

DATA SHEET

MXFS SI QuantumX BraggMETER Module

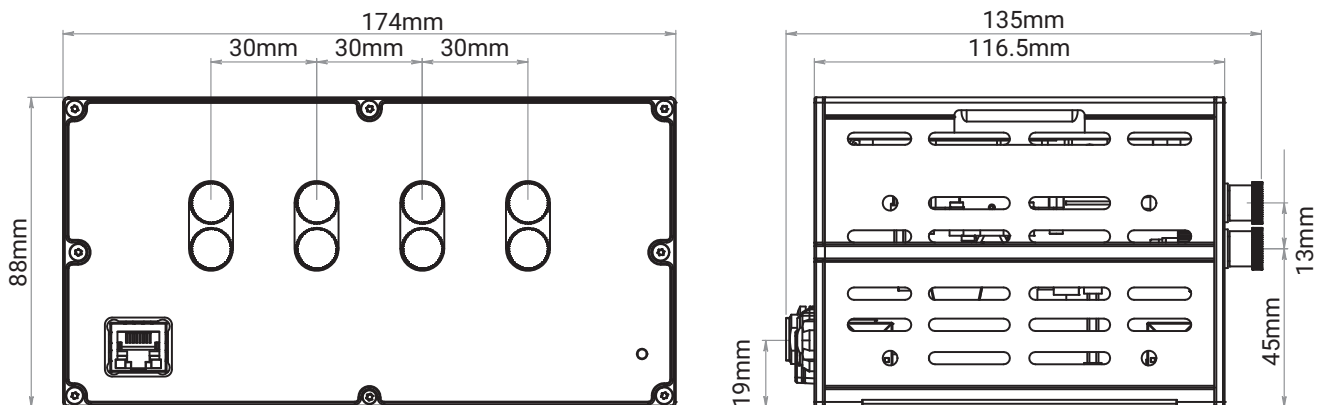
SPECIAL FEATURES

- Optical interrogator for FBG sensors
- Synchronous parallel measurements of hundreds of sensors
- 10 S/s and 1 S/s acquisition rates
- Multiple active low pass filtering
- Smart Peak Detection (SPD)
- Delivered with catman® software
- EN45545 and ATEX certified

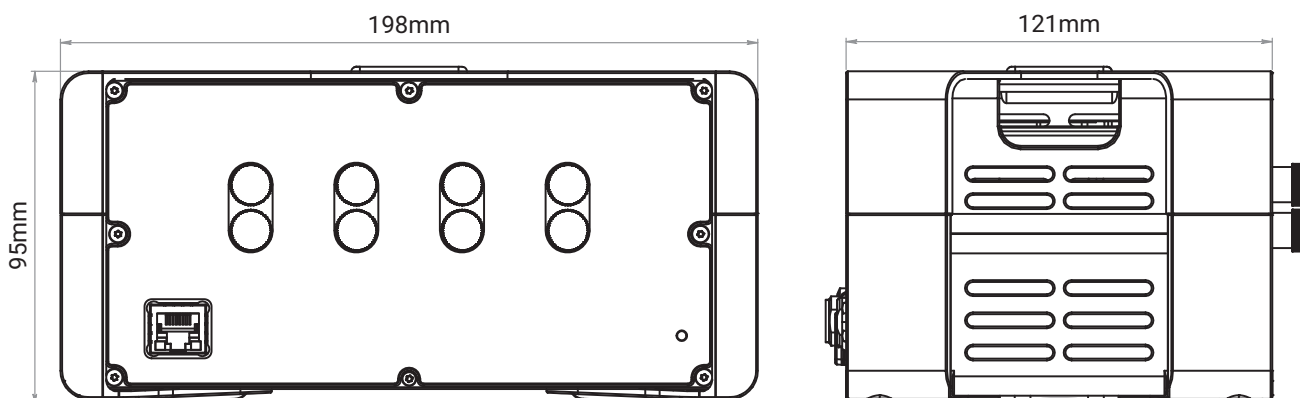


TECHNICAL DRAWINGS

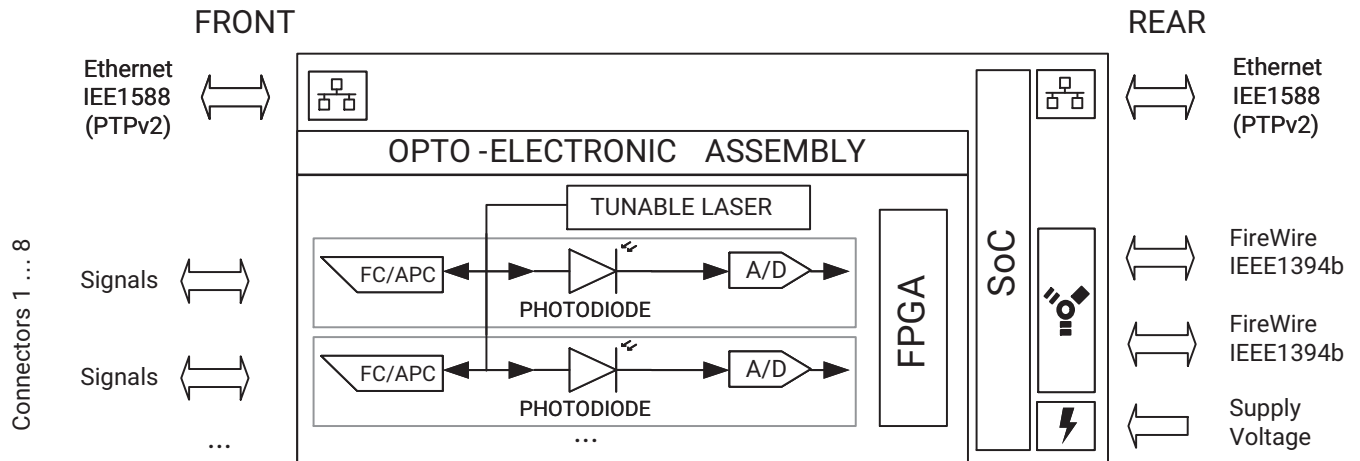
Without case protection



With case protection



BLOCK DIAGRAM



DESCRIPTION

The MXFS BraggMETER module is an optical interrogator based on the QuantumX platform. The compatibility with the QuantumX family adds to fiber Bragg grating (FBG) measurements the possibility of including any other type of sensors in the same sensing network, as well as the generation of analog/digital control signals and the use of most common industrial protocols.

MXFS BraggMETER Modules are delivered together with the powerful catman®Easy software for data acquisition, analysis, visualization and storage.

BraggMETER interrogators employ proven continuous swept laser scanning technology that includes a NIST traceable wavelength reference, providing continuous calibration to ensure system accuracy over long term operation. The high dynamic range and output power combined with Smart Peak Detection allow high resolution to be attained even for long fiber leads and lossy connections.

The MXFS device is certified for fire safety (EN45545) and explosive environments (ATEX).

BENEFITS AND APPLICATION

Interrogator

- Modular design of the QuantumX platform, combinable with all modules
- Compatible with catman® software
- Drivers for connecting to third party software
- Small size and weight for mobile applications
- Excellent accuracy suiting detailed applications such as temperature measurements
- Long term operation for monitoring of Civil structures, wind turbines or ship hulls. Certified for usage in railway vehicles through EN45545
- Measurement of sensors under high voltage or explosive areas: electrical machines, pantograph and overhead power lines, energy distribution infrastructure, LNG tanks, etc.

Fiber Bragg grating technology

- No drift, absolute referenced measurements
- Immune to electro-magnetic and radio frequency interferences
- Passive technology fitting applications in explosive areas
- Reduced cable requirements with intrinsic multiplexing capability
- Long distances between sensors and the interrogators attainable
- Combinable with other FBG sensor types on the same fiber and same interrogator

SPECIFICATIONS FOR MXFS SI

		High speed mode		Low speed mode	
General specifications					
Inputs	-	8			
Connector types	-	FC/APC or SC/APC			
Transducer types	-	Any, based on Fiber Bragg Grating (FBG)			
Output options	-	Relative Wavelength, Absolute Wavelength, Strain, Temperature ¹⁾ , Acceleration, General polynomial ¹⁾			
Optical wavelength measurement range	nm	1,500 to 1,600 [100]			
Maximum number of channels ²⁾	-				
Per optical connector		64			
Total		512			
Sample rate ³⁾	S/s	10		1	
Output rate ⁴⁾	S/s	0.1 ... 10		0.1 ... 1	
Resolution/Repeatability ⁵⁾	pm	< 0.5			
Stability/Reproducibility ⁵⁾	pm	< 1			
Peak detection method	-	SPD ⁶⁾			
Dynamic range ⁷⁾	dB	> 50			
OSA ⁸⁾	-	Yes			
Optical Output Power per connector	dBm				
Typical		-4.5			
Maximum		-4			
Active filters	Hz	Bessel, Butterworth, linear phase 0.1 ... 1 (-3 dB), filter OFF			
Supply voltage	V	12 ... 30 (24 V nominal (rated) voltage)			
Power supply interruption	-	Max. 5 ms at 24 V			
Power consumption	W				
At startup (20 s)		< 35			
Nominal		< 13			
Ethernet (data link)		10Base-T/100Base-TX			
Protocol/addressing	-	TCP/IP (direct IP address or DHCP)			
Connection	-	8P8C plug (RJ-45) with twisted pair cable, Streaming (CAT-5)			
Max. cable length to module	m	100			
Synchronization ⁹⁾					
FireWire	-	IEEE1394b (2 ports per device)			
Ethernet	-	IEEE1588 (PTPv2) or NTP (2 ports per device)			
IEEE1394b FireWire (module synchronization, data link, optional supply voltage)		IEEE1394b (HBK modules only)			
Baud rate	MBaud	400 (approx. 50 Mbyte/s)			
Max. current from module to module	A	1.5			
Max. cable length between nodes	m	5			
Max. number of modules connected in series (daisy chain)	-	12 (=11 Hops)			
Max. number of modules in a IEEE1394b Firewire system (including hubs ¹⁰⁾ backplane)	-	24			
Max. number of hops ¹¹⁾	-	14			
Environmental and mechanical					
Operating temperature range	°C [°F]	-20 ... +50 [-4 ... +122]			
Storage temperature range (EN60068-2-1; EN60068-2-2, EN60068-2-14)	°C [°F]	-40 ... +75 [-4 ... +167]			
Relative humidity	%	5 ... 95 (non-condensing)			

		High speed mode	Low speed mode
Mechanical tests¹²⁾			
Sinusoidal Vibration		EN60068-2-6	API 17f (Q2)
Acceleration	g0-PK	2	5
Duration per axis	min	160	10
Frequency	Hz	10 ... 150	5 ... 150
Random Vibration		EN60068-2-64	API 17f (Q2)
Acceleration	gRMS	1.87	6
Duration per axis	min	30	120
Frequency	Hz	10 ... 500	20 ... 2000
Shock resistance		EN60068-2-27	API 17f (Q2)
Acceleration	g0-PK	15	10
Pulse Duration	ms	6	11
Number of impacts		600	24
EMC requirements	-	Per EN 61326	
Fire Safety (EN45545-2)	-	Hazard levels HL1, HL2 and HL3, according to EN45545-2:2016 and DIN EN45545-2:2020 (without case protection)	
ATEX (EN60079-28) IECEx (EN60079)	-	The device must be erected outside of the explosive atmosphere. The interrogator has been approved according to the EN60079-28:2015, IEC60079-0:2017 and IEC60079-28:2015 for: II (1)G [Ex op is IIC T6 Ga] Zone 0 for gas group IIC II (1)D [Ex op is IIIC Da] Zone 20 for dust group IIIC I (M1) [Ex op is I Ma] Zone M1 for mining	
Dimensions, horizontal (w x h x d)	mm	198 x 95 x 135 (with case protection) 174 x 88 x 135 (without case protection)	
Weight	kg	1.7 (with case protection) 1.5 (without case protection)	
Degree of protection (EN60529; IEC529)	-	IP20	

1) Third order polynomial of the type ax^3+bx^2+cx+d

2) Maximum number of definable channels. The maximum number of meaningful channels that can accommodate readable sensors is influenced by external factors such as the sensors' operating wavelength range, optical losses, and sensor reflectivity.

3) User selectable. Changing the speed mode will restart the device.

4) Minimum output rate using catman is 1Hz.

5) Measurements carried out using calibrated instrument against NIST traceable gas cell. Accuracy as per NIST Technical note 1297. Resolution/repeatability measured as σ value at room temperature over the full wavelength range for 1 min. Stability/Reproducibility measured as $|\mu|+\sigma$ value over full temperature range and over full wavelength range for more than 50 h. Measurements taken without any filtering. Further details on HBK FiberSensing technical notes.

6) Smart Peak Detection. Allows optimum management of multiple FBG with different losses/reflectivities in a single connector. For further details please refer to HBK FiberSensing technical notes.

7) Measured as the admissible loss of a FBG peak that still ensures a measurement repeatability <0.5 pm on both speed modes.

8) Optical Spectral Analysis available at both speed modes (0.5 S/s refresh rate; 10000 points per trace).

9) EtherCAT® available via CX27 gateway module and IRIG-B available via MX440B or MX840B

10) Hub: IEEE1394b FireWire node or distributor.

11) Hop: Transition from module to module/signal conditioning.

12) Device turned on and measuring. No communication losses observed. Tests passed with criteria A - no degradation on measurement - and B - outliers observed, but returning to normal behavior after test. for further details please contact HBK FiberSensing. API 17f is a specific Standard for Subsea Production Control Systems from the American Petroleum Institute (www.api.org).

SOFTWARE, INCLUDED

Article	Description	Order no.
catman® Easy	Test and measurement software for system configuration, data acquisition, analysis, visualization and storage. Includes maintenance for 12 months.	1-CATMAN-EASY

SOFTWARE, TO BE ORDERED SEPARATELY

Article	Description	Order no.
catman® Easy to AP upgrade¹³⁾	Software upgrade: catman Easy to catman AP full version. Only possible with a registered catman Easy version and valid maintenance contract. License key for activation is delivered by e-mail.	1-CATEASY-TO-AP
catman® AP¹³⁾	All-inclusive package, comprising catman® Easy Functionality plus add-on modules such as video camera integration (EasyVideoCam), full post-process analysis (EasyMath), recurrent activity automation (EasyScript), measurement project preparation offline (EasyPlan), and additional functions such as electrical power calculation, special filters, frequency spectrum, etc. Details at https://www.hbkworld.com/pt/products/software/daq	1-CATMAN-AP
catman® PostProcess	PostProcess edition for visualization, analysis and processing of measurement data with many mathematical functions, data export and reporting.	1-CATEASY-PROCESS
LabVIEW™ driver	Universal driver from HBK for LabVIEW™	1-LabVIEW-DRIVER

¹³⁾ MXFS SI is compatible with catman version 5.6.1 or higher

ACCESSORIES, TO BE ORDERED SEPARATELY

Article	Description	Order No.
Power		
AC-DC power supply / 30 W	Input : 100 ... 240 V AC (± 10%), 1.5 m cable Output: 24 V DC, max. 1.25 A, 2 m cable with ODU connector	1-NTX001
3m cable - QuantumX supply	3 m cable for voltage supply of QuantumX modules; Suitable plug (ODU Medi-Snap S11M08-P04MJGO-5280) on one side and open strands on the other end.	1-KAB271-3
Communication		
Ethernet cable	Ethernet patch cable for direct operation between a PC or Notebook and a module / device, length 2 m, type CAT6A	1-KAB239-2
IEEE1394b FireWire cable (module-to-module)	FireWire connection cable for QuantumX or SomatXR-modules; with matching plugs on both sides. Length 0.2 m (angled) / 2 m / 5 m Note: The cable enables QuantumX modules to be supplied with power (max. 1.5 A, from the source to the last drain).	1-KAB272-W-0.2 1-KAB272-2 1-KAB272-5
Mechanic		
Connecting elements for QuantumX modules	Connecting elements (clips) for QuantumX modules; Set comprising 2 case clips including mounting material for fast connection of 2 modules.	1-CASECLIP
Connecting elements for QuantumX modules	Fitting panel for mounting of QuantumX modules using case clips (1-CASECLIP), lashing strap or cable tie. Basic fastening by 4 screws.	1-CASEFIT

Article	Description	Order No.
QuantumX Backplane (big)	QuantumX Backplane for a maximum of 9 modules - Mounting on wall or control cabinet (19") - Connection of external modules by FireWire possible - Power supply: 18 ... 30 V DC / max. 5 A (150 W)	1-BPX001
QuantumX Backplane (Rack)	QuantumX Backplane - Rack for maximum 9 modules - 19" rack mounting with handles left and right - Connection of external modules via FireWire possible - Power supply: 18 ... 30 V DC / max. 5 A (150 W).	1-BPX002
QuantumX Backplane (small)	QuantumX Backplane for a maximum of 5 modules - Connection of external modules by FireWire possible - Power supply: 11 ... 30 V DC / max. 3.75 A (90 W)	1-BPX003

SPECIFICATIONS POWER PACK NTX001

NTX001		
Nominal input voltage (AC)	V	100 ... 240 ($\pm 10\%$)
Stand-by power consumption at 230 V	W	0.5
Nominal load		
U _A	V	24
I _A	A	1.25
Static output characteristics		
U _A	V	24 \pm 4%
I _A	A	0 ... 1.25
U _{Br} (Output voltage ripple; peak to peak)	mV	≤ 120
Current limiting, typically from	A	1.6
Primary - secondary separation		galvanically, by optocoupler and converter
Creep distance and clearance	mm	≥ 8
High-voltage test	kV	≥ 4
Plugs and cables	-	international plugs
Ambient temperature range	°C [°F]	0... +40 [+32 ... +104]
Storage temperature	°C [°F]	-40 ... +70 [-40 ... +158]

ORDERING INFORMATION

Description	Order no,
Static BraggMETER Interrogator Module with 8 Optical Channels and FC/APC connectors	1-MXFS8SI1/FC
Static BraggMETER Interrogator Module with 8 Optical Channels and SC/APC connectors	1-MXFS8SI1/SC

HBK FiberSensing S.A.

Via José Régio, 256 · 4485-860 Vilar do Pinheiro · Portugal
Phone: +351 229 613 010 · Fax: +351 229 613 020
www.hbkworld.com · info.fs@hbkworld.com

Subject to modifications. All product descriptions are for general information only.
They are not to be understood as a guarantee of quality or durability.