MultiFiber™ Pro
Optical Power Meter and Fiber Test Kits

Users Manual

May 2012
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Fluke Networks
PO Box 777
Everett, WA 98206-0777
USA
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MultiFiber™ Pro Fiber Test Kits

Introduction

The MultiFiber™ Pro meter and source let you measure optical power and power loss on fiber installations that have MTP®/MPO connectors.

In one test, the meter measures optical power or power loss on 12 fibers at one wavelength. The test results include the polarity of the connections (A, B, C, or other). The meter measures at 850 nm, 1300 nm, 1310 nm, or 1550 nm.

The meter stores the loss or power measurements for up to 250 12-fiber cables. You can use LinkWare™ software to upload the records to a PC and create professional-quality test reports.

Registration

Registering your product with Fluke Networks gives you access to valuable information on product updates, troubleshooting tips, and other support services. To register, fill out the online registration form on the Fluke Networks website at www.flukenetworks.com/registration.

The Fluke Networks Knowledge Base

The Fluke Networks Knowledge Base answers common questions about Fluke Networks products and provides articles on cable testing techniques and technology. To access the Knowledge Base, log on to www.flukenetworks.com, then click SUPPORT > Knowledge Base.
Safety Information

Table 1 describes the international electrical symbols used on the meter and source and in this manual.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>⚠️</td>
<td>Warning or Caution: risk of damage or destruction to equipment or software. See explanations in the manual.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warning: Risk of electric shock.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warning: Class 1 laser. Risk of eye damage from hazardous radiation.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Do not put products containing circuit boards into the garbage. Dispose of circuits boards in accordance with local regulations.</td>
</tr>
</tbody>
</table>

Forge: This key on the meter and source turns the units on and off.
Warning: Class 1 Laser

To prevent possible eye damage caused by hazardous radiation:

- Do not look directly into optical connectors. Some optical equipment emits invisible radiation that can cause permanent damage to your eyes.
- Do not turn on the source unless a fiber is attached to the port.
- When you inspect fiber endfaces, use only magnification devices that have the correct filters.
- Do not open the case, except to change the batteries; no user-serviceable parts are inside.
- Use of controls, adjustments, or procedures not stated herein can possibly result in hazardous radiation exposure.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment can possibly be impaired.

Caution

To prevent damage to fiber connectors, to prevent data loss, and to ensure maximum accuracy of test results:

- Use proper cleaning procedures to clean all fiber connectors before every use. Neglecting this step or using improper procedures can cause unreliable test results and may permanently damage the connectors.
- Cover all connectors with protective caps when not in use.
- Do not connect the source to an active network. Doing so can disrupt network operations.
- To prevent unreliable test results, replace the battery as soon as the low battery icon appears.
Unpacking

The MultiFiber Pro Fiber Test Kits come with the accessories listed below. If something is damaged or missing, contact the place of purchase immediately.

MFTK1200 Base Kit

- MultiFiber Pro optical power meter
- MultiFiber Pro 850 nm source
- Two test reference cords, OM4, MTP/MPO, pinned/pinned, type B polarity, 1 m
- One test reference cord, OM4, MTP/MPO, pinned/unpinned, type B polarity, 1 m
- One test reference cord, OM4, MTP/MPO, unpinned/unpinned, type B polarity, 0.3 m
- Two MTP/MPO adapters, key up/key up
- 4 AA alkaline batteries
- IBC™ OneClick Cleaner for MTP/MPO connectors
- USB cable for PC communications
- Carrying case
- MultiFiber Pro Getting Started Guide
- MultiFiber Pro Product Manuals CD
- LinkWare Software CD
**Unpacking**

**MFTK1400 Inspection Kit**
- MultiFiber Pro optical power meter
- MultiFiber Pro 850 nm source
- FT600 FiberInspector™ Pro Video Microscope
- NF370 MTP/MPO tip for the Video Microscope
- Two test reference cords, OM4, MTP/MPO, pinned/pinned, type B polarity, 1 m
- One test reference cord, OM4, MTP/MPO, pinned/unpinned, type B polarity, 1 m
- One test reference cord, OM4, MTP/MPO, unpinned/unpinned, type B polarity, 0.3 m
- Two MTP/MPO adapters, key up/key up
- 4 AA alkaline batteries
- IBC™ OneClick cleaner for MTP/MPO connectors
- USB cable for PC communications
- Carrying case for the MultiFiber Pro
- Carrying case for the FT600
- MultiFiber Pro Getting Started Guide
- MultiFiber Pro Product Manuals CD
- LinkWare Software CD

**MFPOWERMETER MultiFiber Pro Power Meter**
- MultiFiber Pro optical power meter
- 2 AA alkaline batteries

**MFMULTIMODESOURCE MultiFiber Pro 850 nm Source**
- MultiFiber Pro 850 nm source
- 2 AA alkaline batteries
**Battery Installation, Life, and Status**

Figure 1 shows how to install the batteries.

The batteries operate for 30 hours minimum in the meter and source.

When the batteries are low, the low battery icon (Elf) flashes.

Note: Fluke Networks recommends alkaline batteries.

**Figure 1. Installing the Batteries**

**Keys and Connectors**

**Figure 2. Meter and Source Features**
1. **0**: On/off key.

2. **F1 F2 F3**: Softkeys. The function for each key shows above the key. For access to user preferences, hold down **F1** and **F3** for 2.5 seconds. See "How to Change User Preferences" on page 11.

3. **Menu**: Meter: Press **Menu** to change the measurement mode. For access to a menu of test settings and the VIEW RECORD mode, hold down **Menu** for 2.5 seconds. See item 1 in Figure 3 on page 8.

   Source: To see modes for the source, hold down **Menu** for 2.5 seconds. See item 1 in Figure 4 on page 10.

4. MTP/MPO connector with self-closing, protective cover.

5. USB port for uploading test records from the meter to a PC. See "Upload Records to a PC" on page 30. You can also use the port to install software updates. See "Update the Software" on page 32.
Display Features

1. Modes for the meter and settings for tests. To select the **POWER**, **SET REF**, or **LOSS** measurement modes, press \( \text{MODE} \). To change settings for measurements or to view records, hold down \( \text{MODE} \) for 2.5 seconds, then use \( \uparrow \downarrow \) and \( \leftarrow \rightarrow \) to make selections.

- **POWER**: Use this mode to measure optical power. See "How to Measure Optical Power" on page 15.
- **SET REF**: Use this mode to set the reference for loss measurements. See "Set the Reference for Loss Measurements" on page 19.
- **LOSS**: Use this mode to measure loss. See "How to Measure Loss" on page 18.
- **LOSS LIMIT**: Select this to set the limit for loss measurements. See "Set the Limit for Loss Measurements" on page 18.
- **VIEW RECORD**: Use this mode to see and delete saved results. See "View Records" on page 27.

2. \( \text{OK} \): There is a problem with a measurement, or you tried to save a measurement, but the memory is full. \( \text{OK} \): All measurements are satisfactory, or the meter saved the results.

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Figure 3. Meter Display Features

GEU03.EPS
Display Features

3 POLARITY: The polarity of the connections between the meter and source:
   • A, B, C: The connections use a standard method, A, B, or C. See Figure A-1 on page 40.
   • ?: The connections do not use a standard method.
   • OTHER: The connections use the Corning Plug & Play™ Universal Systems method of polarity management. See Figure B-16 on page 59.
   • If POLARITY does not show, one or more fibers are not connected or SCAN ALL is off on the source.

4 2 kHz: The meter detects a 2 kHz modulated optical signal. This function helps you identify fibers at patch panels. See "How to Identify Cables or Fibers" on page 26.

5 SAVE: When SAVE shows, you can press F1 to save the power or loss measurement or the reference value.

6 ▼▲: The arrow icons show when you can use F1 ▼ or F2 ▲ to scroll through selections or change settings.

7 CHANNEL: When you measure power or loss, press F2 to scroll through the measurements for the channels.

8 λ: When the source is not in auto wavelength mode, press F2 λ to change the wavelength.

9 DELETE: In VIEW RECORD mode, use F3 DELETE to delete the selected record or all records. See "Delete Records" on page 27.

10 Numeric display with units for loss (dB) and power measurements (mW, µW, dBm).


12 □: Channel indicator. When the source's SCAN ALL function is on, the channel indicator is on the channel that you select. When the source's SCAN ALL function is off, the indicator stays on the channel you select on the source. The numbers for the channels flash in sequence when the meter measures power or loss.

13 The bargraphs show relative value of the loss or power measurement for each channel. For power measurements, see Figure 7 on page 16. For loss measurements, see Figure 9 on page 23.

14 Numeric display for the wavelength.

15 !: When the batteries are low, the low battery icon flashes.
**AUTO** λ shows when the source transmits a wavelength identifier, and the meter changes its wavelength setting to agree with the source. When only λ shows, you must press F3 λ on the meter to select the correct wavelength. See page “Auto Wavelength Function” on page 13.

This icon shows when the meter is connected to a PC through the USB port.
How to Change User Preferences

1. Modes for the source (to see the menu, hold down \( \text{Menu} \) for 2.5 seconds):

   - **SCAN ALL ON**: The source changes the channel automatically.
   - **SCAN ALL OFF**: You press \( F_1 \) \( \downarrow \) or \( F_2 \) \( \uparrow \) to change the channel.
   - **AUTO \( \lambda \)**: ON: The source transmits a wavelength identifier that a MultiFiber Pro meter can read.
     OFF: The source does not transmit a wavelength identifier because the source is in 2 kHz mode. See page "Auto Wavelength Function" on page 13.
   - **MODE 2 kHz**: The output is a 2 kHz modulated optical signal. Use this mode to identify fibers at patch panels. See "How to Identify Cables or Fibers" on page 26.
   - **SET \( \lambda \)**: Lets you change the wavelength when AUTO \( \lambda \) is OFF.

2. Shows the channel that is active.
3. **CHANNEL**: When SCAN ALL is OFF, press \( F_1 \) \( \downarrow \) or \( F_2 \) \( \uparrow \) to change the channel.
4. Numeric display for the wavelength.

5. \( ! \): When the batteries are low, the low battery icon flashes.

How to Change User Preferences

Table 2 describes the user preferences you can set for the meter and source.

**To set user preferences for the meter or source**

1. For the meter: Make sure the meter is in power or loss measurement mode.
   For the source: Make sure the source is in signal output mode.
2. Hold down \( F_1 \) and \( F_3 \) together for 2.5 seconds.
3. To change a setting, press \( F_2 \) \( \uparrow \). Or press \( F_1 \) if \( \downarrow \) shows.
4. To see the next setting, press \( \text{Menu} \).
5. To save the settings and exit setup mode, hold down \( F_1 \) and \( F_3 \) for 2.5 seconds.
Polarity Detection

You can use the MultiFiber Pro meter and source to see the polarity of MTP/MPO patch cords and cables. The signals from the source include the channel numbers. The meter compares the transmitted numbers to the numbers of the channels that received the signals. The meter can then show the polarity of the connections:

- **A, B, C**: The connections use a standard method, A, B, or C. See Figure A-1 on page 40.
- **?**: The connections do not use a standard method.
- **OTHER**: The connections use the Corning Plug & Play™ Universal Systems method of polarity management. See Figure B-16 on page 59.
- **If POLARITY does not show**, one or more fibers are not connected or **SCAN ALL** is off on the source.

⚠️ **Caution**

To get the correct polarity indication when you measure loss, you must use type B test reference cords when you set the reference.

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**Table 2. User Preferences**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>off</strong></td>
<td>Turn the backlight off or on.</td>
</tr>
<tr>
<td><strong>- -</strong></td>
<td>The meter and source turn off automatically if you do not press any keys for the selected period of minutes.</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>To disable this function, select the dashes.</td>
</tr>
<tr>
<td><strong>20</strong></td>
<td><strong>hr</strong></td>
</tr>
<tr>
<td><strong>30</strong></td>
<td><strong>mn</strong></td>
</tr>
<tr>
<td><strong>60</strong></td>
<td><strong>day</strong></td>
</tr>
<tr>
<td><strong>nth</strong></td>
<td>Meter only: Month ((nth)), day ((day)), year ((yr)), hour ((hr)), and minutes ((mn)). The meter includes the date and time with measurements you save. The hour is in 24-hour format. To see the date and time in saved records, look at the records in LinkWare software.</td>
</tr>
<tr>
<td><strong>sOF</strong></td>
<td><strong>sOF</strong>: The software version number.</td>
</tr>
<tr>
<td><strong>FAC</strong></td>
<td><strong>FAC</strong>: Meter only. The factory calibration date.</td>
</tr>
</tbody>
</table>

See "See the Software Version and Calibration Date" on page 31.
2 kHz Mode

The source has a 2 kHz modulated output mode that you can use to identify fibers. See "How to Identify Cables or Fibers" on page 26.

To select 2 kHz mode

1. On the source, hold down \[\text{hold down} \] for 2.5 seconds, press \[\text{hold down} \text{ F1} \text{ or F2} \text{ to put the cursor next to MODE, then press hold down} \] to make \[\text{2 kHz show.} \]

2. To save the setting and exit setup mode, hold down \[\text{hold down} \] for 2.5 seconds.

Notes

- When the source is in 2 kHz mode and the meter is in loss measurement mode, \[\right \text{, the bargraphs, } \text{Err} \text{, and 2 kHz flash on the meter's display, and you cannot save measurements.} \]

- The source’s auto wavelength function does not operate when you use 2 kHz mode.

Auto Wavelength Function

The signal from the source includes an identifier that tells the meter which wavelength to measure. The source transmits the auto wavelength signal unless it is in 2 kHz mode. When you select 2 kHz mode, the source’s AUTO \( \lambda \) setting automatically changes to OFF.

How to Clean MTP/MPO Connectors

Always clean and inspect endfaces in fiber connectors before you make connections. Fluke Networks recommends that you use a mechanical cleaner, such as the Fluke Networks IBC™ OneClick Cleaner, to clean connectors.

To use a OneClick cleaner to clean MTP/MPO connectors

\[\text{Caution} \]

To prevent damage to the device and to connectors and to keep contamination off of endfaces, read all instructions and obey all safety precautions given in the instructions for the device you use to clean connectors.

(continued)
To clean a bulkhead connector, remove the cap from the cleaner. To clean the connector on a fiber cable, remove only the tip of the cap. See Figure 5.

Push the cleaner into the connector, then turn the dial on the cleaner until you hear a loud click. Then remove the cleaner.

Use a fiber microscope, such as the FT600 FiberInspector™ Mini Video Microscope, to inspect the connector. If necessary, clean and inspect the connector again.

Figure 5. How to Use the OneClick Cleaner for MTP/MPO Connectors
How to Measure Optical Power

A power measurement shows the optical power level from a source such as an optical network interface card or optical test equipment.

The meter can show power measurements in watts or dBm.

To change the unit for power measurements

1. On the meter, hold down \( \text{Menu} \) for 2.5 seconds to enter setup mode.
2. With the cursor next to POWER, press \( \text{Menu} \), then press \( F1 \) \( \text{↓} \) or \( F2 \) \( \text{↑} \) to select W (watts) or dBm (decibels relative to 1 milliwatt).

The meter automatically shows watts as milliwatts (mW) or microwatts (µW).

3. To save the setting and exit setup mode, hold down \( \text{Menu} \) \( \text{Menu} \) for 2.5 seconds.

To measure power

1. Clean and inspect all connectors.
2. On the meter, press \( \text{Menu} \) to make POWER show.
3. Make the connections shown in Figure 6.
4. On the meter, press \( F3 \) \( \lambda \) to select the wavelength of the source if necessary.
5. To see the power measurement for the next channel, press \( F2 \) CHANNEL.

   Note

2 kHz flashes and you cannot save measurements if the meter is connected to a MultiFiber Pro source that is set to 2 kHz mode.

6. To save the measurements, make sure the meter has done a scan through all 12 channels, then press \( F1 \) SAVE. The meter briefly shows the record number and OK. The record number shown is for fiber number 12 in the cable.
Measuring power at the end of a link

Measuring the power of a source

Figure 6. Connections for Power Measurements

Figure 7. Power Measurement Display
How to Measure Optical Power

1. The difference (in dB) between the level of power on each channel and the maximum power of all 12 channels:

   | No ovals | < -50.2 dBm | < -2 dB | < -1.5 dB | < -1 dB | < -0.5 dB | Max. |

   At regular intervals, the meter finds the maximum power level again and adjusts the bargraphs as necessary.

2. The channel for the measurement shown (7). To change the channel, press [F2].

3. POLARITY: The polarity of the connections between the meter and source:

   Note
   The polarity indication shows on the meter only when the source’s SCAN ALL function is on and all fibers are connected.

   - A, B, C: The connections use a standard method, A, B, or C. See Figure A-1 on page 40.
   - ?: The connections do not use a standard method.
   - OTHER: The connections use the Corning Plug & Play™ Universal Systems method of polarity management. See Figure B-16 on page 59.
   - If POLARITY does not show, one or more fibers are not connected or SCAN ALL is off on the source.

4. Press [F1] SAVE to save the measurements.

   Note
   SAVE does not show if the source is set to 2 kHz mode.

5. CHANNEL: Press [F2] to see the measurement from the next channel.

6. λ shows when the source does not transmit a wavelength identifier. Press [F3] λ to see the measurements for another wavelength.

7. The power measurement in watts (W, mW, µW) or decibels (dBm). To change the unit, see "To change the unit for power measurements" on page 15.

8. The numbers for the channels flash in sequence when the meter measures power.

9. The wavelength of optical signal the meter measures.
**How to Measure Loss**

The loss measurement shows how much optical power is lost in the fiber and connectors of a link.

**Measure the Loss of Your Test Reference Cords**

To make sure your loss measurements on fiber installations are reliable, you must use good test reference cords. To make sure the cords are good, measure and record their loss at regular intervals. Use the procedures given in the next sections to set the reference and measure loss, but connect the test reference cord where the figures show the fiber link.

---

**Set the Limit for Loss Measurements**

The meter compares loss measurements to a limit to give a status of **OK** or **X** to the measurements. If a measurement for a channel exceeds the limit, **X** flashes, the bargraph for that channel flashes, and the bargraph shows an oval above the limit line on the display.

You can set the limit from 0.05 dB to 50.0 dB. The increments are 0.05 dB up to 10.0 dB and 0.1 dB up to 50.0 dB. The default is 1.5 dB.

**To set the limit**

1. On the meter, hold down **F1** for 2.5 seconds to see the setup menu, press **F1 ▼** to put the cursor next to **LOSS LIMIT**, then press **F2** to put the meter in the loss limit mode. (see Figure 7 on page 16).

2. While **LOSS LIMIT** shows, press **F1 ▼** or **F2 ▲** to decrease or increase the limit value. To change the value quickly, hold down the key.

3. To save the setting and exit setup mode, hold down **F2** for 2.5 seconds.
About the Reference

The reference is the baseline power level for loss measurements. Regular referencing helps account for minor variations in source power and connection integrity. Also, since the reference is the baseline for measurements, the losses of the test reference cords and adapters used for referencing are excluded from test results.

For the most accurate test results, you should set the reference at these times:

- At the beginning of each day.
- Anytime you reconnect a test reference cord to the source.
- Anytime you see a negative loss measurement.

Set the Reference for Loss Measurements

⚠️ Caution

To get the correct polarity indication when you measure loss, you must use type B test reference cords when you set the reference.

1. Clean the connectors on the meter, source, and a test reference cord.

2. Turn on the meter and source and let them warm up for 10 minutes. Allow more time if the equipment has been stored above or below ambient temperature.

3. Make connections to set the reference. Figure 8 on page 21 shows reference connections for links with unpinned connectors. Appendix B shows connections for links with other types of connectors and for fiber modules. On the source, hold down ⌘ for 2.5 seconds to see the setup menu, then select these settings:

- **SCAN ALL**: ON
- **MODE**: 2 kHz does not show

(continued)
On the meter, press \texttt{SET REF} to make \texttt{SET REF} show.

If necessary, press \texttt{CHANNEL} to see the power measurement for each channel.

If a power level is lower than -27.5 dBm (1.78 µW) or if \texttt{Err} and \texttt{X} show, look for these problems:

- There is a bad connection, a dirty connector, or a damaged fiber or connector. Clean and inspect all connectors, then do the reference procedure again.
- An unpinned connector is used where a pinned connector is necessary.
- The source is in \texttt{2 kHz} mode. Turn off \texttt{2 kHz} mode, then do the reference procedure again. See page 13.
- The power measurement on a channel is different from the measurement on an adjacent channel by 3 dB or more. This usually shows that a connection is bad, a connector is dirty, or fiber or connector on the patch cord is bad. Clean and inspect all connectors, then do the reference procedure again.

To save the reference measurements, press \texttt{SAVE}. The meter saves the measurements and the display briefly shows \texttt{REF}, \texttt{OK} and \texttt{REF}. Then the meter goes into loss measurement mode.

If the display shows \texttt{Err} and \texttt{X}, look for the problems given in step 5.

\textbf{Caution}

If you disconnect the test reference cord 1 from the source after you set the reference, you must set the reference again to make sure the loss measurements are reliable.
Figure 8. Reference Connections for Permanent Links with Unpinned MTP/MPO Connectors

1. Use one TRC to set the reference.

2. Disconnect TRC 1 from the meter, then connect cord 2 to the meter.

Caution
Do not disconnect TRC 1 from the source after you set the reference.
Measure Loss

1. Set the reference as described on page 19.
2. Make sure the limit is correct. To see the limit, hold down \( \text{F1} \) for 2.5 seconds, press \( \text{F1} \) \( \downarrow \) to put the cursor next to LOSS LIMIT, then press \( \text{F1} \).
3. Clean and inspect the connectors on the link and on the required test reference cords.
4. Disconnect the test reference cord from the meter, then make the appropriate connections. Figure 9 on page 23 shows connections for a link with unpinned connectors. Appendix B shows connections for other types of links and connectors and for fiber modules.

⚠️ Caution

Do not disconnect test reference cord 1 from the source. If you do, you must set the reference again to make sure the loss measurements are reliable.

5. On the source, select these settings:
   - SCAN ALL: ON
   - MODE: 2 kHz does not show

6. On the meter, press \( \text{F1} \) to make LOSS show. Figure Figure 10 on page 24 shows the display for loss measurements.

   **Notes**
   
   Er and \( \text{F1} \) flash and you cannot save measurements if the wavelength setting on the meter is not the wavelength you used to set the reference.

   2 kHz, Er, and \( \text{F1} \) flash and you cannot save measurements if the source is set to 2 kHz mode.

7. To save the measurements, make sure the meter has done a scan through all 12 channels, then press \( \text{F1} \) SAVE. The meter briefly shows the record number and OK. The record number shown is for the number 12 fiber in the cable.
Figure 9. Connections for Loss Measurements on Type A Permanent Links with Unpinned MTP/MPO Connectors

Caution
Do not disconnect TRC 1 from the source after you set the reference.

Source channel: 1 2 3 4 5 6 7 8 9 10 11 12
Meter channel: 1 2 3 4 5 6 7 8 9 10 11 12

Meter shows POLARITY A
The levels of power loss relative to the limit you set:

| 0% | <25% | <50% | <75% | <100% | 100% |

- When all ovals are below the line for a channel, the measurement for that channel is below the limit you set.
- If the loss for a channel exceeds the limit, the oval above the line is on, and \( \times \) and the bargraph for that channel flash.

The channel for the measurement shown (7). To change the channel, press [F2] CHANNEL.

Polarity: The polarity of the connections between the meter and source:

Note

The polarity indication shows on the meter only when the source’s SCAN ALL function is on and all fibers are connected.

- A, B, C: The connections use a standard method, A, B, or C. See Figure A-1 on page 40.
- ?: The connections do not use a standard method.
• OTHER: The connections use the Corning Plug & Play™ Universal Systems method of polarity management. See Figure B-16 on page 59.

• If POLARITY does not show, one or more fibers are not connected or SCAN ALL is off on the source.

4 Press **F1** SAVE to save the measurements.

**Note**

**SAVE** does not show if the source is set to 2 kHz mode or if the wavelength setting on the meter is not the wavelength you used to set the reference.

5 CHANNEL: Press **F2** CHANNEL to see the measurement from the next channel.

6 The loss measurement in decibels (dB).

**Note**

*If loss is negative, Flashes and the meter shows the measurement for the channel that has the largest negative loss. See "If Loss is Negative" on page 25.*

7 The numbers for the channels flash in sequence when the meter measures loss.

8 The wavelength of optical signal the meter measures.

9 **AUTO λ** shows when the source transmits a wavelength identifier, and the meter changes its wavelength setting to agree with the source. See "Auto Wavelength Function" on page 13.

If Loss is Negative

A negative loss measurement occurs when the measured power level is more than the reference power level. If the loss is negative by more than -0.09 dB, and the measurement flash on the meter.

Negative loss can be caused by the following:

• The fiber ends were dirty when you set the reference.

• The patch cord connected to the source was disconnected after you set the reference.

• There was a kink in a test reference cord when you set the reference.

• The connectors were not properly aligned when you set the reference.

• The meter and source were not set to the same wavelengths when you set the reference or measured loss.
• The meter or source was much colder when you set the reference.
• You did not allow enough time for the source to warm up before you set the reference.
• You measured loss on a fiber that is shorter than the test reference cord you used to set the reference.
If loss is negative, set the reference again then measure loss again.

How to Identify Cables or Fibers

You can use the 2 kHz modulated signal from the source to identify cables or fibers at patch panels. The meter shows 2 kHz on the display when it detects the modulated signal.

To use the 2 kHz mode to identify cables or fibers

1. On the source, hold down ◀ until the setup menu shows. If SCAN ALL is OFF, press ▶ to set it to ON. Press ▼ to make 2 kHz show.

2. On the meter, press ▶ to put the meter in power measurement mode. You can also select loss measurement mode, but the display is easier to read in power measurement mode. If necessary, press ▼ to set the meter to the same wavelength as the source.

   Note

   The source’s auto wavelength function does not operate when you use 2 kHz mode.

   To identify cables, use an MTP/MPO cable to connect the meter to cable outlets. To identify fibers, use a breakout cable to connect the meter to single or duplex fiber outlets.

3. When the meter receives the 2 kHz signal from the source, 2 kHz shows on the meter.

   If you use a breakout cable to connect the meter to an outlet, the channel indicator on the meter moves to the channel that is connected to the source. You can also turn off the SCAN ALL function on the source, then change the channel on the source to identify connections.
Memory Functions

The meter stores the loss or power measurements for up to 250 12-fiber cables. Each record contains the measurement for one fiber in a 12-fiber cable, for a maximum of 3000 records. For example, records 1 through 12 contain the measurements for the 12 fibers in one cable and records 13-24 contain the measurements for the 12 fibers in the next cable.

If memory is full, the meter shows ☢ and FULL when you try to save measurements.

View Records

1 Hold down Setup for 2.5 seconds, press F2 to put the cursor next to VIEW RECORD, then press Menu.

If no records are saved, dashes show for the record number and the measurement.

2 To scroll through the measurements for each fiber in a cable, press F1 ▼ or F2 ▲.

To scroll through the measurements for the same fiber number in each cable, press F1 ▼ or F2 ▲ to select a fiber, then hold down F1 ▼ or F2 ▲. In this mode, the record number increases or decreases by 12.

3 To exit the view record mode, press Menu.

Note

Each record includes the date and time when the measurement was saved. To see the date and time, look at the records in LinkWare software.

Delete Records

You can delete one set of 12 records, or you can delete all the records in memory.

To delete one set of 12 records

Note

When you delete a set of 12 records, that set stays empty until you delete all records and save new ones.

1 Hold down Menu until the setup menu shows, press F1 ▼ to put the cursor next to VIEW RECORD, then press Menu.

2 Use F1 ▼ or F2 ▲ to select the set of records to delete. See Figure 11 on page 28.
3 Press F3 DELETE. The display shows DELETE?.

To exit the delete mode and not delete the records, press F1, F2, or MENU.

4 Hold down F3 DELETE? until OK shows. The 12 fibers show --- for their measurements, and no bargraphs show.

5 To exit the view record mode, press MENU.

To delete all the records in memory

1 Hold down MENU until the setup menu shows, press F2 to put the cursor next to VIEW RECORD, then press MENU.

2 Hold down F3 DELETE until the display shows DELETE ALL?, then release F3.

To exit the delete mode and not delete the records, press F1, F2, or MENU.

3 To delete all records, hold down F3 DELETE ALL?. As the meter deletes the records, the display shows the percentage of records deleted. At 100 percent, OK shows. Then the meter goes back to the power or loss measurement mode.

Figure 11. View Record Display
(loss measurement shown)
Memory Functions

1. The relative level of power or power loss measured on the channel. For loss measurements, the limit line and OK or show. See Figure 7 on page 16 and Figure 10 on page 24 for descriptions of these measurements.

2. The channel for the measurement shown (6). To change the channel, press F1 ▼ or F2 ▲ (4).

3. POLARITY: The polarity used for the connections between the meter and source.

4. To change the channel for the measurement shown (6), press F1 ▼ or F2 ▲.

5. Use F3 DELETE to delete records. See "Delete Records" on page 27.

6. The measurement for the selected channel. To see the measurement for the next channel, press F1 ▼ or F2 ▲.
   
   If the 12 records for a cable have been deleted, --- shows for each channel.

7. The fiber number.

8. The record number for the measurement shown.

9. The wavelength for the measurement. AUTO λ shows if the source was in auto wavelength mode during the measurement.

To use LinkWare software to delete all the records in memory

1. Install the latest version of LinkWare software on your PC.
2. Turn on the meter.
3. Connect the meter to the PC with the USB cable provided, as shown in Figure 12.
4. Start LinkWare software on the PC.
5. On the LinkWare toolbar, select Utilities > MultiFiber Pro > Delete All Tests in Memory.
Upload Records to a PC

1. Install the latest version of LinkWare software on your PC.
2. Turn on the meter.
3. Connect the meter to the PC with the USB cable provided, as shown in Figure 12.
4. Start LinkWare software on the PC.
5. Click **Import** on the LinkWare tool bar, then select **MultiFiber Pro**.
6. Enter project information, then click **OK**.
7. Import all records from the meter or select records to import.

**Note**

*The record numbers from the meter are in the Cable ID column in LinkWare. LinkWare uses the cable number you entered as the first character in the IDs.*

**Figure 12. Connecting to a PC**
Maintenance

⚠️ Warning ⚠️ ⚠️
To avoid possible fire, electric shock, personal injury, or damage to the tester:

- Do not open the case. No user-serviceable parts are inside.
- Replacing electrical parts yourself will void the tester’s warranty and might compromise its safety features.
- Use only specified replacement parts for user-replaceable items.
- Use only Fluke Networks authorized service centers.

Clean the Meter and Source
Clean the display with glass cleaner and a soft, lint-free cloth. Clean the case with a soft cloth dampened with water or water and a mild soap.

⚠️ Caution ⚠️
To prevent damage to the display or the case, do not use solvents or abrasive materials.

Clean the optical connector as described on page 13.

See the Software Version and Calibration Date
The displays can show the software versions for the meter and source and the calibration date for the meter. Calibration is not necessary for the source, so the source does not show a date.

To see the software version and calibration date
1. Turn on the meter or source, then hold down F1 and F3 together for 2.5 seconds.
2. Press F6 until the display shows SoF then a number. The number is the software version.
3. On the meter, press F6 again. The large characters shows FAC then one or two digits. The large digits show the year of the last calibration. The four small digits show the day and month (DDMM) of the last calibration.
Update the Software

⚠️ Caution

To prevent unexpected loss of power when you update the software, put new batteries in the meter and source if the low-battery icon shows (🔋).

Note

The software update procedure does not delete the test records in the meter or the user preferences in the meter or source.

1 Install the latest version of LinkWare software on your PC.

2 Download the MultiFiber Pro update file from the Fluke Networks website, or contact Fluke Networks to get the update by other methods. Save the file to your hard drive.

Note

The update file is in a zipped folder. You must extract the file before you can install the update in the meter or source.

3 Extract the update file (.mfp extension) from the zipped folder.

4 Connect the meter or source to the PC with the USB cable provided, as shown in Figure 12.

5 On the LinkWare menu, select Utilities > MultiFiber Pro > Software Update, find and select the update file, then click Open.

The meter or source display shows 🔄 during the installation process.

6 To make sure the update was installed correctly, look at the software versions on the meter and source. See “See the Software Version and Calibration Date” on page 31.

Options and Accessories

For a complete list of options and accessories visit the Fluke Networks website at www.flukenetworks.com.
## Specifications

### Environmental

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-10°C to +50°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20°C to +50°C</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>95% (10°C to +35°C) non-condensing&lt;br&gt;75% (35°C to +45°C) non-condensing&lt;br&gt;Uncontrolled &lt;10°C</td>
</tr>
<tr>
<td>Operating altitude</td>
<td>4,000 m</td>
</tr>
<tr>
<td>Storage altitude</td>
<td>12,000 m</td>
</tr>
<tr>
<td>Vibration</td>
<td>Random 2 G, 5 Hz to 500 Hz</td>
</tr>
</tbody>
</table>
### Meter

Specifications apply at 23°C (73°F), unless otherwise noted.

<table>
<thead>
<tr>
<th>Detector type</th>
<th>InGaAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrated wavelengths</td>
<td>850 nm, 1300 nm, 1310 nm, 1550 nm</td>
</tr>
<tr>
<td>Measurement range</td>
<td>0 dBm to -50 dBm</td>
</tr>
<tr>
<td>Test time</td>
<td>6 seconds</td>
</tr>
<tr>
<td>Power measurement linearity</td>
<td>±0.1 dB¹</td>
</tr>
<tr>
<td>Power measurement uncertainty</td>
<td>±0.35 dB</td>
</tr>
<tr>
<td>Power measurement repeatability</td>
<td>&lt; 0.10 dB</td>
</tr>
<tr>
<td>Display resolution, dB or dBm</td>
<td>0.01 dB</td>
</tr>
<tr>
<td>Power display units</td>
<td>dBm, mW, µW</td>
</tr>
<tr>
<td>User-selectable limit for loss</td>
<td>0.05 dB to 50.0 dB, in increments of 0.05 dB up to 10.0 dB and 0.1 dB up to 50.0 dB</td>
</tr>
<tr>
<td>Auto wavelength detection</td>
<td>Yes</td>
</tr>
<tr>
<td>Polarity detection</td>
<td>Detects A, B, C, and Corning Plug &amp; Play™ Universal Systems polarities</td>
</tr>
</tbody>
</table>

¹. For 850 nm, 0 dBm to -50 dBm. For 1300, 1310, 1550 nm, -5 to -50 dBm
## Specifications

### Meter (continued)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2 kHz detection</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Record storage</strong></td>
<td>3000 records, one fiber per record (250 12-fiber cables)</td>
</tr>
<tr>
<td><strong>External interface</strong></td>
<td>USB 2.0, full speed</td>
</tr>
<tr>
<td><strong>Optical connector</strong></td>
<td>MTP/MPO interface for 12-fiber, unpinned plugs. Compatible with 62.5 µm, 50 µm, and singlemode fibers. Connector has a self-closing, protective cover.</td>
</tr>
<tr>
<td><strong>Power requirement</strong></td>
<td>2 AA alkaline batteries</td>
</tr>
<tr>
<td><strong>Battery life</strong></td>
<td>&gt;30 hours (typical)</td>
</tr>
<tr>
<td><strong>Automatic power-off</strong></td>
<td>10, 20, 30, or 60 minutes (can be disabled by the user)</td>
</tr>
<tr>
<td><strong>Low battery warning</strong></td>
<td>Low battery icon blinks</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>5.7 in x 3.2 in x 1.5 in (14.5 cm x 8.0 cm x 3.9 cm)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>10.9 oz (309 g)</td>
</tr>
</tbody>
</table>

2. Measured power levels ≤0 dBm. Backlight on. Battery life depends on the condition and type of batteries used. Fluke Networks recommends alkaline batteries.
850 nm Source
Specifications apply at 23°C (73°F), unless otherwise noted.

<table>
<thead>
<tr>
<th>Emitter type</th>
<th>LED: 850 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>850 nm: ±30 nm</td>
</tr>
<tr>
<td>Spectral width (FWHM)</td>
<td>850 nm: 50 nm (typical)</td>
</tr>
<tr>
<td>Minimum output power</td>
<td>850 nm: ≥ -24 dBm</td>
</tr>
<tr>
<td>Power output stability$^3$</td>
<td>≤ ±0.1 dB over 8 hours</td>
</tr>
<tr>
<td>Encircled flux</td>
<td>Meets TIA 455-526-14B, ISO/IEC 14763-3, and IEC 61280-4-1 for 50/125 µm at the source’s optical connector.</td>
</tr>
<tr>
<td>Optical connector</td>
<td>MTP/MPO interface for 12-fiber, unpinned plugs. Compatible with 62.5 µm and 50 µm. Connector has a self-closing, protective cover.</td>
</tr>
<tr>
<td>Modes</td>
<td>2 kHz modulated, auto wavelength</td>
</tr>
</tbody>
</table>

3. 23°C ±2°C, after 10 minutes of warm-up time.
## Specifications

### Multimode Source (continued)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power requirement</td>
<td>2 AA alkaline batteries</td>
</tr>
<tr>
<td>Battery life&lt;sup&gt;4&lt;/sup&gt;</td>
<td>&gt;30 hours (typical)</td>
</tr>
<tr>
<td>Automatic power-off</td>
<td>10, 20, 30, or 60 minutes (can be disabled by the user)</td>
</tr>
<tr>
<td>Low battery warning</td>
<td>Low battery icon blinks</td>
</tr>
<tr>
<td>Size</td>
<td>5.6 in x 3.2 in x 1.6 in (14.2 cm x 8.1 cm x 4.1 cm)</td>
</tr>
<tr>
<td>Weight</td>
<td>10.9 oz (309 g)</td>
</tr>
</tbody>
</table>

<sup>4</sup> Auto wavelength, SCAN ALL, and backlight on. Battery life depends on the condition and type of batteries used. Fluke Networks recommends alkaline batteries.

### Calibration Cycle

1 year

### Certifications, Compliance, and Regulatory Information

- Conforms to relevant European Union directives
- Conforms to relevant Australian standards
- Listed by the Canadian Standards Association
- Laser safety: Complies with 21CFR.1040.10, 11, and EN60825-1, 2:2007 (Class 1, Hazard Level 1)
Appendix A: Polarities for MTP/MPO Connections

Figure A-1 on page 40 shows the end-to-end connections made by type A, B, and C cables with MTP/MPO connectors. The POLARITY indication on the meter shows A, B, C for these polarities.

The meter shows OTHER for the CorningPlug & Play™ Universal Systems method of polarity management. See Figure B-16 on page 59.

Note

The polarity indication shows on the meter only when the source’s SCAN ALL function is on and all fibers are connected.
Figure A-1. Connections for Types A, B, and C Patch Cords
Figure A-2. Connections for the Corning Plug & Play™ Universal Systems Method
Appendix B: Reference and Test Connections

This appendix shows the connections to make to set the reference and measure loss on MTP/MPO links with pinned and unpinned connectors.

⚠️ Caution

To get the correct polarity indication when you measure loss, you must use type B test reference cords when you set the reference.
Type B
TRC 1
Pinned/Pinned

1. Use one TRC to set the reference.

Meter
Source

Type B
TRC 2,
Pinned/Pinned

2. Disconnect TRC 1 from the meter, then connect TRC 2 to the meter.

Do not disconnect TRC 1 from the source after you set the reference.

Type B
TRC 1,
Pinned/Pinned

Figure B-1. Reference Connections for Permanent Links with Unpinned MTP/MPO Connectors
Caution

Do not disconnect TRC 1 from the source after you set the reference.

Figure B-2. Connections for Loss Measurements on Type A Permanent Links with Unpinned MTP/MPO Connectors
Figure B-3. Connections for Loss Measurements on Type B Permanent Links with Unpinned MTP/MPO Connectors

- **Meter** shows POLARITY B
- **Source channel:** 1 2 3 4 5 6 7 8 9 10 11 12
- **Meter channel:** 12 11 10 9 8 7 6 5 4 3 2 1

**Caution:**
Do not disconnect TRC 1 from the source after you set the reference.
Figure B-4. Connections for Loss Measurements on Type C Permanent Links with Unpinned MTP/MPO Connectors

- **Type B** TRC 2
  - Pinned/Pinned
- **Type B** TRC 1
  - Pinned/Pinned

**Adapter**
- **Key-up/Key-down**
- **Pinned/Unpinned**
- **Unpinned/Pinned**

**Fiber link**
- **Type C**

**Warning**
- **Caution**
  - Do not disconnect TRC 1 from the source after you set the reference.

**Meter**
- Shows POLARITY C

**Source channel:** 1 2 3 4 5 6 7 8 9 10 11 12

**Meter channel:** 2 1 4 3 6 5 8 7 10 9 12 11
Figure B-5. Reference Connections for Permanent Links with Pinned and Unpinned MTP/MPO Connectors

1. Use one TRC to set the reference.

2. Disconnect TRC 1 from the meter, then connect TRC 2 to the meter.

Caution: Do not disconnect TRC 1 from the source after you set the reference.
Figure B-6. Connections for Loss Measurements on Type A Permanent Links with Unpinned and Pinned MTP/MPO Connectors

- **Type A**
  - Fiber link
  - Unpinned/Pinned
  - Adapter Key-up/Key-down

- **Type B**
  - TRC 2
  - Pinned/Unpinned

- **Source channel:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
- **Meter channel:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

**Caution**
- Do not disconnect TRC 1 from the source after you set the reference.

**Meter shows POLARITY A**
Figure B-7. Connections for Loss Measurements on Type B Permanent Links with Unpinned and Pinned MTP/MPO Connectors

- Meter shows POLARITY B
- Source channel: 1 2 3 4 5 6 7 8 9 10 11 12
- Meter channel: 12 11 10 9 8 7 6 5 4 3 2 1

⚠️ Caution
Do not disconnect TRC 1 from the source after you set the reference.
Figure B-8. Connections for Loss Measurements on Type C Permanent Links with Unpinned and Pinned MTP/MPO Connectors
Figure B-9. Reference Connections for Permanent Links with Pinned MTP/MPO Connectors

1. Use two TRCs and one adapter to set the reference.

2. Disconnect TRC 2 from the adapter, then connect TRC 3 to the adapter.

Caution
Do not disconnect TRC 1 from the source after you set the reference.
Appendix B: Reference and Test Connections

Figure B-10. Connections for Loss Measurements on Type A Permanent Links with Pinned MTP/MPO Connectors

**Type A**
- Fiber link

---

**Type B**
- TRC 1
  - Pinned/Pinned Adapter
    - Key-up/Key-down
- TRC 2
  - Pinned/Unpinned Adapter
    - Key-up/Key-down
- TRC 3
  - Unpinned/Unpinned Adapter
    - Key-up/Key-down

---

**Warning**
Do not disconnect TRC 1 from the source after you set the reference.

---

Source channel: 1 2 3 4 5 6 7 8 9 10 11 12
Meter channel: 1 2 3 4 5 6 7 8 9 10 11 12

Meter shows POLARITY A
Figure B-11. Connections for Loss Measurements on Type B Permanent Links with Pinned MTP/MPO Connectors

Caution
Do not disconnect TRC 1 from the source after you set the reference.
Figure B-12. Connections Loss Measurements on Type C Permanent Links with Pinned MTP/MPO Connectors

Do not disconnect TRC 1 from the source after you set the reference.

**Caution**
Figure B-13. Connections for Loss Measurements on Permanent Links with Pinned MTP/MPO Connectors when Links are Used with Corning Plug & Play™ Universal Systems

![Diagram of connections for loss measurements](GUE15.EPS)

- **Type B**
  - TRC 2
  - Pinned/Unpinned

- **Type B**
  - TRC 1
  - Pinned/Pinned

- **Type B**
  - TRC 3
  - Unpinned/Unpinned

**Caution**

Do not disconnect test reference cord 1 from the source after you set the reference.

Source channel: 1 2 3 4 5 6 7 8 9 10 11 12

Meter channel: 12 11 10 9 8 7 6 5 4 3 2 1

**Note:**

- Meter shows POLARITY B

- Source channel: 1 2 3 4 5 6 7 8 9 10 11 12

- Meter channel: 12 11 10 9 8 7 6 5 4 3 2 1
1. Use two TRCs and one adapter to set the reference.

2. Disconnect TRC 2 from the adapter, then connect the breakout cable to the adapter.

Caution: Do not disconnect TRC 1 from the source after you set the reference.

Figure B-14. Reference Connections for Fiber Modules with Pinned MTP/MPO Connectors
Figure B-15. Connections for Loss Measurements on a Straight-Through Fiber Module with a Pinned MTP/MPO Connector

Meter shows POLARITY B

Source channel: 1 2 3 4 5 6 7 8 9 10 11 12
Meter channel: 12 11 10 9 8 7 6 5 4 3 2 1

Caution
Do not disconnect test reference cord 1 from the source after you set the reference.
Figure B-16. Connections for Loss Measurements on a Corning Plug & Play™ Universal Systems Module

Caution: Do not disconnect TRC 1 from the source after you set the reference.