

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



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The FPOL Series All-Fiber Polarization Controllers are constructed from a single continuous optical fiber routed through four independently stepper motor-driven loop paddles. Each paddle functions as a rotatable waveplate, enabling full-range polarization control with ultra-low insertion loss, broad wavelength compatibility, and high optical power handling. Each fiber loop introduces controlled stress and rotation, leveraging birefringence modulation and geometric phase effects to precisely manipulate the polarization state of light. This all-fiber design ensures inherently broadband operation across transmitted wavelengths, with only minor wavelength dependence due to birefringence characteristics. The FPOL system can operate as either a polarization controller or a polarization scrambler. When integrated with an automatic control circuit and a polarimeter, it enables transformation of any input polarization state into a defined output state on the Poincaré sphere with high precision and repeatability. The system includes a user-friendly graphical interface accessible via RS-232, a wall-pluggable DC power supply, and support for high-power, connectorized fiber configurations. Custom software options and a Python-based command set are available for advanced system 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]. Loss performance is intrinsic fiber character. Excluding connectors. Connectors add 0.3dB each.
[2]. @1550nm

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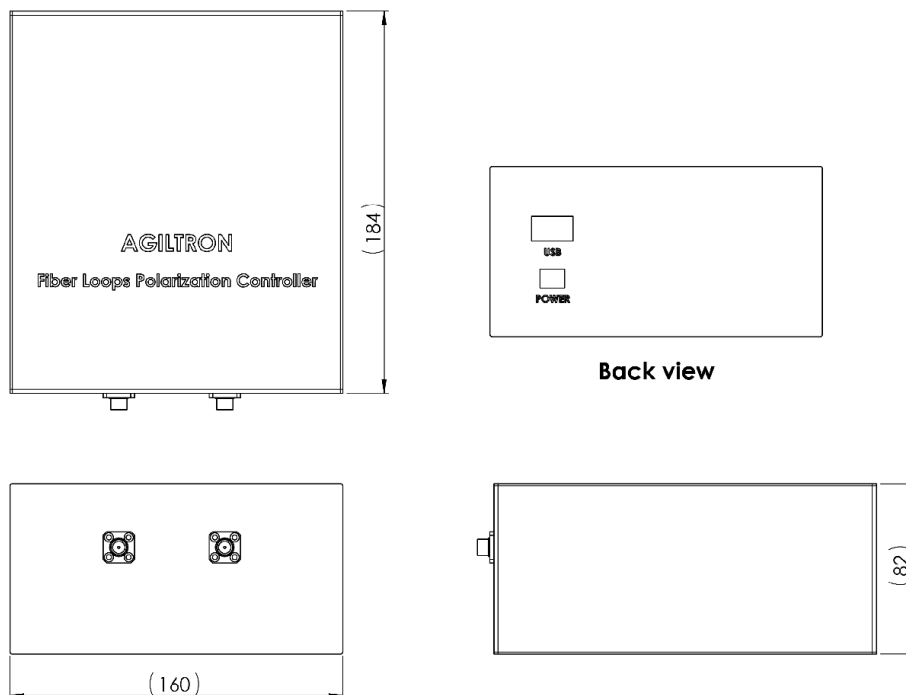
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Mechanical Dimensions (mm)



*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 (Part Number)

	☐	☐	11	☐	1	1	☐
Prefix	Type	Wavelength		Fiber Type			Connector ^[1]
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			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

[1]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

* \$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, there's a 'Connect To Device' section with a dropdown menu set to 'Select...', and buttons for 'Refresh', 'Connect', and 'Read Settings'. Below this is a 'Motor' section containing four rotator controls, each with a numeric input field set to '0' and a small up/down arrow button. At the bottom of the motor section are 'Reset' and 'Set' buttons.

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