

High Resolution Polarization Controller-USB/RS232

Converting any input polarization states into a specific polarization output



DATASHEET

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Features

- Rotation of half wave plates, quarter waveplates
- Rotation of polarizers
- 0.03 degree precision control
- Built-in encoder for closed loop operation
- USB computer control
- User-friendly intuitive GUIs
- SM, PM, MM fiber option
- Free space operation option

Applications

- 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 POLV provides precise polarization control, adaptable for both fiber-coupled and free-space applications across a wide range of operating wavelengths and high optical powers. Configured with three step-motor-driven rotatable waveplates, it converts incoming light with any polarization state into a specific polarization state on the Poincaré sphere, achieving all possible polarization states with high precision and repeatability. With a single or dual rotator configuration using polarizer plates, polarizer prisms, or polarization beam splitters, the POLV functions as a polarizer with sub-degree directional resolution. A high-precision driver with a built-in encoder allows adjustments with accuracy better than 0.03 degrees, managed through an intuitive GUI accessible via USB or RS232. This plug-and-play unit includes a wall-pluggable DC power supply. High-power optics and connectorized fibers are available, and the software and GUI can be customized upon request, with a Python command list also available.

For full-range polarization control on the Poincaré sphere, a typical setup involves placing a $\lambda/2$ plate, $\lambda/4$ plate, and another $\lambda/2$ plate in series. Each plate's orientation determines the polarization transformation: First Half-Wave Plate: Rotates the initial polarization angle. Quarter-Wave Plate: Converts linearly polarized light into elliptical or circular polarization. Second Half-Wave Plate: Further rotates the polarization angle to achieve the desired output state.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	400		2650	nm
Insertion Loss ^[1]		1	1.5	dB
Rotating	0		360	°
Homing Repeatability	0.05			°
Repeatability	0.1			°
Encode Resolution	0.001			°
Minimum Incremental Motion	0.05			°
Return Loss	50			dB
Response Time			300	ms
Operating Optical Power		0.5	1	W
Operation Frequency	DC		5	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.
- [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
- Adjust the Wave Plates to Achieve the Desired Polarization State with $\lambda/2$ plate, $\lambda/4$ plate, and $\lambda/2$ plate in series.
 - Initial Setup: Align the wave plates such that the first half-wave plate is at 0° , the quarter-wave plate is at 45° , and the second half-wave plate is at 0° .
 - Fine-Tuning: Rotate each wave plate individually to adjust the polarization state at the output. Rotate the first $\lambda/2$ plate to set the initial linear polarization angle. Rotate the $\lambda/4$ plate to introduce elliptical or circular polarization. Rotate the second $\lambda/2$ plate to achieve the final desired linear polarization angle.

Ordering Information

Prefix	Wavelength	Stage 1*	Stage 2*	Stage 3*	Interface	Input Fiber	Output Fiber	Fiber Cover	Fiber Length	Connector
POLU-	1550nm = 5 1310nm = 3 1060nm = 1 980nm = 9 850nm = 8 Special = 0	1/2 waveplate = 2 1/4 waveplate = 4 Plate polarizer = 5 Glan-Thompson = 6 Special = 0	1/4 waveplate = 4 1/2 waveplate = 2 Plate polarizer = 5 Glan-Thompson = 6 Special = 0	1/2 waveplate = 2 1/4 waveplate = 4 Plate polarizer = 5 Glan-Thompson = 6 Special = 0	USB = 1 RS232 = 2	SMF-28 = 1 Hi1060 = 2 SM980 = 9 SM850 = 8 780HP = 3 SM1950 = 4 Free Space = S 50/125 = M Special = 0	SMF-28 = 1 Hi1060 = 2 SM980 = 9 SM850 = 8 780HP = 3 SM1950 = 4 Free Space = S PM1550 = 5 PM1310 = 3 PM980 = A PM850 = B PM780 = C PM1950 = D 50/125 = M Special = 0	Bare fiber = 1 0.9mm tube = 3 Special = 0	0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 LC/PC = L Special = 0

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