
EPM-50/ELS-50

Power Meter/Light Source



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1 Introducing the EPM-50/ELS-50

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

-) EPM-50 Power Meter
-) ELS-50 Light Source

Main Features

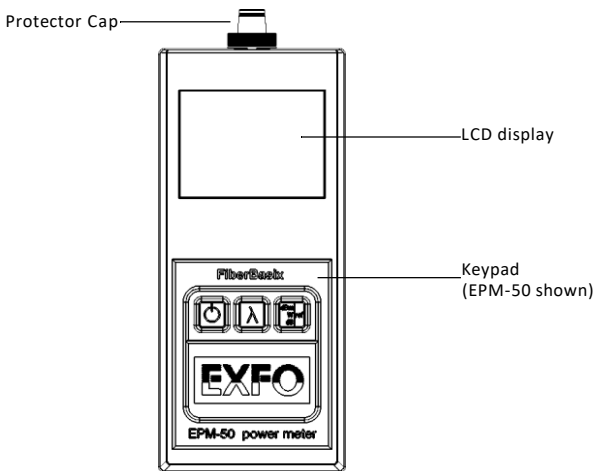
The EPM-50 Power Meter offers:

-) a rugged design
-) Interchangeable connector adapters
-) 300 hours of battery life
-) tone recognition for fiber identification
-) a universal push-pull interface
-) reference function for direct loss measurements

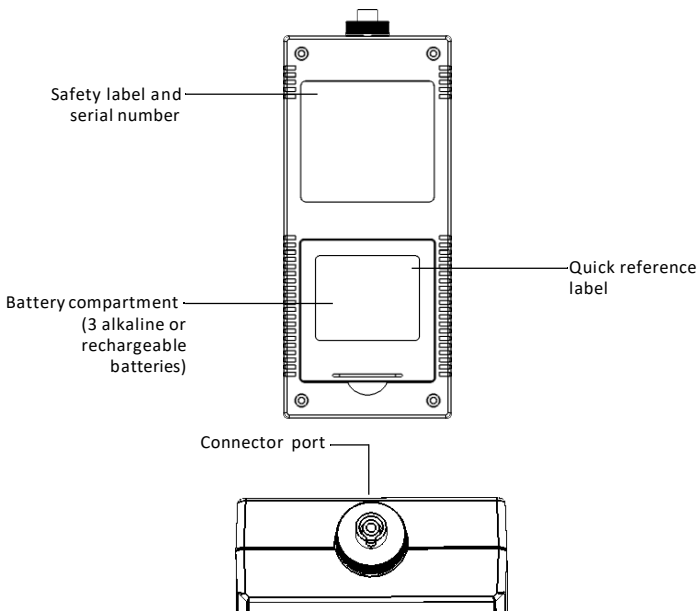
The ELS-50 Light Source offers:

-) a rugged design
-) excellent power stability for reliable loss measurements
-) interchangeable connectors interface
-) up to 60 hours of battery life
-) interchangeable connector adapters
-) tone generation for fiber identification

Front View



Back View



Power Sources

The units operate with 3 AA alkaline or rechargeable batteries.



IMPORTANT

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

Typical Applications

The units offer specific typical applications.

EPM-50 Power Meter:

-) High power model for CATV and Telco applications
-) Enterprise/LAN for singlemode and multimode measurements

ELS-50 Light Source:

-) Telco/CATV and FTTH models; dual and triple wavelengths
-) Enterprise/LAN models; singlemode and multimode

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.

2 Safety Information



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 1 laser product in compliance with standards IEC 60825-1 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

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



Note: *The label is affixed to your product.*

3 Getting Started

Turning the Unit On and Off

When you turn off the EPM-50, it saves the current wavelength, unit and reference power.



IMPORTANT

If you remove the batteries, the unit will turn off *without saving the above values.*

If batteries are low, the unit will save the above values and turn off.

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

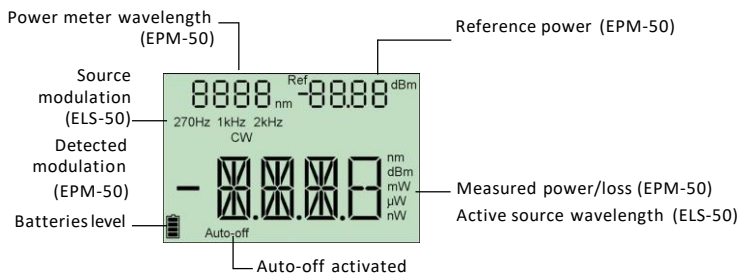
To turn on the unit:

Press . You may use the unit immediately under normal conditions.

To turn off the unit:

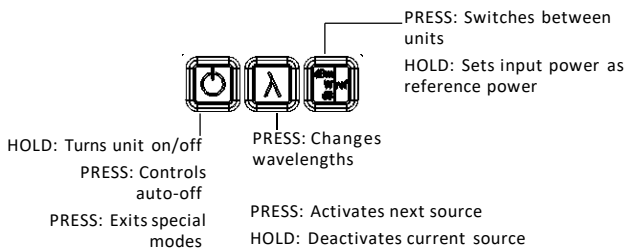
From normal operating mode, hold down a few seconds.

Display

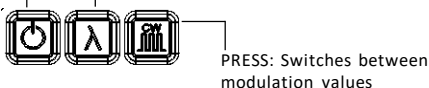


Keypad

EPM-50



ELS-50




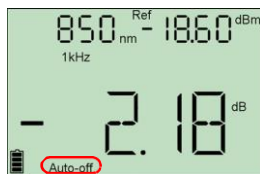
Activating Automatic Shutdown (Auto-Off)

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

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

To deactivate/reactivate auto-off:

When unit is on, press .



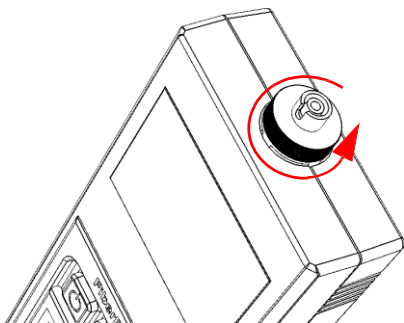
Note: *Auto-off is automatically disabled when you perform an offset nulling.*

Changing Connector Adapters

The connector adapters are optional accessories available on the EPM-50 Power Meter and ELS-50 Light Source. Depending on the type of connector on the fiber you need to test, you might have to change them.

To change connector adapters:

1. Hold the unit so the connector port is facing you.
2. Turn the connector adapter counterclockwise to unscrew it.



3. Screw in the adapter you want to use.

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. FS 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 microscope. 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 isopropyl alcohol.
 - 2b.** Use compressed air to dry 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 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-50)

Nulling Electrical Offsets

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





IMPORTANT

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

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

To perform an offset nulling:

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

Note: *Keypad is disabled during the operation.*



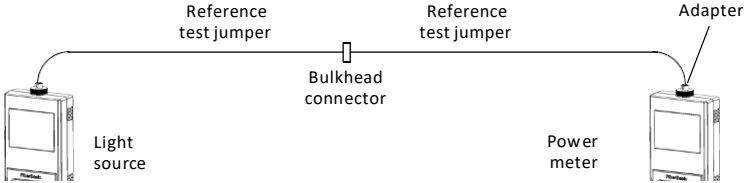
Referencing Your Power Meter to a Source


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-50) to the detector port of your power meter.



2. Activate the source at the desired wavelength.
3. Match the source and power meter wavelengths using . Wavelength is displayed in the top left corner.

4. Hold down  for a few seconds. The power meter stores the currently detected power as the new reference power.

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



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

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

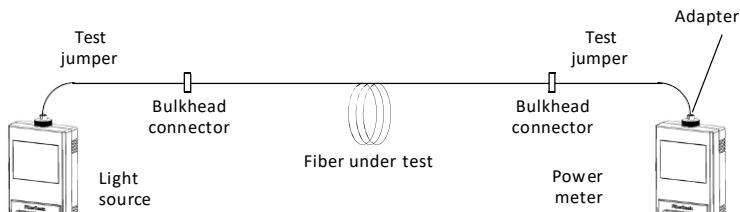
Measuring Power or Loss


Measuring absolute power is done the same way as referencing the power meter to a source, except for the referencing step.

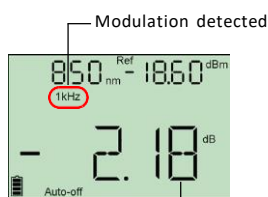
To perform power or loss measurements:

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 9](#)), 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-50) and to the detector port of your unit.

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



5. Activate the source at the desired wavelength.
6. Match the source and power meter wavelengths using .




Actual power
or loss
of fiber under test



When power or loss is outside power limits
(see [Technical Specifications on page 27](#))

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

7. If necessary, change the displayed units by pressing .
8. Repeat the procedure for other wavelengths.


5 Using a Light Source (ELS-50)

The ELS-50 may contain up to three sources.



Activating/Deactivating a Light Source

Only one source may be active at a time. When no source is active, the unit displays **OFF** and leaves the top left corner empty.

To activate a light source and change the wavelength:

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

To deactivate the light source:


-) Press  until you get past the last source.
- OR
-) Hold down  a few seconds.

Modulating the Source Signal

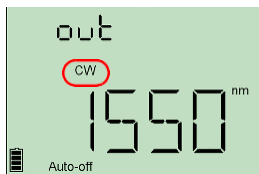
When you activate the first source, the signal is always CW (unmodulated). When you switch sources, the modulation remains the same. Modulation is indicated in the top left corner.

Available modulation values are: CW, 270 Hz, 1 kHz and 2 kHz.

To change the signal modulation:

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

Note: When the output signal is modulated (270Hz, 1kHz, 2kHz), you will notice the mention out blinking in the top left corner of the display.



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 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

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.

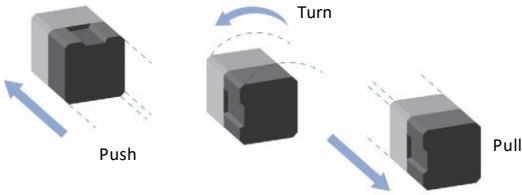


IMPORTANT

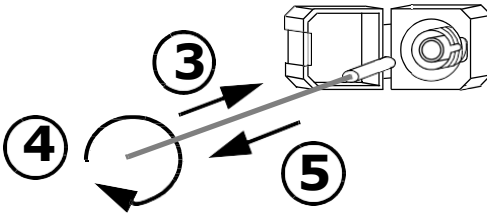
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

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 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 or fiber inspection probe.



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 cloths 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.

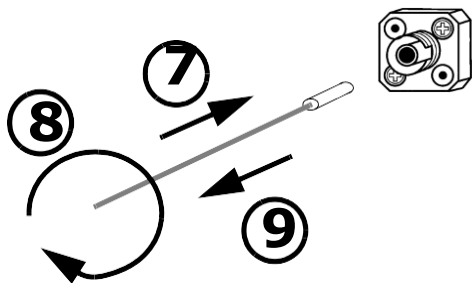
4. With a dry lint-free wiping cloth, gently wipe the same surfaces three times with a rotating movement.
5. Throw out the wiping cloths after one use.
6. Moisten a cleaning tip (2.5 mm tip) with *only one drop* of isopropyl alcohol.



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.

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 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.

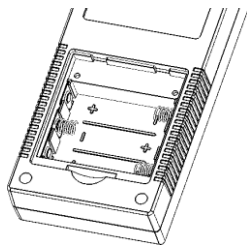
4. While applying light pressure (to avoid breaking the detector window), gently rotate the cleaning tip on the detector window.
5. Repeat step 4 with a dry cleaning tip or blow dry with compressed air.
6. Discard the cleaning tips after one use.

Replacing Batteries

Your unit requires three AAalkaline or rechargeable batteries.

To replace batteries:

1. Turn off the unit.
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. Do not disassemble.

Recalibrating the Unit

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, we recommend calibrating your unit every year.

Note: *Recalibration only applies to the EPM-50 Power Meter.*

7 Troubleshooting

Solving Common Problems

Problem	Possible Cause	Solution
The unit does not turn on.	Batteries are discharged.	Replace batteries.
Reference power different than source output power.	Received power outside detector's range.	Change source output power.

Error Codes and Descriptions

ER: error code displayed until you press a key.

Error Code	Description	Solution
LIGH (EPM-50 only)	Light detected while nulling offsets. Nulling is not performed.	Correctly place protective cap on detector port, then retry.
3/11	Embedded software problem.	Contact EXFO.
7	Hardware problem.	Replace unit.
13	Non-volatile memory corrupted (would occur during unit initialization).	<ul style="list-style-type: none">) Hold down all 3 buttons during initialization to reset unit.) Unit must be recalibrated. Contact EXFO.

A Technical Specifications



IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only.

EPM-50 Specifications

SPECIFICATIONS ^a

MODEL	EPM-53	EPM-53X
Power meter port	InGaAs	InGaAsX
Power range ^b (dBm)	10 to -60	26 to -50
Number of calibrated wavelengths ^c	5	5
Power uncertainty ^d	±5 %	±5 %
Resolution (dB)	0.01	0.01
Display units	dB/dBm/W	dB/dBm/W
Tone detection (Hz)	270, 1 k, 2 k	270, 1 k, 2 k
Battery life (hours) ^d	>300	>300
Warranty (year)	1	1

GENERAL SPECIFICATIONS

Size (H x W x D)	189 mm x 78 mm x 37 mm (7 7/16 in x 3 1/16 in x 1 7/16 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

STANDARD ACCESSORIES

Soft pouch, PMA-22 F C connector adapter, quick reference sticker in five languages, Certificate of Calibration, Certificate of Compliance, three AA batteries

Notes

- All specifications valid at 23 °C ± 3 °C, with an FC/UPC connector
- In CW mode
- Wavelengths: 850 nm, 1300 nm, 1310 nm, 1490 nm, 1550 nm
- Typical

ELS-50 Specifications

SPECIFICATIONS		
MODEL	23BL	12C
Central wavelength (nm) ^b	310 ± 20 550 ± 20	850 ± 25 300 +50/-10
Spectral width (nm) ^{b, c}	5	40/120
Output power (dBm)	-5	-24/-21 (50/125 μm)
Power stability (dB) ^{b, d}	±0.10	±0.10
Battery life (hours) ^b	60	60
Tone generation (Hz)	270, 1 k, 2 k	270, 1 k, 2 k
Warranty (year)		

GENERAL SPECIFICATIONS		
Size (H xW xD)	189 mm x 78 mm x 37 mm (7 7/16 in x 3 1/16 in x 1 7/16 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	

STANDARD ACCESSORIES	
Soft pouch, LSA-89 FC connector adapter, quick reference sticker in five languages, Certificate of Compliance, three AA batteries	

Notes

- a. All specifications valid at 23 °C ± 3 °C, with an FC/UFC connector
- b. Typical
- c. rms for lasers and -3 dB width for LEDs
- d. After 15 minutes warmup; expressed as ± half the difference between the maximum and minimum values measured over 8 hours