

FlexScan® TS100 PON Troubleshooter

One-Touch Troubleshooting

Features

- Locate faults in as fast as <3 seconds with the press of a button
- Displays power and link length, loss, ORL, and pass/fail results
- Single-ended test reduces time and cost
- Rugged, lightweight, hand-held for field use
- Available with field-replaceable connector adapter

Applications

- Troubleshoot PONs or Point-to-Point networks from one end
- Diagnose faults exceeding industry or user pass/fail limits
- Verify loss of PON splitters
- Verify GPON, video and XG/XGS-PON or 10GEPON power levels
- Verify insertion loss, TX output or RX input power levels
- Pinpoint location and verify loss and reflectance of network events



AFL's FlexScan TS100 Optical Troubleshooter is an easy-to-use, all-in-one tool for detecting, identifying, locating, and resolving single-mode optical network issues. The TS100 has auto-configured settings to quickly measure received power, link length, loss, and ORL with the push of a button. The results are displayed using color-coded LinkMap® icons for easy analysis. The FlexScan TS100 automates testing, shortens test time, interprets results, and recommends corrective actions, improving efficiency of frontline technicians and reducing costs.

Diagnose your network in seconds: Just press Start and the TS100 immediately measures and displays received power levels when connected to a live GPON and/or 10G PON network. Within seconds, link length, loss, and ORL are displayed, along with faults exceeding industry or user-set pass/fail limits. The TS100 even recommends corrective actions based on test results making it easier for technicians to find and fix network problems.

Requires minimal, if any, training: Designed primarily for field technicians activating and maintaining broadband access networks, the TS100 requires little training and no OTDR experience. SmartAuto® auto-configures test settings and presents network test results in easy-to-understand, color-coded icons indicating passing or failing connections, splices, and splitters. OTDR and PON OPM test setups can also be saved and recalled to reduce repeated setup of common test configurations.

All-in-one test capability: The FlexScan TS100 family includes options for integrated VFL, broadband and/or PON power meter, and light source capabilities. They can be easily paired to AFL's FOCIS family of inspection scopes, ensuring technicians have everything they need to locate and quickly resolve optical network issues. Featuring automatic wavelength identification and synchronization, the light source and broadband power meter support AFL's Wave ID insertion loss testing. The units also generate and detect fiber-identifying tones.

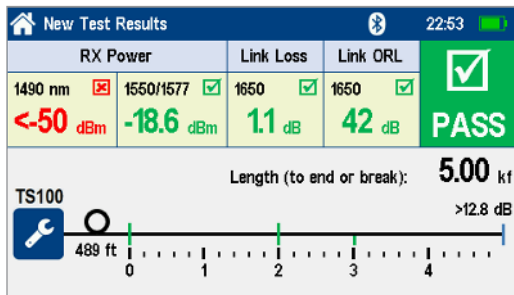
Designed for field use: FlexScan TS100 is small (3.5 x 6 x 1.75 in (86 x 160 x 43 mm)) and weighs less than a pound (0.4 kg). It has a bright indoor/outdoor touchscreen and rechargeable battery that lasts >12 hours for all-day operation.

Multiple storing and reporting options: Results can be stored internally, saved to an external device via USB, or wirelessly uploaded via the free AFL's FlexApp for real-time reporting using the included FlexReports Test Results Manager software. Reports can also be viewed on FlexApp.

Convenient cost-saving kits: Bundle the FlexScan TS100 with your choice of launch cable and FOCIS Flex connector inspection probe with adapter tips for significant cost-savings!

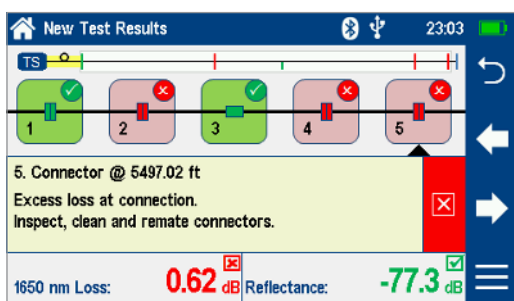
Field-replaceable Optical Port Saver: With AFL's optional field-replaceable Optical Port Saver, avoid expensive service repairs to replace connector adapters damaged due to poor cleaning practices and/or normal wear-and-tear.

FlexScan® TS100 PON Troubleshooter



Verify RX Power, Link Length, Loss, and ORL in Seconds

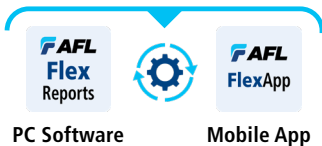
Link length, loss, and ORL are critical parameters to check when verifying optical networks. Within seconds of pressing Start, FlexScan TS100 options measure and report distance, loss, and ORL to the end of a Point-to-Point network or to the first splitter in a PON. Additionally, for an in-service PON, TS100 automatically detects and measures downstream power levels. Measurements of received power, link length, loss, and ORL may be compared to pass/fail limits to immediately identify any issues. Technicians can simply touch the failed measurement value to get information on why the measurement failed and what to do about it.



Identifies & Locates Faults - Recommends Corrective Action

TS100 automatically detects network events such as connectors, splices, and splitters. It displays these events with LinkMap® easy-to-read, color-coded icons and enable users to quickly identify faults that require action. Touching each event icon displays its pass/fail status, location, loss, and reflectance as well as recommended corrective actions. More detail may be obtained by touching the measurement values for failing events. An event type can be changed if needed to another event type and the event analysis is repeated based on pass/fail limits of the new event type. FlexScan TS100 also supports OTDR and PON power meter test setups to be created, saved, transferred to other FlexScans, and recalled in the field, simplifying testing and avoiding user setup errors.

FlexReporter™ Software Suite

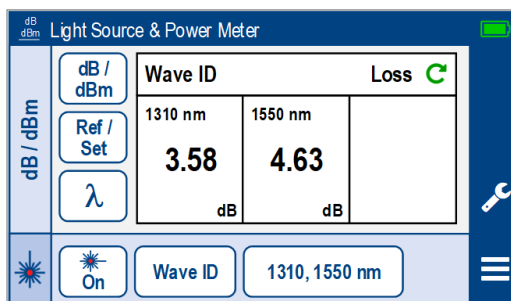


Connectivity

Results can be stored internally, saved to an external device via USB, or wirelessly uploaded via the free FlexApp to a smart device for real-time reporting using the included FlexReports Test Results Manager PC-based software. This real-time reporting can help avoid mistakes in the field that will require future truck rolls. FlexScan TS100 also pairs easily with AFL's award-winning FOCUS® family of connector inspection probes for fast, easy one-button-push inspection of single-fiber and/or multi-fiber connector end-faces. Inspection data can be saved with TS100 results internally or transferred for archiving.

PON Power Meter for GPON, Video, 10GPON

FlexScan TS100-60/70 models include a broadband power meter and a downstream PON power meter, enabling users to immediately and independently verify 1490 nm GPON, 1550 nm video, and 1577 nm 10GPON (XG/XGS-PON or 10GE-PON). FlexScan TS100-30 model includes a downstream PON power meter for verifying 1490 nm GPON and 1577 nm 10GPON (XG/XGS-PON or 10GE-PON). The product family supports fiber-identifying tone generation and detection, as well as AFL's Wave ID insertion loss measurements. With Wave ID, the OPM auto-synchronizes to a single or multi-wavelength Wave ID optical signal transmitted by another FlexScan or AFL light source. The OPM reports detected wavelengths and measures loss at each wavelength, saving significant test time and eliminating setup errors.



FlexScan® TS100 PON Troubleshooter

Specifications^a

FlexScan TS100-30/60/70 models support PON and Point-to-Point network troubleshooting at 1625/1650 nm and, depending the model, include optical light source (OLS), optical power meter (OPM), visual fault locator (VFL), internal results storage plus Bluetooth/Wi-Fi, & USB interfaces.

MODEL	TS100-30/60/70
FAULT LOCATOR	
Emitter Type	Laser
Safety Class ^b	Class I
Fiber Type	Compatible with all G.65x single-mode fiber
Wavelengths (nm)	TS100-30: 1625 nm, TS100-60/70: 1650 nm
Center λ Tolerance ^c	± 20 nm
Link Loss ^d	TS100-30 ≤ 12 dB, TS100-60: ≤ 18 dB, TS100-70: ≤ 23 dB
Test Through Splitter	Up to 1:32 (TS100-70 only)
Test Time	To end or Splitter: TS100-30: ≤ 30 sec, TS100-60/70: ≤ 3 sec Through Splitter: ≤ 40 sec (TS100-70 only)
Index of Refraction	1.3000 to 1.7000
Distance Resolution	0.1 m
Distance Uncertainty ^e	± 1.5 m
Distance Units	m, km, ft, kft, mi (user-selected)
Loss Resolution	0.01 dB
Linearity	± 0.05 dB/dB
Reflectance Resolution	0.1 dB
Reflectance Accuracy	± 2 dB (-20 to -50 dB)
Results File Format	Telcordia SR-4731 Issue 2 compatible .SOR
Results Storage	4 GB internal memory (>5000 traces typical); External USB memory stick
Data Transfer to PC	USB cable or Bluetooth® (option)
Test Modes	TS100-30: SmartAuto Fault Locate, OPM, Inspection TS100-60/70: SmartAuto-Flexpress® Fault Locate, OLS/OPM, Inspection
Live Fiber Protection	No TS100 damage with input power $\leq +15$ dBm for wavelength(s) in range 1260 to 1675 nm
Live Fiber Detection	Reports live fiber with input signal ≥ -35 dBm for wavelength(s) in range 1260 to 1675 nm
PON Filter Isolation	>50 dB for 1260 nm $\leq$ wavelength ≤ 1600 nm
Live PON TS100 Test	TS100-30: 1625 nm filtered detector TS100-60/70: 1650 nm filtered detector

Splitter Support (TS100-70 only)

Minimum Splitter Ratio	1:2
Fiber length before splitter (with minimum 150 m launch cable)	0 to 5 km
Maximum fiber loss before splitter	2.5 dB

Notes:

- All specifications valid at 23 °C $\pm$ 3 °C unless otherwise specified.
- FDA 21 CFR 1040.10 & 1040.11, IEC 60825-1: 2014.
- Using 10 ns pulse width.
- Maximum link loss for which loss and distance to end or splitter can be reliably detected and measured.
- For a 5 km link with insertion loss ≤ 4 dB and reflectance ≥ -45 dB. Excludes uncertainty due to index of refraction.
- Applies when operating from battery with charge level $>20\%$, or from AC when fully charged.
- Max temperature while charging is $+45$ °C.

VISUAL FAULT Locator - TS100-60/70 only	
Emitter Type	Visible red laser, 650 $\pm$ 25 nm
Output Power	1.5 mW (+2 dBm $\pm$ 0.5 dB) into single-mode fiber
Safety Class ^b	Class 3A / Class 3R
Modes	CW and 1 Hz flashing

OPTICAL LASER SOURCE (OLS) - TS100-30/60/70

Emitter Type	Laser
Safety Class ^b	Class I
Fiber Type	Compatible with all G.65x single-mode fiber
Wavelengths (nm)	TS100-30: 1625 nm, TS100-60/70: 1650 nm
Center λ Tolerance (CW)	± 20 nm
Spectral Width (FWHM)	≤ 5 nm
Internal Modulation	270, 330, 1000, 2000 Hz, TS110-60/70 only: CW, Wave ID
Wave ID (TS100-60/70 only)	Compatible with AFL's OLS/OPM
Output Power Stability ^f	$\leq \pm 0.5$ dB
Output Power	> -5 dBm

OPTICAL POWER METER (OPM) - TS100-30/60/70

Calibrated Wavelengths	TS100-30: 1490, 1577 nm, TS100-60/70: 1270, 1310, 1490, 1550, 1577 nm
Detector Type	Filtered InGaAs (x2)
Measurement Range	+10 to -50 dBm
Tone Detect Range	+3 to -35 dBm; auto-detects 270, 330, 1k, 2k Hz
Wave ID Detect Range	TS100-60/70 only: +3 to -35 dBm; auto-detects 1310/1550 Wave ID
Accuracy	± 0.5 dB at -10 dBm
Loss Resolution	0.01 dB
Measurement Units	TS100-30: dBm, TS100-60/70: dB, dBm or Watts (nW, μ W, mW)

General - TS100-30/60/70

Size (in boot)	86 x 160 x 43 mm
Weight	0.4 kg
Operational Temperature ^g	-10 °C to +50 °C, 0 to 95% RH (non-condensing)
Storage Temperature	-40 °C to +60 °C, 0 to 95% RH (non-condensing)
Power	Rechargeable Li-Pol or AC adapter
Battery Life	>12 hours, Telcordia test conditions
Display	4.3 in color touchscreen LCD, 480x272, backlit
USB Ports	1 host, 1 micro-USB function
Bluetooth (optional, not available for TS100-30)	Compatible with Windows PC, Android, iOS

FlexScan® TS100 PON Troubleshooter

FlexScan TS100 Kit Configurations

All kits include selected FlexScan TS100 with AC charger, battery, carry strap, SC/2.5 mm connector adapters, FlexReports, USB cable, and soft carry case. PLUS kits add a 150 m fiber ring, One-Click cleaner, and upgrade to FlexReports Advanced software. PRO kits add a FOCIS® Flex auto-focusing connector inspection probe with IEC pass/fail analysis and two adapter tips. TS100s are manufactured with APC connectors.

Ordering Information

TS100-[MOD]-[KIT]-[Pn]-[Wn]-[LNG]-[AC]-[FR]-[TIP] where:

[MOD]	TS100 Configuration
30	1625 nm filtered Live PON Troubleshooter; Test to Splitter
60	1650 nm filtered Live PON Troubleshooter; Test to Splitter
70	1650 nm filtered Live PON Troubleshooter; Test through Splitter

[KIT]	TS100 Kit Configuration/Kit Contents
BAS	Includes: TS100, soft case, FlexReports Basic, USB cable ^a
PLUS	Includes: BAS kit plus 150 m fiber ring, One-Click, FlexReports Advanced
PRO	Includes: PLUS kit plus FOCIS Flex with 2 adapter tips

[Pn]	Power Meter Option
P2	TS100-60/70: Broadband power meter plus dual-wavelength PON power meter for GPON / Video / XG/XGS/10GE PON
P3	Dual-Wavelength PON power meter for GPON / XG/XGS-PON

[Wn]	Bluetooth and Wi-Fi ^c Wireless Option
W0	Disabled
W1	Installed and enabled

[LNG]	Language
ENG	English
CHS	Chinese Simplified
CHT	Chinese Traditional
CZE	Czech
DEU	German
DNK	Danish
FIN	Finnish
FRA	French

[LNG]	Language
ITA	Italian
JPN	Japanese
KOR	Korean
NOR	Norwegian
POL	Polish
POR	Portuguese
SPA	Spanish
TUR	Turkish

[AC]	Destination Country	AC Plugs
US	USA	2-pin, US
EU	European Union	2-pin, EU
UK	United Kingdom	3-pin, UK
CN	China, Australia	2-pin, SAA

Notes:

- Results can be transferred from FlexScan to FlexReports using USB cable, or uploaded via Bluetooth using FlexApp downloaded from 'Google play' or 'App Store'.
- For additional FOCIS Flex adapter tips, see the FOCIS Flex specification sheet or Buyer's Guide.
- Wi-Fi not available for TS100-30.

[FR1]	150 m SMF Fiber Ring
Absent	N/A in Basic kits
ASC/USC	FR-SMF-150-ASC-USC
ASC/UFC	FR-SMF-150-ASC-UFC
ASC/ULC	FR-SMF-150-ASC-ULC
ASC/UST	FR-SMF-150-ASC-UST
ASC/ASC	FR-SMF-150-ASC-ASC
ASC/ALC	FR-SMF-150-ASC-ALC

[TIP] ^b	FOCIS Flex Tips & Cleaning (PRO only)
Blank	Option not available in Basic and PLUS kits
SC	SC-UPC bulkhead tip, 2.5 mm UPC ferrule tip, 2.5 mm One-Click
FC	FC-UPC bulkhead tip, 2.5 mm UPC ferrule tip, 2.5 mm One-Click
LC	LC-UPC bulkhead tip, 1.25 mm UPC ferrule tip, 1.25 mm One-Click
ASC	SC-APC bulkhead tip, 2.5 mm APC ferrule tip, 2.5 mm One-Click
AFC	FC-APC bulkhead tip, 2.5 mm APC ferrule tip, 2.5 mm One-Click
ALC	LC-APC bulkhead tip, 1.25 mm APC ferrule tip, 1.25 mm One-Click

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Ordering Information

Accessories

AFL NO.	Description
1400-05-0230PZ	FlexScan wrist strap
1400-05-0231PZ	FlexScan neck strap, 36"
4050-00-0931PR	AC charger 100-240 VAC to 5 VDC
1400-01-0111PZ	Soft carry case for TS100 kits with FOCIS Flex and Fiber Ring
1400-01-0128PZ	Soft carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring
1400-01-0134PZ	Hard carry case for TS100 kits with FOCIS Flex, OFI-BIPMe and Fiber Ring
1400-21-0004PZ	Glove case with neck strap and carabiner
4050-00-0033MR	Vehicle charger, 12VDC to 5VDC @2A
6000-00-0031MR	Cable, USB-micro B, 5 pin, 6'
6000-00-0034PR	5V USB charging cable (1.5 m), type A to barrel (0.9 X 3.2 X 9 mm)
Cleaning Supplies	One-Clicks, fluid, wipes, etc. See www.AFLglobal.com

Optical Port Saver

Protect your FlexScan TS100 Troubleshooter ports from damage due to mating with dirty or damaged launch cables or patch cords or normal wear-and-tear. Equip your FlexScan TS100 with a field-replaceable Optical Port Saver, which installs in seconds and accepts AFL's tool-free interchangeable SC, LC, FC and ST connector adapters.

Replace damaged port savers in the field - When normal wear-and-tear or poor cleaning practices damage the port saver's end-face, replace it in seconds without having to return the troubleshooter to a service center for an expensive and time-consuming repair.

AFL NO.	Description
2900-58-0001MR	Optical Port Saver; APC female to APC male
2900-58-0002MR	Optical Port Saver; APC female to UPC male
2900-58-0003MR	Optical Port Saver; UPC female to APC male
2900-58-0004MR	Optical Port Saver; UPC female to UPC male

Connector Adapters

AFL NO.			Connector Adapter
OTDR/OLS Port	OPM Port	VFL Port	
2900-50-0002MR	2900-52-0001MR	N/A	FC
2900-50-0003MR	2900-52-0002MR	N/A	SC
2900-50-0004MR	2900-52-0003MR	N/A	ST
2900-50-0006MR	2900-52-0004MR	N/A	LC
2900-50-0011MR	N/A	N/A	SC/APC
N/A	2900-52-0005MR	2900-50-0007MR	2.5 mm Universal
N/A	2900-52-0006MR	2900-50-0010MR	1.25 mm Universal

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Test Management and Reporting Software

AFL NO.	Description
RPTS-AD-USB-1	FlexReports Advanced, one seat license on USB
RPTS-UP-TRM3-1	FlexReports Advanced, one seat, Upgrade from TRM® 3 Advanced on USB. Users must have TRM-3 Advanced license
FlexReports Basic	FlexReports Basic, available for download on AFL Software Resources website
FlexApp	FlexApp data transfer mobile App, available on Google Play and Apple App Store

Recommended Products



FOCIS Flex and FOCIS Lightning2 Connector Inspection

- Self-contained, tether-free, hand-held inspection solution
- Auto-focus and auto-centering for fast, easy inspection
- IEC, IPC and user-defined pass/fail analysis
- FOCIS Lightning: extremely fast multi-fiber auto-analysis for datacom and telecom inspection applications



OFI-BIPMe Optical Fiber Identifier

- World class signal sensitivity
- Trigger lock, positive stop for optimum detection
- Integrated optical power meter option

Qualifications

Category	Regulation/Standard	Qualification
CE Marking	EU	Compliant to relevant EU Directives on health, safety, and environmental protection, and certified with CE marking
Safety/EMC/EMI	IEC	Compliant to IEC 61010-1 for safety requirements for electrical equipment
	EN	Compliant to EN 61010-1 for safety requirements for electrical equipment
	IEC	Compliant to IEC 61326-1 for EMC requirements for electrical equipment
	EN	Compliant to EN 61326-1 for EMC requirements for electrical equipment
	EN	Compliant to EN 55011 for EMC requirements for industrial, scientific and medical equipment
	Telcordia	Compliant to GR-196-CORE 4.5.1 for requirements on electromagnetic interference
	FCC	Compliant to code of federal regulations FCC 47 CFR 15 on unlicensed transmissions
	FDA	Compliant to code of federal regulations FDA 21 CFR 1040.10 and 1040.11 on laser products
	IEC	Compliant to IEC 60825-1 for safety of laser products
RoHS	EU	Compliant to EU regulations Directive 2011/65/EU (RoHS 2) and Directive 2015/863 (RoHS 3)
Test Method	TIA	Compliant to TIA-568.3-D for test and measurement requirements for premises optical fiber cabling and components
	IEC	Compliant to IEC 11801 for test and measurement requirements for optical fiber cabling for use within premises
	AS/NZS	Compliant to AS/NZS 3080 for test and measurement requirements for optical fiber cabling for use within premises
	TIA	Compliant to TIA-526-7 for test procedures for installed optical fiber cable plant
	TIA	Compliant to TIA-526-14 for test procedures for installed optical fiber cable plant
	IEC	Compliant to IEC 14763-3 for systems and methods for the inspection and testing of installed optical fiber cabling
	AS/NZS	Compliant to AS/NZS 14763.3 for systems and methods for the inspection and testing of installed optical fiber cabling
	IEC	Compliant to IEC 61280-4-1 for test procedures for installed optical fiber cable plant
	IEC	Compliant to IEC 61280-4-2 for test procedures for installed optical fiber cable plant
Generic Requirement	Telcordia	Compliant to GR-196-CORE for generic requirements for OTDR-type equipment
	Telcordia	Compliant to SR-4731 Issue 2 for OTDR data format
	IEC	Compliant to IEC 61746-1 for requirements on calibration of OTDR

Contact Sales@AFLglobal.com to schedule a demonstration or learn how to buy.

Visit www.AFLglobal.com/Test to learn more about FlexScan TS100 Troubleshooters.

International Sales and Service Contact Information available at www.AFLglobal.com/Test/Contact



mesomatic
fiber optics

Mesomatic Messtechnik AG
Birkenstrasse 47
6343 Rotkreuz

+41 41 748 60 22
info@mesomatic.ch | www.mesomatic.ch

