FPM-300/FLS-300
Power Meter/Light Source
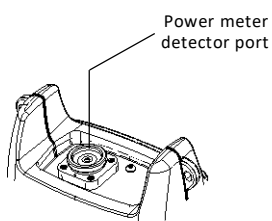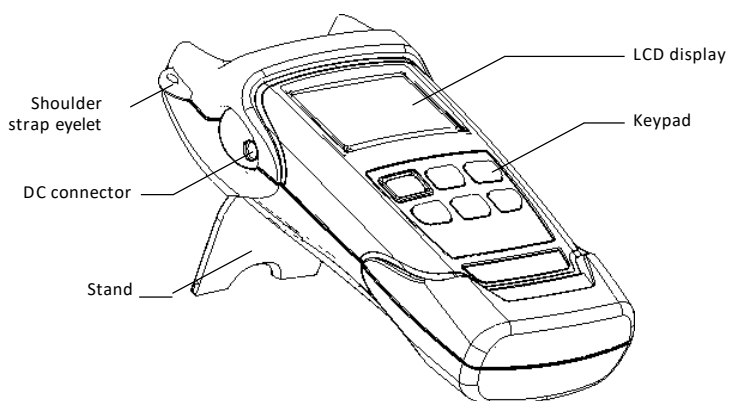
EXFO

EXPERTISE REACHING OUT

Contents

1 Introducing the FPM-300/FLS-300

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

FPM-300 Power Meter

FLS-300 Light Source

Main Features

	FPM	FLS
Ge or GeX detector with 10 calibrated wavelengths	X	
Absolute power and link loss measurements	X	
Editable list of favorite power meter wavelengths	X	
Editable list of favorite source wavelengths		
Automatic wavelength detection	X	
No offset nulling of detectors required in normal operation	X	
Multiple source configurations on a single port		X
Transmission of editable power value with source's signal for automatic reference with compatible power meter		X
Transmission of wavelength to compatible power meter in automatic wavelength or auto-switching mode		X
Modulated signal emission or detection (270 Hz, 1 kHz and 2 kHz) compatible with other EXFO units	X	X
Automatic shutdown after 10 minutes of idle time (auto-off)	X	X

LCD display

Shoulder strap eyelet

Keypad

DC connector

Stand

Power meter detector port

Light source ports

FPM-300

FLS-300

Safety label and serial number (under the stand)

Quick reference label

Battery compartment (3 alkaline batteries)
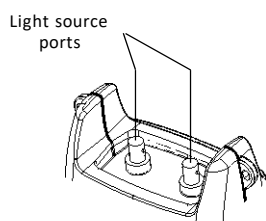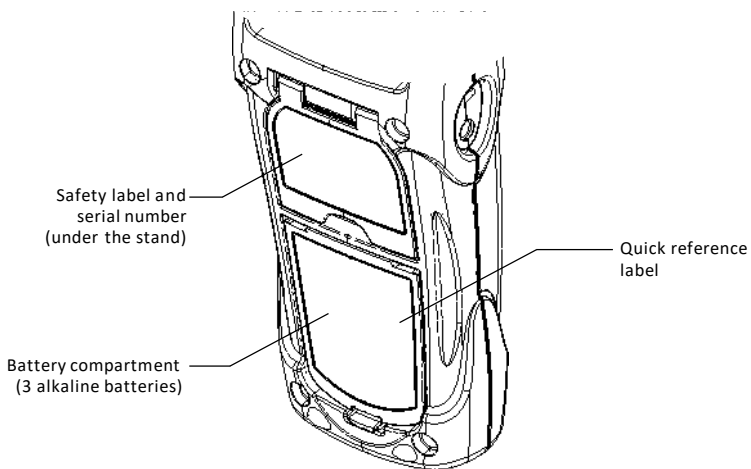
Power Sources

The units operate with the following power sources:

AC adapter (connected to standard power outlet—indoor use only)
Compatible car outlet adapter available upon request.

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)

Fiber identification with 270-Hz, 1-kHz and 2-kHz signals

Fiber installation and maintenance applications

FTTx: testing of passive optical networks (PONs)

Conventions

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

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

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

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

IMPORTANT
Refers to information about this product you should not overlook.
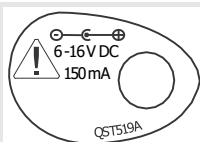
2 Safety Information

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

Electrical Safety Information

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

⚠ 6 -16 V DC
150 mA

QST519A

WARNING
Do not use the unit outdoors in wet locations.

Laser Safety Information (FLS-300)

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

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.

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:

Class 1 Laser Product
Complies with 21 CFR 1040.10
except for deviations
pursuant to Laser Notice No. 50
dated 2007.

Equipment Ratings	
Temperature	
Operation	-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
Maximum operation altitude	2000 m (6562 ft)
Pollution degree	2 (unit used inside; connected to AC mains or powered by batteries)[a]
	3 (unit used outside; powered by batteries)[b]
Overvoltage category	II
Powersupply rating	100 V to 240 V (50 Hz/60 Hz)
	Maximum input current 0.12 A

a. Use the external power supply indoors only.
b. Equipment should be normally protected against exposure to direct sunlight, precipitations and full wind pressure.

3 Getting Started

Turning the Unit On and Off

When you turn off the FPM-300, 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.**
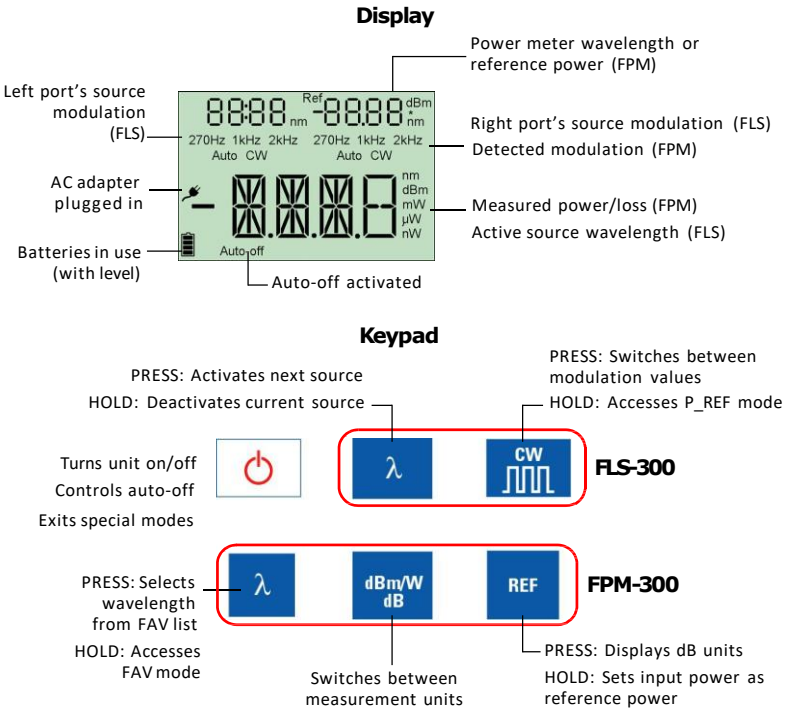
Note: Offset nulling values are always returned to factory settings.

To turn on the unit:
Press ⏻. The unit displays **EXFO Inc.** for a few seconds. You may use it immediately under normal conditions.

To turn off the unit:
From normal operating mode (that is, not FAV or PREF), hold down ⏻ a few seconds.

Display

Power meter wavelength or reference power (FPM)

Left port's source modulation (FLS)

Right port's source modulation (FLS)
Detected modulation (FPM)

AC adapter plugged in

Measured power/loss (FPM)
Active source wavelength (FLS)

Batteries in use (with level)

Auto-off activated

Keypad

PRESS: Switches between modulation values
HOLD: Accesses P_REF mode

PRESS: Activates next source
HOLD: Deactivates current source

Turns unit on/off
Controls auto-off
Exits special modes

FLS-300

PRESS: Selects wavelength from FAV list
HOLD: Accesses FAV mode

FPM-300

Switches between measurement units

PRESS: Displays dB units
HOLD: Sets input power as reference power

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.
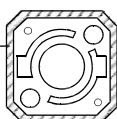
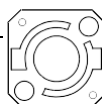*To deactivate/reactivate auto-off:*
When unit is on, press ⏻.

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.

Green border indicates APC option

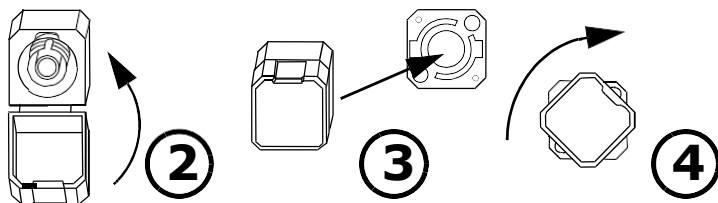Bare metal (or blue border) indicates UPC option

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. 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 (FPM-300)

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 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.*

Defining a List of Favorite Wavelengths

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

At the factory (or after recalibration), the list contains 10 calibrated wavelengths.

Note: *The list must always contain at least one wavelength.*

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

1. Hold down λ (power meter) a few seconds. The unit enters the FAV list and displays the current wavelength.

2. Press λ (power meter) to switch between available wavelengths. An asterisk (✱) appears beside wavelengths already on the list.

3. Press **dBm/W dB** to include/exclude the displayed wavelength.

4. Repeat steps 2 to 3 for other wavelengths as necessary.

5. Press ⏻ to return to normal mode. If your list is empty, the unit beeps and you cannot exit the FAV list.
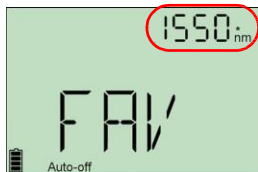
Referencing Your Power Meter to a Source

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

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

Compatible sources (such as FLS-300) can transmit a power value to your power meter, avoiding the need for manual referencing.

IMPORTANT

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

To receive the reference power value from a compatible source:

1. Connect a compatible source to your power meter (as shown below, with or without a fiber under test).

2. Use the source to emit the signal that contains its power value (see *To change the signal modulation: on page* 16).

> If reference value or units change, the power meter beeps and displays *REF* while detecting the special signal.

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

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

To reference the power meter to a source manually:

1. Using the proper adapter, connect a light source (such as FLS-300) to the detector port of your power meter.

Reference test jumper   Reference test jumper   Adapter

Bulkhead connector

Light source   Power meter
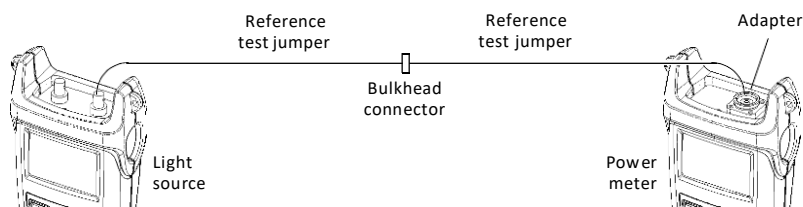
2. Activate the source at the desired wavelength.

3. Match the source and power meter wavelengths:

> If the source emits an auto-wavelength signal (see *Automatically Detecting Wavelength* on page 15), the power meter automatically matches the source wavelength.

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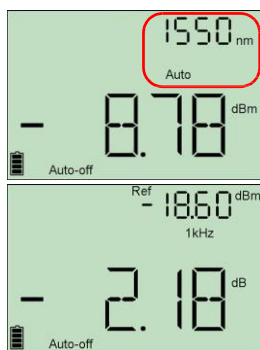
Note: *When using dB units, press* λ (power meter) *to display the current wavelength for a few seconds. To change this wavelength, press* λ *again while it is displayed.*

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

Measuring Power or Loss

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

To perform power or loss measurements:

1. If necessary, perform an offset nulling (see *Nulling Electrical Offsets* on page 9).

2. Check and clean your fibers appropriately for optimum performance (see *Cleaning and Connecting Optical Fibers* on page 8).

3. For loss measurements, reference your power meter to a light source (see *Referencing Your Power Meter to a Source* on page 11), then deactivate the light source.

4. Using the proper adapter and test jumpers, connect a fiber under test to a light source (such as FLS-300) and to the detector port of your unit.

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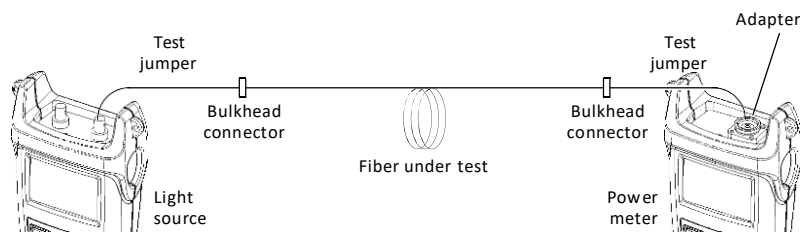
5. Activate the source at the desired wavelength.

6. Match the source and power meter wavelengths:

    If the source emits an auto-wavelength signal (see *Automatically Detecting Wavelength* on page 15), the power meter automatically matches the source wavelength.
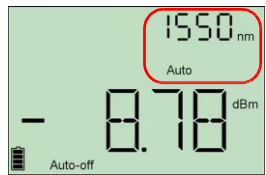
    If the source emits an auto-wavelength signal or is in auto-switching mode (see *Automatically Detecting Wavelength* on page 15 and see *To receive the auto-wavelength signal or detect the source's auto-switching mode:* on page 15), the power meter automatically matches the source wavelength. OR

    Press **λ** (power meter) to switch between pre-selected wavelengths (see *Defining a List of Favorite Wavelengths* on page 10).

7. If you want to see a loss value and your power meter displays W or dBm units, press **REF** to access reference mode.

Modulation detected

Actual power or loss of fiber under test

When power or loss is outside power limits (see *Technical Specifications* on page 32)

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

8. If necessary, change the displayed units by pressing **Bm/W dB**

9. Repeat the procedure for other wavelengths.

Automatically Detecting Wavelength

Compatible sources (such as FLS-300) can transmit their wavelength value through the fiber, avoiding the need to manually match the source and power meter wavelengths.

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

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

1. Connect a compatible source to your power meter.

2. Activate the source in Auto mode (FLS-300: see *Modulating the Source Signal* on page 16) or in auto-switching mode.

   Your power meter automatically matches the source wavelength. If the wavelengths differ, it also beeps and returns you to normal operating mode.
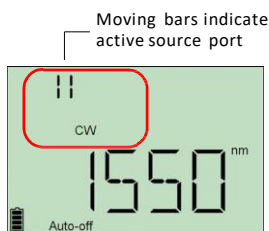
5 Using a Light Source (FLS-300)

The FLS-300 may contain up to two sources (one-port models)

Activating/Deactivating a Light Source

Only one source may be active at a time. When no source is active, the unit displays **NONE** (FLS-300).

Moving bars indicate active source port

FLS-300

To activate a light source and change the wavelength:

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

To deactivate the light source:

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

OR

Hold down λ (source) 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 (port #1) or top right (port #2) corner.

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

Note: *Auto is a modulated signal detected by compatible units (see* Automatically Detecting Wavelength *on page 15). It provides longer battery life than CW, but covers a reduced power range.*

To change the signal modulation:

1. Activate the source.
2. Press 🔲 to switch between available modulations.
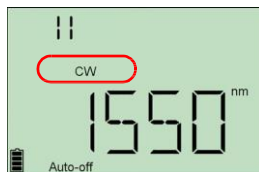
Sending Source Power Value with Signal

Your source can transmit a user-defined power value to compatible power meters (such as FPM-300) through the fiber. If the reference source is far from the power meter, you can connect your source to the power meter to send the reference value. With this feature you can also correct for power variations.

Note: *For details about how compatible power meters receive this power value, see* Referencing Your Power Meter to a Source *on page 11.*

IMPORTANT

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

If the source emits an auto-wavelength signal (see *Automatically Detecting Wavelength on page* 15), the power meter automatically matches the source wavelength.

To send the source power value:

1. Activate the source.

2. Hold down a few seconds. The unit switches to **PREF** mode and displays the wavelength and transmittable power. The left/right modulation indicator identifies the current source port.

$$
\boxed{\;850_{nm} \overset{Ref}{\;-} 2.84^{dBm}\;}
$$

Auto

PREF

🔋 Auto-off

3. If necessary, edit the value to send.

   3a. Press The first digit of the power value blinks.

   3b. Revert to the *factory-default power value* by holding down and

   λ (source) a few seconds.

   OR

   Select a digit to change by pressing λ (source) until it blinks, then increase its value by pressing (it returns to 0 after 9). After the last digit, all digits blink. You may add/remove the "–" sign by pressing

   OR

   3c. Press ⏻ to save the modified value (the value remains in memory even when you turn the unit off).

4. Press λ (source) to send the power value with an auto-wavelength signal.

   OR

   Press ⏻ to return to normal mode without sending a power value.

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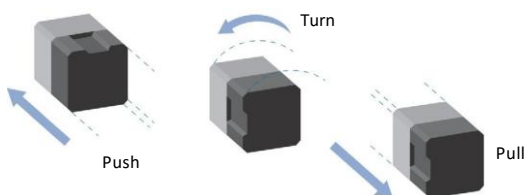
2. Moisten a 2.5 mm cleaning tip with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).

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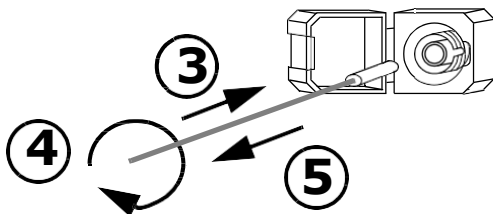
4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

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).
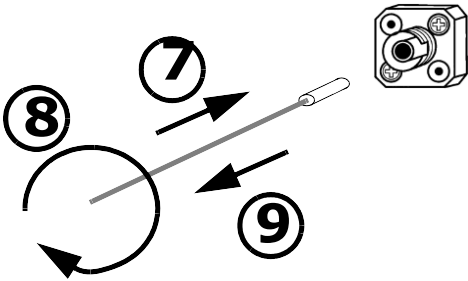
8. Gently turn the cleaning tip one full turn.

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 AA alkaline batteries.

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

To replace 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.
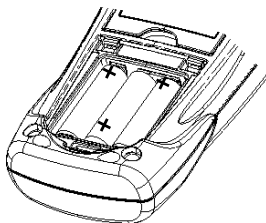
WARNING

Do not throw batteries into fire or water and do not short-circuit the batteries' electrical contacts. 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 recommends calibrating your unit every three years.

Note: *The FlexCare warranty program includes Calibration/Verification packages (see* *).*

To view the last calibration date (FPM-300 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

Solving Common Problems

Problem	Possible Cause	Solution
Unable to change power meter wavelength.	Unit receiving Auto (or REF) signal from source.	Change source mode (see _Modulating the Source Signal_ on page 16), then retry.
	Only one wavelength in list.	Add wavelengths.
Unable to change power meter dB unit or reference power. OR Changed unit or reference value are replaced by other values after a while.	Unit receiving REF signal from source. See _Press to switch between available modulations._ on page 16.	Wait a few seconds until power value is received, then retry.
Many beeps, unstable optical power and blinking **Auto** (or modulation) indicator.	Power too low to recognize Auto mode (or modulation).	Increase source power or switch source to CW.
Reference power different than source output power.	Received power outside detector's range.	Change source output power.

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.
10/11/22	Embedded software problem.	Contact EXFO.
13	EEPROM corrupted (would occur during unit initialization).	Unit must be recalibrated. Contact EXFO.
20	Wavelength sent from compatible source emitting in Auto mode is not available on your power meter.	Change source wavelength or switch source to CW.
28	Unstable optical power detected.	Increase source power in Auto mode, or switch source to CW.

A Technical Specifications

IMPORTANT

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

SPECIFICATIONS [a]

Model [b]	FPM-302	FPM-302X
Power meter port	Ge	GeX
Power range [c] (dBm)	10 to -60	26 to -50
Range displayed (dBm)	Down to -65	Down to -50
Number of calibrated wavelengths [d]	10	10
Power uncertainty [e]	± 5 % ± 1 nW	± 5 % ± 10 nW
Resolution (dB)	0.01 [f]	0.01 [g]
Automatic offset nulling [h]	Yes	Yes
Warmup time [i] (s)	0	0
Display units	dB/dBm/W	dB/dBm/W
Automatic wavelength recognition [j]	Yes	Yes
Screen refresh rate (Hz)	3	3
Tone detection (Hz)	270, 1 k, 2 k	270, 1 k, 2 k
Battery life (hours) (typical)	> 300	> 300
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	

NOTES
a. Guaranteed unless otherwise specified.
b. All specifications valid at 1550 nm and 23 °C ± 1 °C, with an FC connector.
c. In CW mode; sensitivity defined as 6 x rms noise level.
d. Wavelengths: 830 nm, 850 nm, 980 nm, 1300 nm, 1310 nm, 1450 nm, 1490 nm, 1550 nm, 1590 nm and 1625 nm.
e. Traceable to NIST; FPM-302X: up to 20 dBm.
f. From 10 dBm to -50 dBm.
g. From 26 dBm to -35 dBm.
h. Power of > -40 dBm for FPM-302, and of > -25 dBm for FPM-302X.
i. For ± 0.05 dB and temperatures of > 18 °C.
j. At 850 nm, 1300 nm, 1310 nm, 1490 nm, 1550 nm and 1625 nm; power of > -50 dBm for FPM-302, and of > -40 dBm (typical) for FPM-302X.

SPECIFICATIONS [a]

Model [b]	23BL	12D
Central wavelength (nm)	1310 ± 20	850 ± 25
	1550 ± 20	1300 + 50/-10
Spectral width [c] (nm)	) 5	50/135
Output power (dBm)	[e] 1/[e] 1	[e] -20/[e] -20 (62.5/125 μm)
Power stability [d] (dB)		
8 hours	±0.10	±0.10
Battery life [e] (hours)	120	120
Enables automatic wavelength recognition	Yes	Yes
Tone generation (Hz)	270, 1 k, 2 k	270, 1 k, 2 k
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	

NOTES
a. Guaranteed unless otherwise specified.
b. All specifications valid at 23 °C ± 1 °C, with an FC connector.
c. rms for lasers and -3 dB width for LEDs; typical values for LEDs.
d. 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.
e. Typical autonomy in Auto mode.