

# FG-750 Fiber Guardian Series

OTDR-BASED REMOTE FIBER TEST SYSTEM



Scalable test solution for fiber network monitoring and management, from one stand-alone unit to centrally managed systems with one or hundreds of test ports

## MAIN APPLICATIONS

- Continuous 24/7 fiber network monitoring
- Dark-fiber SLA management
- Network fault correlation and analysis
- Automation of OTDR testing for network operation and maintenance

## KEY FEATURES

- Up to 46 dB dynamic range on dark fiber and 43 dB on lit fiber
- Narrow-band CWDM OTDRs
- Redundant and hot-swappable power supply modules
- Scalable from one to 96 ports in 2U height
- Local storage on solid-state disks
- IPV4- and IPV6-compliant

## PART OF THE FG-700 FIBER GUARDIAN SERIES



Test Access  
Module Kit



Node Optical  
Test Access Unit

EXFO

## UNMATCHED FIBER MONITORING SOLUTION

- › Truly scalable from one stand-alone unit to a centrally managed system, without the hassle of any upgrades
- › Adaptive technology that sets the best possible fault detection thresholds while reducing false positives; requires no OTDR experience or previous knowledge of the fiber under test
- › Add test ports without adding rack space
- › System is compliant with NEBS™ for 24/7 permanent installations
- › Fiber can be put on surveillance with just two clicks, upon commissioning or after repair
- › System remote diagnosis and management, as found in server equipment (BMC)
- › High OTDR performance throughout all operation ranges, as opposed to just the longest pulse width

### Self-Learning, Plug-and-Play Unit

Fiber Guardian is a plug-and-play solution that is simple enough for beginners, yet powerful and flexible enough for experts. The unit does not require any additional infrastructure, i.e., no server or external PC—just a LAN/WAN connection and a web browser for remote access.

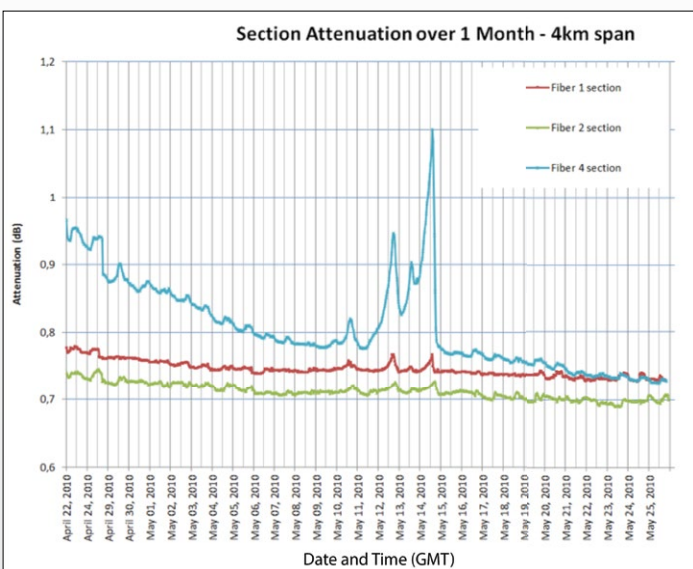
If you have limited knowledge of the fault-detection thresholds required for a new fiber, simply select the appropriate sensitivity level desired—fine, normal or coarse—and Fiber Guardian will take care of the rest. A diagnostic process with adaptive learning algorithms optimally determines where your selected level of fault-detection thresholds can and cannot be applied on the trace.

If you own a competing solution and are tired of it producing alarms for no reason, or annoyed by its lengthy and fully manual event-by-event threshold-setting process, Fiber Guardian is for you.

### Take the More Preventive Approach

Fiber Guardian is a multiport OTDR unit with the capability to first record a reference condition on each connected fiber, and then execute further tests to detect and precisely locate any deviation from the initial condition. Testing can be executed on demand, continuously, or on a programmed schedule. The types of tests supported range from simple, remotely executed OTDR tests to trend analysis spanning days or months on complete cable systems.

- › OTDR testing: Performs unplanned and fully manual tests with a results download.
- › On-demand testing: A test can be triggered manually over the web UI, or automatically using a simple network management protocol (SNMP) command in the case of any management system reporting a link down or service interruption condition.
- › 24/7 monitoring: All fibers are checked one at a time for any degradation, in repeated cycles typically ranging from 10 seconds to 45 seconds. Only fault-related events are stored, and short-message service (SMS), e-mail or SNMP traps are sent out immediately.
- › Scheduled testing: Tests can be set for predefined times and at repeated intervals (daily, weekly, etc.), with all results stored for historical analysis.
- › Cable analysis (template): Same as scheduled testing, but will force testing on every splice/section of a cable, then assemble all test results into a single, organized .csv file.



Example of a real-life cable-attenuation trend analysis created from a cable template test function using one four-port Fiber Guardian unit placed at one end of the cable span for a period of 30 days.

Figure 1. Section attenuation over one-month period, 4 km span

## GROW YOUR SOLUTION STEP BY STEP

Fiber Guardian is a truly scalable solution that can be leveraged with one probe with just a few test ports in one central office, and can be expanded with up to hundreds of centrally connected remote test units, each with up to 96 ports in a very dense rack space. You can therefore build as you grow a fully monitored dark-fiber infrastructure, thus reaching out to the most demanding of your customers. Whether you are looking for a simple installation capable of monitoring one specific link, or to create a complete view of all important cable spans in space and in time, Fiber Guardian will give you all the flexibility you need to help improve your operational efficiency.

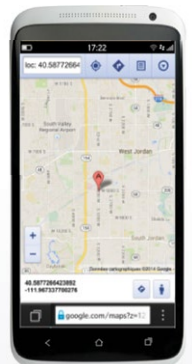
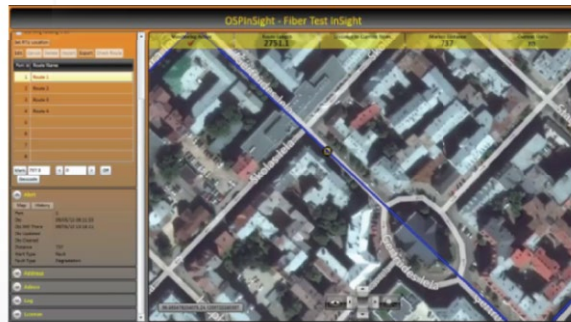


**OSPIInSight:** GIS-based physical-network inventory tool that is fully integrated with NQMSfiber, and used for planning, construction and maintenance of the cable and fiber network.



**NQMSfiber:** Fully centralized operation with unified views of the network status, alarms and users, in addition to performance reports for your fiber network availability.

**Fiber Test InSight:** Automatic mapping of the fiber fault over the Web and Internet maps. Look it up with Google, and then drive to point of failure; can be used with one or multiple Fiber Guardian units.



**Fiber Guardian:** Stand-alone, rack-mounted, remote OTDR with fault detection and analysis, local storage and basic reporting.



**Add ports** on expandable model (FG-750EX) so that you can buy as you grow from a given node.



**Add extra Fiber Guardian units** to cover wider (new) regions, or go deeper into the network.

## A SYSTEM IN A BOX

Fiber Guardian can interface with mobile or fixed users, fault management systems, physical inventory systems, and other equipment, including element management systems (EMS) and network management systems (NMS).

Network setup is done locally using the host Web UI. Fibers to be monitored are connected to the Fiber Guardian—from this point, any authorized user can log in and start testing and monitoring the network. Fiber Guardian can be run over an IPV4 or IPV6 network. A wireless network interface supporting most types of technologies and bands is also available as an option.

On-demand testing over the SNMP interface is supported, which interrupts the multiport round-robin monitoring sequence in order to execute—on a high-priority basis—an OTDR test comparing a baseline or reference with an actual trace. In the event of deviation, a fault status is triggered, after which one or multiple notifications will be immediately sent out on various channels, namely e-mails, SMS and SNMP.

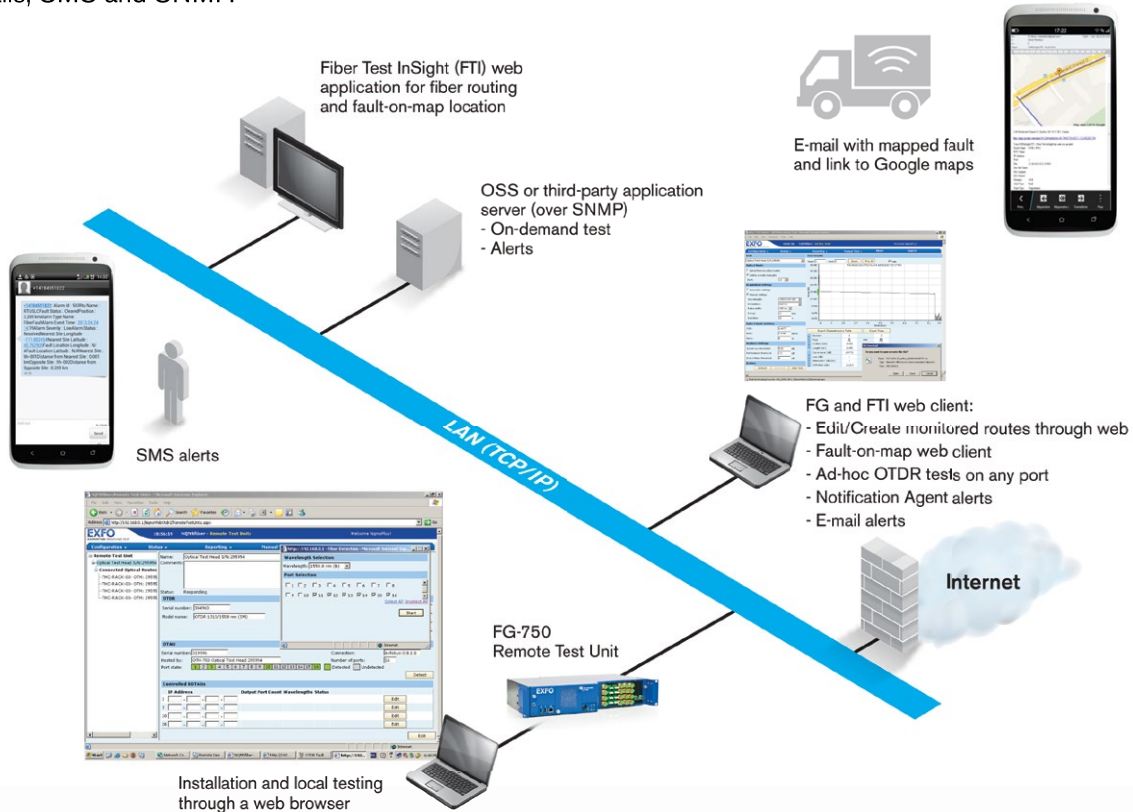


Figure 2. Functional diagram of Fiber Guardian with optional Fiber Test InSight for light and easy fault-on-map capability

## FIBER TEST INSIGHT—AUTOMATION AND SIMPLIFIED OTDR FAULT MAPPING

Fiber Test InSight is a software option that automatically converts an optical-length-to-fault measurement into a physical location on a network map, within just seconds. The software is a web application leveraging internal maps and cloud services such as Google Maps. Drawing and setup of new fiber routes is as easy as using Google or Bing maps. Splice location and span (optical length) are set up directly on the map, enabling the highest level of precision possible with minimum effort. With the ability to support one or multiple Fiber Guardian units, the software is truly scalable. Features include e-mail alert (running on all tablets and smartphones) with a URL/hyperlink to Google Maps software, export/import fiber-route capabilities, color coding, multilingual Web UI, and much more.

All specifications valid at 23° C ± 2° C, unless otherwise specified.

OTDR TEST MODULE FOR FG-750						
Models <sup>a</sup>	OTM-740-DMET	OTM-750-DCOR	OTM-740-AMET	OTM-740-ACOR	OTM-740-CDxx	OTM-700-NODE
Central wavelength(s) (nm) <sup>b</sup>	1550 ± 20	1550 ± 20	1625 ± 10	1650 ± 5	xx: 03 – 1310 xx: 10 – 1490 xx: 11 – 1510 xx: 13 – 1550 xx: 16 – 1610 All ± 3	1625 ± 3/ 1650 ± 4
Acquisition mode	OTDR	OTDR	OTDR	OTDR	OTDR	OTDR or iOLM
Internally filtered (live port)	–	–	Y	Y	Y	Y
Internal filter width (nm)			± 15	± 7	± 6.5	1620 to 1670
Event dead zone (m) <sup>b, c</sup>			0.8			0.5
Attenuation dead zone (m) <sup>b, c</sup>			3.5			2
Sampling points (pts)			256 000			
Sampling resolution (m)			0.04 to 10			
Pulse width (ns) <sup>d</sup>			3 to 20 000			
Distance range (km)			1 to 320			
Display resolution (dB)			0.001 – Attenuation/loss 0.01 – Reflectance			
Reflectance/ORL accuracy (dB) <sup>b</sup>			± 2			
Linearity (dB/dB) <sup>b</sup>			0.03			
Dynamic range (dB) <sup>b, e</sup>	42	46	42	43	41 40@1610	35/33
Distance accuracy (m) <sup>f</sup>			±(0.75 + 0.0025% x distance + sampling resolution)			
Minimum attenuation when measured with HRD (dB) <sup>b, g</sup>						10
Maximum attenuation for HRD detection (5 km/20 km ranges) (dB) <sup>b, g, i</sup>						32/30.5
Maximum measurable attenuation with HRD (dB) <sup>b, g</sup>						35
Attenuation measurement uncertainty (dB) <sup>b, h</sup>						0.6
Attenuation measurement repeatability (dB)						0.1
Attenuation measurement display resolution (dB)						0.01
Minimum optical separation for HRD (m) <sup>b, i</sup>						0.5

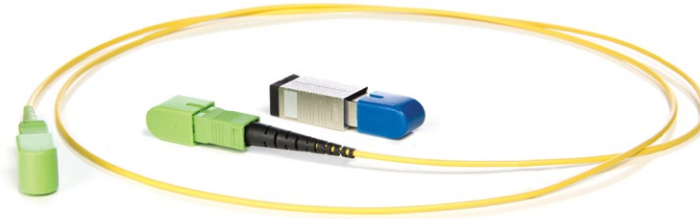
**Notes**

- a. All modules are LinkAware™-ready: only OTM-700-Node works as an iOLM (intelligent Optical Link Mapper) product. OTDR mode is the classical way of acquiring, presenting and filing test results.
- b. Typical.
- c. For reflectance below –55 dB, using the smallest pulse width available. Attenuation dead zone for reflectance below –45 dB is 3 m for OMT-700-NODE and 4.5 m for all other OTM models.
- d. 3 ns available on OTM-700-NODE module, otherwise minimum pulse width is 5 ns.
- e. Dynamic range at 20 µs pulse width, with a three-minute averaging at SNR = 1.
- f. Does not include uncertainty due to fiber index or cable characteristics (e.g., helix).
- g. From OTDR port.
- h. For attenuation levels between 15 and 30 dB with EXFO-qualified HRD filters.
- i. For two HRDs connected to the same splitter or at similar attenuation points.
- j. Guaranteed specification for maximum measurable attenuation for new HRD placement/detection is 30.4 dB for a 5 km (or less) range from the OTDR.

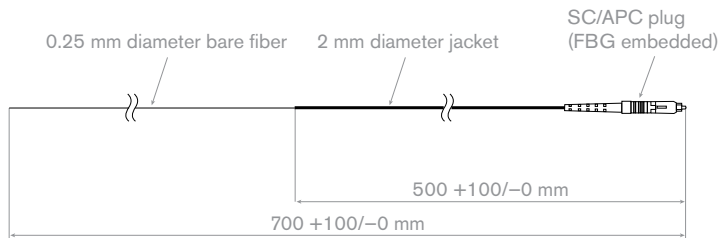


## HIGH-REFLECTANCE DEMARCATION FILTERS

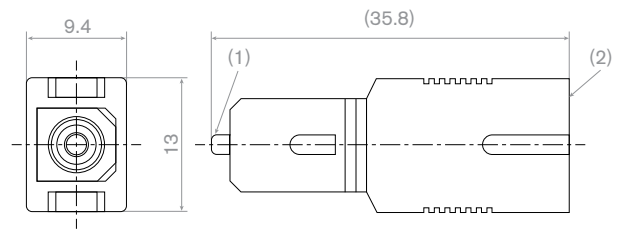
Two models are available: pigtail and adapter. In both cases, the filters must be inserted in the proper direction in order to measure attenuation. Pigtails are bare fiber on the network side (upstream), whereas high-reflectance demarcation (HRD) is in an SC connector, inside ferrule, on the customer side. For plug type or adapter type, the male side connects toward the optical network terminal (ONT). HRDs are also available on request in a field-assembly connector type.



### Pigtail type:



### Plug jack/adapter type:



### HRD FILTER SPECIFICATION (PIGTAIL TYPE)<sup>a</sup>

Passband (nm)	1260 to 1630	
Reflect band (nm)	1645 to 1655	
Fiber type	Corning SMF-28	
Insertion loss (dB) <sup>b</sup>	1310 nm ± 20 nm 1550 nm ± 20 nm	≤ 1.3
Isolation (dB)	1650 nm ± 5 nm	≥ 21
Return loss (dB)	1310 nm ± 20 nm 1550 nm ± 20 nm	≥ 35 ≥ 33
Reflectance (dB)	1650 nm ± 5 nm	≥ -1.1


#### Notes

- a. Specification valid at an operating temperature of 23 °C ± 2 °C.
- b. Including one (1) connector with a nominal loss of 0.4 dB.

REMOTE TEST UNIT—PLATFORM		
Standard model—number of optical ports <sup>a</sup>	SC-APC or FC-APC	1/4/8/12/24/32 ports
Expandable model—number of optical ports	4-port SC-APC optical switch cassette (OSC) 8-port LC-APC OSC 12-port MTP-APC OSC Maximum eight (8) OSCs per unit Scalable, modular construction Field-configurable	8 to 96 ports <sup>b</sup>
Internal optical switch type	MEMs <sup>c</sup>	
Internal optical switch lifetime (minimum number of cycles)		1 000 000 000 (10 <sup>9</sup> )
MEMs external/remote optical switch	Refers also to M-OTAs or MEMs-based optical test access units (SC-APC); DC or AC powered.	1U size: 1x8, 1x16, 1x32 2U size: 1x48, 1x72 4U size: 1x96
Large external/remote optical switch (1 x n) <sup>d</sup>	High number of ports	576/720 ports
Wired network interfacess	10/100/1000 Base-T Ethernet IP-V4 and V6, one dedicated to local access	2
Unit status front LEDs		5
Storage type and data storage (GB)	Solid state drive	32
Dual, hot-swappable and redundant power supplies	Rear swap, AC or DC	VAC 100 to 240, 50/60 Hz VDC -40/-72
Power consumption steady state (fully loaded with 96 ports)	Over entire operating temperature range	35 W
Fan	Field replaceable Front loading	1
Rack type	Drawer on rail	
Supported browsers for unit configuration and status view	MS Internet Explorer™, Mozilla Firefox®, Google Chrome™	
Temperature	Operating Storage	-5 °C to 50 °C (23 °F to 122 °F) -40 °C to 70 °C (-40 °F to 158 °F)
Relative humidity	Non-condensing	0% to 95%
Maximum operation altitude <sup>e</sup>		3000 m (9850 ft)
Size (for 19-in, ETSI or 23-in racks) (H x W x D)	Fits in 300 mm deep ETSI rack with cabling (DC model) connected	88 mm (2U) x 435 mm x 270 mm (3 7/16 in (2U) x 17 1/8 in x 10 5/8 in)
Maximum weight (with 8 OSCs)		8.7 kg (19.1 lb)
Product Compliance	CE, CSA, RoHS, NEBS <sup>f</sup>	
Wireless network interface option	Integrated wireless communication module with external antenna (SIM not included; some conditions such as level of signal inside premises apply)	HSPA+, GSM/GPRS/EDGE and CDMA 1x RTT

SOFTWARE OPTIONS AND OPTIONAL ACCESSORIES	
Ordering	Description
NQMS-SERV-STD	Connect to NQMSfiber Element Management Server application; Standard Edition
NQMS-SERV-ENT	Connect to NQMSfiber Element Management Server application; Enterprise Edition
SW-FTI	Fiber Test InSight for Google Maps and Open Street Maps; fault-on-map web-server application software
OSC-4-SC	1x4 optical switch cassette in SC-APC
OSC-8-LC	1x8 optical switch cassette in LC-APC
OSC-12-MTP	1x12 optical switch cassette in MTP-APC
GP-3059	17-foot wired antenna for wireless interface option
GP-3061	High-reflectance demarcation filter in a SC-APC bulkhead adapter
GP-3062	High-reflectance demarcation filter in a SC-UPC bulkhead adapter
GP-3063	High-reflectance demarcation filter—SC-APC pigtail
GP-3064	High-reflectance demarcation filter—SC-UPC pigtail
GP-3065	Test jumper management tray (attach to unit front)

**LASER SAFETY**



INVISIBLE LASER RADIATION

VIEWING THE LASER OUTPUT WITH CERTAIN OPTICAL INSTRUMENTS (FOR EXAMPLE, EYE LOUPEs, MAGNIFIERS AND MICROSCOPES) WITHIN A DISTANCE OF 100 MM MAY POSE AN EYE HAZARD

CLASS 1M LASER PRODUCT

STANDARD RTU ACCESSORIES
Notification agent software tool
User guide
Rackmount kit
Relay outputs

**Notes**

- a. One port is without internal MEMs switch for connection to external OTAU.
- b. 96 ports with MTP-type OSCs.
- c. Micro-electromechanical system.
- d. Optomechanical-type optical switch.
- e. Operation at higher elevations is possible but restricts the maximum temperature at which the unit can operate; consult the factory for more details.
- f. The equipment is NEBS-compliant based on Verizon VZ.TPR.9303 Issue 1, March 2007 for test and measurement equipment—permanent installation, and AT&T ATT-TP-76200 (Carrier Grade Level 1). Contact factory or visit the following URL for more details about this certification: [www.verizonnebs.com/TPRs/VZ-TPR-9303.pdf](http://www.verizonnebs.com/TPRs/VZ-TPR-9303.pdf)



**ORDERING INFORMATION**

**FG-750ST-XX-XX-XX-XX-XX-XX-XX-XX**

**Model**

- FG-750ST-NODE-iOLM
- FG-750ST-DMET
- FG-750ST-DCOR
- FG-750ST-AMET
- FG-750ST-ACOR
- FG-750ST-CD03
- FG-750ST-CD10
- FG-750ST-CD11
- FG-750ST-CD13
- FG-750ST-CD16

**Port option**

- 01 = 1 port
- 04 = 4 ports
- 08 = 8 ports
- 12 = 12 ports
- 24 = 24 ports
- 32 = 32 ports

**Mapping tool option**

- 00 = No mapping tool
- FTI = Fiber Test Insight
- FTIA = Additional Fiber Test Insight

**Software option**

- 00 = Stand-alone operation
- STD = Connect to a NQMS*iber* Standard edition
- ENT = Connect to a NQMS*iber* Enterprise edition

**Option**

- RK19-2U = 2U rack-mount kit 19-inch
- RK23-2U = 2U rack-mount kit 23-inch
- RKET-2U = 2U rack-mount kit ETSI size

**Power**

- AC = 100-240 VAC power supply
- DC = -48 VDC power supply

**Communication interface**

- 00 = Without modem
- XG = Internal wireless network interface

**Connectors**

- 58 = FC-APC
- 88 = SC-APC

Example: FG-750ST-DMET-04-58-XG-AC-RK19-2U-00-FTI

**FG-750EX-XX-XX-XX-XX-XX-XX-XX-XX**

**Models**

- FG-750EX

**OTDR option**

- NODE-iOLM
- DMET
- DCOR
- AMET
- ACOR
- CD03
- CD10
- CD11
- CD13
- CD16

**Kit connectors**

- 88 = SC-APC mounted kit
- 92F = LC-APC mounted kit
- 104 = MTP-APC mounted kit

**Cassette port**

**For SC-APC Kit**

- SC08 = 8 ports
- SC17 = 17 ports
- SC20 = 20 ports
- SC26 = 26 ports
- SC32 = 32 ports

**For LC-APC Kit**

- LC08 = 8 ports
- LC16 = 16 ports
- LC24 = 24 ports
- LC32 = 32 ports
- LC48 = 48 ports
- LC64 = 64 ports

**For MTP-APC Kit**

- MTP12 = 12 ports
- MTP24 = 24 ports
- MTP48 = 48 ports
- MTP72 = 72 ports
- MTP96 = 96 ports

**Mapping tool option**

- 00 = No mapping tool
- FTI = Fiber Test Insight
- FTIA = Additional Fiber Test Insight

**Software option**

- 00 = Stand-alone operation
- STD = Connect to a NQMS*iber* Standard edition
- ENT = Connect to a NQMS*iber* Enterprise edition

**Option**

- RK19-2U = 2U rack-mount kit 19-inch
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- RKET-2U = 2U rack-mount kit ETSI size

**Power**

- AC = 100 to 240 VAC power supply
- DC = -48 VDC power supply

**Communication interface**

- 00 = Without modem
- XG = Internal wireless network interface

Example: FG-750EX-AMET-88-SC17-XG-AC-RK19-2U-00-FTI

EXFO Headquarters > Tel.: +1 418 683-0211 | Toll-free: +1 800 663-3936 (USA and Canada) | Fax: +1 418 683-2170 | info@EXFO.com | [www.EXFO.com](http://www.EXFO.com)

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