

Optical Sensing Interrogator | si230

Applications

- Continuous lifetime health monitoring of bridges, dams, buildings, tunnels, ships, aircraft, trains, and other complex structures.
- Measurements of fiber Bragg grating (FBG) strain gages, temperature probes, accelerometers, pressure, displacement, and other FBG sensors.
- Simultaneous static and dynamic measurements of hundreds of sensors.

Features

- Wide wavelength swept laser supporting more sensors per channel.
- Spectral Diagnostic View for optimizing sensor system setup and operation.
- Integrated ENLIGHT eases configuration, data acquisition, and on-board data storage.
- Direct mounting to any standard 19" EIA/IEC equipment rack.

Deployment

- Civil structures (bridges, dams, tunnels, mines, buildings).
- Energy (wind turbines, pipelines, nuclear reactors, solar panel farms).
- Aerospace vehicles (airframes, composite structures, wind tunnels, dynamic tests).
- Marine vessels (hull, mast, rudder, deck, cargo containers).
- Transportation (railways, trains, roadways, specialty vehicles, cranes).
- Homeland security (perimeter intrusion, heat detection, security gate monitoring).
- Medical devices (probes, catheters).

Description

The si230 is a full-featured, industrial grade, rack mounted dynamic optical sensor interrogation instrument, powered by Integrated ENLIGHT and featuring local data storage, remote configuration control/data transfer, and up to 16 internal fiber measurement channels.

The si230 Optical Sensing Interrogator is built upon the x30 optical interrogator core, featuring a high power, high speed swept wavelength laser, realized with Micron Optics patented Fiber Fabry-Perot Tunable Filter technology. The x30 interrogator core employs high speed hardware peak detection, optimized for rapid data acquisition of many simultaneous FBG sensors. x30 technology is focused on providing measurements with higher acquisition rates, moderate dynamic range, and continuous lifetime on-board referencing. The combination of high speed and excellent repeatability enables a single x30 interrogator to simultaneously monitor dynamic sensors and measure static sensors with ultra-high resolution. Well over half of the fiber optic sensors deployed today are measured with instrumentation that uses Micron Optics technology.

The Micron Optics "si - Sensing Instrument" platform features an optimized Integrated ENLIGHT environment built on Windows XP Embedded technology. In contrast with the "sm - Sensing Module" platform, Sensing Instruments support on-board management of all optical interrogator core configuration, data acquisition, sensor calibration, data visualization, and data storage tasks. Users of Integrated ENLIGHT interface to the Sensing Instruments through a touch screen LCD, external keyboard/mouse/monitor, or Windows Remote Desktop connections.



si230 Rack Mount Instrument

ENLIGHT combines the useful features of traditional sensor software with the specific tools needed to optimize optical properties during the design, implementation, and operations phases of an optical sensor system. Tables, graphs, and additional data visualization features make ENLIGHT easy to use. Learn more about ENLIGHT at http://www.micronoptics.com/sensing_software.php.



Specifications ^B 1

	si230-200	si230-500	si230-800
Optical Properties			
Number of Optical Channels	1	4	16
Scan Frequency	100 Hz	500 Hz	250 Hz
Wavelength Range	1510-1590 nm		
Wavelength Stability ²	2 pm typ, 5 pm max		
Wavelength Repeatability ³	1 pm, 0.05 pm with 1,000 averages		
Dynamic Range ⁴	25 dB with user-selectable gain		
Max FBGs per Channel	80 (up to 160 with expanded λ range)		
Internal Peak Detection	Included	Included	Included
Spectral Diagnostic View	Optional	Included	Included
Optical Connectors	FC/APC		
FBG Requirements ⁵	0.25 +/- 0.05nm, FWHM (-3dB point); >15dB Isolation		

Data Processing Capabilities

Operating Environment	Integrated ENLIGHT Environment (based on XP Embedded)		
Enhanced Data Management	ENLIGHT Sensing Analysis Software		
Interfaces	Remote Desktop via Ethernet, USB, External Keyboard/Mouse/Monitor		
Relays	3 included, driven by ENLIGHT		
Storage Capacity	100 GB HDD		
Ethernet Pass-through	Supports direct data acquisition by user PC from Optical Sensing Interrogator Core		

Mechanical, Environmental, Electrical Properties

Dimensions; Weight	435 mm x 442 mm x 45 mm; 4.1 kg (9 lbs max)		
Rack Mount Hardware	Included		
Operating Temperature; Humidity	0° to 50° C; 0 to 80%, non-condensing		
Storage Temperature; Humidity	-20° to 70° C; 0 to 95%, non-condensing		
Input Voltage	7 - 36 VDC (100~240 VAC, 47~63Hz), AC/DC converter included		
Power Consumption at 12V	45 W typ, 75 max		

Options

FBG Distance Measurement ^{1,6}	Optional	Optional	Optional
1 kHz Scan Rate	Optional	Optional	n/a
2 kHz Scan Rate ¹	Available with 40nm λ range, (1525-1565nm)		n/a
Expanded FBG Capacity ^{1,7}	λ range of 1460 - 1620nm doubles max FBGs to 160 per channel, 2pm λ Repeatability at full acquisition speed		
1310nm λ Range ¹	Available λ range of 1280-1360nm		

Notes:

1. Beta product or function. For details see www.micronoptics.com/product_designation.php.
2. Captures effects of long term use over full operating temperature range of the instrument. (Assumes an FBG bandwidth of 0.25nm).
3. Per NIST Technical Note 1297, 1994 Edition, Section D.1.1.2, definition of "repeatability [of results of measurements]". (Assumes an FBG bandwidth of 0.25nm).
4. Defined as laser launch power minus detection noise floor. Adjustable 13 dB window within total range.
5. Used for performance qualification (See Notes 2, 3, and 4). Bandwidths of 0.1 to 1.0nm may reduce performance.
6. Minimum FBG λ spacing is 1.5nm; FBGs must be in ascending λ order along the fiber; distance measurement accuracy is ~2m, 1KHz/80nm max.
7. Maximum scan frequency of 500Hz. Not compatible with FBG distance measurement.