FiberBasix Testers

EPM-100/ELS-100/EOT-100

User Guide

EXFO

P/N: 1039113

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EPM-100 Power Meter
ELS-100 Light Source
EOT-100 Loss Test Set

User Guide

P/N: 1039113
May 2004

EXFO

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

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.

Contents

Certification Information

F.C.C. Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

EXFO

DECLARATION OF CONFORMITY

Application of Council Directive(s):	73/23/EEC - The Low Voltage Directive 89/336/EEC - The EMC Directive
Manufacturer's Name:	EXFO ELECTRO-OPTICAL ENG.
Manufacturer's Address:	400 Godin Avenue Vanier, Québec Canada G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Industrial Scientific Equipment
Trade Name/Model No.:	EPM-100 Power Meter, ELS-100 Light Source, EOT-100 OLTS

Standard(s) to which Conformity is Declared:

EN 60825-1: 1994/ A2: 2001	**Safety of Laser Products-Part 1: Equipment Classification, Requirement, and User's guide**
EN 61326: 1997/ A2: 2001	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements**
EN 55022: 1998/ A1: 2000	**Limits and methods of measurement of radio disturbance characteristics of information technology equipment**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer
Signature:

Full Name:	Stephen Bull, E. Eng
Position:	Vice-President Research and Development
Address:	400 Godin Avenue Vanier, Quebec, Canada
Date:	December 15, 2003

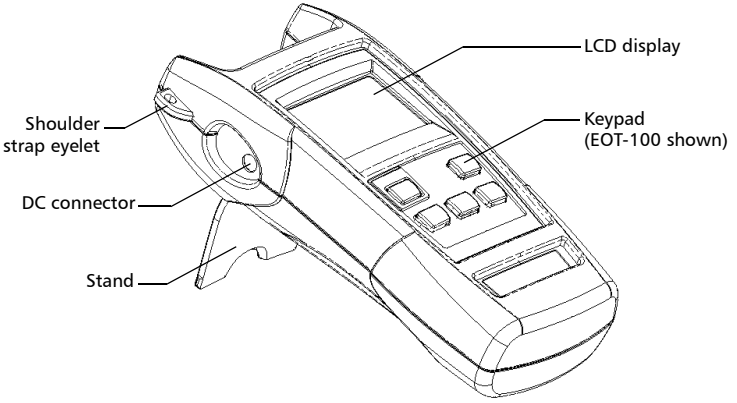
1 Introducing the EPM-100/ELS-100/EOT-100

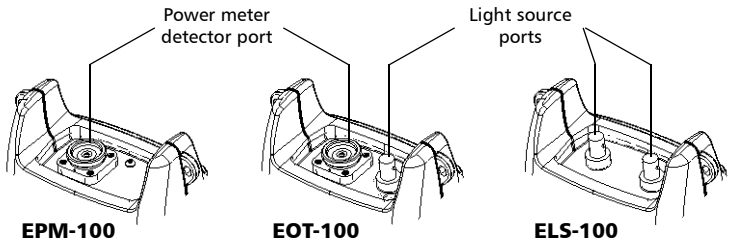
This user guide covers the following products (unless otherwise specified, descriptions apply to all):

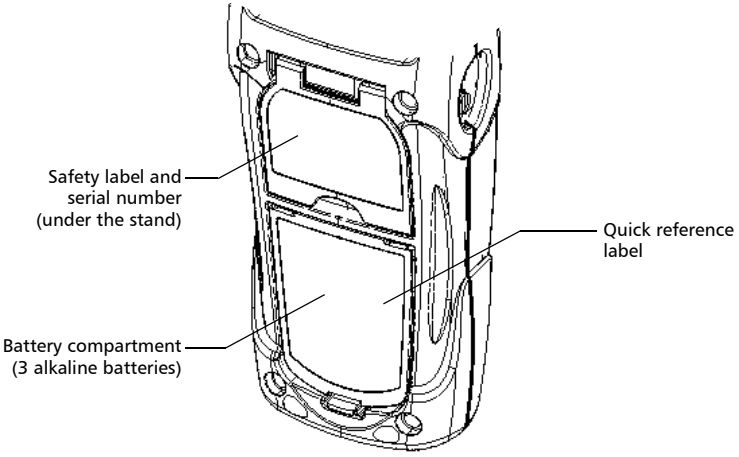
- EPM-100 Power Meter
- ELS-100 Light Source
- EOT-100 Loss Test Set: combines both a power meter and a light source

Main Features

	EPM	ELS	EOT
Ge or GeX detector with 6 calibrated wavelengths	X		X
Absolute power and link loss measurements	X		X
No offset nulling of detectors required in normal operation	X		X
Multiple source configurations on a single port [EOT-100] or on one or two ports [ELS-100]		X	X
Automatic shutdown after 10 minutes of idle time (auto-off)	X	X	X







Power Sources

The units operate with the following power sources:

- AC adapter (connected to standard power outlet—indoor use only)
- AA alkaline batteries (automatically take over if you unplug the AC adapter)

IMPORTANT

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

Typical Applications

- Transmitter power measurements (dBm and W)
- Fiber-link loss testing (dB)
- Component insertion-loss testing (dB)
- Installation and maintenance applications

2 Safety Information

Safety Conventions

Before using the product described in this manual, 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.

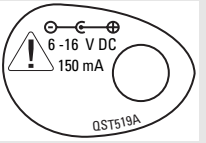
IMPORTANT

Refers to information about this product you should not overlook.

Electrical Safety Information

WARNING

Use the AC adapter provided with this product *indoors only*.



Laser Safety Information (ELS-100 and EOT-100 with VCSEL)

WARNING

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

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Your instrument is a Class 1M laser product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

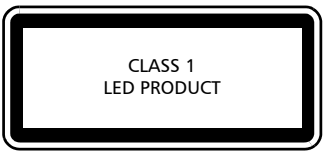
The product is safe under reasonably forseeable conditions of operation but it may be hazardous if you use optics within a diverging or collimated beam. *Do not view directly with optical instruments.*

Note: *Label shown for information purposes only. It is not affixed to your product.*

Laser Safety Information (ELS-100 and EOT-100 without VCSEL)

Your instrument is a Class 1 laser or LED product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

The following labels indicate that a product contains a Class 1 source:



Note: *Labels shown for information purposes only. They are not affixed to your product.*

3 Getting Started

Turning the Unit On and Off

When you turn the EPM-100 or EOT-100 off, it saves the current wavelength, unit and reference power.

IMPORTANT

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

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

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

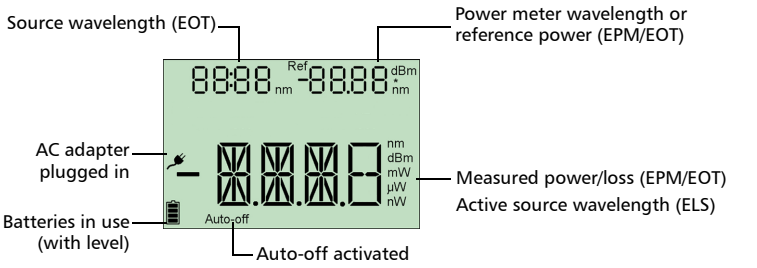
To turn the unit on:

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

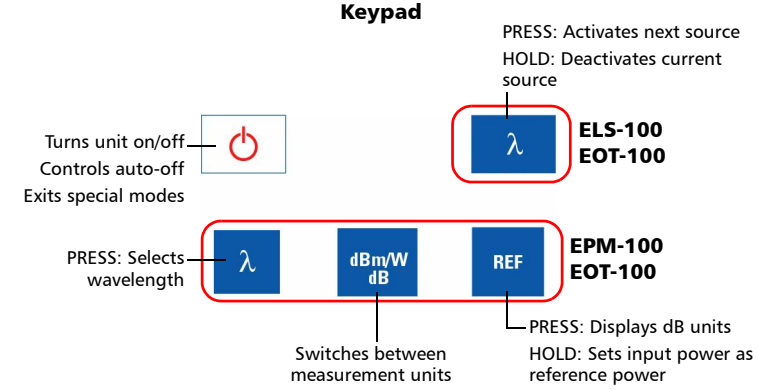
To turn the unit off:

From normal operating mode, hold down ⏻ a few seconds.

Display



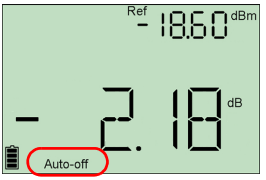
Keypad



Activating Automatic Shutdown (Auto-Off)

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

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

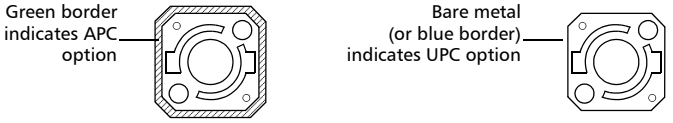


To deactivate/reactivate auto-off:

Press .

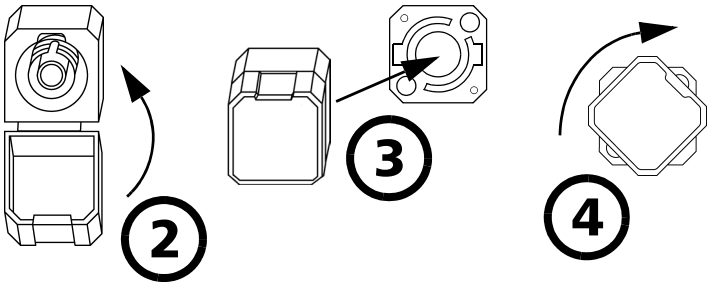
Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) or non-angled (UPC) polishing. A green border around the baseplate indicates that it is for APC-type connectors, as shown below:



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 clean fiber ends 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. Clean the fiber ends as follows:

   1a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.

   1b. Use compressed air to dry completely.

   1c. Visually inspect the fiber end to ensure its cleanliness.

2. 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.

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

   If your connector features a screwsleeve, 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.*

4 Measuring Power or Loss (EPM-100 and EOT-100)

Nulling Electrical Offsets

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

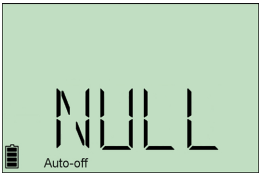
IMPORTANT

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

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

To perform an offset nulling:

Hold down dBm/W dB and λ (power meter) a few seconds. The unit displays **NULL** while nulling the offsets, then returns to normal mode.



Note: *Keypad is disabled during the operation.*

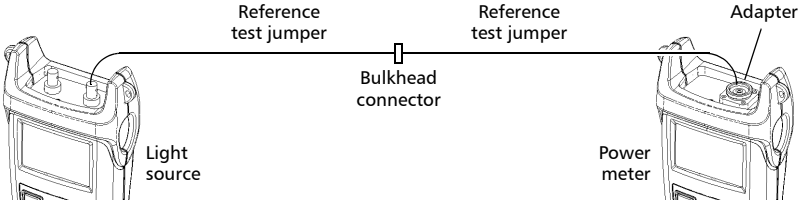
Referencing Your Power Meter to a Source

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

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

To reference the power meter to a source manually:

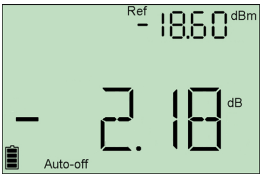
1. Using the proper adapter, connect a light source (such as ELS-100 or EOT-100) to the detector port of your power meter.



2. Activate the source at the desired wavelength.

3. Press λ(power meter) to switch between calibrated wavelengths.
4. Hold down REF a few seconds. The power meter stores the currently detected power as the new reference power.

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



5. Repeat the procedure for each wavelength you want to reference.

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

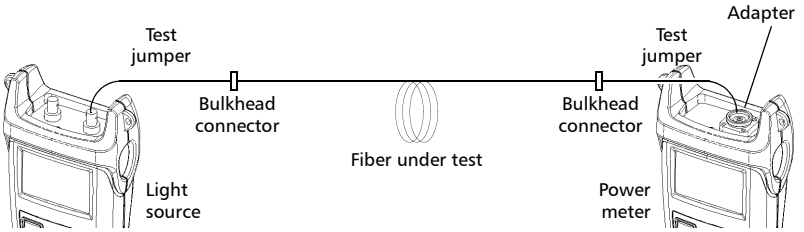
Measuring Power or Loss

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

To perform power or loss measurements:

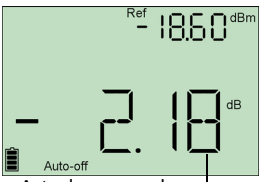
1. If necessary, perform an offset nulling (see *Nulling Electrical Offsets* on page 8).
2. Check and clean your fibers appropriately for optimum performance (see *Cleaning and Connecting Optical Fibers* on page 7).
3. For loss measurements, reference your power meter to a light source (see *Referencing Your Power Meter to a Source* on page 8), then deactivate the light source.
4. Using the proper adapter and test jumpers, connect a fiber under test to a light source (such as ELS-100 or EOT-100) and to the detector port of your unit.

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

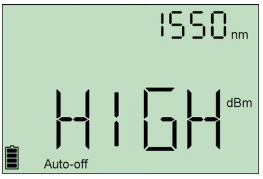


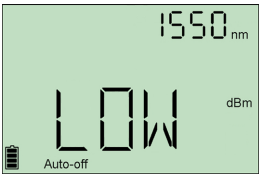
5. Activate the source at the desired wavelength.

6. Press λ(power meter) to switch between calibrated wavelengths.
7. If your want to see a loss value and your power meter displays W or dBm units, press **REF** to access reference mode.



Actual power or loss of fiber under test





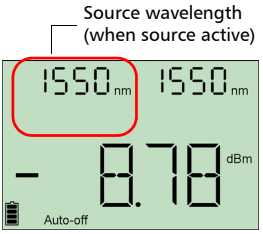
When power or loss is outside power limits (see *Technical Specifications* on page 23)

8. If necessary, change the displayed units by pressing **dBm/W dB**.
9. Repeat the procedure for other wavelengths.

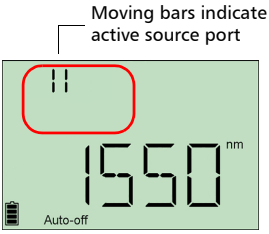
5 Using a Light Source (ELS-100 and EOT-100)

The ELS-100 may contain up to three sources (one-port models) or up to four sources (two-port models). The EOT-100 may contain up to three sources.

Only one source may be active at a time. When no source is active, the unit displays **NONE** (ELS-100) or leaves the top left corner empty (EOT-100).



EOT-100



ELS-100

To activate a light source and change the wavelength:

Press λ(source) to activate each available source in turn. The unit displays the wavelength.

To deactivate the light source:

➤ Press λ(source) until you get past the last source.

OR

➤ Hold down λ(source) a few seconds.

6 Maintenance

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

To help ensure long, trouble-free operation:

- Always clean fiber-optic connectors before using them.
- 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 and let the unit dry completely.

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Cleaning EUI Connectors

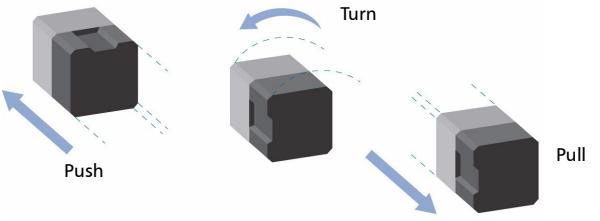
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

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

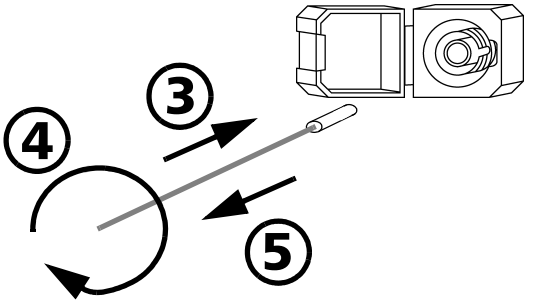
To clean EUI connectors:

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



2. Moisten a 2.5 mm cleaning tip provided by EXFO with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).

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 isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Since isopropyl alcohol is not absolutely pure, it may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, dry the surface quickly, and use a bottle that distributes only a drop of alcohol at a time.

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 portable fiber-optic microscope (e.g., EXFO's FOMS) or fiber inspection probe (e.g., EXFO's FIP).

WARNING

Verifying the surface of the connector WHILE THE UNIT IS ACTIVE WILL result in permanent eye damage.

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

8. Throw out cleaning tips and wiping clothes after one use.

Cleaning Fixed Connectors

Regular cleaning of connectors will help maintain optimum performance. *Do not try to disassemble the unit. Doing so would break the connector.*

To clean fixed connectors:

1. Fold a lint-free wiping cloth in four to form a square.
2. Moisten the center of the lint-free wiping cloth with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the wiping cloth, and do not use bottles that distribute too much alcohol at a time.

3. Gently wipe the connector threads three times with the folded and moistened section of the wiping cloth.

IMPORTANT

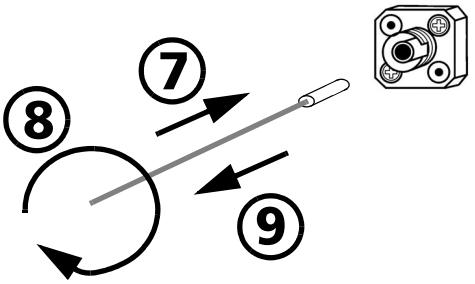
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

4. With a dry lint-free wiping cloth, gently wipe the same surfaces three times with a rotating movement.
5. Throw out the wiping cloths after one use.
6. Moisten a cleaning tip (2.5 mm tip) provided by EXFO with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the cleaning tip, and do not use bottles that distribute too much alcohol at a time.

7. Slowly insert the cleaning tip into the connector until it reaches the ferrule inside (a slow clockwise rotating movement may help).



8. Gently turn the cleaning tip one full turn.

9. Continue to turn as you withdraw the cleaning tip.
10. Repeat steps 7 to 9, but this time with a dry cleaning tip (2.5 mm tip provided by EXFO).

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

11. Throw out the cleaning tips after one use.

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 supplied cleaning tip with *only one drop* of isopropyl alcohol.

IMPORTANT

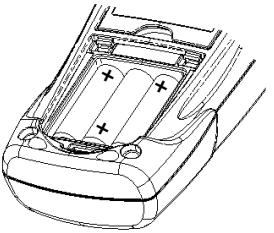
Alcohol may leave traces if used abundantly. Do not use bottles that distribute too much alcohol at a time.

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.

Replacing Disposable Alkaline Batteries

Your unit requires three AA alkaline batteries.

Note: *The AC adapter (provided with the unit) is not a charger.*



To replace disposable alkaline batteries:

1. Turn off the unit (if the AC adapter is plugged in, you may replace batteries while unit is on).
2. Open the battery compartment door located at the back of the unit.
3. Replace batteries, respecting the polarity as shown.
4. Close the battery compartment door.

WARNING

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

Recalibrating the Unit

EXFO's manufacturing and service center calibrations are based on the ISO/IEC 17025 Standard, which states that calibration documents must not contain a recommended calibration interval, unless this has been previously agreed upon with the customer.

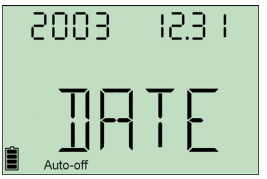
Validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance. You should determine the adequate calibration interval for your unit according to your accuracy requirements.

Under normal use, EXFO recommends calibrating your unit every year.

Note: *The FlexCare warranty program includes Calibration/Verification packages (see* Service and Repairs *on page 29).*

To view the last calibration date (EOT-100 and EPM-100 only):

1. Hold down λ(power meter) and press ⏻ at the same time. The unit displays the main embedded software version.
2. Press λ(power meter) to display the calibration date of the power meter.
3. Press ⏻ to return to normal mode.



7 Troubleshooting

Error Codes and Descriptions

- ER: error code displayed until you press a key.
- WR: warning code displayed for 3 seconds, then unit returns to normal.

Error Code	Description	Solution
LIGH	Light detected while nulling offsets. Nulling is not performed.	Correctly place protective cap on detector port, then retry.
ER 10/11 WR 22	Embedded software problem.	Contact EXFO.
ER 13	EEPROM corrupted (would occur during unit initialization).	Unit must be recalibrated. Contact EXFO.

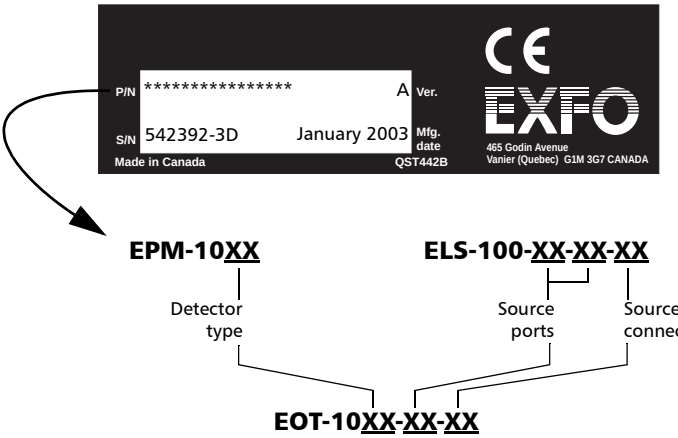
Contacting the Technical Support Group

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, 7:30 a.m. to 8:00 p.m. (Eastern Time in North America).

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

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

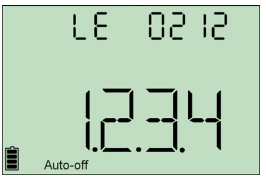
To accelerate the process, please have information such as the name and the serial number (see the product identification label—an example is shown below), as well as a description of your problem, close at hand.



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

To display the embedded software version:

1. Hold down λ(power meter or source) and press ⏻ at the same time. The unit displays the main software version.
2. [ELS-100 and EOT-100] Press λ(source) to toggle between the main and the source's software versions.
3. Press ⏻ to return to normal mode.



Finding Information on the EXFO Web Site

The EXFO Web site provides answers to frequently asked questions (FAQs) regarding the use of your EPM-100/ELS-100/EOT-100.

To access FAQs:

1. Type http://www.exfo.com in your Internet browser.
2. Click on the **Support** tab.
3. Click on **FAQs** and follow the on-screen instructions. You will be given a list of questions pertaining to your subject.

The EXFO Web site also provides the product's most recent technical specifications.

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 shock and vibration.

8 Warranty

General Information

EXFO Electro-Optical Engineering 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 recalibrate the product free of charge should the equipment need to be repaired or if the original calibration is erroneous.

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 EXFO's control.

IMPORTANT

EXFO will charge a fee for replacing optical 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 22). 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 22).

EXFO Service Centers Worldwide

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

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

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

EXFO Europe Service Center
Le Dynasteur
10/12, rue Andras Beck
92366 Meudon la Forêt Cedex
FRANCE

Tel.: +33.1.40.83.85.85
Fax: +33.1.40.83.04.42
europe.service@exfo.com

EXFO China Service Center/
Beijing OSIC
Beijing New Century Hotel
Office Tower, Room 1754-1755
No. 6 Southern Capital Gym Road
Beijing 100044
P. R. CHINA

Tel.: +86 (10) 6849 2738
Fax: +86 (10) 6849 2662
beijing.service@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

ELS-100 Specifications[1]

Model[2]	23BL	235BL	12D	01-VCL
Central wavelength (nm)	1310 ± 20 1550 ± 20	1310 ± 20 1490 ± 10 1550 ± 20	850 ± 25 1300 +50/-10	850 ± 20
Spectral width[3] (nm)	≤ 5	≤ 5	50/135	≤ 1
Output power (dBm)	≥ 1/≥ 1	≥ 1/≥ -4.5/≥ -3	≥ -18/≥ -18 (62.5/125 µm)	≥ -3 (50/125 µm)
Power stability[4] (dB)				
8 hours	± 0.10	± 0.10	± 0.10	± 0.25
Battery life (hours) (typical)	50	45	55	250
Warranty and recommended calibration interval (years)	3	3	3	3

EOT-100 Specifications[1]

Model[5]	EOT-102	EOT-102X
Power meter port	**Ge**	**GeX**
Power range (dBm)[6]	10 to -60	26 to -50
Range displayed (dBm)	Down to -65	Down to -50
Number of calibrated wavelengths[7]	6	6
Power uncertainty[8]	± 5 % ± 1 nW	± 5 % ± 10 nW
Resolution (dB)	0.01[9]	0.01[10]
Automate offset nulling[11]	Yes	Yes
Warmup time (s)[12]	0	0
Display units	dB/dBm/W	dB/dBm/W
Screen refresh rate (Hz)	3	3
Battery life (hours) (typical)	260	260
Warranty and recommended calibration interval (years)	3	3

General Specifications

Size (H x W x D)	18.5 cm x 10.0 cm x 5.5 cm	(7 1/4 in x 4 in x 2 1/8 in)
Weight	0.4 kg	(0.9 lb)
Temperature operating	-10 °C to 50 °C	(14 °F to 122 °F)
storage	-40 °C to 70 °C	(-40 °F to 158 °F)
Relative humidity	0 % to 95 % non-condensing	

Model[2]	23BL	235BL	12D	01-VCL
Central wavelength (nm)	1310 ± 20 1550 ± 20	1310 ± 20 1490 ± 10 1550 ± 20	850 ± 25 1300 +50/-10	850 ± 20
Spectral width (nm)[3]	≤ 5	≤ 5	50/135	≤ 1
Output power (dBm)	≥ 1/≥ 1	≥ 1/≥ -4.5/≥ -3	≥ -18/≥ -18 (62.5/125 µm)	≥ -3 (50/125 µm)
Power stability (dB)[4]				
8 hours	± 0.10	± 0.10	± 0.10	± 0.25
Battery life (hours) (typical)	50	45	55	250
Automatic wavelength recognition	Yes	Yes	Yes	Yes
Tone generation (Hz)	270, 1 k, 2 k	270, 1 k, 2 k	270, 1 k, 2 k	270, 1 k, 2 k
Warranty and recommended calibration interval (years)	3	3	3	3

EPM-100 Specifications[1]

Model[5]	EPM-102	EPM-102X
Power meter port	**Ge**	**GeX**
Power range[6] (dBm)	10 to -60	26 to -50
Range displayed (dBm)	Down to -65	Down to -50
Number of calibrated wavelengths[7]	6	6
Power uncertainty[8]	± 5 % ± 1 nW	± 5 % ± 10 nW
Resolution (dB)	0.01[9]	0.01[10]
Automatic offset nulling[11]	Yes	Yes
Warmup time[12] (s)	0	0
Display units	dB/dBm/W	dB/dBm/W
Screen refresh rate (Hz)	3	3
Battery life (hours) (typical)	> 300	> 300
Warranty and recommended calibration interval (years)	3	3

Notes

1. Guaranteed unless otherwise specified.
2. All specifications valid at 23 °C ± 1 °C, with an FC connector.
3. rms for lasers and FWHM for LEDs; typical values for LEDs.
4. After 15 minutes warmup; expressed as ± half the difference between the maximum and minimum values measured during the period, with an APC connector on the power meter.
5. All specifications valid at 1550 nm and 23 °C ± 1 °C, with an FC connector.
6. In CW mode; sensitivity defined as 6 x rms noise level.
7. Wavelengths: 850 nm, 1300 nm, 1310 nm, 1490 nm, 1550 nm and 1625 nm.
8. Traceable to NIST; EOT-102X: up to 20 dBm.
9. From 10 dBm to -50 dBm.
10. From 26 dBm to -35 dBm.
11. Power > -40 dBm for EOT-102, and > -25 dBm for EOT-102X.
12. For ± 0.05 dB, for temperatures > 18 °C.