

Distributed Polarization Crosstalk Analyzer—PolaX™

PXA-1000

The Distributed Polarization Crosstalk (X-Talk) Analyzer (PXA-1000) is a white light interferometer designed to obtain space-resolved stress information by analyzing stress-induced polarization cross-coupling along a length of polarization maintaining (PM) fiber. Its unique optical design eliminates the strong zero-order interference and reduces the multi-coupling interference common in traditional white light interferometers; as a result, the PXA-1000 has higher measurement sensitivity, higher dynamic range, and higher spatial measurement accuracy than traditional white light interferometers. The PXA-1000 enables the use of the PM fiber itself as the sensing medium, eliminating the need to place multiple fiber gratings along the fiber. It can therefore obtain higher spatial resolution of the stress distribution than grating-based systems. Because no discrete sensing elements are required, the system is easy to install and calibrate, making it ideal for monitoring space-resolved structural changes along bridges, tunnels, dams, oil pipes, or buildings. It can also be used as an intrusion detection system, because any mechanical disturbances to the PM fiber will cause polarization coupling. Another important application is PM fiber quality inspection. The PXA-1000 easily identifies defective sections of PM fiber, enabling the manufacturers or users to remove them. Furthermore, the PXA-1000 is ideal for quality inspection and screening of PM fiber coils, since it can pinpoint the locations of imperfections or areas of local stress on the fiber coil induced during the fiber winding process. The software displays the location and polarization coupling ratio of each stress point as a function of distance, and flags stress points with polarization coupling above a user defined trigger threshold. A quality inspection report window indicates the pass/fail status of the PM fiber or PM fiber coil, with a list of the locations and polarization coupling strengths of all stress points. Other applications of the instrument includes measuring the extremely high polarization extinction ratio of a polarizing waveguide, obtaining the autocorrelation function of a light source, measuring the birefringence of a PM fiber and the lengths of PM and SM fibers, and matching the optical path lengths of an interferometer.



Making Light Work Lighter
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Corporation

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Preliminary Specifications:

Operation Wavelengths	1310 or 1550 nm
Polarization X-talk dynamic range	75 dB (SLD power >5dBm)
Polarization X-talk sensitivity	-95 dB
Polarization X-talk resolution	0.25 dB
Polarization X-talk accuracy	0.5 dB
Measurement or sensing range (Assuming PM fiber Δn of 5×10^{-4})	1.3 km standard, 2.6 km optional
Measurement speed	35 seconds full range
Spatial resolution	5 cm (assuming no fiber dispersion, birefringence $\Delta n=5 \times 10^{-4}$)
PER measurement range	> 30 dB
Spatial accuracy	± 20 cm (fiber $\Delta n = 5 \times 10^{-4}$)
Waveguide PER	> 95dB (SLD power >5dBm)
LiNbO ₃ waveguide spatial resolution	0.75 mm
SLD Power	>10 dBm
SLD bandwidth	> 30 nm
SLD PER	>20 dB
Software	Locations & strengths of polarization X-talk Zoom-in function Quality inspection reporting page
Operating Temperature	10 to 50 °C
Storage Temperature	-20 to 60 °C
Communications interface	USB
Display	Notebook or desk-top PC with USB connection
Dimensions	2U, ¼ 19" rack width 3.5" (H) x 14" (W) x 14" (D)

Applications:

- Distributed stress sensing
- Structural change monitoring in bridges, tunnels, dams, and buildings
- PM fiber quality inspection
- PM fiber coil quality inspection
- Intrusion detection

Unique Features:

- Compact Design
- High spatial resolution: 5 cm
- PM fiber as intrinsic sensing element
- 95 dB polarization X-talk sensitivity
- 30 dB PER measurement range
- Large fiber measurement range: 2.6 km

Ordering Information:

PXA - 1000 - XX - XX

Wavelength:
13 = 1310nm
15 = 1550nm

Connector Type:
FC/PC, FC/APC
SC/PC, or SC/APC