

Distributed Acoustic Sensing (DAS) Interrogator

Product description

The DAS interrogator belongs to the Omnisens distributed sensing product range, designed to achieve high acquisition rate distributed strain and vibration measurements over long distances from a single unit. It has been developed to offer the best possible measurement performance in terms of accuracy, reliability, and robustness whilst maintaining measurement performance over time, thanks to a proprietary technology.

The Omnisens DAS provides kHz acquisition rate with linear response up to 100km (one way) of single mode fibre using a phase sensitive chirped pulse technology. Efficient algorithms allow for accurate threat recognition, making the Omnisens DAS ideal for long range, continuous monitoring of linear assets, such as pipelines, power cables and oil and gas subsea infrastructures.

Combining Omnisens DAS with Omnisens DITEST distributed temperature and strain interrogators is today's most advanced and versatile monitoring system.

Applications

Pipeline monitoring:

- Leak detection
- Third party intrusion
- Pig tracking

Power cable monitoring (offshore / onshore):

- Fault detection and localization
- Dropped object and impacts (ex: anchor / drag / fishing activities...)

Fibre optic network sensing:

- Acoustic data filtering and streaming
- Data analytics and pattern identification

Features and Benefits

Optical unit

- Robust design for demanding environments
- Monitoring range via 2 simultaneous channels; up to 2 x 100km total for TL models
- Operating on telecommunication grade single mode fibres



Patented technology, based on chirped pulse Rayleigh analysis

- Intrinsically insensitive to Rayleigh and polarization fading (no dead zone, no polarization management required)
- Homogenous sensitivity over the entire sensing range
- Direct quantitative strain measurement (linear measurement)
- Measurement stability and drift-free over the asset lifetime
- Self adjusting system maintaining highest performances
- Set-up independent of fibre refractive index

Processing unit

- Linux operating system / industrial server class
- Open source data format
- Seamless web-browser interface, from any computer
- Automated configuration functionalities
- Data visualisation and interpretation application, on any computer
- Remote access diagnostic and maintenance through TCP/IP
- Read access to measured data
- Hotswapp HDD for easy maintenance

Specification Sheet

Feature	Parameter	DAS-C	DAS-M	DAS-L
Performance				
Distance range	(per channel) one way / up to:	30 km	50 km	70 km
Built-in channels	1ch (2ch optional)			
Sensor configuration	Single ended			
Sensing fibre	Standard single mode optical fibres: ITU G.652, ITU G657, ITU G.655			
Gauge length	5m; 10m; 20m	From 5m	From 5m	From 10m
Accuracy of location	+/- 2.5m; +/- 5m; +/-10m; +/-25m	From +/- 2.5m	From +/- 2,5m	From +/- 5m
Optical loss budget - sensing	at 1,535nm (0,2dB/km fibre)	6 dB	10dB	14 dB
Acoustic sensing bandwidth	Up to	1 kHz	1 kHz	500 Hz
Sampling rate	Up to	2 kHz	2 kHz	1 kHz
Technical data				
User interface	On web browser via ethernet connection. On web app for data vizualization and analytics			
Data storage capacity	Internal: HDD 4TB RAID1 Equivalent to 2,500 day of acoustic/compressed data for 20 km monitoring, at 10 m gauge length Equivalent to 2.5 days of strain/raw data for 20 km monitoring, at 10 m gauge length			
Data format	HDF5 - Opensource			
Data flow	- Strain data (raw data): 50MB/ min / km / kHz sampling / at 10 m SR - Acoustic data (compressed data): 25kB / min / km / frequency band 10 m SR Data recording set-up: strain data or acoustic data or both / unlimited amount of frequency			
Optical connectors	SC/ APC (E2000 available on request)			
Dimensions (W x H x D) mm	Optical unit: 483 x 132 x 435 and processing unit: 483 x 177 x 448 19" rack mountable - 3U + 4U			
Weight	Optical unit: 8 kg / processing unit: 19 kg			
Power supply	100-240V and 50-60Hz AC			
Power consumption	Optical unit - 1 channel Optical unit - 2 channel Processing unit - idle Processing unit - typical	30 W 50 W 160 W 230 W	40 W 70 W 160 W 230 W	60 W 100 W 160 W 230 W
Standards	Pass EN 61326-1:2013 (IEC 61326-1:2012, ed2.0) Electrical equipment for measurement, control and laboratory use -- EMC Pass: EN 61000-6-2:2005 (IEC 61000-6-2:2005, ed2.0) Electromagnetic compatibility -- Immunity for industrial environments Pass: EN 61010-1:2010 (IEC 61010-1:2010) Electrical equipment for measurement, control, and laboratory use -- General			
Operating temp	0°C to 40°C			
Transportation / storage temp	-10°C to 60°C			
Ambient humidity	5 to 95 %RH (no condensation)			
Laser class	1M for DAS-C & DAS-M			
MTBF / lifetime	10 years			
Operating system	Linux			

Specified according to SEAFOM MSP-02 DAS Parameter Definitions and Tests. This document does not constitute an offer or contractual guarantee; Omnisens reserves the right to modify this datasheet without notice.

Distributed Temperature Sensing (DTS) DITEST-C Interrogator

Product description

The DTS belongs to the Omnisens DITEST (distributed temperature and strain) product range designed to perform distributed temperature and/or strain measurements over long or very long distances from a single interrogator. It has been developed to offer the best possible measurement performance in terms of accuracy, reliability, robustness and maintained measurement performance over time, thanks to a proprietary measuring technique. High spatial resolution (constant over the entire sensing distance), long distance and fast acquisition are the key features of the DITEST-C interrogator.

Using standard telecommunication-grade single mode optical fibre as the sensor, the DITEST series interrogators owe their high signal-to-noise ratio and long term stability to Stimulated Brillouin Scattering (SBS) measurement. This technique provides fast and reliable measurements, making it ideal for long range, continuous monitoring of linear assets, such as pipelines, power cables and oil and gas subsea infrastructures.

Features & Benefits

- Frequency-based technique with enhanced optical signal processing combined with a single laser source ensures measurement stability and a drift-free operation over the asset lifetime
- Robust optical loss budget to support the most demanding installations and guarantee that measurement performance is maintained even in challenging conditions (e.g. large losses or fibre attenuation)
- Uses standard telecommunication grade singlemode fibres as sensing elements.
- High spatial resolution maintained over the entire sensing distance for accurate detection of the development of small, incipient events (e.g. pipeline leak, power cable hot spot, ground movement).
- Simple configuration of fibre optic cable sensors (both temperature and strain) allows user to easily map fibre optic sensor length to actual structure length for ease in GIS integration (Omnisens Map)



- Robust design for demanding environments with Linux operating system, proprietary database storage and solid-state drive (SSD).
- Fast acquisition time to track the event development and /or switching through a large number of configured channels.
- Automatic and rapid detection of fibre break.
- Configuration and measurement data information are stored in a dedicated database format. An external computer loaded with Omnisens DataViewer™ software provides simple access to data and configurations.
- Automated measurement scheduler for continuous monitoring and self-adjusting measurement to maintain highest instrument performance.
- Seamless status and data communication and interface with Omnisens asset integrity monitoring solutions: Lynx (for pipelines) and Cobra (for power cables).
- DITEST series interrogators are designed to allowing remote access diagnostic and maintenance through TCP/IP connection

Specification Sheet

Performance		
Distance range (per channel)	30 km (60 km max. total fibre loop distance)	
Built-in channels (ext via SO-N external switches)	Default : 4 channels Optional: up to 29 channels via external SO-N Switch module	
Sensor configuration	Loop configuration (requires two fibres per channel)	
Sensing fibre	Standard single mode optical fibres (ITU G.652, ITU G657, ITU G.655)	
Spatial resolution (*)	1 m to 20 m (by increment of 0.25 m)	
Spatial resolution	2 m at max distance range	
Distance sampling interval (*)	0.25 m (0.5 m) (typ. at max distance range)	
Optical loss budget - sensing (*)	10 dB sensing (20 dB total loop loss budget)	
Measurement resolution and range	Brillouin freq. shift: 0.1 MHz Temperature: 0.1 °C Strain: 2 µε	Range from 9.5 GHz to 12.5 GHz Range from -150 °C to +1000 °C (fibre dependent) Range > 5%
Measurement repeatability (1 x STD) (*)	< 0.5°C or < 10 µε typical for 5 min. acquisition time at 30 km with 2 m spatial resolution Using SEAFOM 2x STD criteria as per “MSP-01 guidelines for distributed temperature sensing system measurement specifications” the repeatability is: < 1°C or < 20 µε typical for 5 min. acquisition time at 30 km with 2 m spatial resolution	
Acquisition time (*)	>20 seconds, 1 - 2 minutes typical 2 - 5 minutes for high resolution measurements	
Number of distance points	Up to 50,000	
Measured variables	Temperature, strain, brillouin frequency shift, brillouin gain and width for each distance point	
Technical data		
Graphical user interface	Via external computer (via Ethernet connection); configuration software and data viewer software on external computer (Windows OS)	
Operating system	LINUX - 64 bit OS on solid state drive (SSD)	
Communication / connection	2 x Ethernet port (RJ45)	
Data storage	Internal hard disk - (> 500 GB or more) or optional solid state drive (SSD) (> 250 GB)	
Data format	Proprietary database, text files (via DataViewer™)	
Optical connectors	SC / APC (rear panel) - optional E2000/APC	
Dimensions (W x D x H)	449 x 500 x 177.8 mm (19” rack mountable - 4U high)	
Weight	15 kg	
Power supply	100-240 VAC Typ. (90-264 VAC) / 50-60 Hz Typ. (47-63 Hz) / <150VA (or Optional 18 - 36 VDC)	
Features		
Measurement modes	Automatic unattended measurements configured and controlled by proprietary scheduler according to predefined agenda	
Measurement settings	Automatic measurement configuration (self-adjusting to varying conditions)	
Data visualization and analysis (available via DataViewer™ software)	Off-line data viewer software for measurement analysis, multiple trace comparison with respect to selectable baseline, measurement trends and time evolution, analysis at fixed distances	
Self-diagnosis	Long term operation 24/7 with automatic recovery and continuous system monitoring including system status, measurement quality and fibre break detection	
Laser safety	Omnisens DITEST products emit invisible infra-red radiation in the 1550 nm wavelength range classified to EN 60825-1(2014) as Class 1M laser products	
Applicable standards	CE mark (Council Directive 2006/95/EC and 2004/108/EC), RoHS (Council Directive 2011/65/EC), WEEE (Council Directive 2008/34/EC) CSA US + CA (UL-61010-1 3 Ed; CAN/CSA C22.2 N061010-1-2)	
Software connector	Includes a connector for automatic data transfer to Omnisens monitoring software solutions.	
Environmental specifications		
Operating temperature	0°C to +45°C	
Storage temperature	-10°C to +60°C	
Relative humidity	Max 85% non-condensing	
Protection rating	IP20 (indoor use)	
Pollution protection	Pollution degree 2	

* Specified according to SEAFOM MSP-01 and IEC 61757-2-2. DITEST is a trade mark of Omnisens. This document does not constitute an offer or contractual guarantee; we reserve the right to modify this data sheet without notice.