



## VePAL FX300

### Fiber Expert OTDR

#### Compact, Mini OTDR for Access Fiber Deployments

VeEX™ FX300 Fiber Expert is a lightweight, handheld mini OTDR ideally suited for the installation and troubleshooting of FTTx, xPON, CATV, Mobile Backhaul, and LAN/WAN networks.

### Platform Highlights

- Robust, handheld chassis designed for demanding field testing environments
- High resolution color screen viewable in any lighting conditions
- Fast boot-up time (< 5 seconds) to speed up fiber restoration
- Intuitive menu navigation and keypad for simplified operation
- High-capacity data storage (up to 300 x OTDR traces)
- USB and RS232 ports to upload test data or perform software upgrades
- Smart rechargeable battery with capacity indicator, low voltage alarm and Auto-off function
- Continuous operation for more than 8 hours exceeding Bellcore TR-NWT-001138 recommendations
- Trace Expert PC software for post analysis and batch processing

### Key Features

- Real-time (Live) and Average OTDR test modes
- Dynamic range up to 37dB (FX337 series)
- Event dead zone < 1m (FX337 series)
- Attenuation dead zone < 5m (FX337 series)
- Single, Dual, and Triple Wavelength options - 1310nm, 1490nm, 1550nm & 1625nm
- Bellcore GR196 SOR compatible file format
- Auto OTDR test mode - determines fiber length, adjusts sampling parameters, acquires trace and analyzes fiber events automatically
- Manual OTDR mode – User controls all setup and measurement parameters manually
- Dual markers for distance, attenuation and splice loss measurements
- Visual Fault Locator (VFL) with CW and 1Hz modes
- Universal 2.5mm optical interface for OTDR and VFL connections
- Live fiber detection to warn user and prevent accidental receiver damage

## Test Applications

### Introduction

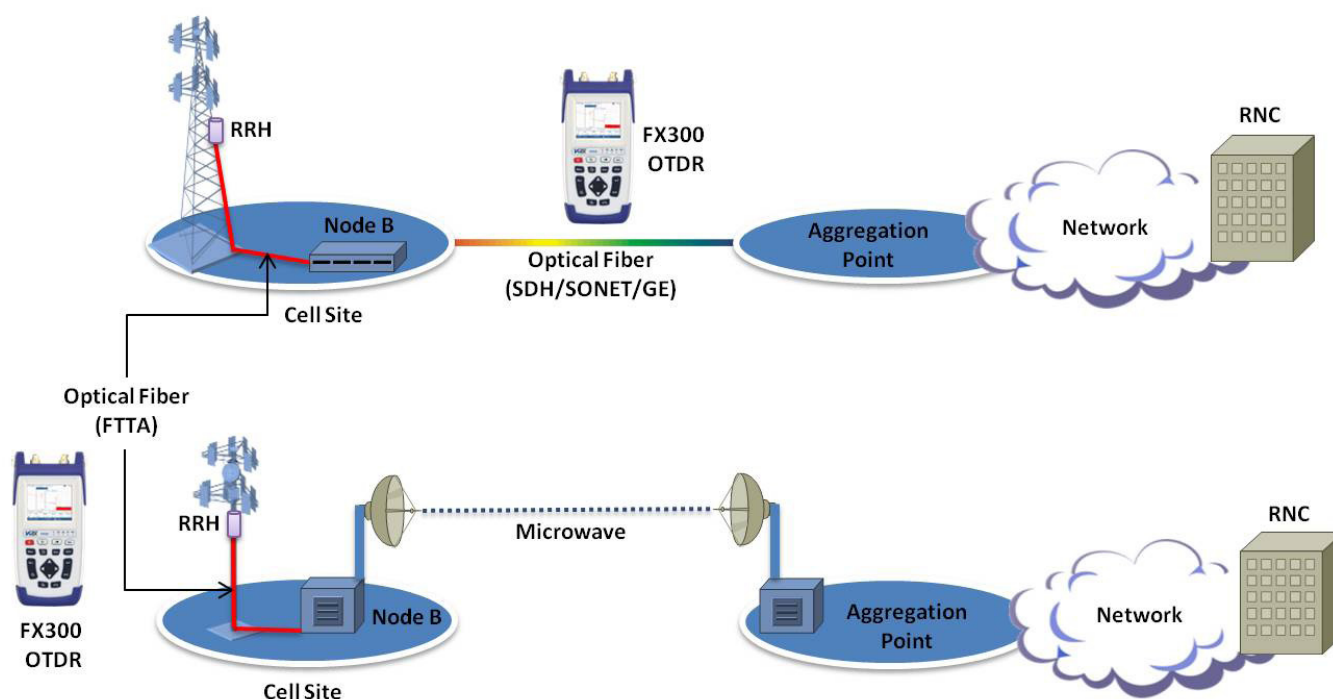
The versatility and form factor of the FX300 OTDR allows it to address a number of applications where optical fibers are used including next generation mobile networks, FTTX/PON/Access networks, and LAN/WAN enterprise networks.

### Next Generation Wireless Networks

New 3G UMTS and 4G LTE mobile systems support more bandwidth-intensive wireless services, including mobile email, text messaging, image sharing, and web surfing. These systems operate at higher frequency bands compared to legacy GSM networks, so many additional smaller radio cells are needed to guarantee similar network coverage, thus increasing the number of antennas and base stations required. Due to increased bandwidth demands and various other technical factors, optical fiber is fast becoming the infrastructure of choice for wireless operators.

### Mobile Backhaul

Backhaul is the crucial link between the mobile operator's radio access network and its core network. Copper, fiber, and microwave can all be used in the last mile and the aggregation part of the network, however fiber still provides the highest capacity to support the growing bandwidth trends of new mobile networks. Convergence of TDM transport and Ethernet based data connectivity is also driving fiber adoption, so wireless operators and installation contractors need to equip technicians with an OTDR to support the growing fiber test requirement. The highly compact FX300 OTDR offers optical performance ideally suited for backhaul applications including an Auto mode that boosts productivity in the field by providing fast and precise fault detection and location with single button automation.



### Fiber to the Antenna (FTTA)

Base stations of conventional mobile systems output signals via coaxial cables to the antenna, however these lengths are usually limited due to propagation losses. Because these losses increase as a function of frequency, conventional copper cables between the base station and the antenna are steadily being converted to optical fiber by operators, hence the new term FTFA (fiber to the antenna). In FTFA architectures, the high-frequency and power electronics are re-located to a remote-radio head (RRH) close to the antenna, however the optical fiber cable linking this equipment to the base station remains exposed to environmental conditions and vulnerable to external forces and should be verified regularly. The FX300 OTDR offers excellent dead zone performance perfect for checking short FTFA links.

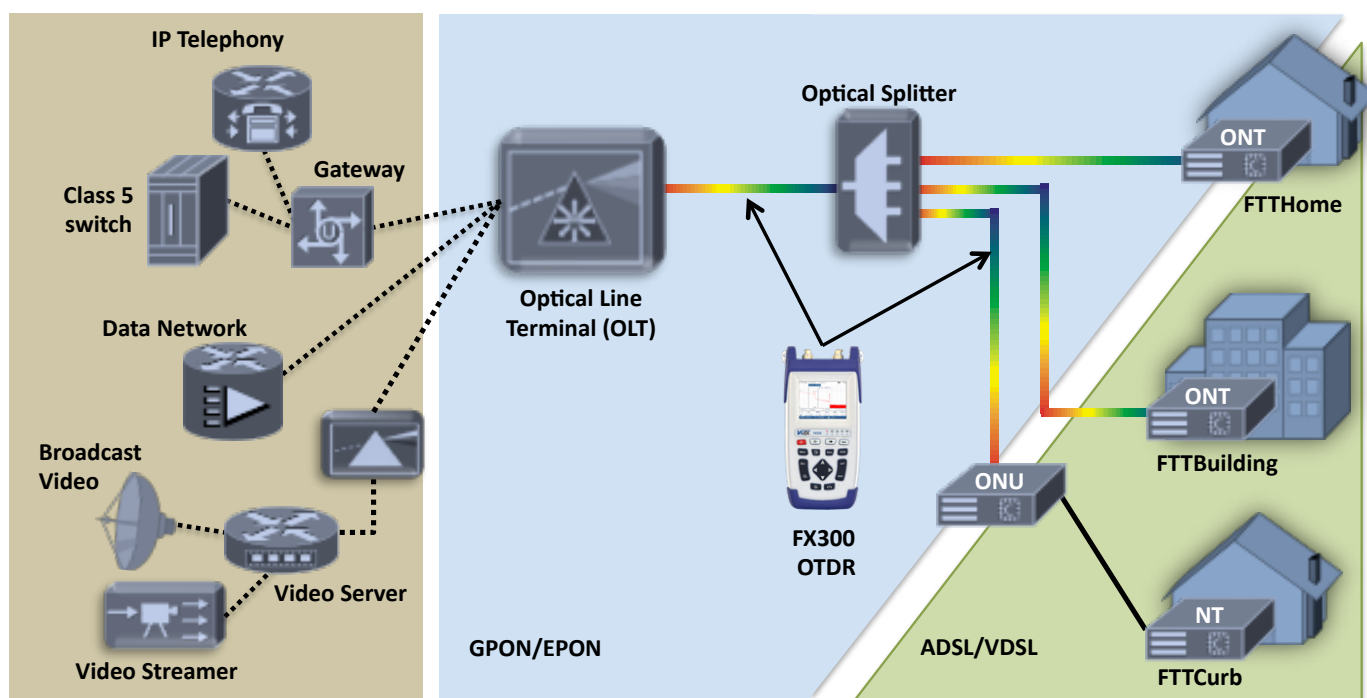
## PON Applications

### FTTx/Passive Optical Networks (PON)

PON is an access technology that uses small, inexpensive optical splitters, instead of large, expensive, and power-hungry optical repeaters used in traditional optical networks. PON network components comprise Optical Line Terminals (OLTs), Optical Network Terminals (ONTs), Optical Network Units (ONUs), and passive optical splitters.

The OLT is usually located in the operator's Exchange or Central Office in a telco type environment, or in the head end in a MSO/CATV provider's network. The ONU or ONT terminates the optical circuit at the subscriber. In Fiber-To-The-Home (FTTH) applications, an ONT typically terminates the circuit at the subscriber premise or home, where it interfaces the optical fiber to an in-home copper circuit. An ONU is also used in Fiber-To-The-Curb (FTTC) architectures where the fiber ends at the curb, and the rest of the local loop is provisioned over ADSL/VDSL copper-UTP service in telco networks or coax in CATV networks.

Finally, a passive optical splitter resides between the OLT and the ONUs or ONTs, which are responsible for dividing the downstream signal into multiple and identical signals broadcasted to the ONUs.



### PON OTDR Testing

PON systems bring new challenges to optical testing, including OTDR measurements. A basic overview of OTDR tests possible with the handheld FX300 OTDR are outlined below.

#### PON Fiber Installation

During fiber installation, splicing and fiber should be verified with an OTDR at both 1310 and 1550nm wavelengths to identify macro-bending and other wavelength dependent anomalies. Bi-directional testing is also recommended.

#### PON Construction/Acceptance Testing

Connectorized splitter: Link and event loss including ORL of both feeder and distribution sections at 1310/1550nm

Spliced splitter: Link and event loss including ORL between OLT and ONT at both 1310/1550nm

#### PON Troubleshooting

In-service troubleshooting is usually performed out-of-band at 1625nm or 1650nm using an OTDR equipped these wavelengths and built-in filter. If no ONUs or ONTs are responding, an out-of-service test from the splitter or OLT to sectionalize the fault is required.

## OTDR Features

### Equipped with Features you can depend on

#### Fast Startup

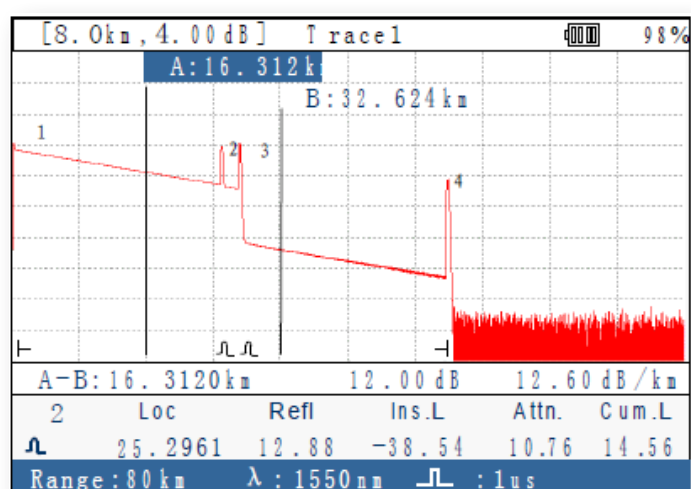
The FX300 powers up and is ready to perform measurements in less than 10 seconds, making it one of the fastest units in the industry. Technicians can start work immediately or restore fiber breaks quickly.

#### Intuitive Design

An ergonomic keypad and easy to interpret user interface offers simple menu navigation and testing with minimal training, so even novice users can test quickly and efficiently. Powerful zooming functions allow users to pinpoint faults with greater certainty and precision.

#### Portability

The lightweight, compact handheld form factor is perfect for working in tight spaces like manholes, crowded distribution closets or even up mobile network towers in FTTA applications. A comfortable shoulder strap enhances portability when moving from one test point to another or the unit can be tethered to an equipment rack so the technician is not forced to hold the unit all the time.



#### Powerful Analysis

The FX300 simplifies OTDR testing by automating test setup parameters and analysis.

In Auto OTDR mode, the unit automatically estimates the fiber length, adjusts the sampling parameters, acquires and analyzes the trace. Results are displayed in an easy-to-read event table that compares fiber attenuation, splice loss and reflectance against user defined thresholds.

For advanced troubleshooting, the user is able to set test parameters manually and move markers to make measurements.

#### Live Fiber Check

A test port check warns the user when the OTDR is connected to live fiber, preventing accidental overload and potential receiver damage. The unit automatically checks if light is present at the test interface prior to making measurement and will disable the transmitter if an active fiber is detected.

#### Simple Software Upgrades

Firmware upgrades are performed easily via the USB port and are available at no charge for registered users from the VeEX website or through VeEX customer support.

#### Extended Battery Operation

The FX300 provides 8 hours of operation on a single charge. Since AC power is not always available on site, this autonomy is available when and where you need it. A low voltage indicator warns the user when the device power reaches critical levels, while the Auto-off function shuts down the unit automatically when the unit is not in use, thus conserving battery life.

#### Test Result Management

Trace Expert software included with each unit, allows the user to organize, edit, view, print, save, or archive test results. Data management includes the ability to export traces in Bellcore GR-196-CORE format so test results can be compared with compatible vendor data. The common OTDR format (SOR) files can easily be shared with colleagues or customers. OTDR emulation to analyze and batch print traces in the office is a powerful function for managers tasked with these duties.

## Optical

FX332 Models <sup>1</sup>	FX332A	FX332B	FX332C
Wavelength (± 20nm)	1310/1550nm	1310/1490/1550nm	1310/1550/1625nm
Dynamic range (dB) <sup>2</sup>	32/30	32/30/30	32/30/30
Pulse width (ns, μs)	5ns, 10ns, 30ns, 50ns, 100ns, 300ns, 1μs, 2.5μs, 10μs		
Event dead zone (m) <sup>3</sup>	1.5	1.5	1.5
Attenuation dead zone (m) <sup>4</sup>	8	8	8
Distance range (km)	0.5 to 160	0.5 to 160	0.5 to 160
Distance Uncertainty (m) <sup>5</sup>	± (1m + 0.005% x distance + sampling resolution)		
Sampling resolution (m)	10cm		
Sampling points	Up to 16,000		
Linearity (dB)	± 0.05dB/dB		
Measurement time	User defined		
Memory capacity	300 traces, Bellcore GR196 SOR format		
Fiber Analysis	Automatic, in tabular format, with user defined PASS/FAIL thresholds		
Fiber type	Single mode, 9/125μm		
Visual Fault Locator (VFL)	Laser, 650 nm ± 10 nm, < 1dBm		
Laser safety	21 CFR 1040.10 and IEC 60825-1:2007		
Optical connectors (OTDR/VFL)	Universal 2.5mm interface, FC/SC/ST adaptors optional		

FX337 Models <sup>1</sup>	FX337A	FX337B	FX337C
Wavelength (± 20nm)	1310/1550nm	1310/1490/1550nm	1310/1550/1625nm
Dynamic range (dB) <sup>2</sup>	37/35	37/35/35	37/35/35
Pulse width (ns, μs)	5ns, 10ns, 30ns, 50ns, 100ns, 300ns, 1μs, 2.5μs, 10μs, 20μs		
Event dead zone (m) <sup>3</sup>	0.8	0.8	0.8
Attenuation dead zone (m) <sup>4</sup>	4.5	4.5	4.5
Distance range (km)	0.5 to 240	0.5 to 240	0.5 to 240
Distance Uncertainty (m) <sup>5</sup>	± (1 + 0.005 % x distance + sampling resolution)		
Sampling resolution (m)	5cm		
Sampling points	Up to 16,000		
Linearity (dB)	± 0.05dB/dB		
Measurement time	User defined		
Memory capacity	300 traces, Bellcore GR196 SOR format		
Fiber Analysis	Automatic, in tabular format, with user defined PASS/FAIL thresholds		
Fiber type	Single mode, 9/125μm		
Visual Fault Locator (VFL)	Laser, 650 nm ± 10 nm, < 1dBm		
Laser safety	21 CFR 1040.10 and IEC 60825-1:2007		
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## Notes

1. Unless noted, all specifications are valid at 23°C ± 2°C (73.4°F ± 3.6°F) using FCPC connectors
2. Typical dynamic range after three-minute averaging and SNR = 1
3. Typical dead zone using 5ns pulse and reflections below -45dB
4. Typical dead zone using 10ns pulse and reflections below -45dB
5. Excludes uncertainty due to fiber refractive index setting

## General

Size	240 x 120 x 55 mm (H x W x D) 9.2 x 4.72 x 2.25 in	Operating Temperature	0°C to 50°C (32°F to 122°F)
Weight	0.9 kg (1.98 lb) nominal	Storage Temperature	-40°C to 60°C (-40°F to 140°F)
Battery	Nickel Metal Hydride (NimH), smart charge, with low voltage indicator	Humidity	0% to 80% non-condensing
Battery Autonomy	> 8 hours continuous operation per Bellcore TR-NWT-001138	Display	3.5 inch color LCD
		AC Adaptor/Charger	Input: 100-240 VAC (50/60 Hz) Output: 12VDC 1.5A
		Languages	English; other languages on demand

## Ordering Information

### Chassis

Z06-00-001P FX300 OTDR Fiber Expert

### Unit Configuration (must select one)

Z06-99-001P FX332A, OTDR Fiber Expert, 1310/1550nm  
32/30dB with VFL

Z06-99-002P FX332B, OTDR Fiber Expert, 1310/1490/1550nm  
32/30/30dB with VFL

Z06-99-003P FX332C, OTDR Fiber Expert, 1310/1550/1625nm  
32/30/30dB with VFL

Z06-99-004P FX337A, OTDR Fiber Expert, 1310/1550nm  
37/35dB with VFL

Z06-99-005P FX337B, OTDR Fiber Expert, 1310/1490/1550nm  
37/35/35dB with VFL

Z06-99-006P FX337C, OTDR Fiber Expert, 1310/1550/1625nm  
37/35/35dB with VFL

### Recommended Accessories

F05-00-010G SC/UPC to LC/UPC, 9/125um (Singlemode) Test  
Jumper (2 m)

F05-00-011G FC/UPC to LC/UPC, 9/125um (Singlemode) Test  
Jumper (2 m)

F05-00-012G FC/UPC to FC/UPC, 9/125um (Singlemode) Test  
Jumper (2 m)

F05-00-013G SC/UPC to SC/UPC, 9/125um (Singlemode) Test  
Jumper (2 m)

F05-00-014G FC/UPC to FC/APC, 9/125um (Singlemode) Test  
Jumper (2 m)

F05-00-015G SC/UPC to SC/APC, 9/125um (Singlemode) Test  
Jumper (2 m)

F99-00-015G FC Adaptor for 2.5mm Universal Interface

F99-00-016G SC Adaptor for 2.5mm Universal Interface

F99-00-017G ST Adaptor for 2.5mm Universal Interface

### Replacement Items

A03-00-007G AC Adaptor, US Plug (for FX300)

C01-00-001G Carrying Case for V100

C03-00-001G Shoulder Strap

Z77-00-022G AC Adaptor, EU Plug (for FX300)

Z77-00-023G AC Adaptor, UK Plug (for FX300)

