

FAZT I4-16 INTERROGATOR



Description

The FAZT I4-16 optical sensing instrument combines the core technology of the flagship FAZT I4G interrogator together with four 1x4 high-reliability, high-speed, premium performance solid-state optical switches to create a 16 Channels Interrogator. Enclosed in a field deployable stainless-steel casing, the instrument provides peak detection for up to 30 Fiber Bragg Gratings (FBG) based sensors on each of its 16 channels. The instrument can be operated in full spectrum and sensor peak detection modes. The FAZT I4-16 is optimized for both static and dynamic measurements.

Our family of rugged FAZ Technology interrogators is used extensively in marine, railways, roads, energy, civil, geotechnical, industrial, security, medical, and many other commercial applications. It is also the instrument of choice for Research and Development Centers that seek to achieve ultimate precision and repeatability measurements. The industrial grade design scales well in volume production.

Benefits

Ultimate precision, repeatability, and accuracy: The FAZT I4-16 Interrogator returns measurements in 1pm steps across its wavelength range. Using patented FAZ Technology scan-by-scan calibration, the instrument features ultimate 0.1pm absolute precision, superb repeatability of 50fm max, and absolute accuracy of 1pm (Gas Cell and MZI referenced in closed PM circuit). *Ultimate measurements require tight control of all three calibration parameters: precision, accuracy and repeatability.*

Top reliability: The FAZT I4-16 Interrogator is based on a semiconductor tunable laser that has no movable parts, no tunable filters, and no opto-mechanical switches, which delivers top reliability over a broad temperature range to form an integral part of a very rugged and reliable sensing system.

Adaptive to more types of sensors: The integrated electronics and embedded software allow the user to quickly adapt the instrument's performance parameters to fit many different sensor configurations. Designed to monitor with ultimate precision more types of sensors than any other instrument, from narrow bandwidth (40-100pm) FBGs used in high-sensitivity accelerometers, pressure sensors, hydrophones, and microphones, to wide bandwidth (1.5nm) FBGs used in bio-sensing. Hardware implementation of peak tracking algorithms for FBG sensors including programmable gain per sensor, width/height thresholds, and distance to sensor setting for accuracy at long distance. The laser output power (typically ~2 dBm depending on configuration) and high sensitivity receiver yield exceptional optical dynamic range performance over long distances.

Systems and network ready: High speed data acquisition and on-board computer processing make the FAZT I4-16 easy to use and easy to transmit large volumes of data by network connection. Trigger Input support enabling synchronization of multiple optical and electrical sensor systems. The Ethernet port for high speed data transfer is 100Mbit/s, with all interrogator settings programmable over a REST interface. NTP (<10ms timestamps) Time accuracy with optional GPS time (<10µs timestamps).



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Applications include Aerospace, Marine, Railways, Roads, Civil & Geo Engineering, Energy, Industrial, and R&D Labs

Femto Sensing International undertakes a rigorous development process before products release. The company is also firmly committed to continuous improvements after release to ensure performance and reliability to the highest standards, hence, specifications are subject to update without notice.

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| PARAMETER | SPECIFICATIONS | NOTES |
|---|-------------------------|--|
| Wavelengths Range | 39.2nm | 1529nm to 1568.2nm |
| Number of Channels | 16 | |
| Number of Sensors per Channel (see Note 1) | 1 to 30 | 16ch * 30 = 480 sensors (assuming 1.2nm spacing of FBG sensors) |
| Wavelength Sample Size / Resolution | 1pm | Raw data. Resolution can be further improved with averaging |
| Wavelength Absolute Accuracy | < 1pm | Gas Cell and MZI referenced in closed loop PM circuit to guarantee long-term performance |
| Wavelength Precision | < 0.1pm | Defined over an 8 hour test |
| Wavelength Repeatability (see Note 2) | < 0.05 pm | |
| Laser Line-Width | 20 MHz | Self-heterodyne measured line-width at static wavelength |
| Laser Output Power per Channel (see Note 3) | +0 to +3dBm | Performance is maintained even with 20dB optical power loss |
| Scan Frequency / FBG Processing | 250Hz | For 16 parallel channels. Also retains 4ch operation at 1/2/4/8 KHz modes of I4G |
| Scan Frequency (Full Spectrum @ 1pm) | 1Hz | 1Hz for 16 channels with 1pm resolution |
| Polarization Switching States | 2 States | Switches polarization state every sweep when user enabled |
| Sensor Range / Distance | 0 to 10km | Lead-in cable (0 to 7.5km), FBG section (0 to 3.25km) |
| Input Voltage and Power Consumption | 12V and 25W | Auto-detect 100V to 240V AC with 12V supply block included |
| Operating Temperature | 0 to +55°C | -20°C to +55°C operation range also available |
| Dimensions (WxDxH) and Weight | 324x276x116mm and 4.9kg | Color is RAL-9005 Black |
| Optical Connection to Sensors | LC/APC | |
| Certifications and Test Reports | YES | See FAZT I4G Datasheet for complete listing of certifications |
| Communications Interface | YES | 100Mbps Ethernet, REST control interface and multiple data output formats/ports |
| Supplied Software | YES | FEMTOSENSE configuration tool, LABVIEW interface examples, API Support Document |

Note 1: FBGs from 40pm to 1.5nm BW@3dB (FWHM) are supported.

Note 2: Standard deviation measured over a 10 second duration for a stable FBG peak. The FBG FWHM is 100pm and the measured reflected FBG peak power is -15dBm.

Note 3: Dynamic programmable receiver gain per sensor (4 levels covering 12dB of gain) delivering >30dB optical power dynamic range (saturation - minimum detectable power levels) at 250Hz sweep rate.

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