

FLS/FOT-600

Light Source/Optical Loss Test Set



EXFO

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Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

The exhaustive list of patents is available at EXFO.com/patent.

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Regulatory Information

USA Electromagnetic Interference Regulatory Statement

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America. However, EXFO Inc. makes reasonable efforts to ensure compliance to the applicable standards.

The limits set by these standards 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 user documentation, 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.

Canada Electromagnetic Interference Regulatory Statement

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.

Cet équipement génère, utilise et peut émettre de l'énergie radio-fréquence et, s'il n'est pas installé et utilisé conformément à la documentation de l'utilisateur, il peut occasionner une interférence néfaste aux communications radio. L'utilisation de cet équipement dans une zone résidentielle est susceptible d'occasionner une interférence néfaste.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Attention : Cet appareil n'est pas destiné à être utilisé dans des environnements résidentiels et peut ne pas assurer la protection adéquate à la réception radioélectrique dans ce type d'environnements.

This is a class A, group 1 product.

Ceci est un produit de classe A, groupe 1.

- Class A equipment: Equipment that is, by virtue of its characteristics, highly unlikely to be used in a residential environment, including a home business shall be classified as class A and shall comply with the class A limits specified in the applicable ICES standard. Characteristics considered in this assessment include price, marketing and advertising methodology, the degree to which the functional design inhibits applications suitable to residential environments, or any combination of features that would effectively preclude the use of such equipment in a residential environment.

Classe A : Matériel qui, en raison de ses caractéristiques, ne sera fort probablement pas utilisé dans un milieu domiciliaire ni par des entreprises établies à domicile. Parmi les caractéristiques considérées dans cette évaluation, il y a le prix, les méthodes de commercialisation et de publicité, la mesure dans laquelle les fonctions de l'appareil font qu'il ne se prête pas à des applications convenant au milieu domiciliaire ou toute combinaison de ces caractéristiques qui aurait pour conséquence d'en prévenir effectivement l'utilisation à domicile. Utilisé également pour indiquer les limites d'émission correspondantes qui s'appliquent à un tel matériel.

- Class B equipment: Equipment that cannot be classified as Class A shall comply with the Class B limits specified in the applicable ICES standard.

Classe B : Matériel qui ne peut pas être inclus dans la classe A. Utilisé également pour indiquer les limites d'émission correspondantes qui s'appliquent à un tel matériel.

- **Group 1 equipment:** group 1 contains all equipment which is not classified as group 2 equipment, and includes equipment such as laboratory and scientific equipment, industrial process, measurement and control equipment.

Group 2 equipment: group 2 contains all ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used locally, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material for inspection/analysis purposes, or for transfer of electromagnetic energy.

Appareils du groupe 1 : le groupe 1 réunit tous les appareils compris dans le domaine d'application de la présente Norme, qui ne sont pas classés comme étant des appareils du groupe 2. Le groupe 1 inclut les appareils scientifiques et de laboratoire, les processus industriels, appareils de mesure ou de contrôle.

Appareils du groupe 2 : le groupe 2 réunit tous les appareils ISM à fréquences radioélectriques dans lesquels de l'énergie à fréquences radioélectriques dans la plage de fréquences comprises entre 9 kHz et 400 GHz est produite et utilisée volontairement ou uniquement utilisée localement sous forme de rayonnement électromagnétique, de couplage inductif et/ou capacitif, pour le traitement de la matière, à des fins d'examen ou d'analyse ou pour le transfert d'énergie électromagnétique.

Supplier's Declaration of Conformity (SDoC)

The SDoC for your product is as follows:

CAN ICES-001 (A) / NMB-001 (A)

EU and UK Electromagnetic Compatibility Regulatory Statement

Warning: This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures. Your product is suitable for use in industrial electromagnetic environments.

Simplified EU and UK Declaration of Conformity

The full text of the declaration of conformity is available at the following Internet address: www.exfo.com/en/resources/legal-documentation.

EU Economic Operator

EXFO Solutions SAS
2, rue Jacqueline Auriol,
Saint-Jacques-de-la-Lande,
35091 Rennes Cedex 9
FRANCE

1

Introducing the FLS/FOT-600

This user guide covers the following products (unless otherwise specified, descriptions apply to all):

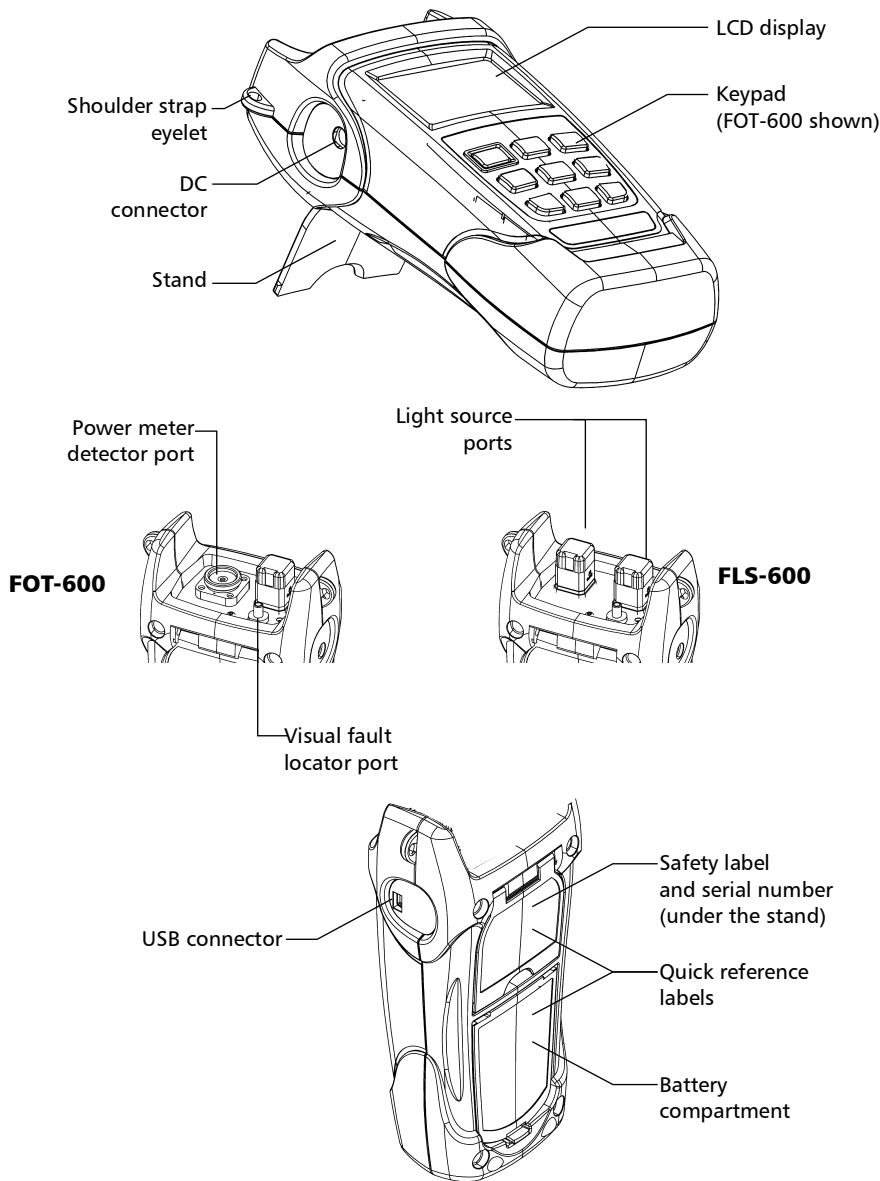
- FLS-600 Light Source
- FOT-600 Optical Loss Test Set: combines both a power meter and a light source

Main Features

	FLS	FOT
Ge or GeX detector with 44 and 45 calibrated wavelengths respectively		X
Absolute power and link loss measurements		X
Editable list of favorite power meter wavelengths		X
Editable list of favorite source wavelengths	X	X
Automatic wavelength detection		X
No offset nulling of detectors required in normal operation		X
Multiple source configurations on a single port [FOT-600] or on one or two ports [FLS-600]	X	X
Visual fault locator		X
Transmission of editable power value with source's signal for automatic reference with compatible power meter	X	X
Transmission of wavelength to compatible power meter in automatic wavelength or auto-switching mode	X	X
Modulated signal emission or detection (270 Hz, 1 kHz and 2 kHz) compatible with other EXFO units	X	X
Data storage on unit and USB transfer to a computer		X
User-configurable pass/fail thresholds with LED indicator		X
Automatic shutdown after 10 minutes of idle time (auto-off)	X	X

Introducing the FLS/FOT-600

Main Features



Power Sources

The units operate with the following power sources:

- AC adapter (connected to standard power outlet—indoor use only) 
Compatible car outlet adapter available upon request.
- Li-Ion rechargeable battery (automatically takes over if you unplug the AC adapter) 



IMPORTANT

If the battery level becomes too low, the unit turns itself off.

Note: *When it is connected with the AC/DC power adapter, the unit will function even if the battery is not present.*

- Possible to switch from AC/DC power adapter to battery power or vice versa without affecting operation.
- The battery recharges automatically when the AC/DC power adapter is connected.

Typical Applications

- Transmitter power measurements (dBm and W)
- Fiber-link loss testing (dB)
- Component insertion-loss testing (dB)
- Fiber identification with 270-Hz, 1-kHz and 2-kHz signals
- Fiber installation and maintenance applications
- FTTx: testing of passive optical networks (PONs)

Conventions

Before using the product described in this guide, you should understand the following conventions:



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.



IMPORTANT

Refers to information about this product you should not overlook.

2

Safety Information



WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.



WARNING

The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.



WARNING

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



WARNING

Use only accessories designed for your unit and approved by EXFO. For a complete list of accessories available for your unit, refer to its technical specifications or contact EXFO.



CAUTION

This product does not contain any user-serviceable components, except if indicated otherwise in this document. Any unauthorized product changes or modifications will invalidate warranty and all applicable regulatory certifications and approvals.



IMPORTANT

Refer to the documentation provided by the manufacturers of any accessories used with your EXFO product. It may contain environmental and/or operating conditions limiting their use.



IMPORTANT

When you see the following symbol on your unit , make sure that you refer to the instructions provided in your user documentation. Ensure that you understand and meet the required conditions before using your product.



IMPORTANT

When you see the following symbol on your unit , it indicates that the unit is equipped with a laser source, or that it can be used with instruments equipped with a laser source. These instruments include, but are not limited to, modules and external optical units.



IMPORTANT

Other safety instructions relevant for your product are located throughout this documentation, depending on the action to perform. Make sure to read them carefully when they apply to your situation.

Other Safety Symbols on Your Unit

One or more of the following symbols may also appear on your unit.

Symbol	Meaning
	Direct current
	Alternating current
	The unit is equipped with an earth (ground) terminal.
	The unit is equipped with a protective conductor terminal.
	The unit is equipped with a frame or chassis terminal.
 or 	On (Power)
 or 	Off (Power)
	On/off (Power)
	Standby (Power)
	Fuse

FLS-600 Laser Safety Information

Your instrument is in compliance with standard IEC 60825-1: 2014 + A11: 2021 and IEC 60825-1 Ed. 3.



WARNING

Viewing the laser output with telescopic optical instruments (for example, telescopes and binoculars) may pose an eye hazard and thus the user should not direct the beam into an area where such instruments are likely to be used.



ATTENTION

L'observation de la sortie optique avec certains instruments d'optique télescopiques (par exemple, des télescopes et des jumelles) peut présenter un danger pour les yeux; il convient donc que l'utilisateur ne dirige pas le faisceau dans une zone où ce type d'instrument est susceptible d'être utilisé.

Laser radiation may be encountered at the optical output port.

The following label indicates that the product contains a Class 1M source:



Label affixed to the back of your product.

INVISIBLE LASER RADIATION
DO NOT EXPOSE USERS OF TELESCOPIC OPTICS
CLASS 1M LASER PRODUCT
RAYONNEMENT LASER INVISIBLE
NE PAS EXPOSER LES UTILISATEURS DE DISPOSITIF OPTIQUE
TÉLESCOPIQUE
APPAREIL À LASER DE CLASSE 1M

Wavelengths: / Longueurs d'onde : 850 nm, 1300 nm, 1310 nm, 1320 nm,
1490 nm, 1550 nm, 1625 nm

Pout max.: / Psortie max. : ≤ 5.5 mW

Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

FOT-600 Laser Safety Information



WARNING

The following symbol on your unit  indicates that laser radiation in excess of Class 1 or Class 2 may be emitted from the aperture.

AVOID EXPOSURE – LASER RADIATION IS EMITTED FROM THIS APERTURE

ÉVITER TOUTE EXPOSITION – RAYONNEMENT LASER ÉMIS PAR CETTE OUVERTURE

Your instrument is in compliance with standard IEC 60825-1: 2014 + A11: 2021 and IEC 60825-1 Ed. 3.

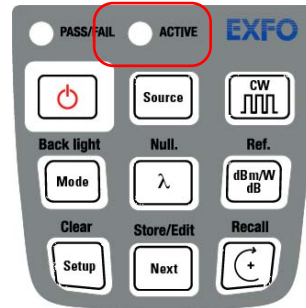
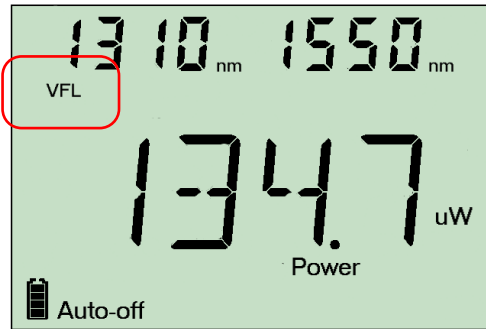
Laser radiation may be encountered at the optical output port.

The following label(s) indicate that the product contains a Class 3R source:



↑
Affixed to back
(under the stand)

The VFL laser is active when VFL is lit up on the display and the Active LED on the unit front panel is on.



Complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

Electrical Safety Information



WARNING

If you need to ensure that the unit is completely turned off, disconnect the power cable and remove the battery. For more information on how to remove the battery, see the section about replacing the battery in this user documentation.



WARNING

- Use the external power supply (AC/DC power adapter) indoors only.
- Unless otherwise specified, all interfaces are intended for connection to ES1 circuits only.
- Use only the listed and certified AC/DC power adapter provided by EXFO with your unit. It provides reinforced insulation between primary and secondary, and is suitably rated for the country where the unit is sold.



CAUTION

- Position the unit so that the air can circulate freely around it.
- When you use the unit outdoors, ensure that it is protected from liquids, dust, direct sunlight, precipitation, and full wind pressure.



CAUTION

The use of voltages higher than those indicated on the label affixed to your unit may damage the unit.



CAUTION

EXFO guarantees the specifications and viability of the products **ONLY** if they are used with the AC/DC power adapters and batteries provided by EXFO.

Equipment Ratings	
Temperature ➤ Operation ➤ Storage	Battery operated: -10 °C to 50 °C (14 °F to 122 °F) Charge mode: 0 °C to 40 °C (32 °F to 104 °F) Battery operated: -40 °C to 70 °C (-40 °F to 158 °F) AC/DC power adapter: -20 °C to 70 °C (-4 °F to 158 °F)
Relative humidity ¹ ➤ unit ➤ AC/DC power adapter	≤ 95 % non-condensing 0 % to 80 % non-condensing
Maximum operation altitude	Connected to external power supply: 2000 m (6562 ft) Operated from batteries: 5000 m (16405 ft)
Pollution degree	2 (connected to external power supply) ² 3 (powered by batteries) ³
Overvoltage category	Unit: I AC/DC power adapter: II
Measurement category	Not rated for measurement categories II, III or IV
Input power ⁴ ➤ unit ➤ AC/DC power adapter	--- 9 V; 9 W ~ 120 V, 14.4 W, 60 Hz ~ 230 V, 17 W, 50 Hz

1. Measured in 0 °C to 31 °C (32 °F to 87.8 °F) range, decreasing linearly to 50 % at 40 °C (104 °F)
2. For indoor use only.
3. Equipment is normally protected against exposure to direct sunlight, precipitations and full wind pressure.
4. Not exceeding ± 10 % of the nominal voltage

3 Getting Started

Turning the Unit On and Off

Note: Turning off the FOT-600 saves the current wavelength, unit, and reference power. It also saves the Hold Min/Max power mode if activated.



IMPORTANT

If you remove batteries (and the AC/DC power adapter is unplugged), the unit will turn off *without saving the above values*.

If batteries are low (and the AC/DC power adapter is unplugged), the unit will save the above values and turn off.

Note: Offset nulling values are always returned to factory settings.

To turn on the unit:

Press . The unit displays EXFO Inc. for a few seconds. You may use it immediately under normal conditions.

To turn off the unit:

From normal operating mode, hold down  a few seconds.



WARNING

When the ACTIVE LED on your unit is on, the laser source is active and emitting light. Do not look directly into a live fiber, and ensure that your eyes are protected at all times.

LED Indicators



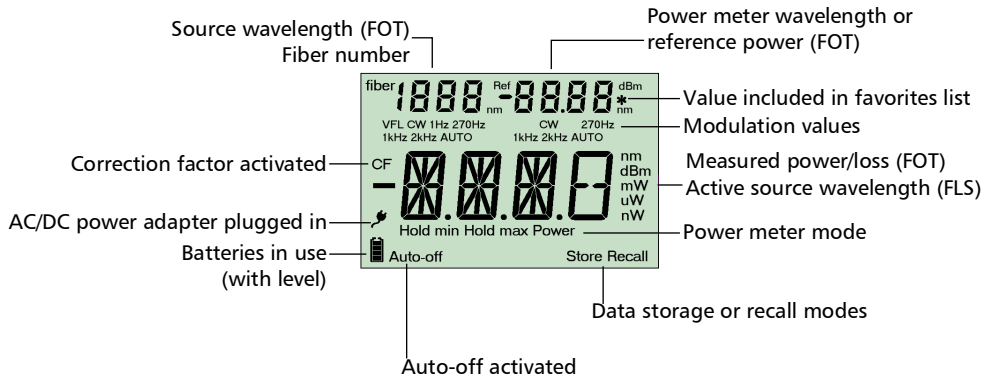
FLS/FOT-600:

The laser source is active.

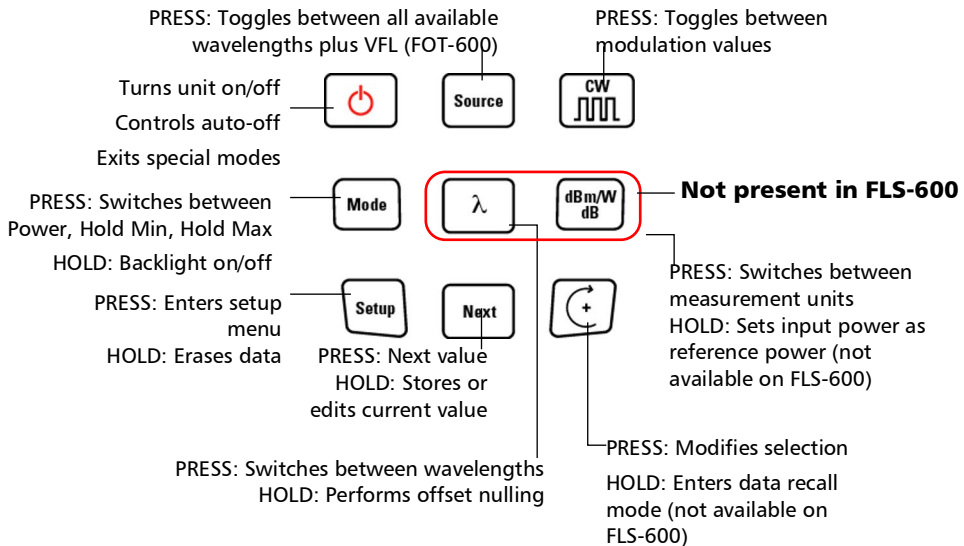
FOT-600:

Whether the test passed or failed according to the thresholds

Display



Keypad



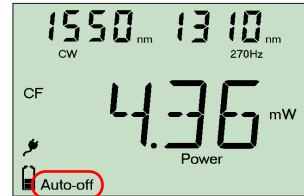
Activating Automatic Shutdown (Auto-Off)

When auto-off is activated, the unit will turn off after 10 minutes of idle time.

Auto-off is activated by default when you turn on the unit.

To deactivate/reactivate auto-off:

When the unit is on, press .



Activating the Backlight

When operating the unit in the dark, use the backlight to make data on the display more visible. The keypad buttons will also light for about 10 seconds.

Note: When the backlight is activated, you must always press a button once to light the keypad, then press the actual button you want.

To activate/deactivate the backlight:

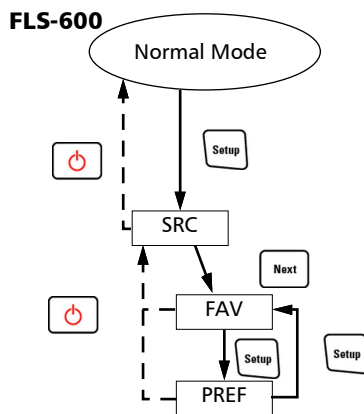
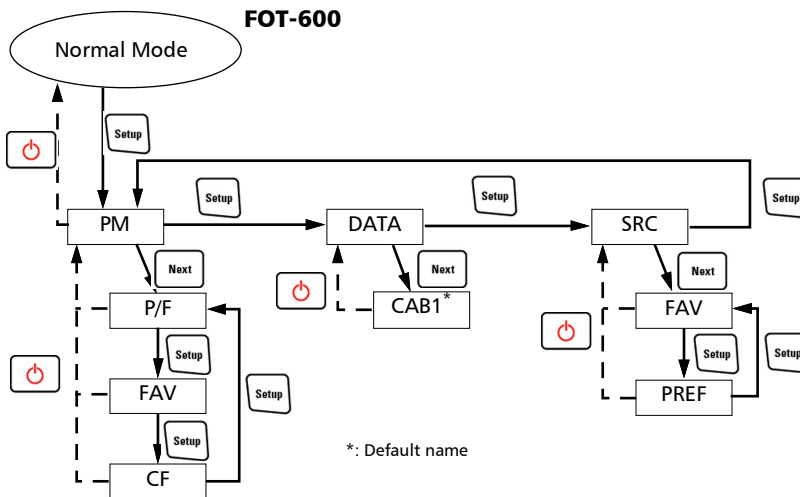
From normal operating mode, hold down  ( on FLS-600) a few seconds.

Accessing and Navigating Setup Menus

Setup menus differ in each model. You may access and navigate menus as follows:

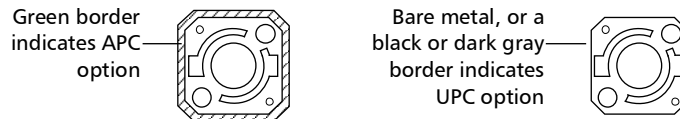
- Press  repeatedly to switch between options in a menu level.
- Press  once to access a submenu from the main level.
- Press  to exit menus (one level at a time).

Note: Details about each menu option are given in this user guide.



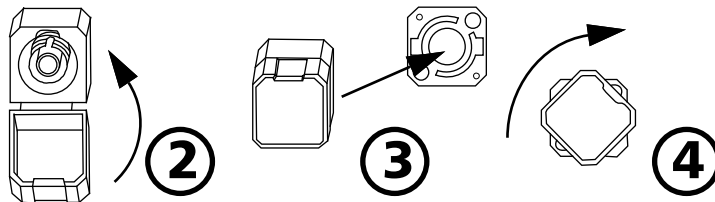
Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) or non-angled (UPC) polishing. The type of border around the baseplate indicates which type of connector it is designed for.



To install an EUI connector adapter onto the EUI baseplate:

1. Hold the EUI connector adapter so the dust cap opens downwards.



2. Close the dust cap in order to hold the connector adapter more firmly.
3. Insert the connector adapter into the baseplate.
4. While pushing firmly, turn the connector adapter clockwise on the baseplate to lock it in place.

Cleaning and Connecting Optical Fibers



CAUTION

To ensure maximum power and to avoid erroneous readings:

- Always inspect fiber ends and make sure that they are clean as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.
- Ensure that your patchcord has appropriate connectors. Joining mismatched connectors will damage the ferrules.

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection scope (or probe). If the fiber is clean, proceed to connecting it to the port. If the fiber is dirty, clean it as explained below.
2. Clean the fiber ends as follows:
 - 2a. Gently wipe the fiber end with a lint-free swab dipped in optical-grade liquid cleaner.
 - 2b. Use a dry swab to dry the connector completely.
 - 2c. Visually inspect the fiber end to ensure its cleanliness.

3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces.

If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.

4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

If your connector features a screw sleeve, tighten the connector enough to firmly maintain the fiber in place. Do not overtighten, as this will damage the fiber and the port.

Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

EXFO uses good quality connectors in compliance with EIA-455-21A standards.

To keep connectors clean and in good condition, EXFO strongly recommends inspecting them with a fiber inspection scope (or probe) before connecting them. Failure to do so may result in permanent damage to the connectors and degradation in measurements.

4

Measuring Power or Loss (FOT-600)

Nulling Electrical Offsets

Temperature and humidity variations affect the performance of electronic circuits and optical detectors. Nulling the electrical offsets eliminates these effects. *Your unit has been designed not to require offset nulling under normal operation*, but you should perform it whenever environmental conditions change significantly or when measuring very low power values.



IMPORTANT

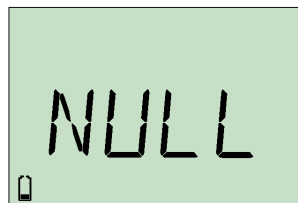
If light reaches the detector when nulling offsets, **LIGH** appears on the display and the nulling is not performed. You will need to press a key to return to the previous display.

Note: *Factory-defined values will be reinstated when you turn off the unit.*

To perform an offset nulling:

Hold down  a few seconds. The unit displays **NULL** while nulling the offsets, then returns to normal mode.

Note: *Keypad is disabled during the operation.*



You may apply a correction factor (CF) to measured power to compensate for inaccuracies or drifts. You should change the CF after performing an offset nulling.

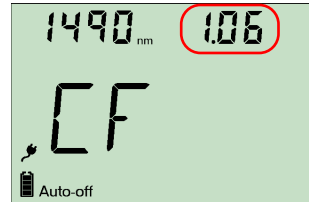
$$\text{Power}_{\text{corrected}} = \text{Power}_{\text{measured}} \times \text{CF}$$

For each favorite wavelength, the CF is set to 1.00 at the factory (even if the unit indicates “----”), but allowed values range between 0.85 and 1.15.

Note: Some other products express the CF in dB, so the CF would be added to measured power.

To set a correction factor for one or more wavelengths:

1. From normal operating mode, press  repeatedly until you reach **PM**.
2. Press  to access the first submenu, then press  repeatedly until you reach the **CF** menu.
3. Press  to switch between available wavelengths. An asterisk (*) appears beside activated correction factors. If no correction factor is set for a wavelength, the unit indicates “----”.
4. Press  to activate/deactivate the displayed correction factor. A “CF” indicator will appear next to measured power in normal mode.



5. Edit the correction factor as follows:

5a. Hold down  a few seconds. The first digit of the CF blinks.

5b. Clear all digits by holding down  for a few seconds.

AND/OR

Select a digit to change by holding  until it blinks, then increase its value by pressing  (it returns to 0 after 9).

5c. While the digit blinks, hold down  for a few seconds to save the modified value (it remains in memory even when you turn off the unit) or press  to return to the previous value without saving.

6. Press  twice to exit setup menus.

Defining a List of Favorite Wavelengths

You must put the wavelengths you want to use on a list of favorite wavelengths (the FAV list). Only wavelengths on this list are available for measurements. You may enter up to 40 favorite wavelengths.

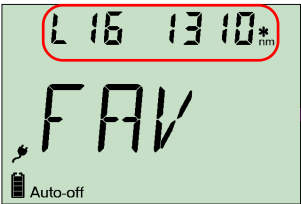
Specifications are guaranteed for calibrated wavelengths only. For other wavelengths, the unit will determine values based on the calibrated wavelengths (3-point interpolation).

To add wavelengths to the FAV list (or to remove them):

Detector Type	Calibrated Wavelengths (nm)	Default Favorite Wavelengths ¹ (nm)
► Ge	800, 820, 830, 840, 850, 860, 870, 880, 910, 980, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1370, 1390, 1410, 1430, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650.	
► GeX	All the above plus 1060.	Same as above

1. To revert to default favorite wavelengths see *Reverting Unit to Factory Settings* on page 56.

1. From normal operating mode, press  repeatedly until you reach **PM**.
2. Press  to access the first submenu, then press  repeatedly until you reach the **FAV** menu.
3. Press  to switch between available wavelengths. An asterisk (*) appears beside wavelengths already on the list. If no wavelength is set for a position, the unit indicates "----". You may also press  to switch between defined wavelengths only.
4. Press  to include/exclude the displayed wavelength.



5. Edit the wavelength value as follows:

5a. Hold down  a few seconds. The first digit of the wavelength blinks.

5b. Clear all digits by holding down  for a few seconds.

AND/OR

Select a digit to change by holding  until it blinks, then increase its value by pressing  (it returns to 0 after 9).

5c. While the digit blinks, hold down  for a few seconds to save the modified value (it remains in memory even when you turn off the unit) or press  to return to the previous value without saving.

6. Press  twice to exit setup menus.

Referencing Your Power Meter to a Source

In reference mode, your unit displays the loss created by the fiber under test only, since a reference value is subtracted from the measured power.

Note: *You must set a reference value separately for each wavelength.*

Compatible sources (such as FOT-600 and FLS-600) can transmit a power value to your power meter, avoiding the need for manual referencing.

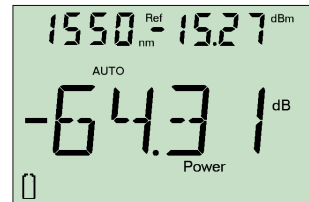


IMPORTANT

The value sent is not the source's actual power. It is a user-defined value that may not take the optical link's loss into account.

To receive the reference power value from a compatible source:

1. Connect a compatible source to your power meter (as shown below, with or without a fiber under test).
2. Use the source to emit the signal that contains its power value (see *To change the signal modulation:* on page 37).

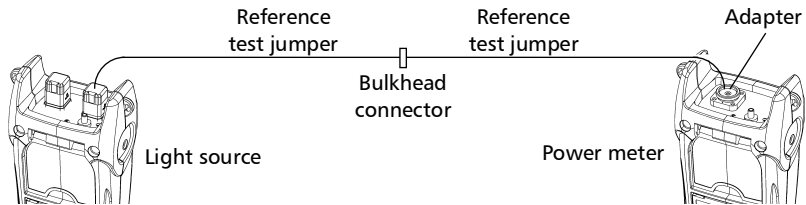


- ❖ If reference value or units change, the power meter beeps.
- ❖ The new reference power is displayed in the top right corner (in dBm) and current loss reading is automatically switched to dB.

Note: *When using this feature, you cannot change the power meter's wavelength manually. The power meter behavior is totally determined by the source.*

To reference the power meter to a source manually:

1. Using the proper adapter, connect a light source (such as FLS-600 or FOT-600) to the detector port of your power meter.



2. Activate the source at the desired wavelength.

3. Match the source and power meter wavelengths:

- ❖ If the source emits an auto-wavelength signal or is in auto-switching mode (see *Automatically Detecting Wavelength* on page 31 and *Using Auto-Switching Mode* on page 37), the power meter automatically matches the source wavelength.

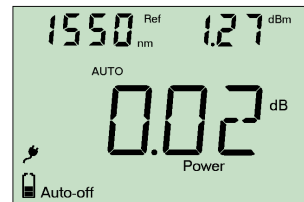


OR

- ❖ Press λ to switch between pre-selected wavelengths (see *Defining a List of Favorite Wavelengths* on page 24).

4. Hold down $\frac{\text{dBm}}{\text{W}} \frac{\text{dB}}{\text{dB}}$ for a few seconds. The power meter stores the currently detected power as the new reference power.

Reference power is displayed in the top right corner (in dBm) and current loss reading is automatically switched to dB.



5. Repeat the procedure for each wavelength you want to reference (if you use auto-switching mode, the power meter automatically references wavelengths one at a time).

Note: When using dB units, press to display the current wavelength for a few seconds. To change this wavelength, press again while it is displayed.

Note: Once all desired wavelengths have been referenced, do not disconnect the Reference Test Jumper from the source port.

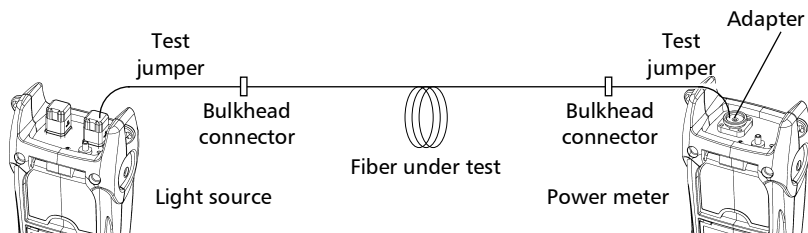
Measuring Power or Loss

Measuring absolute power or link loss is done the same way, except for the referencing step.

To perform power or loss measurements:

1. If necessary, perform an offset nulling (see *Nulling Electrical Offsets* on page 21).
2. Check and clean your fibers appropriately for optimum performance (see *Cleaning and Connecting Optical Fibers* on page 19).
3. For loss measurements, reference your power meter to a light source (see *Referencing Your Power Meter to a Source* on page 26), then deactivate the light source.
4. Using the proper adapter and test jumpers, connect a fiber under test to a light source (such as FLS-600 or FOT-600) and to the detector port of your unit.

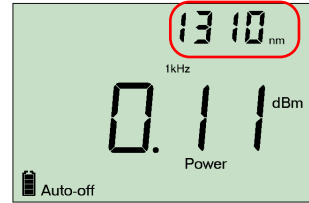
Note: *If you have referenced your power meter to a source, simply connect a fiber under test to the test jumpers used for referencing.*



5. Activate the source at the desired wavelength.

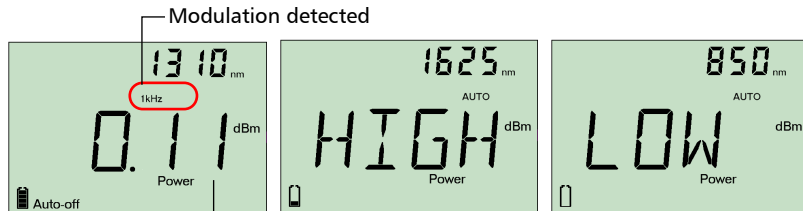
6. Match the source and power meter wavelengths:

- ❖ If the source emits an auto-wavelength signal or is in auto-switching mode (see *Automatically Detecting Wavelength* on page 31 and see *To receive the auto-wavelength signal or detect the source's auto-switching mode* on page 31), the power meter automatically matches the source wavelength.



OR

- ❖ Press λ to switch between pre-selected wavelengths (see *Defining a List of Favorite Wavelengths* on page 24).



Actual power or loss of fiber under test

When power or loss is outside power limits (see *Technical Specifications* on page 67)

When the unit detects a modulated signal, it beeps and displays the modulation value and *average* measured power or loss (see left illustration above). You may notice a slightly unstable last digit.

7. If necessary, change the displayed units by pressing $\frac{dBm}{W}$.
8. Repeat the procedure for other wavelengths.

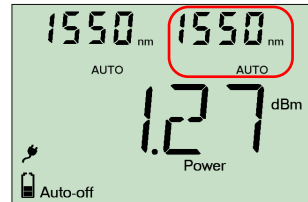
Automatically Detecting Wavelength

Compatible sources (such as FOT-600 and FLS-600) can transmit their wavelength value through the fiber, avoiding the need to manually match the source and power meter wavelengths.

Note: *When you receive an auto-wavelength signal or when the source is in auto-switching mode, you cannot manually change the power meter wavelength. The power meter behavior is totally determined by the source.*

To receive the auto-wavelength signal or detect the source's auto-switching mode:

1. Connect a compatible source to your power meter.
2. Activate the source in Auto mode (FOT-600 and FLS-600: see *Modulating the Source Signal* on page 36) or in auto-switching mode.

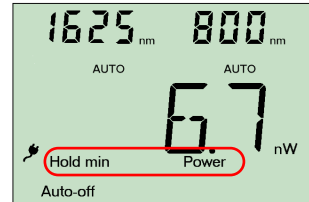


Your power meter automatically matches the source wavelength. If the wavelengths differ, it also beeps and returns you to normal operating mode.

Activating Hold Min/Max Power Mode

With the Hold Min/Max mode you can record extreme values of a varying power signal. You could use it to test the stability of a light source over time.

In this mode, the unit displays the minimum or maximum power value read up to now. It continuously updates the display if a new min/max is measured.



To activate the Hold Min or Hold Max mode:

Press **Mode** to switch between Hold Max, Hold Min and regular power measurement.

To reset the maximum or minimum value:

Hold down **Setup** for a few seconds. The unit displays “----”.

Setting Pass/Fail Thresholds

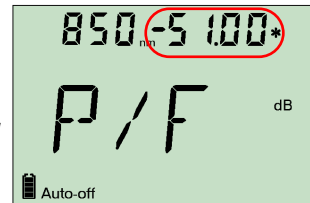
You can define thresholds to specify acceptable power (dBm) or loss (dB) values for each wavelength. Thresholds are often supplied by system manufacturers and depend on the system deployed.

When a threshold is activated, the PASS/FAIL LED is turned on. If it is green, the threshold succeeded, if the PASS/FAIL LED is red, the threshold failed.



To set pass/fail thresholds:

1. From normal operating mode, press  repeatedly until you reach **PM**.
2. Press  to access the first submenu, then press  repeatedly until you reach the **P/F** menu.
3. Press  to switch between power (dBm) and loss (dB) values.
4. Press  to switch between available wavelengths. An asterisk (*) appears beside activated thresholds. If no threshold is set for a wavelength, the unit indicates “----”.
5. Press  to activate/deactivate the displayed threshold. The PASS/FAIL LED will light (green or red) when you return to normal mode.



6. Edit the pass/fail threshold as follows:
 - 6a. Hold down  for a few seconds. The first digit of the threshold blinks.
 - 6b. Clear all digits by holding down  for a few seconds.
AND/OR
Select a digit to change by holding  until it blinks, then increase its value by pressing  (it returns to 0 after 9). After the last digit, all digits blink: you may add/remove the “-” sign by pressing .
 - 6c. While a digit blinks, hold down  for a few seconds to save the modified value (it remains in memory even when you turn off the unit) or press  to return to the previous value without saving.
7. Press  twice to exit setup menus.

5

Using a Light Source or VFL (FOT-600)

The FLS-600 may contain up to three sources (one-port models) or up to four sources (two-port models).

The FOT-600 may contain up to three sources. Only the FOT-600 is equipped with a VFL.

Defining a List of Favorite Wavelengths

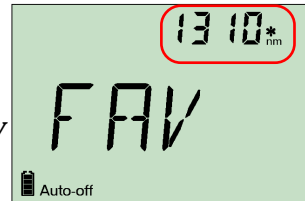
You may put the wavelengths you want to use on a list of favorite wavelengths (the FAV list). Only wavelengths on this list are available for measurements.

At the factory (or after recalibration), the list contains all source wavelengths.

Note: *The list must always contain at least one wavelength. When you empty the list, the first source wavelength is automatically added.*

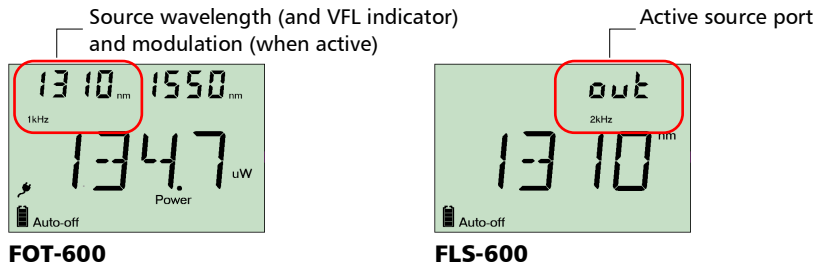
To add wavelengths to the FAV list (or to remove them):

1. From normal operating mode, press  repeatedly until you reach **SRC**.
2. Press  to access the first submenu, then press  repeatedly until you reach the **FAV** menu.
3. Press  to switch between available wavelengths. An asterisk (*) appears beside wavelengths already on the list.
4. Press  to include/exclude the displayed wavelength.
5. Press  twice to exit setup menus.



Activating/Deactivating a Light Source or VFL

Only one source may be active at a time. When no source is active, the unit displays **OFF**.



To activate a light source (or VFL) and change the wavelength:

Press to activate each available source in turn, including the VFL. The unit displays the wavelength and modulation.

To deactivate the light source:

Press until you get past the last source.

Modulating the Source Signal

When you activate the first source (after turning on the unit), the signal is always CW (unmodulated). When you switch sources, the modulation remains the same (VFL remembers its own modulation). Modulation is indicated in the top left (port #1) or top right (port #2) corner.

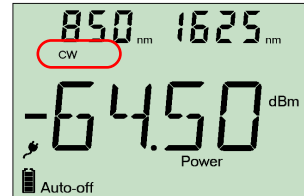
Available modulation values are: CW, Auto, auto-switching mode, 270 Hz, 1 kHz and 2 kHz (VFL: CW and 1 Hz only).

Note: *Auto is a modulated signal detected by compatible units (see Automatically Detecting Wavelength on page 31). It provides longer battery life than CW, but covers a reduced power range.*

Note: The auto-switching mode is a special signal detected by compatible units (see *Using Auto-Switching Mode* on page 37).

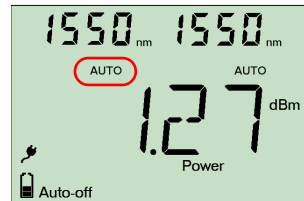
To change the signal modulation:

1. Activate the source.
2. Press  to switch between available modulations.



Using Auto-Switching Mode

In auto-switching mode, your source automatically switches from one wavelength to another. When connected to the light source, a compatible power meter displays the power value for each wavelength one at a time. The wavelength value appearing on the display changes every two seconds.



The unit will show the source's favorite wavelengths one at a time (see *Defining a List of Favorite Wavelengths* on page 35).

To activate auto-switching mode:

1. Press  to activate the source.
2. Press  to switch between available modulations until the **Auto** indicator blinks on your display.

Sending Source Power Value with Signal

Your source can transmit a user-defined power value to compatible power meters (such as FOT-600) through the fiber. If the reference source is far from the power meter, you can connect your source to the power meter to send the reference value. With this feature you can also correct for power variations.

Note: *If you connect a fiber between FOT-600's source and detector ports, the unit can use the actual source output power as reference power.*

Note: *For details about how compatible power meters receive this power value, see Referencing Your Power Meter to a Source on page 26.*



IMPORTANT

The value sent is not (and will not affect) the source's actual power. It is a user-defined value that may not take the optical link's loss into account.

To define the source power value to use as reference:

1. From normal operating mode, press  repeatedly until you reach **SRC**.
2. Press  to access the first submenu, then press  repeatedly until you reach the **PREF** menu.
3. Press  to switch between available source wavelengths and select one. The unit displays the currently defined power value for this wavelength.
4. Edit the power value as follows:
 - 4a. Hold down  for a few seconds. The first digit of the power value blinks.
 - 4b. Revert all digits to 0 by holding down  for a few seconds.

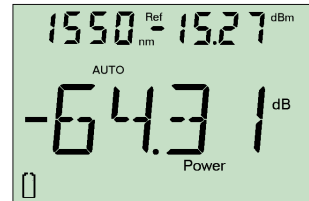
AND/OR

Select a digit to change by pressing  until it blinks, then increase its value by pressing  (it returns to 0 after 9). After the last digit, all digits blink: you may add/remove the “-” sign by pressing .
 - 4c. While a digit blinks, hold down  for a few seconds to save the modified value (it remains in memory even when you turn off the unit) or press  to return to the previous value without saving.
5. Press  twice to exit setup menus.

To use the source's actual output power as reference (FOT-600 only):

1. Connect a fiber between the source and power meter of same unit.
2. Activate the source at the desired wavelength.
3. Match the source and power meter wavelengths:

- ❖ If the source emits an auto-wavelength signal or is in auto-switching mode (see *Automatically Detecting Wavelength* on page 31 and *Using Auto-Switching Mode* on page 37), the power meter automatically matches the source wavelength.



OR

- ❖ Press λ to switch between pre-selected wavelengths (see *Defining a List of Favorite Wavelengths* on page 24).
4. From normal operating mode, hold down **Source** and **dBmW dB**. The unit displays **PREF** for a few seconds while saving the value, then returns to normal mode.

To send the source power value:

1. Activate the source.
2. Change the modulation signal to AUTO or auto-switching.

If you use auto-switching mode, the power value of each wavelength will automatically be sent.

3. Hold down **Source** and **CW** to send the power value with an auto-wavelength signal. The unit displays **Send** for a few seconds, then returns to normal mode.

6

Saving and Recalling Power/Loss Values

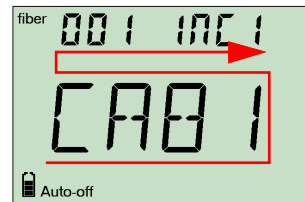
You can save 1000 power/loss values in your unit, along with references. You will save and recall this data according to cable names and fiber numbers. To free up memory, you can transfer saved data to a computer or simply delete all.

Setting Autonaming Scheme

When saving data, the unit suggests fiber IDs based on autonaming settings. After saving a value, the unit prepares the next fiber ID according to the selected increment (0, 1 or 2).

To define the cable name and the starting fiber ID and increment value:

1. From normal operating mode, press  repeatedly until you reach DATA.
2. Press  to access **CAB1** or the last cable name edited.
3. Hold down  until the first character of the cable name blinks.
4. Select a character to change by holding  until it blinks, then increase its value by pressing  (it returns to 0 after Z).
5. While a digit blinks, hold down  for a few seconds to save the modified value (it remains in memory even when you turn off the unit) or press  to return to the previous value without saving.
6. Press  twice to exit setup menus.



Saving, Recalling and Deleting Data

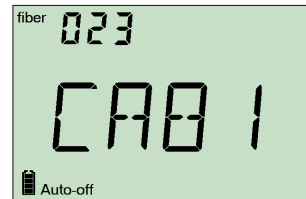


IMPORTANT

- You cannot recover deleted data. Ensure that you transfer your data to a computer if you intend to use it later.
- Deleting a single value does not free memory. To free memory, you must delete all data at once.

To save a power/loss value:

1. If you want to view or change the fiber ID before saving:
 - 1a. From normal operating mode, press  or  to view the fiber ID that will be used next.
 - 1b. Change the fiber ID by using  and  to move forward or backward in the list.
2. Hold down  for a few seconds to save the measured value under the selected fiber ID.





IMPORTANT

When the power meter is connected to the fiber or DUT, you must wait until at least one loss measurement is displayed on the power meter before pressing the  button.

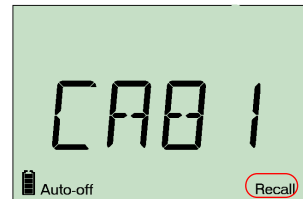
Once you have pressed the button, you must wait until the Store indicator on-screen disappears before disconnecting the power meter or light source to test the next fiber or DUT.

When in Auto-Switching mode, it is important NOT to disconnect the power meter or light source from the fiber or DUT before the storage sequence is complete. The storage sequence is complete when the Store indicator turns off.

The storage process will save the upcoming values, not the preceding ones.

To recall saved data:

1. From normal operating mode, hold down  for a few seconds. The **Recall** indicator is displayed with the cable name, then the last saved value and its fiber ID.
2. When fiber ID is displayed, hold down  for a few seconds to return to the cable name list. Select the cable in which you want to recall saved data by using  and  to move forward or backward. The last saved value in the selected cable and its fiber ID will be displayed after 3 seconds.
3. View values you want by using  and  to move forward or backward in saved data. You can also change the units by pressing .
4. Press  to return to normal mode.



To delete a single saved value from the unit:

1. From normal operating mode, hold down  for a few seconds. The **Recall** indicator is displayed with the cable name, then the last saved value and its fiber ID.
2. When fiber ID is displayed, hold down  a few seconds to return to the cable name list. Select the cable in which you want to delete saved data by using  and  to move forward or backward. The last saved value in the selected cable and its fiber ID will be displayed after 3 seconds.
3. Select the value to delete by using  and  to move forward or backward in saved data.
4. Hold down  a few seconds. The unit displays “dEL”, then displays another saved data.
5. Press  to return to normal mode.



To delete a cable name:

1. From normal operating mode, hold down  a few seconds. The **Recall** indicator is displayed with the last cable name, then the last saved value and its fiber ID.
2. When fiber ID is displayed, hold down  for a few seconds to return to the cable name list, then, select the cable you want to delete by using  and  to move forward or backward.
3. Hold down  a few seconds. The unit displays “dEL”, then displays another cable name.
4. Press  to return to normal mode.



To delete all saved data from the unit:

1. From normal operating mode, hold down  a few seconds. The **Recall** indicator is displayed with the last cable name, then the last saved value and its fiber ID.
2. When fiber ID is displayed, hold down both  and  for a few seconds. The unit displays “dEL” and “ALL”, then automatically returns to normal mode.



Transferring Data to a Computer

Using an appropriate USB cable and the Handheld Data Transfer software, you can transfer saved data from your handheld unit to a computer. This way, you can increase storage capacity, perform better analyses on your data and create reports.



IMPORTANT

Transferred data is not automatically deleted from your unit.

To transfer data to a computer:

1. Using a USB cable, connect your unit to an available USB port of the computer.
2. Turn on both the computer and your handheld unit. Connect your unit to a power outlet to ensure that your unit will remain on during the transfer.
3. On the computer, launch the Handheld Data Transfer application and start the operation.

The unit displays “REM” and temporarily deactivates the keyboard and auto-off.

Note: For details about setting up the software and transferring data, refer to the Handheld Data Transfer [online help](#).

7

Maintenance

This product contains no user-serviceable parts. However, it contains sensitive electronic and optical components, and should be handled carefully and stored in its carrying case when not in use.

To help ensure long, trouble-free operation:

- Always inspect fiber-optic connectors before using them and clean them if necessary.
- Keep the unit free of dirt and dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.



WARNING

The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.

Cleaning Optical Connectors Using a Mechanical Cleaner

Optical connectors are fixed on your unit and can be cleaned using a mechanical cleaner.



WARNING

Verifying the surface of the connector with a fiber-optic microscope **WHILE THE UNIT IS ACTIVE** WILL result in permanent eye damage.



CAUTION

If you are cleaning an EUI with a mechanical cleaner, do not remove it from your device to clean it.

To clean a connector using a mechanical cleaner:

1. Insert the cleaning tip into the optical adapter, and push the outer shell into the cleaner.

Note: *The cleaner makes a clicking sound to indicate that the cleaning is done.*

2. Verify connector surface with a fiber inspection probe (for example, EXFO's FIP).

Cleaning Detector Ports

Regular cleaning of detectors will help maintain measurement accuracy.



IMPORTANT

Always cover detectors with protective caps when unit is not in use.

To clean detector ports:

1. Remove the protective cap and adapter (FOA) from the detector.
2. If the detector is dusty, blow dry with compressed air.
3. Being careful not to touch the soft end of the swab, moisten a cleaning tip with *only one drop* of optical-grade liquid cleaner.



IMPORTANT

Some cleaners may leave traces if used abundantly. Do not use bottles that distribute too much liquid at a time.

4. While applying light pressure (to avoid breaking the detector window), gently rotate the cleaning tip on the detector window.
5. Repeat step 4 with a dry cleaning tip or blow dry with compressed air.
6. Discard the cleaning tips after one use.

Recharging and Replacing the Battery

The Li-ion battery will last about 70 hours (power meter) or 50 hours (source in Auto mode) in normal operation. The charge status is shown on the unit display (lower left corner).



WARNING

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.



WARNING

Do not throw batteries into fire or water and do not short-circuit their electrical contacts. Do not disassemble.



IMPORTANT

Recycle or dispose of used batteries properly, in accordance with local regulations. Do not dispose of them in ordinary garbage receptacles. For more information, see the section about recycling and disposal in this user documentation.



WARNING

Your unit uses a lithium-ion (Li-ion) battery with built-in protection that has been especially designed for EXFO. For this reason, you can only replace it with batteries of the same type and model. You can purchase new batteries from EXFO.



IMPORTANT

- The battery is not charged at the factory. Fully charge it (about 4 hours) before using it for the first time.
- The battery functions and charges properly between 0 °C and 45 °C (32 °F and 113 °F). It will not charge if the temperature is below -10 °C (14 °F) or above 45 °C (113 °F).
- Never store battery at temperatures above 60 °C (140 °F).
- Charge only with specified charger.

Note: *Charging your unit's battery can take up to 5 hours. This battery was custom-made for your unit; replacement batteries must be purchased from EXFO.*

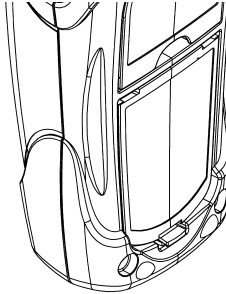
To recharge the Li-Ion battery:

Connect the unit to a power outlet (or car outlet) using the AC/DC power adapter. The charge cycle will start and end automatically.

Note: *While charging, the battery indicator animates continuously. It does not reflect the actual charge status until charging is complete.*

To replace the battery:

- 1.** Turn off the unit (if the AC/DC power adapter is plugged in, you may replace the battery while unit is on).
- 2.** Remove the battery compartment cover, located at the back of the unit.



- 3.** Pull out the old battery using your fingers. Flipping the unit, battery-side down, will ease removal. Do not use tools in order to prevent damage to the battery envelope. Pull out the electrical connector. Put aside the old battery.
- 4.** Remove the new battery from its package (keep the package for future use). Connect the electrical connector, ensuring that the pins are correctly aligned. Place the new battery into the unit.
- 5.** Inspect the inside rib around the unit battery compartment to make sure it is free from any debris. Remove any debris using a dry cloth. Replace the battery compartment cover.

Recalibrating the Unit

EXFO manufacturing and service center calibrations are based on the ISO/IEC 17025 standard (*General Requirements for the Competence of Testing and Calibration Laboratories*). This standard states that calibration documents must not contain a calibration interval and that the user is responsible for determining the re-calibration date according to the actual use of the instrument.

The validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance, as well as the specific requirements for your application. All of these elements must be taken into consideration when determining the appropriate calibration validity period of this particular EXFO unit.

Until you collect the required empirical data to support your own calibration interval strategy, EXFO recommends that the next calibration (due) date of an instrument be established according to the following equation:

Next calibration date = Date of first usage + Recommended calibration period (three years)

Note: *You can use the date of first usage only if the product was stored in proper conditions (23 °C ± 5 °C (73,4 °F ± 9 °F)). If it is not the case or if you do not know the date of first usage, you can use the date at which you received the product, as long as the product was sourced from an official EXFO distribution channel.*

Restriction:

Next calibration date ≤ calibration date on certificate + recommended calibration period (three years) + maximum storage period (six months)

Under normal use, the recommended calibration period for your Light Source/Optical Loss Test Set is: three years.

For newly delivered units, EXFO has determined that the maximum storage period for this product is up to six months.

EXFO guarantees that proper storage at room temperature for up to the maximum storage period between calibration and shipment will not affect the performance of the test and measurement instruments and will not reduce the recommended validity period before requiring a new calibration.

To help you with calibration follow-up, EXFO provides a special calibration label that complies with the ISO/IEC 17025 standard and indicates the unit calibration date and provides space to indicate the due date.

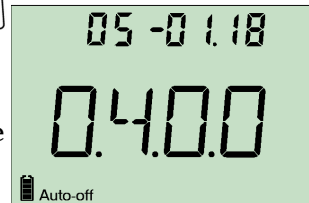
To ensure that test and measurement instruments conform to the published specifications, calibration must be carried out at the relevant EXFO plant, or, depending on the product, at an EXFO service center, or at one of EXFO's certified service centers. All calibrations are performed using standards traceable to national metrology institutes.

Note: *You may have purchased a FlexCare plan that covers calibrations. See the Service and Repairs section of this user documentation for more information on how to contact the service centers and to see if your plan qualifies.*

Note: *The FlexCare warranty program includes Calibration/Verification packages (see Service and Repairs on page 63).*

To view the last calibration date (FOT-600 only):

1. From normal operating mode, hold down  and  for a few seconds. The unit displays the first embedded software version.
2. Press  until you reach the calibration date (and version) of the power meter.
3. Press  to return to normal mode.



Recycling and Disposal



This symbol on the product means that you should recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

For complete recycling/disposal information, visit the EXFO Web site at www.exfo.com/recycle.

8

Troubleshooting

Solving Common Problems

Problem	Possible Cause	Solution
The unit does not turn on.	➤ You did not press  long enough. ➤ AC/DC power adapter not connected. ➤ Main battery discharged. ➤ Weather too cold.	Press  for 2 seconds. Connect AC/DC power adapter and charge battery.
The unit takes very long to turn on.	Too many values saved in memory.	Delete all data from the unit.
Battery does not charge as expected.	➤ Temperature too high. ➤ Battery incorrectly connected. ➤ Incorrect charger used.	Ensure temperature is within specifications. Ensure battery is connected properly. Use the correct charger.
Unable to change power meter wavelength.	➤ Unit receiving Auto (or REF) signal from source. ➤ Only one wavelength in list.	Change source mode (see <i>Modulating the Source Signal</i> on page 36), then retry. Add wavelengths.
Unable to change power meter dB unit or reference power. OR Changed unit or reference value are replaced by other values after a while.	Unit receiving REF signal from source. See <i>Sending Source Power Value with Signal</i> on page 38.	Wait a few seconds until power value is received, then retry.

Problem	Possible Cause	Solution
Many beeps, unstable optical power and blinking Auto (or modulation) indicator.	Power too low to recognize Auto mode (or modulation).	Increase source power or switch source to CW.
Reference power different than source output power.	Received power outside detector's range.	Change source output power.
Unit displays FULL even after you deleted a few values.	You must delete <i>all</i> values from the unit to free memory.	Delete all values as explained in <i>Saving, Recalling and Deleting Data</i> on page 42.
Going from the first value to the last value in recalled data is very slow.	Too many values saved in memory.	Delete all data from the unit.

Reverting Unit to Factory Settings

You can revert most parameters on your unit to their factory state. *When you perform this operation, you will lose all customized parameters.*

To revert unit to factory settings:

1. Turn off your unit.
2. While holding down , press . When your unit beeps, release .

Error Codes and Descriptions

- ER: error code displayed until you press a key.

- WR: warning code displayed for 3 seconds, then unit returns to normal.

Error Code	Description	Solution
LIGH	Light detected while nulling offsets. Nulling is not performed.	Correctly place protective cap on detector port, then retry.
FULL	Storage memory full.	Delete data.
EMPt	Storage memory empty: ➤ You pressed Recall but no data was saved. ➤ Last saved data deleted. ➤ All data deleted.	Add data.
29/30/ 34/36/ 56/57	Calibration errors.	Contact EXFO.
18/52	Incompatible wavelengths or power too low in PREF on FOT-600.	Match source and power meter wavelengths or increase source power.

Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

Technical Support Group

400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

For detailed information about technical support, and for a list of other worldwide locations, visit the EXFO Web site at www.exfo.com.

If you have comments or suggestions about this user documentation, you can send them to customer.feedback.manual@exfo.com.

To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.

You may also be requested to provide the embedded software's version numbers.

To display the embedded software version:

1. From normal operating mode, hold down  and  for a few seconds. The unit displays the first software version.
2. Press  to switch between the software and hardware versions.

Press  to return to normal mode.



Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of three years from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.



IMPORTANT

The warranty can become null and void if:

- unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.
- warranty sticker has been removed.
- case screws, other than those specified in this guide, have been removed.
- case has been opened, other than as explained in this guide.
- unit serial number has been altered, erased, or removed.
- unit has been misused, neglected, or damaged by accident.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Gray Market and Gray Market Products

Gray market is a market where products are traded through distribution channels that are legal but remain unofficial, unauthorized, or unintended by the original manufacturer. Intermediaries using such channels to distribute products are considered to be part of the gray market (hereafter unauthorized intermediary).

EXFO considers that a product originates from the gray market (hereafter gray market product) in the following situations:

- A product is sold by an unauthorized intermediary.
- A product is designed and destined for a particular market and sold on a second market.
- A product is resold, despite being reported lost or stolen.

When products are purchased on the gray market, rather than through an authorized EXFO distribution channel, EXFO is unable to guarantee the source and quality of those products nor the local safety regulations and certifications (CE, UL, etc.).

EXFO will not honor warranty, install, maintain, repair, calibrate, provide technical support nor make any support contracts available for gray market products.

For complete information, refer to EXFO's policy regarding gray market products at

www.exfo.com/en/how-to-buy/sales-terms-conditions/gray-market/

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of EXFO.



IMPORTANT

In the case of products equipped with optical connectors, EXFO will charge a fee for replacing connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

- 1.** Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 64). Support personnel will determine if the equipment requires service, repair, or calibration.
- 2.** If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
- 3.** If possible, back up your data before sending the unit for repair.
- 4.** Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
- 5.** Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 64).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center

400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

EXFO Europe Service Center

Winchester House, School Lane
Chandlers Ford, Hampshire S053 4DG
ENGLAND

Tel.: +44 2380 246800
Fax: +44 2380 246801
support.europe@exfo.com

EXFO Telecom Equipment (Shenzhen) Ltd.

3rd Floor, Building C,
FuNing Hi-Tech Industrial Park, No. 71-3,
Xintian Avenue,
Fuhai, Bao'An District,
Shenzhen, China, 518103

Tel: +86 (755) 2955 3100
Fax: +86 (755) 2955 3101
support.asia@exfo.com

To view EXFO's network of partner-operated Certified Service Centers nearest you, please consult EXFO's corporate website for the complete list of service partners:

<https://www.exfo.com/en/services/field-network-testing/exfo-service-centers>.

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NAMES AND CONTENTS OF THE TOXIC OR HAZARDOUS SUBSTANCES OR ELEMENTS
CONTAINED IN THIS EXFO PRODUCT
包含在本 EXFO 产品中的有毒有害物质或元素的名称及含量

Part Name 部件名称	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 镉 (Cd)	Hexavalent Chromium 六价铬 (Cr(VI))	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴二苯醚 (PBDE)
Enclosure 外壳	O	O	O	O	O	O
Electronic and electrical sub-assembly 电子和电气组件	X	O	X	O	X	X
Optical sub-assembly ^a 光学组件 ^a	X	O	O	O	O	O
Mechanical sub-assembly ^a 机械组件 ^a	O	O	O	O	O	O

注：

This table is prepared in accordance with the provisions of SJ/T 11364.

本表依据 SJ/T 11364 的规定编制。

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下。

X: indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572. Due to the limitations in current technologies, parts with the “X” mark cannot eliminate hazardous substances.

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求。

标记“X”的部件，皆因全球技术发展水平限制而无法实现有害物质的替代。

a. If applicable.

如果适用。

MARKING REQUIREMENTS
标注要求

Product 产品	Environmental protection use period (years) 环境保护使用期限（年）	Logo 标志
This EXFO product 本 EXFO 产品	10	
Battery ^a 电池	5	

a. If applicable.
如果适用。



www.EXFO.com · info@EXFO.com

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