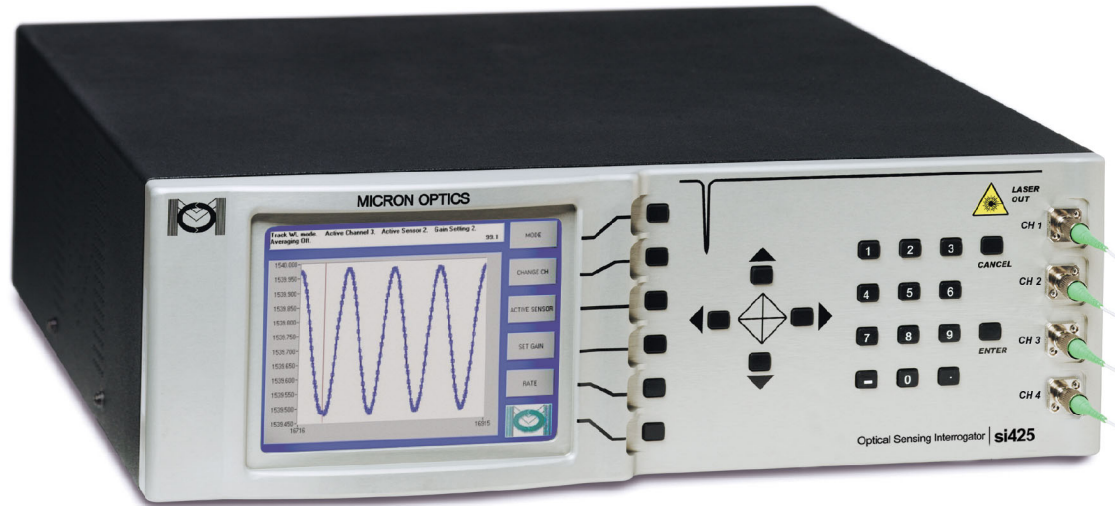




optical sensing



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



Specifications

si425-500

si425-300

si425-200

Optical

Number of Optical Channels	4 (8 & 16 available)	2	1
Max Sensors per Channel	128	64	32
^a Wavelength Range	1520-1570 nm (1510-1590 nm available)		
^b Wavelength Stability	2 pm typ, 5 pm max		
^c Wavelength Repeatability	0.5 pm at full speed, 0.05 pm with 250 averages		
^d Dynamic Range	25 dB	15 dB	15 dB
^e Scan Frequency	250 Hz	100 Hz	50 Hz
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	Yes	Yes	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		
^f Local Data Storage	Available (80 Gb internal hard drive)		
Interfaces	Ethernet (TCP-IP)		
Protocols	Custom MOI protocol via Ethernet (Modbus and others available)		

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

Wireless PDA Kit	Wireless Ethernet communication (802.11b), USB adaptor, PDA, and PDA Utilities		
PDA Utilities Software	Data display, data logger, and instrument control		
Channel Expansion	Please See Our 8 or 16 channel sm040 Multiplexers		

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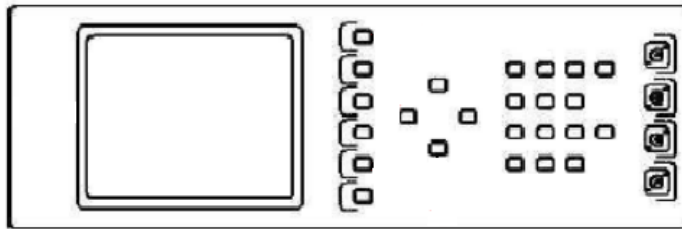
Notes:

- ^a 65,536 data points distributed over either 50 or 80 nm. 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.1.12, definition of "repeatability [of results of measurements]"
- ^d Defined as laser launch power minus detection noise floor. 25 dB over 3 gain stages. 15 dB over 2 gain stages
- ^e Scan frequency is 125 Hz for si425-500 for 100 or more sensors
- ^f Hard drive operating conditions may differ from si425 specifications

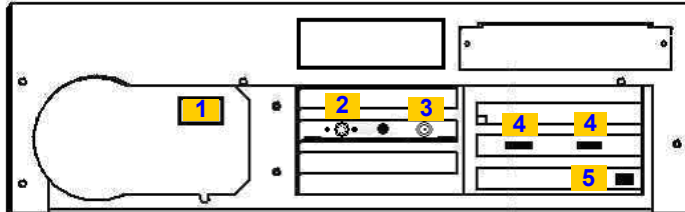


optical sensing

Connections



Front Panel Diagram



Back Panel Diagram

Optical Channels
1 through 4

1. Connector for AC line cord
2. Accessories port
3. BNC connector for Sync output used for si425 system synchronization
4. USB connectors for keyboard attachment (intended for diagnostics)
5. RJ45 connector for Ethernet cable

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.

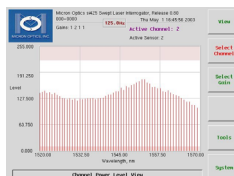
Fast Peak Detection - The si425's on-board peak detection circuitry is fast and efficient. That's why so many simultaneous measurements can be made at 250Hz.

Rack Mountable - The si425 is designed for use in a convention instrument rack, in a protective enclosure at the measurement site, or on a lab bench. It is shown to withstand shock, vibration, and wide temperature extremes while performing to spec.

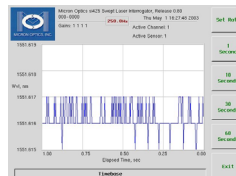
Verifiable Performance - The performance we quote is the performance you'll get. Some manufacturers boast fantastic numbers for accuracy, resolution, and repeatability, but how will they perform in your application? Our specs apply over the entire operating range of temperature, humidity and vibration.

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.

Data Analysis Using On-Board Controls and LabVIEW™ Remote Utility



Channel Power View



Sensor Wavelength View

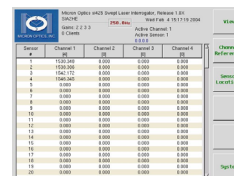
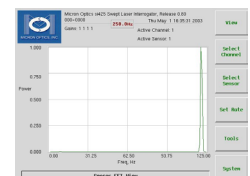


Table View



FFT View

Channel Power View is 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 simultaneously dozens of sensor readings

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

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 LabVIEW™.

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 LabVIEW™.

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.

