Making Light Work Lighter

General Photonics

C o r p o r a t i o n

FST-002

PathScan™ High Speed Optical Path Length Scanner

<u>Operation Manual</u>

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General Photonics Corp.
5228 Edison Ave.
Chino, CA 91710 USA

Ph: (909) 590-5473
Fax: (909) 902-5536
www.generalphotonics.com

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IMPORTANT SAFETY NOTE

The FST-002 electrical connections inside the enclosure may carry hazardous voltages and currents. The DC voltage can reach 150 V. Never open the cover of the FST-002 or touch any electrical connectors when the power is on.

CAUTION

1. To avoid excess heat generation, it is recommended that a sine wave signal be used to drive this device.
2. Make sure that the polarity of the connection between the piezo driver and the FST-002 electrical input is correct. Do not apply a negative voltage to the piezos.

Section 1. Specifications:

Physical Features:

Dimensions	160 (L) × 80 (W) × 60 (H) mm

Max Ratings:

Max voltage on PZT	150 V

Optical Characteristics:

Operating wavelength	1310/1550 nm standard (1060 nm is available)
Peak delay range	16 mm (min), 18 mm (typical) at resonance frequency
Low frequency delay range	> 4.0 mm
System insertion loss[1]	<0.2 dB
PDL	<0.05 dB
Optical power handling	>1000 mW
Fiber Input/Output Connectors	FC/PC, FC/APC, SC/PC, SC/APC[2]

Electrical Characteristics:

Max. voltage on PZT	150 V
Voltage for peak delay at resonance	90 ± 10 V
Load capacitance	0.72 µF
Operating Temperature	0 to 50º C
Storage Temperature	−40 to 80º C

Required Driver:

Piezo driver capable of generating 0-150V/240mA sine wave, with >10 kHz bandwidth

General Photonics' PCD-001 piezo driver can be used with the FST-002.

Notes:
1. Measured without connectors.
2. Per customer specification.

Section 2. Overview

The FST-002 is a piezo-driven high-speed optical path length scanner with a scanning range of up to 18 mm at a resonant frequency around 2 kHz. Built with a patented fiber stretching technology, the device achieves its large resonant scan range with a reasonably low driving voltage of around 90 volts. At frequencies below resonance, a total scan range of 4.0 mm can be achieved with a maximum driving voltage of 150 volts. The fiber stretcher is enclosed in a specially designed enclosure to effectively block audible noise generated by the PZTs.

This patented device can be driven with commercially available PZT drivers, such as General Photonics' PCD-001. The FST-002 enables applications from sensing to medical imaging, interferometry, position measurement, time domain optical coherence tomography (OCT), and spectrum analysis. The large delay range is especially attractive for OCT applications requiring large A-scan depth, where frequency domain OCT has limitations.

2.1   Interface descriptions

Electrical: Electrical interface cable contains two wires:
Red wire connects to piezo driver positive voltage
Black wire connects to piezo driver ground.

Optical: Input and output fiber pigtails or bulkhead connectors
Input and output connectors are interchangeable

Section 3. Operation Instructions:

Important Safety Note

The FST-002 electrical connections inside the enclosure may carry hazardous voltages and currents. The DC voltage can reach 150 V. Never open the cover of the FST-002 or touch any electrical connectors when the power is on.

3.1 Getting started

Unpacking

Inspect FST-002 for any physical damage due to shipping/transportation. Contact carrier if any damage is found. Check the packing list to see if any parts or accessories are missing.

Initial setup

1.　Before connecting to the FST-002, set up the input signal on the piezo driver. Make sure that the output voltage is not negative and does not exceed +150V. With the piezo driver powered off, connect the piezo driver to the FST-002 electrical cable. Make sure that the polarity is correct.

2.　Connect input and output fibers to FST-002. It is important to clean the fiber connectors using industry standard procedures before connecting them. In the case of a high power laser source, turn off optical power source before connector cleaning.

3.　Turn on the light source and power on the piezo driver.

　　Note: For interferometric applications, make sure that all fibers are fixed in position and cannot move during measurement. This can be done by taping them to the optical table.

3.2 Operation

To operate the FST-002, a signal generator and a piezo driver, or a piezo driver with signal generation capability, is required. There are 4 Piezos in this module, and the total capacitance load is about 0.72 μF. Therefore, a piezo driver capable of generating a 0-150V/240 mA output sine wave, with >10kHz bandwidth, is ideal.

1.　**Never apply a voltage higher than 150V to the FST-002. Do not apply a negative input voltage to the FST-002.** In general, the total current should be less than 0.5 A during continuous drive operation.

2.　Adjust the piezo driver voltage to achieve the desired delay at the operating frequency of interest. See Figs. 1-4 for typical performance data for a standard FST-002 with SMF-28 fiber at 1550 nm.
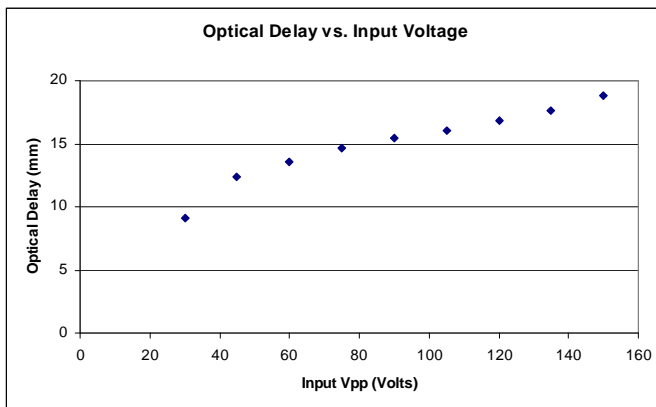
3.　Turn off the power supply when not in use.

Figure 1. Optical delay vs. input voltage at resonance frequency
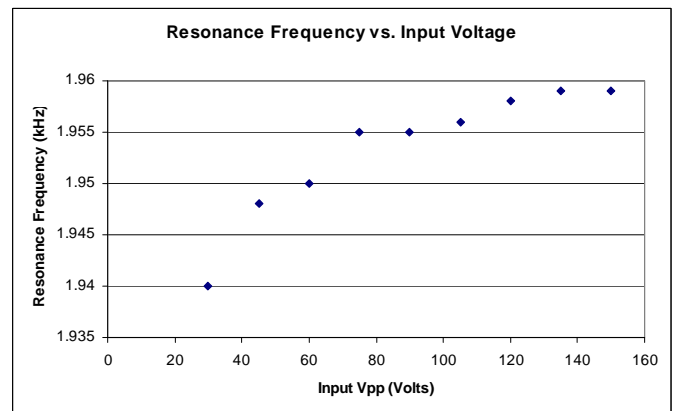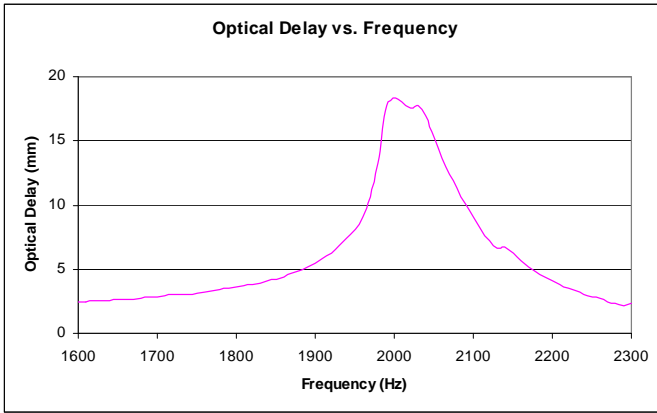

Figure 2. Resonance frequency vs. input voltage

Optical Delay vs. Frequency

Figure 3. Optical delay vs. frequency at V_{pp} = 150V.
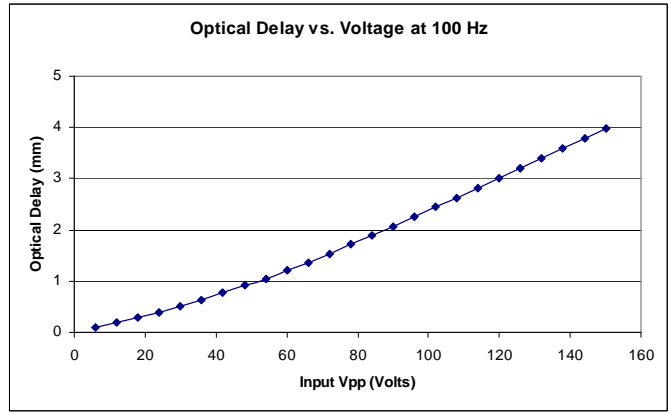

Optical Delay vs. Voltage at 100 Hz

Figure 4. Optical delay vs. input voltage at low frequency (100 Hz).

Section 4. Technical Support

The FST-002 can be serviced only by manufacturer authorized personnel. There are no user serviceable components in this system.

General Photonics is committed to high quality standards and customer satisfaction. For any questions regarding the quality and the use of the FST-002, or future suggestions, please contact General Photonics Corporation at (909)-590-5473 (telephone) or (909)-902-5536 (fax), or by e-mail at info@generalphotonics.com. General Photonics will respond to all customer questions within 24 hours during regular business hours. You can also write to:

General Photonics
5228 Edison Avenue
Chino, California 91710
USA