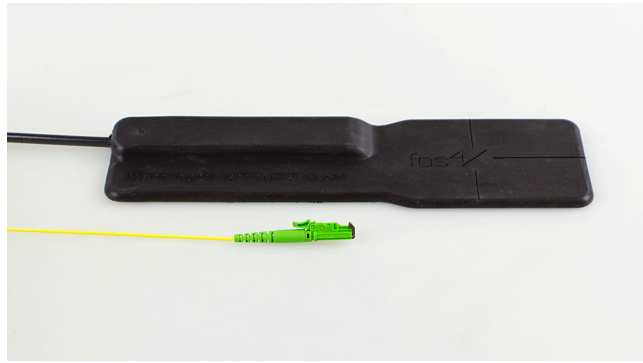


fos4Strain expert (dyn, 3.00m, 1552.6nm, E-2000 green) Sensor



Product Description

The fos4Strain expert is a fiber-optical strain sensor based on a fiber-Bragg grating. The sensor was developed for the strain monitoring of composite structures and in particular of rotor blades of wind turbines. The sensor has passive temperature compensation adapted to the expansion coefficient of the structure.

Highlights

- High durability of the sensors without EMC, ESD or insulation problems.
- Installation in 30 minutes.
- Step protection up to 150 kg.
- Passive temperature compensation.
- Up to 10⁸ load cycles at ±1000 µm/m.
- No metallic conductor.

Calculation of strain

The strain is calculated on the basis of the measured wavelength difference as follows:

$$\epsilon = \frac{1}{k_\epsilon} \left(\frac{\lambda - \lambda_0}{\lambda} \right)$$

(ϵ : Strain; k_ϵ : k-factor; λ : current wavelength; λ_0 : rest wavelength)

Measurement

Property	Value	Unit
Compatible measuring devices from fos4X	Blackbird OECD, nSens	-
Required channels	1	-
k-factor (k_ϵ)	2.07 ± 0.1	-
Compensated coefficient of thermal expansion	12	µm/m/K
Residual temperature cross-sensitivity	<2 (at -40 ... 35 °C)	µm/m/K
	<3 (else)	
Measuring range	±1000	µm/m
Required optical measuring range	1548.7 ... 1557.3	nm
Max. non-destructive strain	±4000	µm/m/K
Integration length	51	mm

Optical Data

Property	Value	Unit
Fiber type	SMF 28 compatible	-
Target wavelength after installation*	1553	nm
Tolerance for wavelength after installation*	1552 ... 1554	nm
Reflectivity	60 ... 80	%
Side lobe suppression	>15	dB
Spectral width	0.55 ... 0.65	nm

* At 23 °C ambient temperature.

Cable Data

Property	Value	Unit
Length*	3.0 -0/+0.2	m
Diameter (cable with step protection)	6 ± 0.5	mm
Min. Bending radius (cable with step protection)	50	mm
Min. bending radius (fan-out cable)	15	mm
Cable exchangeable	No	-
Connector type	E-2000/APC	-

* Length from sensor end to connector end.

Environmental Conditions

Property	Value	Unit
IP protection class*	IP67	-
Maximum operating altitude	3000	m
Permitted temperature (Transport and storage)	-40 ... +80	°C
Permitted relative humidity (Transport and storage)	0 ... 95	%
Permitted temperature (Operation)	-40 ... +55	°C
Permitted relative humidity (Operation)	0 ... 95	%

* The specified protection class only applies if the cable connections have the same or a higher protection class.

Load cycles and MTBF

Property	Value	Unit
Load cycles at ±1000 µm/m	10 ⁸	-
MTBF	>400	Years

Mechanical Data

Property	Value	Unit
Length	260	mm
Height	12	mm
Width	70	mm
Total weight*	0.2	kg

* fos4Strain expert without cable and packaging

Installation

Property	Value	Unit
Installation method	Glued	-

Dimensions

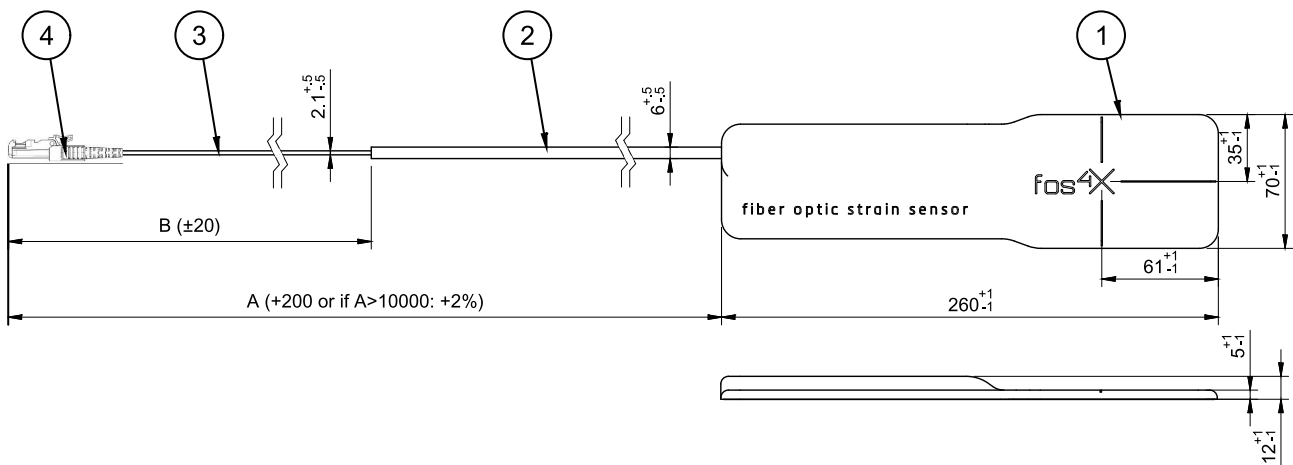


Figure 1: Dimensions

- 1 fos4Strain expert
- 2 Cable with step protection
- 3 Fan-out cable without step protection
- 4 E-2000/APC connector
- A Cable length total
- B Cable length fan-out