



FS62 - Strain Sensors

Optical Strain Sensors

The **FS62 - Strain Sensors** are Fiber Bragg Grating (FBG) based sensors, designed to be bonded to surfaces and materials, spot welded to structures and components, attached or directly cast into concrete wet mix.

Strain sensors are available in the following configurations:

- Miniature Polyimide
- Composite
- Weldable
- Surface
- Embedded

Characteristics

- **Robustness**
Long-term reliability ensured by innovative sensor design, careful selection of materials and IP68 packaging.
- **Completely passive**
Inherent immunity to all electromagnetic effects (EMI, RFI, sparks, etc.) and safe operation in hazardous environments.
- **High multiplexing capability**
Connection of a large number of sensors to a single optical fiber, reducing network and installation complexity.
- **Remote sensing**
Large distance between sensors and interrogator (several kilometers).
- **Compatible with most interrogators**
Provided with calibration sheet, allowing easy and accurate configuration.
- **Self-referenced**
Based on the measurement of an absolute parameter - the Bragg wavelength - independent of power fluctuations.

Applications

HBM FiberSensing strain sensors can be used in several strain measuring applications. They are particularly suited for structural health monitoring in large structures (SHM).

- Civil Engineering
- Transportation
- Energy
- Aeronautics
- R&D

Accessories

The implementation of complex sensing networks in large structures is made simpler with HBM FiberSensing accessories. These include cables especially designed to resist harsh environments as in civil engineering, not only during construction, but also during the lifetime of the structure (humidity, corrosion, etc.).

For the installation of HBM FiberSensing Strain sensors in severe environments, an optional metallic protection cover is available. It must be used in combination with 3 mm armor protection cables.

Quality

All HBM FiberSensing's processes are strictly controlled from development to production. Each product is subjected to high standard performance and endurance tests, individually calibrated and checked before shipping.

HBM FiberSensing, S.A. concentrates all optical sensing activity of HBM and is an ISO 9001:2008 certified company.

Fiber optic technology

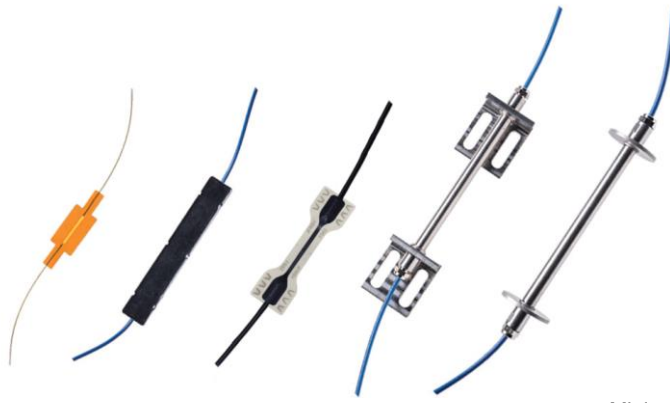
High resolution

Polyimide, stainless steel or composite packaging

IP68 for embedded and surface sensors

Long-term reliability





Miniature Polyimide, Composite, Weldable, Surface, Embedded

Specifications

Sensor

| | |
|--------------------------|---|
| Sensitivity ¹ | Surface and Embedded: 670 (µm/m)/nm Weldable: 849 (µm/m)/nm All others: 830 (µm/m)/nm |
| K-factor | Surface and Embedded: 0.96 Weldable: 0.76 All others: 0.79 |
| Measurement range | Composite: ± 5000 µm/m All others: ± 2500 µm/m |
| Gauge length | Polyimide: <10 mm Composite: 92 mm Weldable: 40 mm Surface ² : 108 ±20 mm Embedded: 104 mm |
| Resolution ³ | <1 µm/m |

Optical

| | |
|-----------------------|-----------------|
| Central wavelength | 1500 to 1600 nm |
| Spectral width (FWHM) | < 0.2 nm |
| Reflectivity | > 65% |
| Side lobe suppression | > 10 dB |

Inputs/Outputs

| | |
|----------------------|--|
| Cable type | Ø 0.9 mm laboratory (hytel) ⁶ Ø 3 mm indoor (kevlar) ⁷ Ø 3 mm outdoor (armor) ⁸ |
| Cable bending radius | static: > 10x cable diameter dynamic: > 20x cable diameter |
| Cable length | 2 m each side (±5 cm) |
| Connectors | FC/APC SC/APC NC (No Connectors) |

Environmental

| | |
|-------------------------|---|
| Operation temperature | Weldable: -20 to 80 °C ⁴ All others: -20 to 80 °C |
| IP rating | Surface and Embedded: IP68 |
| Temp. cross-sensitivity | Surface and Embedded: 5.8 (µm/m)/°C Weldable: 7.6 (µm/m)/°C All others: 7.3 (µm/m)/°C |

Mechanical

| | |
|----------------|---|
| Bending radius | Polyimide: > 10cm All Others: flat |
| Materials | Polyimide: film Composite: GFRP and polyurethane All others: stainless steel |
| Dimensions | Polyimide: 40 x 12 x 0.2 mm Composite: 130 x 20 x 6 mm Weldable ⁵ : 83 x 23 x 6 mm Surface: 163 x 35 x 20 mm Embedded: 140 x Ø 30 mm |
| Weight | Polyimide: 1 g Composite: 21 g Weldable: 3 g Surface: 122 g Embedded: 60 g |

Ordering Information

FS62 – Strain Sensors

P/N

K-FS62 aa bb ccc d

| WAVELENGTH |
|---------------|
| N - 1503.3 nm |
| O - 1509.7 nm |
| K - 1516.1 nm |
| L - 1522.5 nm |
| A - 1528.9 nm |
| B - 1535.1 nm |
| C - 1541.5 nm |
| D - 1547.9 nm |
| E - 1554.3 nm |
| F - 1560.8 nm |
| G - 1567.2 nm |
| H - 1573.8 nm |
| I - 1580.2 nm |
| J - 1586.6 nm |

CABLES

| |
|--|
| 102 - Laboratory cable 2m ⁶ |
| 202 - Indoor cable 2m ⁷ |
| 302 - Outdoor cable 2m ⁸ |

CONNECTIONS

| |
|-------------------------------|
| 10 – No connectors |
| 11 – Optical Connector FC/APC |
| 13 – Optical Connector SC/APC |

TYPE

| |
|--------------------------|
| 16 - Miniature Polyimide |
| 17 - Composite |
| 20 - Weldable |
| 30 - Surface Mountable |
| 50 - Embedded |

¹ Typical values.
² Exact value defined by distance between fixation screws.
³ For 1 µm resolution in wavelength measurement, as found in FS22SI interrogator.
⁴ Valid for dynamic measurements (enhanced creep). For static measurements up to 60°C (creep observed <0.5%, zero point return <10µm/m after cycle in the full temperature and strain range), above 60°C higher levels of creep may be observed. [Technical Note is available for further details].
⁵ Welding plate thickness of 100 µm.
⁶ For miniature polyimide sensors only.
⁷ Not possible for miniature polyimide, surface and embedded sensors.
⁸ Not possible for miniature polyimide sensors.