCH301	NEW! USB Controller Hub and Power Supply for Three K-Cubes or T-Cubes	\$475.00	Today
KCH601	NEW! USB Controller Hub and Power Supply for Six K-Cubes or T-Cubes	\$575.00	Today
KAP101	NEW! Adapter Plate for KCH Series Hubs and 60 mm Wide T-Cubes	\$55.00	Today
KAP102	NEW! Adapter Plate for KCH Series Hubs and 120 mm Wide T-Cubes	\$60.00	Today

Visit the *Single-Axis Flexure Stages: 5 mm Travel* page for pricing and availability information:

https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=720