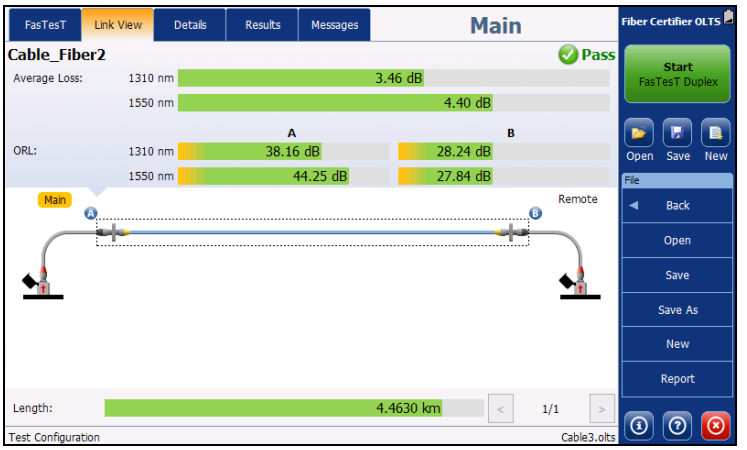
User Guide

# OLTS/Fiber Certifier

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Telecom Test and Measurement

EXPERTISE REACHING OUT

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### *Units of Measurement*

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

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# Certification Information

## North America Regulatory Statement

This unit was certified by an agency approved in both Canada and the United States of America. It has been evaluated according to applicable North American approved standards for product safety for use in Canada and the United States.

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America and from ICES-003 compliance in Canada. 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 guide, 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.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

## European Community Declaration of Conformity

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.

An electronic version of the declaration of conformity for your product is available on our website at *www.exfo.com/library*.

You can find information about the Wi-Fi frequency bands and maximum output power in your platform’s user guide.

# 1 Introducing the OLTS/Fiber Certifier

Optical Loss Test Sets are mainly used to determine optical loss and link length in fiber links. The 94X series is composed of two product lines: the OLTS and the Fiber Certifier, and are used in two main fields of application:

- Telco: The OLTS is used to determine optical loss in single fiber links according to the thresholds you have set and typically use a simplex approach.
- Data centers and enterprise: The Fiber Certifier is used to certify fiber cabling networks using various committee standards or customized thresholds. You can do simplex or duplex tests (two fibers at a time).

***Note:*** *This user documentation covers both the OLTS and the Fiber Certifier. When some information is specific to the Fiber Certifier, it will be clearly identified as such, and is meant for use in data center and enterprise settings.*

Your OLTS/Fiber Certifier can be used in source and power meter mode. An optional high-power power meter and VFL are also available.

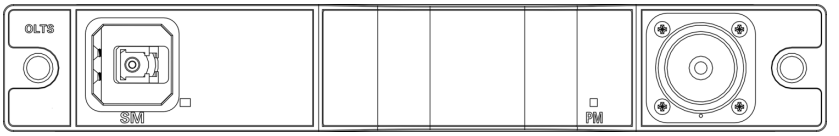
# Models Available

The OLTS/Fiber Certifier unit is available in different optical configurations:

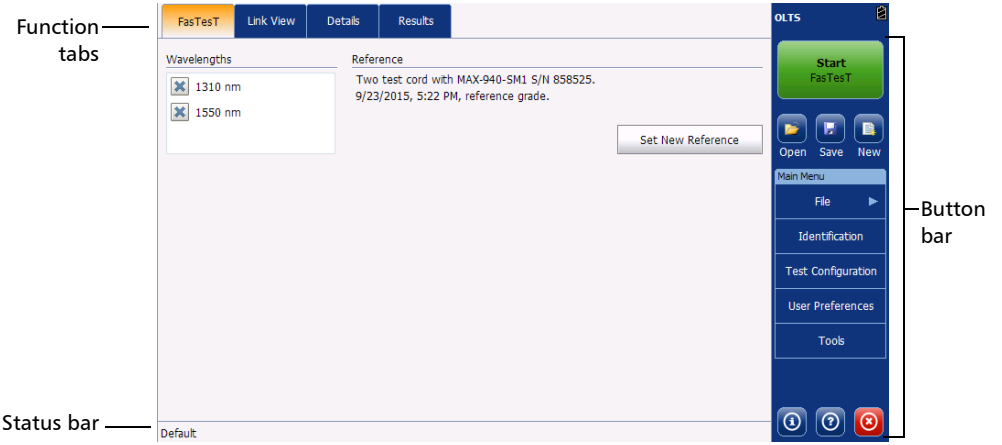
- OLTS Singlemode: This model allows you to perform either bidirectional loss tests (940 models) or bidirectional loss and ORL tests (945 models) on singlemode fibers.
- Fiber Certifier Singlemode: This model allows you to perform duplex tests on two fibers at once in addition to the features already offered by the OLTS unit.

***Note:*** *ORL tests can only be performed in simplex singlemode, one fiber at a time.*

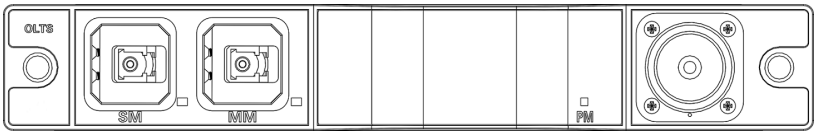
***Note:*** *Both 940 and 945 series modules have the same outside appearance, but the internal components change depending on the type.*



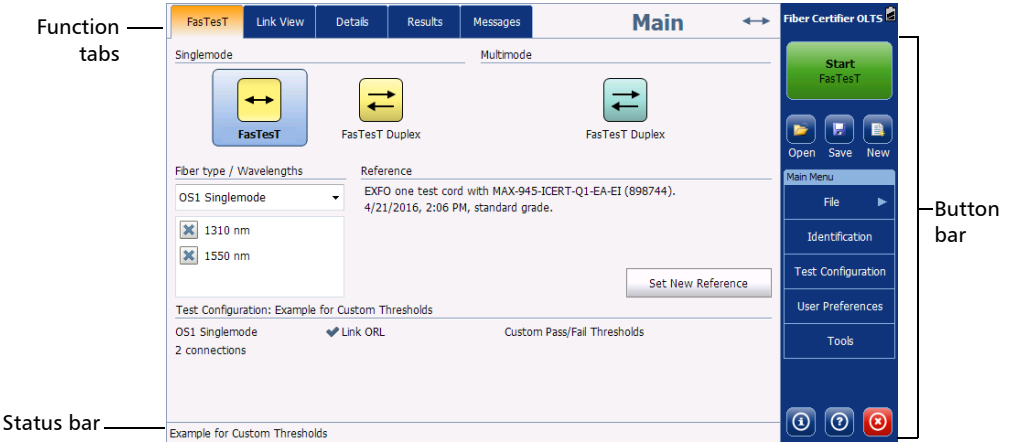

Singlemode FasTesT port  Detector port



- Fiber Certifier Multimode: This model allows you to test fibers using FasTesT duplex for multimode wavelengths.
- Fiber Certifier Quad: This model allows you to test fibers using either FasTesT simplex for singlemode wavelengths, or FasTesT duplex for singlemode or multimode wavelengths.




Singlemode FasTesT port | Multimode port | Detector port



The available models are shown below:

| Model | Optical Configuration | Description |
|---|---|---|
| MAX-940, FTB-940 and FTBx-940 Series | SM1 | OLTS, 1310/1550 nm<br>Singlemode connector: APC or UPC |
| | ICERT-SM1 | Fiber Certifier, Singlemode model, 1310/1550 nm, fiber certification through FasTesT<br>Singlemode connector: APC or UPC |
| | ICERT-Q1 | Fiber Certifier, Multimode model, 850/1300 nm, quad ready<br>Singlemode connector: APC or UPC<br>Multimode connector: UPC |
| | ICERT-Q1-QUAD | Fiber Certifier, Quad model, 850/1300/1310/1550 nm<br>Singlemode connector: APC or UPC<br>Multimode connector: UPC |
| MAX-945, FTB-945 and FTBx-945 Series | SM1 | OLTS, 1310/1550 nm, can measure ORL<br>Singlemode connector: APC |
| | SM3 | OLTS, 1310/1550/1625 nm, can measure ORL<br>Singlemode connector: APC |
| | SM4 | OLTS, 1310/1490/1550 nm, can measure ORL<br>Singlemode connector: APC |
| | ICERT-Q1-QUAD | Fiber certifier, Quad model, 850/1300/1310/1550 nm, can measure ORL<br>Singlemode connector: APC<br>Multimode connector: UPC |

***Note:*** *To test UPC singlemode links using an instrument configured with APCs, you will need test cords with an APC connector at one end and a UPC connector at the other end. Contact EXFO to obtain such test cords as needed.*

Your OLTS/Fiber Certifier also features the following:

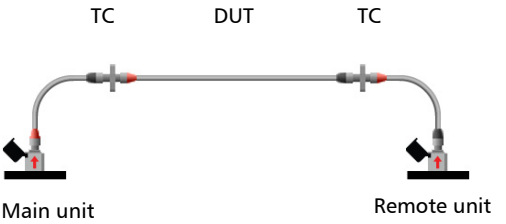
- Singlemode and/or multimode testing available for FasTesT (one to three wavelengths).
- Real-time continuity.
- ORL measurement in singlemode on 945 units.
- A step-by-step reference assistant helps you take the references before you do your measurements. This minimizes measurement errors, such as negative losses.
- Diagnostics to help identify the possible causes of failed results.
- The possibility to send and receive text messages through the fiber under test (simplex and duplex).
- Bidirectional duplex measurement (singlemode and multimode).
- Compatible with FOT-930 and FTB-3930 units.
- PON (FTTx) mode.
- Automatic wavelength detection from compatible sources. Auto-switching is also supported.
- Power meter for manual measurements.
- Source for manual measurements.

# Testing with FasTesT™

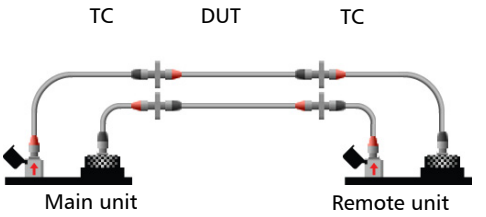
FasTesT is an automated measurement that tests insertion loss for one or several wavelengths. These tests can be unidirectional or bidirectional, and the results are shared and available in both units used to perform them. While the unit is performing the FasTesT, it also determines the length of the fiber.

The two test types are:

- FasTesT Simplex: This test type is done one fiber at a time. It is available only in singlemode. Test cords (TC) and the device under test (DUT) is connected as shown below:




- FasTesT Duplex (Fiber Certifiers only): This test type allows to test two fibers at once. Communication in data centers and multimode is usually, if not always, done on a pair of fibers: Rx and Tx. Test cords (TC) and the device under test (DUT) are connected as shown below:



# Typical Applications

You can use the OLTS/Fiber Certifier for several applications such as:

| Application | OLTS | Fiber Certifier |
|---|---|---|
| Fiber installation and maintenance applications. | X | X |
| Passive Optical Network (PON) representation on simplex links (simplex singlemode only). | X | X |
| Bidirectional loss testing on simplex links (singlemode only). | X | X |
| Length measurement. | X | X |
| Connector end face inspection using an optional fiber inspection probe. | X | X |
| Measuring ORL (945 models, simplex, singlemode only). | X | X |
| Using power meter, VFL and source. | X | X |
| Multistandard certification performed against both application and cabling standards in one operation. | — | X |
| Multimode and singlemode loss testing on duplex links. | — | X |

# Technical Specifications

To obtain this product's technical specifications, visit the EXFO Web site at *www.exfo.com*.

## 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.**

## 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

**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. |
|  | On (Power) |
| | Off (Power) |
| <br>OR<br> | On/Off (Power) |
| | Fuse |

# Laser Safety Information (Units Without VFL)

Your instrument is a Class 1 laser product in compliance with standards IEC 60825-1: 2007 and 21 CFR 1040.10, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. Invisible laser radiation may be encountered at the output port.

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

# Laser Safety Information (Units With VFL)

Your instrument is a Class 2 laser product in compliance with standards IEC 60825-1: 2007 and 21 CFR 1040.10, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. Laser radiation is emitted at the output port.

The following label(s) indicate that the product contains a Class 2 source:

# Electrical Safety Information

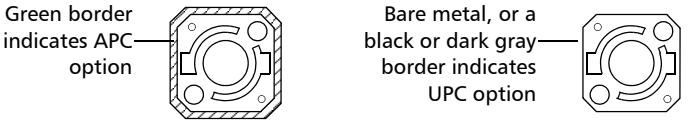
For more information on product safety and equipment ratings, refer to the user documentation of your platform.

Unit power consumption: 8 W maximum.

# 3 Setting up and Using Your OLTS/Fiber Certifier

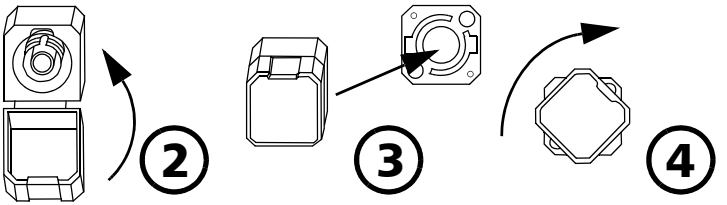
## Installing the EXFO Universal Interface (EUI)

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

## IMPORTANT

**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 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 probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation in measurements.

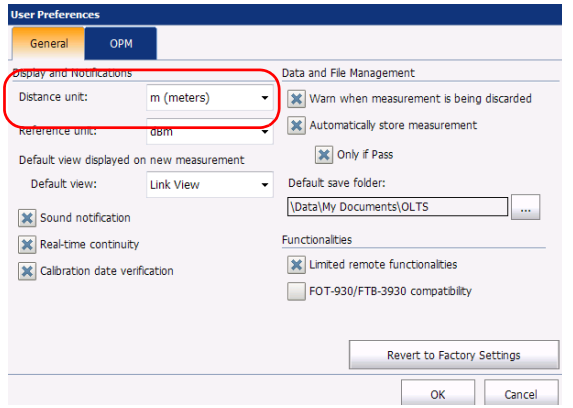
# Setting up User Preferences

The user preferences let you customize how the application behaves and looks.

***Note:*** *On FTB platforms, the user preferences are proper to each Windows user.*

***To change the distance unit:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, select the unit you want to use.

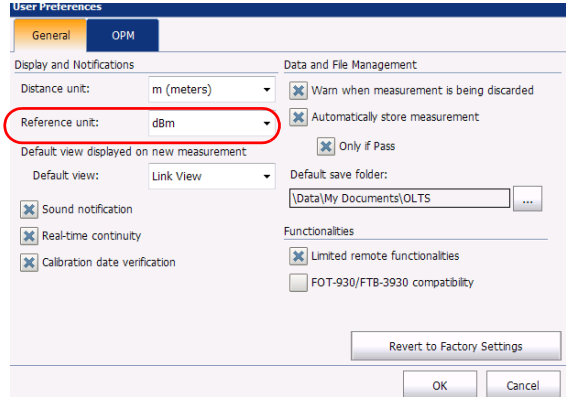



***Note:*** *The number of significant figures depends of the unit you select.*

4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

***To change the reference unit:***

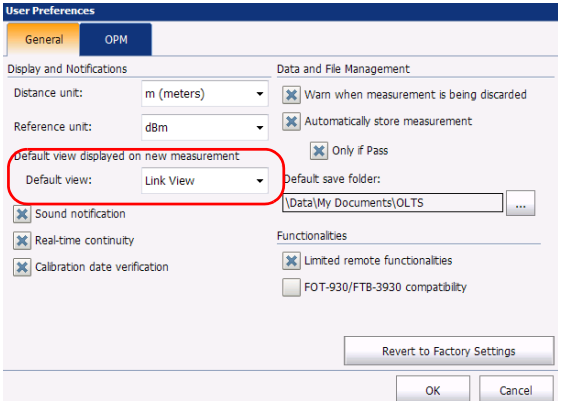
1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, select either dB or dBm for the reference display.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

***To select which view appears after you perform a successful measurement:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, select the view of your choice.

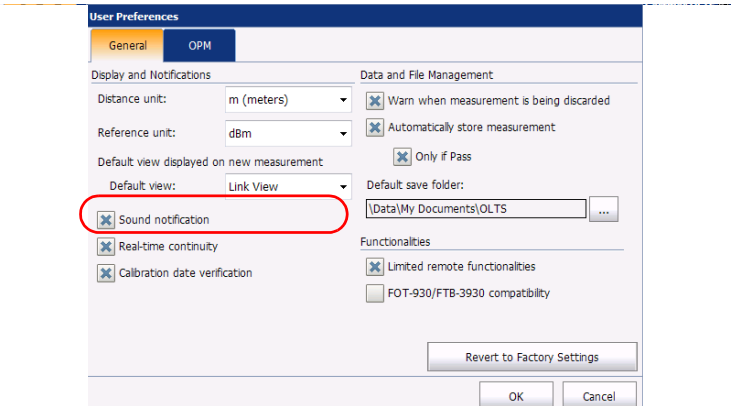



4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

***To enable or disable sound notifications when using the unit:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, enable the corresponding option.

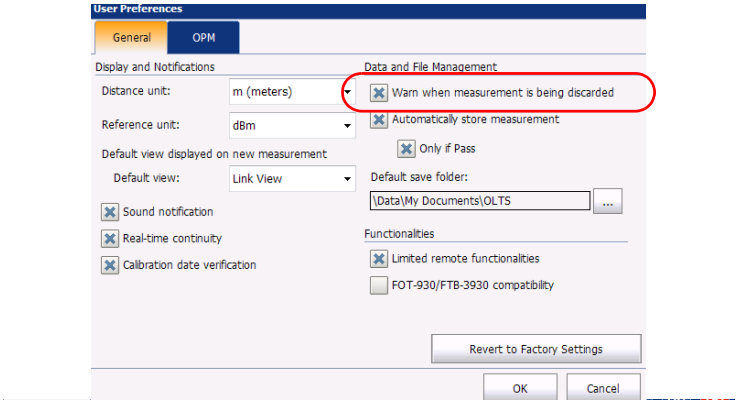
***Note:*** *The sound notifications are enabled by default.*



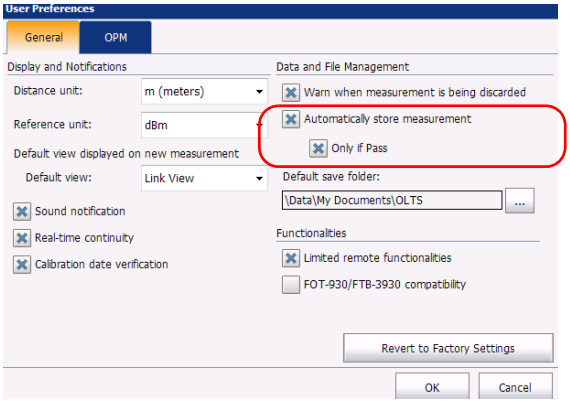

4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

***To set how measurements are stored in the list and the default location for saving files:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Select whether you want the application to notify you when you have a result that is not stored to the list and you are about to discard it.

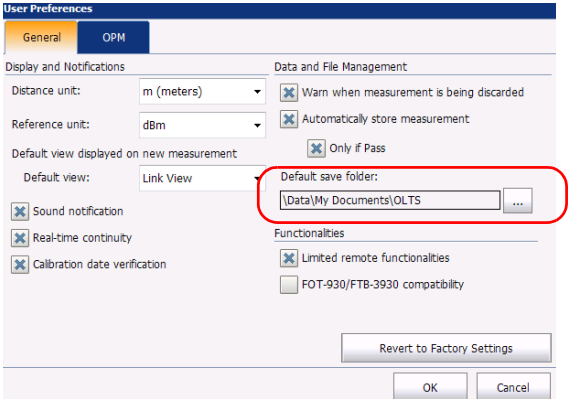


***4.*** Select whether you want the measurements to be stored automatically in the list regardless of the results, or only when the results have a status of pass.




***Note:*** *If the measurement was not automatically stored and you want to keep it, you will have to store it manually by tapping* ***Store*** *in the* ***Link View*** *or* ***Details*** *tabs of the main window.*

***5.*** If desired, change the default location where the new files are saved.




***6.*** Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

# Using the Real-Time Continuity Verification

If you select the real-time continuity verification, as soon as the application is launched, the test unit starts looking if another test unit is connected at the other end. The application remembers the last used FasTesT method, and performs its verification accordingly. Once connected, an audio and/or visual notification is generated by the application; each time the connection is lost, a distinctive notification is also generated.

***Note:*** *If real-time continuity is deactivated on a unit, the latter falls in listening mode and responds to another unit on which the continuity is activated, but the laser source will become inactive as soon as the fiber is disconnected from it.*

This type of functionality is possible because your units are equipped with class 1 lasers. Remember however that even if the emission levels are low, you must take the appropriate precautions when handling active lasers.

## CAUTION

**The real-time continuity is active as soon as it is enabled on one of the two units and uses the unit's laser to perform its verification. When the real-time continuity is deactivated, the laser will be disabled, EXCEPT when using the reference assistant.**

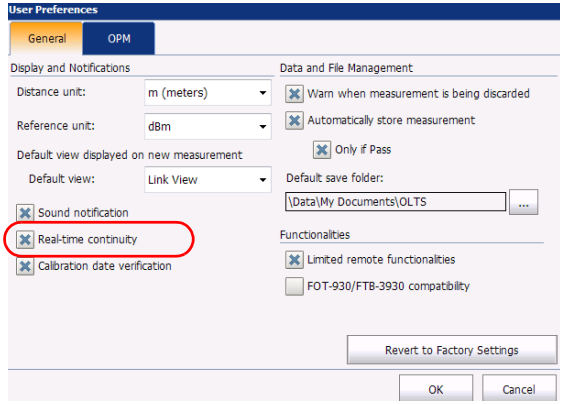
***Note:*** *Real-time continuity is not available when you are using the FOT-930/FTB-3930 compatibility mode.*

***To enable or disable real-time continuity verification:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, select the corresponding option.

***Note:*** *The real-time continuity verification is enabled by default.*

***Note:*** *If the real-time continuity verification is disabled, the FasTesTs will take a little longer to run.*




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

# Setting the Autonaming Scheme

The autonaming feature is useful to make a relevant naming scheme for your tests. This also ensures that you do not overwrite measurements by mistake. You can select which item goes in the measurement name (appears at the bottom of the window), as well as the type of separator you want to use in between.

***Note:*** *On FTB platforms, the identification values and auto-increment feature are set per Windows user.*

***Note:*** *The file name has a limit of 260 characters, including the folder name.*

A preview is available to show you the final output of the name.

The measurement name is made of one or more static parts (alphanumeric) and one or more variable parts (numeric) that will be incremented or decremented, according to your selection, as follows:

| If you choose incrementation... | If you choose decrementation... |
|---|---|
| Variable part increases until it reaches the *highest possible value* with the selected number of digits, then restarts at the indicated start value. | Variable part decreases until it reaches the stop value, then restarts at the *highest possible value* with the selected number of digits. |

***Note:*** *To decrement values, the start number must be higher than the stop number.*

A file can contain more than one measurements. You can use preset, or custom identifiers to help differentiate the measurements within the file.

***Note:*** *Custom identifiers will be added to the measurement name if a corresponding value is set for them.*

The measurement names can be incremented using one or more identifiers. Selecting a single identifier will follow the incrementation (or decrementation) value you have set.

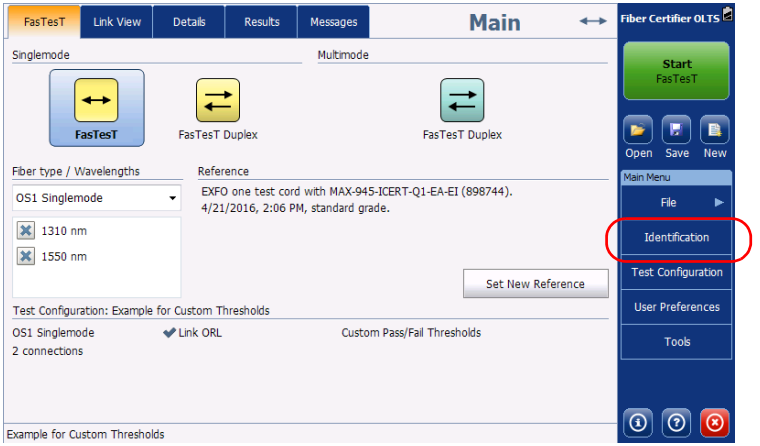
The autonaming parameters can be set only for measurements that have not been saved yet. You will only see the parameters for the current and next acquisition (when the test is done but not saved yet), or for the next acquisition only (test is not done yet). Otherwise, the parameters will not be displayed.

It is also possible to revert the settings to their default values.

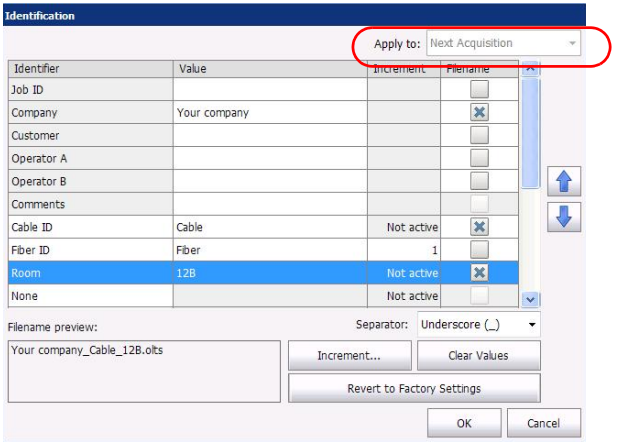
EXFO recommends to use an identifier that is not automatically incremented when creating a file name. For example, in the case of a file that contains all of the fibers of a given cable, you should use a file name composed of the cable name, and not the fiber identifier, which varies from one measurement to the next.

***To configure the automatic file naming:***

***1.*** From the **Main Menu**, tap **Identification**.



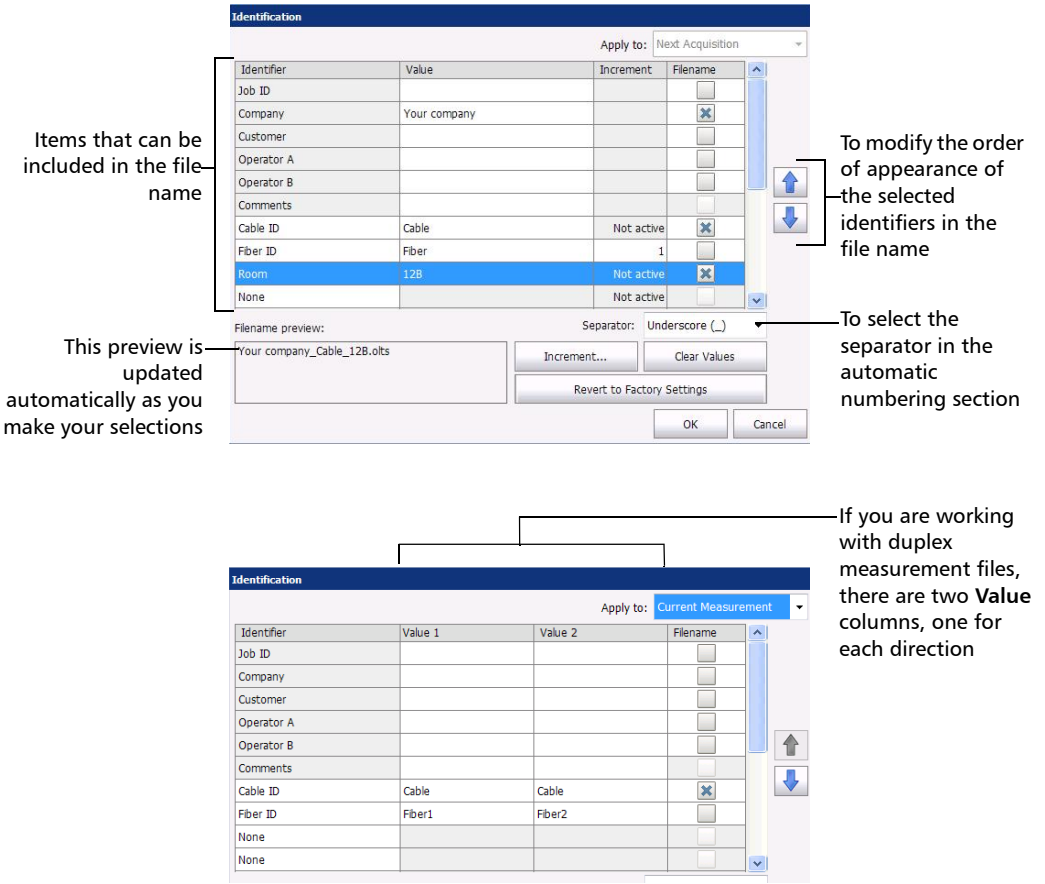

***2.*** From the **Apply to** list, ensure that **Next acquisition** is selected.



***3.*** Select the desired identifiers to include in the file name. You can change the order of appearance of the highlighted component with the up and down arrow buttons.

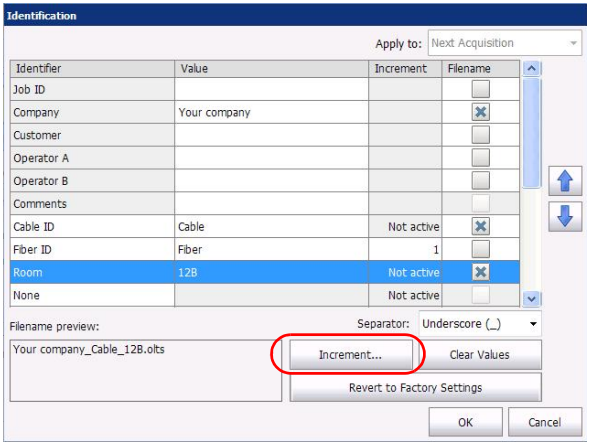
If an identifier has an arrow icon, a predefined list with choices is available, but you can also enter your own customized identifier name. If you select None, it disables the field from the list.

***Note:*** *The information in the dark gray boxes is read-only and cannot be edited.*



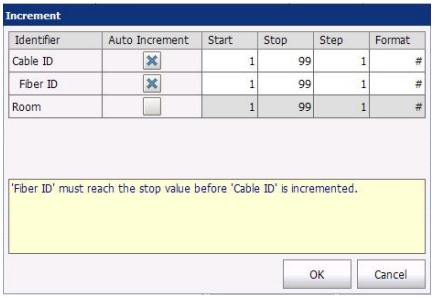
***4.*** If you want to increment automatically the cable ID, the fiber ID or any other custom identifier, proceed as follows:

***4a.*** Tap the **Increment** button.




***4b.*** In the **Increment** window, select the **Auto Increment** check box corresponding to the identifier you want to increment.

***4c.*** Enter the start, stop and increment values as desired.




***Note:*** *The identifiers are processed in order, from the one with the largest indentation to the one with the smallest. For a given identifier, when the increment value reaches the stop value, the incrementation automatically switches to the next identifier. The order of the identifiers in the increment window (and thereby the order of increment) follows the order of the identification window.*

***Note:*** *An identifier set to None will not appear in the increment window.*

***Note:*** *To decrement values, the start number must be higher than the stop number.*

***4d.*** Select the format for the incrementation value. This will determine how many digits are used and the information will be displayed accordingly in the **Identification** window.

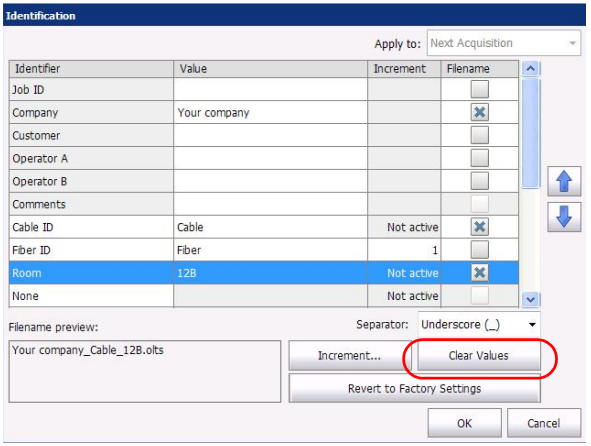
***4e.*** Tap **OK** to return to the **Identification** window.

***5.*** Tap **OK** to confirm your new settings and to return to the main window.

The new settings will apply the next time you perform an acquisition.

***To clear the values:***

1. From the **Main Menu**, tap **Identification**.
2. In the **Apply to** list, select **Next acquisition**.
3. Tap the **Clear Values** button.




4. Tap **OK** to return to the main window.

All values in the **Value** column are erased from the white boxes.

# Reverting to Factory Settings

As long as the file was not already saved, you can revert to factory settings in your menus. However, the **Restore to Factory Settings** button is valid only for the window or tab where you use it.

# Managing Files

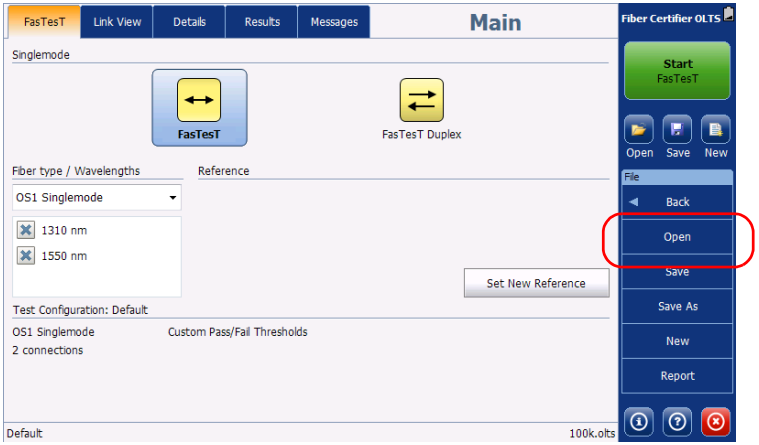
Managing your files can be done using the shortcut buttons, or the **File** menu.

***To open a file:***

***1.*** From the main window, tap the button.

OR

From the **Main Menu**, tap **File**, then **Open**.



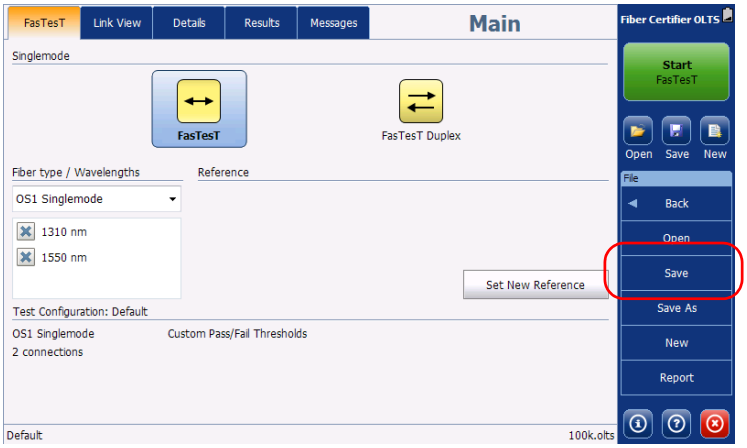

***2.*** Locate the file you want to open, then tap **OK**.

***To save your files:***

From the main window, tap the button.

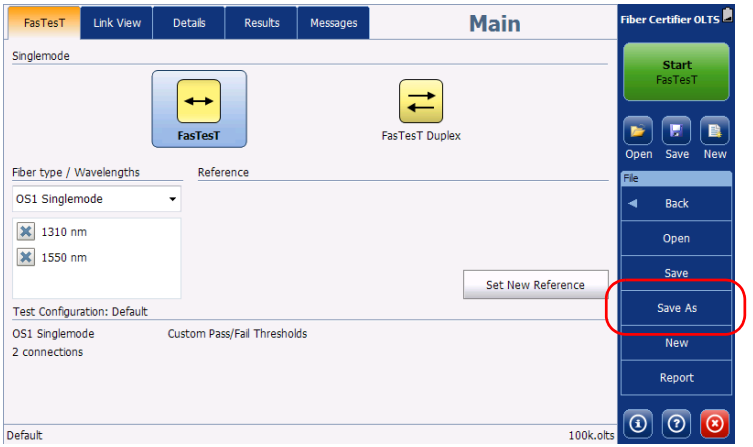
OR

From the **Main Menu**, tap **File**, then **Save**.



***To save your files under a different name or location:***

***1.*** From the **Main Menu**, tap **File**, then **Save As**.




***2.*** Select the location where you will store your file as needed.

***3.*** Change the name of the file as needed.

***4.*** Tap **Save**.

***To clear all measurements from memory:***

From the **Main Menu**, tap **File**, then **New** or use the button.

***Note:*** *If a file was already open and you had made changed on it, you will be prompted to save your work.*

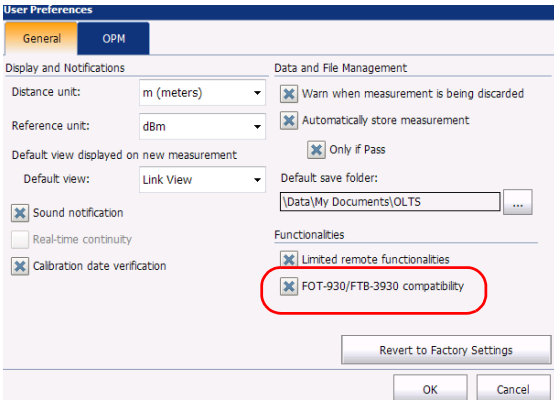
# Activating the FOT-930/FTB-3930 Compatibility Mode

The FOT-930/FTB-3930 compatibility mode lets you use a 94X Series unit and an FOT-930/FTB-3930 unit to perform bidirectional FasTesTs in singlemode. This compatibility mode offers fewer features than when using two 94X Series units. You will not be able to use the messaging feature, start a FasTesT from the FOT-930/FTB-3930 unit or take a side-by-side reference from them (loopback references are possible however). Real-time connectivity is also disabled. Thresholds on the FOT-930 come from the unit itself and will not come from the 900 series.

***Note:*** *You cannot perform a FasTesT using two 94X Series units if one of them is set for FOT-930/FTB-3930 compatibility.*

***To activate the FOT-930/FTB-3930 compatibility mode:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Functionalities**, enable the corresponding option.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

# Setting a Reference

References are crucial to your tests. You should take care to select the type which is appropriate for your situation, and take at least a new reference each day, as well as each time the following situations occur:

- When a test cord is disconnected from the source port on the main or remote unit.
- When any test cord is replaced.
- When you change the main or remote unit (or both).
- When there are negative losses.
- When the test units are exposed to temperature variations.

Setting the reference for your measurements is done with a assistant that will guide you through all of the steps so that they are done in the proper order, and alert you should any problems arise. In such cases, the assistant will indicate possible solutions.

If both units do not have the same set of wavelengths, those of the main unit will be taken into account. If a wavelength is not on the remote unit, there will be no reference for it and you will notice "---" instead of a reference measurement.

***Note:*** *On FTB platforms, the reference is associated with the module's serial number and is not dependent on the user who performed it. Therefore, it will still be valid if another user logs on and uses that same module.*

***Note:*** *EXFO strongly recommends using reference-grade test cords to set your references. This will ensure repeatable results and help prevent negative losses.*

***Note:*** *If you are using a multimode Fiber Certifier, your unit has an internal multimode encircled flux conditioner and is compliant to the applicable standards directly at the test port. In order to maintain encircled flux conditions at the end of the test cord, EXFO recommends to only use EXFO test cords or equivalent to meet the specifications.*

EXFO's test cords are more than patch cords with reference grade connectors: the fiber used to make them is strictly controlled to ensure the proper core size and geometry.

EXFO's test cords are color coded to avoid errors when they are connected to the test ports and devices under test. These colors are also used in the reference assistant animations and instructions to facilitate the manipulations.

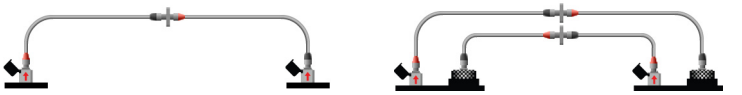
## CAUTION

**While the reference assistant is in use, the unit will use its laser to perform the verification and take measurements. The laser will be active EVEN if the real-time continuity option is disabled.**

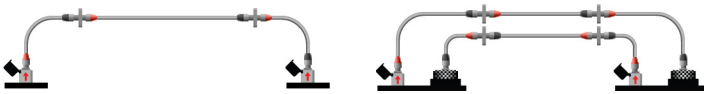
When setting a reference for your tests, you can select between different types of references (simplex references are illustrated on the left and duplex measurements are illustrated on the right):

- *One cord:* This side-by-side type of reference tends to include both the first and last connections in the loss budget. This is the recommended method, and is mainly used for permanent links in fiber certification.

- *Two-cord:* This side-by-side type of reference tends to include only the first or the last connection in the loss budget.



- *Three-cord:* This side-by-side type of reference tends to exclude both the first and last connections in the loss budget. This is the method mainly used for channels in fiber certification.



- Loopback: useful for when the two units are not close enough to perform the side-by-side type. You cannot use this type of reference with certification standards. Not recommended for short links. The loopback reference mode is only available for singlemode measurements.
- No reference: useful for when the two units are not close enough to perform the side-by-side type and the connections are mismatching. You cannot use this type of reference with certification standards. Not recommended for short links. The no reference mode is only available for singlemode measurements.

Depending on the reference methods, you can skip the verification steps. Sometimes, you cannot do the verification steps because the connector types are not compatible. This can happen when the connector for the link under test are of different types.

## IMPORTANT

**The first verification step (loopback) of a side-by-side reference becomes mandatory for two-and three-cord references on 945 models when the ORL measurement is enabled. To be able to skip this verification, you can clear the ORL from the test configuration selected for the next acquisition.**

## IMPORTANT

**Make sure that the reference and verification steps are performed accurately because the results will follow each FasTesT afterward. This allows for complete traceability for the steps that lead to the measurements.**

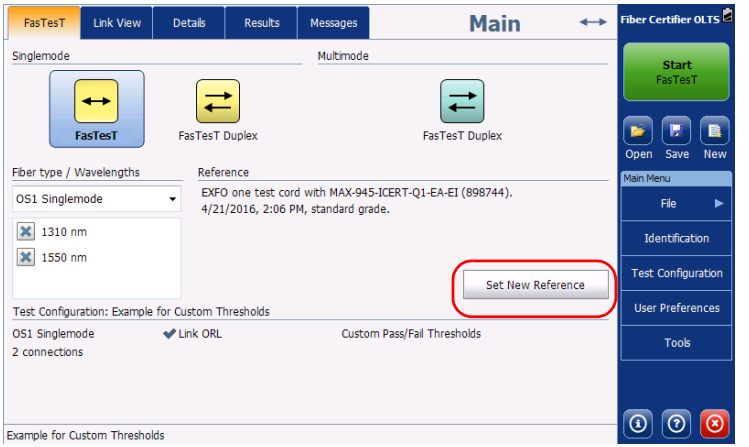
**EXFO recommends to take references regularly to have better precision for low loss level links. In the case of units exposed to temperature variations, you might have to take references several times per hour.**

## IMPORTANT

**When using OM 1 fibers (62.5 µm), you need to use an external conditioner for each source involved in the test. The application will take care of the normal additional loss caused by these conditioners.**

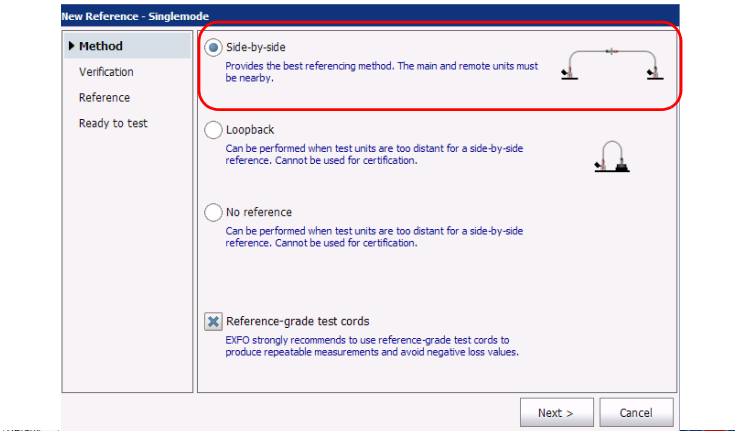
***To set a reference measurement:***

***1.*** From the main window, select the **FasTesT** tab, then tap **Set New Reference**.



2. Select the type of reference method you want to use.

***Note:*** *If a type of reference is already specified in a test configuration, it will already be selected and you do not have a choice to make.*



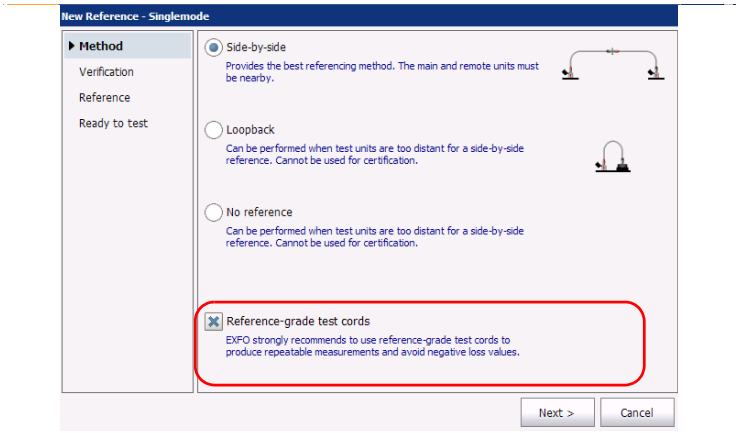

## IMPORTANT

**Both the main and remote units must be set to the same FasTesT method for the reference to be performed.**

3. If you are using reference-grade test cords, select the corresponding option at the bottom of the window. Tap **Next** to access the next step of the reference setup.

***Note:*** *It is also possible to select the test cord type in the test configurations; if the test configuration you are using calls for reference-grade cords, the option will already be selected.*

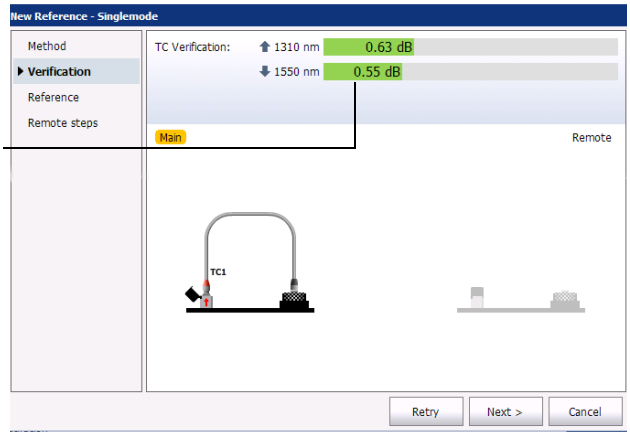
***Note:*** *If you select the reference-grade test cord option, the thresholds to determine the verification status are stricter.*



***4.*** Continue following the instructions on-screen that will be specific to the type you have selected. You may have to perform steps on the main unit only, or on both the main and remote unit, depending on the type of reference selected (ORL reference on a 945 unit).

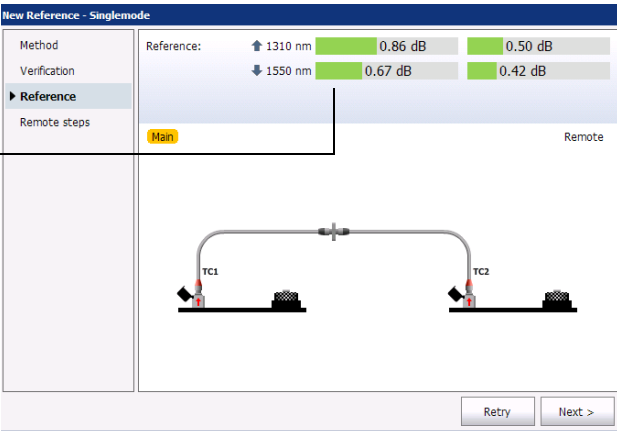
During the reference process, you will notice two important steps: verification and reference. Depending on the reference method you are setting, the verification step will occur before the reference step, or vice versa.

Verification steps allow to determine if the connectors which will be in contact with the device under test are clean and within acceptable loss values. Reasons for a rejection at this point could be dirty or damaged connectors, or a faulty test cord. After a certain number of connections, it is normal that a test cord reach its end of life. Test cords may need to be replaced once in a while.




Tap to view the thresholds used to determine the verification pass/fail status.

Reference is when the actual reference measurement is taken. If you want to keep these values, proceed to the next step.




Tap to view the thresholds used to determine the reference pass/fail status.

***5.*** When you are done, tap **Finish** to exit the assistant and begin testing fibers.

## IMPORTANT

**Do not disconnect the test cords from the source ports of the units. This will render your reference invalid and you will need to start over.**

# Setting the Main and Remote Units

When performing a FasTesT, you have to set one of your two units as the main unit. This unit is the one where the test configuration and fiber identification are set, and where the measurements are stored.

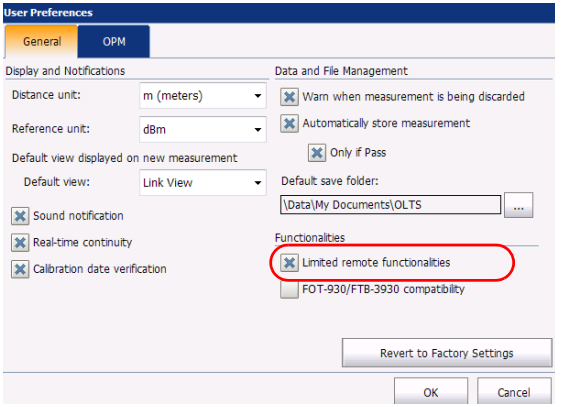
The other unit, the remote unit, will show read-only information following each FasTesT. It will also display messages if there is a problem with the main unit that prevents the FasTesT to be performed (for example, if the current measurement was not stored). You can also start the FasTesT from the remote unit.

The number of allowed actions on the remote unit will depend on the preference you set. A restricted remote unit can only view read-only information about the FasTesTs, whereas it can also be set so that you can open existing files, change configurations for a future use when the unit is set as the main unit (or if you export them), store power meter results or navigate through the measurements from a file you have opened.

***To set the level of restrictions for the remote unit:***

1. On the unit that will be used as remote, from the main window, tap **User Preferences**.
2. Select the **General** tab.

***3.*** Under **Functionalities**, select the corresponding option.




***4.*** Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

***To set one of the unit as the main unit:***

Perform a reference measurement on that unit. The unit on which the FasTesT reference is set automatically becomes the main unit.

In the case of a loopback reference, or if you are not using a reference, you will need to determine which role the units are playing. If both units have the same role, the one on which the first FasTesT is started will become the main unit.

If you want to switch units, simply perform a reference measurement from the other unit.

**IMPORTANT**

**Starting a FasTesT from the remote unit will not set it as the main unit. It will only ask the main unit to start it. The main and remote unit roles remain unchanged unless a new reference is performed.**

# Performing a FasTesT

***Note:*** *The available choices you see on-screen depend on what type of unit you are using.*

In the case of Fiber Certifiers, if the settings were not already determined by the selected test configuration, or if your test configuration includes an undefined fiber type, you can select the FasTesT settings directly from the main window before performing the test.

For Fiber Certifiers, when you select a new test configuration, or modify the current one, the application will select the wavelengths and test type that are adapted to the standards you have selected. If you modify the test type and fibers manually afterwards, such changes might not reflect the standard configuration settings and thresholds, and could result in missing pass/fail thresholds.

***Note:*** *The available wavelengths are filtered by fiber type.*

***Note:*** *On FTB platforms, the settings are stored for each Windows user, for each module (determined by the serial number).*

## IMPORTANT

**Both the main and remote units must be set to the same FasTesT method for the FasTesT to be performed.**

You can also start the FasTesT from the remote unit. Doing so actually sends a message to the main unit to start the test, and the behavior will be exactly the same as if you had started it from the main unit. Should anything prevent the FasTesT to start on the main unit, such as a missing reference, or results that were not stored, you will be notified accordingly.

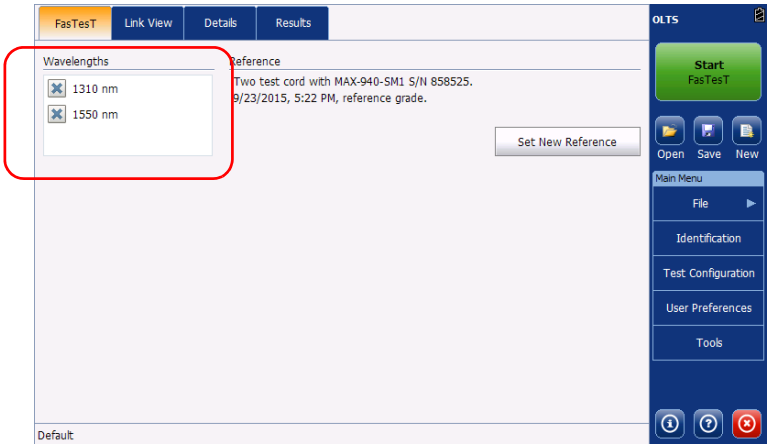
***To start a test when using a test configuration:***

Since the settings are already selected, all you need to do is tap the **Start FasTesT** button.

***To select test settings manually and start a test (OLTS):***

***1.*** Select wavelength or wavelengths, as needed.

***Note:*** *If your test configuration is set to anything other than an unspecified fiber type for the next acquisition, some manual choices will be unavailable.*

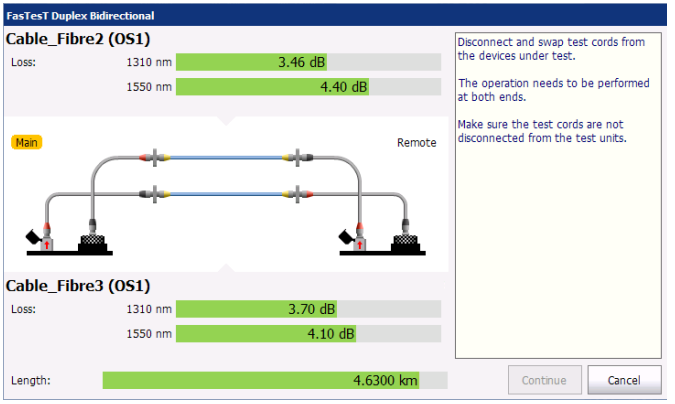


2. Tap **Start FasTesT**.

   If you are taking bidirectional duplex measurements, the application will indicate when to disconnect the DUTs to change the direction. You will have to do this change on both units.

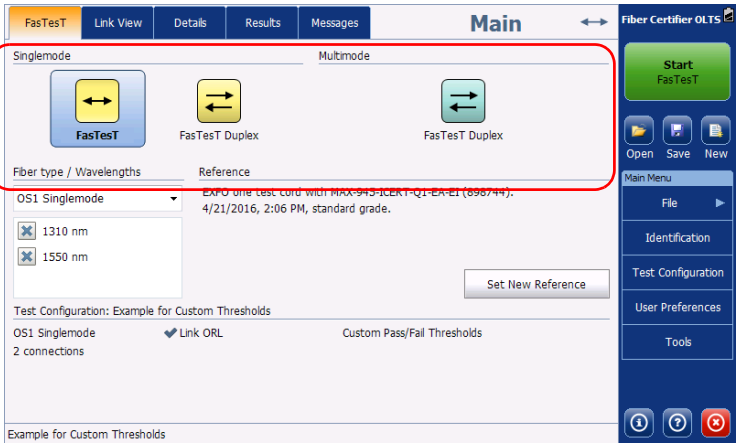
## IMPORTANT

**Disconnect the *DUTs* from the test cords to invert the test direction. DO NOT invert the test direction by disconnecting the test cords from the source ports of your units.**



***To select test settings manually and start a test (Fiber Certifier):***

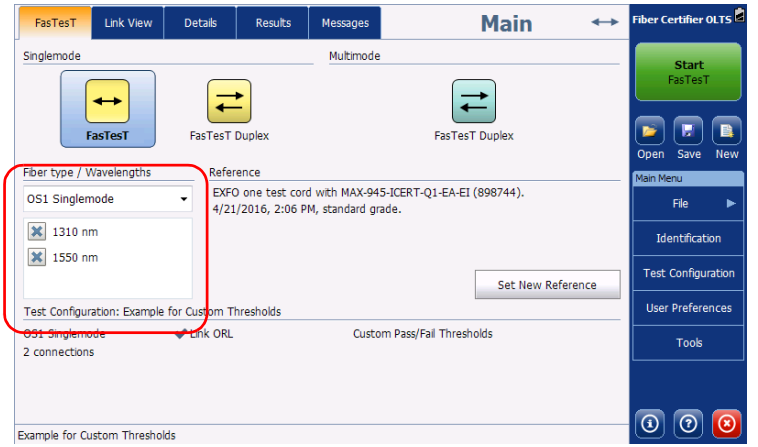
***1.*** Select whether you want to perform singlemode or multimode measurements.



2. Select the fiber type and wavelength or wavelengths, as needed.

***Note:*** *If the fiber type and wavelengths you select manually do not reflect your test configuration settings and thresholds, it could result in missing pass/fail statuses.*

***Note:*** *If your test configuration is set to anything other than an unspecified fiber type for the next acquisition, some manual choices will be unavailable.*

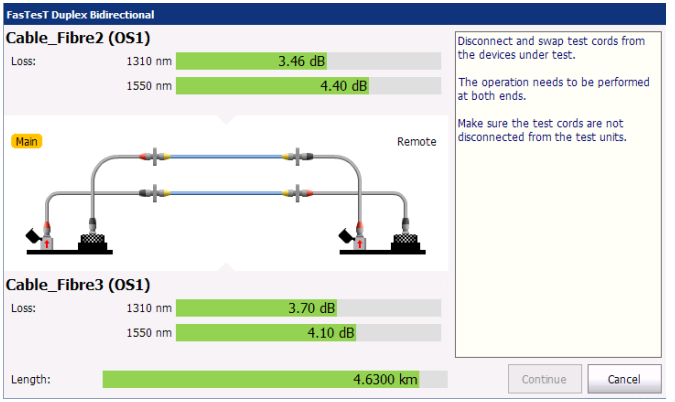


***3.*** Tap **Start FasTesT**.

If you are taking bidirectional duplex measurements, the application will indicate when to disconnect the DUTs to change the direction. You will have to do this change on both units.

## IMPORTANT

**Disconnect the *DUTs* from the test cords to invert the test direction. DO NOT invert the test direction by disconnecting the test cords from the source ports of your units.**



# 4 Managing Test Configurations

Test configurations allow you to quickly have the required criteria for your tests. A list of predefined configurations is already available as examples when you first purchase your unit, but you can also create configurations that will meet your specific needs.

***Note:*** *You can remove the predefined configurations if they do not correspond to your testing needs.*

Creating custom test configurations is done through duplicating an existing configuration, and then modifying the desired criteria. If you create configurations on one unit and want to transfer them to another unit through importation, you can do so.

You do not have to import or export test configurations between the main and remote units. All of the information required to display the values on the remote unit is automatically sent during the FasTesT.

When working with FTB platforms, the test configurations are available for all modules and users. However, they are filtered by according to the module (options, wavelengths, and so on) and the current selection is kept for each Windows user, for each module with similar features.

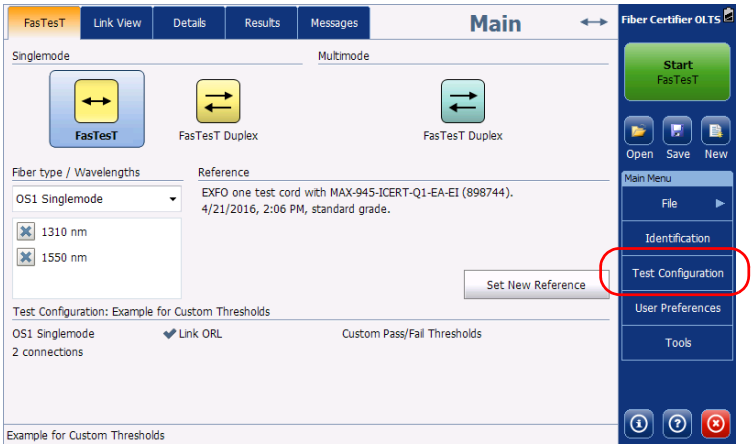
# Selecting a Test Configuration

You can select a test configuration to use on future acquisitions. You can also view the configuration for an existing measurement.

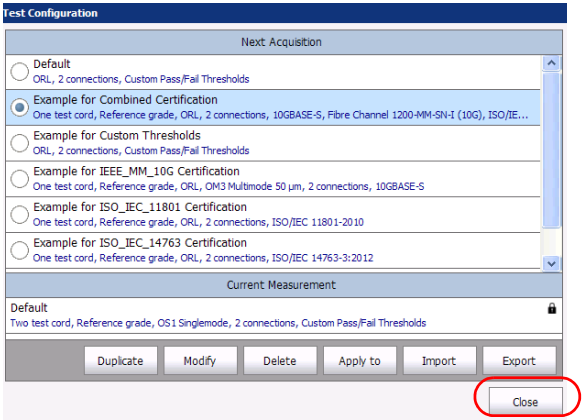
***Note:*** *You cannot modify the test configuration for an already existing measurement directly on your unit. If you want to change the configuration for such measurements, you must use the FastReporter 2 post-processing software.*

***To select a test configuration for the next acquisition:***

1. From the **Main Menu**, select **Test Configuration.**



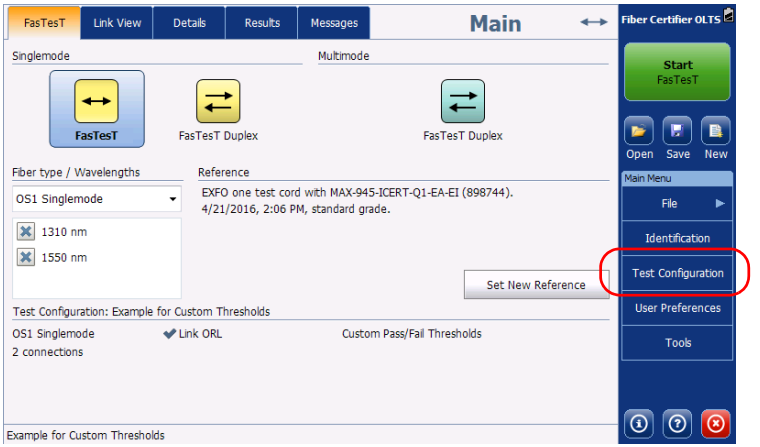
***2.*** In the list of available test configurations, select the configuration you want to use and tap **Close**.



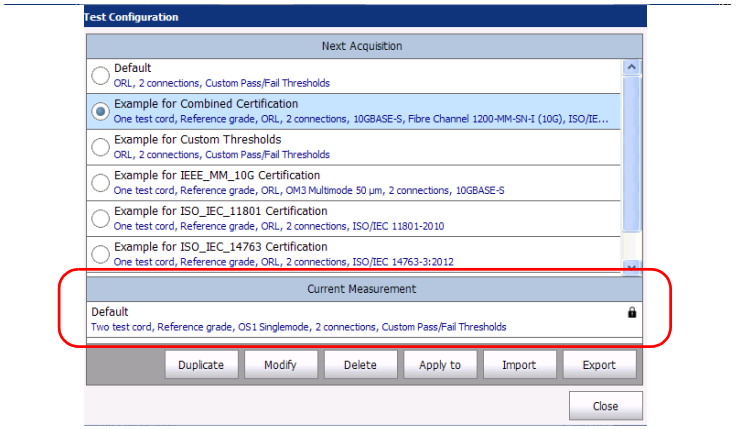

***Note:*** *In the case of Fiber Certifiers, after selecting a new configuration, some of the acquisition parameters, such as the FasTesT method, the fiber type and the wavelengths, could be modified.*

***To view the configuration used for an existing measurement:***

1. Select the measurement for which you want to see the configuration.
2. From the **Main Menu**, select **Test Configuration.**




3. Under **Current Measurement**, you can see the details of the configuration in use. Tap **Close** to exit the window.



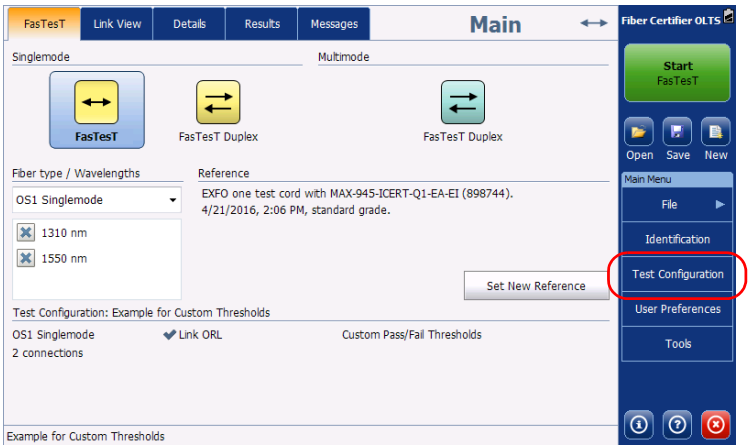
# Creating a Test Configuration

You can create your own test configurations by duplicating an existing one and modifying the settings to fit your needs.

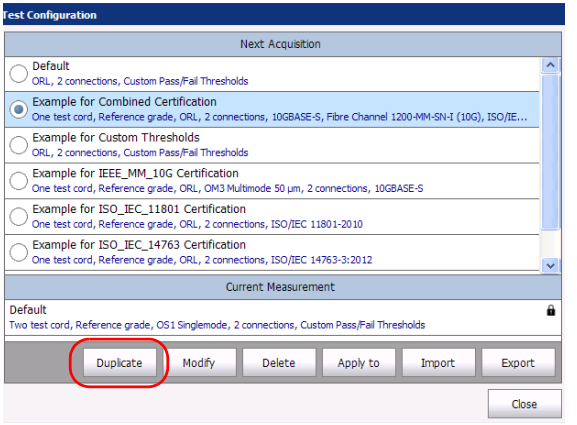
***Note:*** *Depending on the type of units you are using, some tabs or items will not be available. For example, 940 series units do not have the ORL item, or OLTS units with no certification capacities do not have the* ***Link Definition*** *tab.*

***To create a test configuration:***

1. From the **Main Menu**, select **Test Configuration**.

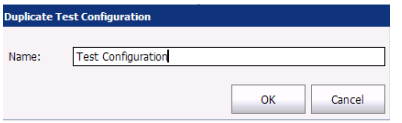


2. Select the row corresponding to the configuration that is the closest to the one you want to create, then tap **Duplicate**.




3. A default name is suggested for the new configuration. Change the name as needed, then tap **OK**.

***Note:*** *You cannot have two configurations with the same name.*



***4.*** Tap the **Modify** button to change the settings according to your needs:

- Properties: This is where you can change the name of the configuration, as well as the reference method and the test cord type. See *Setting the Test Configuration Properties* on page 60 for details.
- Link Definition (Fiber Certifier): This is where you can select the fiber type for your test configuration and the number of connections and splices. See *Defining the Link for Your Test (Fiber Certifier)* on page 65 for details.
- FasTesT Pass/Fail: This is where you can select the certification standards for your test configuration (Fiber Certifier) and edit the pass/fail thresholds (both non-Fiber Certifier and Fiber Certifier). See *Selecting Certification Standards (Fiber Certifier)* on page 70 for details.
- OPM Pass/Fail: This is where you can set the thresholds for your power meter. See *Setting Custom Power Meter Thresholds* on page 80 for details.

***5.*** Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

# Setting the Test Configuration Properties

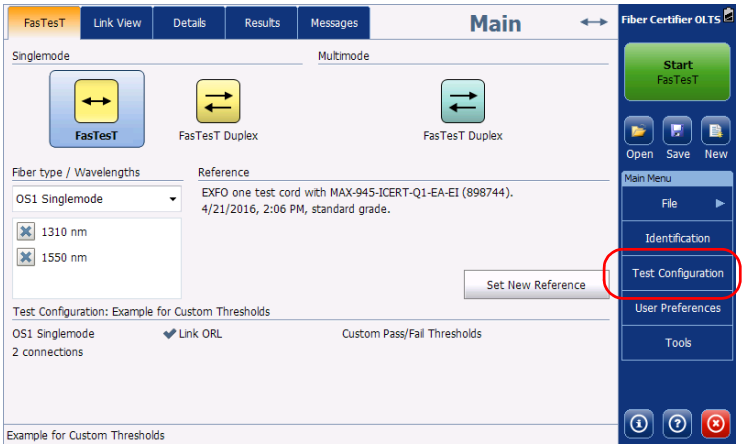
The properties for your test configuration include its name, as well as the reference method, and the type of test cord you will use. When you select a specific test cord type, or reference method in your configuration, they will be automatically selected when performing your test and will save you time and manipulations. For example, if you have selected a specific reference method, the assistant will start right after the selection of that method, so you do not have to go through the first steps for nothing.

***Note:*** *Reference grade cords have a lower connection loss level than standard grade cords.*

If you are working with Fiber Certifier units, you can select how the bidirectional measurement loss is consolidated in each direction, using the average or worst value. On standard units, the average value is used for bidirectional measurement loss.

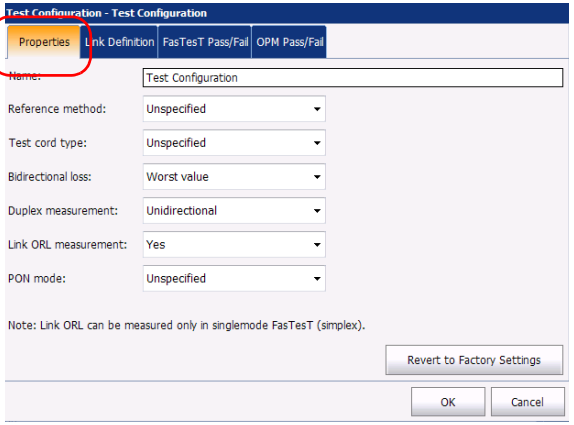
***To change the test configuration properties:***

1. From the **Main Menu**, select **Test Configuration**.



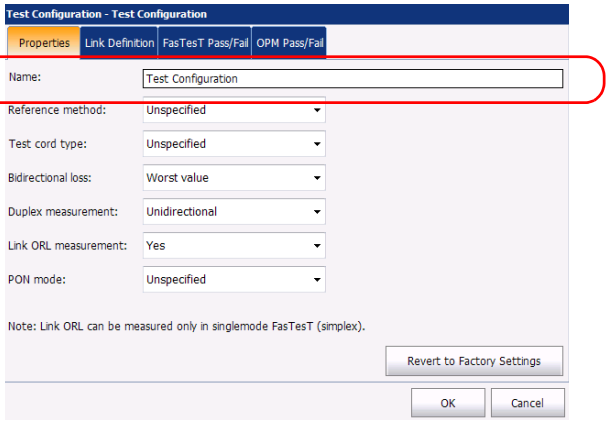

2. Select the configuration you want to edit and tap **Modify**.

***3.*** Select the **Properties** tab.

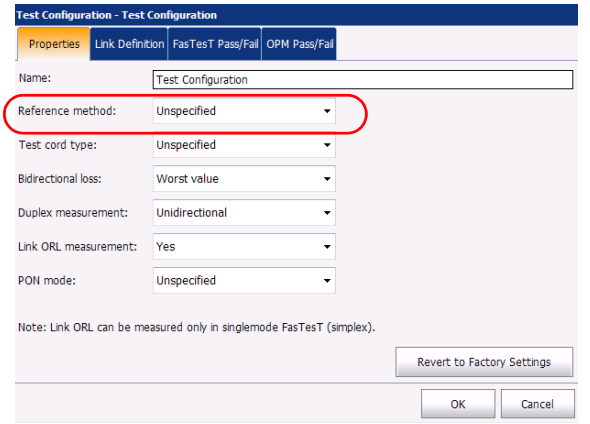



***4.*** If desired, change the configuration name by tapping in the corresponding field and entering your information.

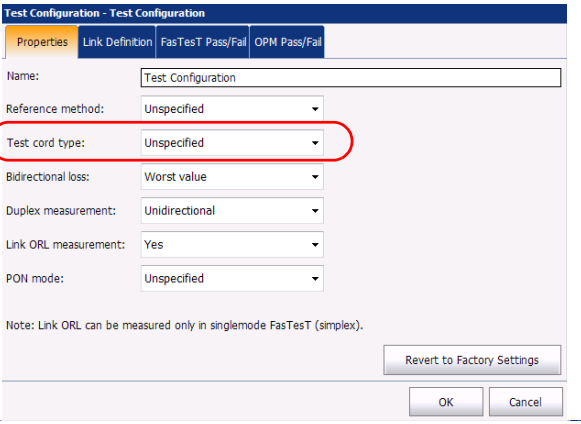
***Note:*** *You cannot have two test configurations with the same name.*



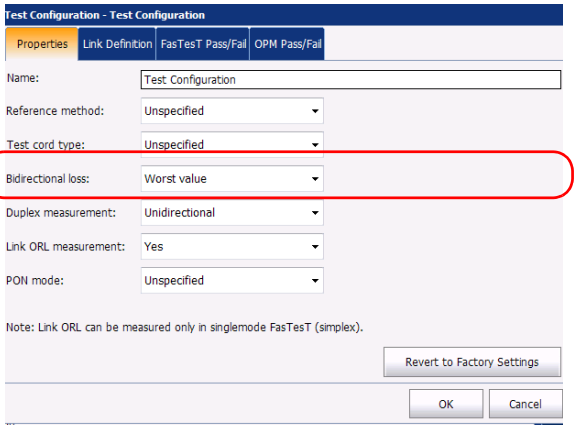
***5.*** Select the reference method you want to force for this configuration. Selecting a method will automatically skip the selection steps in the assistant and go directly to the desired reference method. Selecting Unspecified will open the assistant at the first step.



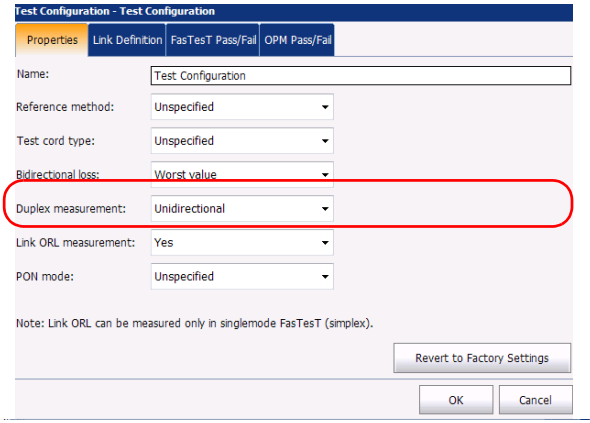

***6.*** Select the type of test cord to force. Selecting Unspecified will let you select the cord type in the reference assistant.



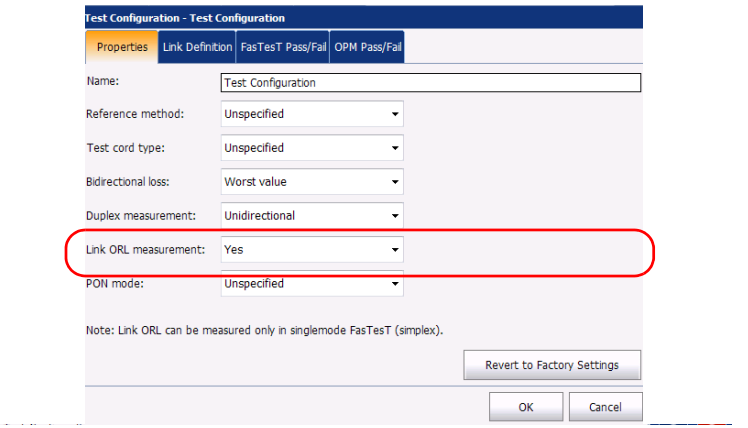
***7.*** If you are setting up a Fiber Certifier unit, select how the bidirectional loss is calculated (worst value or average loss value). In general, the worst value is selected. On OLTS units, the loss is always calculated using the average value.



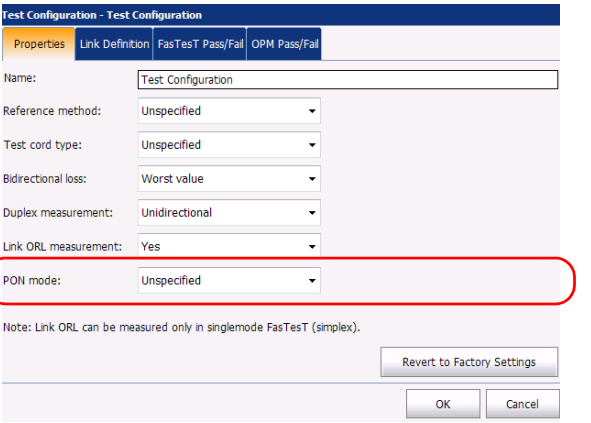

***8.*** If you are setting up a Fiber Certifier unit, select whether the duplex measurement will be unidirectional or bidirectional. This will change how the FasTesT is performed and the results are displayed, depending whether one or both directions are tested.



***9.*** If you are using a 945 series unit, you can enable the ORL measurement to include this type of measurement in your tests.




***10.*** If you want to use the PON mode, select whether the main unit is the one closest to the central office (CO, or OLT) or to the premises (or ONT).




***11.*** Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

# Defining the Link for Your Test (Fiber Certifier)

You can specify a fiber type for the link in your configuration. The available fiber types will differ depending if you have a singlemode or a multimode Fiber Certifier:

| Type | Fiber Core | Comments |
|---|---|---|
| Unspecified | Various | ➤ You will have to chose the fiber type in the **FasTesT** tab of the main window.<br>➤ All of the possible standards are available in the **FasTesT Pass/Fail** tab. |
| OM1 | Multimode 62.5 $\mu$m | Modal Bandwidth: 200-500 MHz·km<br>Fiber Channel Designation: M6<br>Fiber jacket is orange or slate. |
| OM2 | Multimode 50 $\mu$m | Modal Bandwidth: 500 MHz·km<br>Fiber Channel Designation: M5<br>Fiber jacket is orange. |
| OM3 | Multimode 50 $\mu$m | Modal Bandwidth: 1500-2000 MHz·km<br>Laser optimized (VCSEL) at 850 nm.<br>Fibre Channel Designation: M5E<br>Fiber jacket is aqua. |
| OM4 | Multimode 50 $\mu$m | Modal Bandwidth: 3500-4700 MHz·km<br>Laser optimized (VCSEL) at 850 nm.<br>Fiber Channel Designation: M5F<br>Fiber jacket is aqua or violet. |

| Type | Fiber Core | Comments |
|---|---|---|
| OS1 | Singlemode<br>9 $\mu$m | Fiber jacket is yellow. |
| OS2 | Singlemode<br>9 $\mu$m | Low water peak fiber designed for CWDM operation.<br>Fiber jacket is yellow. |

The list of certification standards in the **FasTesT Pass/Fail** tab will be filtered according to the type of fiber selected. To see the complete list of standards, select the unspecified fiber type.

When you select a fiber type in the test configuration (one other than unspecified), the application performs a consistency check relative to the previously selected standards and lets you know if there are problems.

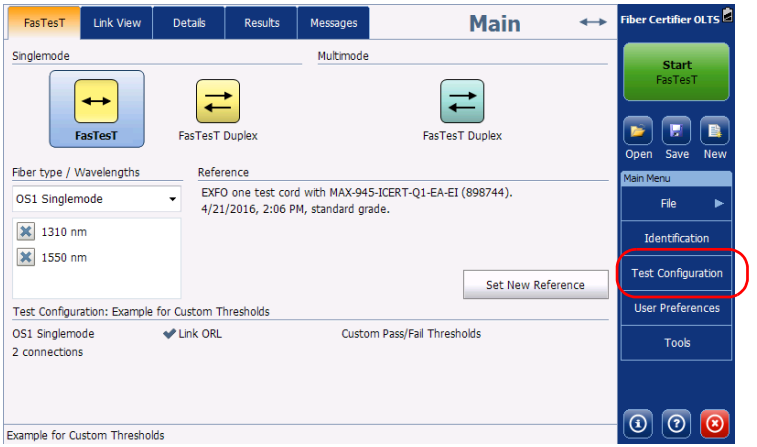
The number of connections and splices affects the threshold calculated when cabling certification standards are selected, or if dynamic custom thresholds are used.

## IMPORTANT

**The number of connections defined on the link is independent from the reference type used. There is always a minimum of two connections on a link.**

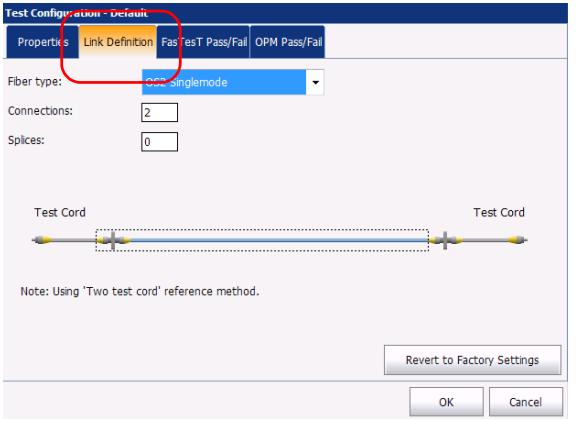
***To define the link for your test configuration:***

1. From the **Main Menu**, select **Test Configuration**.

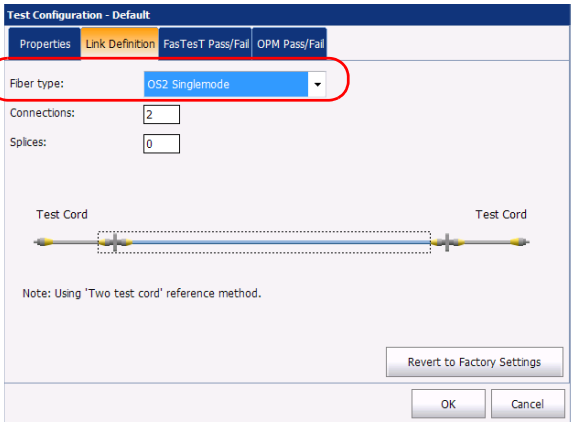



2. Select the configuration you want to edit and tap **Modify**.

***3.*** Select the **Link Definition** tab.

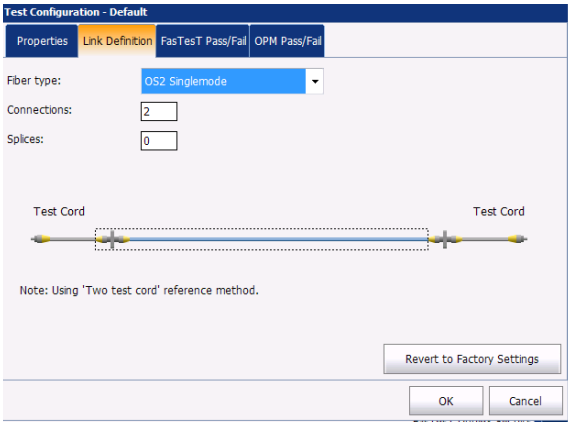



***4.*** Select the fiber type in the list of available choices.



***5.*** If you are using cabling standards or custom dynamic thresholds, you must specify the number of splices and connections on your link. The illustration will be updated accordingly. If there is more splices and connections that can be displayed, a number appears over the link. Depending on the reference method, some connections will not be included in the count:

- One test cord, loopback and no reference: the equivalent value of first and last connections are included in the link loss measurement.
- Two test cords: the equivalent value of one of the connections (either first or last) is excluded from the link loss measurement.
- Three test cords: the equivalent value of the first and last connections are excluded from the link loss measurement.




***6.*** Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

If you select **Unspecified**, the list becomes available in the **FasTesT** tab of the main window for you to select the type.

# Selecting Certification Standards (Fiber Certifier)

The committees and standards you can choose from are grouped by categories. You can select more than one standard and you can select standards from different categories at the same time; the most restrictive values of the selected standards are then used to determine if the test results in a pass or fail status.

Standards are divided into two main categories:

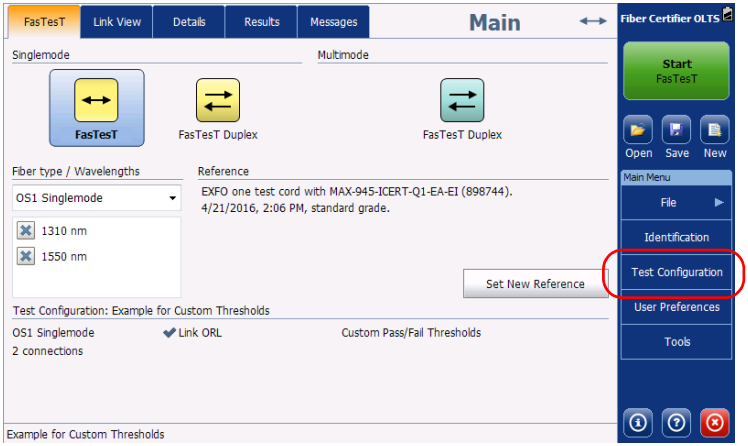
- *Cabling*: Ensures that the connections and splices are made properly and cumulate fewer losses than the normally expected maximum values. The thresholds are adjusted according to the number of connections and splices, and the thresholds also take into account the normal attenuation of the fiber. They can vary from one type of fiber to another and according to the length of the link. These thresholds do not take into account the limitations of specific communication protocols. There are international standards, but also versions that are more regional, such as for Europe, or specific countries. These standards can evolve with time according to technological progresses. It is therefore important to know which standard to refer to, because the thresholds can be different. Some examples of cabling standards include TIA-568, ISO/IEC 14763 and ISO/IEC 11801.
- *Application*: These standards are used to validate that a given link can allow a flow according to a communication protocol. They rest on fixed thresholds, which are maximum link loss and length values. These thresholds do not take into account the link topology (number of connections and splices). A short link could, for instance, allow more connections than a longer link. The important factor is to remain within the specified fixed thresholds. Examples of application standards include Ethernet and Fibre Channel.

When a cabling standard is selected, you will need to manually provide the number of connections and splices to correctly calculate the link loss budget (for more information, see *Defining the Link for Your Test (Fiber Certifier)* on page 65 for details). The more there are connections and splices, the greater the link loss budget is.

Predefined standards are available for you to select, or you can create a custom setting.

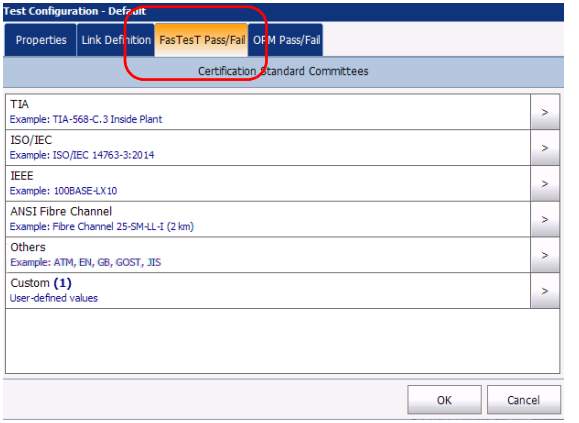
### *To select predefined certification standards:*

1. From the **Main Menu**, select **Test Configuration**.




2. Select the configuration you want to edit and tap **Modify**.

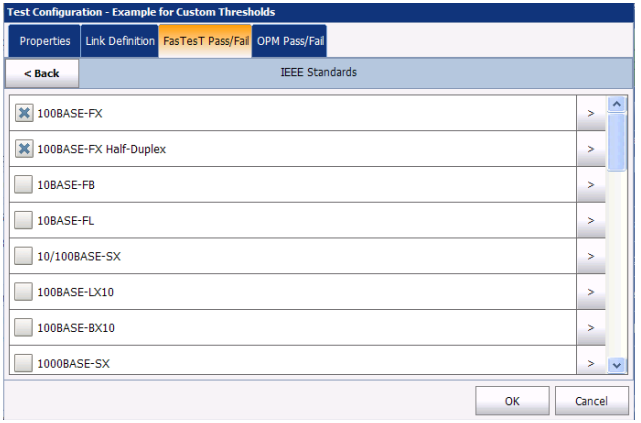
***3.*** Select the **FasTesT Pass/Fail** tab.




***4.*** In the available items of the configuration, select the certification committee you want and tap the > button at the end of the row.

***Note:*** *Depending on the category you select, you may have to tap* > *again to access the list of available certification types.*

5. Select which items of this certification type you want to include.



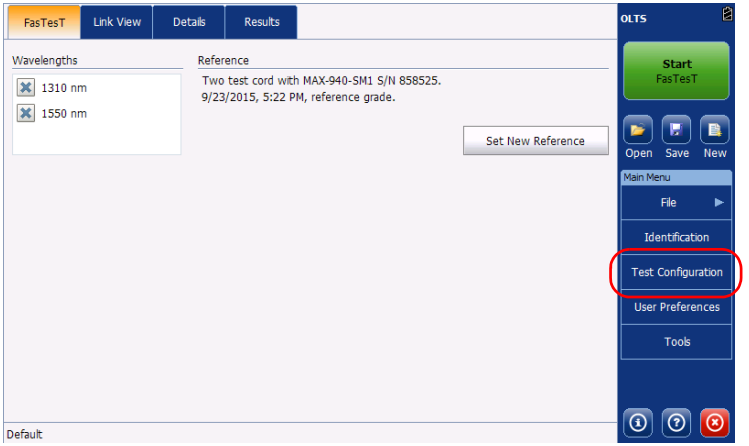

You can view the details for each certification type by tapping the > *at the end of the corresponding row. You cannot modify the certification information.* Tap **OK** when you are done to return to the list of certifications.

6. Tap **Back** to go to the previous level and select other standards as needed.

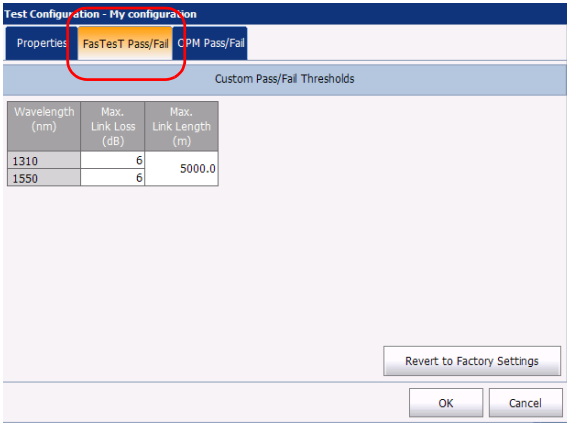
7. Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

### *To create custom thresholds (OLTS):*

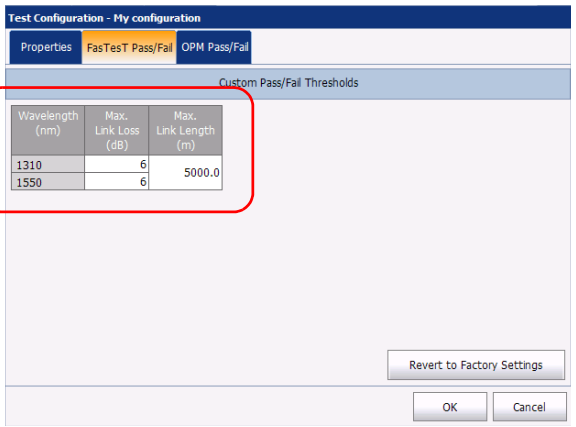
1. From the **Main Menu**, select **Test Configuration**.




2. Select the configuration you want to edit and tap **Modify**.
3. Select the **FasTesT Pass/Fail** tab.



***4.*** Enter the values you want to use as thresholds in the corresponding cell tables.




The fiber type, which is defined in the link definition of the configuration (see *Defining the Link for Your Test (Fiber Certifier)* on page 65 for details), is indicated in the window. If you have selected unspecified as the fiber type, you can select it here to set the thresholds.

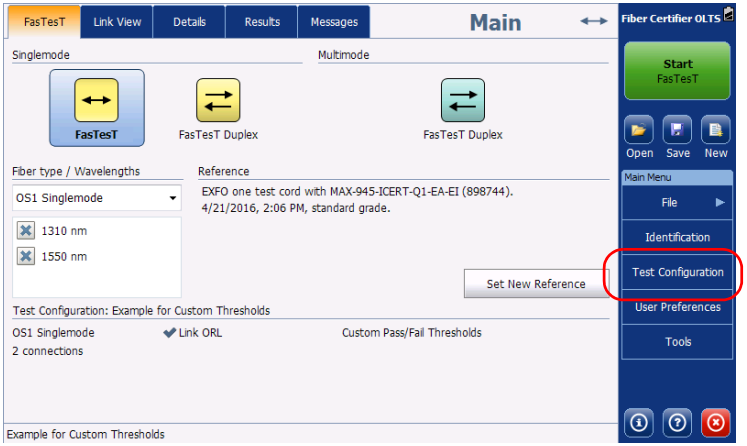
**IMPORTANT**

**An empty cell in the threshold table WILL NOT be considered. If you want to set zero as a threshold value, enter 0 in the corresponding cell.**

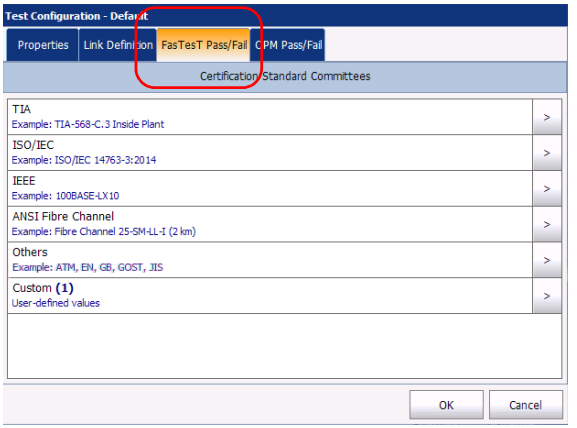
***5.*** Tap **Back** to return to the previous menu and set other configuration items. Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

### *To create custom certification standards (Fiber Certifier):*

1. From the **Main Menu**, select **Test Configuration**.

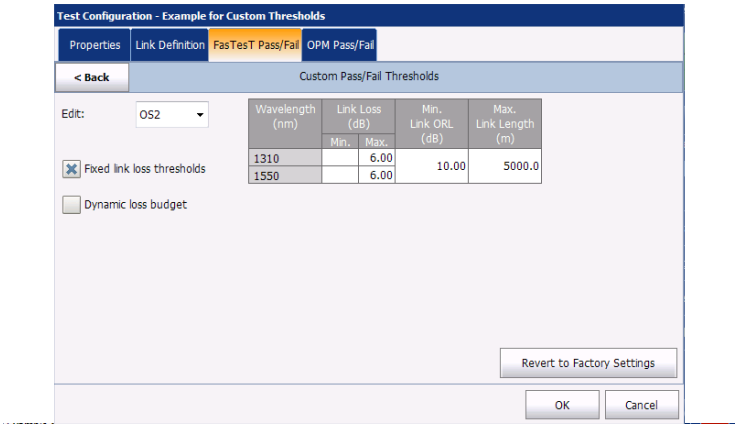



2. Select the configuration you want to edit and tap **Modify**.
3. Select the **FasTesT Pass/Fail** tab.



4. In the available items of the configuration, select the Custom certification type and tap the > button at the end of the row.
5. Tap the > button at the end of the row again to access the custom threshold window.
6. Select the type of loss budget that fits your needs according to the chosen fiber type:

   ➤ Fixed: You can set the minimum and maximum link loss for each wavelength, the maximum link ORL and the maximum link length.

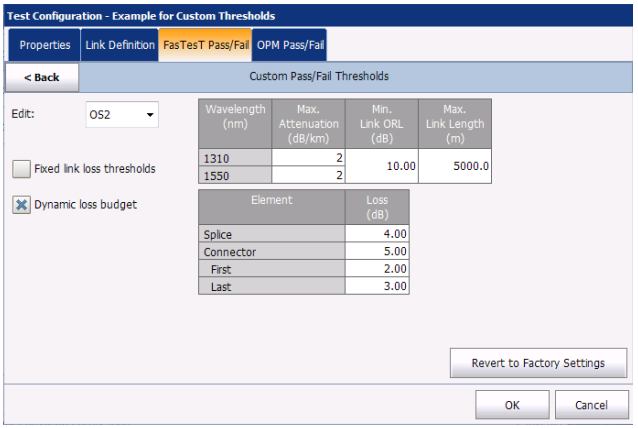



***Note:*** *The link ORL is available for singlemode fibers only.*

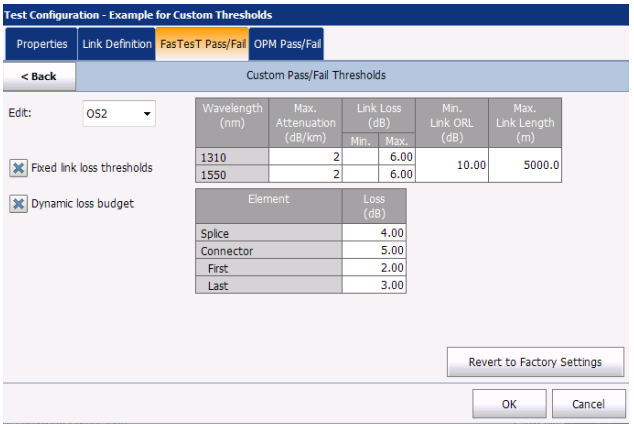
➤ Dynamic: The dynamic loss budget is calculated according to the link definition and the fiber length. The maximum attenuation, as well as the loss values for the splices, connections, and the first and last connections will all be used to calculate the loss budget.

If there is no specific value for the first or last connector, the application will use the value specified for connectors in general.

If no value is specified for the connectors or splices and that the link definition contains any, the application will not be able to determine the threshold, and therefore, the pass/fail status of the link.



➤ You can also activate both options at the same time. The more restrictive thresholds of the two type will be considered when testing.




When the fiber type is specified in the link definition (see *Defining the Link for Your Test (Fiber Certifier)* on page 65 for details), you can edit thresholds for this fiber type only. If you have selected unspecified as the fiber type, you can specify threshold values for each available fiber type.

Enter the values you want to use as thresholds in the corresponding cell tables.

**IMPORTANT**

**An empty cell in the threshold table WILL NOT be considered. If you want to set zero as a threshold value, enter 0 in the corresponding cell.**

***7.*** Tap **Back** to return to the previous menu and set other configuration items.

***8.*** Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

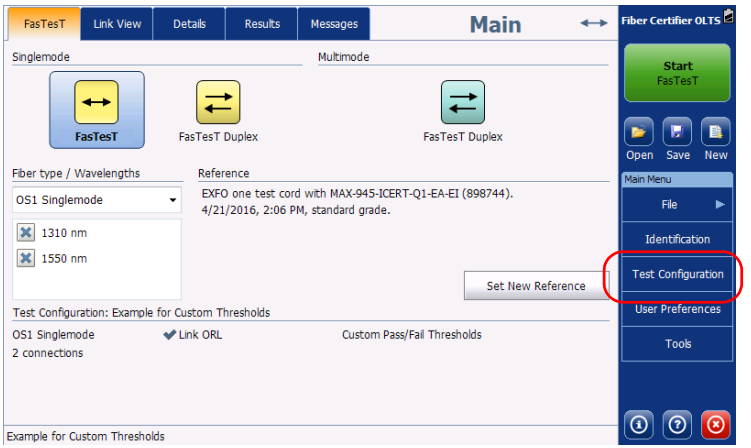
# Setting Custom Power Meter Thresholds

You can set thresholds for the maximum and minimum power, as well as the loss value for each wavelength you have set in the user preferences.

***Note:*** *You must have selected wavelengths for your power meter as explained in* Selecting the Wavelengths *on page 113 to be able to set the thresholds.*

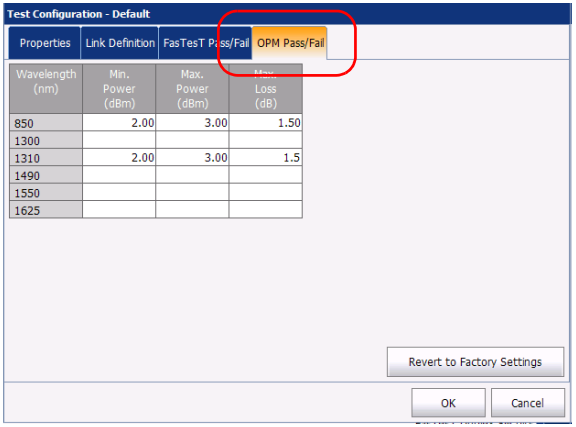
***To set the power meter threshold values:***

1. From the **Main Menu**, select **Test Configuration**.




2. Select the configuration you want to edit and tap **Modify**.

***3.*** Select the **OPM Pass/Fail** tab.




***4.*** Enter the desired values for the minimum and maximum power, as well as the maximum loss threshold values for each wavelength.

***5.*** Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

# Modifying a Test Configuration

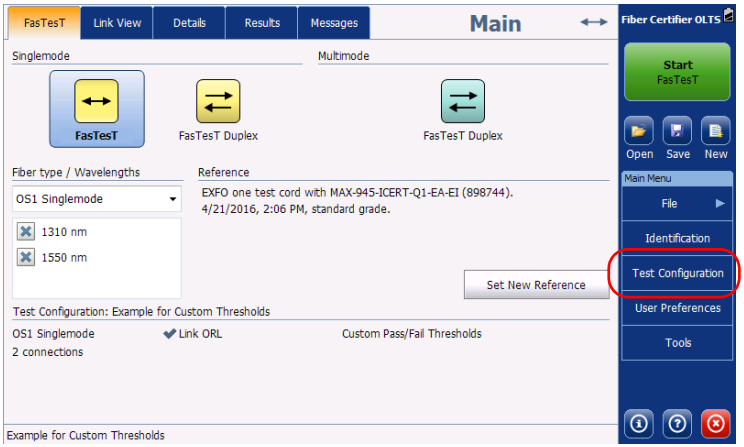
The test configurations you have created or imported can be modified to better fit your requirements.

***Note:*** *You cannot edit standard test configurations.*

***Note:*** *Depending on the type of unit or measurement, some configuration items may be unavailable.*

***To edit a test configuration:***

1. From the **Main Menu**, select **Test Configuration**.




2. Select the configuration you want to edit and tap **Modify**.
3. Change the criteria as required. For details, see *Creating a Test Configuration* on page 57.

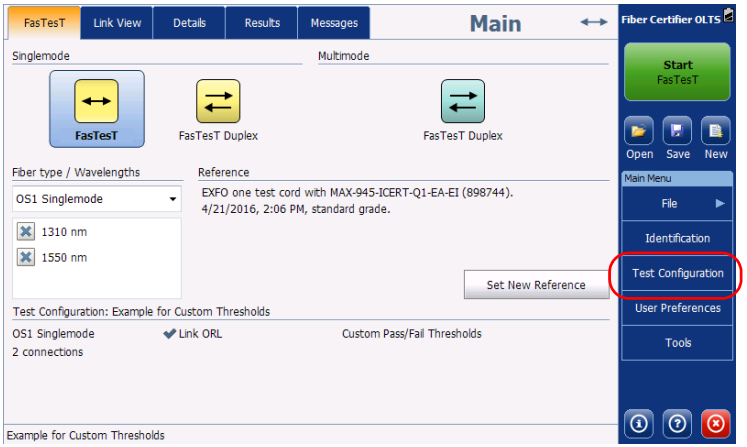
# Importing a Test Configuration

You can import test configurations from other units to facilitate consistent testing.

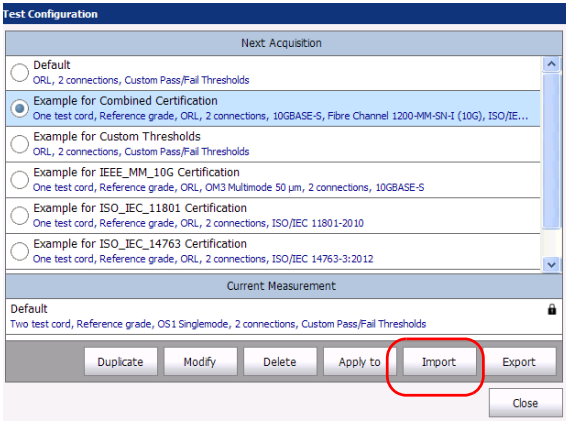
***Note:*** *You can only import one test configuration at a time.*

***To import test configurations:***

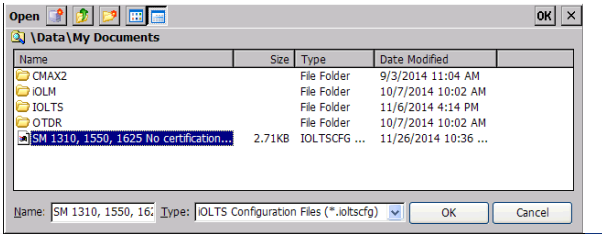
***1.*** From the **Main Menu**, select **Test Configuration**.



***2.*** From the **Test Configuration** window, tap **Import**.




***3.*** Select the file you want to import.




***4.*** Tap **OK** to close the window. The imported configuration is added to the list automatically.

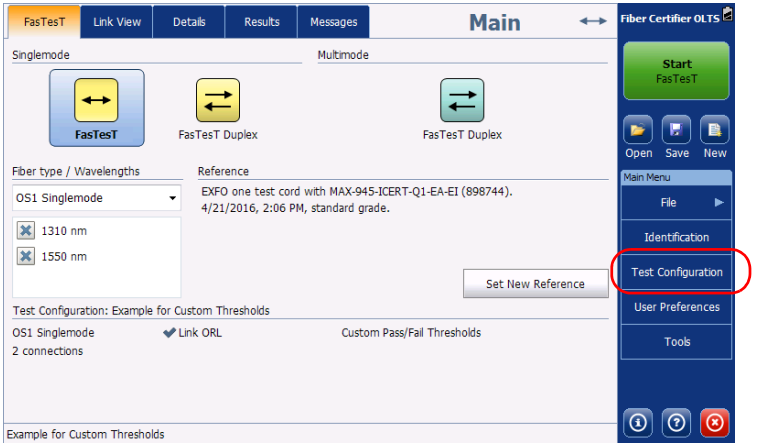
# Exporting a Test Configuration

Test configurations can be exported from one unit to another to facilitate consistent testing.

***Note:*** *You can only export one configuration at a time.*

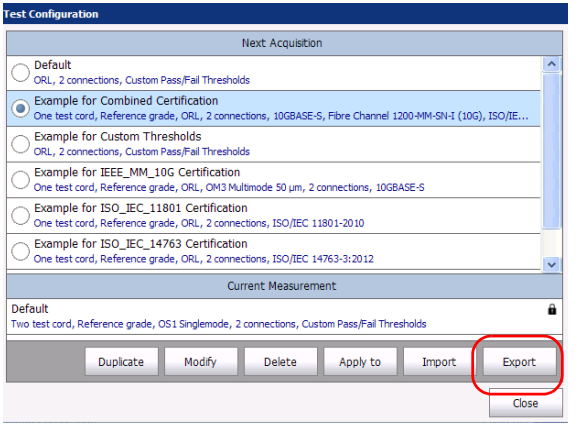
***To export test configurations:***

1. From the **Main Menu**, select **Test Configuration**.

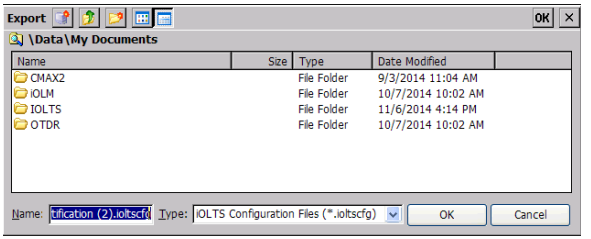



2. From the **Test Configuration** window, select the test configuration you want to export.

***3.*** Tap **Export**.




***4.*** Select the folder where you want to export your file.




***5.*** If desired, modify the file name.

***6.*** Tap **OK** to close the window.

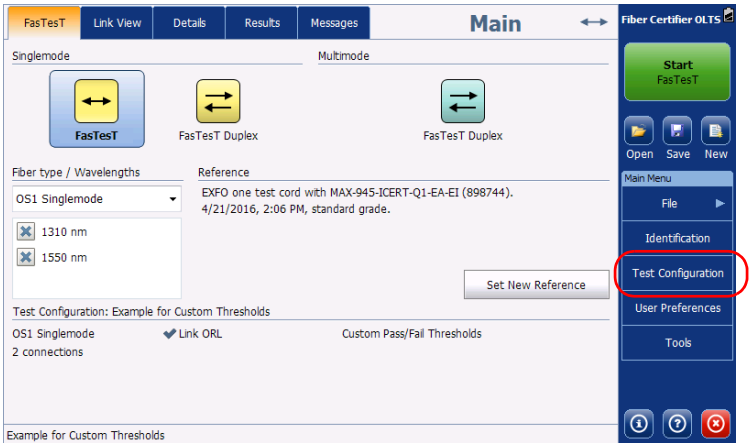
# Deleting a Test Configuration

You can remove test configurations from your unit to keep only those relevant for your work.

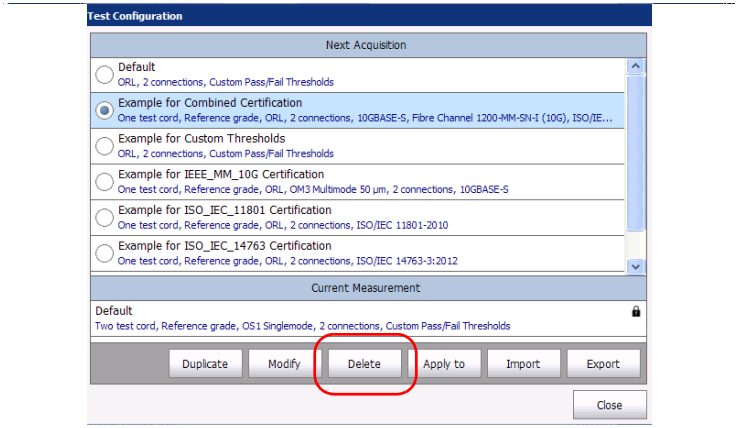
***Note:*** *You cannot delete standard test configurations.*

***To delete a test configuration:***

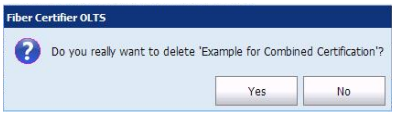
1. From the **Main Menu**, select **Test Configuration**.



***2.*** Select the row corresponding to the configuration you want to remove, then tap **Delete**.




***3.*** Confirm your choice.



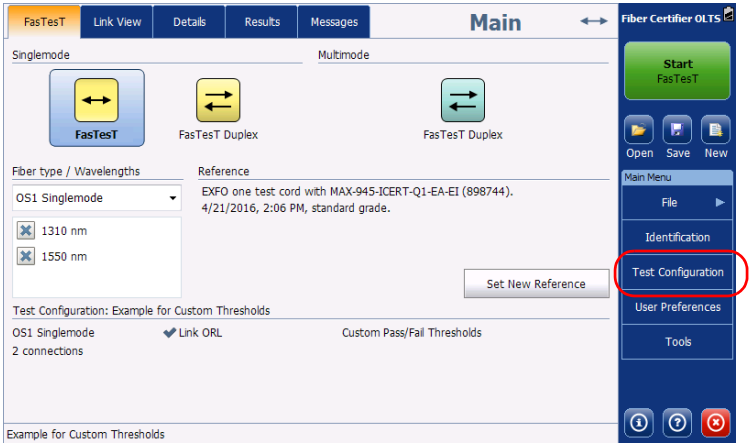
# Applying a Test Configuration to Measurements in Memory

You can apply an existing test configuration to the measurements you have currently stored in memory. This is particularly useful if the wrong standard or test configuration was selected to do FasTesTs, or if the link was not defined properly, as you will not need to redo the tests again.

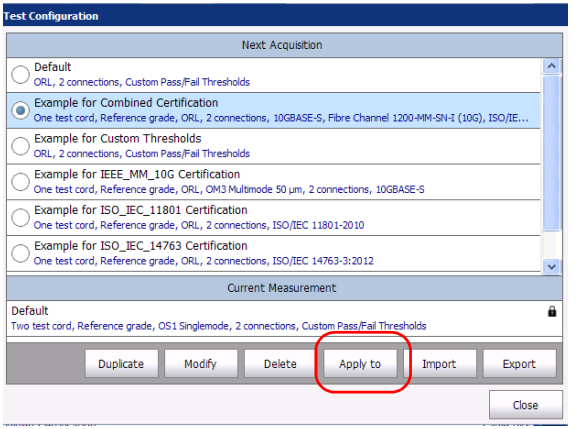
***Note:*** *The configuration will not be applied to all the files you have saved, but rather to the measurements listed in the* ***Results*** *tab for the currently opened file.*

***To select a test configuration and apply it to the current measurements:***

1. From the **Main Menu**, select **Test Configuration**.

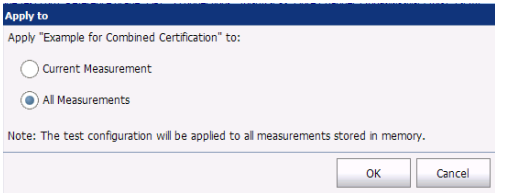


2. Select the row corresponding to the configuration you want to use, then tap **Apply to**.




3. Select whether you want to apply the configuration to the currently selected measurement only, or all of the measurements in the list, then tap **OK**.

***Note:*** *If you only have one measurement currently stored in memory, the* All Measurements *selection is not available.*



# 5 Analyzing Results

You can view the results for your test in different ways:

- Link view: shows a visual representation of the fibers you are currently testing, with the general pass/fail information.
- Detailed view: indicates the complete information for each measurement, including loss in each direction for bidirectional measurements, reference values, verification values, link length, reference method, reference date and time, and test cord type.
- Results list: this is a global view of all of the measurement you have taken to help you access specific measurements quickly. All of those measurements are gathered into a single file. You can retest a fiber, or delete unwanted results from the list.

## Storing Measurements in the List

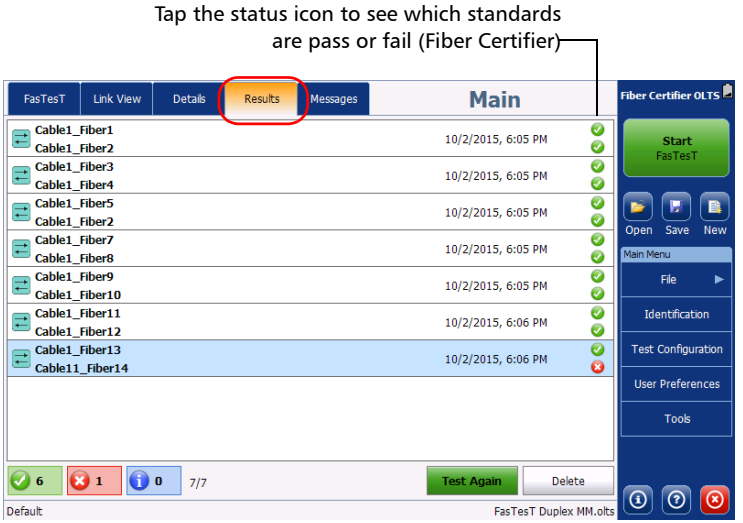
An OLTS/Fiber Certifier file can be composed of multiple measurements performed on different fibers. The measurements can be either automatically added to the list, or you can add them manually. For more information on how to set the way that the items are stored to the list, see *Setting up User Preferences* on page 16.

# Viewing Measurements in the Results List

The result list shows a summary of each measurement, with their statuses. The total number of measurements is indicated, as well as the global pass/fail status for all measurements.

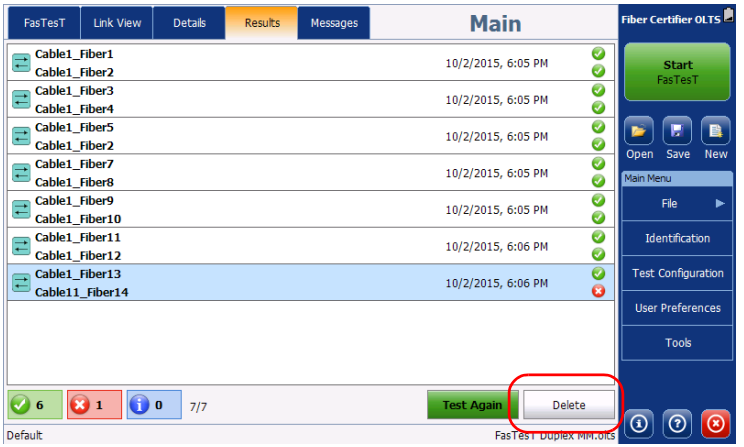
***To view the results list:***

From the main window, select the **Results** tab.



***To remove a measurement from the results:***

1. In the **Results** tab, select the measurement to remove.
2. Tap **Delete**.




3. Confirm your choice.

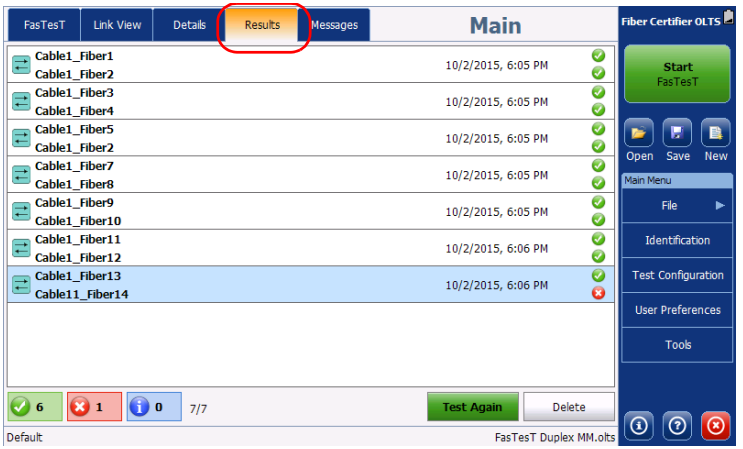
# Retesting Fibers

Sometimes, you might have to retest fibers. The application will use the same test configuration and identification information to perform the test. Retesting a fiber will be done using the most recent reference taken.

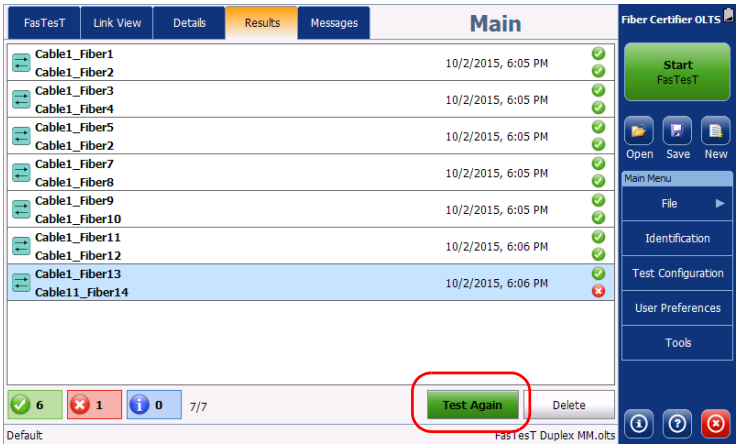
***Note:*** *You must use the same reference method and measurement type to be able to retest a fiber. If you are opening a file that is coming from another unit, the wavelength of that measurement must be supported by the unit used for the retesting.*

***To retest a fiber:***

1. From the **Results** tab, select the fiber you want to test again by taping on it once.

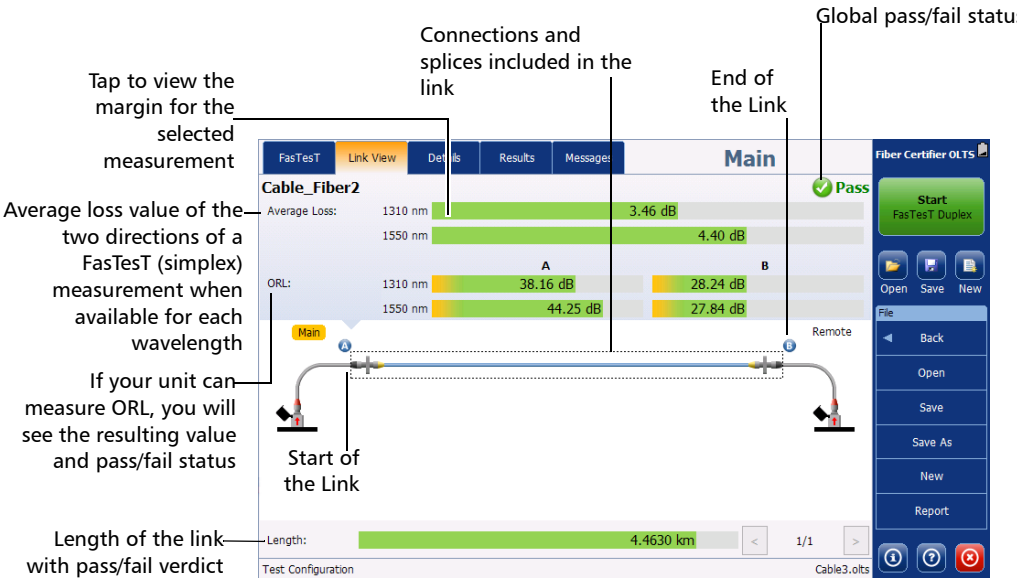


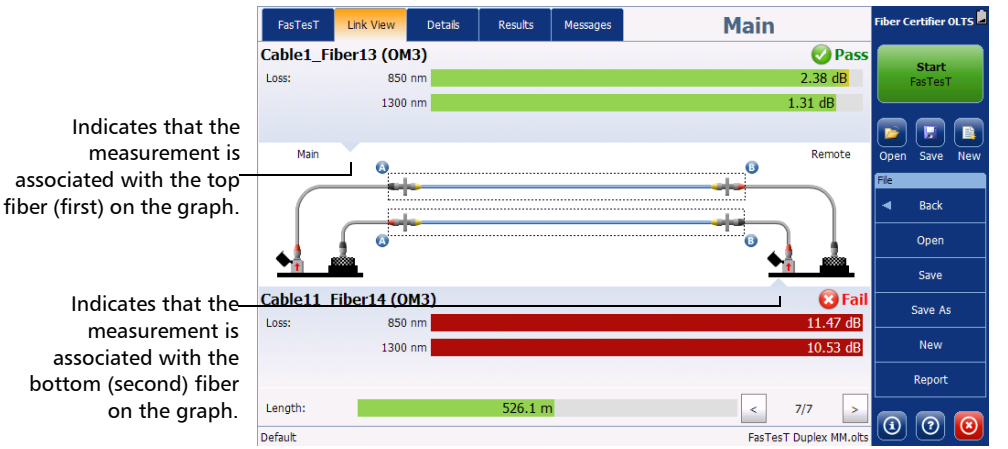
***2.*** Tap **Test Again**.



# Viewing Results in the Link View

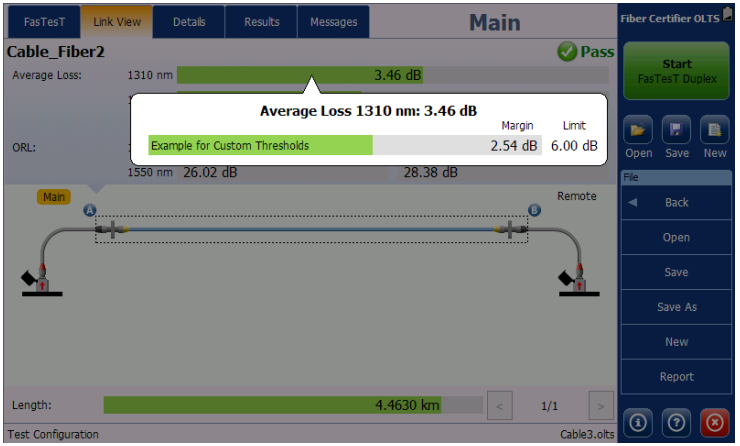
The link view is a visual representation of the fiber you are currently testing.



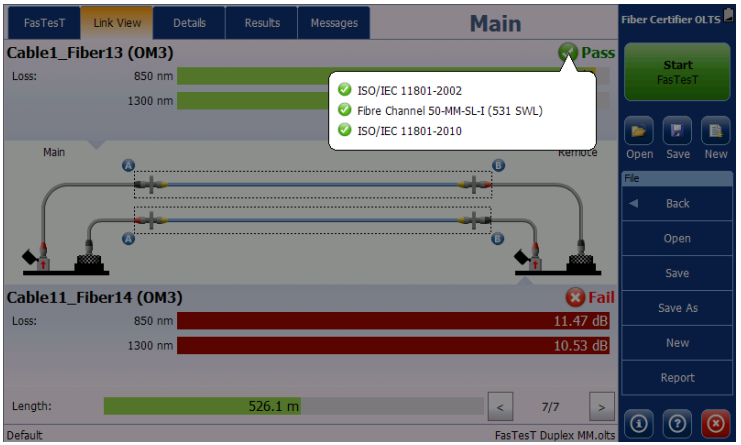



***Note:*** *Some negative length and loss values can still have a status of pass because they are within the tolerance values. A negative length or loss value that is beyond the expected thresholds will prevent a pass/fail status to display on the selected thresholds and standards. Taking a new reference can help to solve problems related to negative values.*

To view the margin of a measured value compared with the thresholds, tap on the value. A tooltip appears and provides you with more information, such as the threshold and the margin.

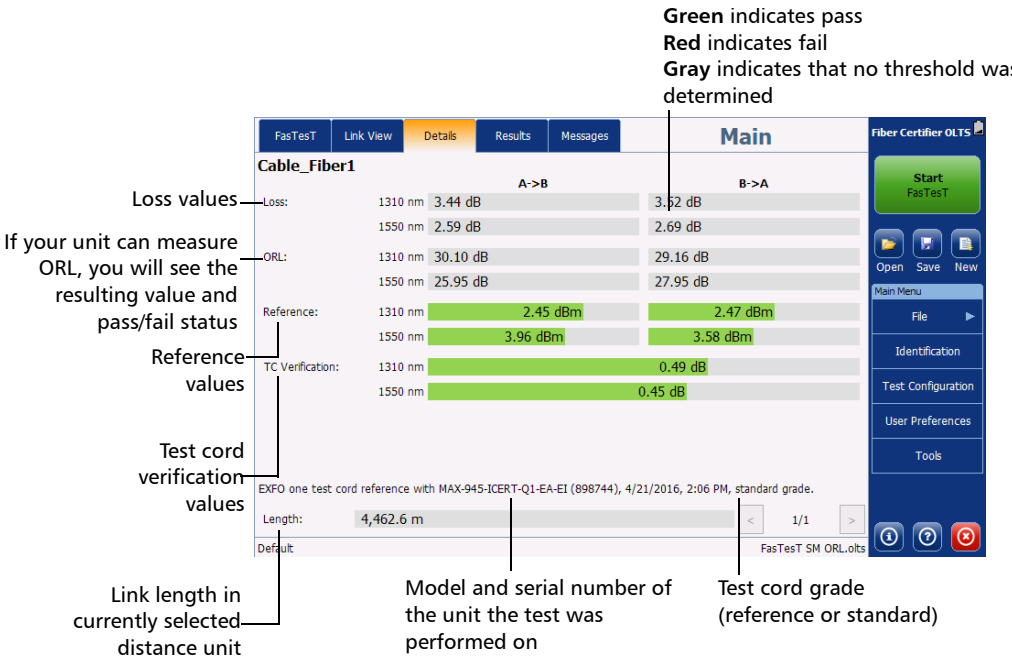


In the case of Fiber Certifiers, if you have selected more than one standard, you can view which ones have a pass or fail status by tapping on the status icon of the desired measurement.



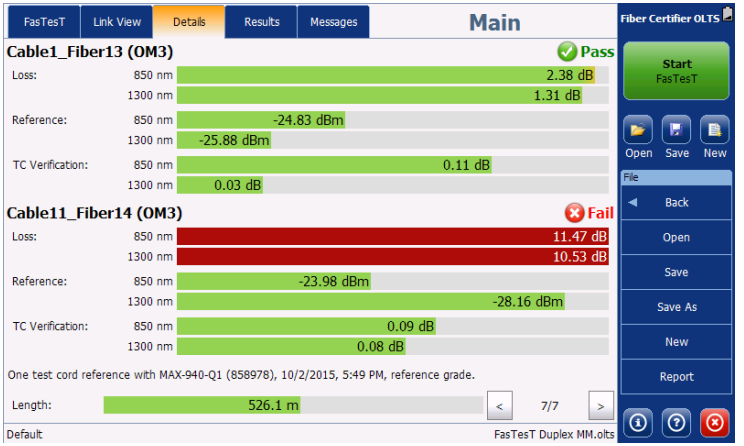
# Viewing Results in Details

You can view the detailed information for your measurements in one location.

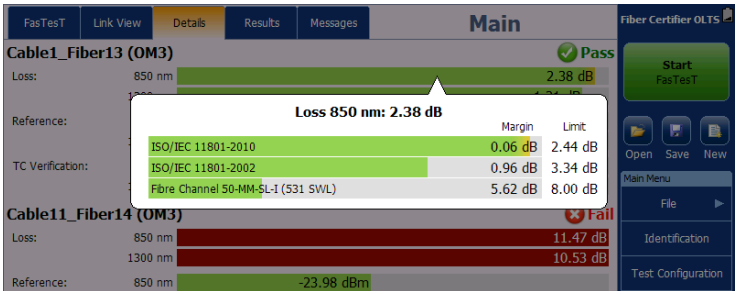


***Note:*** *In the case of bidirectional measurements, the pass/fail status is based on the averaged value for both directions. Thus, if there is a loss outside the threshold in one direction, but the average with both directions is still within the threshold, the status will be set globally to pass.*

Each directional measurement has its own values for loss, reference and test cord verification.




To view the margin of a measured value compared with the thresholds, tap on the value. A tooltip appears and provides you with more information, such as the threshold and the margin.

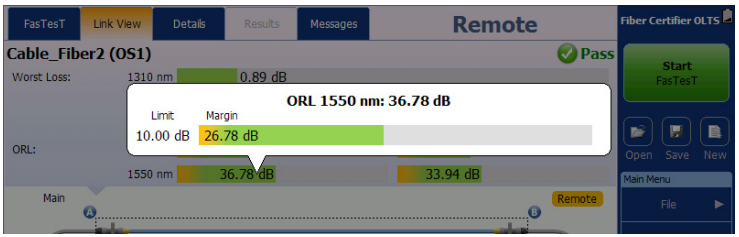


# Understanding ORL Results

Optical return loss (ORL) is the total effect of multiple reflections and scattering events within a fiber-optic system. ORL results are interpreted differently from loss results: a minimum return loss is expected. Results below the pass/fail threshold will show as a fail.

| Condition | Pass/Fail Status |
|---|---|
| No minimum threshold is defined | Undetermined |
| ORL value is not available | Undetermined |
| ORL value is higher than sensitivity but lower than the minimum threshold | Undetermined |
| ORL value is smaller or equal to sensitivity and higher or equal to minimum threshold | Pass |
| ORL value is higher than sensitivity and higher or equal to the minimum threshold. | Pass |
| ORL value is lower than minimum threshold. | Fail |

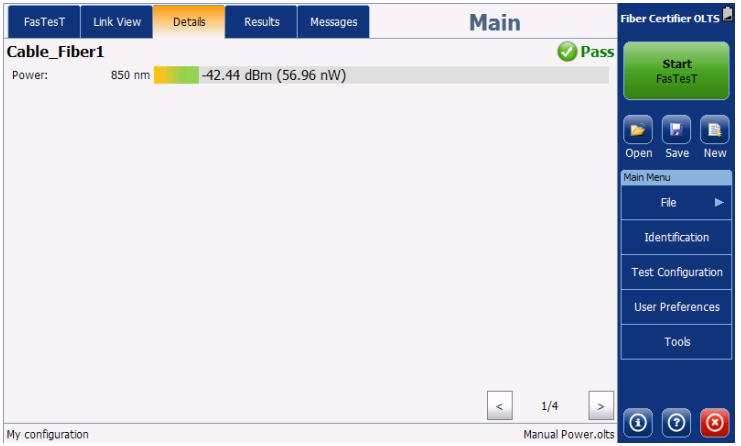
At any time if you tap on one of the results, you can see the margin meter for this result, that is, the margin according to the set threshold.



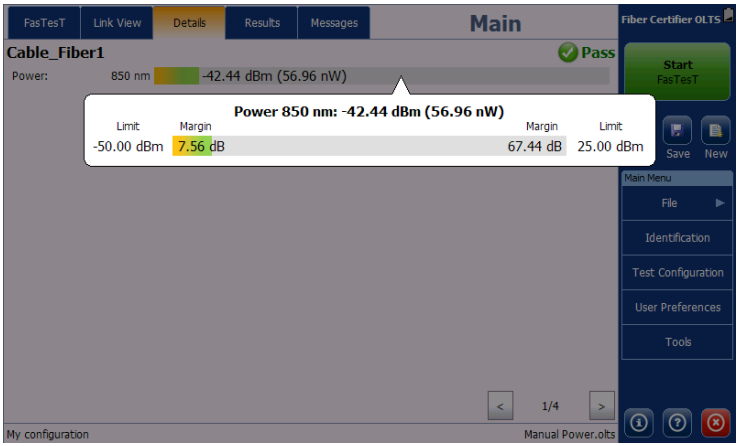

ORL measurement are done for each direction. If you see an ORL value that is much lower in one direction compared to the other, it can be a good indication of the faulty location (connector) that is closer to location A or B.

# Understanding Power Meter Results

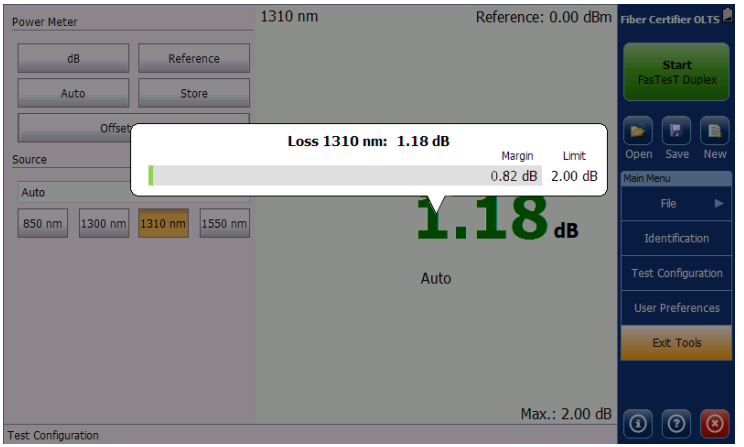
In the **Details** tab, you can see the stored results for your power meter measurements.




At any time if you tap on one of the results, you can see the margin meter for this result, that is, the margin according to the set thresholds. The graphic indicator will show you the result status according to the minimum threshold to the left and the maximum threshold to the right if any was set.



You can also see the margin meter when you tap in the power meter window.



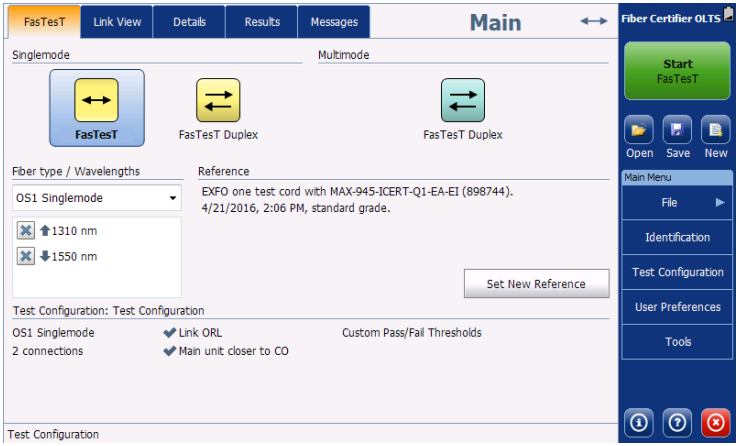
# Working with the PON (FTTx) Mode

You can set your units to better reflect the reality of testing PONs. If your unit is set for singlemode wavelengths, you can enable the PON display for them.

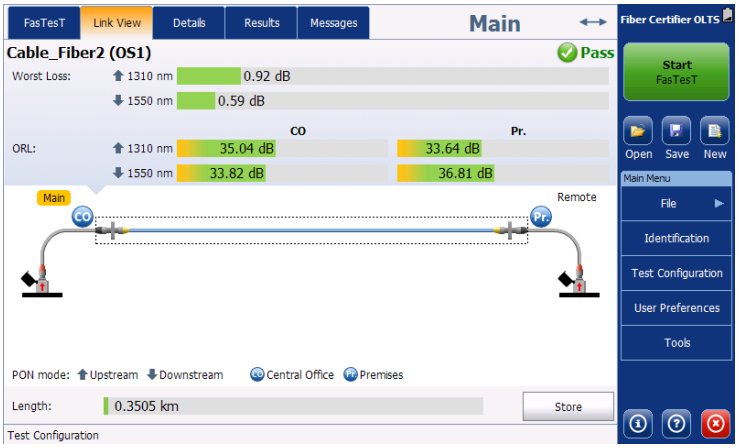
The PON display is enabled when you set up your test configuration (see *Setting the Test Configuration Properties* on page 60 for details). This is where you can set whether the main unit is closest to the central office (CO) or the premises.

***Note:*** *The CO and premises tags are not linked with the direction of the tests.*

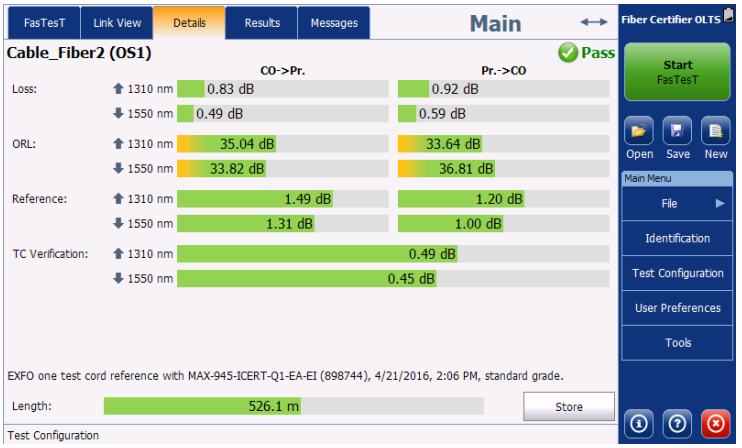
In the **FasTesT** tab, you will notice arrows indicating the wavelengths used for upstream and downstream flow. The information about the test configuration indicates whether the main unit is closer to the CO or to the premises.



In the **Link** tab, you can see the legend for the stream direction and where the CO and the premises are located.



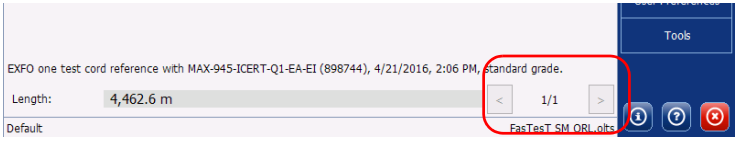

The **Details** tab also displays the stream direction and locations.



# Navigating Through the Measurements

When there are more than one measurements, you can go from one to the other easily using the navigation tool at the bottom of the **Link View** and **Details** tabs.

***Note:*** *You must store the current measurement to be able to navigate through the others.*

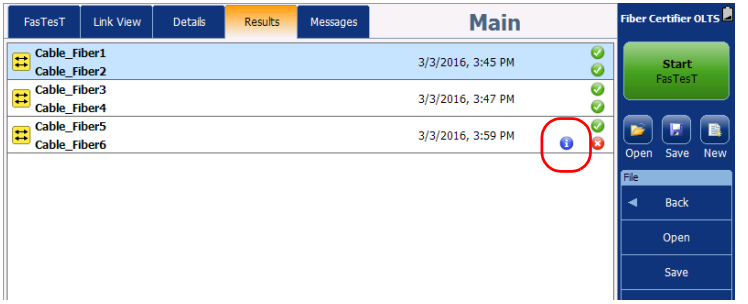



# Viewing Diagnostics

When possible problems, or ambiguous situations occur during tests, the application will provide diagnostics to help you understand what the problem could be and take the appropriate action.

***To view the diagnostics:***

From the **Link View**, **Details** or **Results** tabs, tap on the icon next to the result you want to see.



# Sending and Receiving Messages

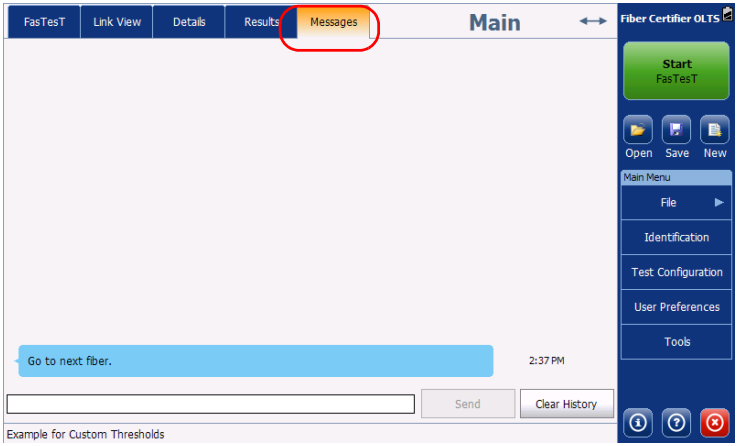
You can communicate directly to the other unit using live messaging. Both the main and remote units can send messages. The tab will display 50 messages, then remove the oldest message in the list as a new one comes in.

***Note:*** *On FTB platforms, the list of sent and received messages are proper to each Windows user.*

***Note:*** *The messaging feature is not available when in FOT-930 compatibility mode.*

***To send a message to the other unit:***

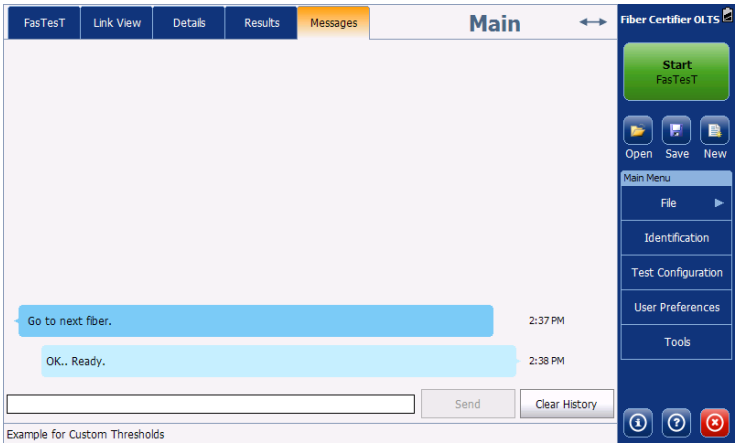
***1.*** From the main window, select the **Message** tab.



2. Type in your message in the corresponding box, then tap **Send**.

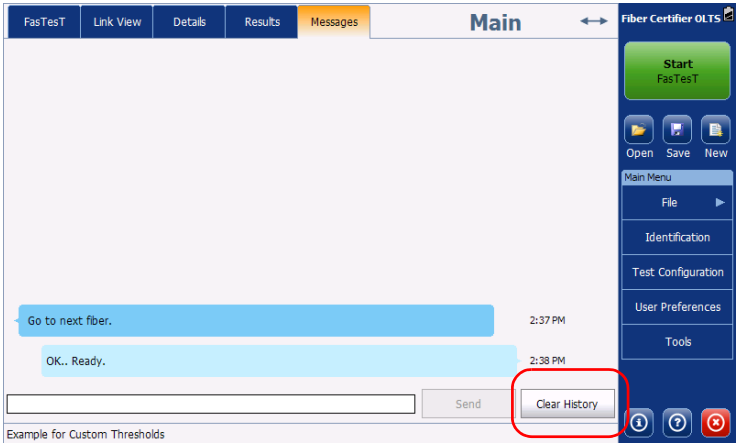
   The message appears instantly on the other unit. If the operator on the other unit is in the **Message** tab, they will see the message there; if they are in another tab, the message appears at the top of the screen and a sound notification is heard.

***Note:*** *If you want to repeat a message that is already in the conversation history, simply tap on it, then tap* ***Send****.*



***To clear the local history of messages:***

From the Message tab, tap **Clear Histo**ry.



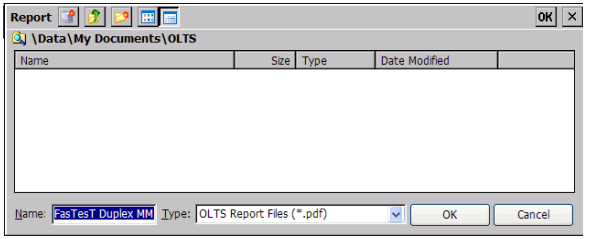

***Note:*** *The history of the other unit is not cleared.*

# Managing Reports

You can have reports created in PDF or XML format for your test results.

***To create a report:***

1. From the **Main Menu**, tap **File**, then **Report**.
2. If desired, change the format of report.
3. If desired, change the location where you want to save your report.

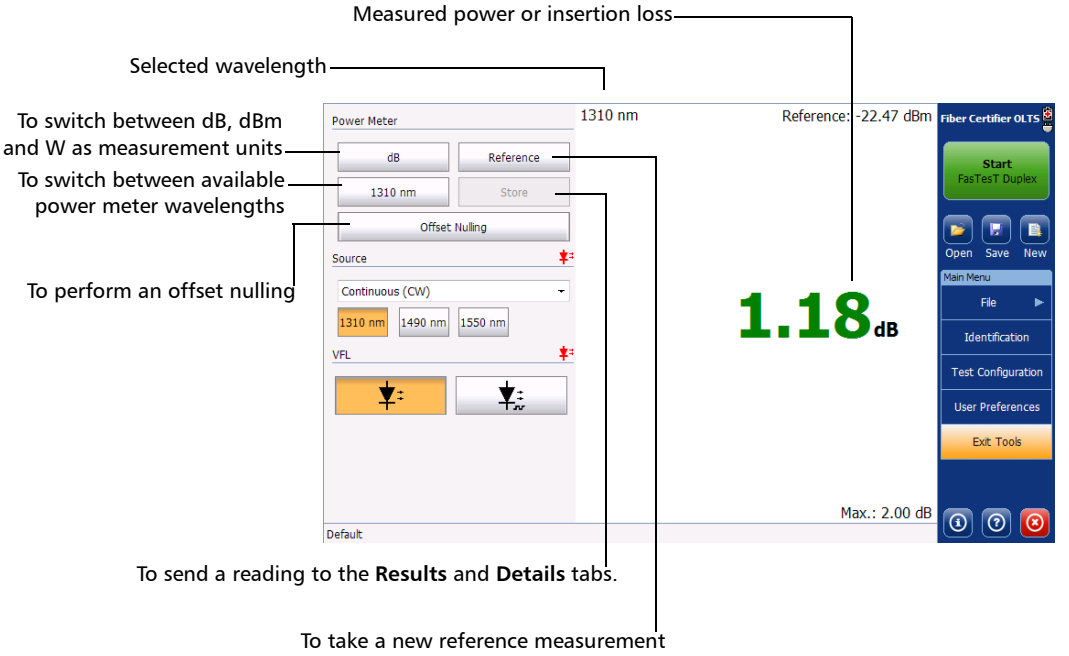



4. Enter a name for your report.
5. Tap **Save** to save the report.

# 6 Using Tools

Your unit is equipped with a power meter and a source. It can also be equipped with an optional VFL.

## Using the Power Meter




### Selecting the Power Meter to Use (MaxTester Units Only)

If you are working with MaxTester units, they may be equipped with two power meters:

- InGaAs: This is the power meter that is included directly on your OLTS/Fiber Certifier.
- High power (GeX): This is the power meter that can be optionally included on the MaxTester unit.

***Note:*** *If you are working with an FTB platform and the latter is equipped with a power meter, you can control it through the platform's application.*

If there are two power meters, you will have to choose which one you want to use. You can also set the default power meter you want to use automatically.

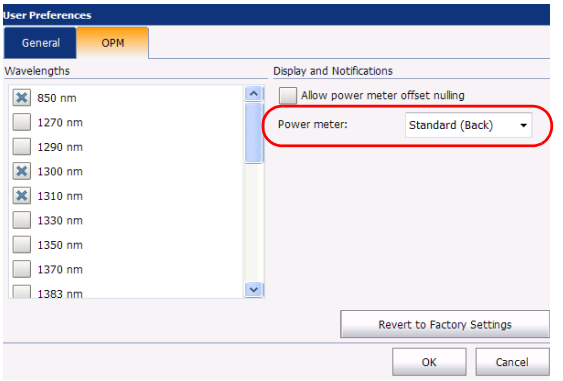
***To select the power meter from the Tools window:***

When you start the power meter application, select the power meter you want to use.

***Note:*** *If you want to retain this selection for future sessions, select* ***Do not show this message again****.*

***To select the power meter in the Settings window:***

1. From the main window, tap **User Preferences**.
2. Select the **OPM** tab.
3. Select which power meter you want to use in the list of available choices.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

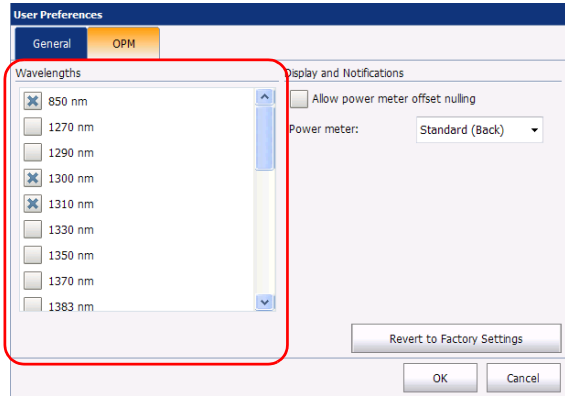
## Selecting the Wavelengths

You can select which wavelengths are available when you are using the power meter on your unit.

***Note:*** *On FTB platforms, the selected wavelengths are saved for each Windows user, for each module (determined by the serial number).*

***To select the wavelengths:***

1. From the main window, tap **User Preferences**.
2. Select the **OPM** tab.
3. Select the wavelengths in the list of available choices.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

## Nulling Offsets

Temperature and humidity variations affect the performance of electronic circuits and optical detectors, which can offset measurement results. To compensate for this offset, the unit is equipped with an offset nulling function.

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.

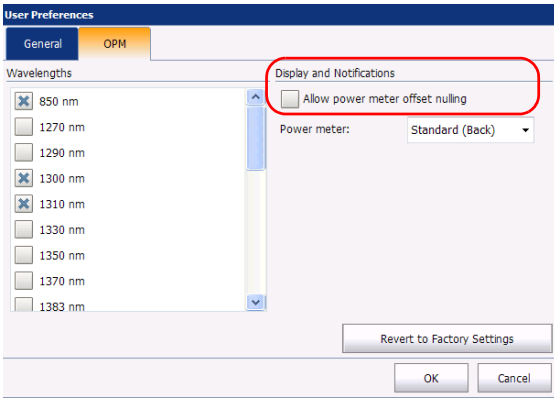
**IMPORTANT**

**Light must not reach the detector when nulling offsets. Use either an EUI, protective screw cap or a soft rubber cover.**

Since the offset nulling is not required under normal condition, it is hidden by default. To see and use offset nulling, you must enable the it in the user preferences.

### *To enable the offset nulling:*

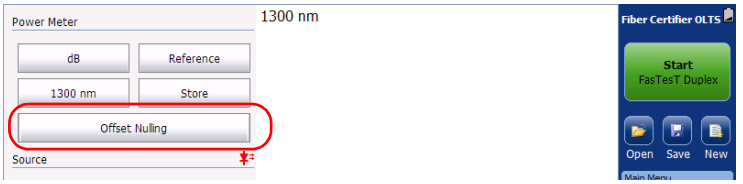
1. From the main window, tap **User Preferences**.
2. Select the **OPM** tab.
3. Enable the corresponding option by tapping on it.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

### *To perform an offset nulling:*

1. Make sure that the offset nulling option is enabled in the general settings, as explained above.
2. Tighten the protective cap on the power meter port.
3. From the main window, tap **Tools**.
4. Tap **Offset Nulling**.



## Setting Reference Values on Your Power Meter

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

You can set a reference value for each wavelength. A reference value remains in memory until a new one is stored at the same wavelength.

If the source and power meter you are using has auto-wavelength or auto-switching capacity, you can take the reference value automatically for each wavelength as well.

***Note:*** *On FTB platforms, the reference is associated with the module's serial number and not the user who performed it. Therefore, it will still be valid if another user logs on and uses that same module.*

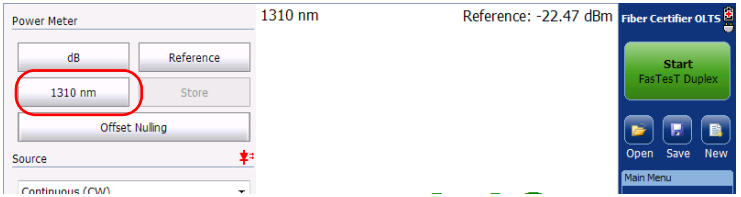
***To set reference values to use in Reference mode:***

1. Check your fibers and clean them properly.
2. Using the proper adapter and test cords, connect a light source to your power meter.
3. Tap **Tools**.

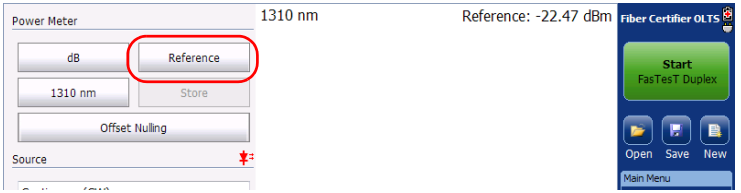
***4.*** Select the wavelength in the list. Activate the source at the same wavelength.

OR

If you want to use the auto-wavelength or auto-switching mode, enable it on the source, then select **Auto** in the wavelength list (for more information on the auto-wavelength or auto-switching mode, see *Measuring Power or Insertion Loss* on page 118). The power meter will automatically switch to the auto mode as well.




***5.*** Tap **Reference** to save the current power value as the new reference. It will appear on the upper-right corner of the data display. In auto-switching mode, the reference is taken automatically for several wavelengths. If you are not in dB/loss mode at this point, the switch will be made automatically.



## Measuring Power or Insertion Loss

Measuring absolute power or link (insertion) loss is done the same way, except for the referencing step. You can take power or insertion loss measurements and save them for further analysis.

**IMPORTANT**

**If you intend to take measurements with a very low power level using the built-in power meter, make sure that your testing conditions are optimal to ensure the best results (for example, do not use the VFL).**

You can either perform measurements manually and select each wavelength yourself, or you can use the automatic mode of your source, if the model allows it.

***To perform power or insertion loss measurements:***

1. From the main window, tap **Tools**.
2. If necessary, perform an offset nulling (see *Nulling Offsets* on page 114).
3. Check your fibers and clean them properly.
4. For insertion loss measurements, reference your power meter to a light source (see *Setting Reference Values on Your Power Meter* on page 116), then deactivate the light source.

5. If you have used a single reference test cord, disconnect it *from the power meter port only*, then attach a second reference test cord to the power meter.

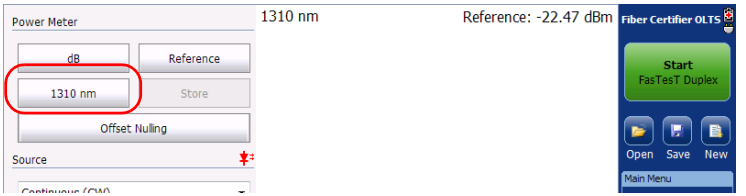
   OR

   If you have used two reference test cords, disconnect both of them at the bulkhead.

## IMPORTANT

**In auto mode, there is a small delay (about 2 seconds per wavelength) allowed for refreshing the values. When switching from one fiber to another, wait for these few seconds to make sure that the measurement you are reading is not a residual measurement from the previous fiber.**

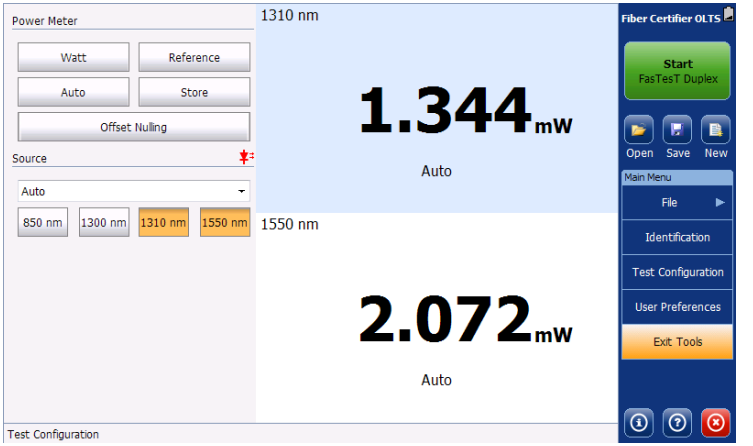
6. Using bulkhead adapters or the system patch panels, connect a fiber under test to a test cord attached to the light source and power meter.
7. If you have not done it already when you took a reference, set the list to select a wavelength. Activate the source at the same wavelength.




   OR

   Select **Auto**. to activate the source with an auto mode.

Readings with more than one wavelength appear on-screen at the same time when the auto-switching feature is enabled on the source.




***Note:*** *If the source is not set in auto-mode, and that you try to use the auto feature of the power meter, you will be notified clearly in red, and no reading is displayed. To reestablish the reading, you must either select a specific wavelength or make sure that the source is in auto mode.*

***8.*** Tap **Store** to transfer the displayed values to the **Results** and **Details** tabs.

***9.*** Repeat the procedure for other wavelengths and fibers.

***10.*** Once your work is complete, tap **Exit Tools** to exit the power meter mode.

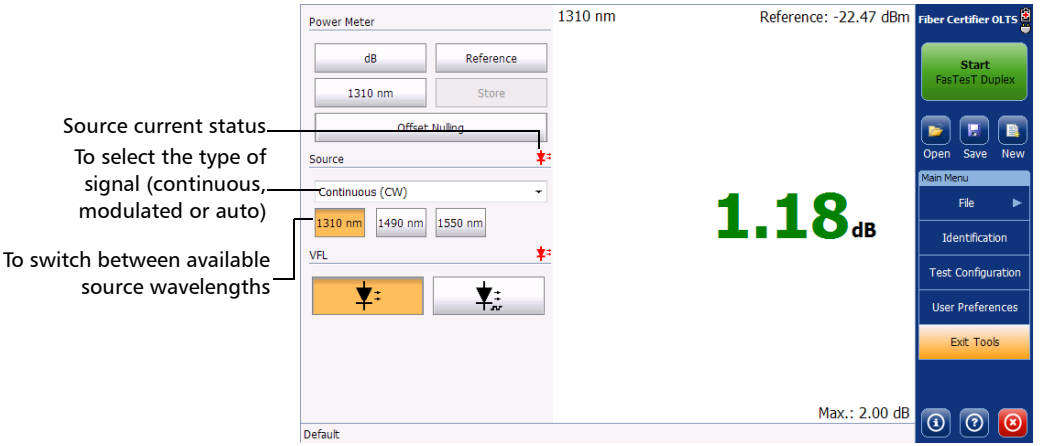
You can view and manage your measurements in the **Results** and **Details** tabs as you would for any FasTesT measurement. See *Viewing Measurements in the Results List* on page 92 and *Viewing Results in Details* on page 99 for details.

# Using the Light Source

Your optical source can be set to send a continuous or modulated signal, or switch automatically from one available wavelength to another (auto-switching mode). It can also send its current wavelength to a power meter so that it is detected automatically (auto-wavelength mode).

***Note:*** *The number of available wavelengths depends on the model you are using.*

***Note:*** *Selecting multiple wavelengths is only possible when done on the same optical port.*



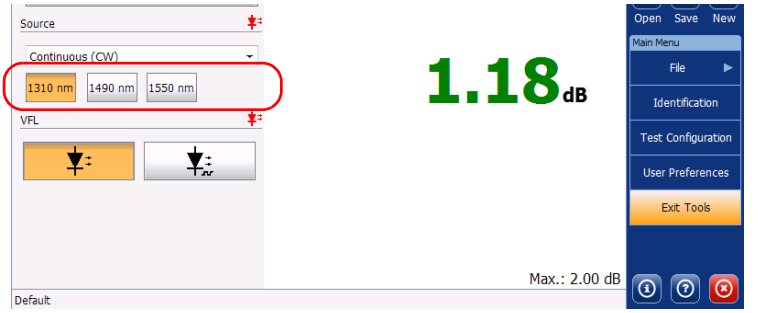
***To select the source modulation:***

1. From the main window, tap **Tools**.
2. Select the desired modulation in the list of available choices.

***Note:*** *If you select Auto you can select one or several wavelengths. When several wavelengths are selected, each of them will be activated in turns. This is also known as auto-switching.*

***To select the wavelengths:***

1. From the main window, tap **Tools**.
2. Tap on the wavelength you want to use.




***Note:*** *You can select multiple wavelengths in auto mode only.*

# Using the Optional VFL (MaxTester Units Only)

If you are working with MaxTester units, it could be equipped with an optional visual fault locator (VFL) to help you identify bends, faulty connectors, splices and other causes of signal loss. It can also help the person at the other end of the link to identify the fiber under test, which can be particularly useful when working on cables containing many fibers.

From its dedicated port, the VFL emits a red signal which becomes visible at the location of a fault on the fiber. This signal can be continuous (CW) or blinking.

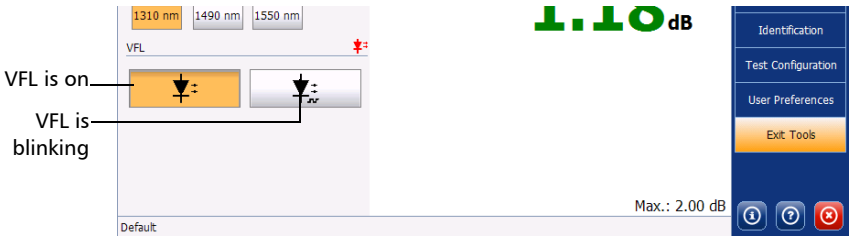
***Note:*** *On an FTB platform, the VFL is only available on the platform application, not the module.*

## WARNING

**When the VFL is active, the VFL port emits visible laser radiation. Avoid exposure and do not stare directly into the beam. Protect any unused port with a cap.**

***To use the VFL:***

1. From the main window, tap **Tools**.
2. Select which type of signal you want to use.




3. Tap **Exit Tools** again to exit the VFL mode and return to your OLTS/Fiber Certifier application.

# 7 Maintenance

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 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.
- If any liquids are spilled on or into the unit, turn off the power immediately, disconnect from any external power source, remove the batteries and let the unit dry completely.

**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 EUI Connectors

Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

**IMPORTANT**

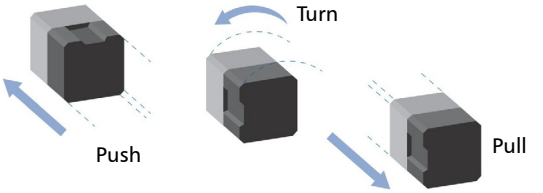
**If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.**

## WARNING

**Looking into the optical connector while the light source is active WILL result in permanent eye damage. EXFO strongly recommends to TURN OFF the unit before proceeding with the cleaning procedure.**

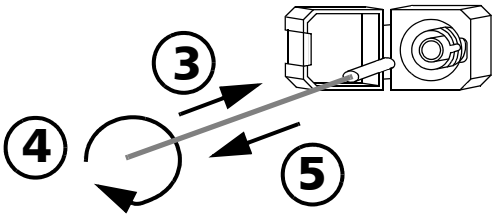
***To clean EUI connectors:***

1. Remove the EU from the instrument to expose the connector baseplate and ferrule.




2. Moisten a 2.5 mm cleaning tip with *one drop* of optical-grade liquid cleaner.

***3.*** Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).




***4.*** Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

***5.*** Repeat steps 3 to 4 with a dry cleaning tip.

***Note:*** *Make sure you don't touch the soft end of the cleaning tip.*

***6.*** Clean the ferrule in the connector port as follows:

***6a.*** Deposit *one drop* of optical-grade liquid cleaner on a lint-free wiping cloth.

**IMPORTANT**

**Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.**

***6b.*** Gently wipe the connector and ferrule.

***6c.*** With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

***6d.*** Verify connector surface with a fiber inspection probe (for example, EXFO's FIP).

***7.*** Put the EUI back onto the instrument (push and turn clockwise).

***8.*** Throw out cleaning tips and wiping cloths after one use.

# Cleaning VFL-Type Connectors

VFL-type 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.**

***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.

# Enabling Calibration Notifications

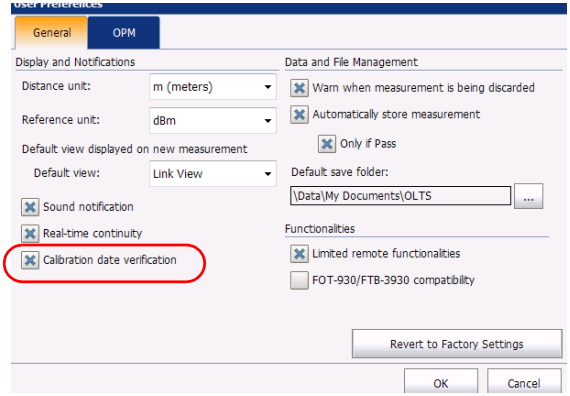
Your unit can indicate when the calibration due date is approaching, or if a calibration is due.

If the notification is active, a pop-up reminder will appear to indicate that the date is approaching. You can also see the number of remaining days in the **About** window.

***Note:*** *Although your units will continue to take measurements despite having an expired calibration date, some contractors and manufacturers might not find such results acceptable.*

***To enable the notification:***

1. From the main window, tap **User Preferences**.
2. Select the **General** tab.
3. Under **Display and Notifications**, enable the corresponding option.




4. Tap **OK** to confirm your choice, or **Cancel** to exit the window without changing anything.

# 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 interval of this particular EXFO unit.

Under normal use, the recommended interval for your OLTS/Fiber Certifier is: three years.

For newly delivered units, EXFO has determined that the storage of this product for up to six months between calibration and shipment does not affect its performance (EXFO Policy PL-03).

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. Unless you have already established a specific calibration interval based on your own empirical data and requirements, EXFO would recommend that the next calibration date be established according to the following equation:

**Next calibration date = Date of first usage (if less than six months after the calibration date) + Recommended calibration period (three years)**

To ensure that your unit conforms to the published specifications, calibration may be carried out at an EXFO service center or, depending on the product, at one of EXFO's certified service centers. Calibrations at EXFO 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.*

## Recycling and Disposal (Applies to European Union Only)

For complete recycling/disposal information as per European Directive WEEE 2012/19/UE, visit the EXFO Web site at www.exfo.com/recycle.

# 8 Troubleshooting

## Solving Common Problems

| Problem | Cause | Solution |
|---|---|---|
| The verification steps in the reference assistant always indicate that the loss level is too high. | The connectors are dirty or damaged. | ➤ Use a fiber inspection probe to do a visual inspection of the connectors at each end of the test cords.<br>➤ Clean or replace the test cord as needed.<br>➤ Make sure that the selected test cord type (reference or standard grade) truly correspond to the characteristics of the test cord you are using. |
| For multimode references, even with new and clean test cords, the loss level is always too high for a TC1+TC2 connection. | The test unit test port may be dirty or damaged. Encircled Flux condition may not be well maintained due to a bad connection. | ➤ Inspect the test unit port and the end of TC1 which is in contact with the test port using a fiber inspection probe.<br>➤ Clean the test port and test cord if required.<br>➤ Send to test unit in a service center if the test port appear to be damaged. |

| Problem | Cause | Solution |
|---|---|---|
| Negative lengths which result in a Fail status. | ➤ The test cords were changed since the last reference was set.<br>➤ The last reference was not set correctly or faulty values about the test cord length were entered if the verification steps were not performed. | Set a new reference and do not skip the verification steps. |
| Negative loss which results in a fail status. | ➤ Test cord connector may be damaged, worn out, dirty or not well connected during the reference procedure.<br>➤ Excessive fiber bending could have been present during one of the reference steps. | ➤ Take a new reference measurement to avoid FasTesT with a negative loss value.<br>➤ Inspect and clean test cords as needed.<br>➤ Replace test cords if the problem persist.<br>➤ Make sure the fiber is not bent when taking the reference measurement. |

# Viewing Online Documentation

An online version of the OLTS/Fiber Certifier user guide is available at all times from the application.

***To access online help:***

At the bottom of the **Main Menu**, tap .

# 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.

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.

# Viewing Information About your OLTS/Fiber Certifier

You can view information about your OLTS/Fiber Certifier such as the version number and contact information for technical support in the **About** window.

***To view OLTS/Fiber Certifier information:***

From the main window, tap .

# 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.

# 9 Warranty

## 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.

# 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 141). 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 141).

# 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
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CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS)
中国关于危害物质限制的规定

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

Note:
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<br>产品 | Environmental protection use period (years)<br>环境保护使用期限 （年） | Logo<br>标志 |
|---|---|---|
| This EXFO product<br>本 EXFO 产品 | 10 | |
| Battery[a]<br>电池 | 5 | |

a. If applicable.
如果适用。

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