FLUKE
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MultiFiber™ Pro

Optical Power Meter and Fiber Test Kits

Users Manual

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4/04

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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**.

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Visit our website for a complete list of phone numbers.

Safety Information

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

Table 1. International Electrical Symbols

⚠	Warning or Caution: risk of damage or destruction to equipment or software. See explanations in the manual.
⚠	Warning: Risk of electric shock.
☀	Warning: Class 1 laser. Risk of eye damage from hazardous radiation.
🚮	Do not put products containing circuit boards into the garbage. Dispose of circuits boards in accordance with local regulations.

Ⓘ: 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

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 (!) flashes.

AA
IEC LR6
NEDA 15A

Note: Fluke Networks recommends alkaline batteries.

GUE02.EPS
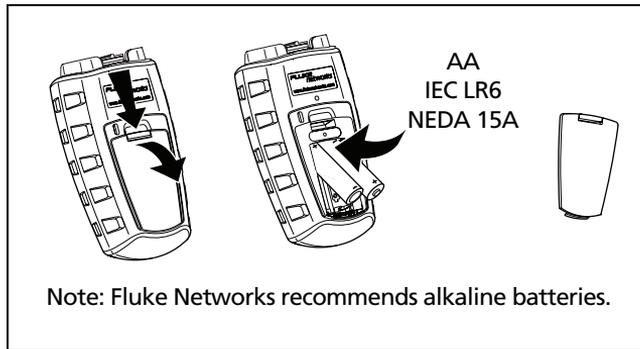
Figure 1. Installing the Batteries

Keys and Connectors

GUE05.EPS
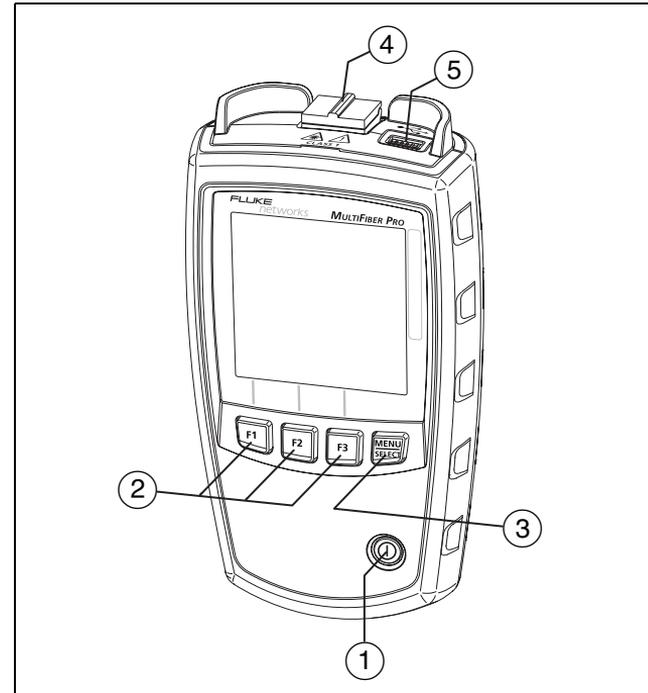
Figure 2. Meter and Source Features

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

Source: To see modes for the source, hold down MENU/SELECT 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
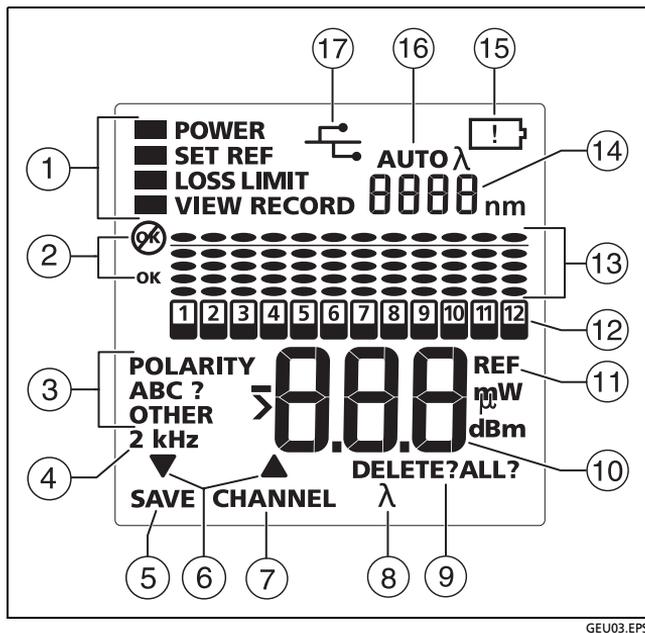
Figure 3. Meter Display Features

GEU03.EPS

① Modes for the meter and settings for tests.

To select the **POWER**, **SET REF**, or **LOSS** measurement modes, press [MENU/SELECT]. To change settings for measurements or to view records, hold down [MENU/SELECT] for 2.5 seconds, then use ▼▲ and [MENU/SELECT] 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 ⊘: There is a problem with a measurement, or you tried to save a measurement, but the memory is full.

OK: All measurements are satisfactory, or the meter saved the results.

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**).

⑪ **REF** (reference): Shows when you save the reference level. See "Set the Reference for Loss Measurements" on page 19.

⑫ 🄁: 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.

⑯ **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.

⑰ ⊏⊐: This icon shows when the meter is connected to a PC through the USB port.
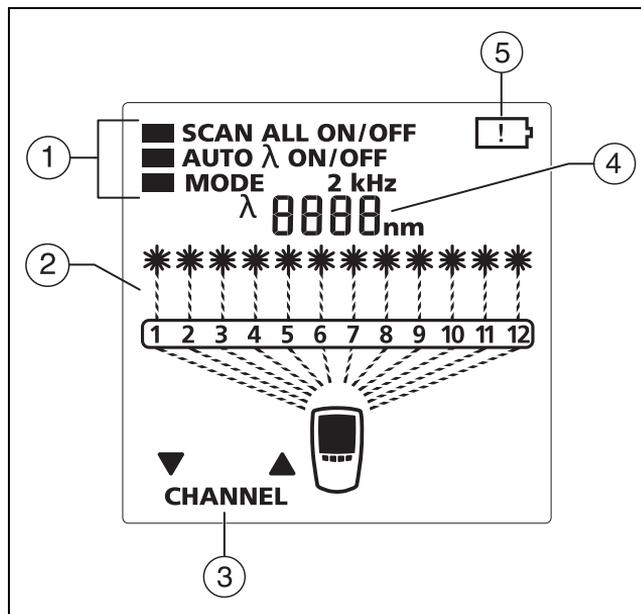
GUE04.EPS

Figure 4. Source Display Features

① Modes for the source (to see the menu, hold down [MODE] for 2.5 seconds):

- **SCAN ALL ON**: The source changes the channel automatically.

  SCAN ALL OFF: You press [F1] ▼ or [F2] ▲ to change the channel.

- **AUTO λ**: **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 λ**: Lets you change the wavelength when **AUTO λ** is **OFF**.

② Shows the channel that is active.

③ **CHANNEL**: When **SCAN ALL** is **OFF**, press [F1] ▼ or [F2] ▲ 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 [F1] and [F3] together for 2.5 seconds.

3   To change a setting, press [F2] ▲. Or press [F1] if ▼ shows.

4   To see the next setting, press [MENU SELECT].

5   To save the settings and exit setup mode, hold down [F1] and [F3] for 2.5 seconds.

Table 2. User Preferences

Setting	Choices
oFF on	Turn the backlight off or on.
-- 10 20 30 60	The meter and source turn off automatically if you do not press any keys for the selected period of minutes. To disable this function, select the dashes.
nth dAY Yr hr nn	Meter only: Month (nth), day (dAY), year (Yr), hour (hr), and minutes (nn). 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.
SoF FAC	SoF: The software version number. FAC: Meter only. The factory calibration date. See "See the Software Version and Calibration Date" on page 31.

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.

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 [MENU SELECT] for 2.5 seconds, press [F1] ▼ or [F2] ▲ to put the cursor next to **MODE**, then press [MENU SELECT] to make **2 kHz** show.

2   To save the setting and exit setup mode, hold down [MENU SELECT] for 2.5 seconds.

Notes

When the source is in 2 kHz mode and the meter is in loss measurement mode, OK, the bargraphs, Err, 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** λ 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

⚠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.

1 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.

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

3 Use a fiber microscope, such as the FT600 FiberInspector™ Mini Video Microscope, to inspect the connector. If necessary, clean and inspect the connector again.
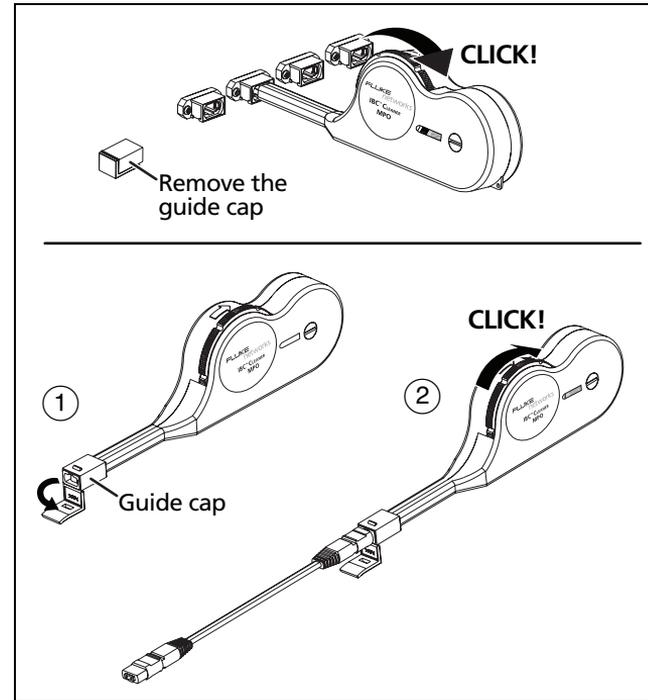
GUE01.EPS

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 ⌷ for 2.5 seconds to enter setup mode.

2   With the cursor next to **POWER**, press ⌷, then press F1 ▼ or F2 ▲ 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 ⌷ for 2.5 seconds.

To measure power

1   Clean and inspect all connectors.

2   On the meter, press ⌷ to make **POWER** show.

3   Make the connections shown in Figure 6.

4   On the meter, press F3 λ 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.

GUE23.EPS
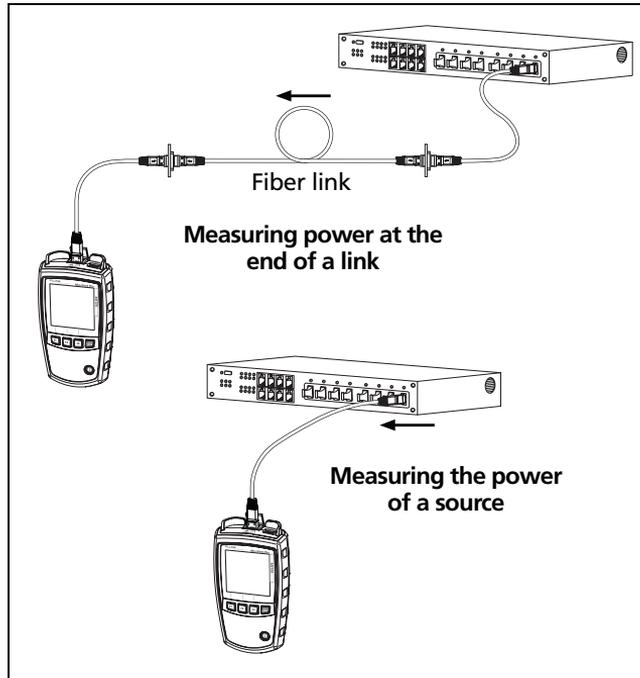
Figure 6. Connections for Power Measurements

GUE06.EPS
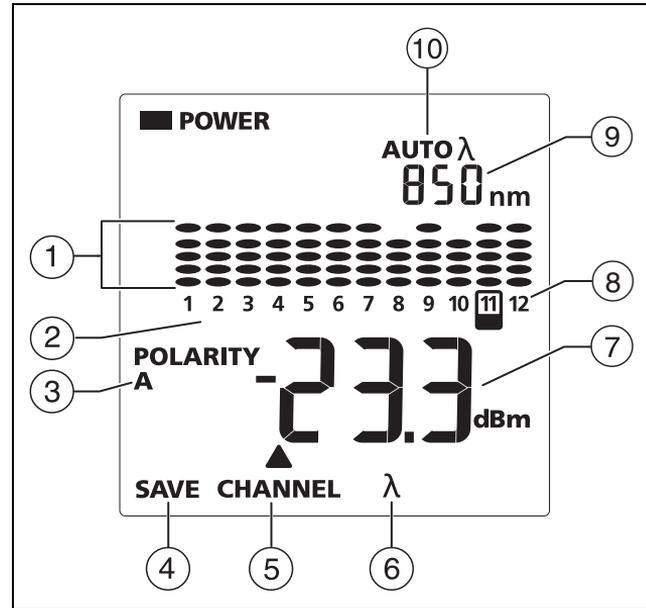
Figure 7. Power Measurement Display

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.

⑩ **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.

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 ⊗ to the measurements. If a measurement for a channel exceeds the limit, ⊗ 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 [MENU SELECT] for 2.5 seconds to see the setup menu, press F1 ▼ to put the cursor next to **LOSS LIMIT**, then press [MENU SELECT] 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 [MENU SELECT] 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)

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4   On the meter, press 🔲 to make **SET REF** show .

5   If necessary, press [F2] **CHANNEL** to see the power measurement for each channel.

If a power level is lower than -27.5 dBm (1.78 µW) or if Err and ⊘ 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 **2 kHz** mode. Turn off **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.

6   To save the reference measurements, press [F1] **SAVE**. The meter saves the measurements and the display briefly shows rEF, **OK** and **REF**. Then the meter goes into loss measurement mode.

If the display shows Err and ⊘, look for the problems given in step 5.

⚠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.

① Use one TRC to set the reference.

Type B
TRC 1
Pinned/Pinned

⚠ **Caution**

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

Meter

Source

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

Type B
TRC 2
Pinned/Pinned

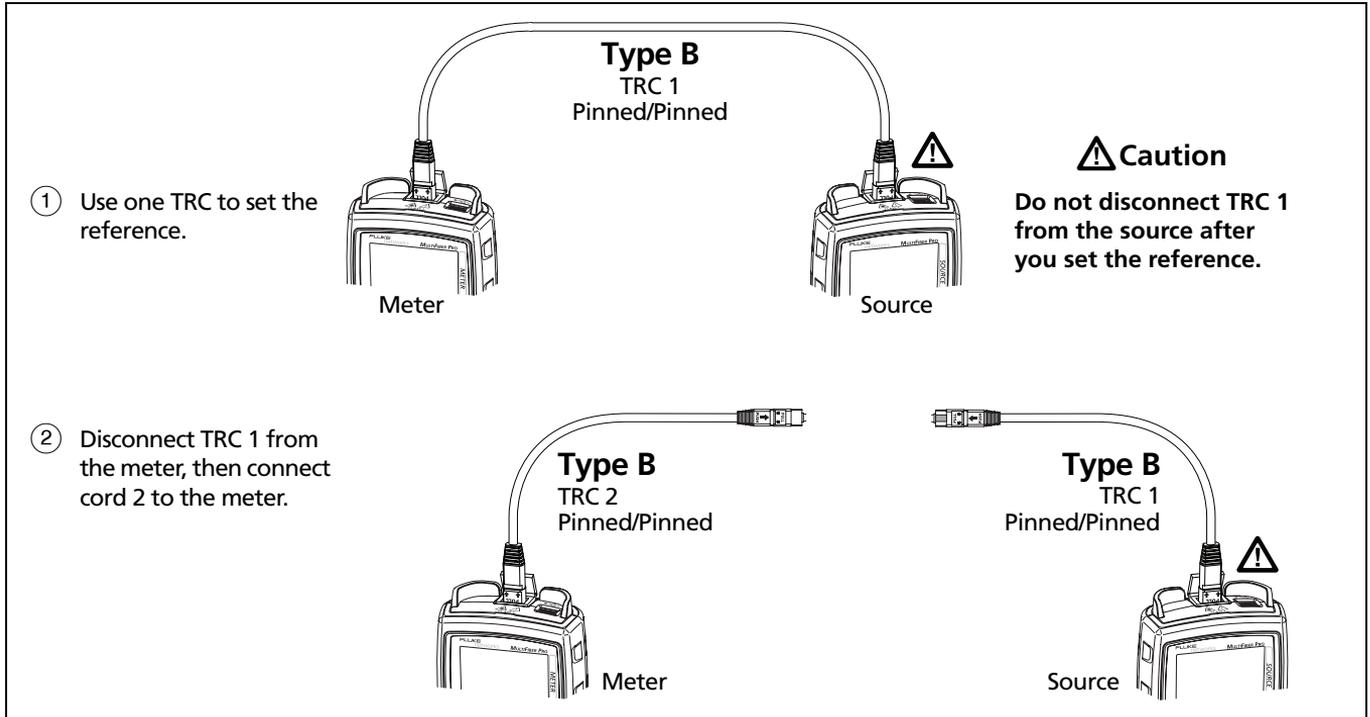**Type B**
TRC 1
Pinned/Pinned

Meter

Source

GUE19.EPS

Figure 8. Reference Connections for Permanent Links with Unpinned MTP/MPO Connectors

Measure Loss

1   Set the reference as described on page 19.

2   Make sure the limit is correct. To see the limit, hold down 🔲 for 2.5 seconds, press [F1] ▼ to put the cursor next to **LOSS LIMIT**, then press 🔲.

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 🔲 to make **LOSS** show. Figure Figure 10 on page 24 shows the display for loss measurements.

Notes

Err and ⊗ 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, Err, and ⊗ 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 [F1] **SAVE**. The meter briefly shows the record number and **OK**. The record number shown is for the number 12 fiber in the cable.

Pinned/Unpinned

Unpinned/Pinned

Adapter
Key-up/Key-down

Type A
Fiber link

Adapter
Key-up/Key-down

Type B
TRC 2
Pinned/Pinned

Type B
TRC 1
Pinned/Pinned

Meter shows
POLARITY A

⚠ **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

Source
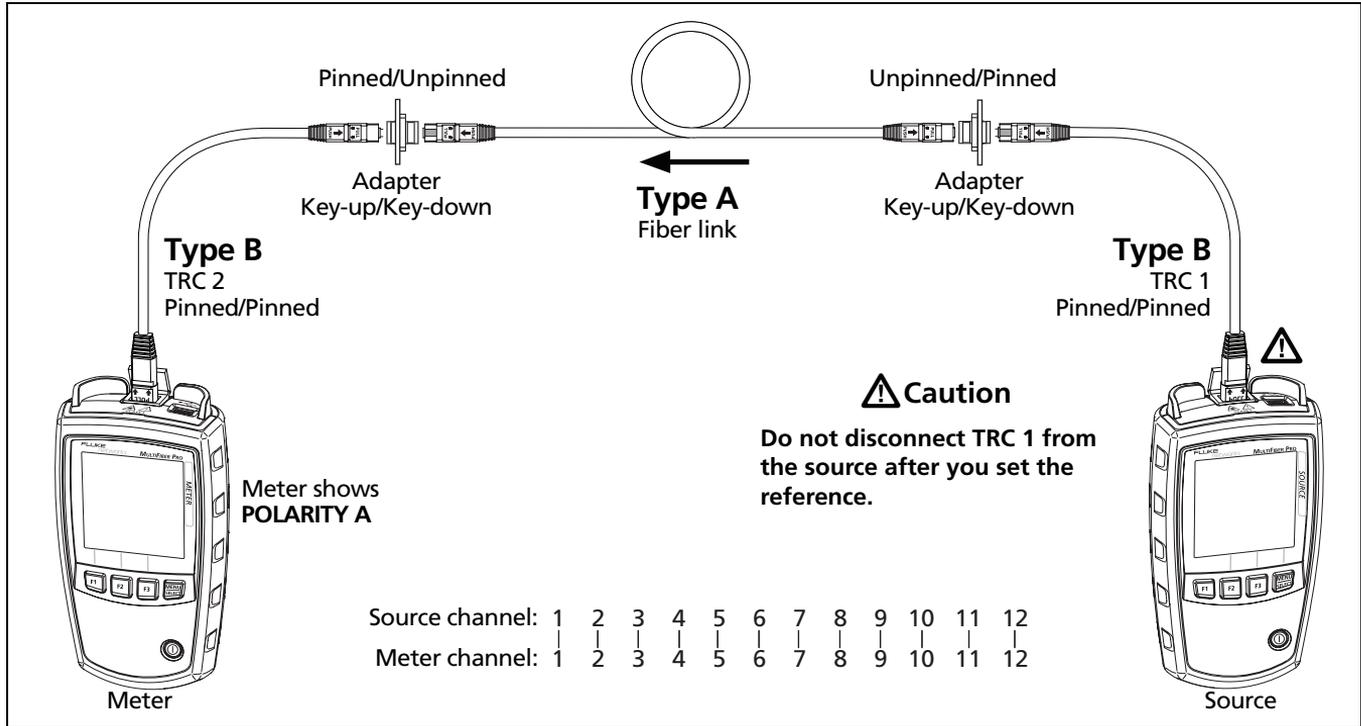
GUE10.EPS

Figure 9. Connections for Loss Measurements on Type A Permanent Links with Unpinned MTP/MPO Connectors

23
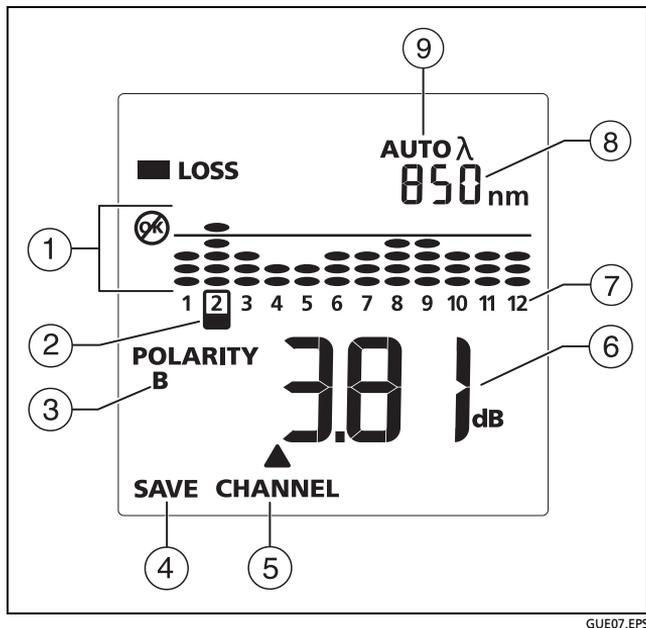
GUE07.EPS

Figure 10. Loss Measurement Display

① 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 🚫OK and the bargraph for that channel flash.

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

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 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 F2 ▲ to put the cursor next to **MODE**, then 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 F3 λ 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 MENU/SELECT for 2.5 seconds, press F2 to put the cursor next to **VIEW RECORD**, then press MENU/SELECT.

   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/SELECT.

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/SELECT until the setup menu shows, press F1 ▼ to put the cursor next to **VIEW RECORD**, then press MENU/SELECT.

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 SELECT].

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 SELECT].

To delete all the records in memory

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

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 SELECT].

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 ¦00 percent, **OK** shows. Then the meter goes back to the power or loss measurement mode
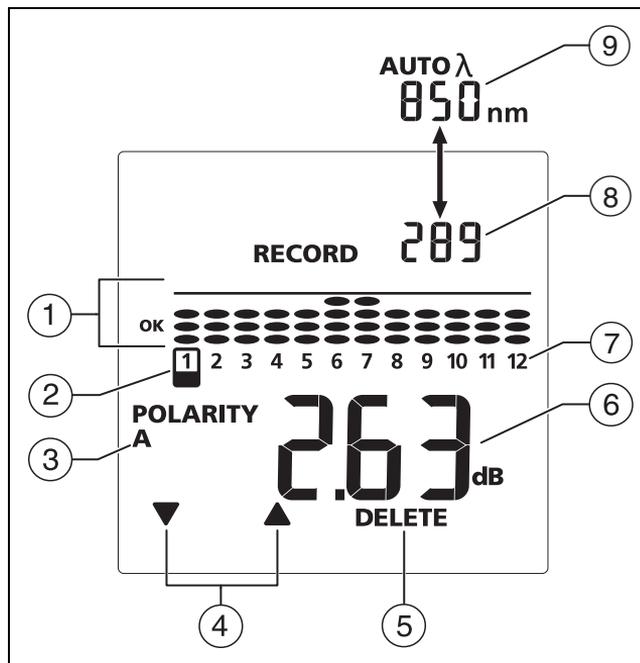
GUE00.EPS

**Figure 11. View Record Display
(loss measurement shown)**

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(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.

USB cable
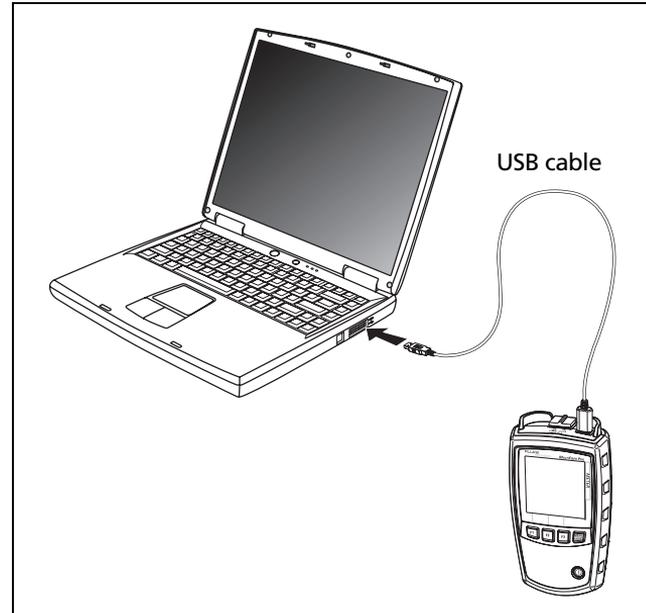
GUE24.EPS

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 ⬛ until the display shows 5oF then a number. The number is the software version

3 On the meter, press ⬛ 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 ⎕P ⎕r 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

Operating temperature	-10ºC to +50ºC
Storage temperature	-20ºC to +50ºC
Operating humidity	95% (10ºC to +35ºC) non-condensing 75% (35ºC to +45ºC) non-condensing Uncontrolled <10ºC
Operating altitude	4,000 m
Storage altitude	12,000 m
Vibration	Random 2 G, 5 Hz to 500 Hz

Meter

Specifications apply at 23ºC (73ºF), unless otherwise noted.

Detector type	InGaAs
Calibrated wavelengths	850 nm, 1300 nm, 1310 nm, 1550 nm
Measurement range	0 dBm to -50 dBm
Test time	6 seconds
Power measurement linearity	±0.1 dB[1]
Power measurement uncertainty	±0.35 dB
Power measurement repeatability	< 0.10 dB
Display resolution, dB or dBm	0.01 dB
Power display units	dBm, mW, µW
User-selectable limit for loss	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
Auto wavelength detection	Yes
Polarity detection	Detects A, B, C, and Corning Plug & Play™ Universal Systems polarities
1. For 850 nm, 0 dBm to -50 dBm. For 1300, 1310, 1550 nm, -5 to -50 dBm	

Meter (continued)

2 kHz detection	Yes
Record storage	3000 records, one fiber per record (250 12-fiber cables)
External interface	USB 2.0, full speed
Optical connector	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.
Power requirement	2 AA alkaline batteries
Battery life[2]	>30 hours (typical)
Automatic power-off	10, 20, 30, or 60 minutes (can be disabled by the user)
Low battery warning	Low battery icon blinks
Size	5.7 in x 3.2 in x 1.5 in (14.5 cm x 8.0 cm x 3.9 cm)
Weight	10.9 oz (309 g)
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.

Emitter type	LED: 850 nm
Wavelength	850 nm: ±30 nm
Spectral width (FWHM)	850 nm: 50 nm (typical)
Minimum output power	850 nm: ≥ -24 dBm
Power output stability[3]	≤ ±0.1 dB over 8 hours
Encircled flux	Meets TIA 455-526-14B, ISO/IEC 14763-3, and IEC 61280-4-1 for 50/125 μm at the source's optical connector.
Optical connector	MTP/MPO interface for 12-fiber, unpinned plugs. Compatible with 62.5 μm and 50 μm. Connector has a self-closing, protective cover.
Modes	2 kHz modulated, auto wavelength
3. 23°C ±2°C, after 10 minutes of warm-up time.	

Multimode Source (continued)

Power requirement	2 AA alkaline batteries
Battery life[4]	>30 hours (typical)
Automatic power-off	10, 20, 30, or 60 minutes (can be disabled by the user)
Low battery warning	Low battery icon blinks
Size	5.6 in x 3.2 in x 1.6 in (14.2 cm x 8.1 cm x 4.1 cm)
Weight	10.9 oz (309 g)

4. 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

CE   Conforms to relevant European Union directives

N10140   Conforms to relevant Australian standards

CSA   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.
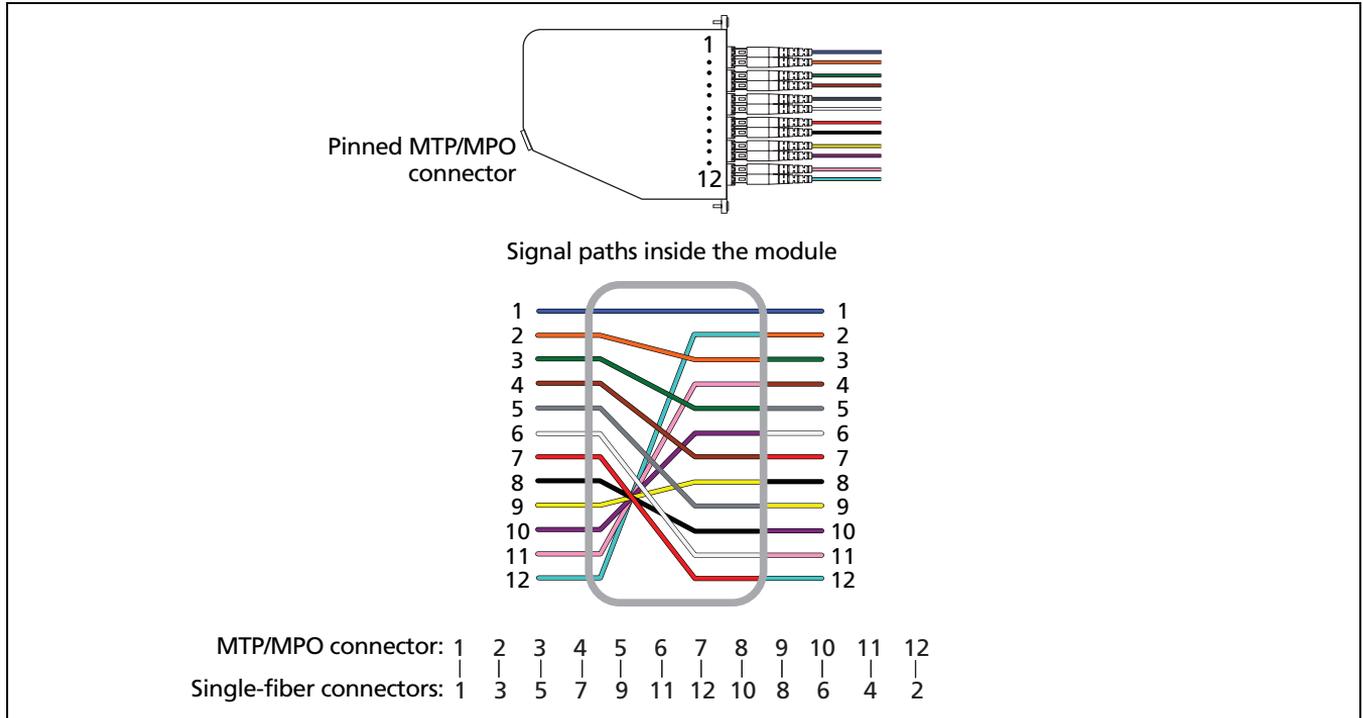
Note

*The polarity indication shows on the meter only when the source's **SCAN ALL** function is on and all fibers are connected.*
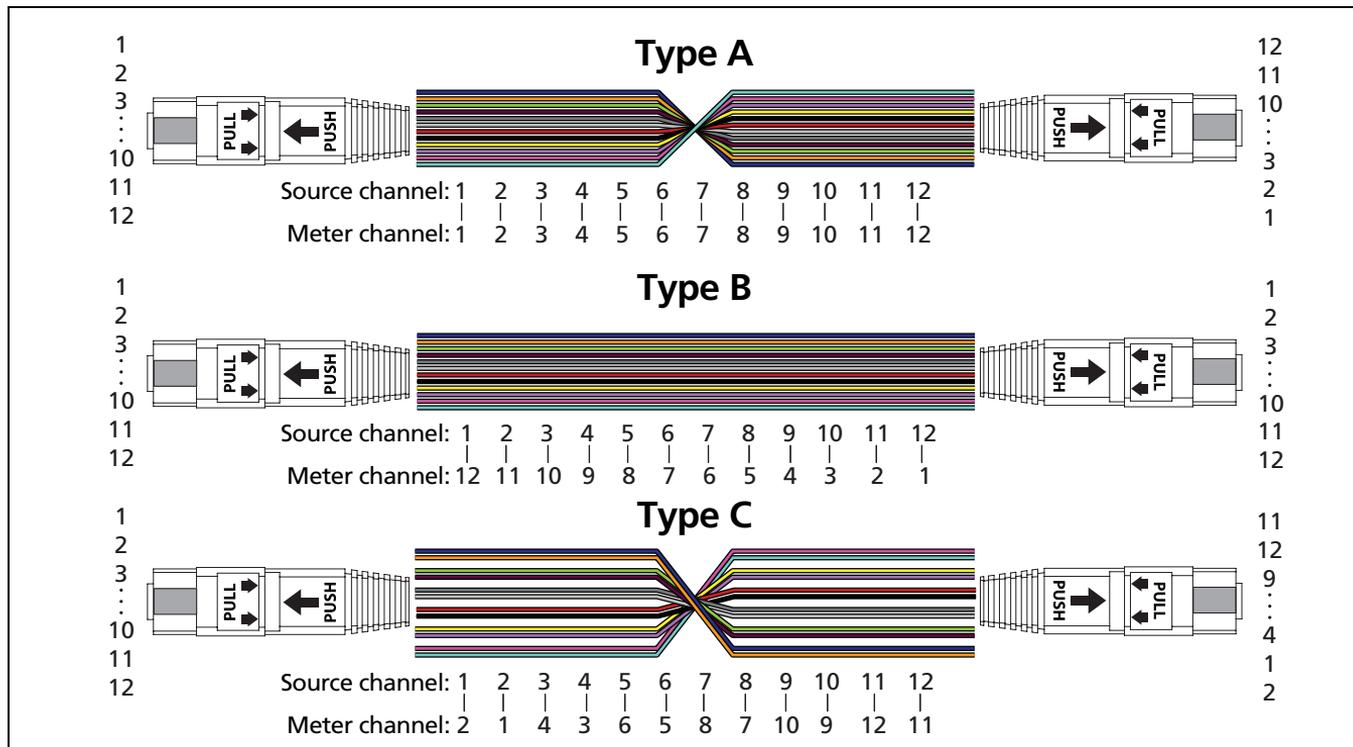
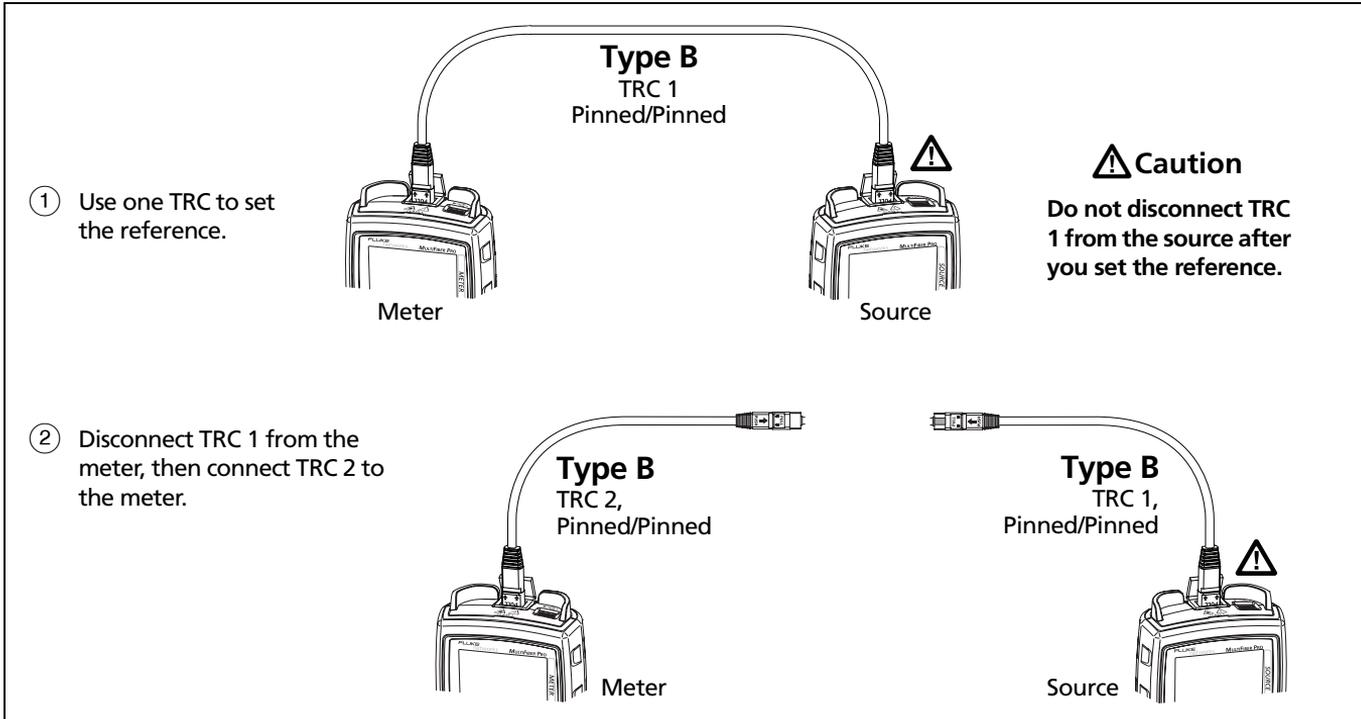**Figure A-1. Connections for Types A, B, and C Patch Cords**

GUE08.EPS

Figure A-2. Connections for the Corning Plug & Play™ Universal Systems Method

GUE28.EPS

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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.
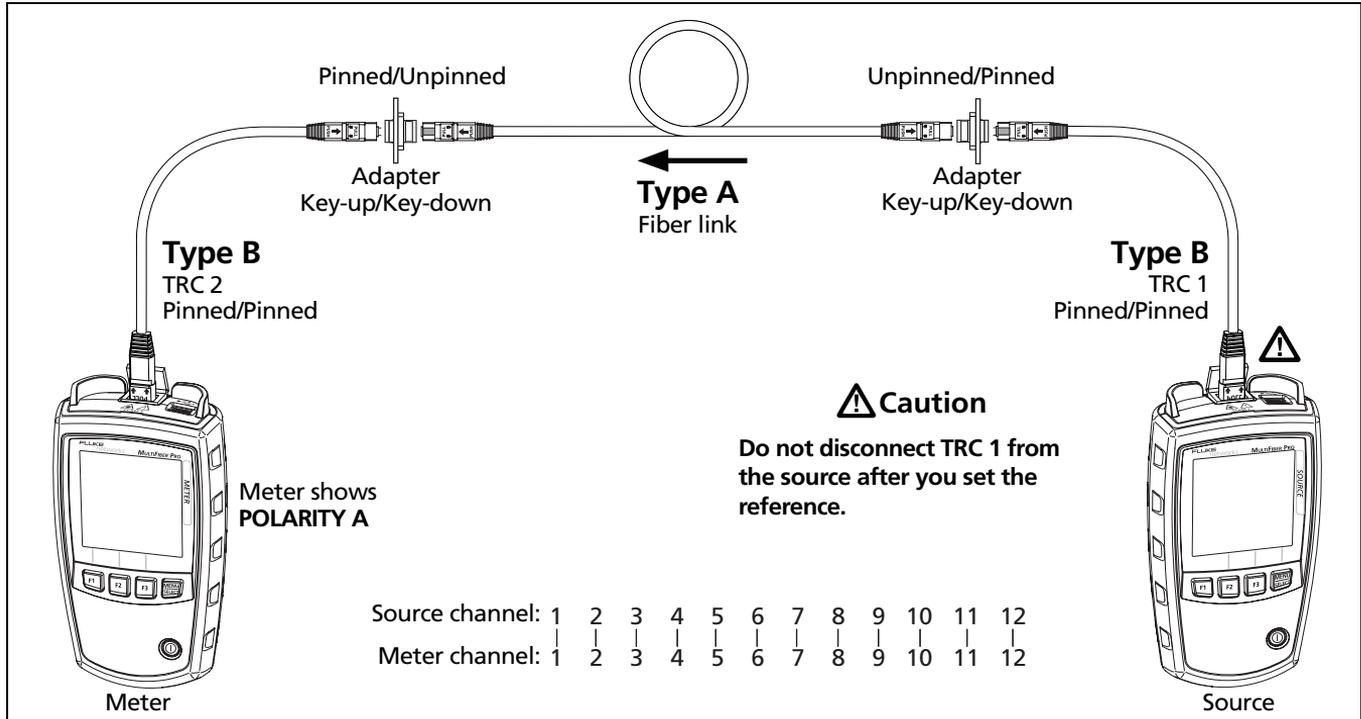
⚠ **Caution**

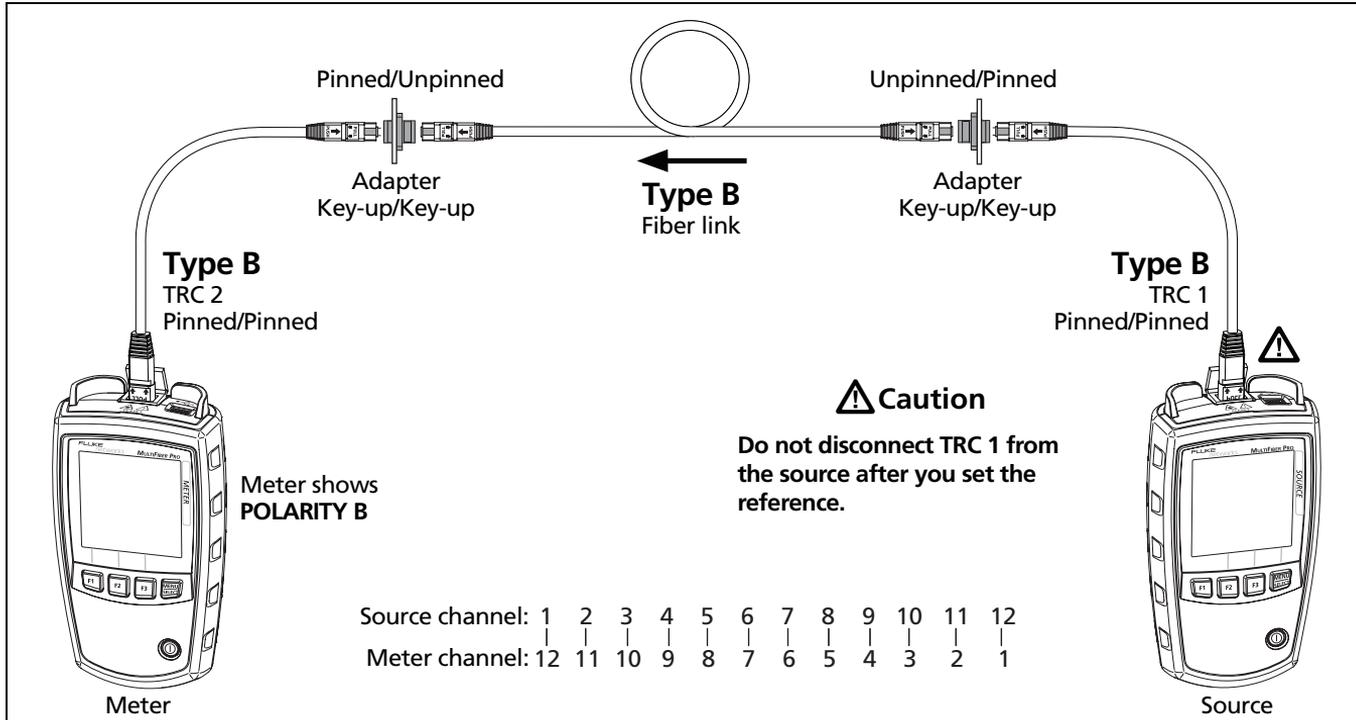**To get the correct polarity indication when you measure loss, you must use type B test reference cords when you set the reference.**

Type B
TRC 1
Pinned/Pinned

① Use one TRC to set the reference.

⚠**Caution**

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

Meter

Source

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

Type B
TRC 2,
Pinned/Pinned

Type B
TRC 1,
Pinned/Pinned

Meter

Source

GUE19.EPS

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

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

Pinned/Unpinned

Unpinned/Pinned

Adapter
Key-up/Key-up

Type B
Fiber link

Adapter
Key-up/Key-up

Type B
TRC 2
Pinned/Pinned

Type B
TRC 1
Pinned/Pinned

Meter shows
POLARITY B

⚠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: 12 11 10 9 8 7 6 5 4 3 2 1

Meter

Source

GUE12.EPS

Figure B-3. Connections for Loss Measurements on Type B Permanent Links with Unpinned MTP/MPO Connectors
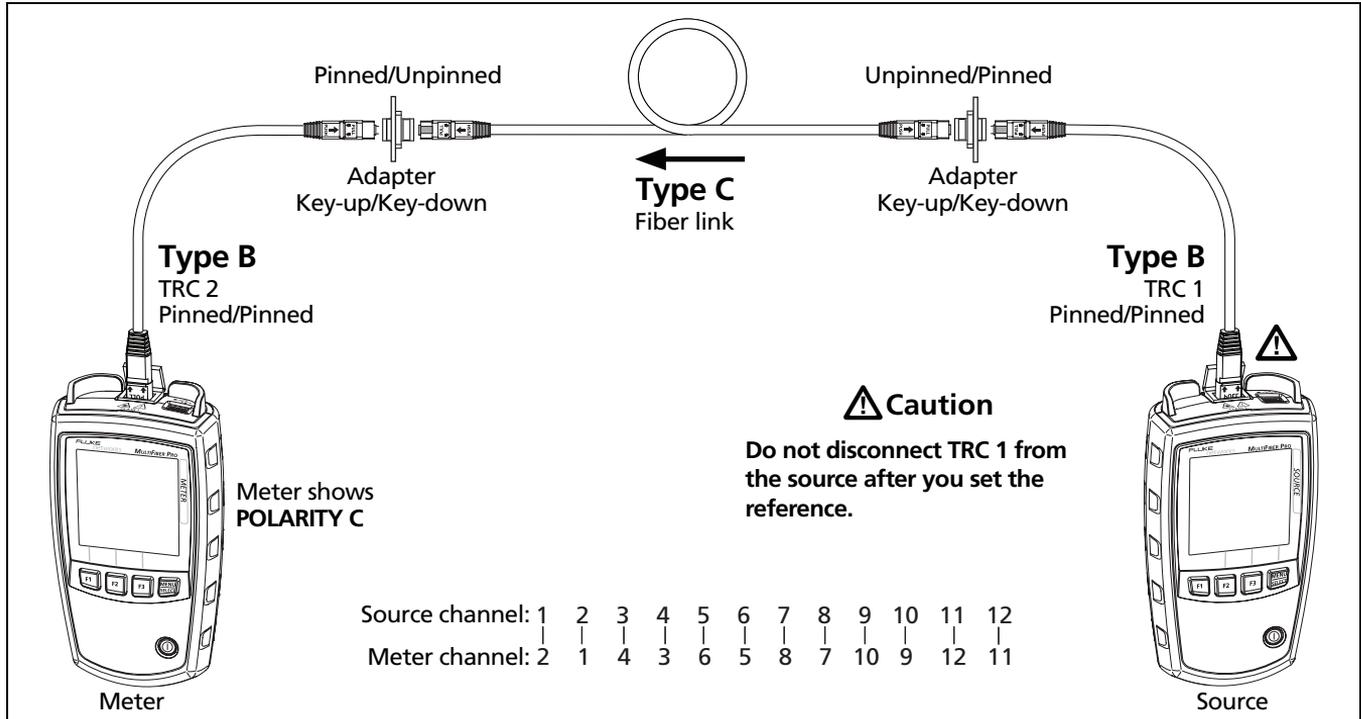
GUE20.EPS

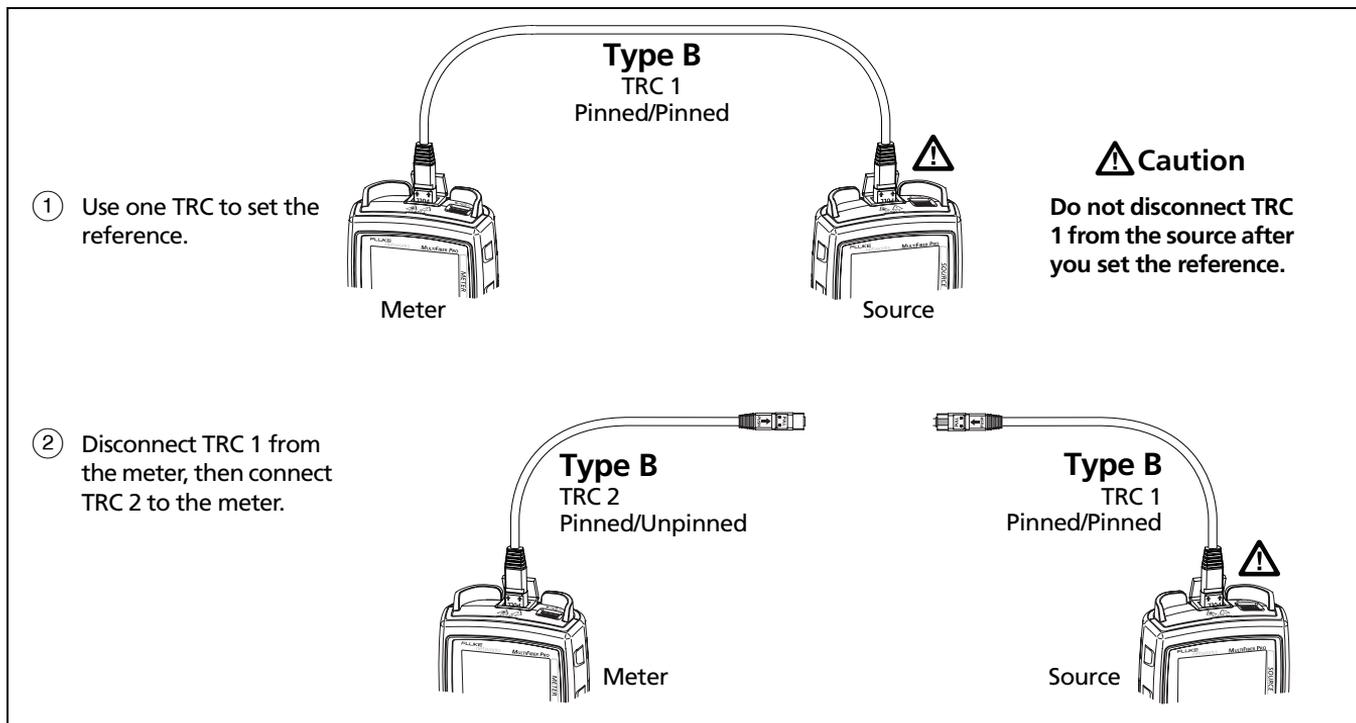**Figure B-4. Connections for Loss Measurements on Type C Permanent Links with Unpinned MTP/MPO Connectors**
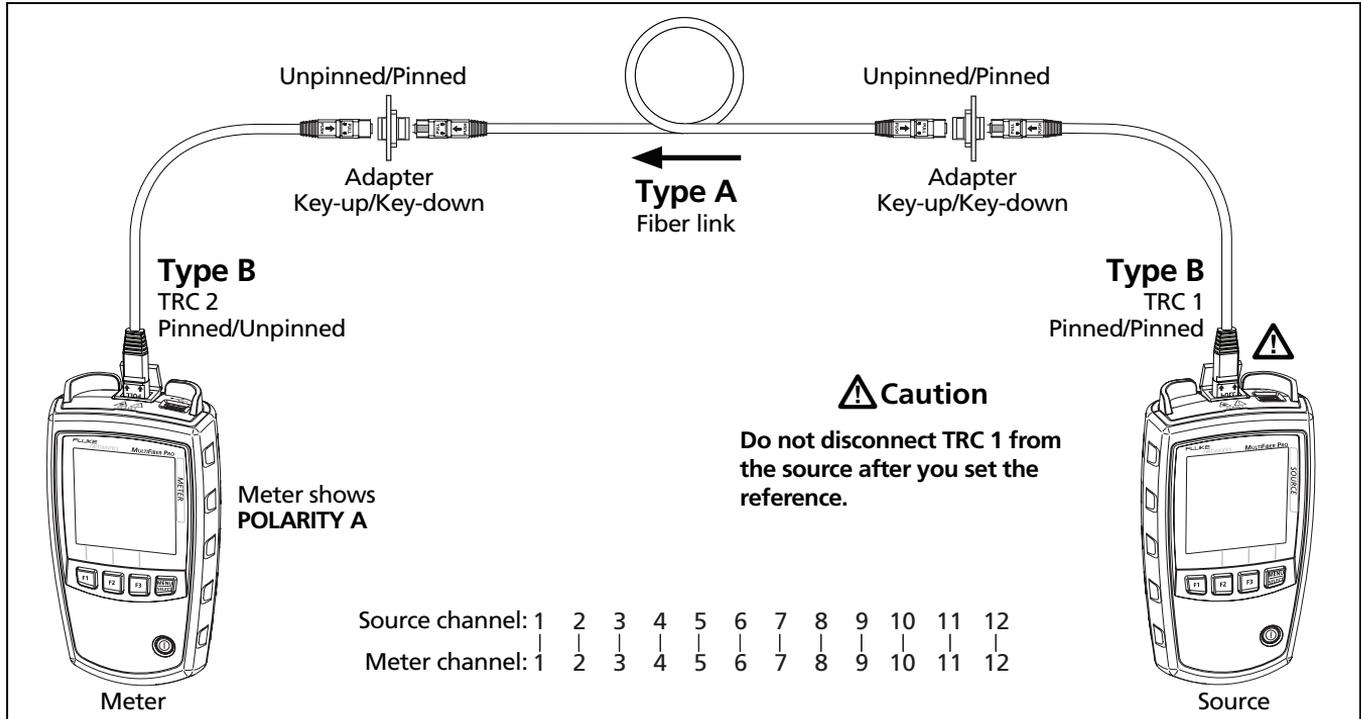
Pinned/Unpinned

Unpinned/Pinned

Adapter
Key-up/Key-down

Type C
Fiber link

Adapter
Key-up/Key-down

Type B
TRC 2
Pinned/Pinned

Type B
TRC 1
Pinned/Pinned

Meter shows
POLARITY C

Meter

⚠ **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:	2	1	4	3	6	5	8	7	10	9	12	11

Source

① Use one TRC to set the reference.

Type B
TRC 1
Pinned/Pinned

⚠ **Caution**

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

Meter

Source

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

Type B
TRC 2
Pinned/Unpinned
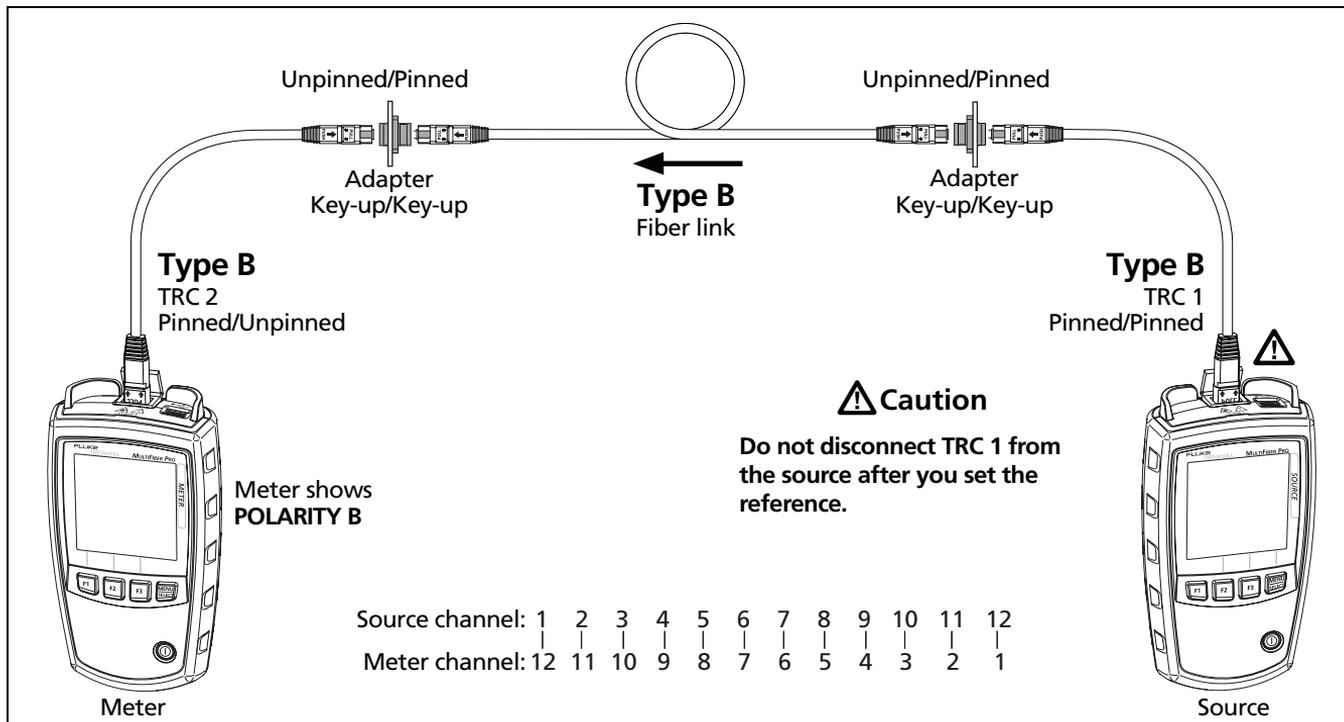
Type B
TRC 1
Pinned/Pinned

Meter

Source

GUE26.EPS

Figure B-5. Reference Connections for Permanent Links with Pinned and Unpinned MTP/MPO Connectors

GUE11.EPS

**Figure B-6. Connections for Loss Measurements on Type A Permanent Links
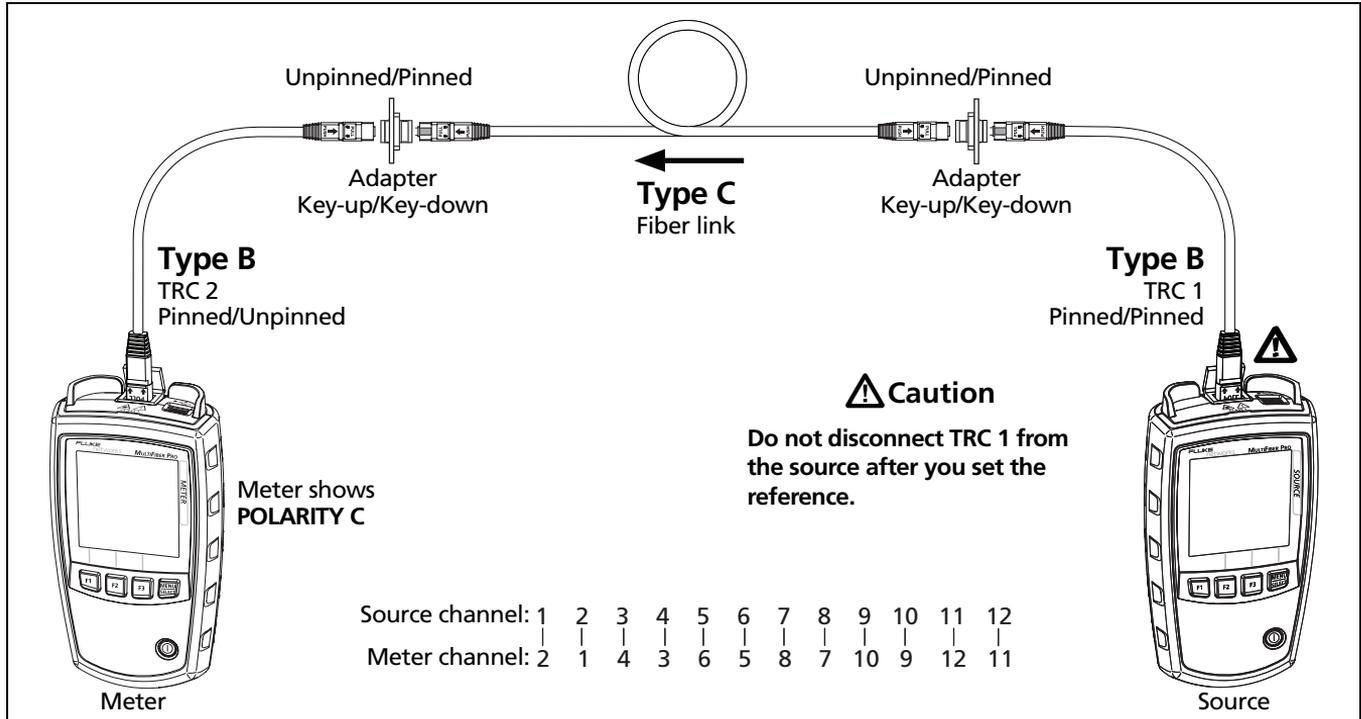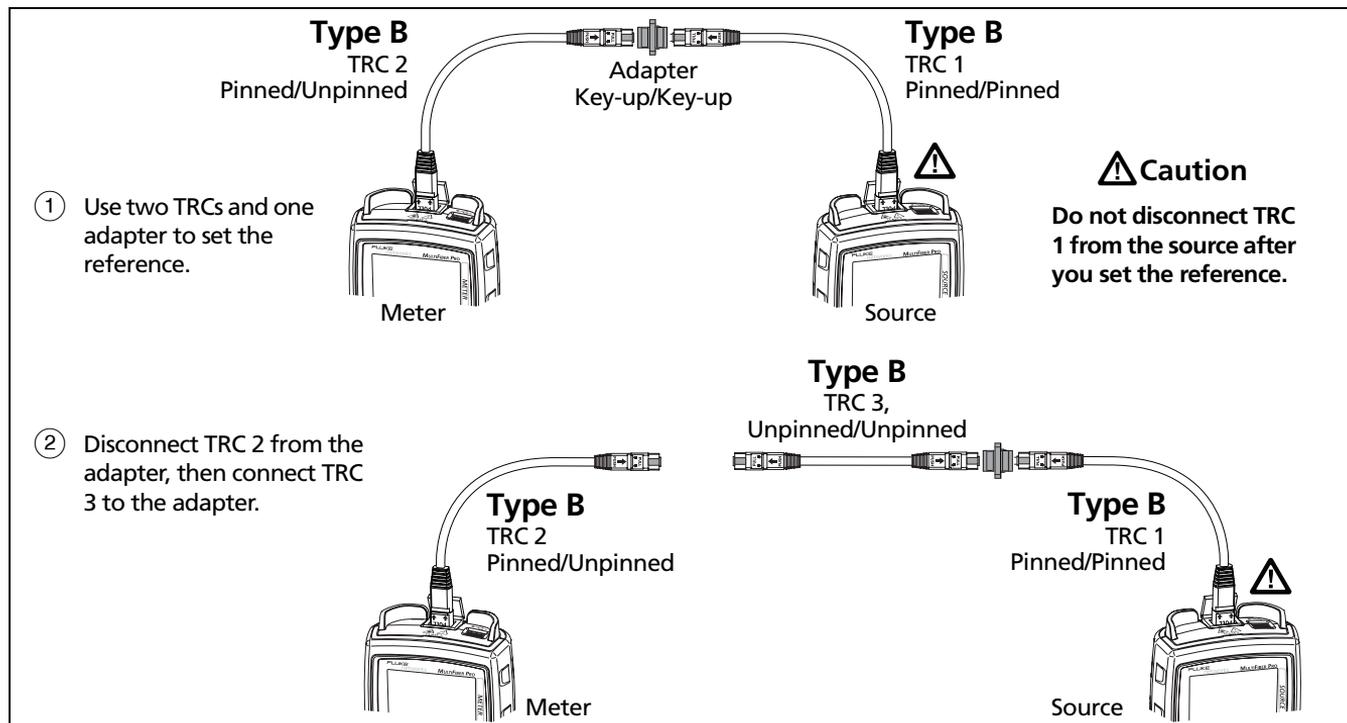with Unpinned and Pinned MTP/MPO Connectors**

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

GUE21.EPS

Figure B-8. Connections for Loss Measurements on Type C Permanent Links with Unpinned and Pinned MTP/MPO Connectors
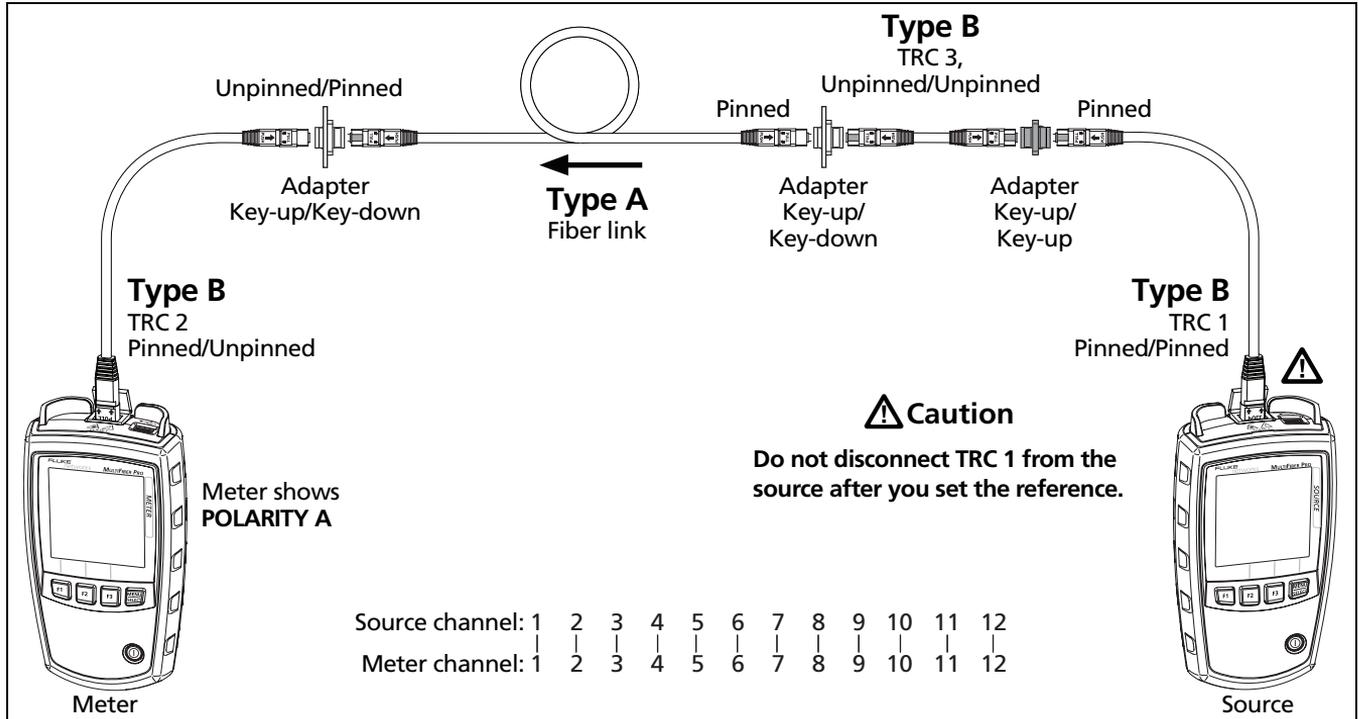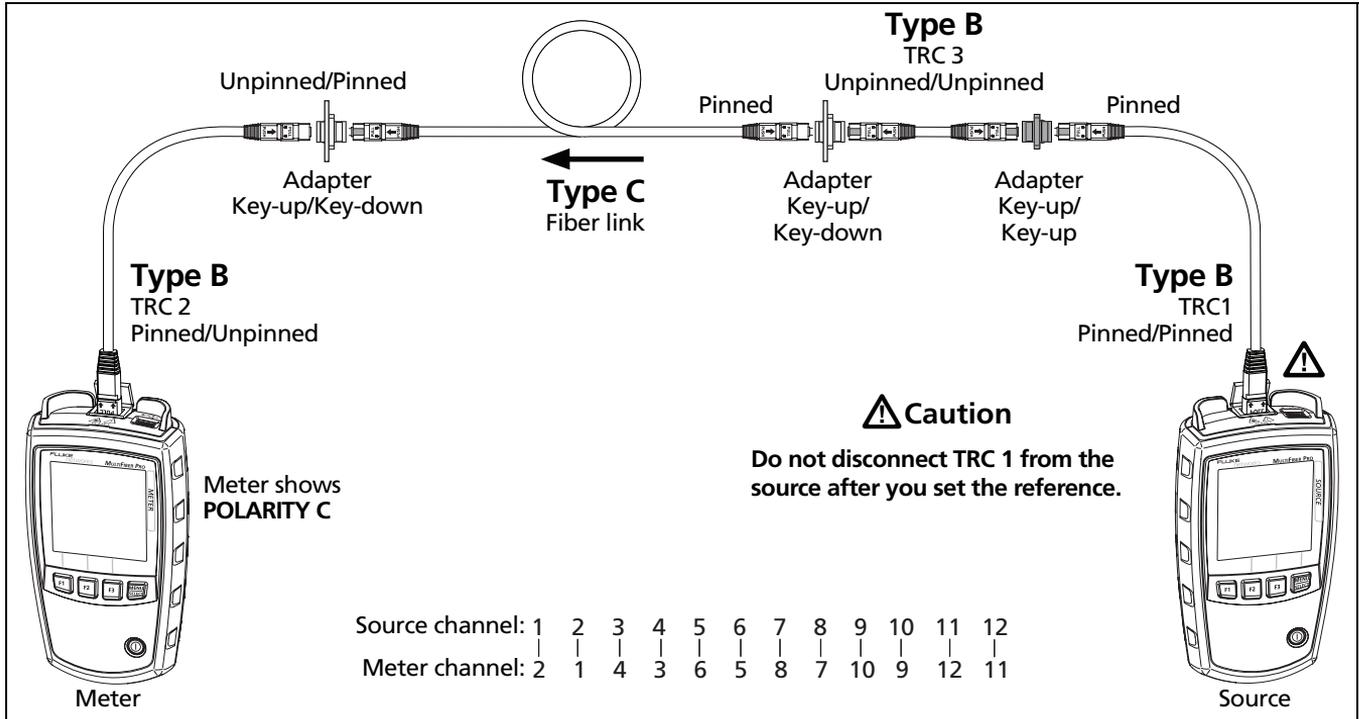
51

Type B
TRC 2
Pinned/Unpinned

Adapter
Key-up/Key-up

Type B
TRC 1
Pinned/Pinned

⚠ Caution

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

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

Meter

Source

Type B
TRC 3,
Unpinned/Unpinned

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

Type B
TRC 2
Pinned/Unpinned

Type B
TRC 1
Pinned/Pinned

Meter

Source

GUE27.EPS

Figure B-9. Reference Connections for Permanent Links with Pinned MTP/MPO Connectors

Type B
TRC 3,
Unpinned/Unpinned

Unpinned/Pinned

Pinned

Pinned

Adapter
Key-up/Key-down

Type A
Fiber link

Adapter
Key-up/
Key-down

Adapter
Key-up/
Key-up

Type B
TRC 2
Pinned/Unpinned

Type B
TRC 1
Pinned/Pinned

⚠ **Caution**

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

Meter shows
POLARITY A

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

Source

GUE13.EPS

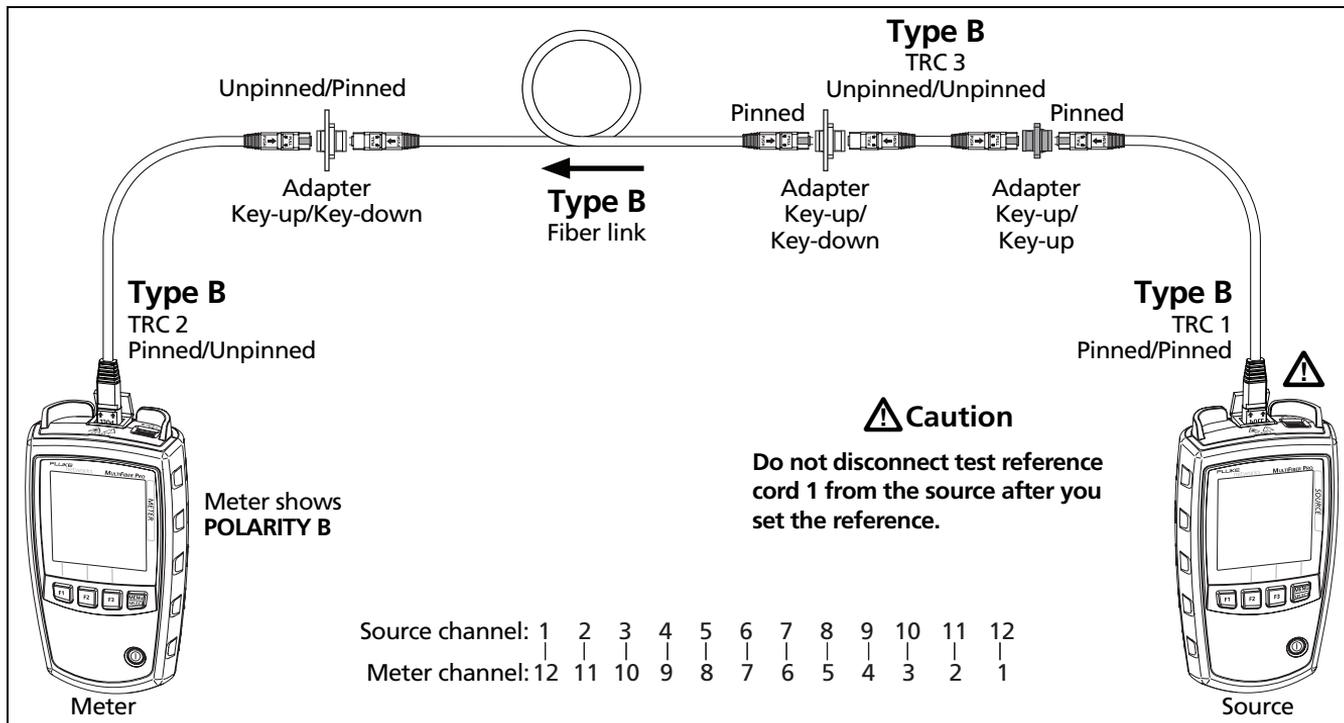**Figure B-10. Connections for Loss Measurements on Type A Permanent Links with Pinned MTP/MPO Connectors**
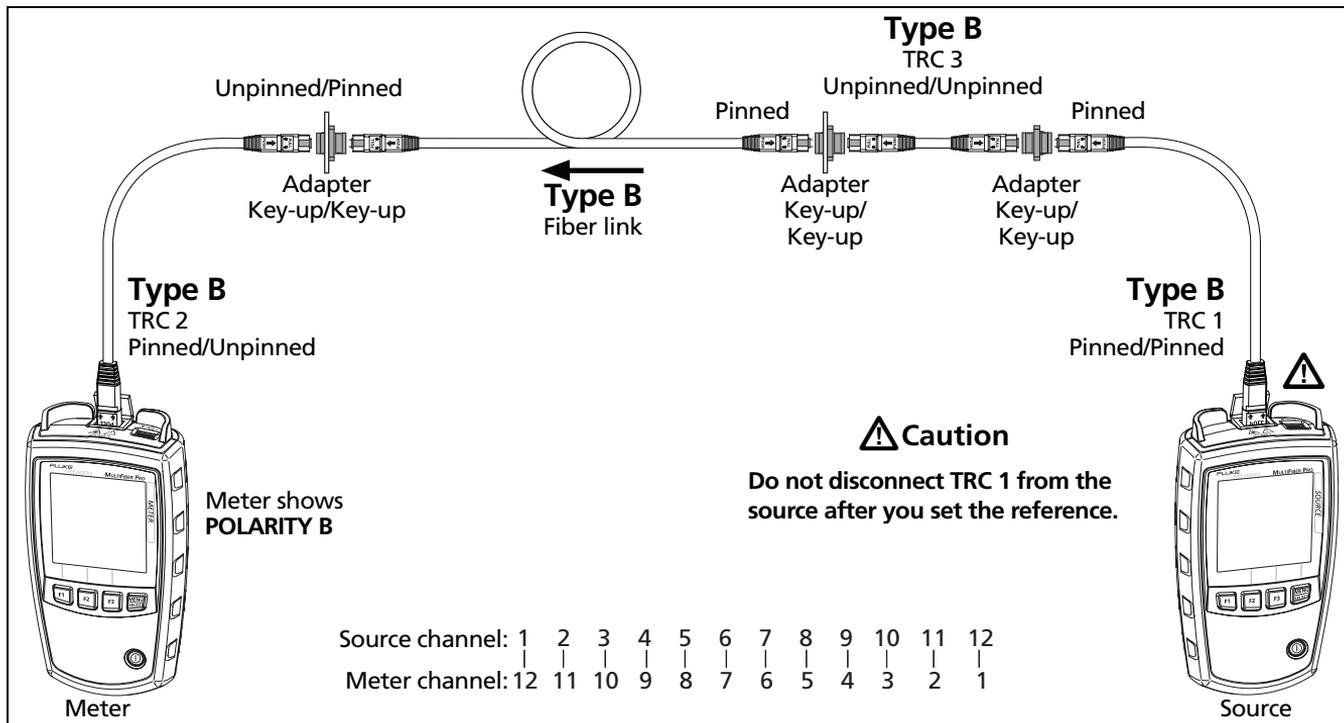
Figure B-11. Connections for Loss Measurements on Type B Permanent Links with Pinned MTP/MPO Connectors

Figure B-12. Connections Loss Measurements on Type C Permanent Links with Pinned MTP/MPO Connectors

GUE15.EPS

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
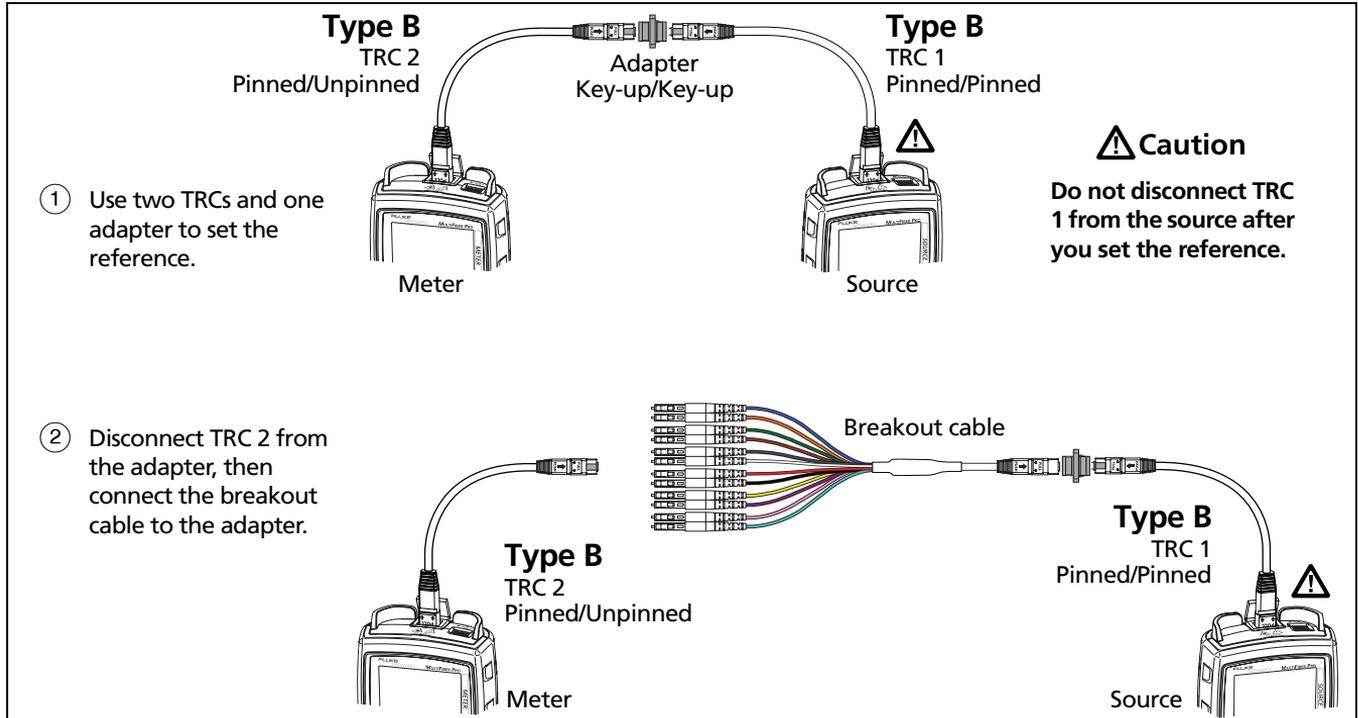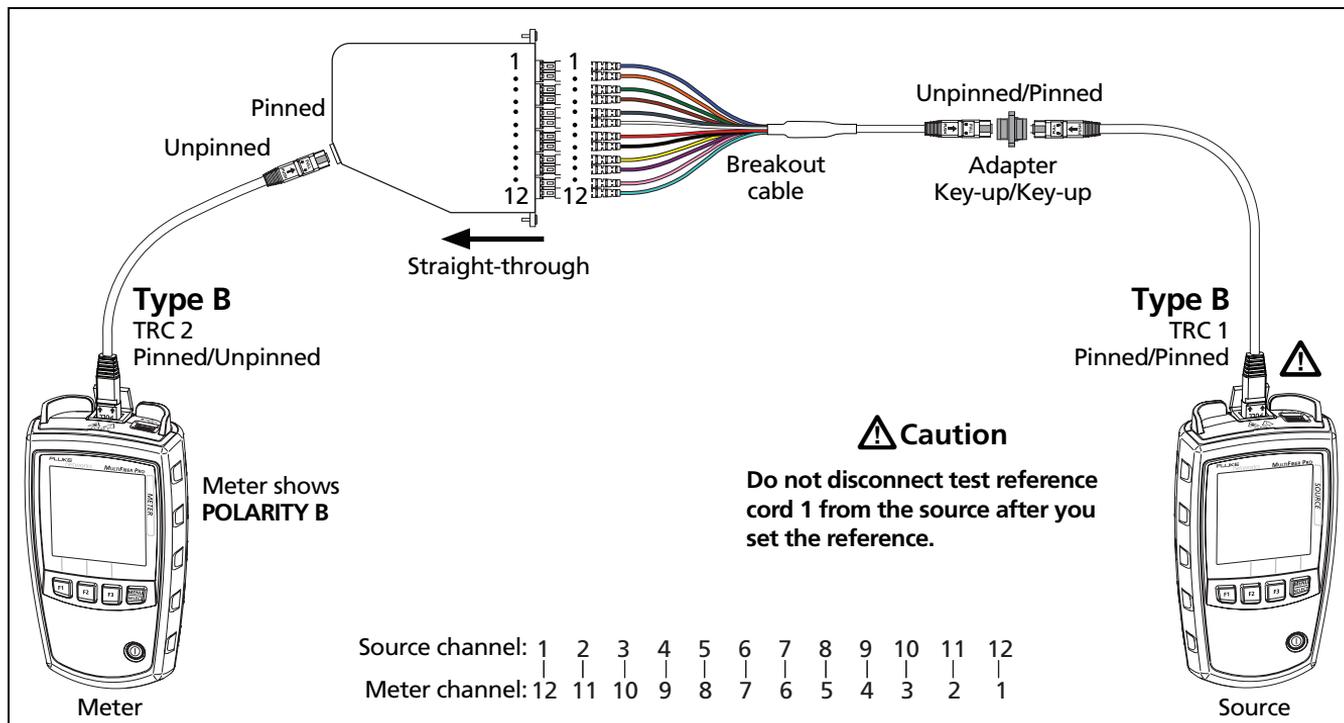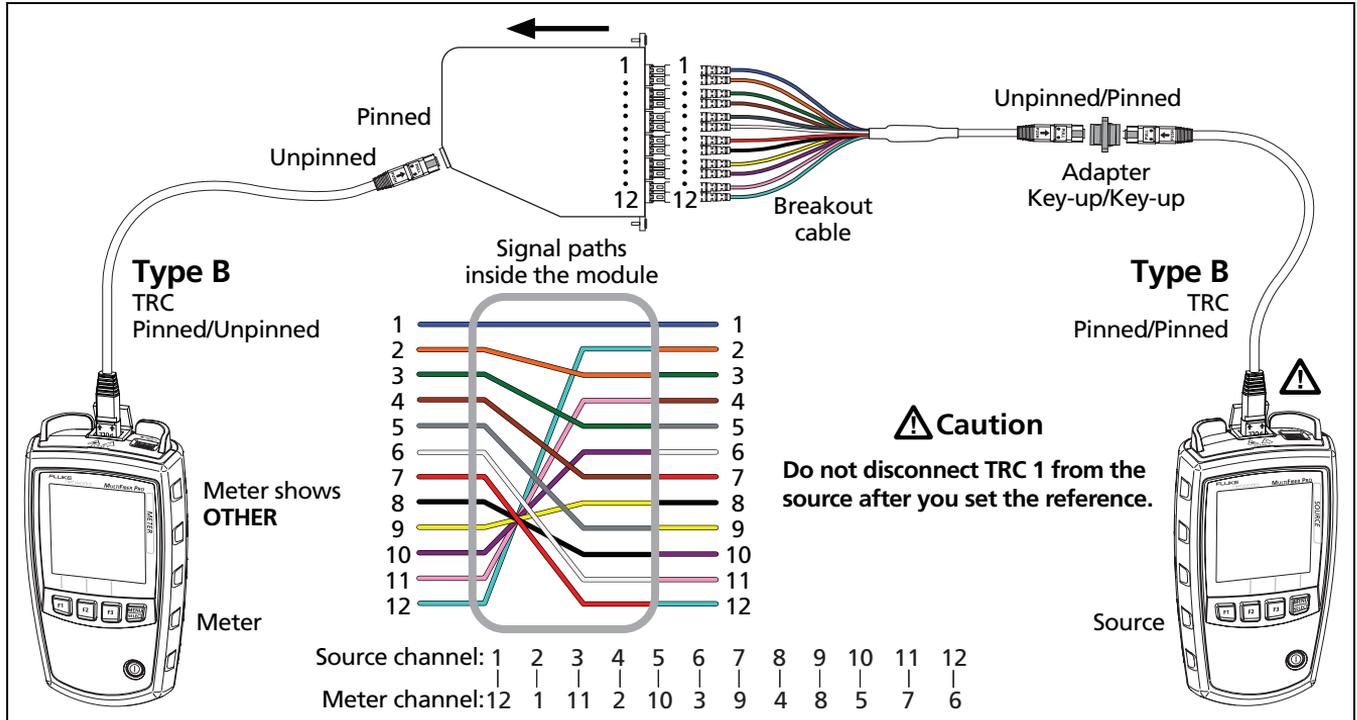
Figure B-14. Reference Connections for Fiber Modules with Pinned MTP/MPO Connectors

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

GUE16.EPS

Figure B-16. Connections for Loss Measurements on a Corning Plug & Play™ Universal Systems Module