

DATASHEET

FAZT I4G Interrogator



Description

The FAZT I4G optical sensing instrument is a revolutionary new breed of interrogator. Featuring 4 monitoring channels the FAZT-I4G is the company's flagship model instrument. 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 4 channels. The instrument can be operated in full spectrum and sensor peak detection modes. The FAZT I4G 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 I4G Interrogator returns measurements in 1pm steps across its wavelength range. Using patented FAZ Technology scan-by-scan calibration, the instrument features ultimate 0.1pm 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 I4G 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 ~3 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 I4G 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).

Specifications

Performance

Wavelengths Range	39.2nm	1529nm to 1568.2nm
Number of Channels	4	
Number of Sensors per Channel (see Note 1)	1 to 30	4ch * 30 = 120 sensors (assuming 1.2nm spacing of FBG sensors)
Wavelength Sample Size / Resolution	1 pm	Raw data. Resolution can be further improved with averaging
Wavelength Absolute Accuracy	< 1 pm	Gas Cell and MZI referenced in closed loop PM circuit to guarantee long-term performance
Wavelength Precision	< 0.1 pm	Standard deviation of a tracked HCN P10 Gas Cell line measured >8-hours
Wavelength Repeatability (see Note 2)	< 0.05 pm	20fm typical achieved with suitable sensors
Laser Line-Width	20 MHz	Self-heterodyne measured line-width at static wavelength
Laser Output Power per Channel (see Note 3)	+1 to +5dBm	Performance is maintained even with 20dB optical power loss
Scan Frequency / FBG Processing	1/2/4/8 KHz	2kHz@39.2nm, 4kHz@18nm, 8kHz@8nm operation modes supported; user selectable
Scan Frequency (Full Spectrum @ 1pm)	4/16 Hz	4Hz for 4 channels or 16Hz for 1 channel, always with 1pm true raw data resolution
Polarization Switching States (see Note 4)	2 States	Switches polarization state every sweep when user enabled (supported @ 1kHz)
Sensor Range / Distance	0 to 10 km	Lead-in cable (0 to 7.5km), FBG section (0 to 3.25km)

Environmental

Operating temperature	0 to +55°C	
Storage temperature	-20 to +70°C	

Physical

Dimensions (W x D x H)	325x276x88mm	Color is White
Max. weight	4.4 kg	
Housing material	Stainless steel	
Input Voltage and Power Consumption	12V and 25W	Auto-detect 100V to 240V AC with 12V supply block included
Fiber port	LC/APC	We offer hybrid optical jumpers and adapters to FC/APC, SC/APC, and other sensor connectors
Certifications and Test Reports	YES	CE Certified, Emissions and Immunity to EN61326-1:2013, EN55011:2009+A1:2010, EN61000-3-2:2014, EN61000-3-3:2013, Safety Standards EN61010-1, Laser Safety to IEC 60825, ATEX Compliance Certification Available, REACH and ROHS Compliant.
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

*Notes on next page

Note 1: FBGs from 40pm to 1.5nm BW@3dB (FWHM) are supported. Ultimate performance results at 4kHz and 8kHz obtained using 160pm FBGs from www.technicasa.com

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 kHz sweep rates.

Note 4: The standard flagship I4G model includes the internal solid-state high-speed polarization switch. Other polarization control options include the I4G-P1 with passive depolarizer for femtosecond-FBGs.

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