

Manual

FBG-Scan X0X

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1 THE FBG-SCAN X0X

This hardware manual applies to the following set of FBG-Scan interrogators:

Model	Wavelength range [nm]	Number of channels	Max scan rate [Hz]
800	1510 - 1590	1	2000
804		4	500
808		8	250
904		4	400
908		8	220

These interrogators are dynamic, high accuracy measurement devices for Fibre Bragg Grating (FBG) sensors. The units can have 1, 4 or 8 optical input channels. They can measure up to 40 FBG sensors per optical channel. All sensors on of an input channel are simultaneously monitored. The maximum scan rate depends on the number of channels, as indicated in the above table.

The system contains a broadband light source and performs spectral analysis by means of a spectrometer. A user-friendly software interface called the 'ILLumiSense' software allows reading out the spectral information from a laptop over USB 2.0 and calculating the peak wavelengths in real time.




Figure 1: Picture of the FBG-Scan 904

2 SAFETY, COMPLIANCE AND WARRANTY

2.1 Safety Symbols

The following safety symbols are marked on the unit. The purpose of safety symbols is to alert the user to possible dangers. The safety symbols and the explanations within this manual deserve your careful attention and understanding. The safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures.

Symbol	Description
	Laser safety. The unit is a Class 1 laser product according to IEC 60825-1 (2001). See section 2.3 for further safety instructions for use and handling.

Throughout this document, the following safety messages will be used:

Message	Description
WARNING	This sign indicates a procedure with the potential to cause injury to the user if not performed with strict adherence to all safety instructions. Ensure that all conditions are fully understood and met before proceeding.
CAUTION	This sign indicates a procedure with the potential to cause damage to or destruction of the unit if not performed with strict adherence to all safety instructions. Ensure that all conditions are fully understood and met before proceeding.

2.2 Line Power

The FBG-Scan X0X can operate from any DC power supply that outputs 12V and 40W of power. All instruments are supplied with an external AC adapter which accepts an input voltage ranging from 100-240VAC within a frequency range of 50-60Hz.

WARNING: If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. There are no internal user-serviceable parts.

WARNING: To avoid possibility of injury or death, do not operate any electrical device with visible damage to power supply, line cord, or outer enclosure.

CAUTION: Do not expose the unit directly to rain or other excessive moisture.

IMPORTANT NOTICE REGARDING POWER CONNECTORS:

The FBG-Scan X0X is equipped with one input power connector at the rear panel. It is important that the power is applied in the proper sequence:

1. Plug the power connector into the rear panel of the FBG-Scan.
2. Connect the power supply leads to the main power supply outlet box.
3. Switch the power button to the ON position (front panel).

If the power connector needs to be removed, the power switch **MUST** be turned OFF **BEFORE** it is disconnected or reconnected. FBGS recommends the use of a qualified surge protector to prevent damage from unexpected power transients.

2.3 Laser Safety

The used optical source is a Class 1 laser product according to IEC 60825-1 (2001). Its specifications are as follows:

Centre wavelength: between 1510-1590 nm
 Bandwidth: 80 nm
 Power: maximum 10 mW
 Beam diameter: 9 µm

The laser class is indicated with a label on the rear panel of the unit:



The light is released through the optical connectors contained in the front panel of the unit. The optical source is enabled when power is supplied to the instrument and the system is switched ON with the ON/OFF button.

WARNING: Instruments with malfunctioning light sources must be returned to FBGS for repair and calibration.

Refer servicing only to qualified and authorized personnel. There are no internal user-serviceable parts.

WARNING: Do not enable the light source (turn on instrument) when neither an optical connector nor LC/APC connector cover is connected to the optical output connector.

WARNING: Under no circumstances look into the end of an optical fiber attached to the optical output when the device is operational.

WARNING: The light radiation is not visible to the human eye, but it can seriously damage your eyesight.

3 HARDWARE DESCRIPTION

3.1 What is included?

The items listed below are included with the FBG-Scan. If any of these items are missing, please contact FBGS.

- Hardtop casing
- FBG-Scan X0X interrogation system
- Power supply cable with transformer (input: 100-240 VAC, 50-60 Hz; output: 12 VDC, 3.33 A)
- 1x USB2.0 cable for external laptop/desktop control
- USB-key with:
 - a. Hardware manual
 - b. ILLumisense software installer
 - c. Manual ILLumisense software
 - d. Calibration file
 - e. Product Key
 - f. CE-declaration
- Ferrule cleaner

3.2 Specifications

Parameter	FBG-Scan				
	800	804	808	904	908
Optical					
Wavelength (nm)	900	904	908	904	908
Source power (mW)	91.98		91.8		
Source power (mW) (typical)	9			8.1	
Source power (mW) (max)	98			1	
Wavelength (nm) (typical)	908			98	

Electrical	
fl fl	
tf n	91
tf n fl	98S
n rfl n	1 ttf n
Environmental	
n fl n n	8 01
n fl fl fl	8 68 M fl
Mechanical	
S fl	0 0
fl fl S	018 968 48

¹ Measured on a 200 GHz etalon with bandwidth of 120pm FWHM.

Table 1: Specifications of the FBG-Scan X0X

4 CONNECTIONS

The front panel of the FBG-Scan-X0X contains the LC/APC optical connectors and a power switch with light indicator. The rear panel contains the power supply connection, the SMA trigger input connection (not functional) and the USB-connection. Pictures of front and rear panel are shown in Figure 2.



Figure 2: Picture of the front panel (top) and rear panel (bottom) of the FBG-Scan-904.

4.1 Power supply

The FBG-Scan-X0X needs to be powered with a 12 V power supply capable of providing up to 10 W. This is delivered using an external AC adapter which accepts an input voltage ranging from 100-240 VAC at 50-60 Hz

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

Warning: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful

interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

4.2 Communication Port

The system is controlled over a USB2.0 link. The USB-connector is positioned at the rear panel.

NOTE

There are different types of USB-cables on the market. We can only guaranty the functionality when you use the USB-cable delivered with the unit. This cable is labelled like in the picture below.



4.3 Trigger Input

The logic low level of external triggering signal is lower than 0.6 V and logic high level is higher than 1.6 V. The maximum signal level is 5 V. If the external triggering signal is higher than the maximum signal level, the unit may be damaged. The type of the used trigger connector is SMA (coaxial).

The external trigger can be used to synchronize the sampling of the FBG-Scan with other devices. Several external triggers need to be given for each sample: number of active channels + 1. For example, if 3 channels are active, 4 external trigger signals need to be supplied for each sample. So if sampling needs to be done at 100 Hz, the trigger should receive pulses at 400 Hz. Note that the external trigger will only become activated with the software running in a viewer window other than the Initialization window. Switching back to the Initialization window will de-activate the external trigger again.

4.4 Optical Connections

The FBG-Scan-X0X has several LC/APC optical connections (adapters) on the front panel. They are also compatible with F3000 connectors. Care should be taken to use only clean connectors. Dirty or mismatched connectors will cause degradation in performance and this may damage the unit.

The front panel mounted LC/APC adapters should be periodically cleaned to maintain optimal performance. When not being used, it is recommended to put the white dust caps into the adapters from the front panel to keep them clean.



Figure 6: View of the LC/APC connector (left) and adapters (right).

CAUTION: Connecting damaged connectors to the unit can damage the optical connectors on the unit.

CAUTION: Never force-fit an optical connector. A ferrule may break off and damage the unit.

CAUTION: Do not attempt to connect connectors that are not compatible with the LC/APC adapters on the front panel of the FBG-Scan-X0X. Such mismatched connections can lead to malfunction or even damage of the module.

NOTE

In order to maintain optimal measurement performance of the FBG-Scan-X0X, the front panel optical connectors must be kept clean. Use the ferrule cleaner delivered together with the unit for cleaning the optical connectors on a regular basis. Follow the standard guidelines as described in the manual of the cleaner tool.

4.5 LED Indicator

One LED indicator can be found on the power ON/OFF button at the right-hand side of the FBG-Scan- X0X front panel. This LED will illuminate when the unit is switched on.

NOTE

A warm up period following complete initialization should be allowed for maximum wavelength accuracy and stability. For the FBG-Scan models, maximum stability will be reached after 2 minutes.

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