

Fiber Optic Range Sensor



Overview

Optical fibers can be used as sensors to measure, , and other quantities by modifying a fiber so that the quantity to be measured modulates the,,, or transit time of light in the fiber. Sensors that vary the intensity of light are the simplest, since only a simple source and detector are required. A particularly useful feature of intrinsic fiber-optic sensors is that they can, if required, provide distributed sensing over very large distances.

Key Takeaways

Fiber optic sensors typically have a sensing range from a few millimeters up to 2000 mm, depending on sensor type, operation mode, and environmental conditions.

Typical Sensing Ranges

The maximum detection distance of a fiber optic sensor varies widely based on its configuration and application: Transmitted light operation: Light passes directly from the emitter to the receiver, allowing the longest ranges, typically up to 2000 mm. One-way reflective operation: Light reflects off the target back to the sensor, with ranges generally up to 1200 mm. Retro-reflective operation: Light reflects off a reflector and returns to the sensor, offering intermediate ranges depending on reflector quality and alignment.

Factors Affecting Sensing Range



Several factors influence the effective range of fiber optic sensors: Sensor model and design: Some sensors are optimized for short-range, high-precision detection, while others are designed for long-range applications. Target reflectivity: Highly reflective surfaces increase detection distance, whereas dark or matte surfaces reduce it. Fiber optic cable type: The quality, diameter, and numerical aperture of the fiber affect light transmission and reception, impacting range.

Environmental conditions: Dust, dirt, ambient light, and temperature can interfere with light signals, reducing effective range. Installation geometry: Tight spaces or crowded environments may require focused or specialized fiber heads to maintain detection accuracy.

Practical Considerations

Fiber optic sensors are widely used in factory automation, harsh environments, and narrow spaces because the sensing heads contain no electronics, making them resistant to vibration, temperature extremes, and electrical noise. For precise applications, manufacturers provide detailed specifications for each sensor model, including maximum range under ideal conditions, response time, and environmental tolerances. In summary, while fiber optic sensors can detect objects from a few millimeters to 2 meters, the actual range depends on the sensor type, target characteristics, fiber quality, and environmental factors.

Always consult the manufacturer's datasheet for the specific model to determine the optimal sensing range for your application.

Article Content

FIBER-OPTIC SENSORS

For over 30 years OMRON has been a supplier of fiber2. Preventing fiber breakageModels with enhanced protection and tested resistance against harsh environments3. Operational stabilityEasy to set up and adjustThe little extraApplication solution supportProduct modificationsSpecial solutions400°C 350°C 200°C 150°CVacuum chamberAtmospheric-pressure sideOutput 1: ON Output 2: ONSpecial application fiber sensor headsfor saturated andPress only twice.DPCAutomatically compensateDPCField bus connectivityST 5000 9999Dynamic range increased by a factor of 40,000 Automatically compensate incident levelDPCN-Smart platformSpecificationsE3X-DAC-S high functionality mark detection sensorFiber amplifier connectorsDigital fiber amplifier with infrared LEDTightening ForceCylindrical modelCutting FiberE32-T14/E32-G14Supplied slit for E32-T16E32-G14Protective Spiral TubesMounting the End Plate (PFP-M)Mounting ConnectorsRemoving Connectors1. ConnectionJoining Amplifier UnitsSeparating Amplifier Unitsa time. (Do not attempt to remove Amplifier Units from the DIN track without sep-arating them first.)Protective CoverREAD AND UNDERSTAND THIS DOCUMENTWARRANTYLIMITATIONS OF LIABILITYSUITABILITY FOR USEPERFORMANCE DATACHANGE IN SPECIFICATIONSDIMENSIONS AND WEIGHTSERRORS AND OMISSIONSPROGRAMMABLE PRODUCTSCOPYRIGHT AND COPY PERMISSIONControl SystemsMotion & DrivesControl ComponentsSensing & SafetyToday, already with over 500 standard, application optic solutions to leading manufacturers, especially in the semiconductor, the consumer electronics and the car electronics industry, as well as for food packaging and small plastic parts production. The requirements for fiber optic solutions can be very demanding particularly for applications wi...See more on assets.omron Wikipedia

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OverviewIntrinsic sensorsExtrinsic sensorsChemical sensors and biosensors

Optical fibers can be used as sensors to measure strain, temperature, pressure and other quantities by modifying a fiber so that the quantity to be measured modulates the intensity, phase, polarization, wavelength or transit time of light in the fiber. Sensors that vary the intensity of light are the simplest, since only a simple source and detector are required. A particularly useful feature of intrinsic fiber-optic sensors is that they can, if required, provide distributed sensing over very large distances.

Fiber Sensors

A Fiber Sensor is a type of Photoelectric Sensor that enables detection of objects in narrow locations by transmitting light from a Fiber Amplifier Unit with a Fiber Unit.

Fiber Optic Sensors: Types, Working Principle

This article explores the different types of Fiber Optic Sensors, their working principles, and various applications. We'll delve into Intrinsic, Extrinsic, and

Type of fibre optic sensors | Sensor Basics: Principle

This site provides information useful for people involved in manufacturing to select sensors. Fibre Optic Sensors can meet wide range of conditions such as

FUH 010B2002 BAUMER

BAUMER FUH 010B2002 | Sensor: fiber-optic; Range: 25mm; Oper.mode: diffuse-reflective - This product is available in Transfer Multisort Elektronik. Check out our wide range of products.

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Fiber optic sensors are a type of proximity sensor that have an optical fiber connected to a light source to allow for detection in tight spaces or where a small profile is beneficial. The optical fiber is a

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What is a Fibre Optic Sensor? Fibre optic sensors are a type of proximity sensor that have an optical fibre connected to a light source to allow for detection in tight spaces or where a small profile is

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