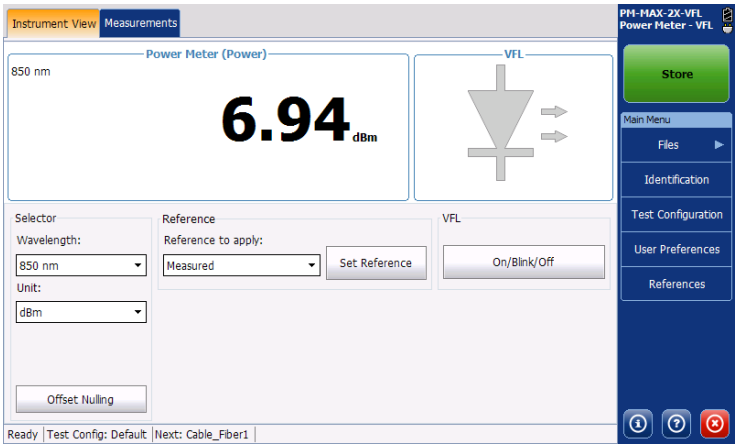
User Guide

Power Meter and VFL



www.EXFO.com
Telecom Test and Measurement

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

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

Version number: 5.0.1.1

Contents

Contents

1 Introducing the Optional Power Meter and VFL

Your unit can be equipped with an optical power meter to measure absolute power (dBm or W) or insertion loss (dB). The power meter can detect modulated signals (1 kHz, 2 kHz, 270 Hz and 330 Hz).

The built-in power meter can also include a visual fault locator (VFL) to inspect or identify fibers.

Using your Unit with TestFlow

You can use this product for your test jobs in the TestFlow application. For more information about using TestFlow or other instruments as part of your tests, refer to the corresponding user documentation.

Note: *Some of the features for your product are not available while in TestFlow mode.*

Certification Information

The certification and declaration of conformity for your unit is specific to the unit you are using. Please refer to the corresponding user documentation for more details.

Safety Information

The laser and electrical safety information pertaining to your unit is specific to the unit you are using. Please refer to the corresponding user documentation for more details.

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.

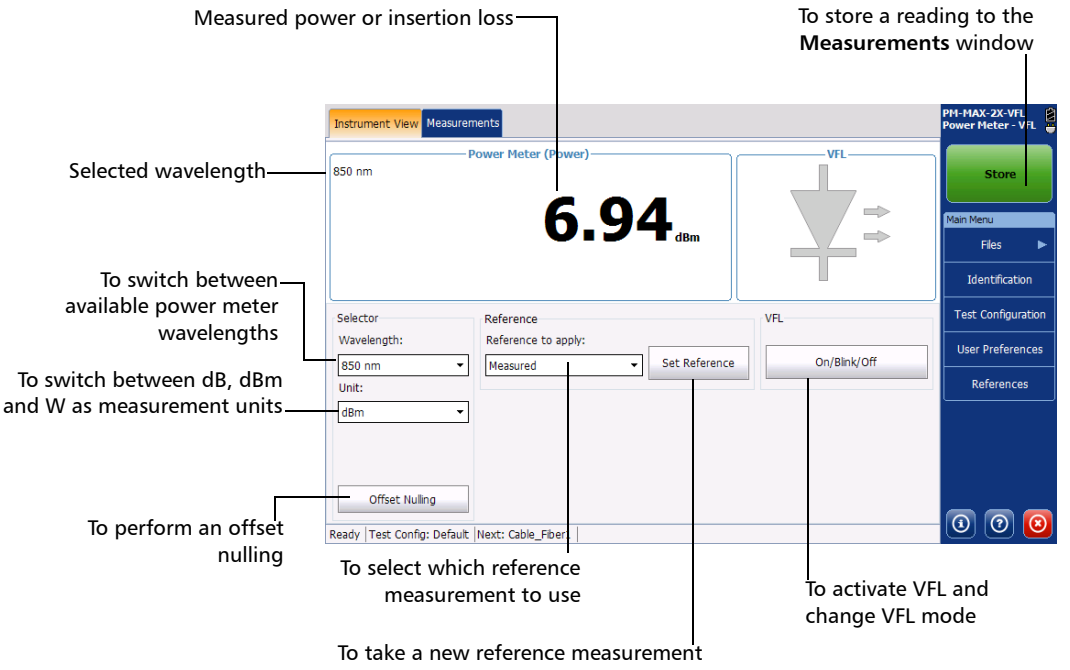
IMPORTANT

Refers to information about this product you should not overlook.

2 Using the Optional Power Meter and VFL

Note: *Some buttons are not available when you first access the Power Meter application, but will be available after you tap* ***Store*** *for the first time or after you open a file.*

Below is a description of the Power Meter buttons and functions.



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.

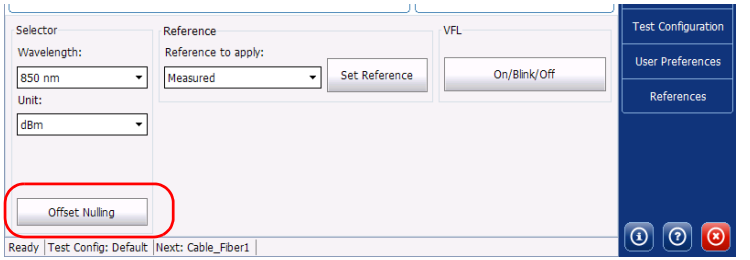
Your unit has been designed *not to require offset nulling* under normal operation, but you should perform it whenever environmental conditions change significantly or when measuring very low power values.

IMPORTANT

Light must not reach the detector when nulling offsets. Always use an EUI or protective screw cap, or a rubber cover.

To perform an offset nulling:

1. Put the protective cap on the power meter port.
2. From the **Instrument View** tab, tap **Offset Nulling**.



The nulling process may take a moment.

Setting Correction Factors

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

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

where:

$\text{Power}_{\text{corrected}}$ = the corrected power value

$\text{Power}_{\text{measured}}$ = the measured power value

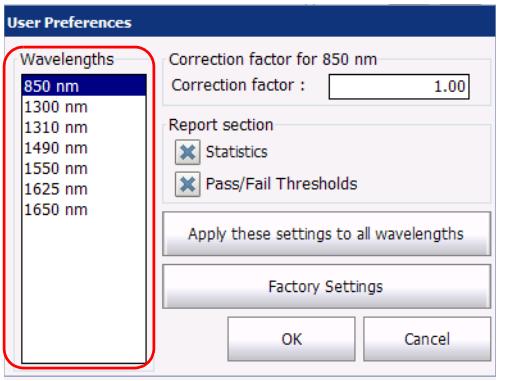
CF = the correction factor

For each favorite wavelength, the CF is set to 1.00 at the factory, but allowed values range between 0.85 and 1.15.

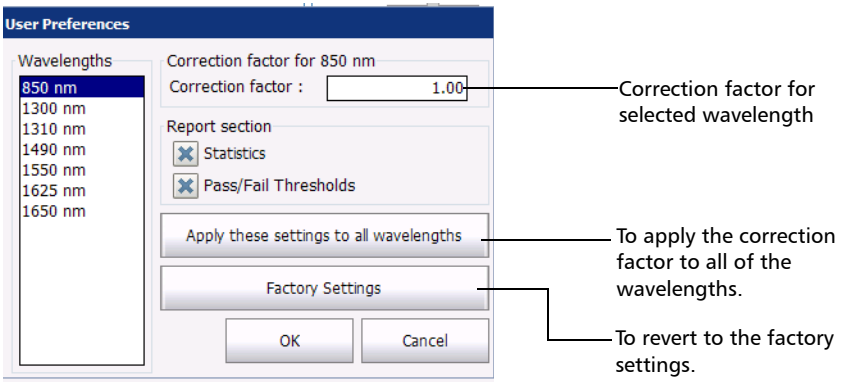
Note: *Some other products express the CF in dB, so the CF would be* added *to measured power.*

To set correction factors:

1. From the **Instrument View** tab, tap **User Preferences**.
2. From the **Wavelengths** list, select the wavelength for which you want to set a correction factor.



3. Modify the correction factor for the selected wavelength.



4. Tap **OK** to enter the changes.

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.

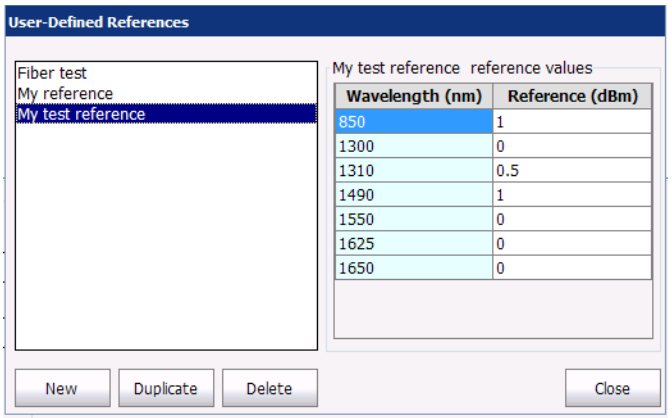
You can set a different reference value for each wavelength. A reference value remains in memory until a new one is stored at the same wavelength.

You can use either the reference value you measure live with your unit or use preset reference values you have previously stored.

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.

To create a list of reference values:

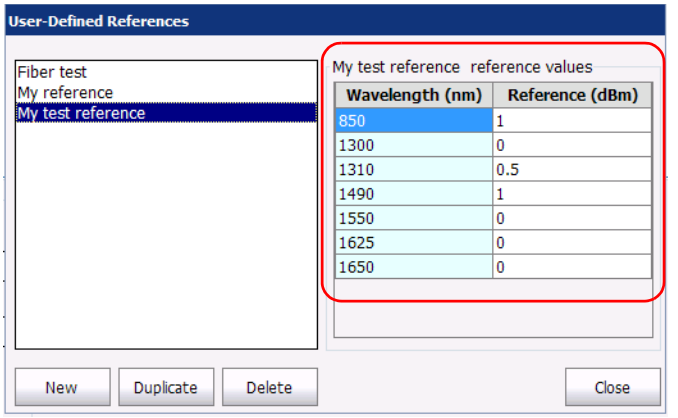
1. From the main window, tap **References**.
2. Tap **New**, then enter a name for the reference file. Tap **New** again to exit the window.
3. Enter reference values for the desired wavelengths. This list is dynamic and any changes are automatically kept.



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

To create a list of references based on an existing list:

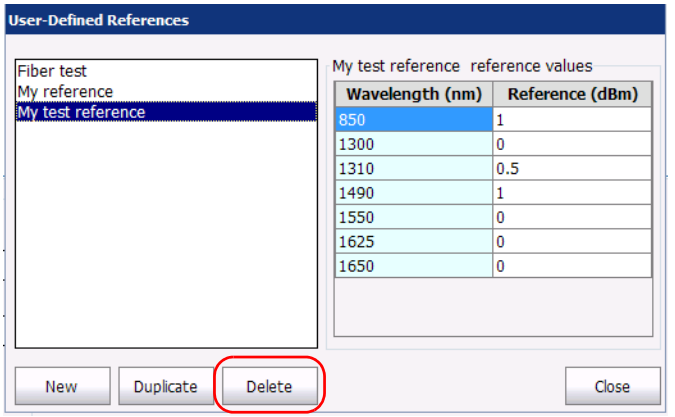
1. From the main window, tap **References**.
2. Tap **Duplicate**, then enter a name for the new reference file. Tap **Duplicate** again to exit the window.
3. Change the reference values as needed. This list is dynamic and any changes are automatically kept.



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

To delete a list of references:

1. From the main window, tap **References**.
2. Select the list you want to remove, then tap **Delete**. Confirm your choice.



3. Tap **Close** to return to the main window.

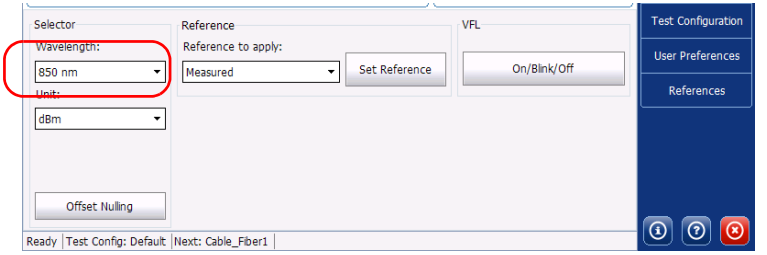
To measure reference values to use in Reference mode:

1. Check your fibers and clean them properly.
2. Using the proper adapter and test jumpers, connect a light source to your power meter.

3. From the **Instrument View** tab, select the wavelength in the list. Activate the source at the same wavelength.

OR

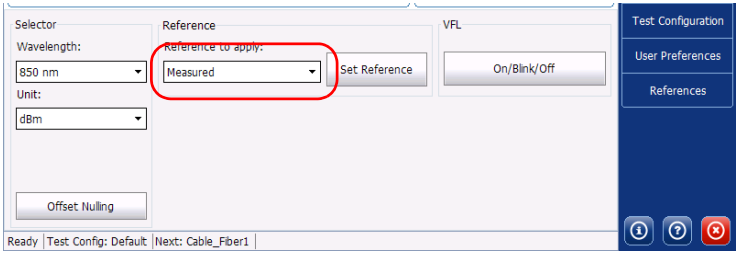
If you want to use the auto-wavelength or auto-switching mode, enable it on the source, then select **Auto** in the wavelength list (for more information on the auto-wavelength or auto-switching mode, see *Measuring Power or Insertion Loss* on page 11).



4. Tap **Set Reference** to save the current power value as the new measured reference. It will appear on the upper-left corner of the data display.

To select which reference list will be used for your measurements:

From the **Instrument View** tab, select the desired reference in the corresponding list.



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 auto-wavelength and auto-switching modes of your source, if the model allows it.

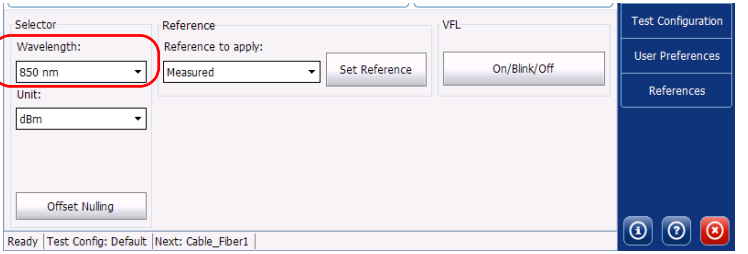
Note: *Not all power meters have auto-wavelength and auto-switching detection capacities. If the auto mode is not available, you cannot select it in the* ***Wavelength*** *list. However, if the power meter has the capacity, but the auto mode is still not available, a firmware update may be required. Please contact EXFO to see how to proceed to update the firmware.*

To perform power or insertion loss measurements manually:

1. If necessary, perform an offset nulling (see *Nulling Offsets* on page 4).
2. Check your fibers and clean them properly.
3. For insertion loss measurements, reference your power meter to a light source (see *Setting Reference Values on Your Power Meter* on page 7), then deactivate the light source.
4. If you have used a single reference patchcord, disconnect it *from the power meter port only*, then attach a second reference patchcord to the power meter.

   OR

   If you have used two reference patchcords, disconnect both of them at the bulkhead.
5. Using bulkhead adapters or the system patch panels, connect a fiber under test to reference patchcord attached to the light source and power meter.
6. From the **Instrument View** tab, use the list to select a wavelength. Activate the source at the same wavelength.



7. Tap **Store** to transfer the displayed values to the **Measurements** list.

Note: *If you tap **Store** just after switching to another measurement unit, the application will prompt you to save any unsaved measurements. You must either save these measurements and close the file, or discard them (see* Clearing Measurements from the Display *on page 20) before being able to add values expressed in the new measurement unit.*

8. Repeat the procedure for other wavelengths.

9. Once your work is complete, tap the **Measurements** tab to manage the results as explained on page17.

To perform power or insertion loss measurements using the auto wavelength or auto switching modes of your source:

1. If necessary, perform an offset nulling (see *Nulling Offsets* on page 4).

2. Check your fibers and clean them properly.

3. For insertion loss measurements, reference your power meter to a light source (see *Setting Reference Values on Your Power Meter* on page 7), then deactivate the light source.

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

OR

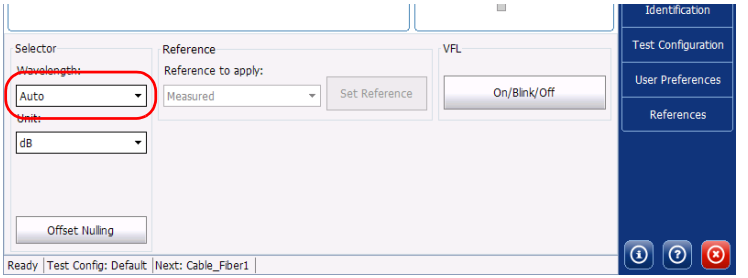
If you have used two reference patchcords, disconnect both of them at the bulkhead.

5. Using bulkhead adapters or the system patch panels, connect a fiber under test to reference patchcord attached to the light source and power meter.

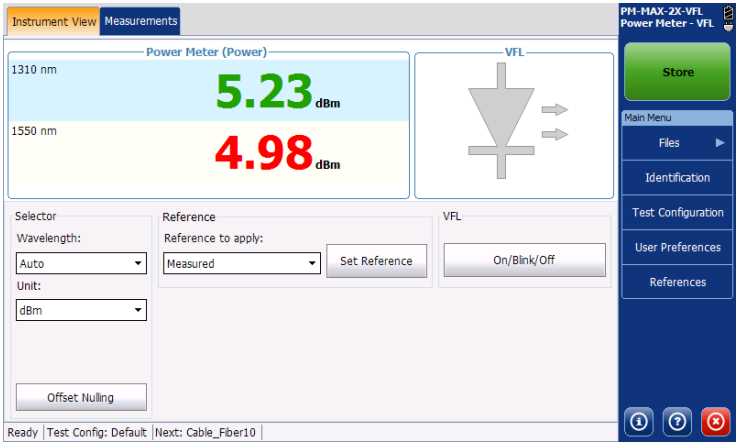
IMPORTANT

In auto-wavelength or auto-switching 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.

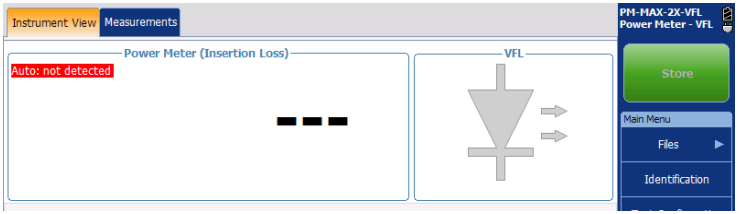
6. From the **Instrument View** tab, select **Auto**. Activate the source with the auto-wavelength or auto-switching mode.



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



If the auto-wavelength or auto-switching mode are not activated for your source, 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.



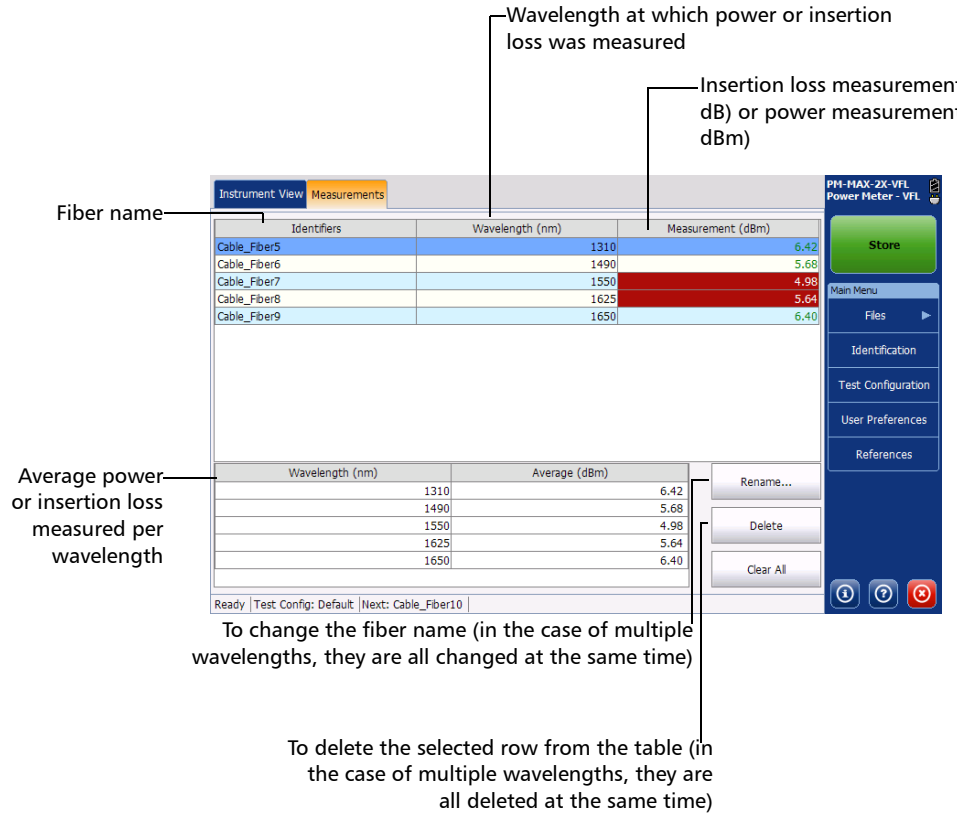
7. Tap **Store** to transfer the displayed values to the **Measurements** list. In auto-switching mode, the measurements are added for all wavelengths at once, using one line per wavelength.

Note: *If you tap **Store** just after switching to another measurement unit, the application will prompt you to save any unsaved measurements. You must either save these measurements and close the file, or discard them (see* Clearing Measurements from the Display *on page 20) before being able to add values expressed in the new measurement unit.*

8. Once your work is complete, tap the **Measurements** tab to manage the results as explained on page17.

To view and edit power or insertion loss measurements:

1. Select the **Measurements** tab. All your measurements are displayed in the order they were performed.
2. Tap **Rename** to rename the fiber, tap **Delete** to remove the selected value from the list, or **Clear All** to remove all measurements from the list.

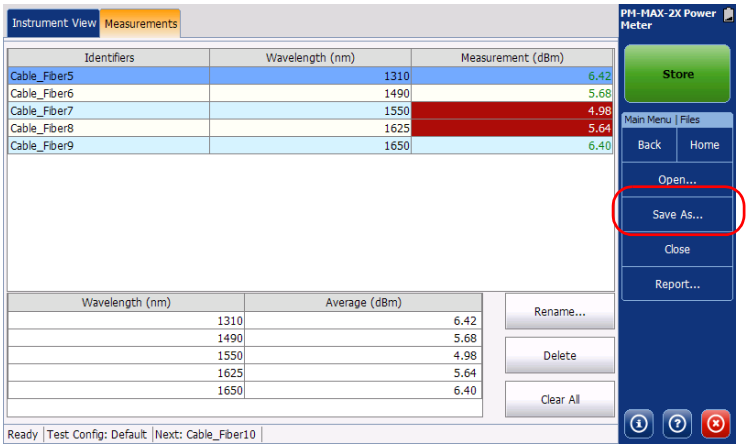


Saving Results Files

Once you have added measurements to your list, you might want to save them onto a file for future consultation.

To save a measurement file:

1. From the main window, tap **Files**, then **Save As**.



2. If desired, change the name and location, then tap **Save**.

Opening Result Files

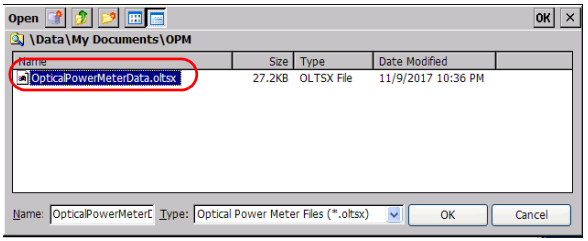
You can open results files that are stored on your unit or on a USB memory key. If you need more flexibility and a greater choice of report types, you can also transfer results files to a computer onto which EXFO's FastReporter is installed.

IMPORTANT

The file that you will open includes the threshold values and job information that you had set when you saved that file. These settings will replace the current settings.

To open results files:

1. From the button bar, tap **Files**, then **Open**.
2. If necessary, change the location from which the file should be opened. The application will keep in memory the last selected folder.
3. From the given list of files, select the file to open.



4. Confirm with **OK**.

   If you have already performed power measurements, but not saved them, the application will prompt you to save your work. You must either save or discard the unsaved measurements before being able to open a file.

5. To view the reopened file, go to the **Measurements** tab. The power or insertion loss measurements are displayed on the results list.

Clearing Measurements from the Display

When measurements do not meet your requirements, you can clear the display and start over.

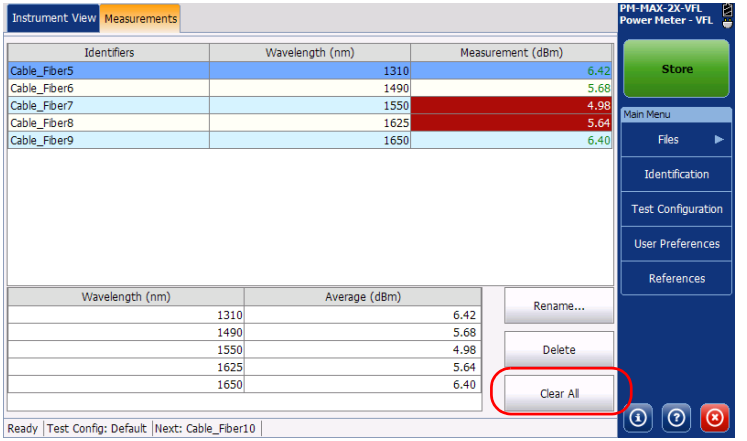
Note: *Clearing measurements from the display does not delete them from the disk (if they were saved previously).*

To clear power measurements:

From the button bar, tap **Files**, then **Close**.

OR

From the **Measurements** tab, tap **Clear All**.



If you have not saved the measurements already, the application will warn you that you will lose your work if you continue. You will be prompted to save your results.

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 measurement. 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.

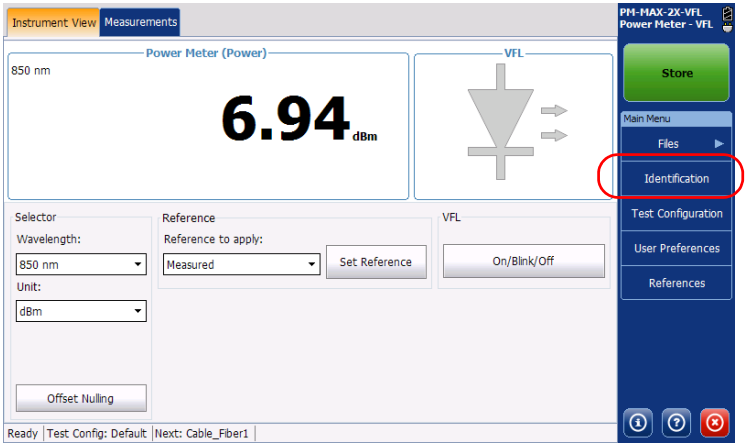
The autonaming parameters can be set only for measurements that have not been saved yet. You will only see the parameters for the current and next acquisition (when the test is done but not saved yet), or for the next acquisition only (test is not done yet). Otherwise, the parameters will not be displayed.

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

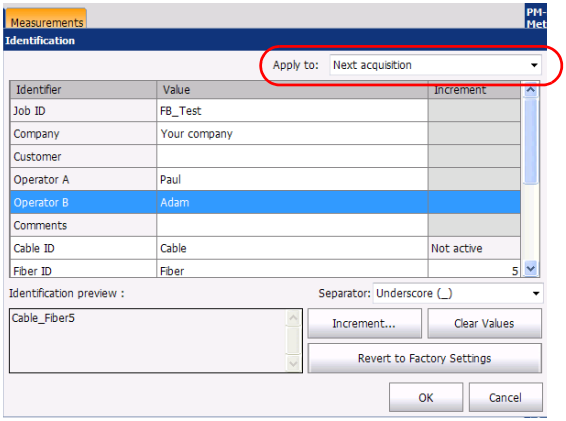
EXFO recommends to use an identifier that is not automatically incremented when creating a file name. For example, in the case of a file that contains all of the fibers of a given cable, you should use a file name composed of the cable name, and not the fiber identifier, which varies from one measurement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

To configure the automatic file naming:

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



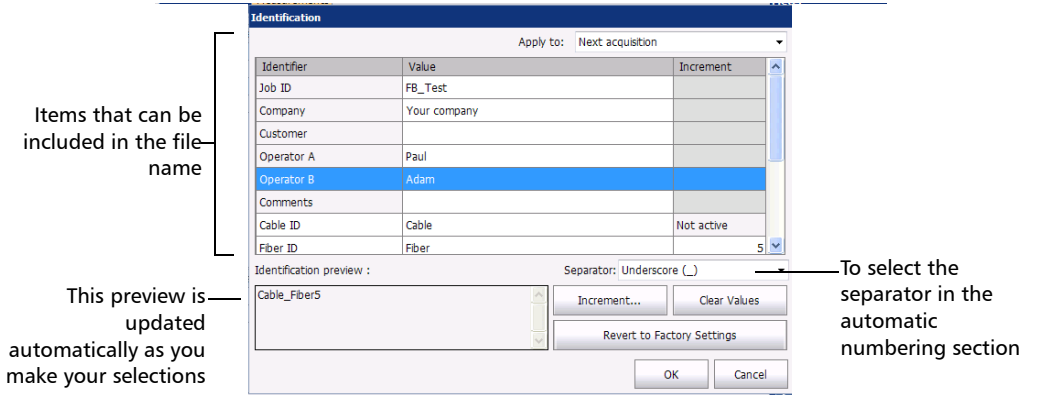
2. From the **Apply to** list, ensure that **Next acquisition** is selected.



3. Select the desired identifiers to include in the file name.

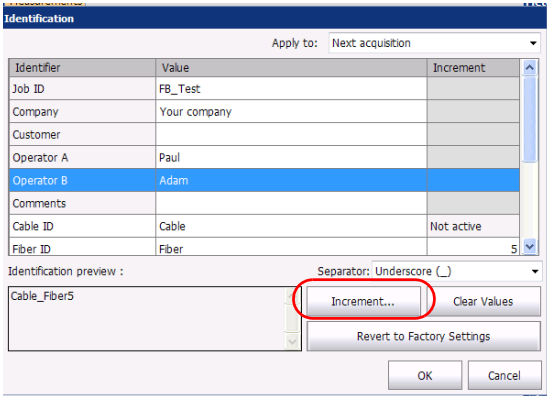
If an identifier has an arrow icon, a predefined list with choices is available, but you can also enter your own customized identifier name. If you select None, it disables the field from the list.

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



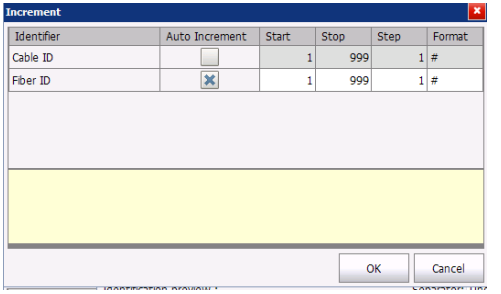
4. If you want to increment automatically the cable ID, the fiber ID or any other custom identifier, proceed as follows:

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.

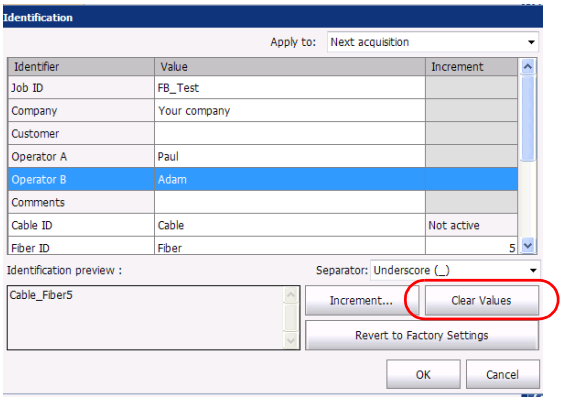
4e. Tap **OK** to return to the **Identification** window.

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.

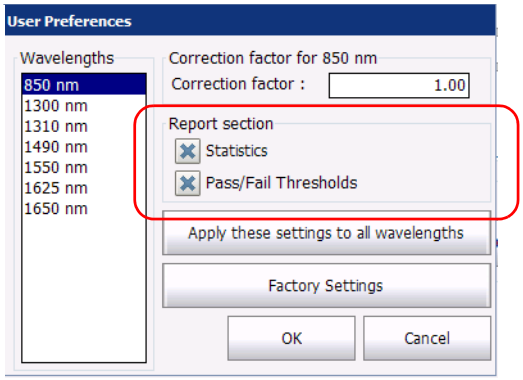
Generating Result Reports

You can generate reports directly from your unit in PDF format. You can modify the information related to customer, cable and job.

Depending on the information you want in your report, you can include the statistics, the pass/fail thresholds, or both.

To select the items to include in your report:

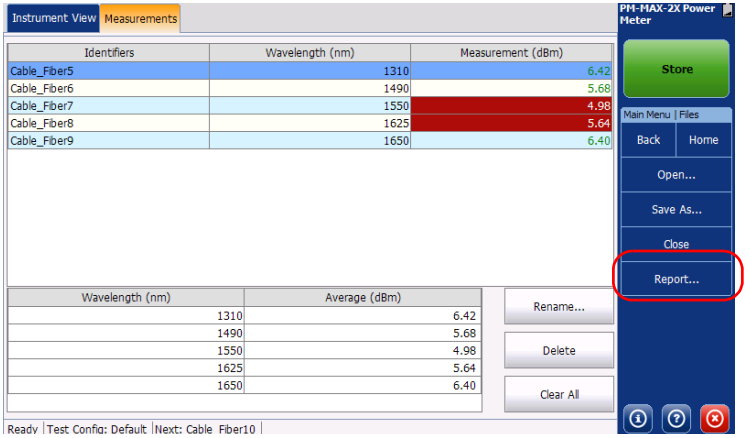
1. From the main window, tap **User Preferences**.
2. Select which items you want to include in the reports.



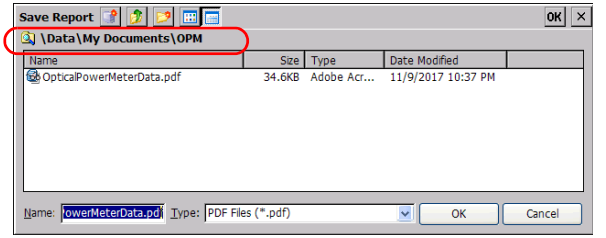
3. Tap **OK** to confirm your choice.

To generate a power measurement report:

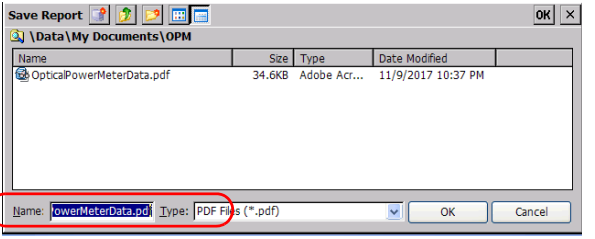
1. From the button bar, tap **Files**, then **Report**.



2. If desired, change the location for the file.



3. Enter a name for your file.



4. Tap **OK** to save your report.

Identifying Fiber Faults Visually with the VFL

The optional visual fault locator (VFL) helps 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 could be particularly useful when working with cables containing many fibers.

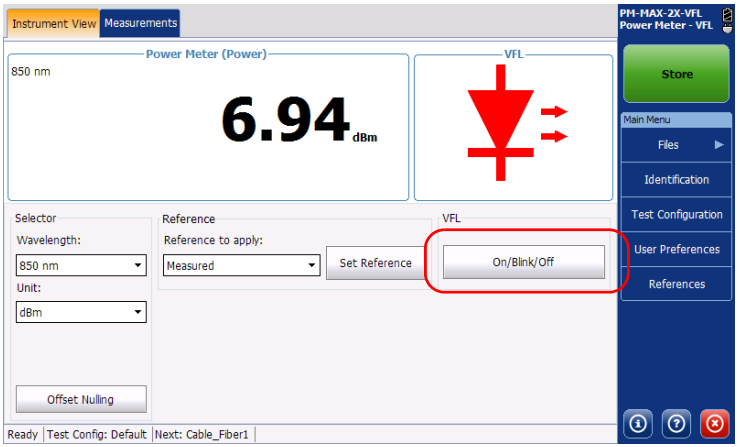
From its dedicated port, the VFL emits a red signal which becomes visible at the location of a fault on the fiber. This signal can be continuous (CW) or blinking (1 Hz).

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 activate the VFL and inspect a fiber:

1. Clean the connectors properly.
2. Connect the fiber under test to the VFL port.
3. Start your power meter application on your unit.
4. Select the **Instrument View** tab.
5. Tap **ON/Blink/OFF** to change the VFL state.



6. Without looking directly into the beam, examine the fiber. If light is coming out of the rubber jacket or on the side of the ferrule, the fiber is defective.

3 Managing Test Configurations

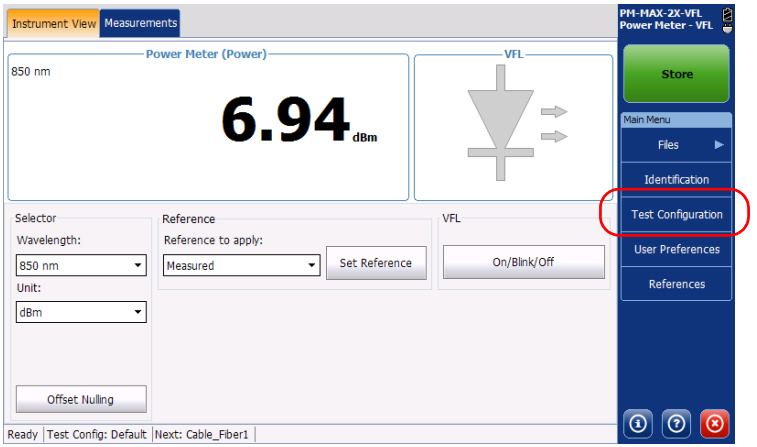
Test configurations allow you to quickly have the required criteria for your tests. Creating custom test configurations is done through duplicating an existing configuration, and then modifying the desired criteria. If you create configurations on one unit and want to transfer them to another unit, you can do using the importation feature.

Selecting a Test Configuration

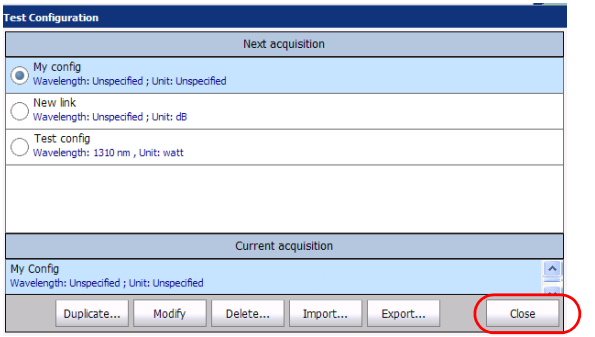
You can select a test configuration to use on future acquisitions. You can also view the configuration for an existing measurement.

To select a test configuration for the next acquisition:

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

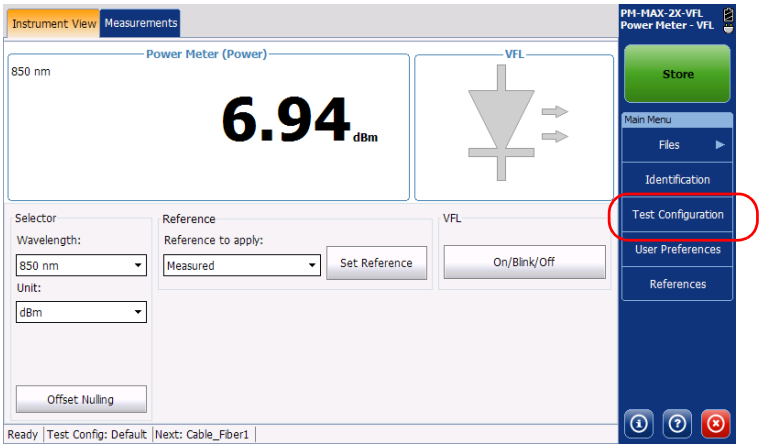


2. In the list of available test configurations, select the configuration you want to use and tap **Close**.

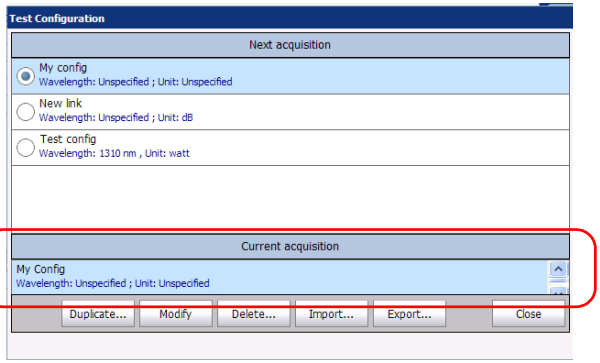


To view the configuration used for an existing measurement:

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.

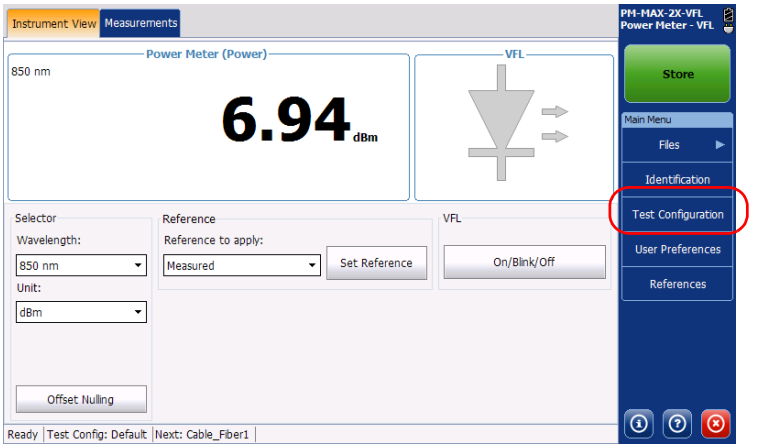


Creating a Test Configuration

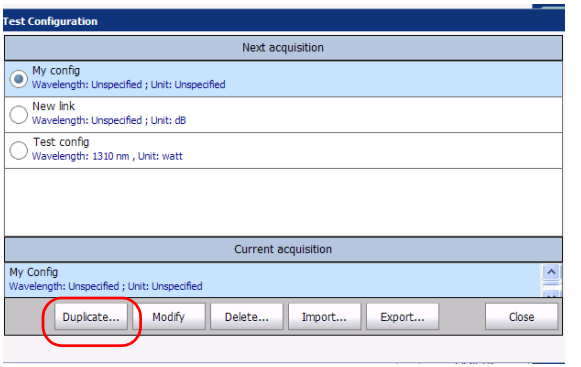
You can create your own test configurations by duplicating an existing one and modifying the settings to fit your needs.

To create a test configuration:

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

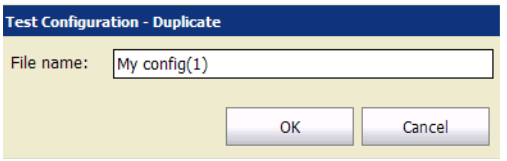


2. Select the row corresponding to the configuration that is the closest to the one you want to create, then tap **Duplicate**.



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.*



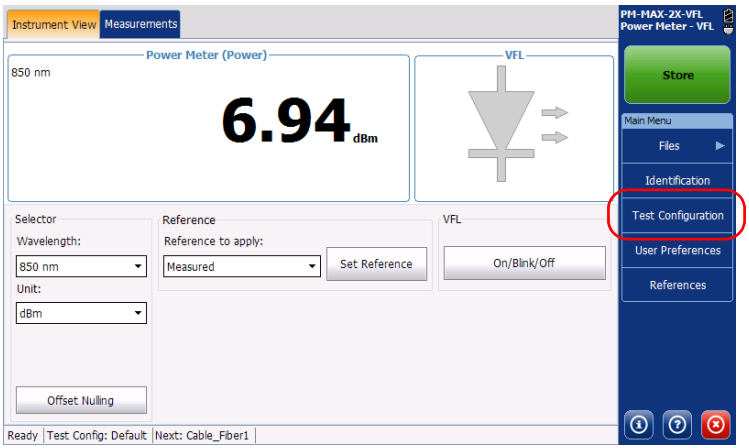
4. Tap the **Modify** button to change the settings according to your needs:
   - Properties: This is where you can change the name of the configuration, as well as the wavelength used for the measurement. See *Setting the Test Configuration Properties* on page 38 for details.
   - Wavelengths and Thresholds: This is where you can set the thresholds for your power meter. See *Setting Wavelengths and Thresholds* on page 41 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, the measurement type and the wavelength to use. When you select a specific wavelength or measurement type in your configuration, they will be automatically selected when performing your test and save you time and manipulations.

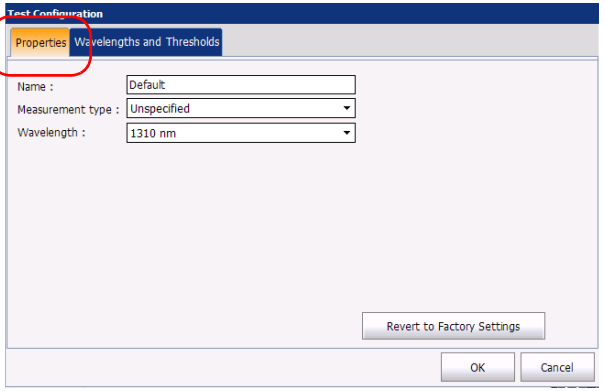
To change the test configuration properties:

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



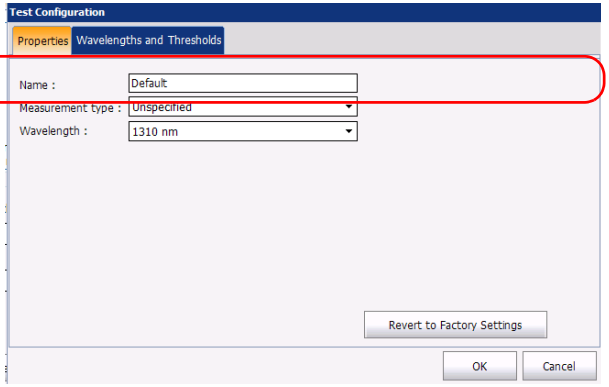
2. Select the configuration you want to edit and tap **Modify**.

3. Select the **Properties** tab.

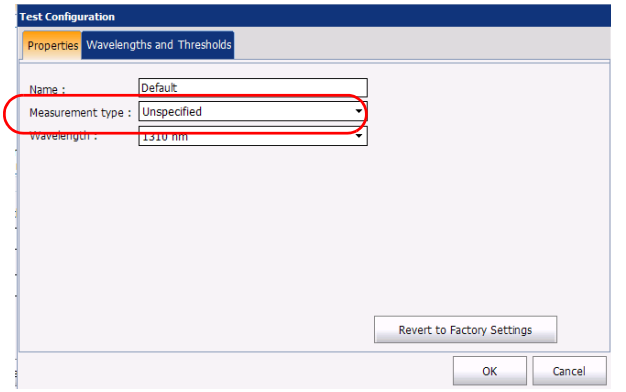


4. If desired, change the configuration name by tapping in the corresponding field and entering your information.

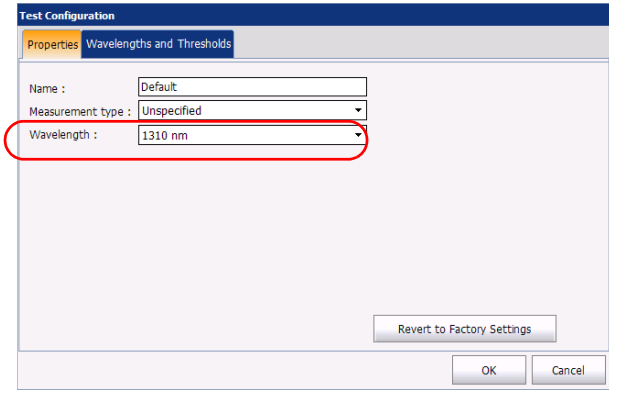
Note: *You cannot have two test configurations with the same name.*



5. Select the measurement type you want to use for this configuration. Selecting a type will gray out the corresponding list in the **Instrument View** tab and automatically use this type of unit. Selecting Unspecified will leave the list enabled so you can select the unit as needed.



6. Select the wavelength at which to take the measurements. Selecting one will gray out the corresponding list in the **Instrument View** tab and automatically use this wavelength. Selecting Unspecified will leave the list enabled so you can select the wavelength as needed.



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

Setting Wavelengths and Thresholds

You can define thresholds to specify acceptable power or insertion loss values for each wavelength. Thresholds are usually supplied by system manufacturers and depend on the system deployed.

When the measurement status is “Pass”, the value is displayed in green in the **Instrument View** tab, on the **Measurements** list, and in reports.

When the measurement status is “Fail”, the value is displayed in red in the **Instrument View** tab, on the **Measurements** list and in reports.

Note: *A power measurement (in dBm) will be considered as “Fail” when its value is outside the defined absolute power threshold.*

Note: *An insertion loss measurement (in dB) will be considered as “Fail” when its value is greater than the insertion loss threshold.*

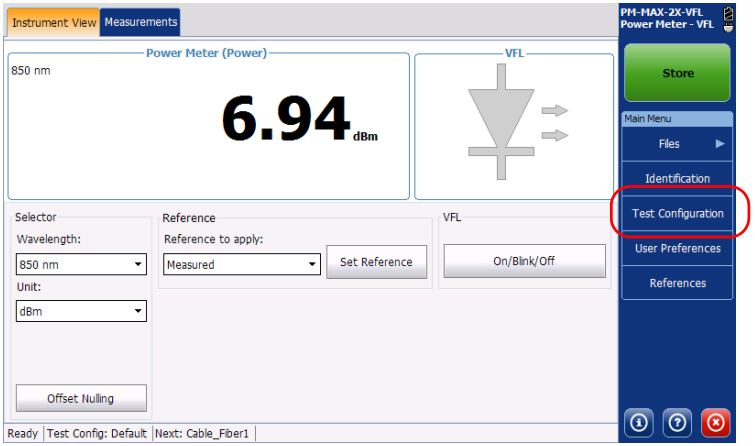
You must select the pass/fail status feature for the application to take into account the defined thresholds and display the appropriate status icons. By default, this feature is not selected.

IMPORTANT

If you revert to factory settings, you will erase all your thresholds and correction factors. The pass/fail status feature will be disabled automatically.

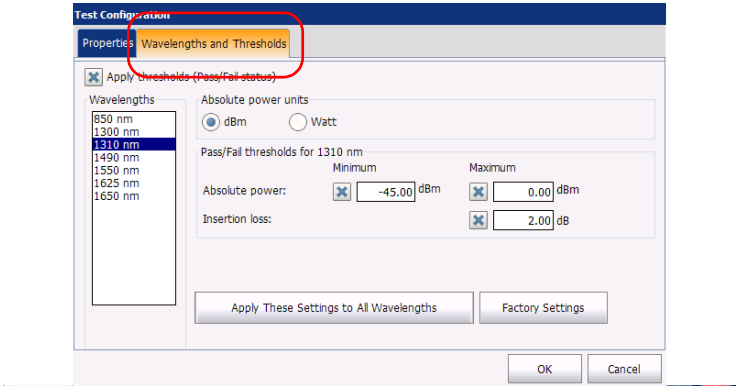
To set the power meter threshold values:

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



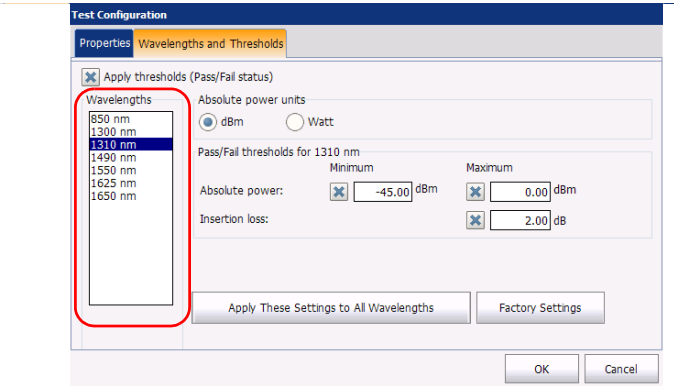
2. Select the configuration you want to edit and tap **Modify**.

3. Select the **Wavelengths and Thresholds** tab.

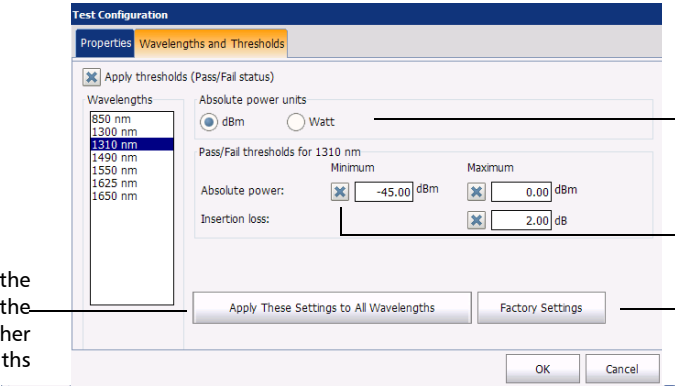


4. Select **Apply thresholds (Pass/Fail status)** to apply the thresholds and display the relevant information in the **Instrument View** tab of the main window.

5. From the **Wavelengths** list, select the wavelength for which you want to set a threshold.



6. Modify the values as needed.



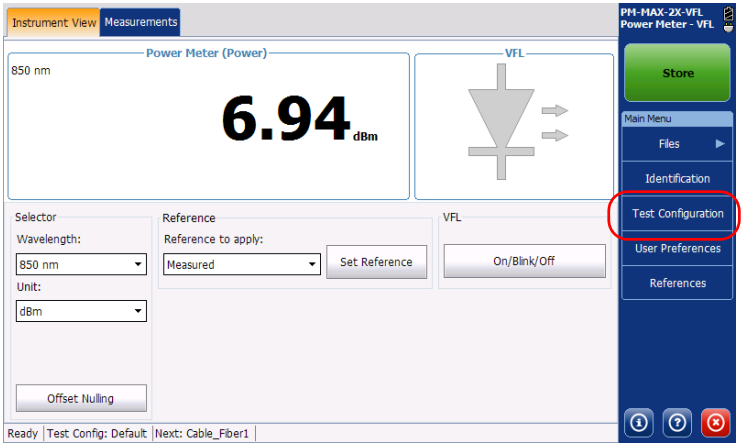
7. Tap **OK** to confirm your changes and close the window. Tap **Cancel** to ignore your changes and close the window.

Modifying a Test Configuration

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

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 36.

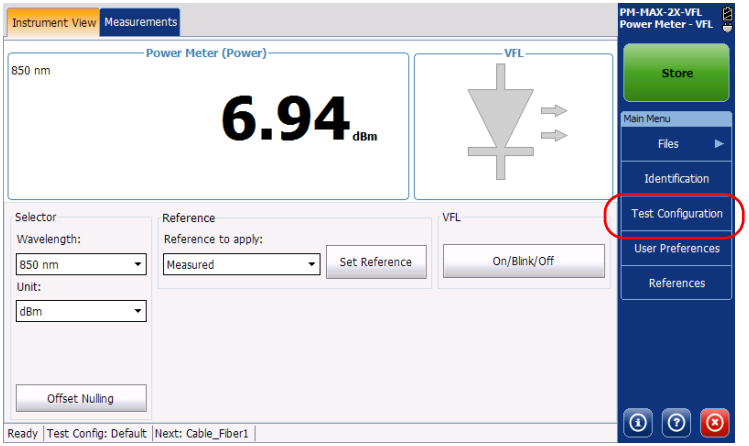
Exporting a Test Configuration

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

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

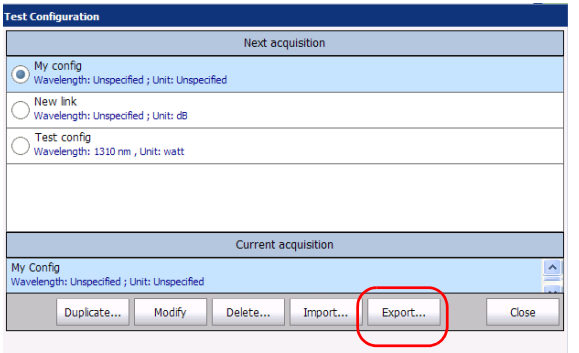
To export test configurations:

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

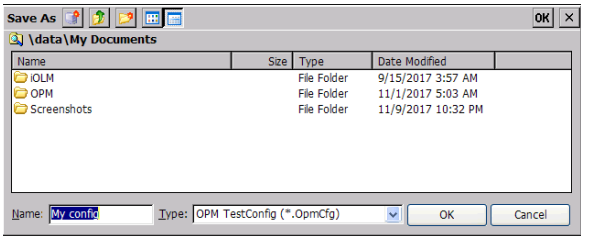


2. From the **Test Configuration** window, select the test configuration you want to export.

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.

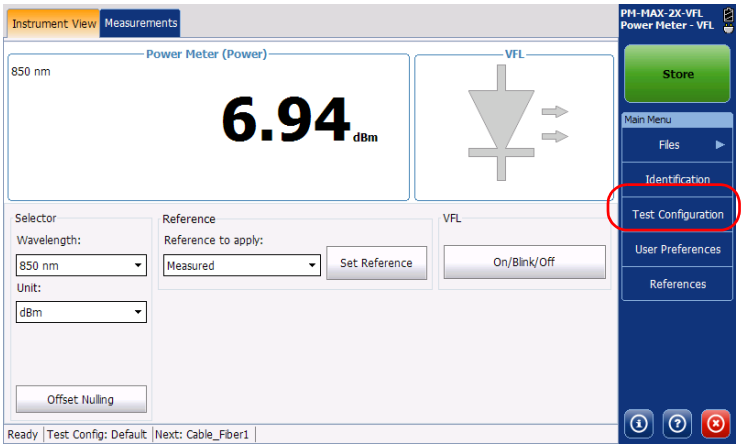
Importing a Test Configuration

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

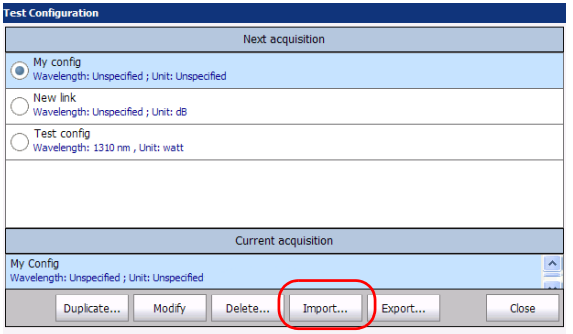
Note: *You can only import one test configuration at a time.*

To import test configurations:

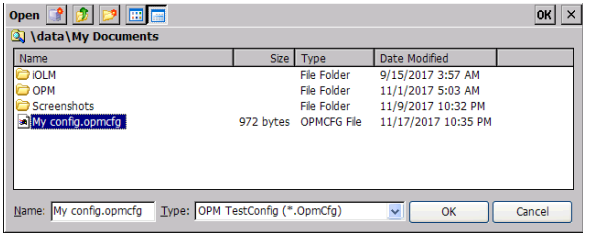
1. From the **Main Menu**, select **Test Configuration**.



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.

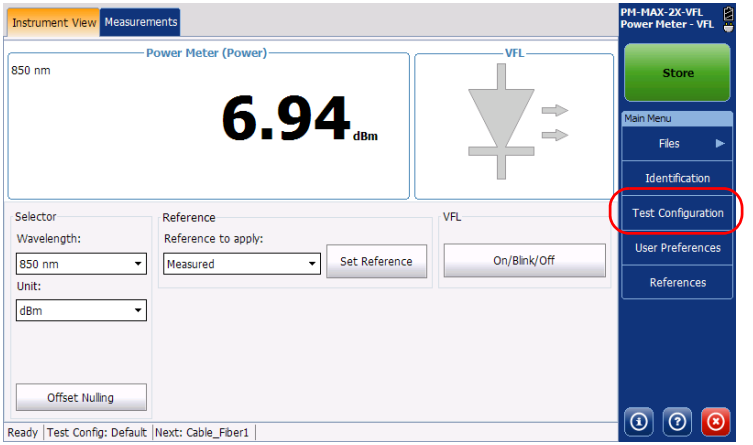
Deleting a Test Configuration

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

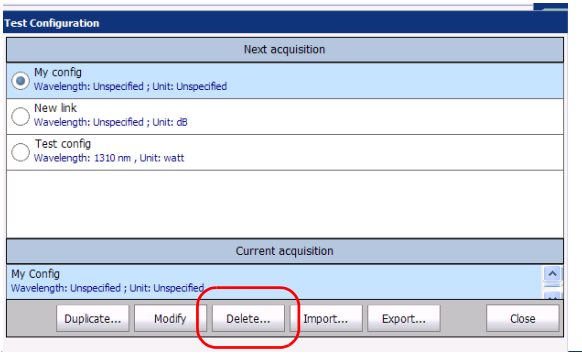
Note: *You cannot delete standard test configurations.*

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.

4 Maintenance and Troubleshooting

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.

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).

Viewing Online Documentation

An online version of the Power Meter and VFL user guide is available at all times from the application.

To access online help:

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

Installing a Unit You Have Purchased Separately

If you have purchased your power meter unit separately, please refer to the corresponding unit user documentation for important information on how to install your unit, or remove it for maintenance or calibration purposes.

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 Power Meter and VFL is: one year.

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 (one year)

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.*

Contacting the Technical Support Group

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

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

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

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

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

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.

5 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year 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 60). 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 60).

EXFO Service Centers Worldwide

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

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

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

EXFO Europe Service Center
Winchester House, School Lane
Chandlers Ford, Hampshire S053 4DG
ENGLAND

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

EXFO Telecom Equipment (Shenzhen) Ltd.
3rd Floor, Building C,
FuNing Hi-Tech Industrial Park, No. 71-3,
Xintian Avenue,
Fuyong, Bao'An District,
Shenzhen, China, 518103

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

To view EXFO's network of partner-operated Certified Service Centers nearest you, please consult EXFO's corporate website for the complete list of service partners:
http://www.exfo.com/support/services/instrument-services/exfo-service-centers.

Index

U

V

W

Z

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

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

a. If applicable.
如果适用。

P/N: 1072747

www.EXFO.com · info@exfo.com

CORPORATE HEADQUARTERS	400 Godin Avenue	Quebec (Quebec) G1M 2K2 CANADA Tel.: 1 418 683-0211 · Fax: 1 418 683-2170
EXFO AMERICA	3400 Waterview Parkway Suite 100	Richardson, TX 75080 USA Tel.: 1 972-761-9271 · Fax: 1 972-761-9067
EXFO EUROPE	Winchester House, School Lane	Chandlers Ford, Hampshire S053 4DG ENGLAND Tel.: +44 2380 246 800 · Fax: +44 2380 246 801
EXFO ASIA-PACIFIC	62 Ubi Road 1, #09-01/02 Oxley Bizhub 2	SINGAPORE 408734 Tel.: +65 6333 8241 · Fax: +65 6333 8242
EXFO CHINA	Beijing Global Trade Center, Tower C, Room 1207, 36 North Third Ring Road East, Dongcheng District	Beijing 100013 P. R. CHINA Tel.: +86 (10) 5825 7755 · Fax: +86 (10) 5825 7722
EXFO SERVICE ASSURANCE	250 Apollo Drive	Chelmsford MA, 01824 USA Tel.: 1 978 367-5600 · Fax: 1 978 367-5700
EXFO FINLAND	Elektroniikkatie 2	FI-90590 Oulu, FINLAND Tel.: +358 (0) 403 010 300 · Fax: +358 (0) 8 564 5203
TOLL-FREE	(USA and Canada)	1 800 663-3936

Printed in Canada (2017-11)

EXPERTISE REACHING OUT