

Optical Wavelength Laboratories

OPERATIONS GUIDE

MPO SERIES OPTICAL POWER METER



Revision 1.0a

OWL-INC.COM

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INTRODUCTION

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INTRODUCTION

BEFORE YOU BEGIN

All personnel testing optical fibers should be adequately trained in the field of fiber optics before using any fiber optic test equipment.

If the user is not completely familiar with testing fiber optics, they should seek competent training. Such training can be acquired from a variety of sources, such as local hands-on training classes.

Valuable information about fiber optic testing can also be gathered from reading printed literature carefully or by thoroughly reading supplied operations manuals.

Fiber optic testers vary from other types of test equipment due to issues such as:

- 1) standards-based testing
- 2) proper fiber optic test procedures (FOTPs)
- 3) "zeroing" or referencing of power levels
- 4) determining the correct link budget to pass or fail by

Complete understanding of each of these issues is critical for performing proper fiber optic tests.

ABOUT THIS MANUAL

Throughout this manual you will find various symbols that assist with understanding the procedures outlined in this manual. Below is a list of these symbols and a short description of their purpose:



Shows a helpful tip that will make a procedure go more smoothly



Tells the user some useful information about the successful completion of a procedure



Warns the operator of a potentially dangerous condition

INTRODUCTION

DESCRIPTION

The MPO Series optical power meter is a high-accuracy, high-resolution, microprocessor-controlled optical power meter capable of performing a wide variety of testing applications, from basic optical power measurement up to dual-wavelength fiber loss measurement. With a wide measurement range and NIST-traceable wavelengths, MPO Series power meters are ideal for both singlemode and multimode MPO fiber cable and link testing.

Enclosed in an attractive hand-held case made from high impact plastic and protected by a protective rubber boot, test readings and graphical help screens can be viewed on the color LCD, and an intuitive 10-key keypad allows for easy data entry.

Each MPO Series power meter is powered by a re-chargeable lithium polymer battery, which typically allows up to 50 hours of continuous use. A built-in auto-shutdown feature further conserves battery life. The battery is re-charged through the USB port via a supplied battery charger.

The intuitive built-in Link Wizard prompts the user to enter key information used to set up the meter for MPO cable testing, and helpful diagrams guide the user through the setup and testing procedure.

Thousands of data points with descriptive link and fiber run labels can be stored in internal memory. Stored information can be selectively viewed, re-tested, or deleted from the device.

The data can also be downloaded to OWLView certification software to produce professional-looking formatted certification reports. OWLView software.

INTRODUCTION

MPO TESTING APPLICATIONS

Traditional Fiber Optic Link Certification. When used with a separate MPO Series light source, CERT (certification) mode allows users to certify MPO fiber cables and links at up to two wavelengths simultaneously. The Link Wizard in the meter uses attenuation parameters from popular cabling standards to certify fiber links, and shows a link's PASS/FAIL status right in the field.

Attenuation (Optical Loss) Measurements. Loss measurement of MPO cables is recommended at various times: to verify that the cable is good after it has shipped from the MPO cable vendor, or to test the cable both before and after the cable is installed in a network to make sure the cable was not damaged during the installation process.

SINGLE-FIBER TESTING APPLICATIONS

The MPO power meter also includes a single-fiber test port for testing one fiber at a time, such as for testing MPO cables that have been installed into cassettes, or for traditional single-fiber loss measurement and certification. In this way, the MPO meter operates as a traditional optical power/loss meter.

Traditional Fiber Optic Link Certification. CERT (certification) mode allows users to certify non-MPO cabling, or MPO cabling installed in cassettes, one fiber at a time, and at up to two wavelengths simultaneously. The Link Wizard in the meter uses attenuation parameters from popular cabling standards to certify fiber links, and shows a link's PASS/FAIL status right in the field. Requires a separate light source, such as OWL's MPO sources, or single-fiber sources such as the WaveSource Pro, Laser OWL Pro (singlemode) or Dual OWL Pro (multimode).

Attenuation (Optical Loss) Measurements. After a MPO or traditional multi-strand fiber cable has been installed, optical loss measurements can be used to determine if the fiber is installed according to customer specifications. A comparison between the actual power measurement and the reference value determines how much optical power is lost through the link.

INTRODUCTION

PRECAUTIONS

Safety - Exercise caution when working with any optical equipment. High-intensity fiber optic laser sources output potentially dangerous high energy invisible light, and could cause serious, irreparable damage to the eye. Thus, it is recommended to **NEVER** look into the connector port of a light source or the end of a fiber.

Operational - It is important to keep connector ferrules and optical connector ports clean. If dirt, dust, and oil are allowed to build up inside connector ports, irreparable damage may occur to the optics inside the port. For best results, replace dust caps after each use.

PRODUCT LABEL

On the back of each MPO series power meter are labels similar to the one shown below containing model number, serial number, power requirements, and special cautionary information.



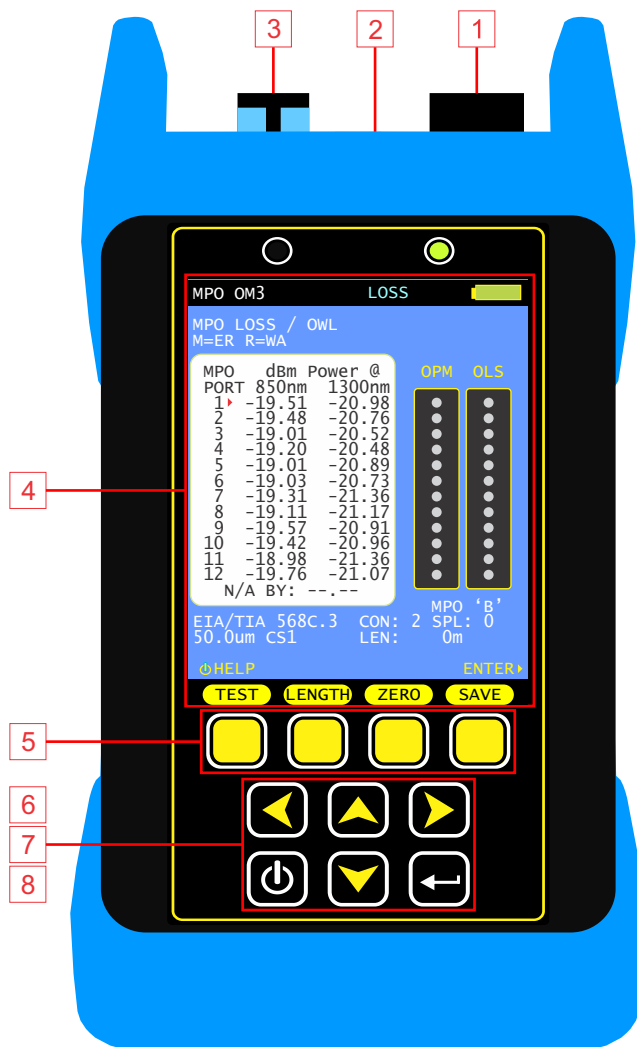
MPO SERIES

OPTICAL POWER METER

(MODEL #: MPO-OPM)

GENERAL FEATURES

- 1 **MPO Port** - 12-fiber MPO port. Includes shutter to prevent dust from building up inside the port.
- 2 **USB Serial Download Port** - downloads stored data to a PC using the supplied USB download cable. Also used for charging re-chargeable batteries (not included).
- 3 **Single-fiber Test Port** - enables the MPO Series power meter to test individual optical fibers.
- 4 **High-resolution Color LCD Display**
- 5 **Function keys** - activate corresponding menu options shown at the bottom of the power meter's LCD display
- 6 **Arrow keys** - activate corresponding menu options shown at the bottom of the power meter's LCD display
- 7 **Enter key**
- 8 **Power key**



SPECIFICATIONS

OPTICAL POWER METER PORT	
Detector Type	InGaAs
Wavelengths	850, 980, 1300, 1310, 1490, 1550, 1625 nm
Measurement Range	+5 to -70 dBm
Accuracy (Uncertainty)	±0.15 dB
Display Resolution	0.01 dB
Measurement Units	dBm, dB
Connector Type	MPO: 12-fiber // Single-fiber: SC
Data Storage Points	up to 10,000
Download Port Connection	USB
Software	OWLView
Modes of Operation	CERT, LOSS, OPM

Bold wavelengths are NIST Traceable

Conforms to the Harmonized European Standards EN 61326-1 and EN 61010-1.

GENERAL	
Display Type	2.8" Color LCD
Battery Type	Lithium Polymer
Battery Life	up to 50 hours
Auto-shutdown	Yes
Operating Temperature	-10 to 55° C
Storage Temperature	-30 to 70° C
Dimensions	2.87" x 4.42" x 1.25"
Weight	10 ounces (284 g)

TEST PROCEDURES

TESTING MPO CABLES

OVERVIEW

Due to the multi-fiber nature of MPO connectors, testing MPO trunk cabling and links requires specialized equipment designed to test and measure each individual fiber in the cable separately but automatically, without disconnecting the MPO connector.

Typical multi-fiber cables with individual fibers can be easily repaired by replacing a single connector. But MPO cables, with all the fibers in the same connector, is much more difficult to repair.

So, it is important to test the MPO cable multiple times during the installation. First, test the cable out of the bag to make sure the factory provided a good cable, then test the cable after installation to make sure that nothing happened to the cable during cable pulling.

This section will detail how to fully test MPO cables both pre- and post-installation to ensure that the MPO cabling will support the network application for which it was designed.

REQUIRED EQUIPMENT AND ACCESSORIES

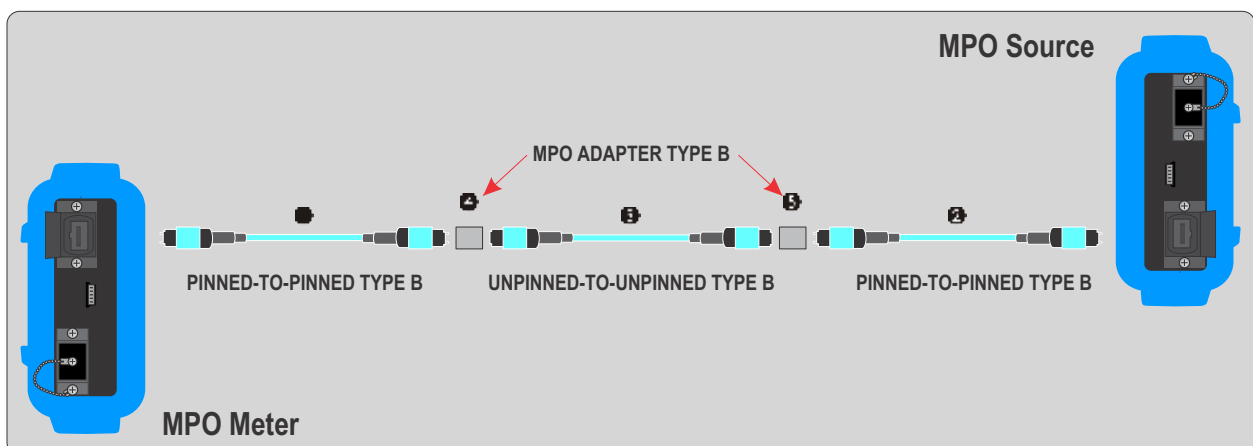
The test equipment used in this procedure is the MPO power meter (part #: MPO-OPM) and an OWL MPO source designed for the fiber type under test.

Testing MPO cabling with this procedure will require the user to use the three test jumpers, so the following cables and adapters must also be acquired (see the 3-jumper diagram below):

- 12-fiber MPO “B” reference cables (pinned-to-pinned) of the appropriate fiber type
- 12-fiber MPO cable that is the same configuration as the MPO cable under test (but should be as short as possible)
- MPO “B” adapters



NOTE: this procedure assumes the cable under test is the most commonly used “unpinned-to-unpinned” trunk cable configuration. Other configurations may require the user to use different reference cables and/or adapters.



TEST PROCEDURES

TESTING MPO CABLES

GATHER LINK SETUP INFORMATION

To make the setup process go more smoothly, have the following information ready in advance.

LINK NAME – general information about the job (user-definable)

Project	Name of the overall project
Location	Building or geographic area where the fiber link is located
Meter End	End of the fiber link where the meter unit will be used
Source End	End of the fiber link where the light source unit will be used

FIBER TEST MODE – how to go about testing the fiber link

Test Mode	CERT (if using a standard to show PASS/FAIL results) or LOSS (if a standard is not required)
Standard	Cabling standard used for the certification test; most technicians will use EIA/TIA 568C.3 <i>🔗 Note: the standard will not be applied if LOSS mode is selected</i>

TEST CORD TYPE – defines inter-connection loss at the very ends of the fiber link where the test equipment connects in (patch panels, wall outlets) – Options: REFERENCE-grade or **STANDARD**-grade

SOURCE PORT	refers to the type of test cord attached to the light source
OPM PORT	refers to the type of test cord attached to the optical power meter
<i>🔗 For MPO cabling, use STANDARD-grade for best results</i>	

LINK INFORMATION – physical configuration of the link under test

Fiber Type	Type of fiber used in the link under test; options may vary based on chosen cabling standard
Connections	Number of mid-span connections NOT covered by TEST CORD TYPE connections
Splices	Number of splices in the link under test; can be either fusion or mechanical splices <i>🔗 MPO cabling (which is generally pre-connectorized from the factory) will have 0 splices</i>
Reference Method	1-jumper reference method
Connector	Select the type of MPO polarity of the cables under test (A, B, or C, or NON MPO) <i>🔗 Most MPO trunk cables are Type B</i>

ENCIRCLED FLUX – is EF compliance required for this test: YES or **NO** (only required for multimode testing)

Consult cabling standard documentation or end user requirements to determine if EF compliance is required; if so, special mode controller cables will be required for setting the optical reference (aka “zeroing”).	
<i>🔗 For MPO cabling, select NO since EF compliance is not supported by the C.3 standard</i>	

RUN NAME – naming of fiber test results within the job to uniquely identify individual fiber strands

Name	The name used to identify the group of individual fiber strands in the link
Number	The starting fiber strand number in the link. The number will be automatically incremented as the test results are saved.

TEST PROCEDURES

TESTING MPO CABLES

JOB SETUP

Only the MPO power meter is required for initial job setup. This procedure will demonstrate how to create a new job.

- 1**  : power on the MPO power meter.



- 2** At the STARTUP MENU screen:
 : highlight CREATE NEW LINK
 : start link configuration



TEST PROCEDURES

TESTING MPO CABLES

JOB SETUP

3

At the LINK NAME screen:

- ✓⬆ : navigate the entry fields
- ⬇ : edit the contents of the selected field
- NEXT : accept values and continue



4

At the FIBER TEST MODE screen:

- ✓⬆ : navigate the entry fields
- ⬇ : scroll through available settings
- NEXT : accept values and continue



If PASS/FAIL is required, choose CERT
if PASS/FAIL is not required, choose LOSS



TEST PROCEDURES

TESTING MPO CABLES

JOB SETUP

5

At the **LINK INFORMATION** screen:

- ✓▲ : navigate the entry fields
- ▶ : scroll through available settings
- NEXT** : accept values and continue



If a multimode fiber type was selected, a screen referring to Encircled Flux will appear before proceeding to the next step.

If the 568-3.D standard was chosen, then press YES.
All other standards, press NO.



6

At the **RUN NAME** screen:

- ✓▲ : navigate the entry fields
- ▶ : scroll through available settings
- NEXT** : accept values and continue



NAME: the name for this group of fiber cables
NUMBER: the first number to use
MPO POSITIONS: the number of fibers in the MPO connector



TEST PROCEDURES

TESTING MPO CABLES

JOB SETUP

7

Review the LINK INFORMATION:

SAVE : accept values and continue

BACK : go back to change incorrect values



8

Setting a reference is required for measuring loss and certifying fiber cables.

Review the explanation screen, then:

YES : continue to set a reference

NO : skip setting a reference at this time



TEST PROCEDURES

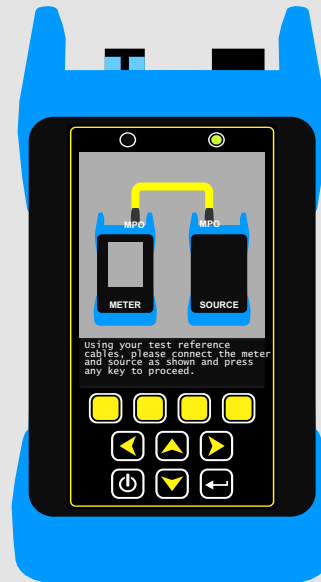
TESTING MPO CABLES

SETTING THE REFERENCE

9

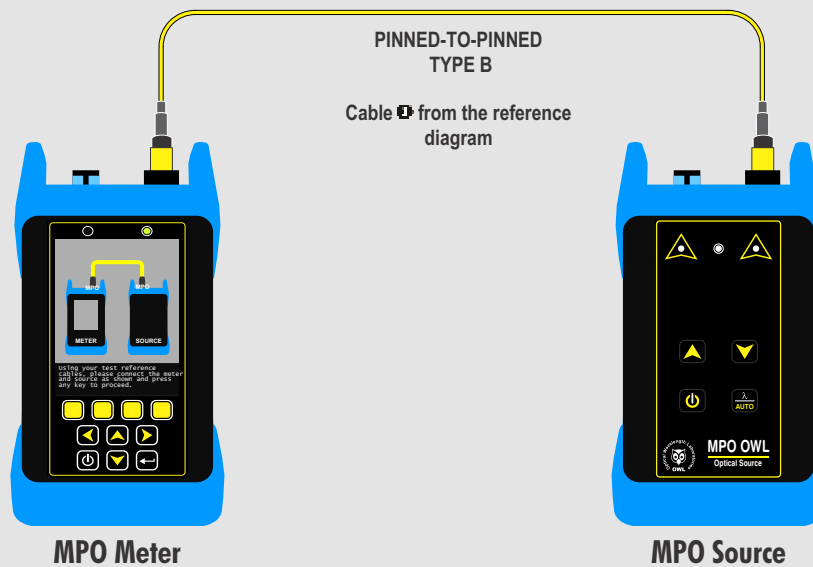
Review the reference connection screen.

Gather the MPO light source and all required accessories, but do not press any key at this time.



10

Connect the reference cable as shown.



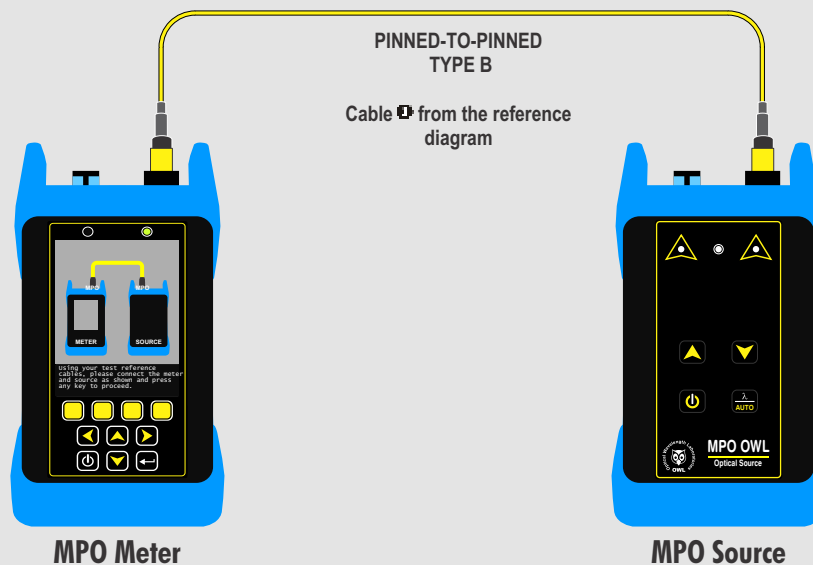
TEST PROCEDURES

TESTING MPO CABLES


SETTING THE REFERENCE

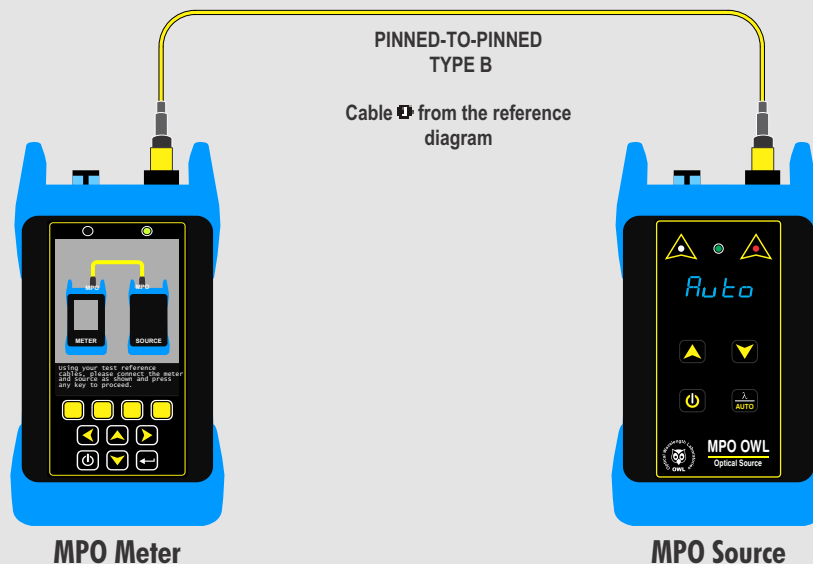
11

 : Power ON the light source.



12

 (hold) : Set source into AUTO mode. The source will begin to alternate between wavelengths and MPO channels, and will continue to do so until any key on the source is pressed.

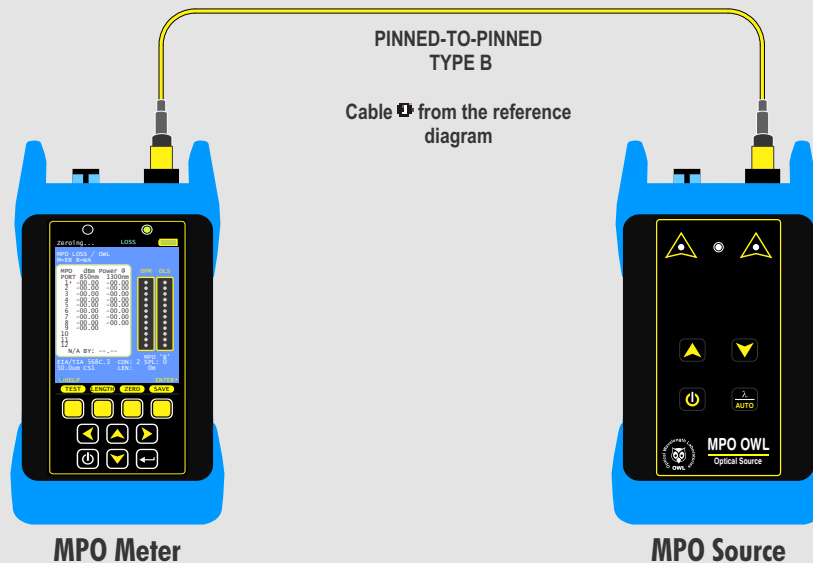


TEST PROCEDURES

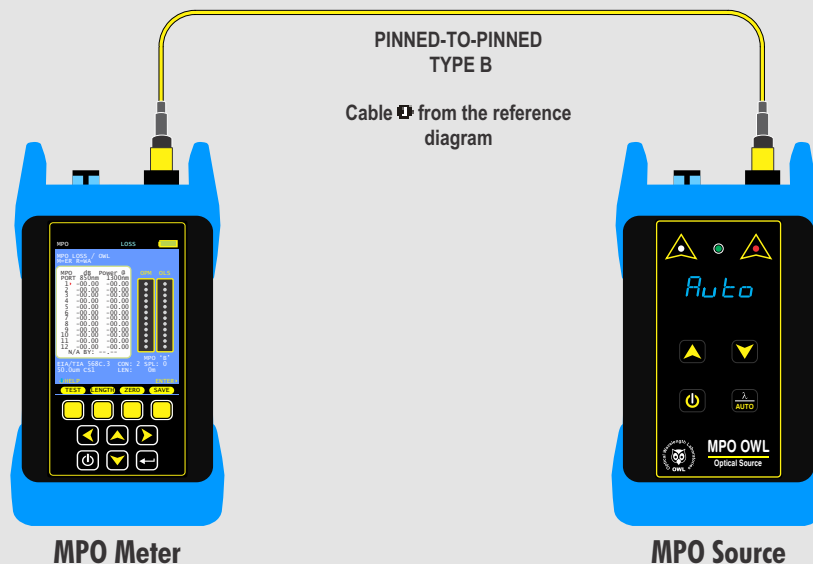
TESTING MPO CABLES

SETTING THE REFERENCE

- 13** Press any key to begin setting the reference. After a few seconds, the MPO meter will begin to populate with reference level readings.



- 14** Wait until reference levels are shown for all fibers and all wavelengths.

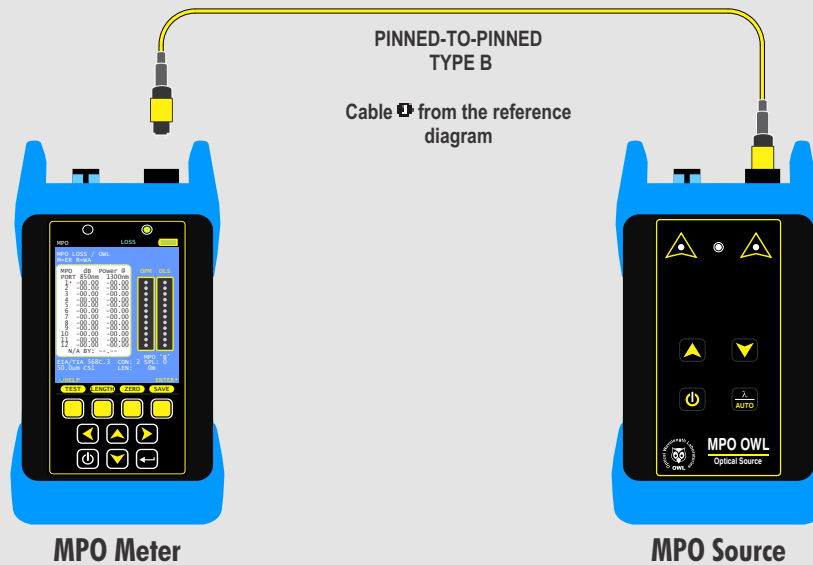


TEST PROCEDURES

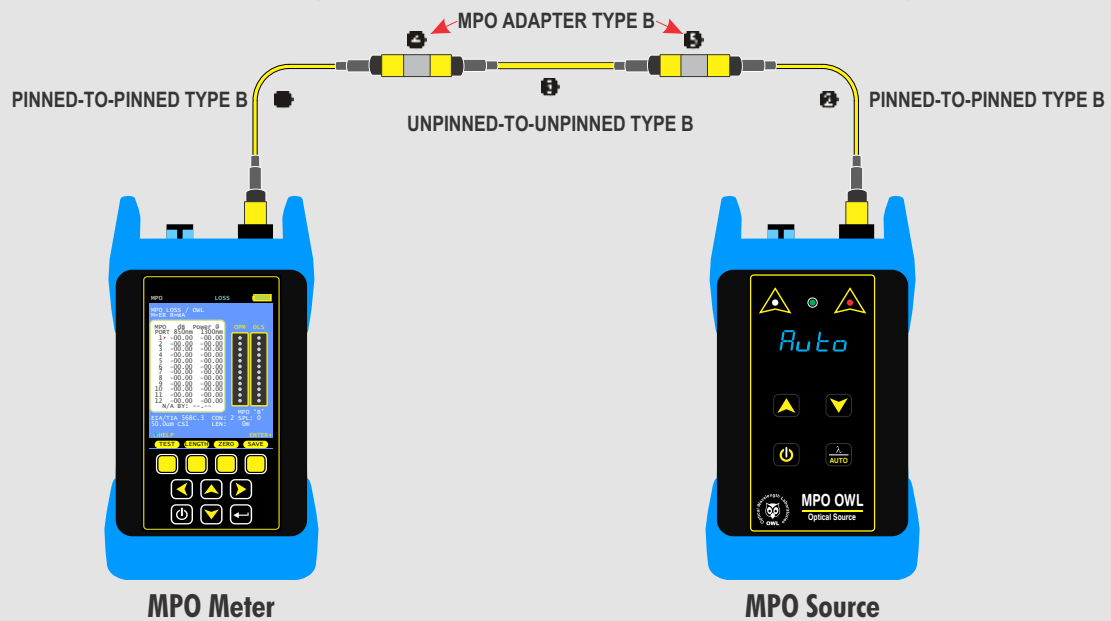
TESTING MPO CABLES

SETTING THE REFERENCE

15 Disconnect the reference cable from the MPO Meter.



16 Connect all of the remaining cables and adapters as shown in the reference diagram.



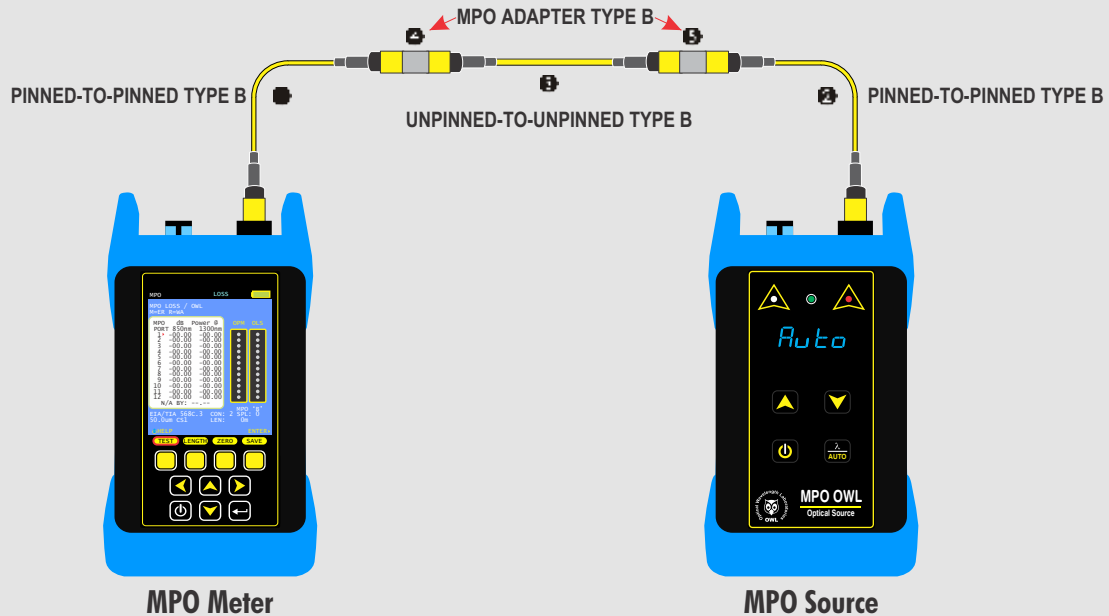
TEST PROCEDURES

TESTING MPO CABLES

SETTING THE REFERENCE

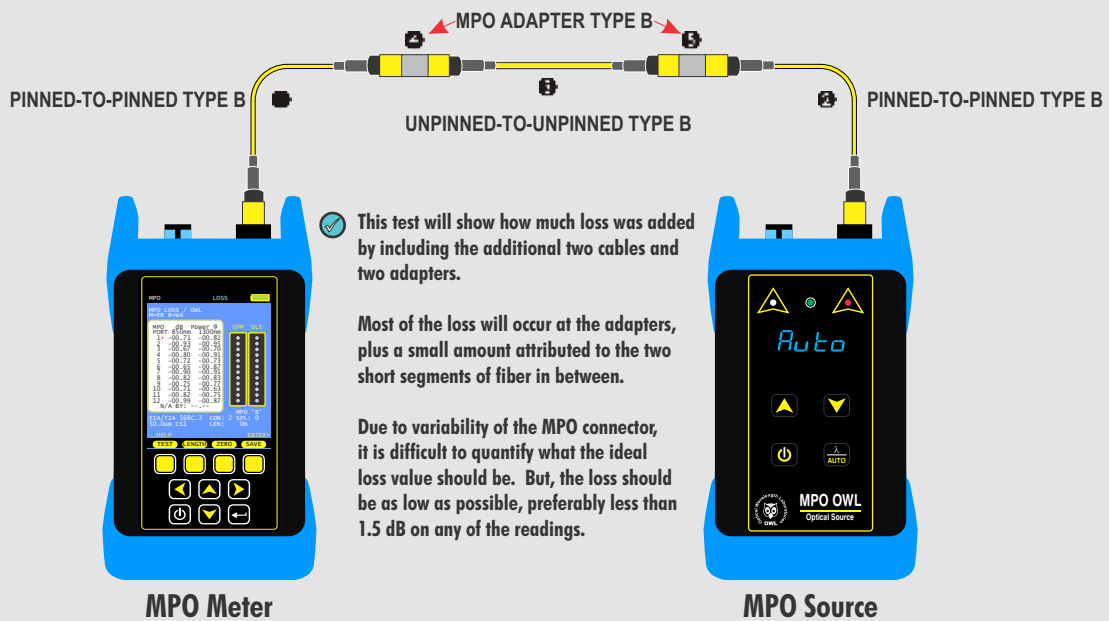
17

TEST : run a quick test to verify the quality of the reference cables.



18

After the test is complete, review the loss measurement to verify reference cable quality.



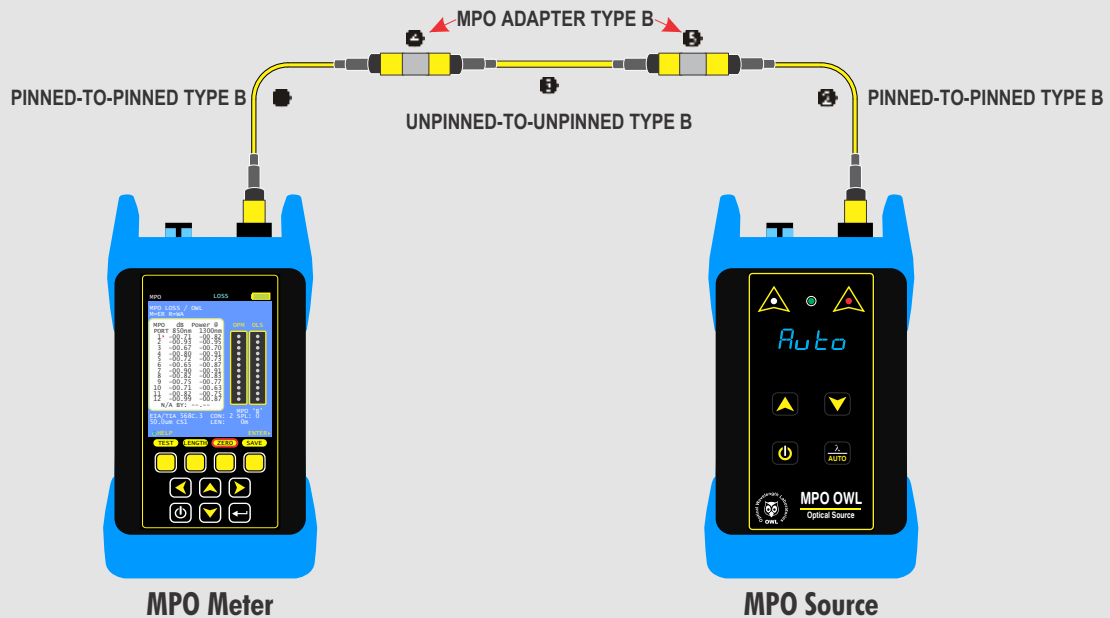
TEST PROCEDURES

TESTING MPO CABLES

SETTING THE REFERENCE

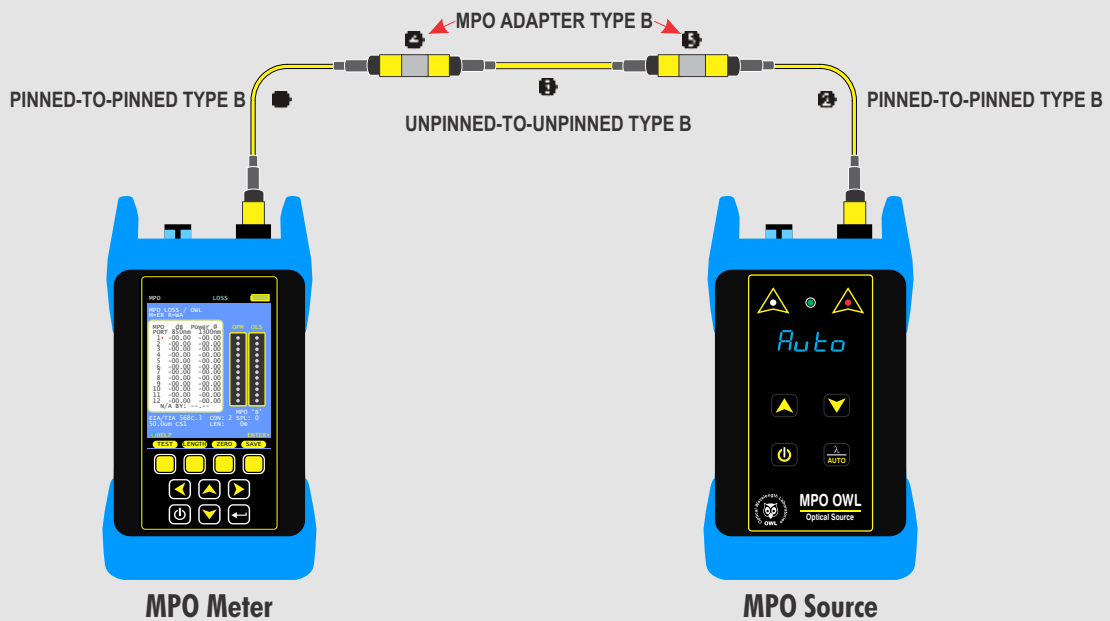
19

ZERO : re-set the reference, this time with all three reference cables.



20

ZERO : re-set the reference now that all of the cables have been verified.

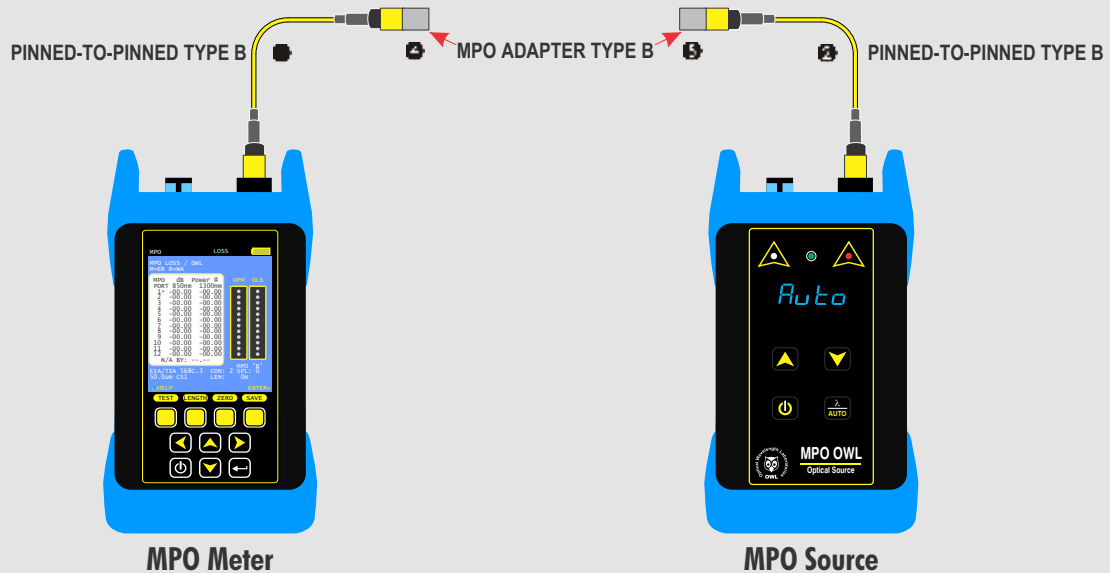


TEST PROCEDURES

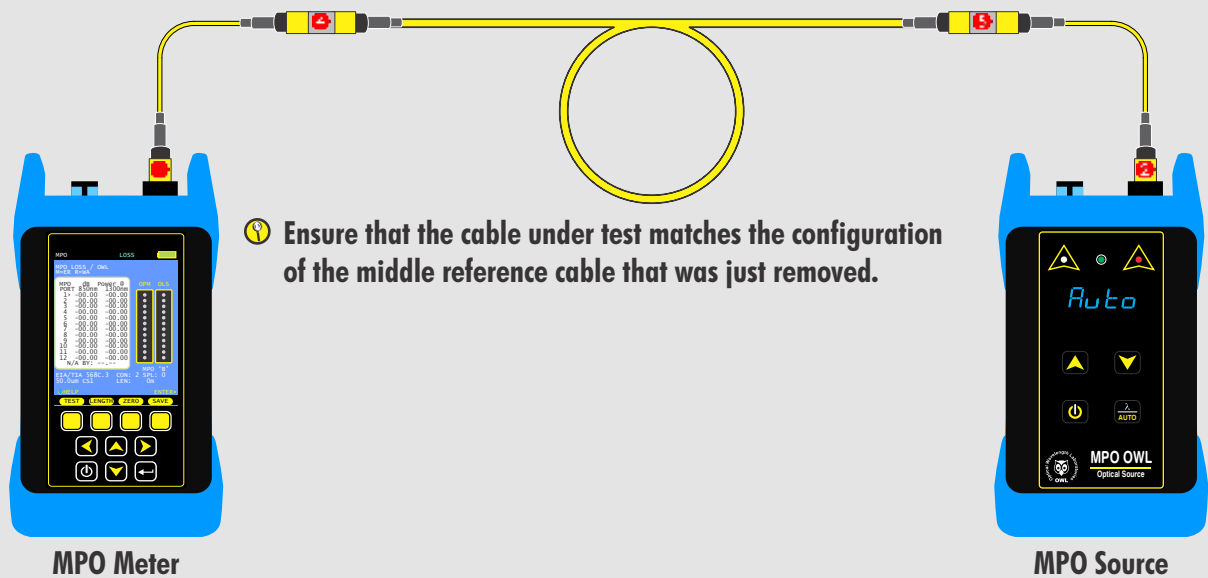
TESTING MPO CABLES

MEASURE LOSS

- 21** Remove the middle reference cable ③, but leave the remaining cables (① ②) and adapters (④ ⑤) in place.



- 22** Insert the first MPO cable to test.



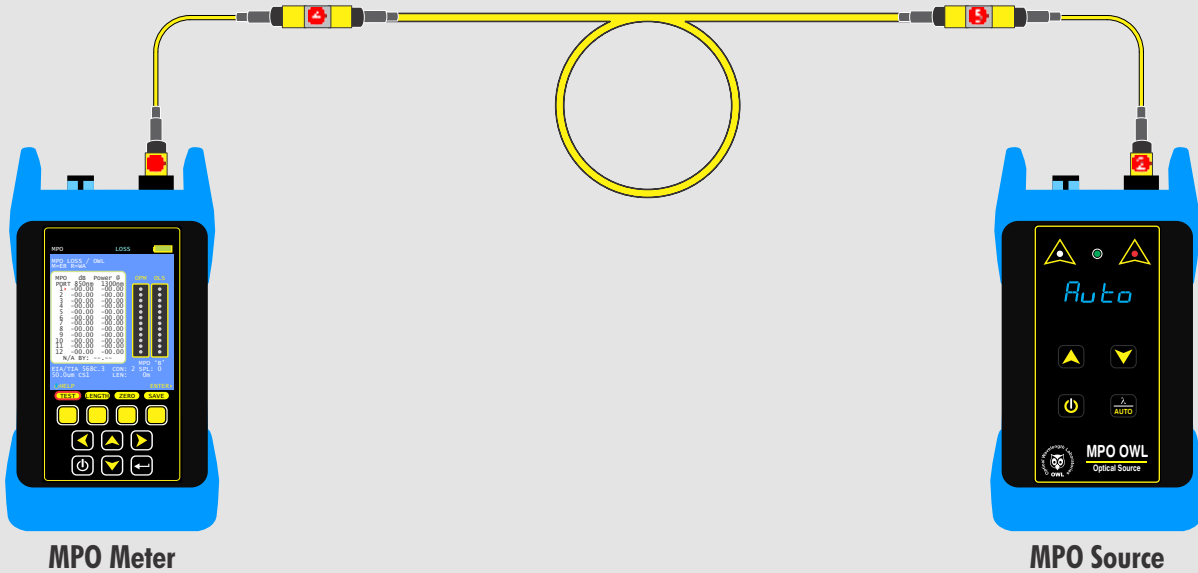
TEST PROCEDURES

TESTING MPO CABLES

MEASURE LOSS

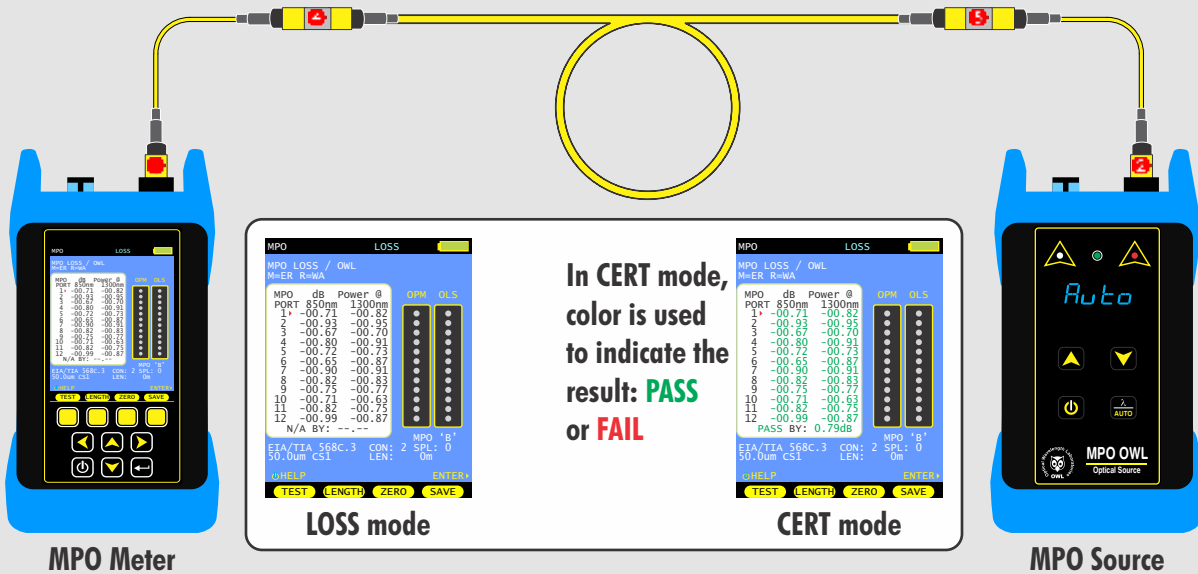
23

TEST : Initiate the optical loss measurement. The test results screen will clear out, then begin to populate as individual fibers are tested.



24

Review the test results.



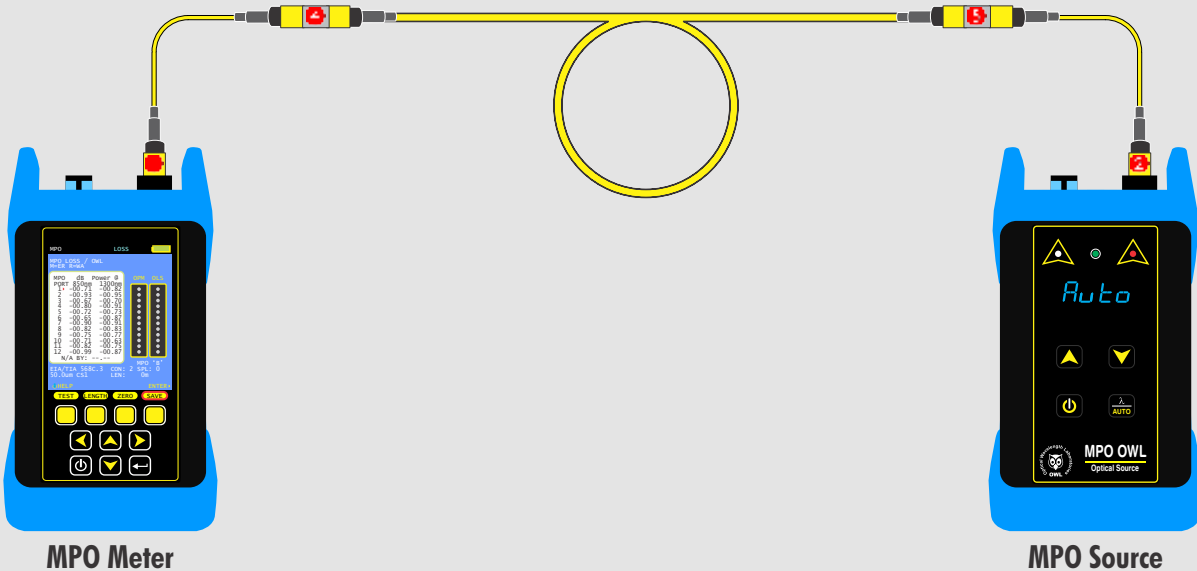
TEST PROCEDURES

TESTING MPO CABLES

SAVE TEST RESULTS

25

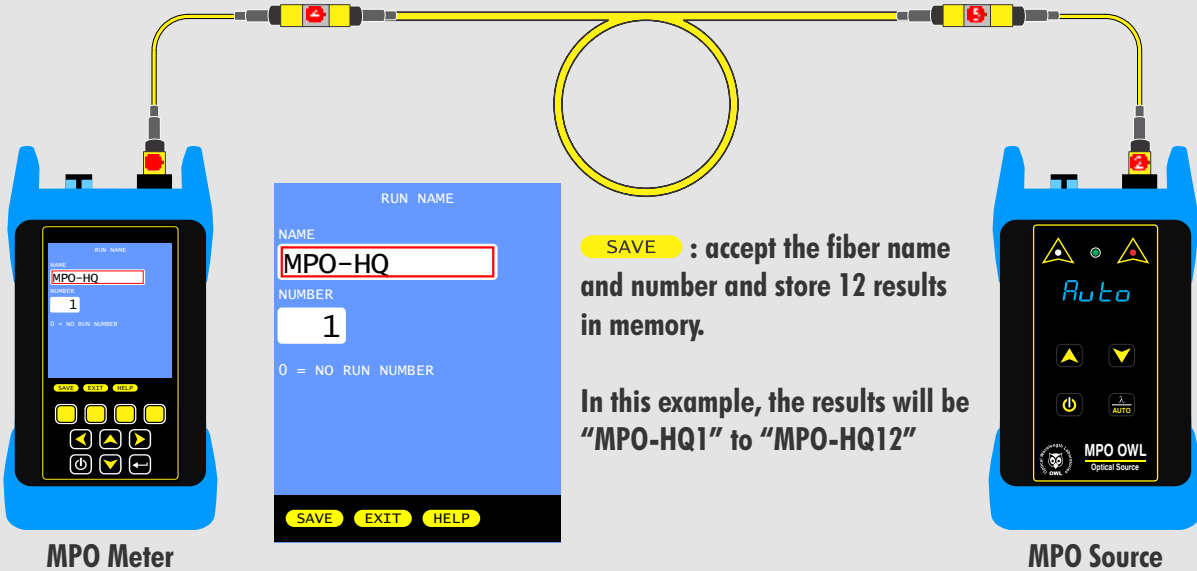
SAVE : save the result, which will allow the name and number to be changed, if necessary.



26

Change the run name and number if necessary, then

SAVE : store the 12 individual fiber test results.



TEST PROCEDURES

TESTING MPO CABLES

SAVE TEST RESULTS

27

Remove the cable under test.



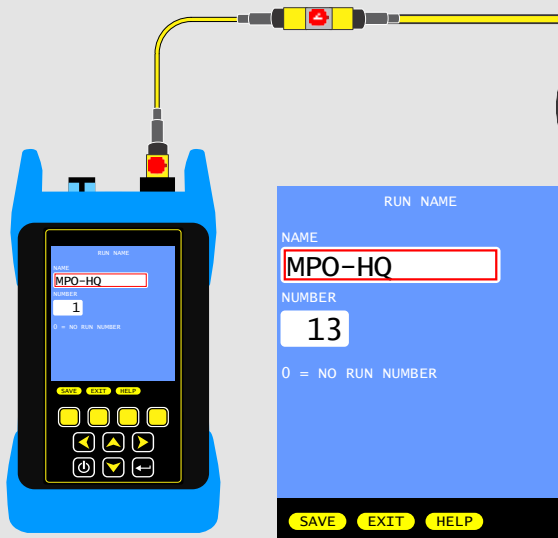
MPO Meter



MPO Source

28

Insert the next cable under test, and repeat steps 23 through 27 until all MPO cables have been tested.



MPO Meter



MPO Source

Note: if the NAME is not changed, the starting fiber number will increment in steps of 12:
Cable 1: start with 1 (to 12)
Cable 2: start with 13 (to 24)
Cable 3: start with 25 (to 36)
and so on.

TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

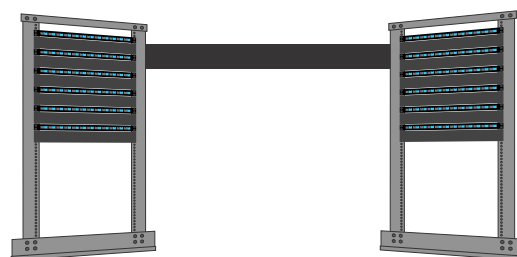
OVERVIEW

The MPO meter also includes a single-fiber SC power meter port that allows users to test and certify individual fibers one at a time like traditional optical power meters and certifiers.

With the single-fiber test port, users can test through MPO cassettes, or traditional multi-strand fiber links.













12-fiber MPO backbone cable attached to 6-pair duplex LC cassettes

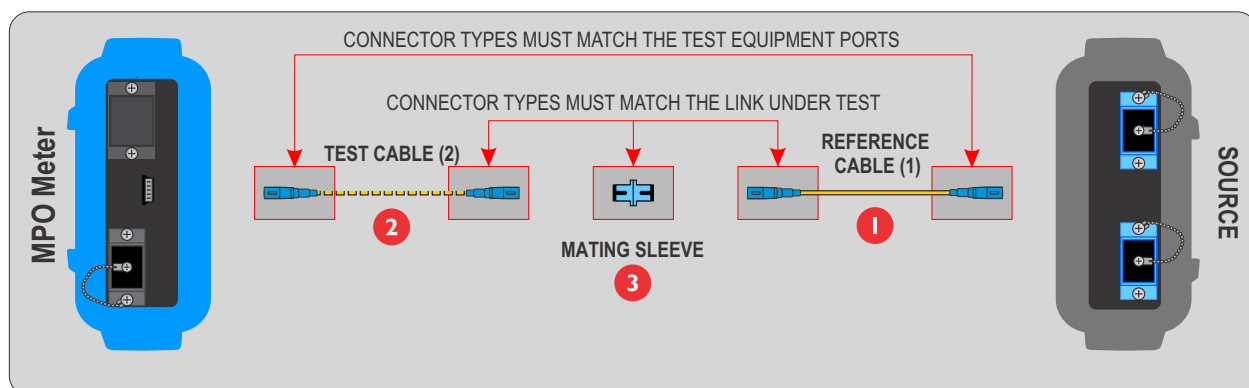


Multi-strand non-MPO cable installed between two patch panels

REQUIRED EQUIPMENT AND ACCESSORIES

The test equipment used in this procedure is the MPO power meter (part #: MPO-OPM) and any compatible OWL light source, along with the necessary patch cables and adapters required.

		1	2	3
		SOURCE REFERENCE CABLE (per light source port)	METER TEST CABLE	MATING SLEEVE
SINGLEMODE				
MULTIMODE 62.5/125 (OM1)		  0.7" MANDREL		
MULTIMODE 50/125 (2/3/4)	TIA-568 A,B,C	  0.9" MANDREL		
	D			



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS


GATHER LINK SETUP INFORMATION

To make the setup process go more smoothly, have the following information ready in advance.

LINK NAME – general information about the job (user-definable)

Project	Name of the overall project
Location	Building or geographic area where the fiber link is located
Meter End	End of the fiber link where the meter unit will be used
Source End	End of the fiber link where the light source unit will be used


FIBER TEST MODE – how to go about testing the fiber link

Test Mode	CERT (if using a standard to show PASS/FAIL results) or LOSS (if a standard is not required)
Standard	Cabling standard used for the certification test; most technicians will use EIA/TIA 568C.3  <i>Note: the standard will not be applied if LOSS mode is selected</i>

TEST CORD TYPE – defines inter-connection loss at the very ends of the fiber link where the test equipment connects in (patch panels, wall outlets) – Options: REFERENCE-grade or STANDARD-grade

SOURCE PORT	refers to the type of test cord attached to the light source
OPM PORT	refers to the type of test cord attached to the optical power meter

LINK INFORMATION – physical configuration of the link under test

Fiber Type	Type of fiber used in the link under test; options may vary based on chosen cabling standard
Connections	Number of mid-span connections NOT covered by TEST CORD TYPE connections
Splices	Number of splices in the link under test; can be either fusion or mechanical splices  <i>MPO cabling (which is generally pre-connectorized from the factory) will have 0 splices</i>
Reference Method	1-jumper reference method
Connector	NON MPO

ENCIRCLED FLUX – is EF compliance required for this test: YES or **NO** (only required for multimode testing)

Consult cabling standard documentation or end user requirements to determine if EF compliance is required; if so, special mode controller cables will be required for setting the optical reference (aka “zeroing”).

RUN NAME – naming of fiber test results within the job to uniquely identify individual fiber strands

Name	The name used to identify the group of individual fiber strands in the link
Number	The starting fiber strand number in the link. The number will be automatically incremented as the test results are saved.

TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

JOB SETUP

Only the MPO power meter is required for initial job setup. This procedure will demonstrate how to create a new job.

- 1**  : power on the MPO power meter.



- 2** At the STARTUP MENU screen:
 : highlight CREATE NEW LINK
 : start link configuration



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

JOB SETUP

3

At the LINK NAME screen:

- ✓▲ : navigate the entry fields
- ▶ : edit the contents of the selected field
- NEXT : accept values and continue



4

At the FIBER TEST MODE screen:

- ✓▲ : navigate the entry fields
- ▶ : scroll through available settings
- NEXT : accept values and continue



If PASS/FAIL is required, choose CERT
if PASS/FAIL is not required, choose LOSS



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

JOB SETUP

5

At the **LINK INFORMATION** screen:

- ✓▲ : navigate the entry fields
- ▶ : scroll through available settings
- NEXT : accept values and continue



If testing a factory-terminated MPO trunk cable with cassettes, then **CONNECTIONS** = 2 and **SPLICES** = 0

If testing a multi-strand cable, then consider how the cables were terminated. If the fibers were fusion-spliced or mechanical spliced (e.g. Unicam), then **CONNECTIONS** = 0 and **SPLICES** = 2.

If the patch panel connections are SC, then choose 1-jumper reference, otherwise choose 2-jumper reference.

CONNECTOR should be NON MPO.

This procedure will assume that the link is a singlemode MPO trunk cable installed into MPO cassettes with LC connectors.

Enter 2 connections for the connections between the MPO cable and the cassettes. The LC cassette connectors require the 2-jumper reference method.



6

At the **RUN NAME** screen:

- ✓▲ : navigate the entry fields
- ▶ : scroll through available settings
- NEXT : accept values and continue



NAME: the name for this group of fiber cables

NUMBER: the first number to use



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

JOB SETUP

7

Review the LINK INFORMATION:

SAVE : accept values and continue

BACK : go back to change incorrect values



8

Setting a reference is required for measuring loss and certifying fiber cables.

Review the explanation screen, then:

YES : continue to set a reference

NO : skip setting a reference at this time



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

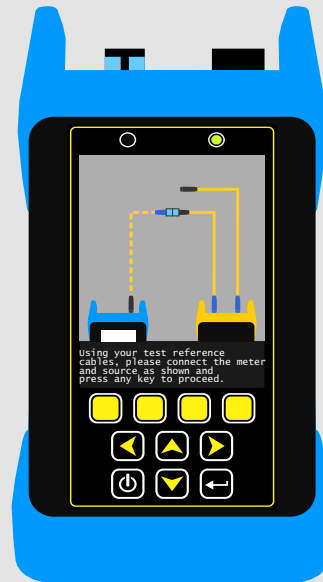
SETTING THE REFERENCE

9

Review the reference connection screen.

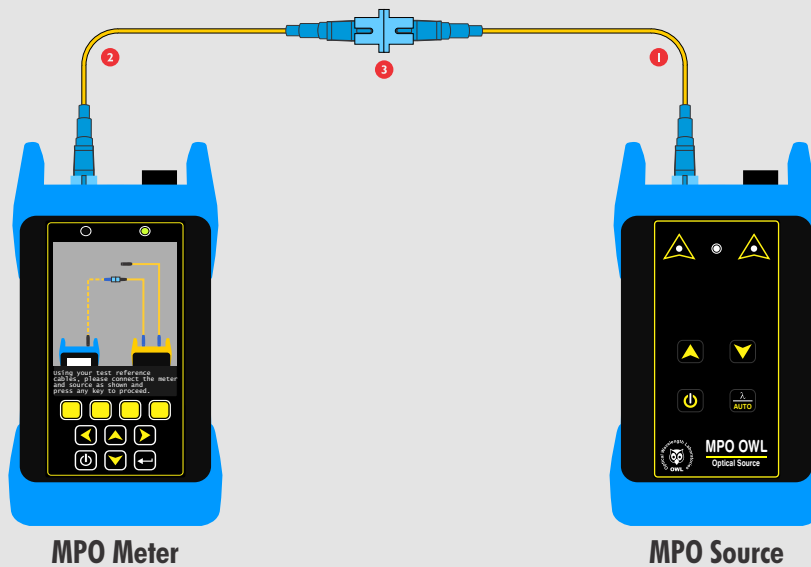
Gather the test light source and all required accessories, but do not press any key at this time.

In this example, the single-fiber test port on the MPO source will be used.



10

Connect the source reference cable 1, meter test cable 2, and adapter 3 as shown.



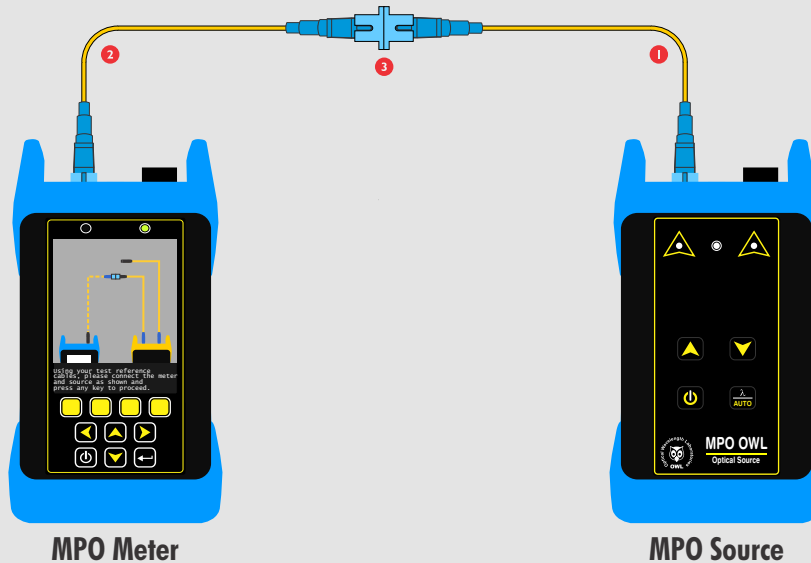
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

SETTING THE REFERENCE

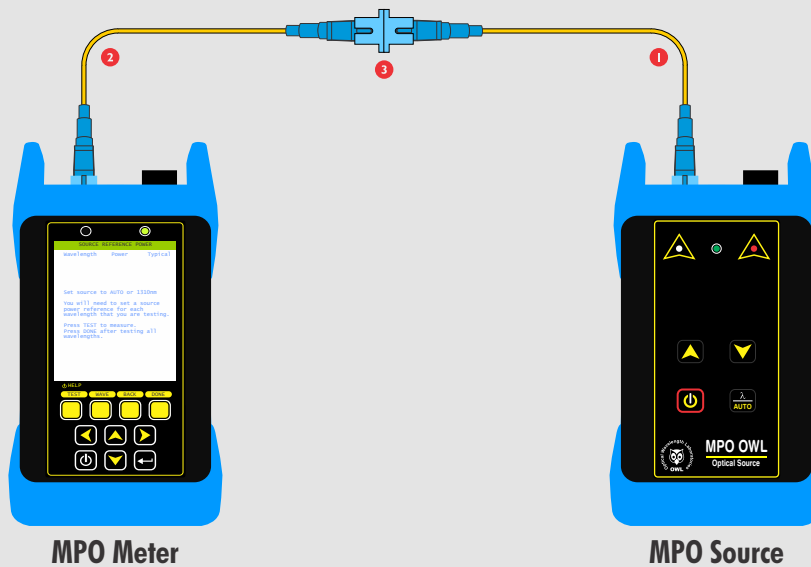
11

Press any key on the MPO meter to begin the set reference procedure.



12

 : Power ON the light source.



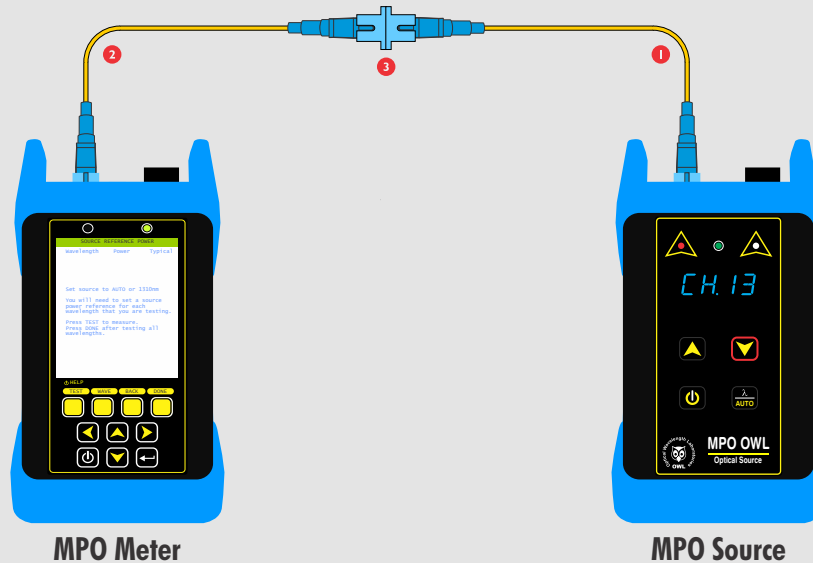
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

SETTING THE REFERENCE

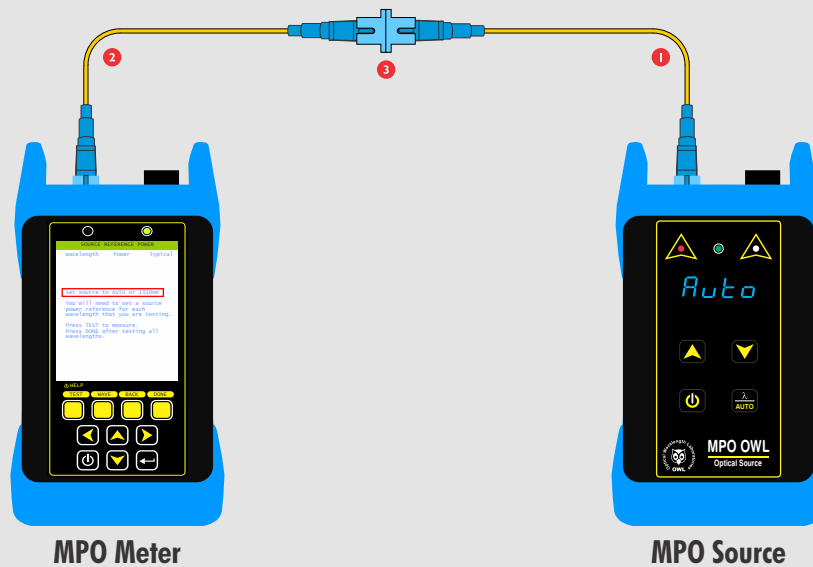
13

✔ : set the MPO source to the single-fiber test port (Channel 13).



14

If there are multiple wavelengths in the MPO source,  : to set the MPO source to AUTO. The source will begin to alternate between the wavelengths.



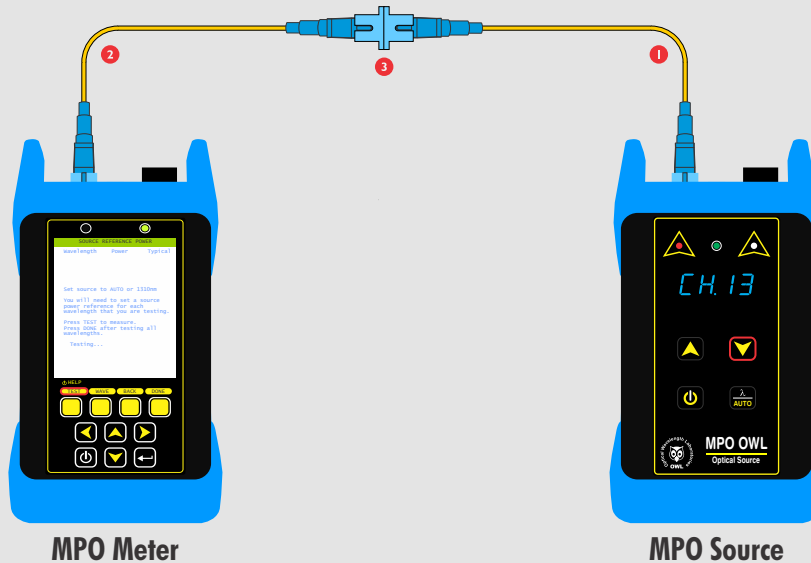
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

SETTING THE REFERENCE

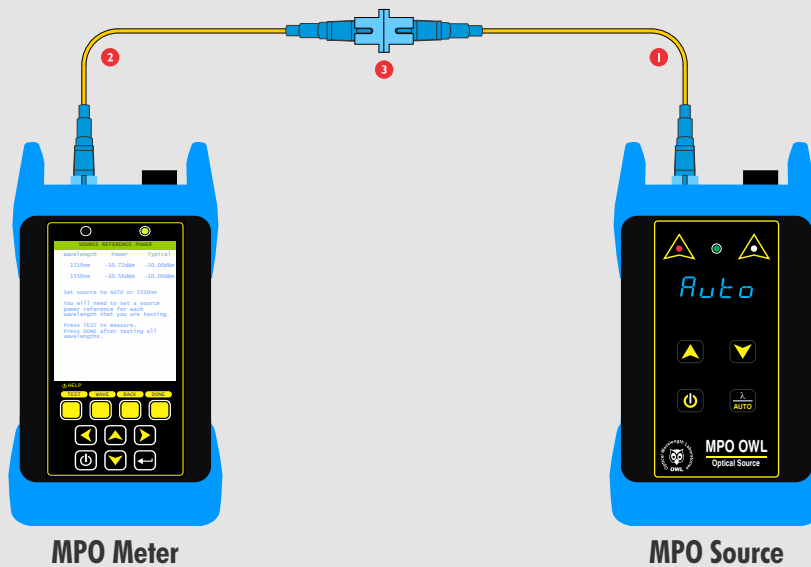
15

TEST : begin setting the reference.



16

After a few seconds, the reference levels for all available wavelengths will be shown on the screen.



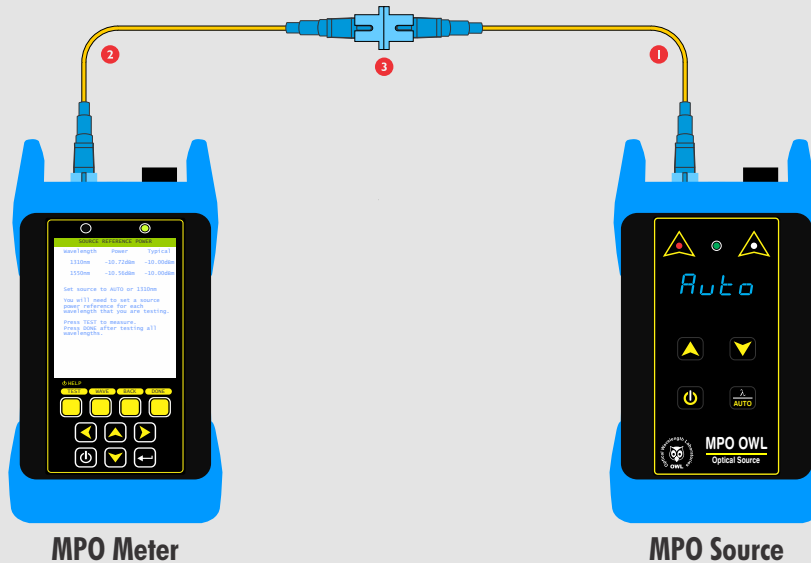
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

SETTING THE REFERENCE

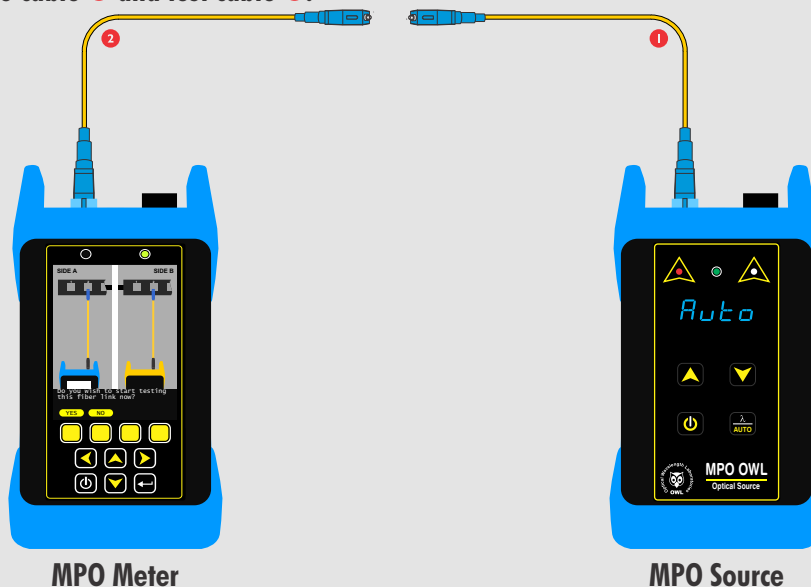
17

DONE : accept the reference values and continue.



18

The devices are now ready to take measurements. Remove the mating sleeve from between the reference cable ① and test cable ②.



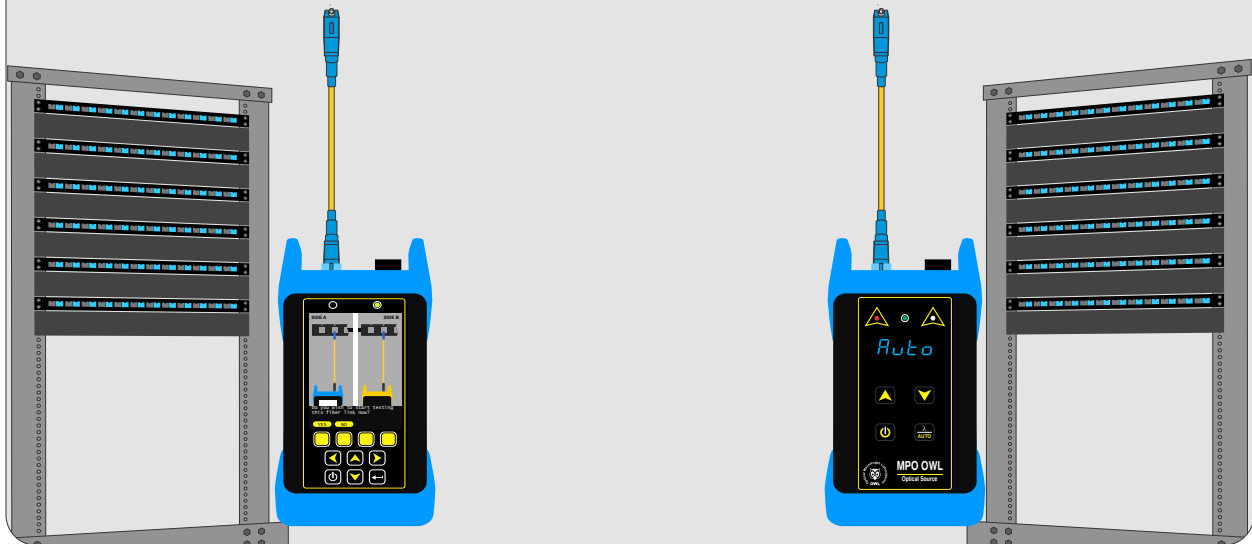
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

TAKE MEASUREMENTS

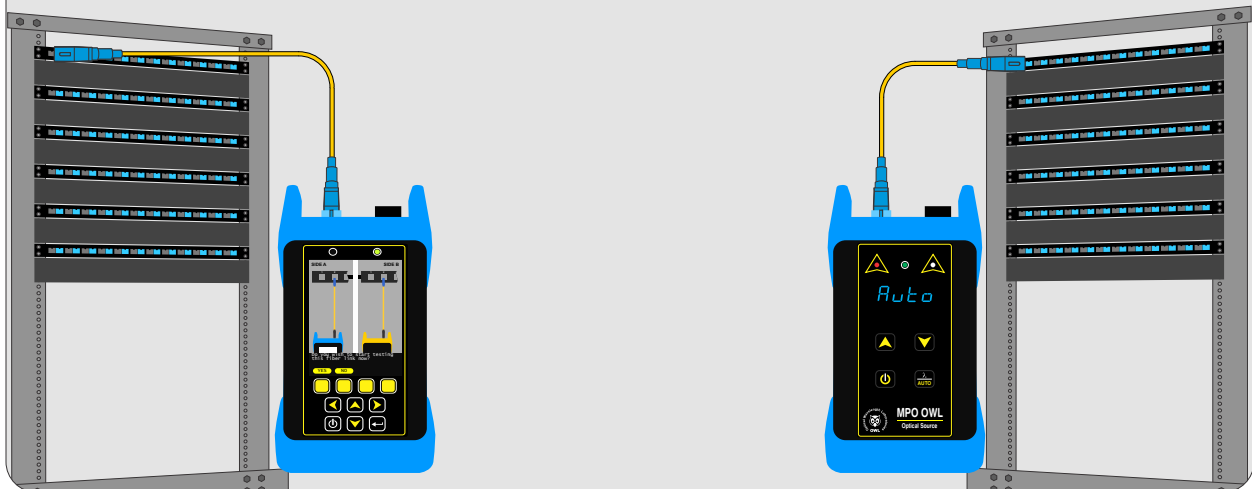
19

Without removing the cables from the test ports, take both units to opposite ends of the link under test.



20

Connect the devices into the first fiber port to be tested as shown on the screen.



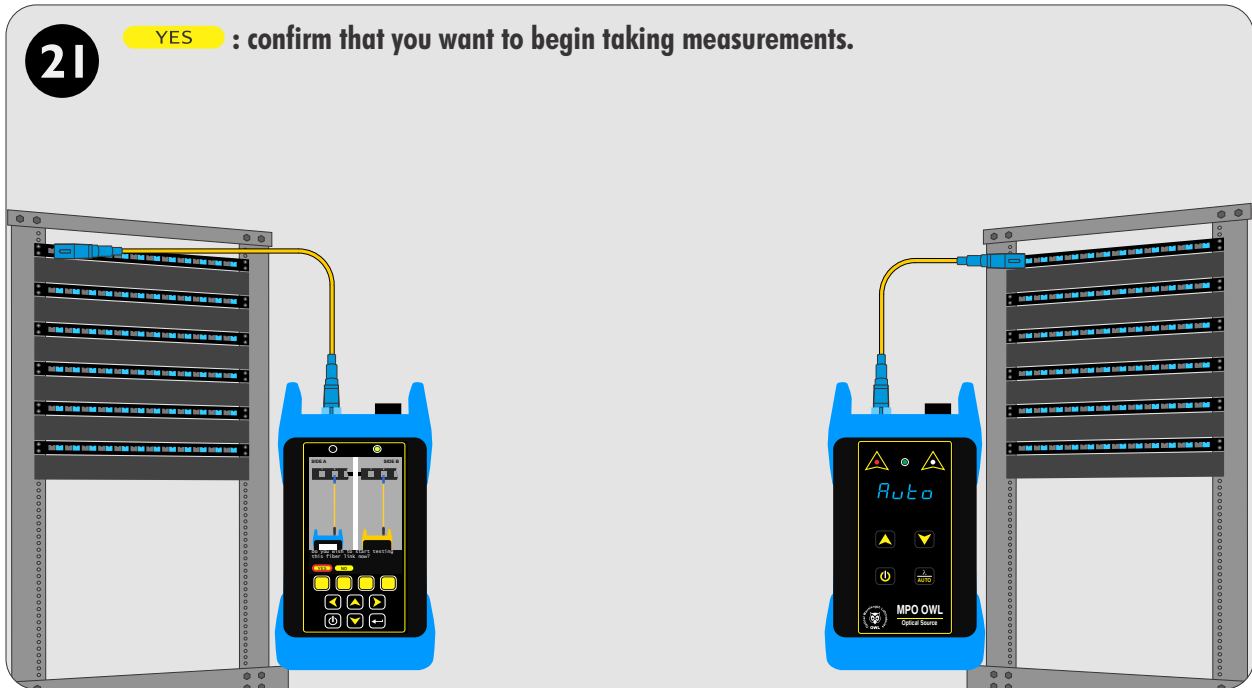
TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

TAKE MEASUREMENTS

21

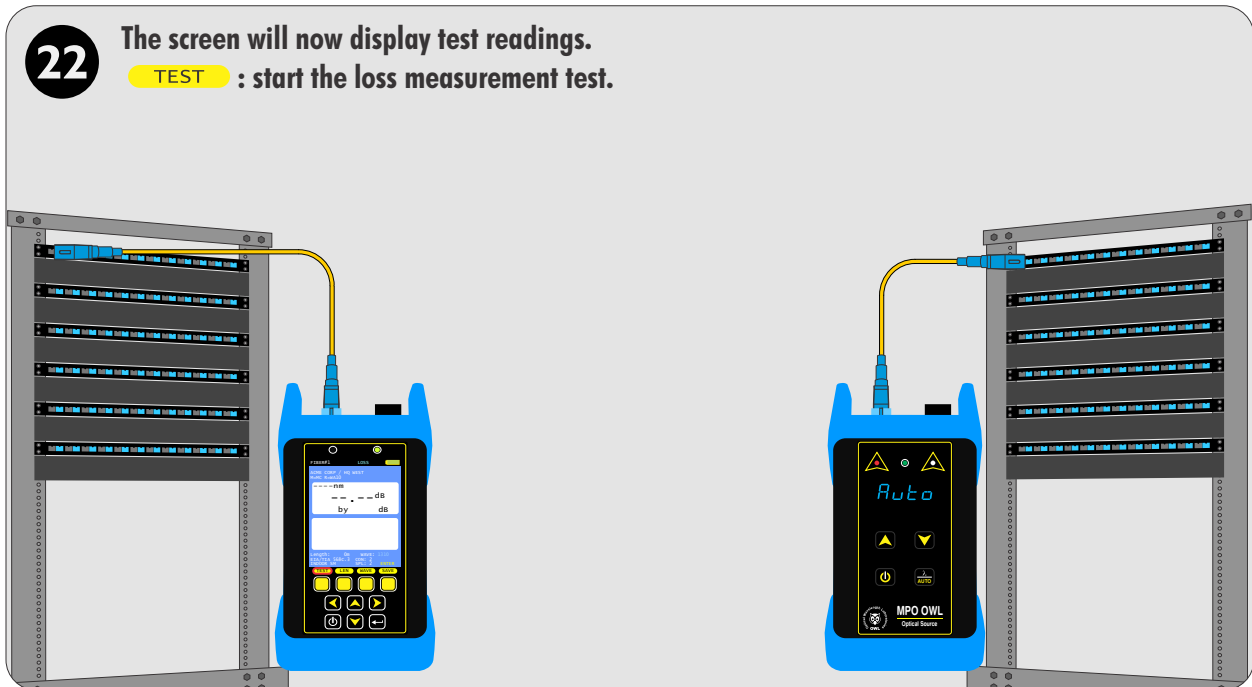
YES : confirm that you want to begin taking measurements.



22

The screen will now display test readings.

TEST : start the loss measurement test.



TEST PROCEDURES

TESTING SINGLE-FIBER APPLICATIONS

TAKE MEASUREMENTS

23

After a few seconds, the test will complete, and will show the loss readings.

In LOSS mode, the loss and reference level will be shown.

In CERT mode, the loss, pass/fail result, and overhead will be shown.

(green = pass / red = fail) (blue = false gain; recommend re-setting the reference)



24

SAVE : store the test results in memory



TEST PROCEDURES

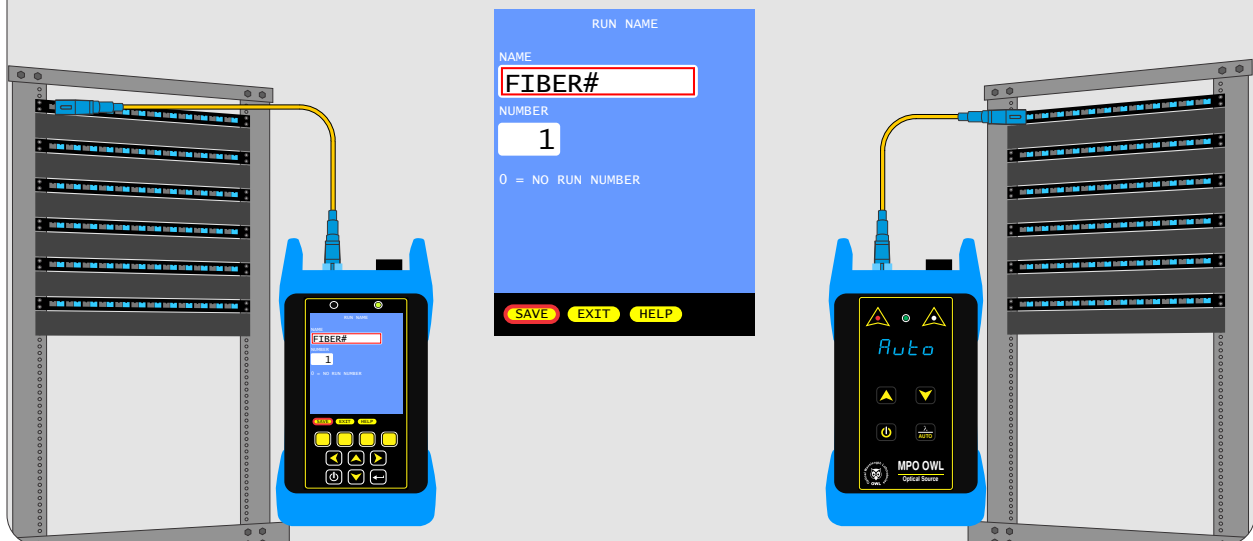
TESTING SINGLE-FIBER APPLICATIONS

TAKE MEASUREMENTS

25

If necessary, edit the fiber name and number.

SAVE : save the test result in memory, and return to the test readings screen.



26

Connect to the next fiber under test, then repeat steps 22 - 26 until all fibers have been tested and stored.

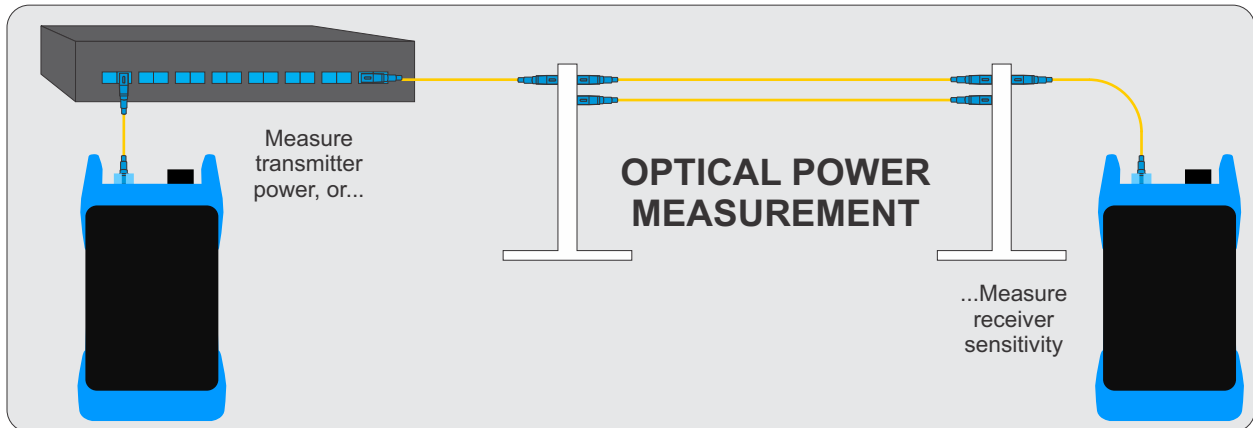


TEST PROCEDURES

OPM MODE

OVERVIEW

OPM MODE – Optical power is an absolute measurement of the amount of light intensity; i.e. “brightness”, and can be measured either at the output of a transmitter (transmit power), or at the input of a receiver (receiver sensitivity). When in OPM (optical power meter) mode, OWL MPO meters can be directly attached to this equipment via a patch cord to check whether the transmitter is within the manufacturer’s specified power range.



TEST PROCEDURES

OPM MODE

ACCESSING OPM MODE

1 Power on the MPO meter.



2 Press to OPM MODE, then to continue.



3 The meter will immediately begin to display optical power readings.



AVAILABLE FUNCTIONS

LENGTH	Measure fiber spool or link length; see LINK LENGTH section
WAVE	Select next wavelength
ZERO	Sets optical reference for the currently displayed wavelength (or two wavelengths if using a compatible OWL auto-capable light source)
UNITS	Toggles display units between dBm (optical power) and dB (optical loss)
EDIT	Edit link setup information
LOAD	Load a previously stored link (make sure that references are re-set before taking further measurement)
MENU	Access MAIN MENU

DISPLAYED RESULT

LOW	No measurable amount of incoming optical power
HIGH	Incoming optical power is too bright to be measured

(black)	Normal optical power/loss measurement
(blue)	INVALID OPERATING MARGIN (indicates invalid “negative loss” or “gain” test condition; re-set the reference using the ZERO function)

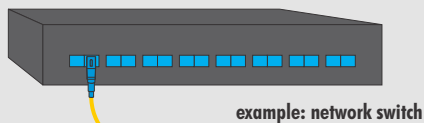
TEST PROCEDURES

OPM MODE

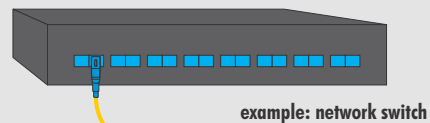
TRANSMITTER OUTPUT POWER MEASUREMENT

Measure the output power directly from network transmission equipment to determine if the equipment is transmitting within manufacturer output power specifications.

Connect the MPO meter to the transmitter port of the transmission equipment (e.g. switch, router, hub, GBIC, light source, etc.) and make sure the equipment is powered on.

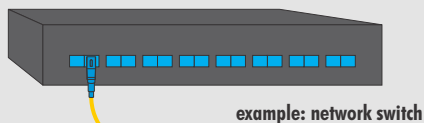


Press WAVE until the meter is set to the same wavelength as the network equipment. Press UNITS until the meter is set to display optical power in dBm.



View the displayed optical power.

NOTE: if the transmitter is sending out digital data, the displayed power level will fluctuate based on average power of data bits received during the sampling period.

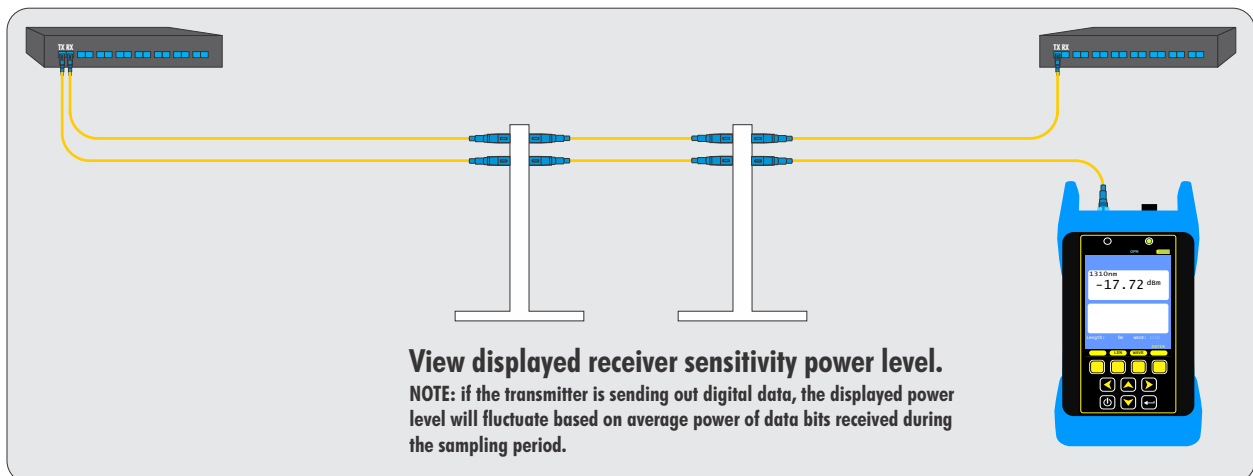
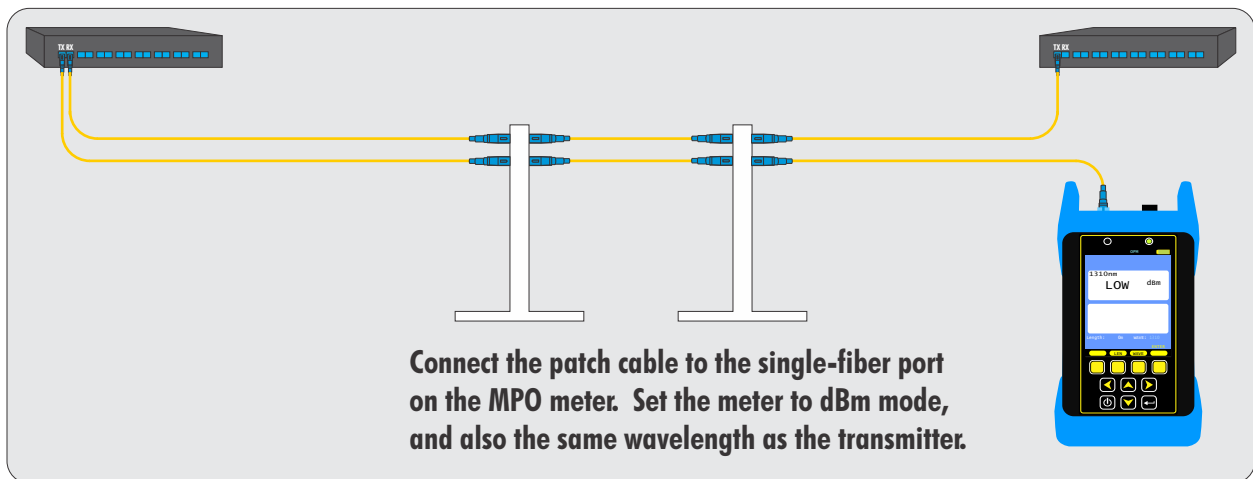
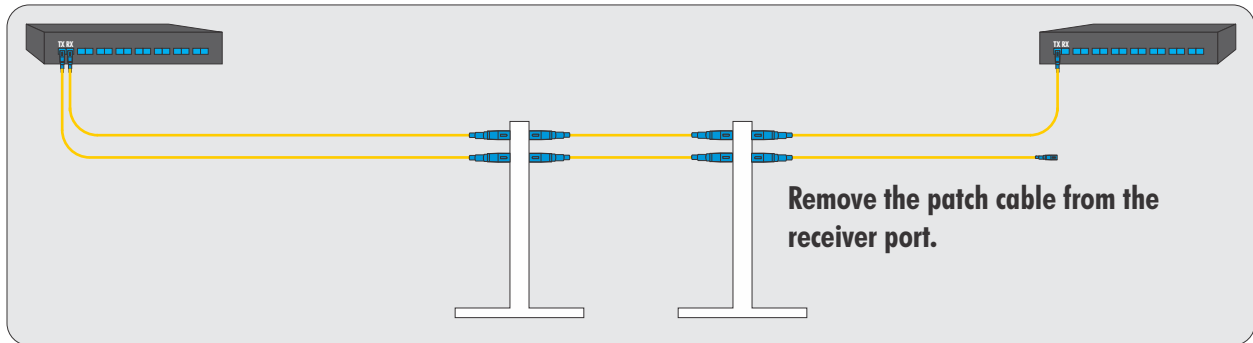


TEST PROCEDURES

OPM MODE

RECEIVER SENSITIVITY MEASUREMENT

Output power measured from a transmitter through a link at the far-end receiver will determine if the received power is within manufacturer receiver sensitivity specifications.



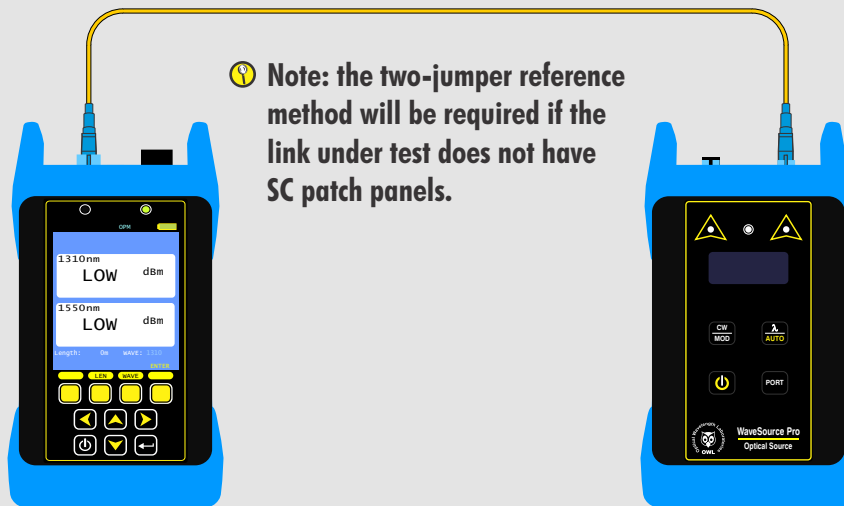
TEST PROCEDURES

OPM MODE

OPTICAL LOSS MEASUREMENT

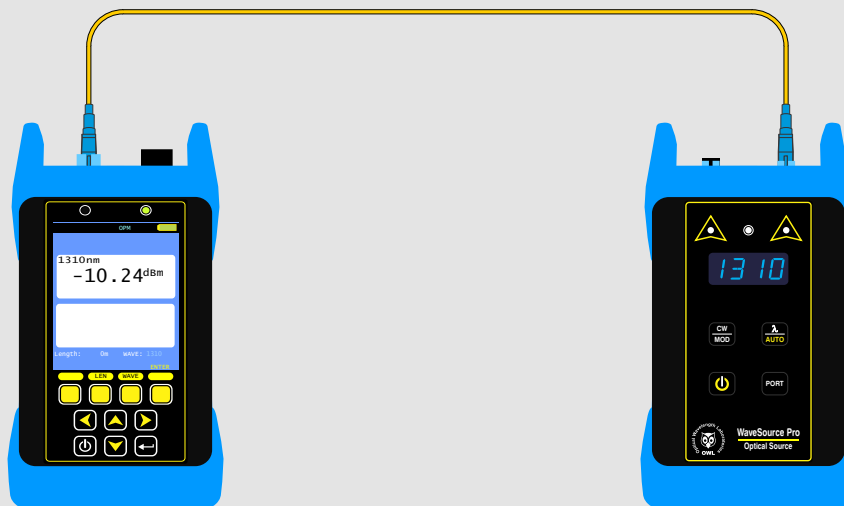
Measure the attenuation, or loss, of optical fiber links.

Connect an appropriate reference cable (one per light source port) as shown between the single-fiber port on the MPO meter and the light source port being used for the loss measurement.



Power on the light source, then set both units to the same wavelength.

NOTE: if using an OWL auto-test capable source, set the source into AUTO mode to test both wavelengths simultaneously.



TEST PROCEDURES

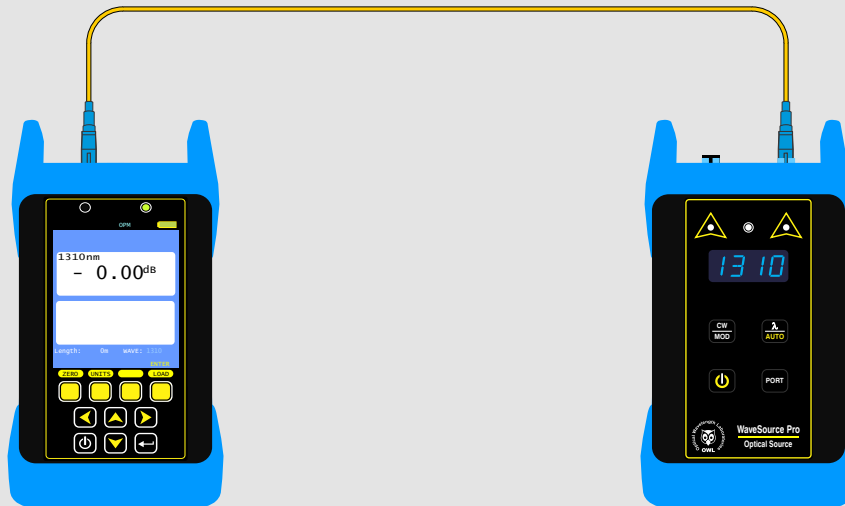
OPM MODE

OPTICAL LOSS MEASUREMENT

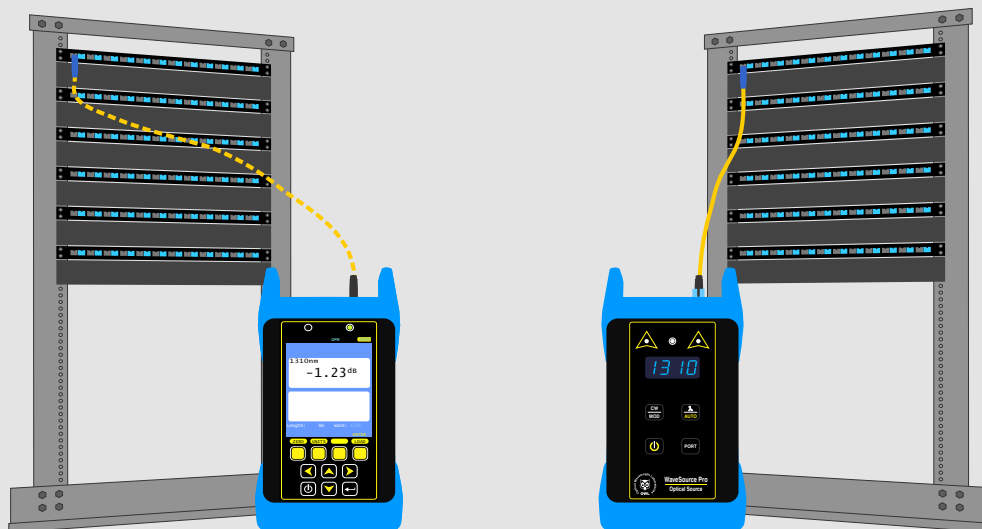
Measure the attenuation, or loss, of optical fiber links.

Press ZERO to set the reference. The measurement units will automatically change to dB.

NOTE: if using an OWL auto-test source, both wavelengths will be set simultaneously.



Connect the METER and source into the first fiber in the link under test as shown. The meter will begin to display loss readings automatically.



OPERATION/MAINTENANCE

MAIN MENU

From any test results screen on the MASTER, press the MENU button to access the MAIN MENU.

OPERATIONS MENU

CREATE NEW LINK	Configure the meter for a new project
CONFIGURE SOURCE	(no source installed)
SYSTEM INFORMATION	Display system information
ENTER OPM MODE	Optical Power Meter (OPM) mode

SETUP MENU

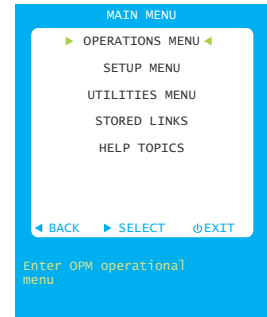
OPERATING PARAMETERS	Set Length units / index of refraction
USER INFORMATION	Enter user name and phone number
DISPLAY PREFERENCES	Display dimness / brightness / speaker
POWER OPTIONS	Display timer: dim / standby / off
CUSTOM STANDARD	Configure a user-customizable standard

UTILITIES MENU

SET SYSTEM CLOCK	Set real-time clock
FORMAT DATA FLASH	Formats data storage - erases all stored links
FACTORY RESET	Reset to factory defaults
VIEW SLIDES	View help slides
MANUFACTURER SETUP	Manufacturer only - no user configurable settings

STORED LINKS View the data stored in the MASTER

HELP TOPICS View various help topics regarding the operation of the MASTER



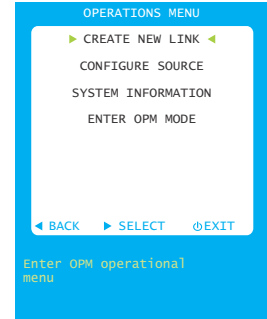
OPERATION/MAINTENANCE

OPERATIONS MENU

From any test results screen on the MASTER, press the MENU button to access the MAIN MENU.

From the MAIN MENU, select OPERATIONS MENU.

CREATE NEW LINK	Configure the meter to test a new project
CONFIGURE SOURCE	No source installed; not applicable
SYSTEM INFORMATION	Display system information
ENTER OPM MODE	Optical Power Meter (OPM) mode



OPERATIONS MENU > CONFIGURE SOURCE -- not applicable for this model

EXIT	Return to OPERATIONS MENU
HELP	Context-sensitive help



OPERATIONS MENU > SYSTEM INFORMATION -- View system-specific hardware, firmware, calibration, and date/time information



OPERATIONS MENU > ENTER OPM MODE -- Allows the user to perform basic optical power measurements in dBm when certification or loss measurements are not required -- such as measuring output power from an active transmitter (NIC, SFP, GBIC, switch port, etc.)

When used with an OWL auto-wavelength light source, up to 2 wavelengths can be measured simultaneously.

	context-sensitive help
	scroll through various groups of menu options



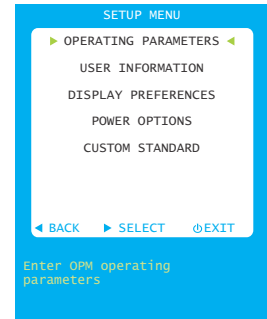
OPERATION/MAINTENANCE

SETUP MENU

From any test results screen on the MASTER, press the MENU button to access the MAIN MENU.

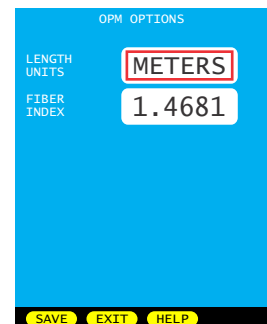
From the MAIN MENU, select SETUP MENU.

OPERATING PARAMETERS	Set Length units / index of refraction
USER INFORMATION	Enter user name and phone number
DISPLAY PREFERENCES	Display dimness / brightness / speaker
POWER OPTIONS	Display timer: dim / standby / off
CUSTOM STANDARD	Configure a user-customizable standard



SETUP MENU > OPERATING PARAMETERS -- set length units and index of refraction

LENGTH UNITS	METERS	display length measurements in meters
	FEET	display length measurements in feet
FIBER INDEX	not applicable; no length testing source available for this model	
SAVE	Save settings and return to SETUP MENU	
EXIT	Exit without saving settings and return to SETUP MENU	
HELP	Context-sensitive help	



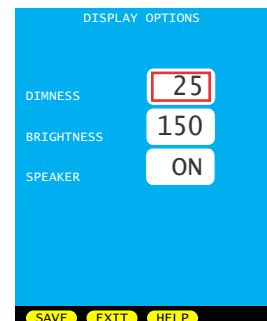
SETUP MENU > USER INFORMATION -- Set user name and phone number

USER NAME	15 characters
PHONE NUMBER	10-digit phone number
SAVE	Save settings and return to SETUP MENU
EXIT	Exit without saving settings and return to SETUP MENU
HELP	Context-sensitive help



SETUP MENU > DISPLAY PREFERENCES -- Set options for the user interface such as display dimness and brightness levels, and internal speaker operation.

DIMNESS	dimness level during power saving mode Range of values: 25 to 125 (dim level previews as value changes)
BRIGHTNESS	Brightness level during normal operation Range of values: 150 to 254 (brightness level previews as value changes)
SPEAKER	turns speaker ON or OFF
SAVE	Save settings and return to SETUP MENU
EXIT	Exit without saving settings and return to SETUP MENU
HELP	Context-sensitive help



OPERATION/MAINTENANCE

SETUP MENU

SETUP MENU > POWER OPTIONS -- Set duration for various power saving modes

DIM TIME	minutes before display goes into DIM mode Range of values: 1 to 250
STANDBY TIME	minutes before unit goes into standby mode (only display turns off) Range of values: 2 to 250
OFF TIME	minutes before unit turns completely off Range of values: 3 to 250
SAVE	Save settings and return to SETUP MENU
EXIT	Exit without saving settings and return to SETUP MENU
HELP	Context-sensitive help

DISPLAY OPTIONS

DIM TIME:	5
STANDBY TIME:	15
OFF TIME:	45

SAVE EXIT HELP

SETUP MENU > CUSTOM STANDARD -- configure a custom standard with user-definable standard parameters. Parameters are set for each fiber type.

FIBER TYPE Options: 62.5um OM1 // 50.0um OM2 // 50.0um OM3 // 50.0um OM4
Indoor/OS1 // Outdoor/OS2

Select a fiber type and press **EDIT** to set parameters for that fiber type.

SET CUSTOM STANDARD

FIBER TYPE

62.5um OM1

EDIT EXIT HELP

Wave (nm) Up to 2 wavelengths (column A and B) can be defined per fiber type
Options: 850, 980, 1300, 1310, 1490, 1550, 1625, 0

Two types of standards can be defined:

GENERIC STANDARDS (link budget is calculated based on link configuration)

uses **Loss/km**, **Max len**, **Con loss**, and **Spl loss**

APPLICATION STANDARDS (link budget is a fixed number)

uses **Max loss**, **Min loss**, and **Max len**

GENERIC STANDARD PARAMETERS

Loss/km (dB)	Amount of acceptable dB loss (attenuation) per kilometer of fiber
Max len (m)	Maximum length of fiber link in meters
Con loss (dB)	dB loss per interconnection; defines both reference-grade and standard-grade reference cable connectors
Spl loss (dB)	dB loss per splice; can be either fusion or mechanical splices

APPLICATION STANDARD PARAMETERS

Max loss (dB)	loss measurements that exceed Max loss will show as a FAIL
Min loss (dB)	loss measurements that do not reach the Min loss will show as a FAIL
Max len (m)	Maximum length of fiber link in meters

(selected fiber type)

Wave (nm)	850	1300
Loss/km (dB)	3.50	1.50
Max loss (dB)	0.00	0.00
Min loss (dB)	0.00	0.00
Max len (m)	90	90

Reference Standard

Con loss (dB)	0.30	0.75
Spl loss (dB)	0.30	

SAVE EXIT HELP

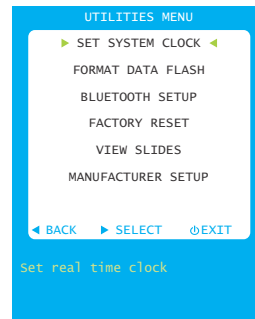
OPERATION/MAINTENANCE

UTILITIES MENU

From any test results screen on the MASTER, press the MENU button to access the MAIN MENU.

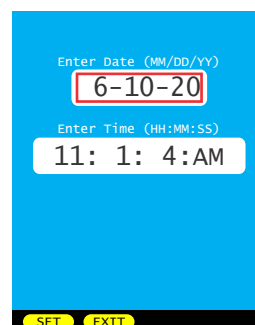
From the MAIN MENU, select UTILITIES MENU.

SET SYSTEM CLOCK	Set real-time clock
FORMAT DATA FLASH	Formats data storage - erases all stored links
BLUETOOTH SETUP	Pair with select wireless label printers
FACTORY RESET	Reset to factory defaults
VIEW SLIDES	Browse through the various help slides
MANUFACTURER SETUP	Manufacturer only - no user configurable settings



UTILITIES MENU > SET SYSTEM CLOCK -- set time and date

DATE	Format: MM/DD/YY (MM=month/DD=day/YY=year)
TIME	Format: HH:MM:SS (HH=hour/MM=minute/SS=second) : AM/PM
SET	Save settings and return to UTILITIES MENU
EXIT	Exit without saving settings and return to UTILITIES MENU



UTILITIES MENU > BLUETOOTH SETUP -- pair to select wireless label printers to print labels directly from the meter to the printer

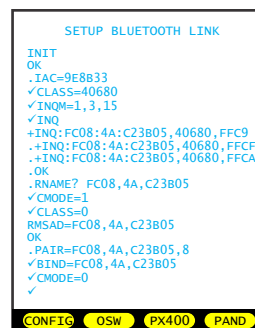
CONFIG Check configuration of internal bluetooth module (if installed)

OSW Pair with OWL optical MPO switch

PX400 Pair with Epson™ PX400 portable label printer

PAND Pair with Panduit MP100 portable label printer

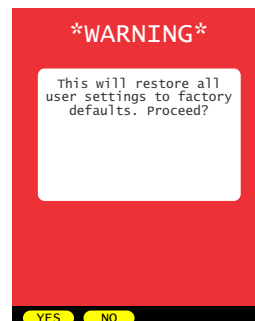
 Return to UTILITIES MENU



Example of pairing setup

UTILITIES MENU > FACTORY RESET -- reset to factory defaults

YES	Reset device to factory defaults
NO	Exit without resetting device and return to UTILITIES MENU



OPERATION/MAINTENANCE

WORKING WITH STORED DATA

Each stored link has two lines of information:

Job / Site info

Location info for the MASTER and REMOTE.

GREEN text shows the link that is currently loaded in memory.

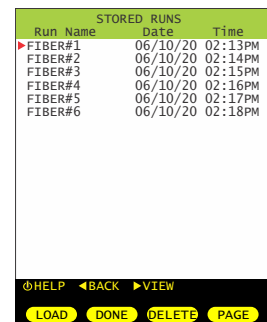
Use the link selection cursor (▶) to select a link to work with.

Stored runs: shows how many data points are stored at the link selection cursor.

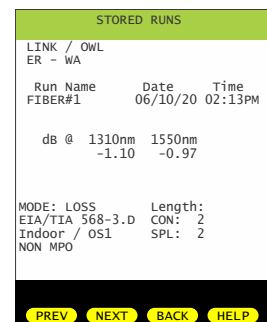
LOAD	loads the selected link, and displays a list of fiber runs stored for that link
DONE	exits the stored links list without loading a link (prompting the user to set a reference and start testing the selected fiber link), or exits the stored runs list while loading the last run in the selected link
DELETE	delete the selected link, or all links
PAGE	loads the next page of stored links (if more links than will fit on one page)
HELP	view context-sensitive help
BACK	same as DONE
VIEW	view LINK INFORMATION screen



LOAD	displays the test results for the currently selected fiber run
DONE	exits the stored runs list while loading the last run in the selected link
DELETE	delete the selected fiber, or all fiber runs for that link
PAGE	loads the next page of stored runs (if more runs than will fit on one page)
HELP	view context-sensitive help
BACK	same as DONE
VIEW	view all STORED RUN data for the selected fiber run



NEXT	displays next set of fiber runs
PREV	displays the previous set of fiber runs
BACK	return to the previous STORED LINKS screen
HELP	view context-sensitive help



Information includes:

Project / Job info (ACME CORP / OPS)

MASTER / REMOTE location info (COMPUTER ROOM - DATA CENTER)

Fiber run info (FIBER#1 03/22/17 10:47AM)

Fiber test result, and wavelength

Fiber parameters (Length, Mode, Standard, Fiber Type, Connections, Splices)

Use arrow keys to navigate through the available fiber data

GREEN text indicates a PASS

RED text indicates a FAIL

BLUE text indicates an invalid reading

OPERATION/MAINTENANCE

CLEANING THE OPTICAL PORTS

This cleaning procedure applies to both ports on the MPO meter.

Required Accessories:

- › Isopropyl alcohol (91% or better)
- › One-click 2.5mm cleaner for single-fiber test port
- › One-click MPO cleaner for MPO port
- › Compressed Air (optional)

Below are procedures for “wet” cleaning and “dry” cleaning. For best results, a combination of these cleaning methods may be necessary.



IMPORTANT SAFETY NOTE: WHEN INSPECTING AN OPTICAL PORT, NEVER LOOK DIRECTLY OR INDIRECTLY INTO THE PORT WITHOUT SUFFICIENT EYE PROTECTION. THE OPTICAL PORT MAY BE ENERGIZED WITH POWERFUL INVISIBLE RADIATION THAT IS HARMFUL TO THE HUMAN EYE.

INVISIBLE LIGHT IS ESPECIALLY DANGEROUS SINCE THE EYE IS NOT AWARE OF EXPOSURE TO HARMFUL INVISIBLE ENERGY, AND BECOMES INCREASINGLY DANGEROUS WITH PROLONGED EXPOSURE.

TO AVOID ACCIDENTAL EXPOSURE TO OPTICAL ENERGY, IT IS HIGHLY RECOMMENDED TO POWER OFF EQUIPMENT BEFORE INSPECTING OPTICAL PORTS.

IT IS ALSO HIGHLY RECOMMENDED TO USE AN LCD-BASED FIBER INSPECTION SCOPE, WHICH CAN INSPECT OPTICAL PORTS AND FIBER ENDFACES WITHOUT EXPOSING THE EYE TO HARMFUL OPTICAL RADIATION.

“WET” CLEAN PROCEDURE

- 1 Wet the tip of a 2.5mm cleaning swab with isopropyl alcohol.
- 2 Carefully insert the wet tip of the swab into the optical port.
- 3 Clean out the optical port according to the directions provided with the swabs.
- 4 Blow dry the optical port with the compressed air. If compressed air is not available, allow 2 minutes for the alcohol to evaporate.
- 5 Inspect the optical port with an in-adapter fiber optic inspection scope (if available) to ensure the port is clear of obstructions.

“DRY” CLEAN PROCEDURE

- 1 Carefully insert the one-click cleaner into the optical port.
 - 2 Clean out the optical port according to the directions that came with the cleaning accessories.
 - 3 Inspect the optical port with an in-adapter fiber optic inspection scope (if available) to ensure the port is clear of obstructions.
- If the port is still dirty, another round of cleaning will be necessary. You may also want to use a combination of “wet” and “dry” cleaning to achieve best results.

If the port is still dirty, another round of cleaning will be necessary. You may also want to use a combination of “wet” and “dry” cleaning to achieve best results.

APPENDICES

WARRANTY INFORMATION

Repair. Repair of this unit by unauthorized personnel is prohibited, and will void any warranty associated with the unit.

Cleaning. For accurate readings, the optical connectors on the MPO meter and the connectors on the patch cords should be cleaned prior to attaching them to each other. Minimize dust and dirt buildup by replacing the dust caps after each use.

Calibration. It is recommended to have Optical Wavelength Laboratories calibrate this unit once per year.

Warranty. The OWL MPO meter comes standard with a two-year factory warranty, which covers manufacturer defect and workmanship only.

CONTACT INFORMATION

Address:

Optical Wavelength Laboratories, Inc.
N9623 US Hwy 12
Whitewater, WI 53190

Phone:

262-473-0643

Internet:

OWL-INC.COM

APPENDICES

SUPPORTED CABLING STANDARDS

The Fiber OWL 4 supports the following fiber optic network cabling standards:

ITU G.983.3	EIA/TIA-568	CAN-T529	ISO/IEC 11801
10 Gigabit Ethernet	1000Base-SX	1000Base-LX	100Base-FX
10Base-FL	10Base-FB	FDDI	ATM-155
ATM-622	Fibre Channel	Token Ring	FTTH

10-GIGABIT ETHERNET STANDARD

Support for the IEEE 802.3ae 10-Gigabit Ethernet standard has been added to OWL Reporter, which means that Fiber OWL 4 users can now certify their 10GbE networks.

With this new standard, users are given the option of choosing from one of several versions of this standard, based on the fiber type, wavelength, and 10GbE electronics used. Below is a summary of the various 10GbE standards.

In order to choose the correct 10GbE standard, it is important to know the specifications of the fiber under test, especially the fiber type and modal bandwidth.

If these specifications are unknown, contact the optical fiber manufacturer for more details.

IEEE Standard Name	Fiber OWL Link Wizard Name	Fiber Type	Modal Bandwidth	Wavelength	Loss (dB)	Maximum Distance (m)
10GBASE-S	10GBASE-S LEGACY	62.5/125 multimode	160 MHz • km	850nm	2.6	26
10GBASE-S	10GBASE-S OM1/OM2	62.5/125 multimode	200 MHz • km	850nm	2.5	33
10GBASE-S	10GBASE-S LEGACY	50/125 multimode	400 MHz • km	850nm	2.2	66
10GBASE-S	10GBASE-S OM1/OM2	50/125 multimode	500 MHz • km	850nm	2.3	82
10GBASE-S	10GBASE-S OM3	laser-optimized 50/125 multimode	2000 MHz • km	850nm	2.6	300
10GBASE-LX4	10GBASE-LX4 LEGACY	62.5/125 multimode	500 MHz • km	1300nm	2.5	300
10GBASE-LX4	10GBASE-LX4 LEGACY	50/125 multimode	400 MHz • km	1300nm	2.0	240
10GBASE-LX4	10GBASE-LX4	50/125 multimode	500 MHz • km	1300nm	2.0	300
10GBASE-LX4	10GBASE-LX4	50/125 multimode	2000 MHz • km	1300nm	2.0	300
10GBASE-LX4	10GBASE-LX4	singlemode	NA	1310nm	6.3	5000
10GBASE-L	10GBASE-L/E	singlemode	NA	1310nm	6.2	5000
10GBASE-E	10GBASE-L/E	singlemode	NA	1550nm	11.4	5000

APPENDICES

UPDATING FIRMWARE

The firmware in MPO series meters can be updated on any computer that has OWLView software installed.

To update the firmware:

- 1) Save the firmware file to the PC
- 2) Connect the device to the computer via the supplied USB cable
-- do NOT remove the USB cable until the whole process is complete
- 3) Power on the device
- 4) Open OWLView software
- 5) Click Tools > Update Firmware > From file...
- 6) Browse to the location of the firmware file, then click Open
- 7) The software and the device will indicate the firmware update process

Once the firmware is updated, the device will re-boot. Now it is safe to remove the USB cable.

RE-CHARGING THE DEVICE BATTERY

The Lithium Polymer battery in the MPO meter is re-charged through the USB port.

A battery charger and USB cable is supplied for this purpose.

The device can either be recharged using the battery charger or a computer USB port.



To avoid damage to the unit or harm to the user, only use approved battery chargers.

Battery charger electrical specifications:

INPUT:	100-240V AC 50-60Hz
OUTPUT:	DC 5.0V 100mA +/- 5%