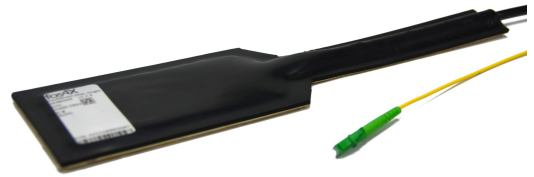


fos4Strain expert (dyn, 1.5m, 1550nm)

Temperature compensated fiber optic strain sensor



Product highlights

The features of the fos4Strain expert (dyn, 1.5m, 1550nm) include:

- Up to 10^9 load cycles
- $\pm 1000 \mu\text{m/m}$ nominal strain
- Immune to EMI, intrinsically isolated
- Quick installation in less than 20 min
- 150 kg step-on protection
- Athermal design with less than $1 \mu\epsilon/\text{K}$ cross-sensitivity

1 General description

The fos4Strain expert (dyn, 1.5m, 1550nm) sensor is a fiber optic strain sensor based on a fiber Bragg grating. It is designed to measure surface strains of anisotropic structures. It combines several features in a single sensor.

- Thanks to its fiber optic technology the sensor is able to reliably measure surface strain
- The optical working principle also makes the sensor immune to electromagnetic interference and lightning.

- The sensor may be installed with our proprietary installation tools in a very short time at a wide range of environmental conditions.
- It features a step-on protection for up to 150 kg and is thus well protected against impact from service personnel.
- Anisotropic material such as glass-fiber reinforced plastics show different thermal coefficients of expansion for different directions. Thus half-bridges for temperature compensation are not feasible. Therefore, the fos4Strain expert (dyn, 1.5m, 1550nm) sensor has a mechanical temperature compensation working principle that can be adjusted according to the expansion coefficient of the structure.
- Matrix materials such as glass-fiber reinforced plastics usually exhibit inhomogeneous strain distributions at their surface. The fos4Strain expert (dyn, 1.5m, 1550nm) sensor measures the mean strain level over several millimeters to circumvent this effect.

2 Application examples

The fos4Strain expert (dyn, 1.5m, 1550nm) sensor has been developed for strain monitoring of composite structures and especially rotor blades of wind energy converters. It features a passive athermal strain sensing concept, with integrated strain field integration over a length of approximately 70 mm. The specific design of the sensor provides high resolution strain data with a higher sensitivity especially for composite structures. Its ease of installation concept has proven its applicability in blade manufacturing and retro-fit situations with many different blade types.

3 Installation

The sensor installation procedure is optimized for fast installation and easy handling. The installation time is less than 20 minutes in the field. Field application can be carried out at ambient temperatures down to -10°C .

4 Product specifications

Sensor parameter	Unit	fos4Strain expert (dyn, 1.5m, 1550nm)
Maximum measurement range approximately	$\mu\epsilon$	± 2000
k_ϵ (with compensation according to CTE of $6 \cdot 10^{-6} \text{K}^{-1}$)	ppm	1.33 ± 0.05
Temperature cross-sensitivity	$\mu\epsilon/\text{K}$	< 1
Length of strain field integration approximately	mm	70
Maximum strain level	$\mu\epsilon$	± 4000
Optical parameter	Unit	fos4Strain expert (dyn, 1.5m, 1550nm)
Sensor type		Fiber Bragg grating
Fiber type		SMF 28 compatible
Bragg wavelength at 23°C (λ_0)	nm	1550 ± 0.5
Spectral width	nm	0.3 ... 0.6
Reflectivity	%	50 ... 95
Side mode suppression	dB	> 12
Connector		LC/APC

General specifications		Unit	fos4Strain expert (dyn, 1.5m, 1550nm)
Suitable fos4X measurement device			fos4Test dyn
Sensor type			Fiber Bragg grating
Optical connector type			LC/APC
Fiber type			SMF 28 compatible
Minimal bending radius	mm		50
Storage temperature	°C		-40 ... +80
Operating temperature	°C		-20 ... +70
Dimensions		Unit	fos4Strain expert (dyn, 1.5m, 1550nm)
Mounting			UHU Plus Black
Height x width x length	mm		5 x 70 x 250
Weight	g		200
Diameter of sensor cable	mm		6
Standard length of sensor cable	m		4