SMARTFOX® 3.0
Monitoring Equipment and Services
fibre optic point sensors (FBG technology)

PHOTONICS DIVISION

SestoSensor SRL - a SOCOTEC COMPANY is a 100% Italian engineering company active in R&D and production of electronic monitoring systems and fibre optic sensors.

Founded in 2009 as an industrial spin-off of the EU-funded project SMooHS-Smart Monitoring of Historic Structures (EU FP7 grant agreement 212939), the company capitalises on the founders' academic, research and professional experience with excellence - and a genuine passion - in engineering high-tech distributed sensing solutions.

The company holds the rights to 14 patents and applications related to electronic and fibre-optic sensors.

From September 2022 it becomes the **PHOTONICS division of SOCOTEC Italia**.

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BY SOCOTEC

Trust & Tech by SOCOTEC is the technological and data expertise used by our experts in the exercise of our professions, in the field and at the service of our customers for technical consultancy and risk management in the Construction, Infrastructure and Industry sectors in a context of environmental, energy and digital transformations.

SMARTFOX® 3.0

Stand-alone, interrogation and monitoring unit for FBG fibre optic sensors

SMARTFOX® is an integrated and fully autonomous device capable of interrogating a large number of Fibre Bragg Grating (FBG) sensors via a combination of Wavelength-Division Multiplexing (WDM) across an extended wavelength spectrum and Time-Division Multiplexing (TDM) in up to 64 sequentially switched channels.

SMARTFOX® is based on cutting-edge 'static' spectrum analysis technology, without any moving mechanical parts it guarantees higher interrogation speed, vibration stability and the best long-term reliability.

SMARTFOX® is the first static and dynamic 'hybrid' interrogator for both fibre optic and traditional electronic sensors that, thanks to two MODBUS ports, can also interrogate electronic sensors with a 'bus' connection technology capable of handling up to 64 nodes.

ADVANTAGES OF FIBRE OPTICS

SAFE IN ANY ENVIRONMENT	INVISIBLE AND NON-INVASIVE	ENVIRONMENT - FRIENDLY	IMMUNE TO INTERFERENCE

TECHNICAL SPECIFICATIONS

SMARTFOX® is run by a powerful LINUX system that, in addition to controlling the optical part, makes it a complete and self-sufficient monitoring system without the need for an external computer or additional buffer power supply.

	Wavelength	Temperature (indicative value, depending on sensor)	Strain (indicative value, depending on sensor)
Resolution (dependent on sampling rate):	Up to 0.02 pm	~0.02 °C (0.04°F)	~ 0.1 µε
Accuracy:	±2 pm max	~ ±0.25 °C (1 °F)	~ ±1.5 µε
Repeatability (precision)**:**	< 2 pm	~ ±0.25 °C (0.5 °F)	~ ±1.5 µε
Wavelength range :	1525 ÷ 1565 nm (standard) / 1510 ÷ 1595 nm (extended)		
Max tolerable optical line attenuation :	>25 dB		
Optical power output :	< 10mW at any of the optical ports		
LASER safety class :	1 M – CEI EN 60825-1 (2017-06) + CEI EN 60825-1/A11		
Embedded ethalon for linearity self-calibration:	athermic FBG reference (optional) stability ±0.5 pm in temperature range -20 ÷ +60 °C		
Max number of sensors connected on the same channel :	>40 (dependent on sensors configuration and required measurement rate)		
Maximum length of fiber cable:	from 10 to 30 km depending on sensor characteristics and connections		
Simultaneous sensor sampling speed :	20Hz standard, optional up to1500 Hz (dependent on number of sensors/channel and attenuation)		
Number of independent channels (sequentially scanned)**:**	1, 2, 4, 8, 16, 32 or 64		
Connectors:	LC/APC (standard), FC/APC, E2000/APC or MPO (on request)		
Operating temperature range :	ITU standard from 0°C to +50°C (range extendable to -10°C / +60°C with increased energy consumption)		
Storage temperature range:	from -20°C to +85°C		

Embedded control unit:

System resources:	ARMv7 @ 1GHz + 512MB (RAM)
Internal flash disk:	4GB flash disk + micro-SD internal data-log memory
Connectivity:	2×USB 2.0, Ethernet 10/100, 2×RS485/MODBUS (galvanically isolated), Optional Wi-Fi 802.11n 300Mbps
Optional interfaces:	- 3× relay outputs SPDT 30VDC 2A / 110 VDC 0.3 A / 125 VAC 0.5 A (System OK – Warning - Alarm) - 12V AC/DC on/off request input - 3x configurable digital inputs 12V AC/DC (acquisition trigger, power on/off, user) - (galvanically insulated)

Embedded software features:

Web-based control interface:	- real-time or synchronised measurements - direct calculation of final engineering parameters and compensation - configuration of acquisition and communication settings - direct download of recorded data
Alarms:	Sending emails when user-settable thresholds are exceeded or for diagnostic and telemetry events of power supply parameters (requires internet connection).
Quasi-static data logging:	User-configurable with local (4GB internal micro-SD or external USB disk) and remote (requires internet connection) redundant recording, with automatic re-start.
Dynamic data recording: (Optional)	Acquisition of packet data with user-settable parameters, recurring, when instantaneous sensor thresholds are exceeded and with external hardware synchronisation. Decimation, FFT spectral analysis and compression of recorded data also available (optional).

Power supply:

Primary power input:	15V 30W (standard) or 10 to 26V 30W or 18 to 32V 30W (optional)
Secondary power input:	10-15V 30V from the battery of an external solar charge controller
Integrated battery:	Pb-gel 12V 7Ah
Mains adapter supplied:	class I input 100-240Vac (IEC 320-C14 connector)

Case:

Product version:	Benchtop	Portable	Ruggedized field-ready
Dimensions:	Rack 19" 3U D245mm 483×88×245mm	470×370×180mm	425×325×180mm
Weight:	7 kg (max)	6 kg (max)	9.5 kg (max)
Protection class:	IP54	IP67 (closed)	IP65
Case material:	Steel and aluminium (ABS for feet and handles)	ABS	Thermosetting resin reinforced with glass fibre

MEASURING, RECORDING AND DIAGNOSTICS

SMARTFOX® offers an intuitive web interface and data logging, internet server communication, diagnostics, messaging and alarm functions that make it the ideal choice for continuous monitoring of infrastructures and industrial installations, portable field measurements and laboratory needs.

DATA LOGGING :
> configurable acquisition parameters
> configurable data packet size
> automatic restart

MEASURES :
> engineering size calculation
> thermal compensation
> offset cancellation
> configurable averaging
> configuration of WDM windows
> configuration of alarm thresholds
> automatic source switch-off for battery life extension

NETWORK AND DIAGNOSTICS :
> settable auto tethering mode
> FTP client
> real-time spectrum analysis
> automatic sensor diagnostics
> power and battery telemetry
> email alarm notification
> remote control from web interface
> downloading of recorded data from the web
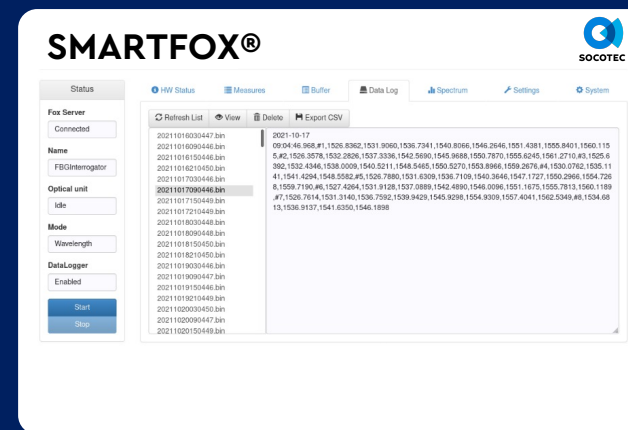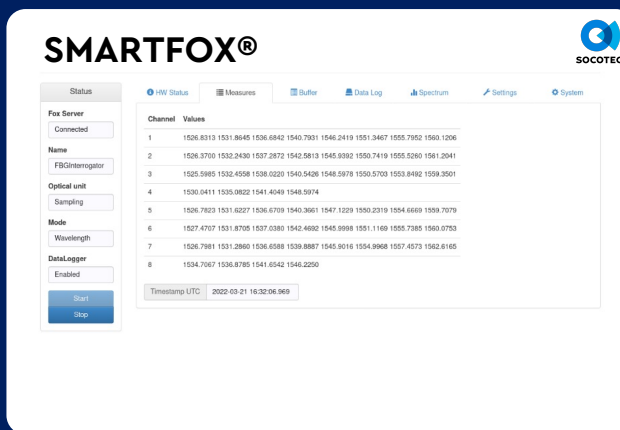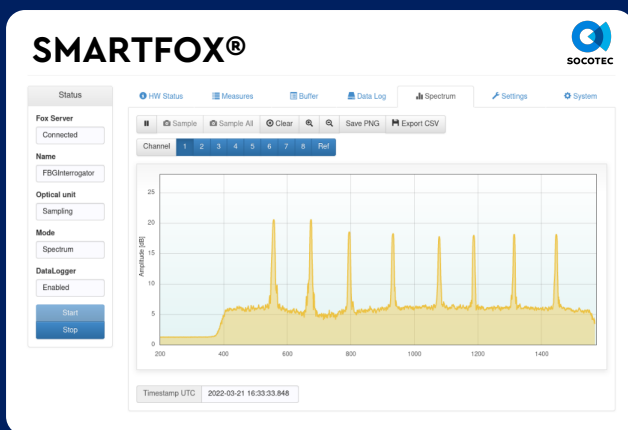
FIELDS OF APPLICABILITY

The SMARTFOX® system can be applied for monitoring and control in areas such as:

Structural Health Monitoring (SHM)

Oil & Gas

Energy

Museum masterpieces monitoring

Nuclear

Transportation

Defense

Mechatronics

TRUST
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140
PUBLICATIONS

14
PATENTS

4
AWARDS INNOVATION

4
EUROPEAN PROJECTS

SOCOTEC Group

SOCOTEC Italia is part of the SOCOTEC Group, one of Europe's leading I.C.T. (Inspection, Certification and Testing) operators in the construction and infrastructure sector.

With 70 years of experience in the management and optimisation of infrastructure assets and the safety of people, SOCOTEC and its subsidiaries confirm their commitment to building your future every day. SOCOTEC operates in 25 countries, with 11,000 employees.

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FOR A SAFER AND SUSTAINABLE WORLD

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