

Fiber Loops Polarization Controller < 0.5dB Loss

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



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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

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.

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 add 0.3dB each.

[2]. @1550nm

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Rev 09/08/25

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P +1 781-935-1200

E sales@photonwares.com

W www.agiltron.com

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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 $\lambda/2$ waveplate, $\lambda/4$ waveplate, and $\lambda/2$ 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		
Y	460HP				

GUI

The screenshot shows the AGILTRON GUI interface. At the top is the AGILTRON logo. Below it is a 'Connect To Device' section with a dropdown menu set to 'Select...', and buttons for 'Refresh', 'Connect', and 'Read Settings'. Underneath is a 'Motor' section containing four rotator controls, each with a numeric input field set to '0' and a directional arrow button. At the bottom of the motor section are 'Reset' and 'Set' buttons.