Fiber Polarization Controller – Piezoelectric

0.5dB Low Loss, 100kHz Rate

DATASHEET

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The Piezoelectric Polarization Controller (PIPC) employs three or four piezoelectric fiber-squeezing plates arranged 45 degrees apart to induce controlled birefringence and phase retardation through mechanical stress. Built from a single continuous strand of polyimide-coated fiber, the design ensures ultra-low insertion loss, high reliability, and long-term durability. Each piezoelectric element applies variable pressure to the fiber, producing stress-induced birefringence via the photoelastic effect, in which the refractive index becomes directionally dependent. This anisotropy introduces differential phase delay between orthogonal polarization modes, enabling effective polarization rotation. The all-fiber architecture is inherently broadband, affecting all wavelengths transmitted through the fiber, though the birefringence response has wavelength dependence. The PIPC is designed to be used as both a polarization scrambler and a polarization controller. When integrated with an automatic control circuit and a polarimeter, it can accurately transform any input polarization state into a desired output state on the Poincaré sphere with high precision and repeatability. A compact driver with 0–5 V control inputs is available for convenient modulation of the piezo actuators.

Features

- Large Phase Change
- High Reliability
- Low Insertion Loss
- Compact Size
- High Optical Power Handling

Applications

- Polarisation Scrambler
- Polarisation Management
- Polarisation Mode dispersion compensation
- Instrumentation

Specifications

Parameter	Min	Typical	Max	Unit
Wavelength	400		2650	nm
Insertion Loss [1]	0.1	0.5	0.8	dB
Polarization Mode Dispersion			0.05	ps
Return Loss	65			dB
Response Time Rise/Fall	30			µs
Operating Optical Power		0.5	1	W
Operation Frequency	DC		100	kHz
Polarization Rotation [2]	0		4	π
Control Voltage [2]	0	35	80	V
Operating Temperature	-30 ~ 60			°C
Storage Temperature	-40 ~ 85			°C

Notes:

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

[2]. @1550nm

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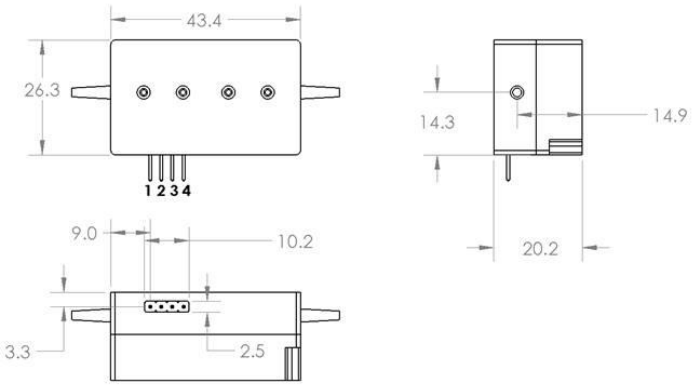
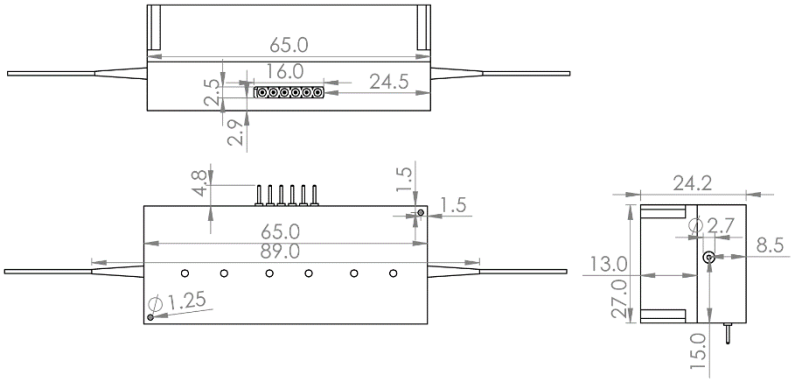
Mechanical Dimensions (mm)

2 Plates

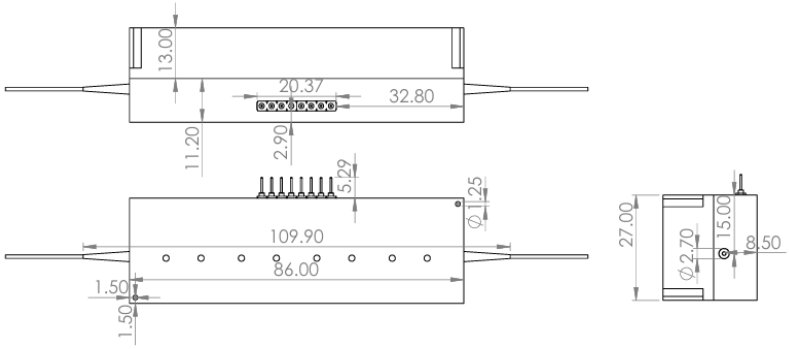


Pin #	Plate/Connection
1	NC
2	Ch 2
3	Ch 1
4	Ground

3 Plates

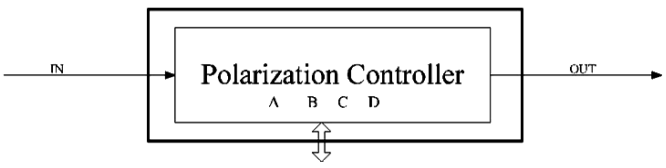


4 Plates



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

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



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

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Ordering Information

	1 1	☐	☐	☐	☐☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**# Plates**	**Driver**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**
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	Non = 1 Yes = 2 Special = 0	*Select from below table*	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

Fiber Type Selection Table:

01	SMF-28	34	PM1550	71	MM 50/125µm
02	SMF-28e	35	PM1950	72	MM 62.5µm
03	Corning XB	36	PM1310	73	105/125µm
04	SM450	37	PM400	74	FG105LCA
05	SM1950	38	PM480	75	FG50LGA
06	SM600	39	PM630	76	STP 50/125
07	780HP	40	PM850	77	IRZS23
08	SM800	41	PM980	78	IRFS32
09	SM980	42	PM780	79	
10	Hi1060	43		80	
11	SM400	44	PM405	81	UV180nm
12		45	PM460		
13		46			

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Driver PCB

The driver contains four independent amplifiers that convert an input signal of 0-5V to 0-40V with a frequency bandwidth of DC-500KHz. A wall pluggable 12V DC power supply is included. The analog inputs are through SMA connectors. A metal electrostatic protection enclosure is an option for laboratory use to prevent electrostatic damage from hand touching.

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