

FIBER OPTIC SENSORS

STRAIN AND RELATIVE DISPLACEMENT

Temperature compensated FBG (Fiber Bragg Grating) sensors for embedding in or mounting on the structure.

- Measuring length : 0,20 to 2,00m
- Measuring range : shortening: 0,5%
elongation: 1,0%
- Resolution : $0,2\mu\epsilon = 0,0002\text{mm/m}$
- Accuracy : $2,0\mu\epsilon = 0,002\text{mm/m}$
- Temperature : -50° to $+110^{\circ}\text{C}$

Their relative large measuring length renders these sensors ideally suitable for structures of relative heterogeneous construction materials such as reinforced concrete. The sensors can be installed in series.

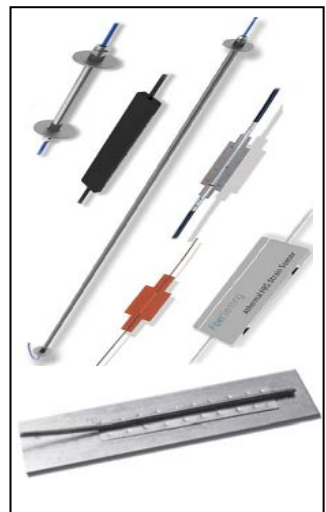


LOCAL STRAIN / STRESS

Pad-type FBG sensors of very small size, also for dynamic measurements. The housing is available in the following versions:

- Polyamide : for fixing with adhesive
- Composite : can be fixed with adhesive or can be embedded
- Stainless steel : for spotwelding
- Resolution : $1\mu\epsilon = 0,001\text{mm/m}$
- Accuracy : $2\mu\epsilon = 0,002\text{mm/m}$
- Temperature : -20° to $+80^{\circ}\text{C}$

These sensors are the fiber optic version of traditional strain gauges. They however have the big advantage of durability, absence of drift and immunity to environmental factors such as electromagnetic induction. Also these sensors can be installed in series.



TEMPERATURE

Ideally suited for long term monitoring under demanding conditions. As for all FBG sensors, also the temperature sensors can be installed in series and the reading unit can be located at a distance of several kilometers.

- Measuring range : -20° to $+80^{\circ}\text{C}$ (other ranges available on request)
- Resolution : $0,1^{\circ}\text{C}$
- Accuracy : $0,5^{\circ}\text{C}$
- Execution : mounting on or embedding in the structure or weldable version.



WATER PRESSURE

A range of water pressure meters amongst which the world's smallest available: the FOP-Micro PZ that has a length of 54mm and an outer diameter as small as 4,8mm! It can be mounted where no other existing piezometer can. The small size was achieved by application of a MOMS (Micro Optical mechanical System) pressure transducer that is interrogated via Fabry-Perot interferometry.

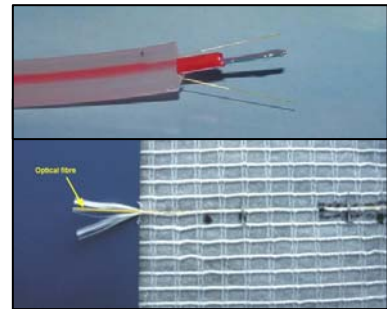
- Measuring range : 100, 200 or 300kPa
- Resolution : $0,025\% \times \text{F.S.}$
- Accuracy : $0,1\% \times \text{F.S.}$
- Overload : up to $1,5 \times \text{F.S.}$
- Material : SS 316



DISTRIBUTED STRAIN

The untreated fiber acts as sensor. Executed as cable or as geotextile with integrated optical fiber.

- Length : 50km, with booster 200km
- Interval : one reading every meter
- Resolution : $2\mu\epsilon = 0,002\text{mm/m}$
- Accuracy : $20\mu\epsilon = 0,02\text{mm/m}$



DISTRIBUTED TEMPERATURE

Also here the untreated fiber is the actual sensor. The cable has a loose tube fiber and is available in a number of versions, including a rodent-proof execution.

- Length : up to 50km
- Interval : one reading every meter
- Resolution : $0,005^\circ$ to $1,0^\circ\text{C}$, depending of application and requirements
- Range : -50° to $+300^\circ\text{C}$, depending on type of cable.



READING UNITS AND SOFTWARE

Measurements can be collected at programmable time intervals or continuously in real-time. The FBG and Fabry-Perot sensors can also be interrogated dynamically. Comprehensive software packages are available for processing and visualization of the measurement data. If so desired we organize and control the data management via our web server that is accessible for the client. The client then also automatically receives a warning via sms and email whenever a pre-set measurement value is reached.



MEASURING WITH LIGHT

- Unmatched reliability and accuracy
- Totally immune to electromagnetic induction
- No drift, not even over a period of decades
- Insensitive to corrosion, humidity, water and vibration
- Not influenced by variations in temperature
- Very small size
- Resists the most hostile environments
- Intrinsically safe, so ideally suited for use in hazardous areas
- Unrivalled durability.



SPECIALISTS IN FIBER OPTICS

Inventec is front runner in fiber optic applications in civil/structural engineering, geotechnical engineering, piping, energy and security.



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