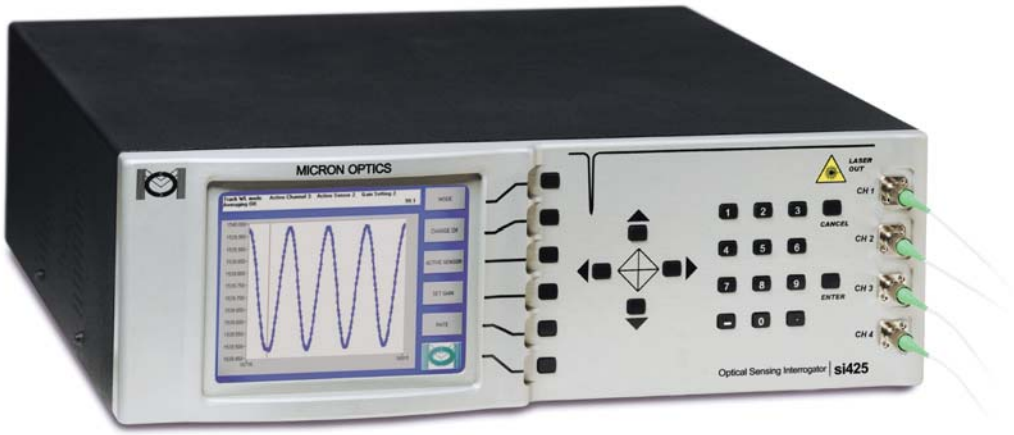
S

optical sensing

Optical Sensing Interrogator | si425



Applications

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

Description

The **si425 Optical Sensing Interrogator** is installed today monitoring hundreds of active structures. Users rely on the **si425's** ability to make fast, simultaneous, measurements of hundreds of fiber-optic strain and temperature sensors that indicate the health of their bridges, dams, tunnels and buildings.

The rugged **si425** combines an industrial PC with **Micron Optics'** robust, high-power, low-noise swept laser source. The **Micron Optics si425** is a complete standalone multi-FBG-sensor system that provides high optical power, and rapid measurement of up to 512 sensors on four fibers. It is expandable to 8 or 16 channels, and its modular design allows customization volume applications.

Micron Optics instruments are installed in hundreds of challenging applications all over the world, from large-span bridges in China to earthquake monitors in California to aircraft tests in Europe.

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

Micron Optics, Inc.
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www.micronoptics.com

si425 | Optical Sensing Interrogator

PRELIMINARY

Specifications		si425-500	si425-200
Optical			
Number of Optical Channels		4 (up to 16)	1 (up to 16)
Wavelength Range	[a]	1520-1570 nm (1510-1590 nm available)	
Wavelength Stability	[b]	2 pm typ, 5 pm max	
Wavelength Repeatability	[c]	0.5 pm at full speed, 0.05 pm with 250 averages	
Dynamic Range	[d]	25 dB	15 dB
Scan Frequency	[e]	250 Hz	50 Hz
Max Sensors per Channel		128	32
Optical Connectors		FC/APC (E2000 available)	
Mechanical			
Dimensions		134 mm x 432 mm x 451 mm	
Weight		15.5 kg (34 lbs)	
Color LCD Display		162 mm (diagonal)	No
Environmental			
Operating Temperature		10° to 40°C	
Operating Humidity		0 to 80%, non-condensing	
Storage Temperature		-20° to 70°C	
Storage Humidity		0 to 95%, non-condensing	
Electrical			
Input Voltage		100 VAC to 240 VAC, 50/60 Hz input (24 VDC available)	
Power Consumption		80 W typ, 150 W Max	
Interfaces		Ethernet	
Protocols		Custom MOI protocol via Ethernet	
Data Management			
On-Board Firmware		Instrument control, GUI management	
Remote Software		Peak detection, 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 sm040 multiplexers	
Local Data Storage	[f]	80GB Internal hard drive	

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Notes:

a 65,536 data points distributed over either 50nm or 80nm. Effect on performance is minimal.
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. 25dB over 3 gain stages. 15dB over 2 gain stages.
e Scan frequency is 125Hz for si425-500 for 100 or more sensors.
f Hard drive operating conditions may differ from si425 specifications.

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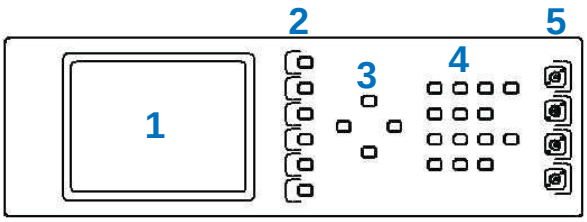
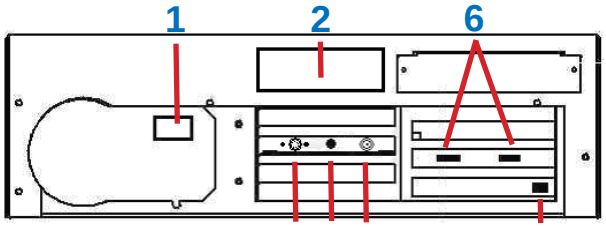
Connections



Front Panel View

1) LCD Display, used for viewing data
2) Menu Keys, used for navigation through options menus
3) Arrow Keys, used for incrementing integer data inputs
4) Number Keys, used to entering numeric data
5) FC/APC Connectors, used for connecting optical sensors



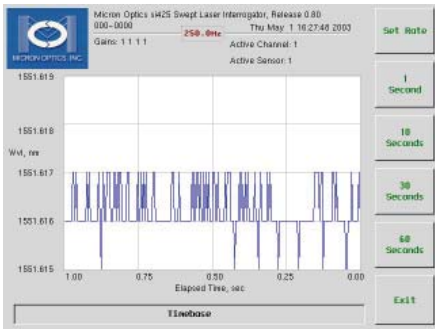
Rear Panel View

1) Connector for AC line cord
2) Label, including instrument serial number and calibration date
3) Accessories port
4) On/Off power switch
5) BNC connector for sync output, used for si425/system synchronization
6) USB connectors for keyboard attachment (intended for diagnostics),
7) RJ45 connector for Ethernet cable.

Data Analysis Using On-Board Controls and 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.

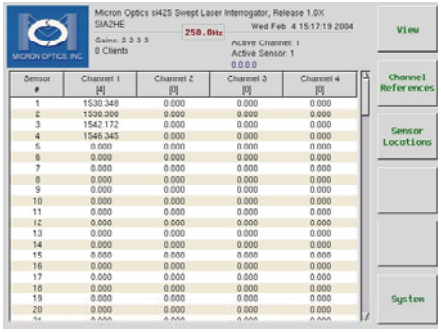
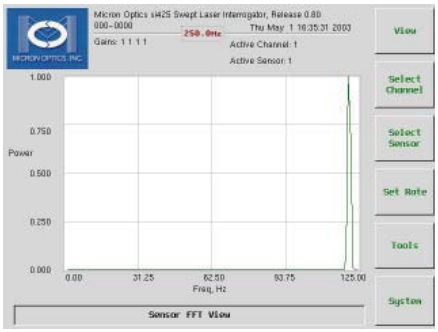


Table View

Shows dozens of sensor readings simultaneously.



FFT View

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

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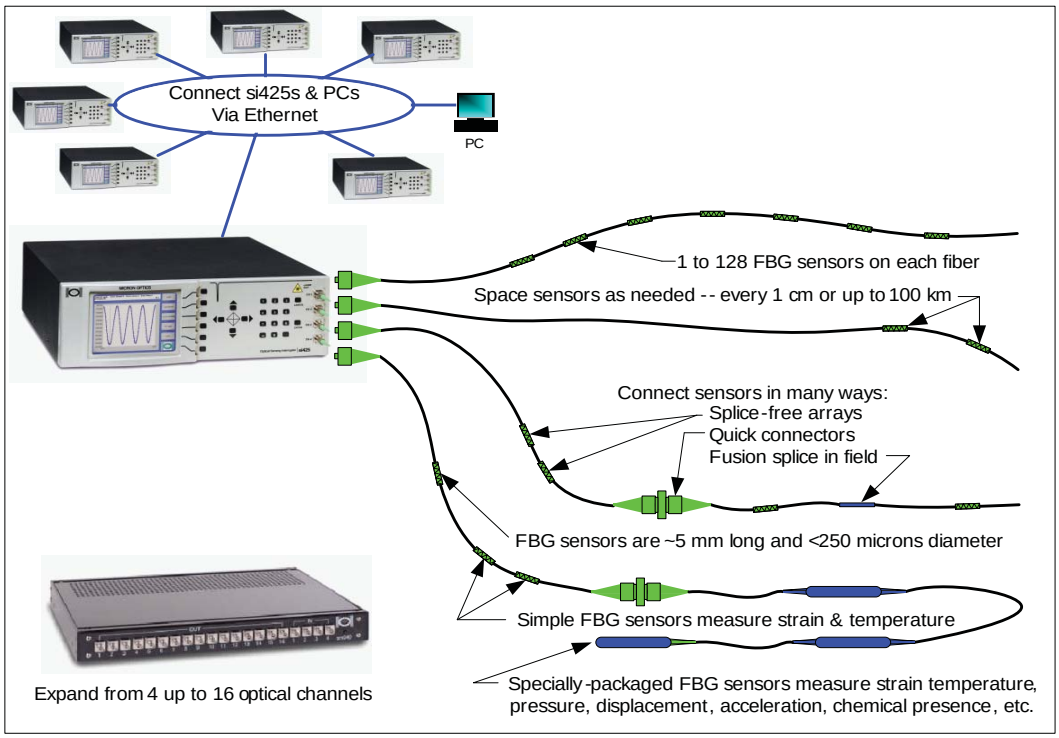
Benefits

- **No Calibration -** The si425 never needs calibration. Wavelength is calibrated automatically on every scan.
- **Robust Operation -** The si425 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 si425 can monitor a huge number of multiplexed fiber Bragg grating sensors. With 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 cost.
- **Fast Peak Detection -** The si425's on-board peak detection circuitry is fast and efficienty. That's why so many simultaneous measurments can be made at 250Hz.
- **Rack Mountable -** The si425 is designed for use in a convention instrument rack, in a protective enclosure at the measurment site, or on a lab bench. It is shown to withstand shock, vibration, and wide temperature extremes while performing to spec.
- **Verifiable Performance -** The performance we quote is the performance you'll get. Some manufacturers boast fantastic numbers for accuracy, resolution, and repeatability, but how will they perform in your application? Our specs apply over the entire operating range of temperature, humidity and vibration.
- **Modular Design -** The si425 is offered in three standard models. Custom configurations allow optimization of unit costs and feature sets for volume customers. Some si425 instruments have a built-in display and front panel controls. All use Ethernet to network to external PCs for additional data analysis.

Channel Expansion Modules

- **sm040-416 (16-channel Switch Extension):** 1U box converting four optical channel I/O from si425-500 to 16 optical channel I/O for sensor arrays. Product pricing includes all necessary jumpers, standard 100V/220V operation, control software and Ethernet command set providing access through LabVIEWTM.
- **sm040-408 (8-channel Switch Extension):** 1U box converting four optical channel I/O from si425-500 to 8 optical channel I/O for sensor arrays. Product pricing includes all necessary jumpers, standard 100V/220V operation, control software and Ethernet command set providing access through LabVIEWTM.
- **sm040-016 (16-channel Coupler Extension):** This 1U chassis contains four 1x4 couplers to accommodate connection of up to four fibers per channel. All fibers are scanned simultaneously. This provides no net gain of wavelength range or sensor capacity; it is solely intended to provide more fiber connection options.
- **sm040-008 (8-channel Coupler Extension):** This 1U chassis contains four 1x2 couplers to accommodate connection of up to two fibers per channel. All fibers are scanned simultaneously. This provides no net gain of wavelength range or sensor capacity; it is solely intended to provide more fiber connection options.



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