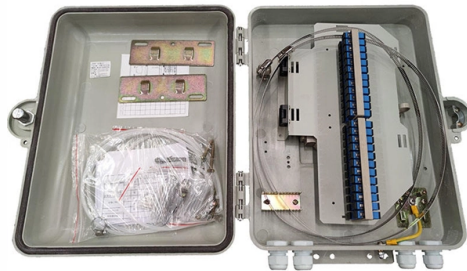


Function of Fiber Optic Sensor Lenses



AI Overview

Lenses in fiber optic sensors focus, collimate, or direct light to enhance measurement accuracy and sensitivity.

Role of Lenses in Fiber Optic Sensors

In fiber optic sensors, lenses are used to control the propagation of light between the fiber and the sensing environment. They serve several key functions:

- **Focusing Light:** Lenses concentrate light into the fiber core or onto a specific sensing element, improving the signal-to-noise ratio and enabling detection of small changes in physical parameters such as strain, temperature, or pressure .
- **Collimating Light:** Lenses can convert diverging light from the fiber into a parallel beam, which is essential for long-distance transmission or for interacting with external optical components like gratings or mirrors .
- **Directing Light:** In extrinsic fiber optic sensors, lenses guide light to and from an external sensing element, ensuring that the light interacts efficiently with the target and returns to the fiber for analysis .

Integration with Sensing Mechanisms

Lenses are often combined with Fiber Bragg Gratings (FBGs) or other intrinsic sensing elements. For example, in FBG-based sensors, a lens may focus light onto the grating to maximize reflection efficiency, allowing precise measurement of strain or temperature through shifts in the Bragg wavelength . In extrinsic sensors, lenses help project light onto a remote target or collect reflected light, enabling measurements...

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