



optical sensing



### Applications

- ◆ Fiber Bragg grating (FBG) strain, temperature and pressure measurements
- ◆ Extrinsic Fabry-Perot (EFP) strain, temperature and pressure measurements
- ◆ Development of fiber optic sensor packages and transducers
- ◆ Analysis of FBG and EFP sensor behavior and shape



### Description

The **sm125 Optical Sensing Interrogator** meets the growing demand for measuring strain, pressure and temperature in civil, down-hole oil, and pipeline applications where both high accuracy and low cost are required. Most of these applications require the durability and versatility of the fiber Bragg grating based strain, temperature and pressure sensors for which the **sm125** is well suited.

The small, accurate, powerful and economical **sm125** combines an industrial PC with **Micron Optics'** robust, high-power, low-noise swept laser source. **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)
- ◆ **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	sm125-500	sm125-300	sm125-200
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**Optical**

Number of Optical Channels	4 (8 & 16 available)	2	1
Wavelength Range	1510-1590 nm	1520-1570 nm	1520-1570 nm
<sup>a</sup> Wavelength Accuracy	1 pm	5 pm	10 pm
<sup>b</sup> Wavelength Stability	1 pm	2.5 pm	5pm
<sup>c</sup> Wavelength Repeatability	0.5 pm at 1 Hz, 0.2 pm at 0.1 Hz		
<sup>d</sup> Dynamic Range	50 dB	45 dB	40dB
Scan Frequency	1 Hz (2 Hz available)		
Typical Sensor Spacing	> 2 x Sensor Bandwidth		
Optical Connectors	FC/APC (E2000 available)		

**Mechanical**

Dimensions	114 mm x 234 mm x 132 mm		
Weight	2 kg (4.5 lbs)		

**Environmental**

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

**Electrical**

Input Voltage	+5 VDC (9 to 36 VDC converter available)		
AC/DC Converter	Included (100~240 VAC, 47~63 Hz)		
Power Consumption	18 W typ, 30 W Max		
<sup>e</sup> Local Data Storage	Available (external USB memory)		
Interfaces	Ethernet (TCP-IP) (USB, RS-232, RS-485, and wireless Ethernet available)		
Protocols	Custom MOI protocol via Ethernet (Modbus and others available)		

**Data Management**

On-Board Firmware	Full-spectrum and peak-detection modes		
Remote Software	Spectral analysis, peak detection, data logger, peak tracking, and instrument control		
LabView Source Code	Allows for customization of remote software		

**Options**

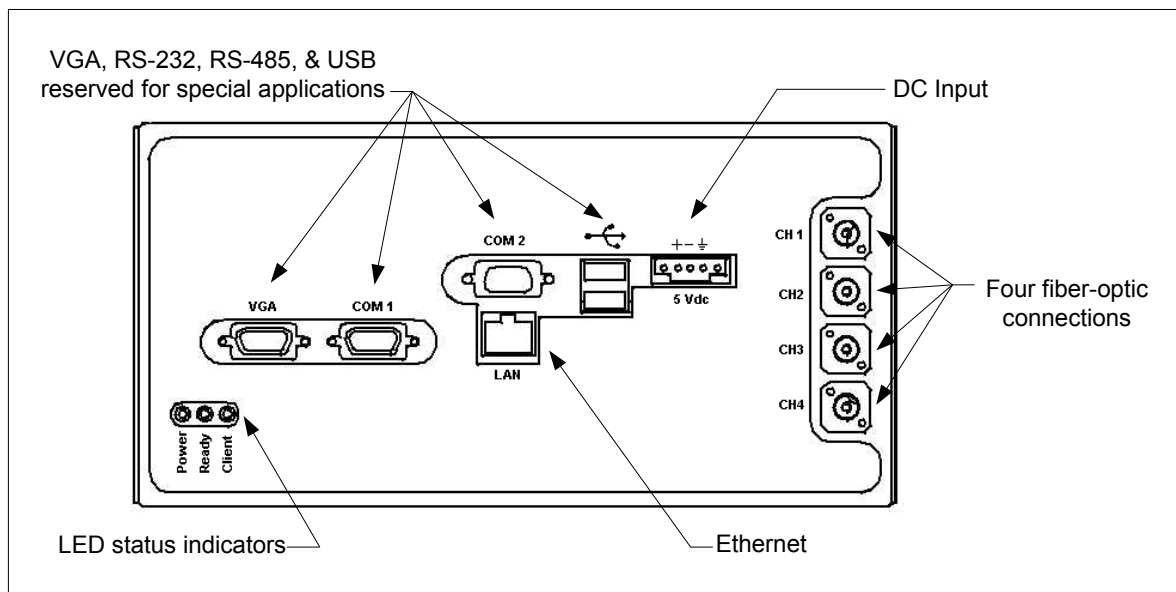
Wireless PDA Kit	Wireless Ethernet communication (802.11b), USB adaptor, PDA, and PDA Utilities		
PDA Utilities Software	Data display, data logger, and instrument control		
Channel Expansion	Please See Our 8 or 16 channel sm041 Multiplexers		

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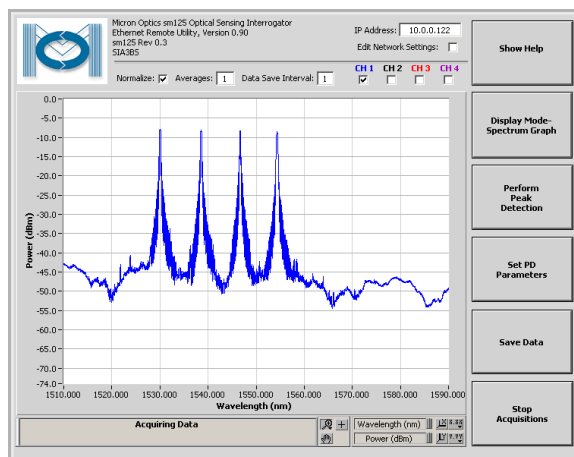
**Notes:**

- <sup>a</sup> Per NIST Technical Note 1297, 1994 Edition, Section D.1.1.1, definition of "accuracy of measurement"
- <sup>b</sup> Captures effects of long term use over full operating temperature range of the instrument.
- <sup>c</sup> Per NIST Technical Note 1297, 1994 Edition, Section D.1.1.2, definition of "repeatability [of results of measurements]"
- <sup>d</sup> Defined as laser launch power minus detection noise floor.
- <sup>e</sup> USB memory operating conditions may differ from sm125 specifications.

## Connections

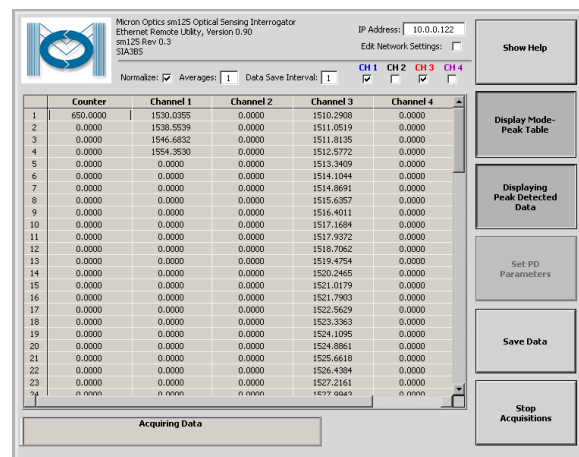


## Data Analysis Using LabVIEW™ Remote Utility



### sm125 Full-Spectrum View

The sm125 produces a complete set of spectral information every second for every sensor on every fiber. The complete spectrum contains the most information possible regarding the condition at each sensor. This can be displayed as wavelength vs. optical power (as above) or time.



### sm125 Peak Table View

This is another example of the LabVIEW™ Remote Utility included with standard sm125 instruments. User-configurable peak detection parameters allow customization for various applications. All LabVIEW™ source code is provided for fully-custom user-interface development. Interfaces can also be written in VisualBasic, C++, or your favorite programming environment.

## Benefits

**No Calibration** - The sm125 never needs calibration. Wavelength is calibrated automatically on every scan. Some models include an internal NIST-traceable gas cell for applications where tight absolute measurements are needed.

**Robust Operation** - The sm125 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 sm125 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.

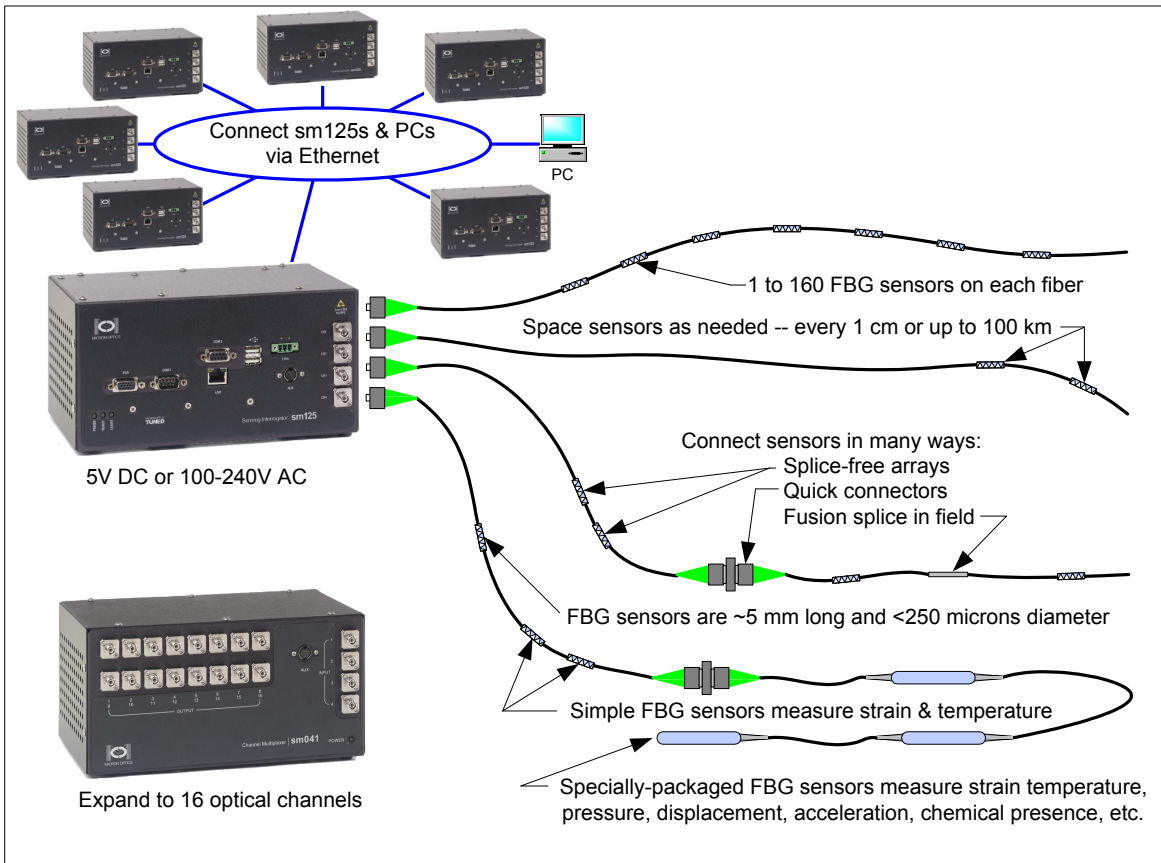
**Full Spectrum Flexibility** - Sensors in special applications can produce unique spectral profiles. The sm125's full-spectral data allows the user to get a complete picture of how the sensor is performing under all conditions.

**Fast Peak Detection** - Using the full-spectrum data, on-board peak detection capabilities are included and can be customized for each application.

**Compact Size** - The sm125 weighs a mere 2kg and is smaller than a shoebox. All ports are accessible from one side allowing integration into existing control panels or convenient connections right in its hard-shell carrying case.

**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?

**Modular Design** - The sm125 is offered in three standard models. Custom configurations allow optimization of unit costs and feature sets for volume customers. sm125 instruments use Ethernet to network to external PCs for data analysis. OEM units may include MODBUS, RS-232, USB, local data storage, etc., and can leverage the powerful internal processor for customized sensor analysis and status alerts.



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