

RIVO MULTITRADE OPTICAL SYSTEMS

How to install optical fiber in an optical fiber sensor



Overview

Install the sensor as late as possible into the assembly process. Install before drying and sizing the Coils.

Key Takeaways

Connecting an optical fiber sensor to an optical fiber involves selecting the appropriate sensor type, preparing the fiber, and using either fusion splicing, adhesive bonding, or connectorized interfaces to ensure reliable signal transmission.

Step 1: Identify the Sensor Type

Optical fiber sensors can be intrinsic, where the sensing occurs directly in the fiber, or extrinsic, where an external transducer modulates the light signal. Common sensors include Fiber Bragg Gratings (FBGs), which reflect specific wavelengths based on strain or temperature changes. Ensure the sensor is compatible with the fiber type (single-mode or multi-mode) and the intended measurement range.

Step 2: Prepare the Optical Fiber

Before connecting, the fiber must be cleaned and stripped of its protective coating at the connection point. Use proper fiber cleaving tools to create a smooth, flat end face, which minimizes signal loss and back reflections. For surface-mounted sensors, the fiber may also require abrasion and conditioning to improve adhesive bonding.

Step 3: Choose a Connection Method

- **Fusion Splicing:** This is a permanent method where the fiber and sensor fiber are fused using heat. It provides low-loss, high-reliability connections and is ideal for pre-assembled sensor arrays .
- **Adhesive Bonding:** For surface-mounted sensors, the fiber can be glued to the sensor or structure using specialized adhesives like M-Bond 200 or AE-10. After curing, a protective layer such as RTV silicone can shield the fiber from environmental damage .
- **Connectorized Interfaces:** Some sensors come with pre-attached connectors that can be plugged into the optical fiber network. This method is convenient for temporary setups or when frequent disconnection is required .

Step 4: Install and Protect the Fiber

Once connected, secure the fiber to prevent mechanical stress or bending beyond its minimum bend radius. For embedded applications, fibers can be placed in grooves or cast into materials like concrete, with attention to environmental factors such as moisture and temperature . For surface installations, protective coatings or tapes can enhance durability.

Step 5: Verify Signal Integrity

After connection, check the optical signal using an interrogator or optical power meter. Ensure that the sensor's wavelength signals do not overlap with other sensors on the same channel and that optical losses are within acceptable limits . Proper alignment and minimal bending are critical for accurate measurements. By following these steps, an optical fiber sensor can be reliably connected to an optical fiber, ensuring accurate and stable sensing performance across various applications, from structural health monitoring to industrial process control .

Article Content

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Optical Fiber Sensors Guide

An optical fiber sensing system is basically composed of a light source, optical fiber; a sensing element or transducer and a detector

Fiber-optic sensor

Fiber-optic sensor A fiber-optic sensor is a sensor that uses optical fiber either as the sensing element ("intrinsic sensors"), or as a

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