

## Phase Shifters

### Q. What are the key characteristics of the fiber phase shifter? Are there any moving parts?

**A.** General Photonics' All Fiber Phase Shifters achieve optical phase modulation directly on a section of optical fiber. No optical waveguides or fiber pigtails are used. There is no epoxy in the optical path. The standard model is polarization independent, although polarization-maintaining versions are available. The GP Phase Shifter uses no mechanical moving components.

### Q. Is the phase shift independent of the modulation frequency of the input light?

**A.** The amplitude of the phase shift depends only on the applied voltage. It is independent of the data modulation rate of the optical signal. The dependence on the input light wavelength is very small unless the input light is from a very broadband source.

### Q. Can the phase shifter be controlled with a DC drive voltage?

**A.** A DC control voltage can be used to achieve the desired phase shift. It is recommended that a closed loop feedback system be used for high accuracy phase control.

### Q. What is the maximum frequency of operation for your All Fiber Phase Shifter to generate a half-wave phase change at 1550 nm? What are the required drive voltages?

**A.** The operation frequency range and  $V_{\pi}$  depend on the model of phase shifter.

Model	Operating Frequency Range	Typical $V_{\pi}$	Maximum Phase Shift
FPS-001	DC-20 kHz	10-20V	$8\pi - 15\pi$
FPS-002	DC-20 kHz	2.5-4.5V	$>65\pi$
FPS-003	DC-60 kHz	1-3V	$>55\pi$

### Q. Is the All Fiber Phase Shifter bi-directional?

**A.** Yes, the fiber phase shifter is bi-directional.

### Q. What can I use to drive the phase shifter?

**A.** For common applications that require small phase shifts, a function generator or standard laboratory DC power supply can often be used to generate the drive voltage.

### Q. How accurately can I control the phase?

**A.** Since the phase shifters are piezo-driven, the phase resolution will depend on the resolution with which the drive voltage can be controlled. For very precise control, it is recommended that the phase shifters be used in a closed-loop system. Because the piezos have some hysteresis, it can be difficult to maintain or return to a particular phase value when using the phase shifter in an open-loop system.