



## DITEST-DSM – DYNAMIC STRAIN MONITORING SYSTEM

### FIBER OPTIC DISTRIBUTED SENSING FOR DYNAMIC STRAIN MONITORING APPLICATIONS

Offshore oil exploration and production is extending into deepwater setting increasing performance requirements on long slender structures. These subsea components, such as umbilicals, flexible risers, flowlines, flexible pipes, mooring ropes, etc. are subject to dynamic disturbances imposed by vessel and wave induced motion effects.

The complex nature of the induced stress renders the use of static analysis inadequate for the design and the monitoring of long offshore structures whilst fatigue remains the ultimate design limit.

The implementation of in-situ real-time structural monitoring enables the direct measurement of the actual strain profile, the identification of abnormal strain peaks and the accumulation of strain leading to structure fatigue.

### DITEST-DSM

The DITEST-DSM Series uses Omnisens DITEST™ fiber optic core sensing technique adapted to dynamic strain monitoring applications. Unlike point sensors, fully distributed fiber optic monitoring provides the complete information about the structure strain via measured strain profiles over the whole fiber length.

The DITEST-DSM features full strain profile measurement along a sensing fiber with an acquisition rate in the 1 Hertz range while maintaining high strain resolution to meet the application requirement for dynamic strain monitoring. The spatial resolution can be adjusted from 2 to 10 meters depending on the application requirements and the number of measurement points along the distance can be as high as 10'000 points (typically one point every 0.5m along the complete measured distance).

#### APPLICATIONS

- *Static and dynamic strain monitoring on offshore structures*
- *Fatigue monitoring*
- *Marine flexible riser strain monitoring*
- *Vortex induced vibration monitoring*
- *ROV umbilical strain monitoring*
- *Mooring ropes strain monitoring*
- *Spoolable pipe deployment*
- *Towed arrays*

#### DITEST-DSM - FEATURES & BENEFITS

- *Fully distributed dynamic strain monitoring*
- *On-line monitoring with 1 Hz acquisition rate*
- *10km distance range*
- *Fiber optic strain sensing system*
- *No active underwater component*
- *Based on proven technology*
- *Axial and bending strain measurement*
- *Meter spatial resolution*
- *High strain resolution 25  $\mu\epsilon$*
- *Seamless data communication*

**UNLIKE POINT SENSORS, FULLY DISTRIBUTED FIBER OPTIC MONITORING PROVIDES THE COMPLETE INFORMATION ABOUT THE STRUCTURE STRAIN VIA MEASURED STRAIN PROFILES OVER THE WHOLE FIBER LENGTH.**

## DITEST-DSM FEATURES & PERFORMANCE

<b>Performance</b>	Sensor configuration	2 fibers (Loop configuration)		
	Nombre of channels	2 (independent channels)		
	Distance range (per channel)	10km		
	Spatial resolution	2 to 10 m (settable by increment of 0.1m)		
	Default spatial resolution	2 m		
	Distance Resolution	0.5 m		
	Number of distance points	Up to 10'000 (typical 5'000)		
	Strain range	≤ 0.5%	1%	> 2%
	Acquisition rate (full strain profile)	1 Hz	0.5 Hz	0.25 Hz
	Measured variables	Strain profile along distance, date & time		
	Optical Loss budget	3 dB	6 dB	
	Uncertainty*	25 µε	80 µε	
<b>Features</b>	Communication	Ethernet port (TCP/IP), USB		
	Output signals	SPST relays, TCP/IP message		
	Data storage	Internal Hard disc (40 GB or more)		
	Data format	Database, text files, MS Excel, bitmap plot		
	Optical Connections	E-2000/APC		
	Laser wavelength	1.5 µm wavelength range		
	Operating temperature	0 C to 40 °C		
	Humidity	< 95% non-condensing		
	Power supply and consumption	100 - 240 VAC ; 50-60Hz; max. 200 W		
	Dimensions (W x D x H)	449 x 500 x 266 mm (19" rack)		
	Weight	< 20 kg		

\*  $2\sigma$  on measurement repeatability at 10 km

*Laser safety: Omnisens Ditest products emit invisible infra-red radiation in the range 1550 nm. They are classified to EN 60825-1(2001-03) as Class 1M laser products.*

## DITEST IS A TRADE MARK OF OMNISENS

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