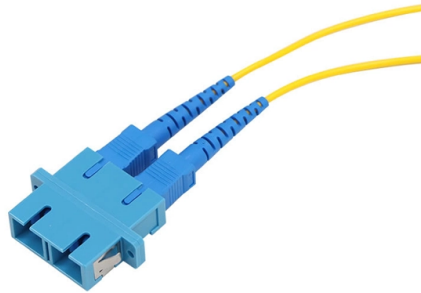


Structure of a Fiber Bragg Grating Demodulator



Article Overview

A Fiber Bragg Grating (FBG) demodulator consists of an FBG sensing array, an optical interrogation system, and signal processing modules to convert wavelength shifts into measurable physical quantities.

Core Components

1. FBG Sensing Array: The FBG sensors are inscribed in the fiber core and reflect light at specific Bragg wavelengths. Changes in temperature, strain, or pressure cause shifts in the reflected wavelength, which the demodulator detects . 2. Optical Interrogation System: The demodulator typically includes one of the following:

- Tunable Laser Source: Scans across the FBG wavelength range to detect the peak reflection.
 - Broadband Light Source with Tunable Filter: Measures the transmitted or reflected spectrum.
 - Spectral Imaging System: Uses miniaturized fiber optic spectrometers to capture the reflected spectrum for static and dynamic strain measurements .
 - Filterless Systems with PWM: Detect wavelength shifts without optical filters, suitable for harsh environments .
3. Signal Processing and Demodulation Module: The demodulator converts the optical signal into a wavelength measurement using algorithms such as:
- Cross-Correlation and Variable-Step-Size Methods: Achieve high-resolution wavelength demodulation by interpolating spectra and refining the search for the p...

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Website: <https://www.chromadecksigns-eastrand.co.za>

Email: sales@chromadecksigns-eastrand.co.za

Phone: +32 2 318 5792

Address: Avenue Louise 500, 1050 Brussels, Belgium

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