

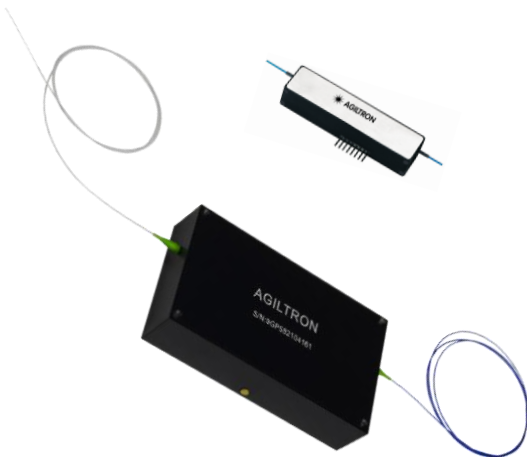
Fiber Polarization Controller – Piezoelectric



0.1dB Low Loss, 10Hz Rate, analog input 0-5V & USB digital

DATASHEET

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Features

- Large Phase Change
- High Reliability
- Low Insertion Loss
- Compact Size
- Plug and Play
- Low Power Consumption

Applications

- Quantum System
- Sensor
- OCT
- Instrumentation

The Piezoelectric Polarization Controller (PIPC) uses up to four piezoelectric fiber-squeezing elements spaced 45° apart to induce controlled birefringence and phase retardation in an optical fiber. Each actuator applies variable pressure to the fiber, creating stress-induced birefringence via the photoelastic effect, where the refractive index becomes polarization-dependent. This controlled anisotropy produces a differential phase shift between orthogonal polarization modes, enabling precise polarization rotation and full coverage of the Poincaré sphere. The device is built from a single continuous strand of polyimide-coated fiber, ensuring minimal insertion loss, high reliability, and broadband operation, although the birefringence magnitude has some wavelength sensitivity. A compact turnkey module is available, incorporating a four-channel driver with independently adjustable 0–5 V analog control inputs and USB digital control with GUI. The controller includes a wall-powered supply and a five-pin connector for system integration in addition to the USB port for digital operation. Since piezoelectric actuators inherently drift with temperature and time, the PIPC is designed to operate with an external feedback loop and polarimeter for long-term polarization stability, enabling accurate transformation of any input polarization state to the desired output state with repeatability and precision.

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	700		2650	nm
Insertion Loss ^[1]	0.01	0.1	0.15	dB
Polarization Dependent Loss		0.01	0.1	dB
Polarization Mode Dispersion			0.05	ps
Return Loss	65			dB
Response Time Rise/Fall Rate			5	ms/V
Operation Frequency	DC		10	Hz
Electrical Control Interface	5 pin connector, 4 channel share a common ground			
Power Supply	12V /300 mA			
Power Consumption		0.7	1.2	W
Operating Optical Power		0.3	0.7	W
Operation Frequency	DC		100	kHz
Polarization Rotation (each element) ^[2]	0		4	π
Control Voltage (component)	0	60	80	V
Control Voltage (module)	0		5	V
Operating Temperature		-30 ~ 60		°C
Storage Temperature		-40 ~ 85		°C

Notes:

[1]. Excluding connectors. Connectors add 0.3dB.

[2]. @1550nm



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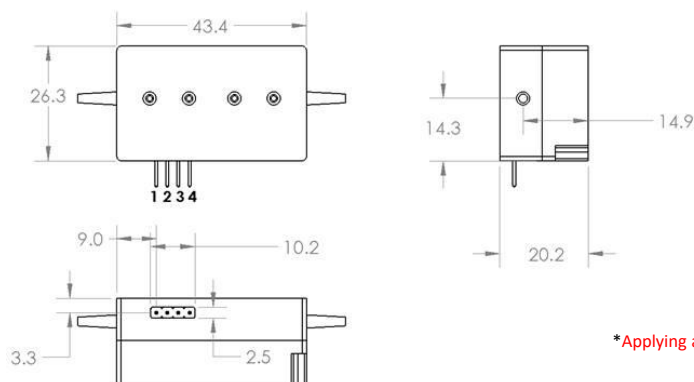


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Mechanical Dimensions (mm) For Component

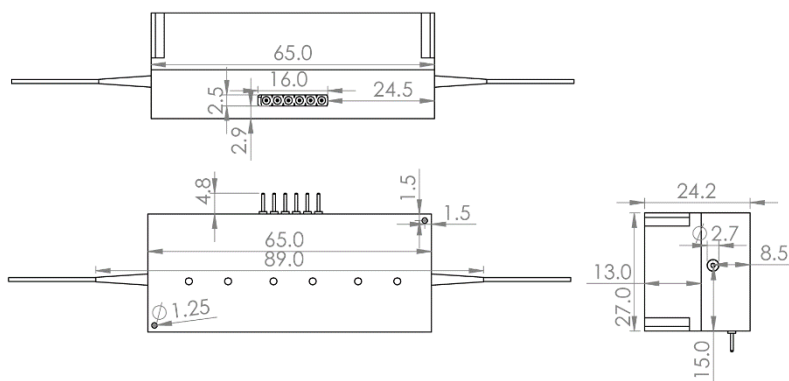
Two Plate



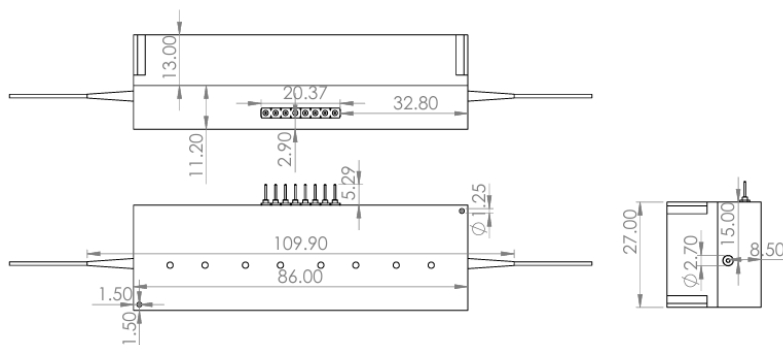
Pin #	Plate/Connection
1	NC
2	Ch 2+
3	Ch 1+
4	Ground

*Applying a wrong polarity will permanently damage the device

Three Plate



Four Plates



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

Electrical Driver Pin Definition (4 plates A, B, C, D)

*Applying a wrong polarity will permanently damage the device



Pin #	Plate/Connection	Pin #	Plate/Connection
1	Ao	5	B+
2	Bo	6	C+
3	Co	7	D+ (NC For 3 Plates)
4	A+	8	Do (NC For 3 Plates)

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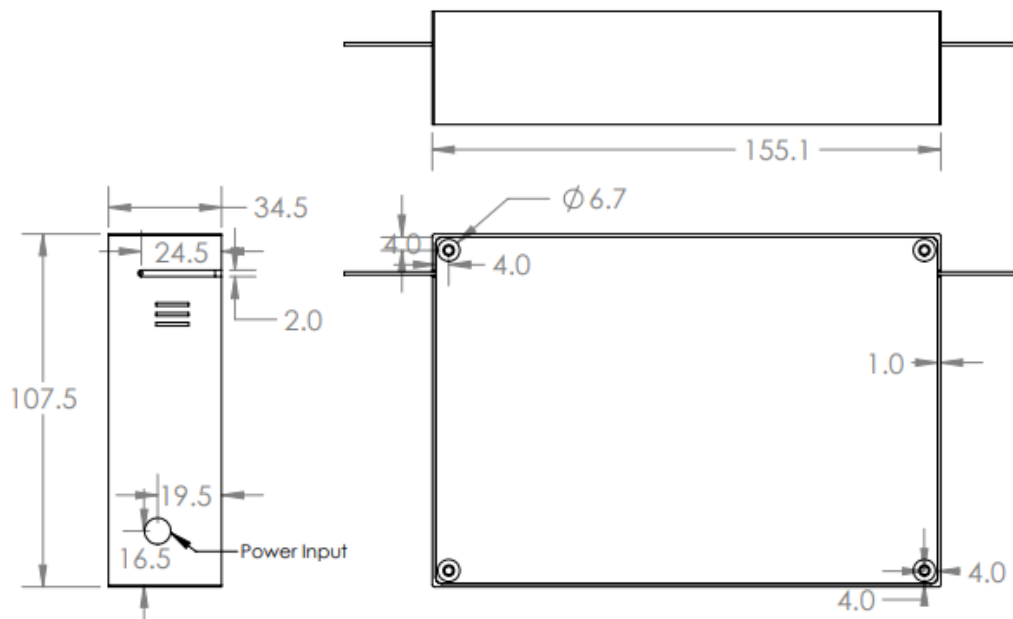
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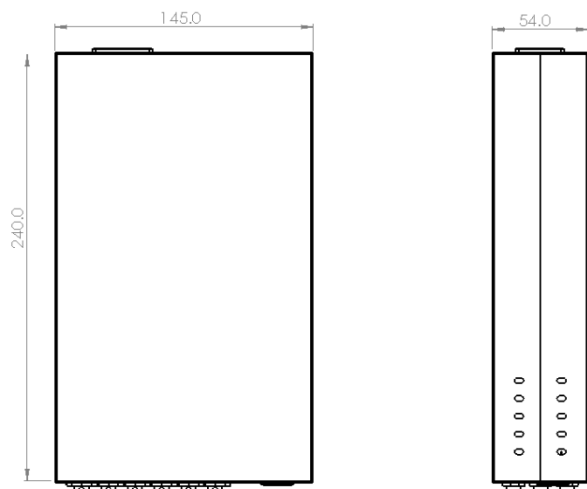
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Mechanical Dimensions (mm) For Module



Mechanical Dimension (mm) For Benchtop



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Ordering Information (Part Number)

	22	☐	☐	☐	☐	☐	☐	☐	☐
Prefix	Type	Wavelength	# Plates	Package ^[1]	Fiber Type	Fiber Cover	Fiber Length	Connector ^{[2][4]}	API ^[3]
PIPC-		2000 nm = 2 1550 nm = 5 1310nm = 3 1060nm = 1 980nm = 9 850nm = 8 430nm = 4 530nm = A 630nm = 6 780nm = 7 Special = 0	2 = 2 3 = 3 4 = 4 7 = 7	Component = C Module = M Benchtop = B	<i>Select from below table</i>	Bare fiber = 1 0.9mm loose tube = 3 Special = 0	0.25m = 1 0.5m = 2 1.0 m = 3 Special = 0	None = 1 FC/PC = 2 FC/APC = 3 LC/PC = L Special = 0 HEFC/PC = H HEFC/APC = A	None = 1 Python = 2

- [1]. Component – A bare part with pins that meets the performance specifications; no housing or support electronics. Module – The component mounted on a driver PCB, packaged in a metal box, and includes a wall-plug DC power supply. Benchtop – A fully integrated, turn-key unit with built-in driver and power supply, accepting 100–240 VAC input at the back.
- [2]. Regular fiber connector has PER ~22dB. Connector of HEFC/PC and HEFC/APC with PER >27 dB is available using special process
- [3]. We provide a complete command list for customer integration but do not offer debugging support for customer code. However, an Application Programming Interface (API) service is available for an additional fee to assist with system integration and remote connectivity.
- [4]. 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.

Fiber Type Selection Table:

01	SMF-28	34	PM1550
02		35	PM1950
03		36	PM1310
04	SM450	37	PM400
05	SM1950	38	PM480
06	SM600	39	PM630
07	780HP	40	PM850
08	SM800	41	PM980
09	SM980	42	PM780
10	Hi1060	43	
11		44	PM405
12		45	PM460
13		46	

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