

## DATA SHEET

# FS64TLS Tilt Sensor

## SPECIAL FEATURES

- Temperature compensated
- Robust design
- Configurable wavelengths, cable lengths and connector types



## DESCRIPTION

The Tilt Sensor is a Fiber Bragg Grating (FBG) based sensor designed to measure small angle variations towards the vertical. This sensor uses two FBGs in an innovative push-pull configuration for effective temperature compensation. It is a robust and completely passive sensor with high multiplexing capability, suited for remote sensing, self-referenced and compatible with most interrogators. The Tilt Sensor can be used in a large range of monitoring applications, such as in slopes and bridge pillars.

The FS64TLS is based on the newLight® technology developed by HBK FiberSensing. newLight sensors employ high strength fiber coatings ensuring robustness, increased sensitivity, and higher measurement

accuracy. HBK FiberSensing offers innovative sensor designs compatible with standard telecommunication fibers. This eases network design and significantly reduces installation time and cost, even when a large number of sensors are multiplexed on the same fiber, sometimes kilometers apart. The technology is completely passive - fitting explosive environments -, self-referenced - providing measurement long term stability -, and compatible with most interrogators in the market.

Connect two tilt sensors at orthogonal directions for bi-axial tilt measurements. Contact HBK FiberSensing for custom service of preassembling the sensors in such way and connected via splices.

## BENEFITS AND APPLICATIONS

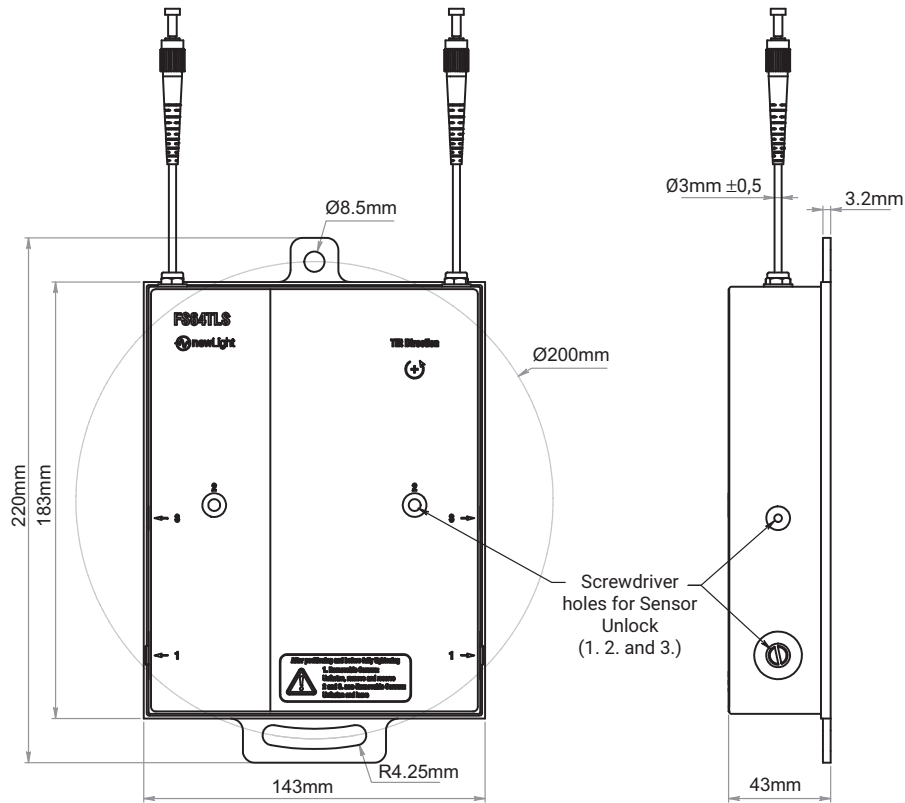
### Sensor design

- In series installation with lead in and lead out fibers
- Possibility to assemble with other tilt sensors for bi-axial measurements
- No need for temperature compensation with external elements
- Suited for outdoor applications
- Fitting applications like structural health monitoring of large structures across several industries (civil engineering, wind...)

### 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

## DIMENSIONS



## SPECIFICATIONS

Sensor		
Sensitivity <sup>1)</sup>	pm/deg	185
Resolution <sup>2)</sup>	deg	0.002
Measurement range	deg	10
Transverse sensitivity <sup>3)</sup>	%	<5
Maximum calibration error <sup>4)</sup>	deg	0.05
Settling time	s	1.5
Operation and storage temperature	°C	-20 ... +80
Temperature cross sensitivity	deg/°C	<0.003
Sensor bend radius	n.a.	Cannot bent
Attachment method <sup>5)</sup>	n.a.	Bolted (M8)
Degree of protection <sup>6)</sup>	n.a.	IP65
Dimensions	mm	220 ±0.5 x 140 ±0.5 x 42.5 ±0.5
Weight <sup>7)</sup>	kg	3.3
Main materials <sup>8)</sup>	n.a.	Stainless steel, aluminium, polycarbonate, brass, ormocer®
Bragg wavelengths	nm	1500 ... 1600 (±0.5)
Fiber type	n.a.	SMF-28 compatible
Fiber cladding and coating diameter	µm	125/195
FWHM, reflectivity and side lobe suppression	n.a.	≤0.3 nm, 21±4%, >10 dB

Inputs / Outputs		
Cable type	n.a.	Ø 3 mm armor (Hytrell, stainless steel spiral, Kevlar®, stainless steel mesh and PE)
Cable bend radius <sup>9)</sup>	mm	>30
Cable length <sup>10)</sup>	m	0 ... 20
Connectors	n.a.	FC/APC, SC/APC or NC (No Connectors)

- 1) Typical value per FBG.
- 2) For 0.5 pm resolution in wavelength measurement, as found in FS22SI interrogator.
- 3) Tilt on the measurement axis for each tilted degree in the perpendicular axis.
- 4) Typical traceability uncertainty of ±0.09 deg.
- 5) Anchors and screws not included.
- 6) DIN EN 60529.
- 7) With 2 m cable each side and no connectors.
- 8) The full composition of the sensor including cable, complies with RoHS, REACH, Conflict Minerals and fire propagation prevention directives.
- 9) Induced loss due to one complete turn around a mandrel lower than 0.05 dB.
- 10) For cables longer than 2 m, a splice (Ø8x150mm) is included at 2 m from the sensor. Specified cable length is ensured on delivery. A margin of up to 10 cm can be present. For different cable lengths or splice position please contact HBK FiberSensing.

## ORDERING INFORMATION

Configurable Item		Standard item <sup>11)</sup>
K-FS64TLS – 1 2 – 3 – 4 5		
<b>Options</b>		1-FS64TLS-10/2510
<b>1</b>	<b>NC</b> - No connector; <b>FC</b> - FC/APC; <b>SC</b> - SC/APC	1-FS64TLS-10/2530
<b>2</b>	0.5 m < <b>Cable length</b> < 20 m @0.5 m steps	1-FS64TLS-10/2550
<b>3</b>	1510 nm ≤ <b>Wavelength</b> <sup>12)</sup> ≤ 1595 nm @10nm steps	1-FS64TLS-10/2570
<b>4</b>	0.5 m < <b>Cable Length</b> < 20 m @0.5 m steps	
<b>5</b>	<b>NC</b> - No connector; <b>FC</b> - FC/APC; <b>SC</b> - SC/APC	

11) Standard Items correspond to a configuration: 2m length cable to each side terminated with FC/APC connectors. Wavelength pairs 1510/1520; 1530/1540; 1550/1560; 1570/1580 nm.

12) Pre-defined pairs of wavelength: 1510/1520; 1530/1540; 1550/1560; 1570/1580 nm. For different wavelengths please contact HBK FiberSensing.

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