



## Applications

- Measurements using FBG strain gages, temperature probes, accelerometers and pressure sensors
- Perform dynamic and static simultaneous measurements of hundreds of sensors on multiple fibers
- Continuous, decades-long structural health monitoring of ships, aircraft, trains and other complex structures
- Permanent installations for tracking the condition and performance in smart structures like bridges, dams, buildings and tunnels



## Description

The **sm130 Optical Sensing Interrogator** meets the growing demand for fast interrogation of fiber optic sensors in harsh environments. This versatile instrument can interrogate up to 50 sensors simultaneously on up to 4 fibers at 1kHz or hundreds of sensors at 100 to 500 Hz. With the **Micron Optics** sm041-416 channel expansion unit, the sensor count can be quadrupled. The result is a single system that can measure both dynamic and static phenomena for large complex structures. Strain measurements are the most common **sm130** application, but the system is equally capable of measuring acceleration, pressure, temperature, etc.

The small, accurate, powerful and economical **sm130** combines an industrial PC with **Micron Optics'** robust, high-power, low-noise, high speed swept laser source in a single rugged package. **Micron Optics** instruments are installed in hundreds of harsh applications around the world from oil platforms in Brunei to marine vessels in the North Sea to tunnels in Japan.

## Where are Micron Optics Instruments Deployed?

- **Civil Structures/Civionics** (bridges, dams, tunnels, buildings, etc.)
- **Energy** (wind turbines, pipelines, nuclear reactors, etc.)
- **Aerospace Vehicles** (composite structures, wind tunnels, dynamic tests, etc.)
- **Oil & Gas** (well reservoir management, platform structural health monitoring, etc.)
- **Marine Vessels** (hull, mast, rudder, submarine pressure tests, etc.)
- **Transportation** (railways, roadways, etc.)
- **Homeland Security** (perimeter intrusion, shipping container integrity, etc.)
- **Research** (medical devices, military armor, chemical sensing, etc.)



MICRON OPTICS

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# sm130 | Optical Sensing Interrogator

PRELIMINARY

Specifications      sm130-700      sm130-500      sm130-200

## Optical

Number of Optical Channels <sup>a</sup>	4 (up to 16)	4 (up to 16)	1 (up to 16)
Wavelength Range	1520-1570 nm	1510-1590 nm	1510-1590 nm
Wavelength Stability <sup>b</sup>	2 pm typ, 5 pm max		
Wavelength Repeatability <sup>c</sup>	0.5 pm @ 250 Hz, 1 pm @ 1 kHz, 0.05 pm with 1,000 averages		
Dynamic Range <sup>d</sup>	25 dB with user-selectable gain		
Scan Frequency	1 kHz	500 Hz	100 Hz
Max Sensors per Channel <sup>e</sup>	125		
Optical Connectors	FC/APC (E2000 available)		

## Mechanical

Dimensions	132 mm x 267 mm x 135 mm		
Weight	2.5 kg (5.5 lbs)		

## Environmental

Operating Temperature	0° to 50°C		
Operating Humidity	0 to 80%, non-condensing		
Storage Temperature	-20° to 70°C		
Storage Humidity	0 to 95%, non-condensing		

## Electrical

Input Voltage	+5 VDC (12 and 24 VDC convertors available)		
AC/DC Convertor	Included (100~240 VAC, 47~63 Hz)		
Power Consumption	25 W typ, 50 W Max		
Interfaces	Ethernet		
Protocols	Custom MOI protocol via Ethernet (others available)		

## Data Management

Remote Software	Data logger, peak tracking, and instrument control		
LabVIEW™ Source Code	Allows for customization of remote software		

## Options

8-16 Channel Expansion	Please see our 8 or 16 channel sm041 multiplexers		
Local Data Storage <sup>f</sup>	Internal hard drive, 120 Gb		
Rechargeable Battery Pack	For up to 4 hours of autonomous operation		

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## Notes:

- a sm130 accommodates up to 4 integrated optical channels. Max of 16 ch possible when combined with sm041 multiplexer.
- b Captures effects of long term use over full operating temperature range of the instrument.
- c Per NIST Technical Note 1297, 1994 Edition, Section D.1.1.2, definition of "repeatability [of results of measurements]"
- d Defined as laser launch power minus detection noise floor. Adjustable 15 dB window within total range.
- e Maximum of 50,000 sensor readings per second.
- f Hard drive operating conditions may differ from sm130 specifications.

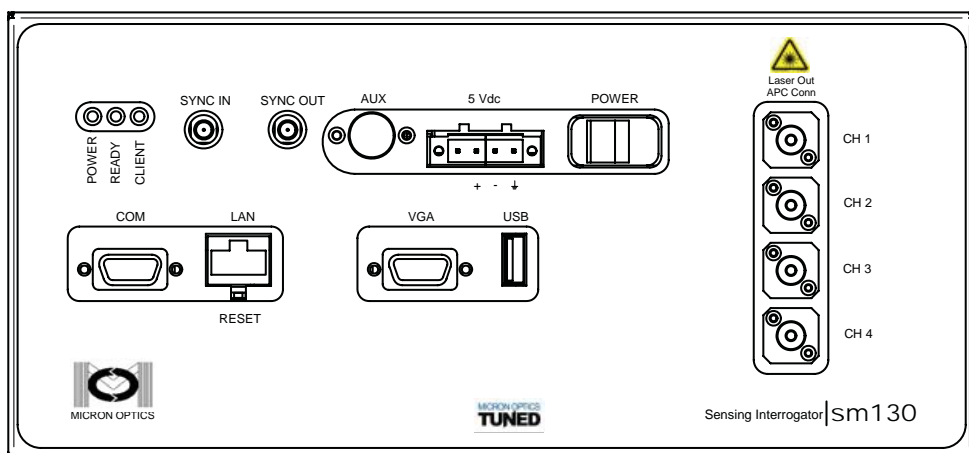
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optical sensing

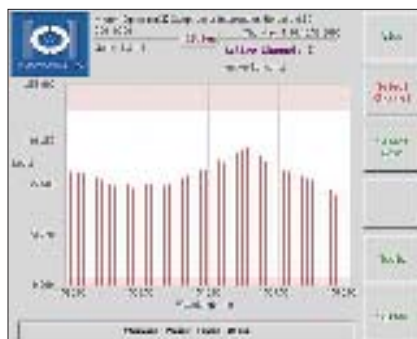


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## Connections

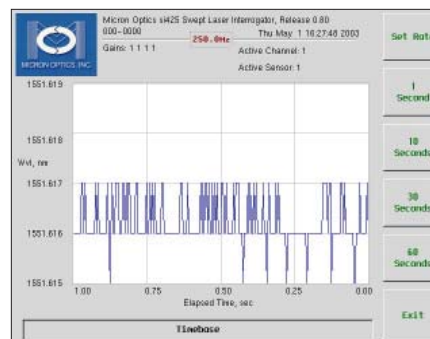


## Data Analysis Using LabVIEW™ Remote Utility



## Channel Power View

Used for system setup. Relative power of each sensor is displayed. See instant response to gain settings.



## Sensor Wavelength View

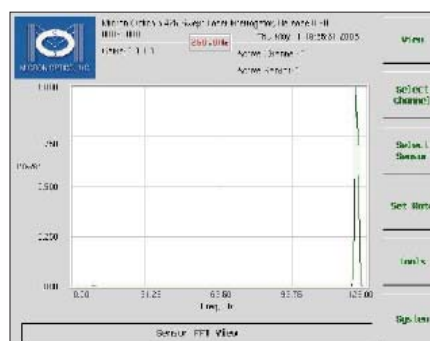
Shows sensor values as a function of time.

The screenshot shows a table with columns for Sensor, Channel, Channel 2, Channel 3, and Channel 4. The table contains 20 rows of sensor readings.

Sensor	Channel	Channel 2	Channel 3	Channel 4
1	1520820	1216350	1216350	1521600
2	1520820	1216350	1216350	0.000
3	1520820	1216350	1216350	0.000
4	1520820	1216350	1216350	0.000
5	0.000	1216350	1216350	0.000
6	0.000	1216350	1216350	0.000
7	0.000	1220310	1220310	0.000
8	0.000	1220310	1220310	0.000
9	0.000	1220310	1220310	0.000
10	0.000	1220310	1220310	0.000
11	0.000	1220310	1220310	0.000
12	0.000	1224270	1224270	0.000
13	0.000	1224270	1224270	0.000
14	0.000	1224270	1224270	0.000
15	0.000	1224270	1224270	0.000
16	0.000	1224270	1224270	0.000
17	0.000	1228230	1228230	0.000
18	0.000	1228230	1228230	0.000
19	0.000	1228230	1228230	0.000
20	0.000	1228230	1228230	0.000

## Table View

Shows dozens of sensor readings simultaneously.



## FFT View

Fast Fourier Transform (FFT) View shows frequency content for individual sensors.



## Benefits

- **No Calibration** - The sm130 never needs calibrating. Wavelength is calibrated automatically on every scan.
- **Robust Operation** - The sm130 survives harsh environments. Tests at professional facilities, meticulous customer evaluations and tests at Micron Optics headquarters prove how well Micron Optics products are designed and built.
- **Huge FBG Sensor Capacity** - The sm130 can monitor a huge number of multiplexed fiber Bragg grating sensors. With up to 80nm of wavelength range per channel and up to 16 optical channels, users of the system have great flexibility in designing their sensing system to maximize the number of sensors per interrogator, and to minimize total solution costs.
- **Fast Peak Detection** - FBG peak reflections provide the information needed to relate wavelength to strain, temperature or other measurands. The sm130's internal peak detection circuitry delivers fast, repeatable peak detection. The user can optimize peak detection parameters to meet each particular application.
- **Compact Size** - The sm130 weighs a mere 2.5kg and is smaller than a shoebox. All ports are accessible from one side allowing integration into existing control panels.
- **Verifiable Performance** - The performance we quote is the performance you will get. Some manufacturers boast fantastic numbers for accuracy, resolution and repeatability, but how will they perform in your application?
- **Modular Design** - The sm130 is offered in 3 standard models. Custom configurations allow optimization of unit costs and feature sets for volume customers. sm130 instruments use Ethernet to network to external PCs for data analysis.

