

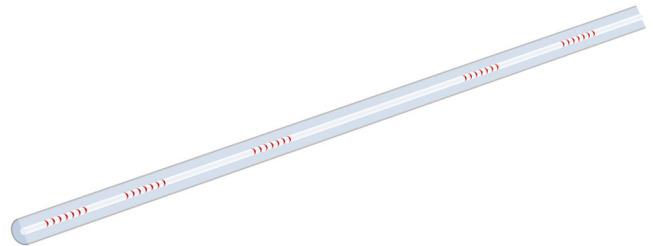
DATA SHEET

FS70FBG

Array of bare FBG

SPECIAL FEATURES

- Optical fiber with several Fiber Bragg Gratings (FBG)
- Definable distances and wavelengths
- Configurable cable lengths and cable and connector types



DESCRIPTION

The Array of bare FBG is a bare optical fiber with newLight® fiber Bragg gratings for all sorts of applications. The FS70FBG delivers the technology at its essence: a bare FBG can be bonded to different surfaces and materials, embedded in composite¹⁾ or mechanically attached to structures for multi-purpose measurements. The possibility of defining the number of measuring points, the distances between FBG and their wavelengths brings to reality the long desired freedom for the most diverse applications.

The newLight® technology was developed by HBK FiberSensing. Our sensors employ high strength fiber

coatings ensuring increased strain ranges, enhanced fatigue resistance and higher measurement accuracy. HBK FiberSensing offers innovative sensor designs compatible with common telecommunication fiber. This eases network design and importantly reduces installation time and cost. Both in small projects to high sensor count applications with multiplexed sensors on the same fiber even if kilometers apart. The technology is completely passive, self referenced and compatible with most interrogators in the market.

BENEFITS AND APPLICATIONS

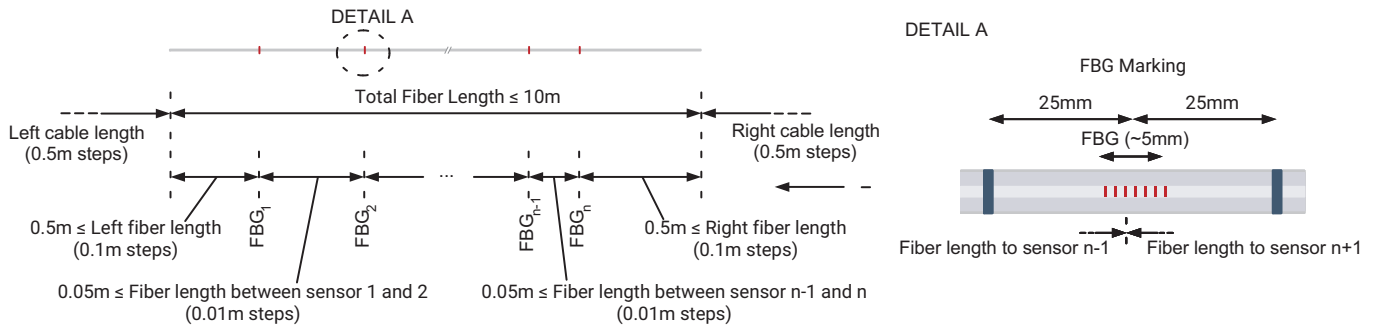
Sensor design

- Suited from cryogenic to high temperature applications
- Ready for laboratory applications where small size is required
- Suited to high strain and high fatigue measurements

Fiber Bragg grating technology

- No drift, absolute referenced measurements
- Immune to electro-magnetic and radio frequency interferences
- Passive technology fitting applications in explosive areas
- Reduced cable requirements with intrinsic multiplexing capability
- Long distances between sensors and the interrogators attainable
- Combinable with other FBG sensor types on the same fiber and same interrogator

DETAILS



SPECIFICATIONS

FBG		
Bragg wavelengths	nm	1500 ... 1600 (± 0.3)
Maximum number of FBG	n.a.	20
FWHM, reflectivity and side lobe suppression	n.a.	$\leq 0.3\text{nm}$, $21\pm 4\%$, $> 7\text{dB}$
Fiber cladding and coating diameter	μm	125/195
Fiber type	n.a.	SMF-28 compatible
Maximum allowed power difference of FBG	dB	8
FBG length	mm	5 ± 1
k-factor	n.a.	0.78 ± 0.02
Sensitivity ²⁾	$\text{pm}/(\mu\text{m}/\text{m})$	1.2
Resolution ³⁾	$\mu\text{m}/\text{m}$	0.5
Maximum breaking stress (strain) ⁴⁾	GPa [$\mu\text{m}/\text{m}$]	> 3.65 (> 50000)
Operation ⁵⁾ and storage ⁶⁾ temperature ⁷⁾	$^{\circ}\text{C}$	$-268.9 \dots 200$; $-20 \dots 80$
Operation and storage humidity	%	< 95
Temperature cross sensitivity ⁸⁾	$(\mu\text{m}/\text{m})/^{\circ}\text{C}$	8
Attachment method ¹⁾	n.a.	Glue (EP310, X60) ⁹⁾
Bend radius	mm	Over FBG: > 10 ; Outside FBG > 5
Main materials ¹⁰⁾	n.a.	Optical fiber, Ormocer®

- 1) Gluing process may lead to changes in the spectral response of the FBG, with impact on the quality of the measurement. For embedding in composite materials or applying in non-uniform surfaces (where strain gradients over the FBG length occur), please contact HBK FiberSensing.
- 2) Typical. Considering an FBG with 1550 nm wavelength.
- 3) For 0.5 μm resolution in wavelength measurement, as found in FS22SI interrogator.
- 4) Actual measurement range depends on the chosen adhesive as well as on the available wavelength range per FBG.
- 5) Operating temperature depends on the selected adhesives and on the applied strain range.
- 6) Limited by the connectors.
- 7) Aramid cables start changing their mechanical characteristics above 70°C . Sensor behavior and measurement is not affected by this change.
- 8) Temperature Cross Sensitivity (TCS) is the thermal strain induced by a 1°C change in temperature.
- 9) HBK FiberSensing suggests the use of bi-component epoxies, as for example 3M DP490 cold curing adhesive.
- 10) The full composition of the sensor including cable, complies with RoHS, REACH, Conflict Minerals and fire propagation prevention directives.

Cables		
Type	n.a.	Ø1 mm braid (fiber glass, silicone varnish) Ø3 mm aramid (Hytrel, Kevlar® and LSZH) Ø 3mm armor (Hytrel, stainless steel spiral, Kevlar®, stainless steel mesh and LDPE)
Cable fiber core, cladding and coating diameter	µm	9/125/250
Cable fiber coating	n.a.	Acrylate
Cable bend radius ¹¹⁾	mm	Armor > 30; other >16
Connecting splice	n.a.	Braid: Ø3x60mm (Polyolefin; vinyl acetate; glass fiber); other: Ø6x150mm for other cables (Polyolefin; vinyl acetate; Steel; Polyimide)
Max. cable length	m	Braid: 4±0.05; other: 20±0.05
Cable terminations	n.a.	FC/APC, SC/APC or No Connectors

¹¹⁾ Induced loss due to one complete turn around a mandrel lower than 0.05 dB

ORDERING INFORMATION

Configurable Item K-FS70FBG			
Options			
Number of FBG	1 ≤ number of FBG ≤ 20		
Sensor wavelengths ¹²⁾	1502.5nm ≤ Wavelength ≤ 1597.5nm @2.5nm steps, non repeating		
	Min. (mm)	Max. (m)	Steps of (mm)
FBG spacing ¹³⁾	50	9	10
Connecting fiber ¹³⁾	500	9.5	100
Connecting cable ¹⁴⁾	500	Braid: 4; other: 20	500
Cable types	BRD - Braided; ARD - Aramid; ARM - Armor		
Cable terminations	NC - No connector; FC - FC/APC; SC - SC/APC		

¹²⁾ Wavelengths should preferably be in ascending order (from the Interrogator). For different wavelengths please contact HBK FiberSensing.

¹³⁾ Distances between FBG are measured from center to center. Tolerance is ±2mm for distances up to 1m and ±10mm for bigger distances. Total fiber length is limited to 10m. For different distances please contact HBK FiberSensing.

¹⁴⁾ If connecting cable option is selected. Specified cable length is ensured on delivery. A margin of up to 10cm can be present.

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