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Fiber Optic Sensor Resistance



Overview

Extrinsic fiber-optic sensors use an optical fiber cable, normally a multimode one, to transmit modulated light from either a non-fiber optical sensor, or an electronic sensor connected to an optical transmitter. A major benefit of extrinsic sensors is their ability to reach places which are otherwise inaccessible. An example is the measurement of temperature inside aircraft jet engines by using a fiber to transmit radiation into a radiation pyrometer located outside the engine.

Key Takeaways

Fiber optic sensors do not have a conventional electrical resistance because they operate using light rather than electrical current.

Fiber optic sensors function by transmitting light through optical fibers and detecting changes in light properties such as intensity, phase, wavelength, or polarization when exposed to an external stimulus like pressure, temperature, or strain . The sensing element is either intrinsic, where the fiber itself is modulated by the measurand, or extrinsic, where an external transducer modulates the light . Electrical resistance is not a relevant parameter for the fiber itself because the fiber is made of glass or plastic, which are insulators and do not conduct electricity . The fiber's performance is instead characterized by optical properties such as attenuation, refractive index, and transmission efficiency. Any electronic components, such as detectors or amplifiers, may have their own electrical resistance, but the fiber optic sensor as a whole does not present a measurable resistance like a resistive sensor or a photoresistor . Key points about fiber optic sensors:

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• They are immune to electromagnetic interference and do not conduct electricity, making them safe for high-voltage or flammable environments .

• The sensing mechanism relies entirely on light modulation, not electrical current, so resistance is not a design consideration .

• Applications include structural health monitoring, industrial process control, and medical diagnostics, where precise optical measurements are more important than electrical properties . In summary, fiber optic sensors do not have a defined electrical resistance, and their operation is based on optical signal changes rather than electrical conduction. Any electrical characteristics are limited to the associated electronics, not the fiber itself.

Article Content

Fiber-optic sensor

Extrinsic fiber-optic sensors use an optical fiber cable, normally a multimode one, to transmit modulated light from either a non-fiber optical sensor, or an electronic sensor connected to an optical transmitter. A major benefit of extrinsic sensors is their ability to reach places which are otherwise inaccessible. An example is the measurement of temperature inside aircraft jet engines by using a fiber to transmit radiation into a radiation pyrometer located outside the engine. Extrinsic sensors can also be used in the same w

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