Nova Fiber – RTU-2

OTDR-BASED REMOTE TEST UNIT

SPEC SHEET

Centrally and remotely managed OTDR instrument for auditing, troubleshooting and continuously monitoring FTTx optical fibers.

KEY FEATURES AND BENEFITS

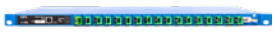
- Smaller, denser and more scalable: OTDR and 1024 ports fit in 3U height
- Recognized EXFO quality: FTBx-735C high-end OTDR module
- Optional 1x4 FTBx-9160 optical switch module for dual-stage scaling of test ports
- MPO connectors: Less connectors, less issues.
  16x less connections than other vendors
- Up to 4 switches per RTU (1024 ports)

APPLICATIONS

- Fixed OTDR function for lifecycle testing of point-to-point (P2P) and point-to-multipoint (P2MP) fiber network topologies
- End-to-end continuity and loss verification in PONs
- Massive FTTx network auditing
- Automated troubleshooting of fiber-related issues
- Preventive tracking of degradations

RELATED PRODUCTS

MEMS Optical switches modules
FTBx-9160



External MEMS optical switch
RTUe-9120

OTDR modules
FTBx-735C

OTDR/traffic coupler
Test acces module kit

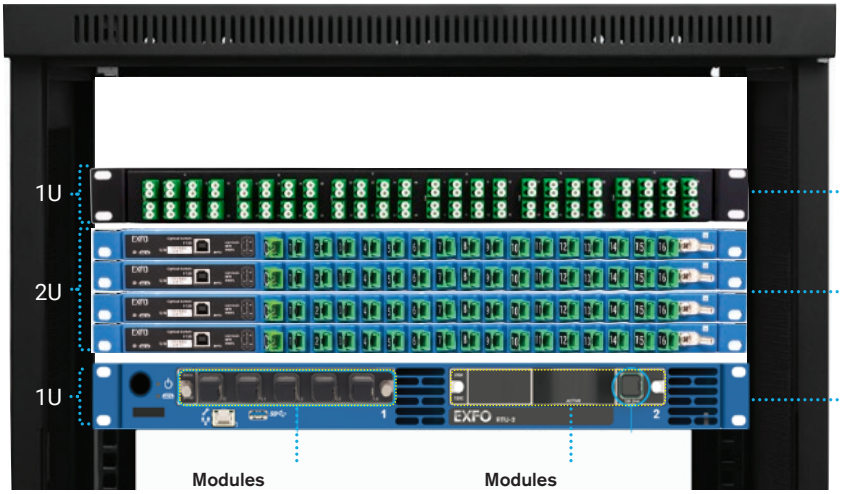
REMOTE TEST UNIT COMPONENTS

Overview

The RTU-2 is a test unit that is remotely controlled via our Nova Fiber's central fiber monitoring system (FMS). This is the test solution's central manager and is referred to as Nova Fiber FMS for short. As to the RTU-2, it is a modular unit, hence allowing for flexibility and scalability. OTDR modules and optical switches enable centralized fiber characterization through patented OTDR/iOLM technology. Optical link management can also be scaled up to 1024 ports with external optical switches.

In-service testing and monitoring of P2P and PONs is possible thanks to in-service OTDR port at 1650 nm coupled with a traffic multiplexer (test access module coupler).

Finally, measure PON end-to-end fiber attenuation at 1650 nm with a traceable test method using a high-reflectance demarcation filter.



Live
TAM kit
Couple OTDR testing and live traffic

Scale
RTUe-9120: Optical switches
Scale testing capacity up to 1024 links (256/switch)

Test
RTU-2: Remote test unit
Modular platform controlled via cloud-native Nova Fiber FMS

Modules
FTBx-9160: Optical switch
first stage switching

Modules
FTBx-735C: OTDR
Fiber characterization

MAIN/CONTROLLER UNIT AND MODULES

RTU-2

The RTU-2 is a 1U modular rackmount platform for remote fiber testing.

When paired with the FTBx-735C OTDR module and the FTBx-9160 optical switch, the RTU-2 can handle in-service testing and monitoring of P2P and PONs.

Modules
FTBx-9160: Optical switch
first stage switching

Modules
FTBx-735C: OTDR
Fiber characterization

OTDR MODULE

FTBx-735C-SM7R

The FTBx-735C high-resolution OTDR is designed for metro/PON networks testing and splitter characterization in PON FTTx applications.

Its capabilities are diverse:

› Reflectometry: characterizes, evaluates or audits fiber quality

› Tone generation identifies the fiber, whether it is in-service or not

› HRD testing certifies the link end to end for PON architectures

KEY OTDR-iOLM CAPABILITIES

End-to-end loss (EEL) measurement

A practical function of the iOLM is its ability to measure end-to-end loss or optical attenuation between the OTDR's location, in this case the central office, and any connector port downstream—even when a port is beyond a series of splitters. By simply splicing or inserting a **high-reflectance demarcation (HRD)** filter and using a mobile smart app, link characterization can be done within 10 seconds.

Key information and values:

› Confirmation of proper upstream connectivity

› Loss and expected loss budget (dB) at the measured point of the network

› Optical fiber length-correlation with network documentation

In Figure 2, the attenuation is measured from the node to any connection terminal using the RTU-2 OTDR and HRD filter. This is performed by a field technician who is testing on one or every port of a second-stage splitter during network installation or when certifying a contractor's work.

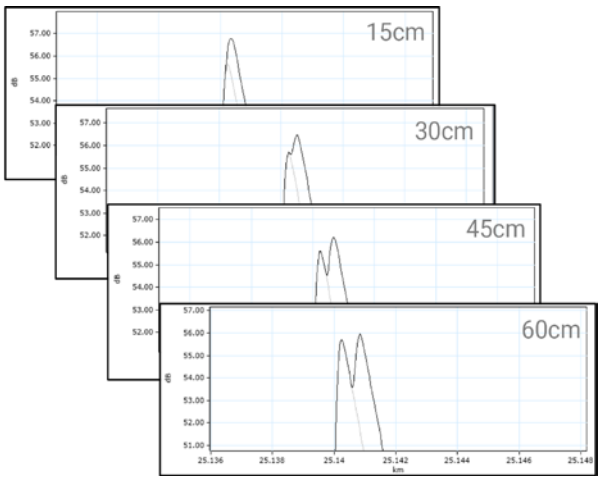


Figure 1. High-resolution demarking of PON termination ports capability using HRDs down to 60 cm.

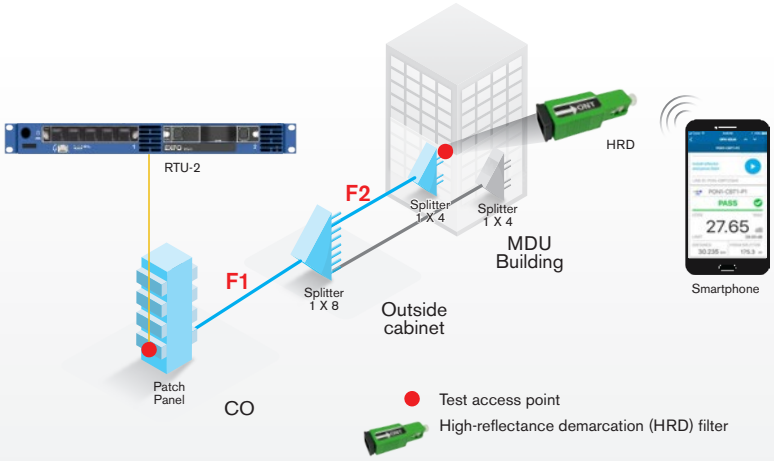


Figure 2. Link certification in a PON architecture with end-to-end connectivity.

MERGING OTDR AND iOLM CAPABILITIES

Link-Aware™ technology: simplify OTDR tests

Simplify and optimize the test run. In one click, the test unit automatically performs link recognition, sets the optimal parameters and launches multiple acquisitions. It then consolidates the results for every link event, section and splitter (if any). The iOLM software removes front-end events, like optical switches, that are part of the test setup to only keep and report the relevant part of the test.

The unit provides accurate data such as position, loss and reflectance on all elements and displays an easy-to-read result for any NOC or field technicians. The smart iOLM software yields N single OTDR traces that can be verified and compared with their respective baseline, allowing second and third-tier support to analyze further into these acquisitions.

HOW DOES IT WORK?

Dynamic multipulse acquisition → **Intelligent trace analysis** → **Combine all results into a single link view and single report file** → **Comprehensive diagnosis** →

iOLM adjusts test paramaters dynamically for ANY link under test–using a mix of short, medium and long pulses as needed.

Based on the multiple acquisitions and with the help of advanced algorithms, iOLM is able to detect more events with maximum resolution.

Results are visually displayed in an icon-based fiber-link view to quickly assess each event's pass/fail status per standard selected, eliminating any risk of misinterpretation.

Delivers an analysis of failed events and suggests solutions; guides the technicians in fixing the fault quickly and successfully.

Turn traditional OTDR testing into clear, automated, first-time-right results for technicians of any skill level.

Three ways to benefit from the OTDR-iOLM

1. **No calibration needed for end-to-end loss measurements**
2. **Accuracy of single-ended end to end loss similar to light source–power meter technique**
3. **Long-term stability of the end-to-end (to HRDs) measurement in monitoring**

Tone generator

It can be daunting to pinpoint a specific live fiber, untangle fiber mislabeling or deal with poor record-keeping.

The FTBx-735C can generate a tone signal to work in conjunction with the live fiber detector in the field. The tone signal is triggered via a smartphone-based application. It communicates with the Nova Fiber FMS server to request the tone generated signal to enable the fiber identification process for a time period that can be set.

This avoids costly downtime/network outages and minimizes the need to access the network, thus avoiding errors.

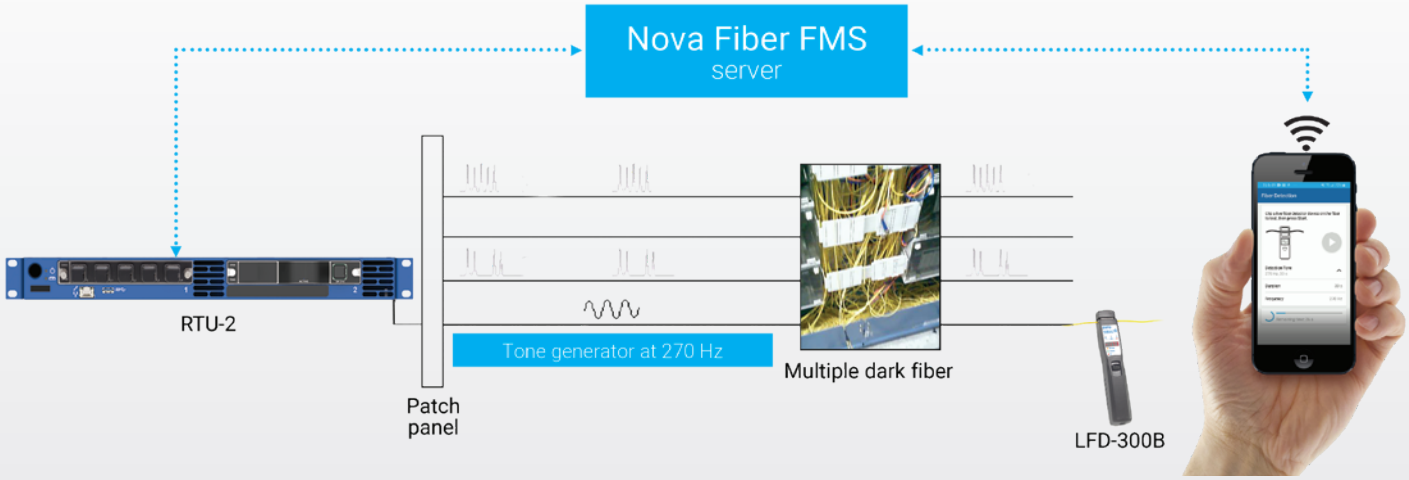


Figure 3. Source/tone mode for fibre identification.

OPTICAL SWITCHES: SCALING REMOTE TESTING CAPABILITIES

Module: 1xN optical switch FTBx-9160

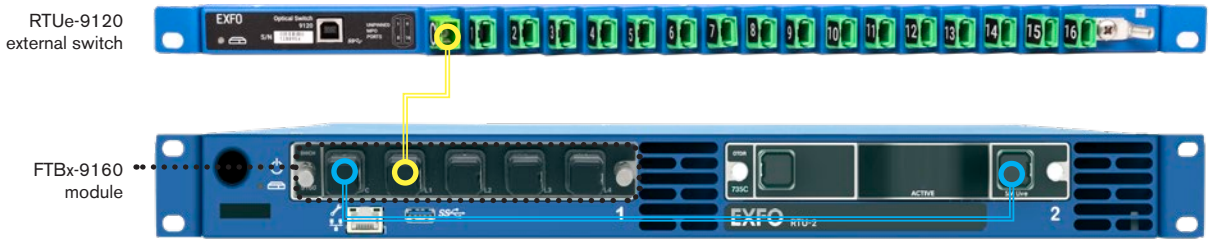
With its MEMS-based design, the FTBx-9160 delivers durable performance in a compact package. Fast switching time and a 1-billion-cycle lifetime expectancy make it ideal for the demanding needs of production testing and monitoring applications. The FTBx-9160 MEMS optical switch is available for singlemode fibers with a choice of 1 x 4 and 1 x 12 modules (note: for RTU-2 in Nova Fiber context).

As a first stage switching of the RTUe-9120 external switch, the setup can provide 1024 different optical paths to test.

OPTICAL SWITCHES: SCALING REMOTE TESTING CAPABILITIES

Expansion unit: External 1xN optical switch RTUe-9120

Connect the OTDR module live port directly to the common port of RTUe-9120 external optical switch unit or add up to four units by first connecting the OTDR port to the common port of the 1x4 optical switch module, allowing up to 1024 ports.



TEST ACCESS MODULE (TAM) KITS: TESTING LIVE NETWORKS

TAM couples OTDR to line

TAM is the optical coupling element, which is used in remote testing and monitoring applications to combine the OTDR signal with traffic.

The device used to perform this function is typically a coupler. Some are broadband-type, others are WDM-type or wavelength-division multiplexers, which are spectrally sensitive combiners.

HOW IS THE RTU-2 INTEGRATED?

› RTU-2 platform is handled by Nova Fiber FMS, which is a scalable system that can control and manage up to 1000 units with horizontal scaling capabilities

› RTU-2 platform is a true client requiring minimal outbound firewall to be opened for messaging-based communication using encrypted protocol

› Integration by third-parties can be done from Nova Fiber FMS micro-services APIs offering the exact functional capability than Nova Fiber web and mobile clients (UIs)

ILLUSTRATION OF RTU-2 INTEGRATION

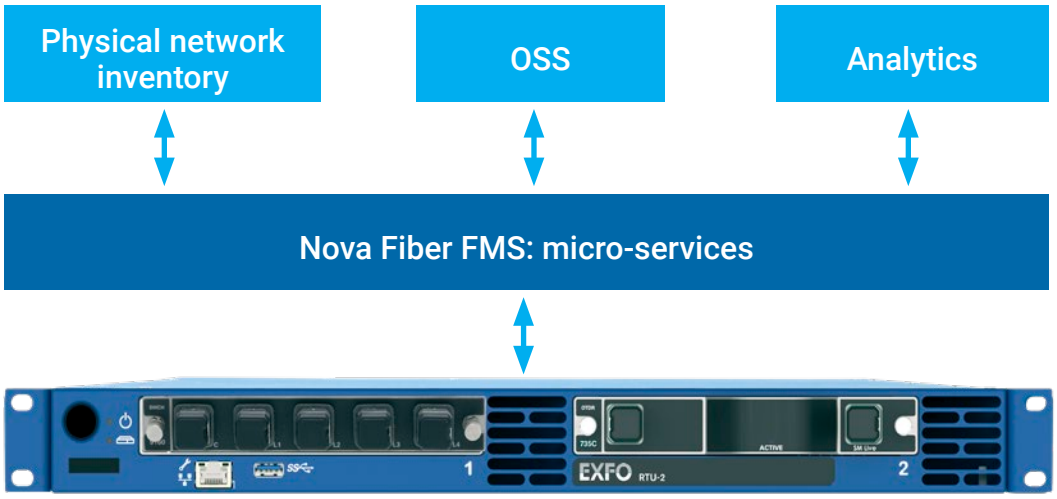
Key benefits

› Everything from every measurement is captured to feed analytics platform

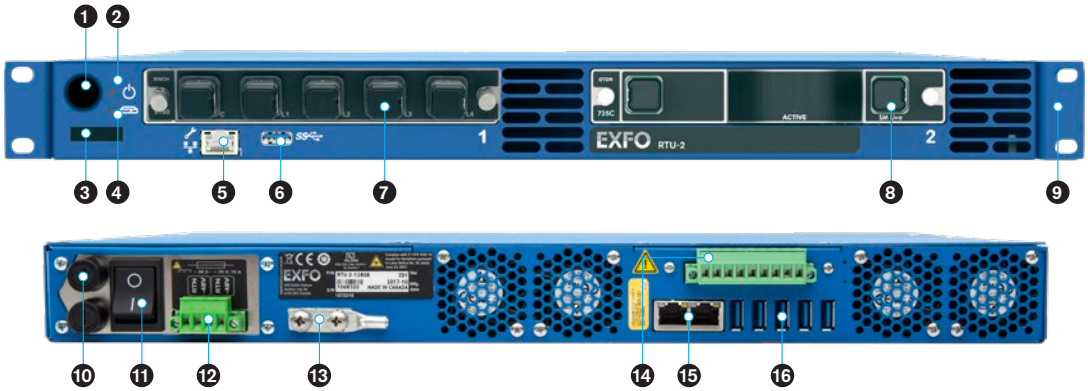
› Support the usual OSS interfaces, alarms via SNMP and inventory connection via RESTful APIs

› Qualified for 1000+ probes under a single “EMS” instance

› API-ready backend unlocking system capabilities and how it can integrate



SPECIFICATIONS



1 Power button
2 Power LED
3 System information display
4 System LED
5 Ethernet management port
6 USB 3.0 port
7 Module–Slot 1
8 Module–Slot 2
9 Removable rack mount brackets
10 –48V input circuit fuses
11 Main power switch
12 –48V dual feed input
13 Ground lug
14 Dry contact relays (3)
15 Ethernet ports
16 USB 3.0 (5)

RTU-2 PLATFORM SPECIFICATIONS

Mainframe		Quad-core Intel i7 processor / 8 GB / Windows 10 IoT OS
Front interfaces		1 x RJ45 10/100/1000 Mbit/s (management port) 1 x USB 3.0
Rear interfaces		2 x RJ45 10/100/1000 Mbit/s (management + Ethernet ports) 5 x USB 3.0 Relay contact: 3 (power, system and user configurable)
Storage		128 GB SSD internal memory
Power supply		–48VDC DC, 10A (ordering option: external AC-DC adapter for AC operation)
Power consumption	Idle state OTDR measuring	25 W 40 W (typical)
Dimensions (H x W x D) (includes brackets)		44 mm (1 U) x 482 mm x 262 mm (1 3/4 in x 19 in x 10 5/16 in)
Weight (includes brackets)		5.1 kg (11.2 lb)
Temperature	Operating Storage	–5 °C to 50 °C (23 °F to 122 °F) –40 °C to 70 °C (–40 °F to 158 °F)

All specifications valid at 23 °C ± 2 °C.

OTDR FTBx-735C-SM7R	
Wavelength (nm)	1650
Internal filter for in-service testing	Yes
Dynamic range at 20 µs (dB) [a]	41
PON dead zone (m) [b]	30
Sampling resolution - minimum value (m)	0.04
Sampling points	Up to 256 000
HRD measurement time (s) [c]	4
HRD measurement loss range (dB)	18 to 35
HRD minimum distance separation (m) [d]	0.6
First splitter to HRD maximum distance (km)	8
Source mode tone frequencies (kHz)	0.27, 0.33, 1, 2

FTBx-9160 MEMS OPTICAL SWITCH	
Number of output ports	4
Operation wavelength range (nm)	1290-1650
Insertion loss at 1530 nm - 1650 nm (dB) [e]	0.7
Lifetime in cycles	>1 billion (10^9)

LASER SAFETY

a. Typical dynamic range with three-minute averaging at SNR=1.
b. Non-reflective FUT, non-reflective splitter, 13-dB loss, 50-ns pulse, typical value.
c. Excluding networking latency - for a PON F2/distribution range of 4 km with nominal loss of 20 dB.
d. Typical, for similar level of attenuation between both.
e. Typical, including loss of one connector.

ACCESSORIES

GP-2256	FTBx module slot blank cover
GP-3122	External AC-DC 48 V power supply with power cord
GP-3123	19-inch rackmount brackets (kit of 2)
GP-2016	RJ45 LAN cable (10 feet/3 m)
GP-3170	19-inch to ETSI rack extenders
GP-3162	USB 3.0 client cable, 6 feet (2 m), right-angle connector

ORDERING INFORMATION

RTU-2-XX

Power input
DC = Internal DC 48V power supply
AC = External 48V DC dual input feed with power cord

Example: RTU-2-DC

FTBx-735C-SM7R-EA-EUI-91

Model
FTBx-735C-SM7R-EA-EUI-91

FTBx-9160-01-04-B-88

Model
FTBx-9160-01-04-B-88

Including a 1.5 m SC-APC/SC-APC FLEX-boot type jumper cable is included to connect OTDR module live port to optical switch module common port.

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RTUe-9120 external optical switch

HIGH-DENSITY 1XN MEMS-TYPE OPTICAL SWITCH UNIT

SPEC SHEET

Highest optical-switch-port density for OTDR-based remote fiber test systems and fiber monitoring applications

KEY FEATURES

- Reliable 1XN MEMs optical switch
- MPO 16-fiber connectors
- Available in 32, 64, 128 and 256 ports
- Small footprint – 1/2U
- High port density, up to 512 ports/1U
- Low insertion loss for such a high port count
- Lifetime of over 2.5 billion cycles
- Very low power consumption

MAIN APPLICATIONS

- PON/FTTx central remote testing and monitoring
- Large- or edge-site fiber testing and surveillance
- Data-center interconnect and campus monitoring with large cable fiber counts

COMPATIBLE PRODUCTS AND ACCESSORIES

OTDR based remote test unit RTU-2

Test access module (TAM) kit

OPTICAL SPECIFICATIONS

Parameter	Min	Typ.	Max
Insertion loss [a] – all models at 1310, 1550 and 1650 nm (dB)		2	
Crosstalk [b] (dB)	50		-50
Back reflection [b] (dB)			-45
Switching time (ms)			150
Durability (cycles)		2.5 billion	
Fiber type		9/125 µm singlemode fiber	
Connector type - output		MPO-APC (16f populated onto a standard MPO 24f ferrule)	
Connector type - input		SC-APC	

ELECTRICAL SPECIFICATIONS

Latching type	Non-latching
Supply type	USB 2.0
Operating power consumption	~1 W

GENERAL SPECIFICATIONS

Chassis size		½ U, rackmount chassis (19")
Dimensions		(22 mm x 440 mm x 220 mm) ($^{7}/_{8}$ in x 17 $^{5}/_{16}$ in x 8 $^{11}/_{16}$ in)
Weight		1.2 kg (2.6 lb)
Optical connector location		Front panel
Temperature	operating [c] storage [d]	–5 °C to 50 °C (23 °F to 122 °F) –40 °C to 70 °C (–40 °F to 158 °F)

Accessories included
- Instruction manual (hard copy)
- GP-3120: 1U rackmount brackets (kit of 2)
- Extender brackets to ETSI rack size
- 1.5 m optical jumper SC-APC to SC-APC with FLEX boots
- USB cable, 1.8 m, right-angle connector

Notes

a. Measured at 23 °C ± 5 °C, including input and output connectors.
b. Measured at 1550 nm.
c. With less than 80% relative humidity, non-condensing.
d. With less than 95% relative humidity, non-condensing.

ORDERING INFORMATION

RTUe-9120-SPLX-XXX

Configuration
XX = 1x32 port optical switch
XX = 1x64 port optical switch
XXX = 1x128 port optical switch
XXX = 1x256 port optical switch

Example: RTUe-9120-SPLX-32

Optional item
Multifiber connector cables hydra-or fan-out cable 20 meters long:
MPO 16f to 16 LC-APC connectors = TJ-B92M-16-104-20M
MPO 16f to 16 SC-APC connectors = TJ-B92M-16-88-20M

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Test Access Module Kit

SPEC SHEET

Combines with the FG-750 Node iOLM as part of the first practical FTTx line quality assessment solution from the node.

KEY FEATURES AND BENEFITS

- Combines OTDR wavelength(s) 1625 and/or 1650 nm with OLT/ONT/Tx/Rx traffic signals up to 1614 nm
- 24-channel WDM kit
- Dense construction, only 1U height, less than 300 mm deep
- SC-APC front access ports, left to OLTs, right to network/ODN
- Pigtailed at the rear for direct connection to test equipment, saving one jumper and one connection–3 m long
- Rear pigtail models for SC, LC, 12-fiber MTPs and 8-fiber MPOs

PART OF THE FG-700 FIBER GUARDIAN SERIES

FG-750
Node iOLM

Node Optical
Test Access Unit

EXFO

TAM COUPLES OTDR TO LINE

Test access module (TAM) is the common and standard name given to a fiber-optic coupling element, which is used in remote testing and monitoring applications to combine the OTDR signal with traffic. The device used to perform this function is typically a coupler. Some are broadband-type, others are WDM-type or wavelength-division multiplexers, which are spectrally sensitive combiners.

24-WDM TAM KIT

This kit allows 24 transmit/receive ports to be coupled with an OTDR test signal with the lowest loss possible, compared to other tapping techniques. These WDMs also isolate Tx/Rx circuits from any OTDR signal coming back from the network in excess of 30 dB.

Figure 1. Typically sitting on top of or in the same rack as the Fiber Guardian unit, the TAM kit monitor ports are pigtailed at the rear (SC, LC, MTP -12f or MPO-8f) and connected to the front of the remote test unit.

MTP/MPO 48-CHANNEL FANOUT OR PATCH PANEL (WITHOUT WDM)

If you own EXFO test equipment or opt for an optical switch terminated with 12-fiber MTPs or 8-fiber MPOs, and need an SC-APC termination, EXFO also offers the same footprint and assembly, without the WDMs. Similarly to the TAM kits, 3 m-long multifiber pigtails at the rear can connect to the front/rear of the test equipment that is terminated with a multifiber connector. This is used to transfer from multifiber to single-fiber cabling, close to the test equipment.

TAM KIT SPECIFICATIONS

Transmitted band (nm)	1260 to 1614
Reflected band (nm)	1619 to 1670
Passband insertion loss at 1260-1613 (dB)	<0.8
Passband insertion loss at 1613-1614 (dB)	<1.1
Reflected band insertion loss at 1619-1620 (dB)	<1.1
Reflected band insertion loss at 1620-1655 (dB)	<0.8
Reflected band insertion loss at 1655-1670 (dB)	<1.1
Isolation in transmission at 1619-1670 (dB)	>30
PDL (dB)	<0.2
Return loss (dB)	>50
Directivity (dB)	>50
Fiber type	SMF 28e+
Connector type—Network and OLT/Tx/Rx sides	SC/APC [b]
Operating temperature	0 °C to 70 °C
Storage temperature	–40 °C to 85 °C
Package dimension	1U rack

NOTES

a. Excluding connector loss.

b. Other connector types available on request.

ORDERING INFORMATION

TAMK-WDM-GA-24-XX

Models

SCP-88 = 24 WDM Grade A couplers for connection to FG-750ST/FG-750EX SC-APC terminations.
MTPP-88 = 24 WDM Grade A couplers for connection to FG-750EX MTP-APC terminations.
LCP-88 = 24 WDM Grade A couplers for connection to FG-750EX LC-APC terminations.
MPOP-88 = 24 WDM Grade A couplers for connection to node OTAU MPO-APC terminations.

FANOUT-K-48-XX

Models

MPOP = 48 position SC-APC fanout rack from MPO-APC-terminated node OTAU.
MTPP = 48 position SC-APC fanout rack for MTP-APC-terminated FG-750EX optical switch cassettes.

All kits include:

› Quick Reference guide
› Certificate of compliance
› 1U universal rackmount kit (19", ETSI and 23")

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