Fiber Loops Polarization Controller < 0.5dB Loss

low loss 0.5dB, 1Hz rate, all wavelength, high power

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The FPOL series All-Fiber Polarization Controllers use four independently stepper motor-driven fiber loop paddles to function as rotatable waveplates, enabling full-range polarization control. Constructed from a single continuous fiber strand, the design ensures ultra-low insertion loss and high optical power handling. Each fiber loop applies controlled stress and rotation — leveraging birefringence modulation and geometric phase effects (including Sagnac-like mechanisms) — to alter the polarization state of light. This all-fiber approach is inherently broadband and affects all wavelengths transmitted through the fiber, although with some wavelength dependence in birefringence response. The FPOL system is suitable for use as a polarization scrambler or a polarization controller. When combined with an automatic control circuit and a polarimeter, it can transform any input polarization state into a defined output state on the Poincaré sphere with high precision and repeatability. The system features a user-friendly GUI accessible via RS232, a wall-pluggable DC power supply, and supports high-power, connectorized fiber configurations. Custom software options and a Python command set are available for advanced integration and control.

Features

- Four Rotations of Waveplates
- Built-In Encoder for Closed Loop Operation
- USB Computer Control
- User-Friendly Intuitive GUIs
- SM, PM, MM Fiber Option

Applications

- Polarization transformation
- Automation of multi-polarization state analysis
- Quantum state tomography
- Polarization calibration
- Polarization state analyzer and controller
- Polarized fiber optic source
- Polarization extinction ratio controller
- PM fiber axes conversion
- Optical Interferometric systems
- Laser to fiber coupling and coherent detection

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	400		2650	nm
Insertion Loss [1]	0.3	0.5	0.7	dB
Number of Rotating Paddles			4	
Homing Repeatability	0.1			°
Repeatability	0.1			°
Minimum Incremental Motion	0.1			°
Return Loss	55			dB
Response Time			1	s
Operating Optical Power		0.3	0.5	W
Operation Frequency	DC		1	Hz
Power Consumption			0.5	W
Power Input	4.5	5	5.5	DCV
Operating Temperature		-5 ~ 60		°C
Storage Temperature		-40 ~ 85		°C

Notes:

[1]. Excluding connectors. Connectors ad 0.3dB each.

[2]. @1550nm

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Mechanical Dimensions (mm)

*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

Operation Instruction

- Plug in the accompanied power supply
- Connect an input light and output
- Connect to a computer using the accompanied cable
- Load the accompany software (in a memory disk)
- Run the GUI

* To control polarization in a full range on the Poincaré sphere: select λ/2 waveplate, λ/4 waveplate, and λ/2 waveplate

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Ordering Information

	☐	☐	11	☐	1	1	☐
Prefix	**Type**	**Wavelength**		**Fiber Type**	**Fiber Cover**		**Connector**
FPOL-	Standard = 1 Special = 0	488 = 4 532 = 5 650 = 6 780 = 7 850 = 8 980 = 9 1060 = 1 1310 = 3 1550 = C 2000 = 2 Special = 0		*Select below*	0.9mm Tube = 1 Special = 0		FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = 8 LC/UPC = U Special = 0

* $3950 integrated with a polarimeter for polarization transformation, converting into a fixed output polarization state

Fiber Type Selection Table

1	**SMF-28**	5	**PM1550**	M	**MM 50/125µm**
		D	**PM1950**	N	**MM 62.5µm**
		3	**PM1310**		
4	**SM450**	E	**PM400**		
A	**SM1950**	F	**PM480**		
6	**SM600**	G	**PM630**		
7	**Hi780**	H	**PM850**		
8	**SM800**	I	**PM980**		
9	**SM980**	J	**PM780**		
B	**Hi1060**	K	**PM460**		
C	**SM400**	L	**PM405**		