

# Method for Measuring Air Pressure with Fiber Optic Gratings

## Article Overview

Fiber Bragg grating (FBG) sensors measure air pressure by converting pressure-induced strain into shifts in reflected light wavelength.

### Principle of FBG Pressure Sensing

FBG sensors operate by reflecting specific wavelengths of light that shift when the fiber experiences strain. In pressure measurement, external air pressure is applied to a mechanical structure—such as a diaphragm, capillary, or elastic membrane—that transmits axial strain to the FBG embedded in the fiber. This strain changes the grating period and refractive index, causing a measurable shift in the Bragg wavelength, which is proportional to the applied pressure .

### Sensor Design and Sensitivity Enhancement

Bare FBGs have low intrinsic pressure sensitivity (around 3.04 pm/MPa), so mechanical amplification structures are commonly used:

- Diaphragms: Thin metal or polymer membranes deform under pressure, transferring strain to the FBG. Sensitivity can range from 43.7 to 175.5 pm/kPa depending on diaphragm thickness .
- Levers or Coaxial Tubes: Mechanical levers or steel tube structures amplify the strain on the FBG, increasing sensitivity above 20 pm/MPa .
- Epoxy-embedded FBGs: Embedding the FBG in a compliant diaphragm material c...

## Article Content

Dec 04, 2025

High-Sensitivity Fiber Bragg Grating Pressure Sensor With a Hinged ...

Abstract—This article presents a high-sensitivity fiber Bragg grating (FBG) pressure sensor with a metal diaphragm and hinge-lever

Dec 05, 2025

Fibre optic pressure sensing arrays for monitoring horizontal and ...

Abstract— Distributed pressure sensing arrays fabricated from fibre Bragg gratings have been demonstrated for real time monitoring

Sep 02, 2025

Fiber Bragg grating sensors: principles and applications

Following the early work on the formation of photogenerated gratings in germanosilicate optical fiber by sustained exposure of the

Feb 22, 2026

Fiber Bragg Grating Sensors: Design, Applications, and ...

By evaluating the advancements in sensor design, implementation methods, and packaging techniques, we will assess

Feb 25, 2026

Recent advancements in fiber Bragg gratings based temperature and ...

Fiber Bragg Gratings or FBGs have achieved significant attention towards sensing and communication applications

Aug 18, 2025

Optical Fiber Sensors: Working Principle, Applications, and Limitations

This work reviews the fiber-optic sensors based on Bragg gratings, long period gratings, interferometers, surface

Aug 18, 2025

(PDF) Pressure measurement with fiber-optic sensors: Commercial ...

Mainly three technologies are presently commercially available for pressure measurement with fiber-optic sensors:

May 29, 2026

Enhanced pressure sensitivity of side-hole fiber bragg grating sensor ...

Side-hole fiber Bragg gratings can facilitate dual-parameter measurement of temperature and pressure due to their

Apr 03, 2026

3D Structured Optical Fiber Pressure Sensors

We have developed optimized designs for pressure sensors with complex 3D structures using simulations and fabricated them within

Jul 12, 2026

Fiber Bragg Grating-Based Sensors and Systems

A prototype instrument using fast digitizing and processing with an FPGA was used to characterize the chirp, from which the

Aug 16, 2025

Fiber-Optic Pressure Sensors: Recent Advances in

This review further examines current manufacturing technologies for fiber-optic pressure

Jun 16, 2026

Concatenated Bragg grating fiber-optic sensors for simultaneous ...

This study introduces four sensors utilizing multiple fiber Bragg grating constellations embedded in a silicon dioxide single-mode fiber

Feb 08, 2026

(PDF) Optical fiber Bragg grating-based pressure sensor for soil ...

A temperature compensated diaphragm-type Fiber Bragg Grating (FBG) sensor for high pressure measurement, with a

Mar 20, 2026

Sensitivity-variable fiber optic pressure sensors using microbend fiber ...

We report on sensitivity control of fiber optic sensors using microbend long-period fiber gratings. By tuning the phase

Oct 13, 2025

Optomechanical sensor network with fiber Bragg gratings

Here, we demonstrate a kilometer-scale optomechanical sensor network, integrating multiple fiber-optic

Mar 23, 2026

Liquid Pressure Sensor Based on Fiber Bragg Grating with an ...

In this paper, a fiber-optic liquid pressure sensor is designed and developed by encapsulating the fiber Bragg grating

Jan 19, 2026

Design of a Pressure Sensor Based on Optical Fiber Bragg Grating

This paper describes steps involved in the design and realization of a new type of pressure sensor based on the optical

Aug 17, 2025

Fiber Bragg Grating Technology | Frequently Asked

Concise answers to the most frequently asked questions about optical strain gages and fiber bragg grating

Dec 01, 2025

Microsoft Word

2. Theory and models of FBG Fiber Bragg Grating (FBG) technology is one of the most popular choices for optical fiber sensors for

Aug 17, 2025

Design of optical fiber Bragg grating-based sensors for flow ...

Abstract In this work, optical Fiber Bragg grating (FBG) sensors were used to measure water flow in pipes. Several

Aug 09, 2025

Exploring Fiber Bragg Gratings for High-Sensitivity Pressure

The application of fiber optic technology in the aerospace sector offers numerous advantages, including the reduction and

Jun 27, 2026

A Study on Fiber Bragg Gratings and Its Recent Applications

A new type of optical fiber underwater acoustic sensor (hydrophone) constructed with two fiber Bragg gratings (FBG)

Sep 15, 2025

Exploring Fiber Bragg Gratings for High-Sensitivity Pressure

This study aims to investigate a potential alternative based on Fiber Bragg Grating (FBG) technology for measuring pressure

Jun 01, 2026

A Novel Fiber-Optic Tapered Long-Period Grating Sensor for Pressure ...

In this paper, the fabrication method for tapered long-period fiber gratings, the sensing principle, the sensor structure,

Dec 20, 2025

Miniature Fiber Optic Acoustic Pressure Sensors With Air-Backed ...

To remedy this limitation, we will, through experimental and numerical methods, investigate two approaches to

Feb 16, 2026

Liquid flow motion rate measuring method, based on the fiber Bragg gratings

The paper presents the study of the possibilities of optical monitoring of the fluid flow velocity. An optical fiber with an

Sep 26, 2025

Investigation on FBG based optical sensor for pressure and ...

Optical fiber Bragg grating (FBG) sensors have advanced significantly in the last several years. The use of innovative

Dec 09, 2025

Research on a compact and high sensitivity gas pressure sensor

We report a high-resolution fiber optic temperature sensor system based on an air-filled Fabry-Pérot (FP) cavity,

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For more information, pricing, or custom solutions, please contact us:

Website: <https://www.iiss.co.za>

Email: [sales@iiss.co.za](mailto:sales@iiss.co.za)

Phone: +27 63 174 2895

Address: Unit 8, Innovation Park, 15 Rivonia Road, Sandton, Johannesburg,  
2196, South Africa

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