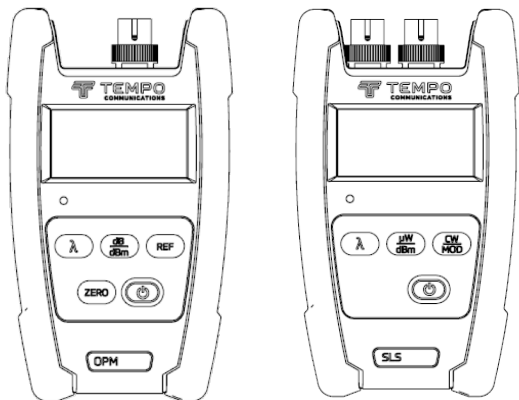


# INSTRUCTION MANUAL



## **OPM510 • OPM520 Fiber Optic Power Meter**

## **SLS520 • SLS530 • SLS535 • SLS536 Laser Source**

## **SLS525 LED Source**



Read and understand all of the instructions and safety information in this manual before operating or servicing this tool.

Register this product at [www.TempoCom.com](http://www.TempoCom.com)

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**KEEP THIS MANUAL**

## Description

The Tempo Communications fiberTOOLS™ instruments are handheld fiber optic tools designed to measure optical power levels and link loss on multi-mode and single-mode fiber optic cabling networks.

- The OPM510 power meter measures optical power at 850 nm, 1300 nm, 1310 nm, 1490nm, 1550nm and 1625 nm between a power range of +10 to -65dBm. The OPM510 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.
- The OPM520 power meter measures optical power at 850 nm, 1300 nm, 1310 nm, 1490nm, 1550nm and 1625 nm between a power range of +27 to -50dBm. The OPM520 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.
- The SLS520 Laser source provides a light source at 1310nm and 1550nm to measure insertion loss on singlemode fiber optic cabling. The SLS520 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.
- The SLS525 LED source provides a light source at 850nm and 1300nm to measure insertion loss on multimode fiber optic cabling. The SLS525 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available. The modal launch is not controlled.
- The SLS530 Laser source provides a light source at 1310nm, 1490nm and 1550nm to measure insertion loss on singlemode fiber optic cabling. The SLS530 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.
- The SLS535 Laser source provides a light source at 1310nm, 1550nm and 1625nm to measure insertion loss on singlemode fiber optic cabling. The SLS535 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.
- The SLS536 Laser source provides a light source at 1310nm, 1550nm and 1650nm to measure insertion loss on singlemode fiber optic cabling. The SLS536 is supplied standard with a SC bulkhead adapter with LC, ST and FC adapters optionally available.

## **Safety**

Safety is essential in the use and maintenance of Tempo Communications tools and equipment. This instruction manual and any markings on the tool provide information for avoiding hazards and unsafe practices related to the use of this tool. Observe all of the safety information provided.

## **Purpose of This Manual**

This instruction manual is intended to familiarize all personnel with the safe operation and maintenance procedures for the Tempo Communications OPM510, OPM520, SLS520, SLS525, SLS530, SLS535 and SLS536 fiberTOOLS instruments.

## Important Safety Information



### SAFETY ALERT SYMBOL

This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.

#### **⚠ DANGER**

Immediate hazards which, if not avoided, **WILL** result in severe injury or death.

#### **⚠ WARNING**

Hazards which, if not avoided, **COULD** result in severe injury or death.

#### **⚠ CAUTION**

Hazards or unsafe practices which, if not avoided, **MAY** result in injury or property damage.



#### **⚠ WARNING**

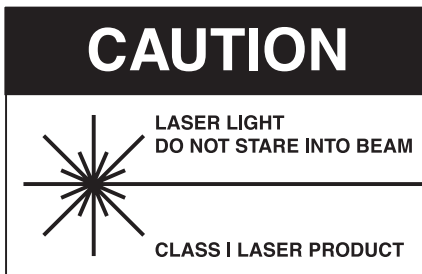
Read and understand this material before operating or servicing this equipment. Failure to understand how to safely operate this tool could result in an accident causing serious injury or death.



#### **⚠ WARNING**

Electric shock hazard:  
Contact with live circuits could result in severe injury or death.

## Important Safety Information



The SLS520, SLS530, SLLS535 and SLS5336 instruments are a laser device conforming to the requirements of CDRH, CFR 1040. While there is no potential for eye damage due to unaided direct exposure, users should always avoid looking directly into the output port. The use of optical viewing instruments, such as microscopes, magnifiers, etc., should always be avoided. The use of such devices around active fibers can focus an intense beam of light energy onto the retina of the eye, which can result in permanent damage.

### **⚠ CAUTION**

Laser hazard:

- When performing measurements on fiber optic systems, avoid eye exposure to any open-ended fibers, optical connectors, optical interfaces, or other sources because they may be connected to active laser transmitters.
- Do not look into the optical port when a source is turned on.
- Avoid looking at the free end of a test fiber, i.e., the end not connected to the instrument. If possible, direct the free end toward a non-reflective surface.

Failure to observe these precautions may result in injury.

## Important Safety Information

### **CAUTION**

Electric shock hazard:

- Do not insert batteries with the polarity reversed.
- Do not open the case of the unit for any reason. It contains no user-serviceable parts.
- Use this unit for the manufacturer's intended purpose only, as described in this manual. Any other use can impair the protection provided by the unit.

Failure to observe these precautions may result in injury and may damage the unit.

### **CAUTION**

Instrument damage hazard:

- Do not leave the unit in direct sunlight or near direct sources of heat.
- Protect the unit from strong impacts or shock.
- Do not immerse the unit in water or store in areas with high humidity.
- When necessary, clean the case, front panel, and rubber cover with a damp cloth. Do not use abrasives, harsh chemicals, or solvents.
- Replace the interface dust cap(s) when the unit is not in use.
- Store the unit and interface adapters in a cool, dry, and clean place.

Failure to observe these precautions may result in injury and may damage the unit.

## Introduction

### Model Designations

The fiberTOOLS instruments incorporate different types of interfaces and must be used with the compatible adapters.

### fiberTOOLS Individual Instruments

OPM510	InGaAs Optical Power Meter
OPM520	InGaAs Optical Power Meter with high power measurement range
SLS520	1310/1550nm Laser Source with SC connector
SLS525	850/1300nm LED Source with SC connector
SLS530	1310/1490/1550nm Laser Source with SC connector
SLS535	1310/1550/1625nm Laser Source with SC connector
SLS536	1310/1550/1650nm Laser Source with SC connector

### fiberTOOLS Instruments Kits

SM DUAL KIT	OPM510 & SLS520
SM DUAL KIT HP	OPM520 & SLS520
MM DUAL KIT	OPM510 & SLS525
SM T PON KIT	OPM510 & SLS530
SM T 1625 KIT	OPM510 & SLS535
SM T 1650 KIT	OPM510 & SLS536
SM T PON KIT HP	OPM520 & SLS530
SM T 1625 KIT HP	OPM520 & SLS535
SM T 1650 KIT HP	OPM520 & SLS536
SMMMKIT-T	OPM510, SLS520 & SLS525
SMMMKIT-M	OPM520, SLS520 & SLS525

### Tempo Communications OPM Adapters

SC-OPM	SC Adapter
LC-OPM	LC Adapter
FC-OPM	FC Adapter
ST-OPM	ST Adapter



## Tempo Communications SLS Adapters

SC-Source	SC/UPC Adapter
LC-Source	LC/UPC Adapter
FC-Source	FC/UPC Adapter
ST-Source	ST/UPC Adapter

## Tempo Communications Accessories

CC-1	Carry Case, Single Instrument
PS-100	External Power Supply
CC-2-3	Carry Case, Dual & Triple Instrument

## Unpacking and Inspection

All fiberTOOLS instruments have been carefully inspected before shipment. When received, the shipping carton should contain the items listed below:

- 1 fiberTOOLS instrument
- 1 Soft Carry Case
- 1 Quick Reference Card

Please account for and inspect each item while unpacking and preparing the instrument for use.

If the instrument received is damaged, contact Tempo Communications.

Keep the shipping carton in case re-shipment is required for any reason.



Do not discard this product or throw away!  
For recycling information, go to [www.TempoCom.com](http://www.TempoCom.com).

All specifications are nominal and may change as design improvements occur. Tempo Communications Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

fiberTOOLS is a trademark of Tempo Communications Inc.

## Specifications

### OPM

MODEL	OPM510	OPM520
Cal. Wavelength	850, 1300, 1310, 1490, 1550, 1625nm	
Measure range	-65 to +10dBm	-50 to +27dBm
Detector type	InGaAs	
Accuracy	±5% ±0.01nW (±0.5dB@850nm)	±5% ±1nW (±0.5dB@850nm)
Linearity	+/-0.5dB (+10 to -3dBm) +/-0.1dB (-3 to -50dBm) +/-0.5dB (-50 to -65dBm)	+/-0.5dB +27 to -3dBm +/-0.1dB -3 to -50dBm
Resolution	0.01dB	
Functions	W/mW/μW/dBm/dB(REF)/ MOD TONE DETECT 270Hz, 1kHz, 2kHz	
Connector Type	SC (Interchangeable LC, FC and ST)	
Fiber Type	Singlemode & Multimode	
Battery Life	> 100 hours	
Power Supply	9V Alkaline or 1000mAh Lithium Battery / 9V AC adapter	
Operating Temperature	-10°C ~ 50°C	
Storage Temperature	-20°C ~ 70°C	
Relative Humidity	0 to 95% (non-condensing)	
Weight	0.68lbs (310g)	
Dimensions (H x W x T)	6.1 x 3.5 x 1.3" (155 x 88 x 33mm)	
IP Rating	IP54	
Vibration	5Hz to 150Hz, Amplitude = 0.15mm	
Shock	Peak acceleration 25g at a pulse duration of 6ms	
Compliance	CE, FCC	

(1) The lower limit of 850nm measurement is -60 dBm for OPM510.

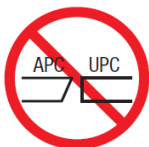
Specifications subject to change without notice.

# Specifications

## SLS

MODEL	SLS520	SLS525	SLS530	SLS535	SLS536
Wavelength ( $\pm 20\text{nm}$ )	1310/1550	850/1300	1310/ 1490/ 1550	1310/ 1550/ 1625	1310/ 1550/ 1650
Range of Use	Singlemode	Multimode	Singlemode		
Emitter Type	FP	LED	FP		
Spectral Width	$\leq 5 \text{ nm}$	$\pm 40 \text{ nm}$	$\leq 5 \text{ nm}$		
Output Power Typical/ Minimum	0dBm/ -1dBm	-20dBm/ -21dBm	0dBm/-1dBm		
Output Power Stability	$\pm 0.05$ dB/15min; $\pm 0.10$ dB/8hr	$\pm 0.05$ dB/15min; $\pm 0.15$ dB/8hr	$\pm 0.05$ dB/15min; $\pm 0.10$ dB/8hr		
Modulation Frequency	270Hz, 1kHz, 2kHz				
Display	LCD				
Battery Life	60 hours				
Connector Type	SC/PC (Interchangeable LC, ST, SC)				
Power Supply	9V Alkaline or 1000mAh Lithium Battery / 9V AC adapter				
Operating Temperature	$-10$ to $+50^{\circ}\text{C}$				
Storage Temperature	$-20$ to $+70^{\circ}\text{C}$				
Relative Humidity	0 to 95% (non-condensing)				
Weight	0.71 lbs (320g)				
Dimensions (H x W x T)	6.1 x 3.5 x 1.3" (155 x 88 x 33mm)				
IP Rating	IP54				
Vibration	5Hz to 150Hz, Amplitude = 0.15mm				
Shock	Peak acceleration 25g at a pulse duration of 6ms				
Compliance	CE, FCC, 21 CFR 1040.10 (laser)				

Specifications subject to change without notice.



## General Information

This section provides general instructions on how to use the fiber-TOOLS instruments.

If circumstances require that the instruments be serviced and maintained in-house, contact Tempo Communications for technical assistance.

### Battery

The OPM510, OPM520, SLS520, SLS525, SLS530, SLS535 and SLS536 instruments are powered by one 9V alkaline battery or one 9V Lithium battery.

The external power supply can be used to power and charge all OPM and SLS versions.

Do not attempt to charge alkaline batteries with the external power supply.

When the battery power is low the low battery indicator will be displayed on the LCD.

### Auto Power Off.

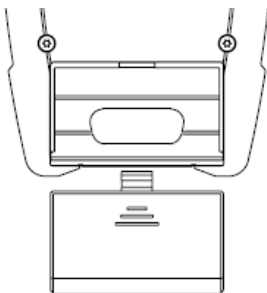
The instrument will automatically turn off if there are no keypad pushes for approximately five minutes.

To deactivate the auto power off hold the [On/Off] when turning on until "AUTO OFF" is displayed on LCD. To reactivate the auto power off hold the [On/Off] button until "AUTO OFF" is no longer displayed.

## Battery Installation or Replacement

**To replace the batteries, follow these steps:**

1. Turn instrument off.
2. Remove battery cover by sliding down.
3. Install new battery to the wire leads observing correct polarity.



## Connector Interface

All fiberTOOLS OPM and SLS units utilize a screw on adapter for SC, LC, FC and ST configurations. The OPM and SLS instrument bulkheads are unique in that the adapters for the OPM are different from the SLS. Do not attempt to use a OPM adapter on a SLS or vice versa. Please consult the accessories section of this instruction manual for adapter part numbers.

## Cleaning the OPM and SLS Interfaces

Make sure that the instrument is powered off. Do not look into the output of any SLS port. Unscrew the OPM adapter and use a clean lint free wipe to clean the exposed OPM detector window. Always use a new 2.5mm cleaning swab to clean the SLS bulkhead.

## OPM Operations

### External Connector Instruction



#### 1. Fiber Optic Input

OPM510 & OPM520 is available with SC fiber optic connector (Interchangeable LC/ST/FC).

#### 2. Ext. AC Power Jack

OPM510 & OPM520 can be operated with an External Power Adapter 9V DC@250mA.

## Keypad Functions

**⏻**: Push the power button to turn the OPM on or off. The default setting will turn the OPM off after five minutes of inactivity. Hold the power button for two seconds to place the OPM into a constant on mode. Holding the power button again for two seconds will revert to the auto off mode.

**dB/dBm**: Press this key to switch the measurement mode between absolute power (dBm) and relative loss (dB). Hold the key until "HELD" is displayed.

**Zero**: Press the Zero key to zero the OPM with the input port protected from ambient light. A message of "SUCC" will be displayed upon successful zeroing. If an "ERR" message appears check that the input port was in fact covered properly and repeat the zeroing procedure.

**REF**: Press this key to display the reference value stored in memory. Hold the key down until "HELD" appears in the display. When the OPM is switched to dB mode, the LCD displays the difference in dB between the reference level and the current input signal.

**λ**: Press this key to select the desired wavelength. The current wavelength will be displayed on LCD.

## SLS Operations

### External Connector Instruction




#### 1. Fiber Optic Output

SLS supplied with SC/PC fiber optic connector (intechangeable LC/FC/ST). This is a flat polished connector; do not connect angle polished connectors to the bulkhead.

#### 2. Ext. AC Power Jack

SLS can be operated with an External Power Adapter 9V DC@250mA.

## Keypad Functions

 : Power on or off the instrument. With the default setting, the SLS will conserve battery life by automatically turning itself off if no key has been pressed for approximately 5 minutes.

**μW/Bm**: Press this key to switch the display mode from absolute power (dBm) to microwatt(μW). The current optical power will be displayed on LCD.

**CW/Mod**: Press this key to switch the output of SLS from CW to the desired modulation frequency.

**λ**: Press this key to select the desired wavelength. The current wavelength will be displayed on LCD.

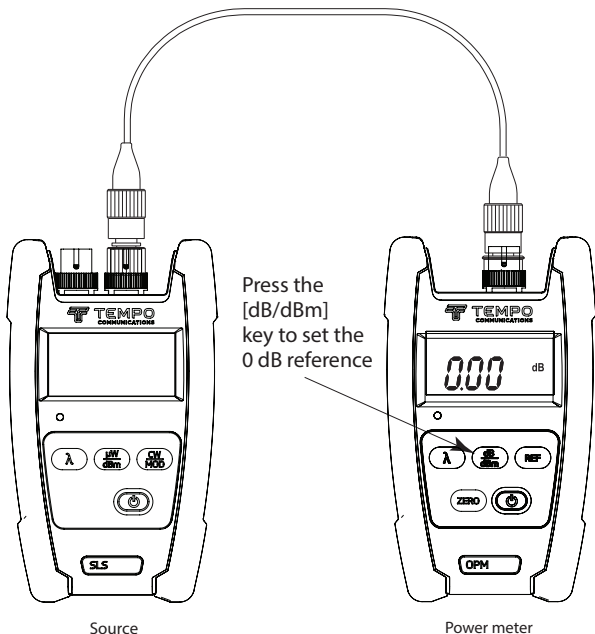
## Applications

The following applications for the fiberTOOLS instruments are described in this manual:

- Connector/cable insertion loss measurements
- Link loss measurements

### One Test Jumper Method: Connector Loss

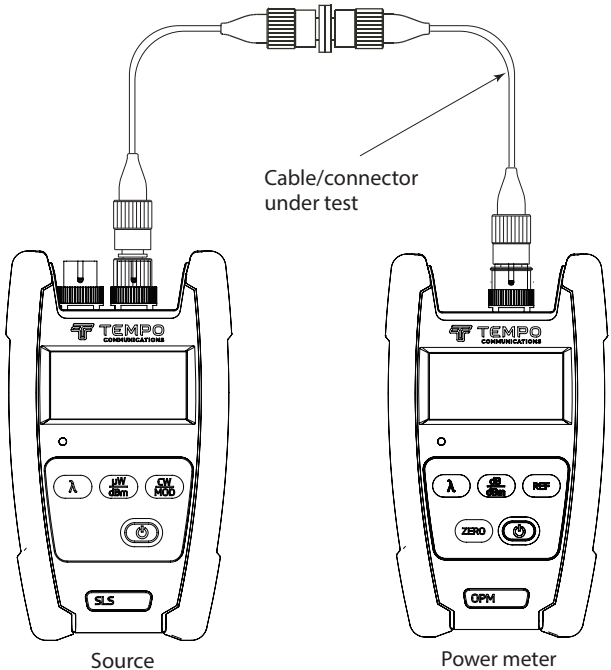
1. Connect an appropriate light source to the optical power meter using a suitable reference cable with a length of about 2 to 3 meters (6 to 10 feet).
2. Ensure that the light source is in continuous wave (CW) output mode. Set the optical power meter to the appropriate wavelength (using the [ $\lambda$ ] key) and to dBm units (using the [dB/dBm] key).
3. To store the reference level, press the [dB/dBm] key on the optical power meter until the display reads 0.00 dB. See below.



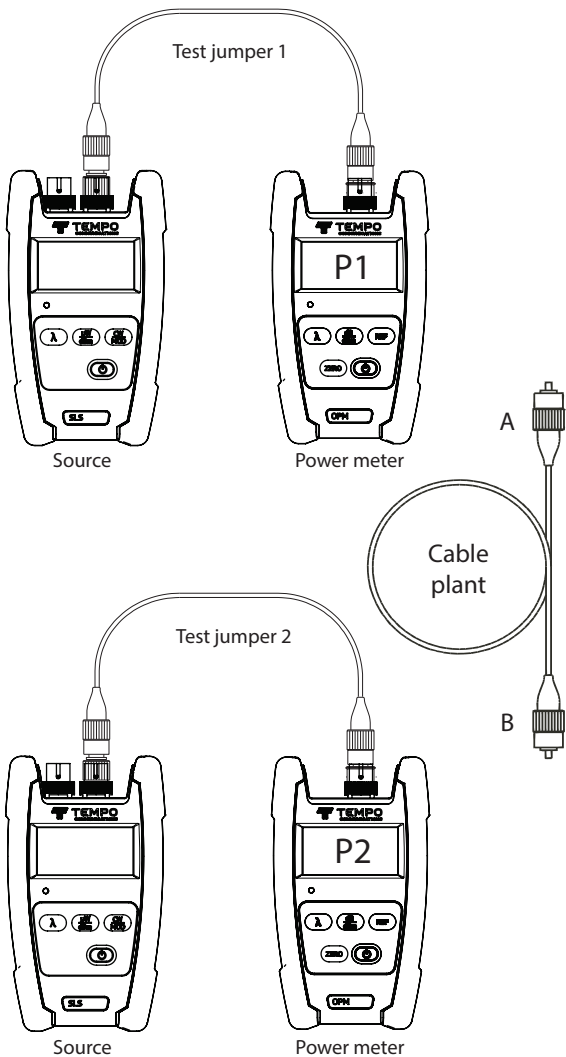


## One Test Jumper Method: Connector Loss (cont'd)

4. Disconnect the reference cable end from the optical power meter and insert the cable to be tested using an appropriate mating adapter. The optical power meter reads the connector/cable loss in dB.



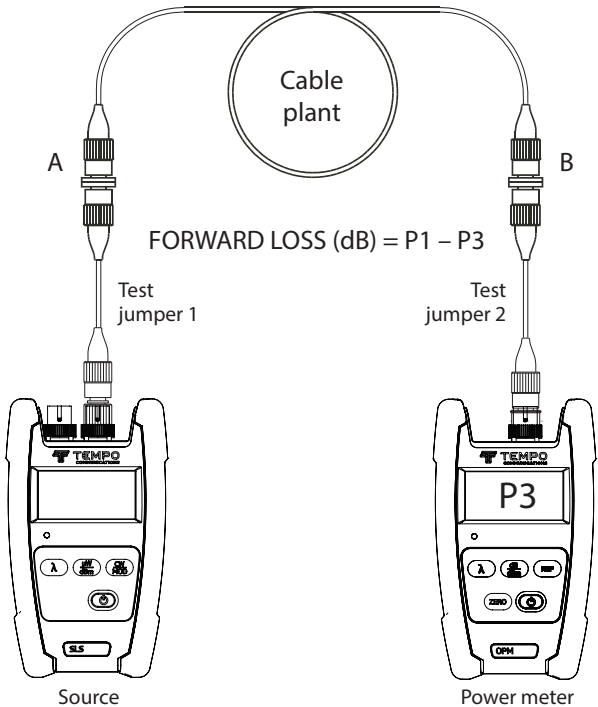
## Two Test Jumper Method: Link Loss



## Two Test Jumper Method: Link Loss (cont'd)

1. If a complete test set (light source and optical power meter) is available at each end, it is advisable to test the output power of the sources and the condition of the test jumpers before commencing measurement of the link.

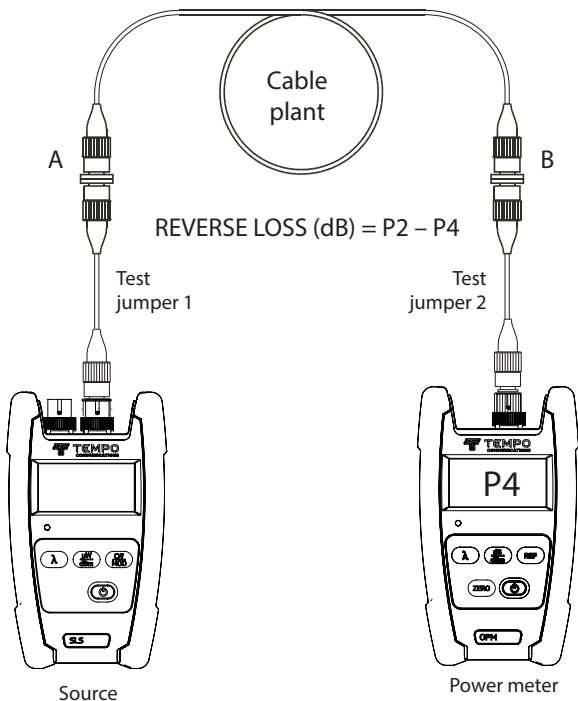
Connect each source and optical power meter with a test jumper, as shown above. The sources should be set to continuous wave (CW) output mode. The power meters should be set to the correct wavelength and to dBm measurement units. Note the P1 and P2 dBm readings. For example, a SLS520 1310 NM laser source should read approximately -1dBm on the optical power meter.



## Two Test Jumper Method: Link Loss (cont'd)

2. Connect a light source and optical power meter to the respective patch panel ports using the test jumpers, as shown on the left.
3. Using the formula shown above, take the dBm reading on the optical power meter (P3) and the nominal source output value, corresponding to the light source in use.

Note: Make sure the optical power meter supports the wavelength of the light source in use.



4. It is advisable to measure the loss in both directions. Reverse the source and optical power meter connections, as shown above. Calculate the reverse loss using the formula shown above.
5. Report both forward and reverse loss values.

### **Limited Warranty**

Tempo Communications Inc. warrants to the original purchaser of these goods for use that these products will be free from defects in workmanship and material for three years, excepting normal wear and abuse.

For all Test instrument repairs, you must first request a Return Authorization Number by contacting our Customer Service department at: toll free in the US and Canada 800-642-2155

Telephone +1 760 510-0558.

Facsimile +1 760 598-9263.

This number must be clearly marked on the shipping label. Ship units Freight Prepaid to: Tempo Repair Center, 1390 Aspen Way, Vista, CA 92081 USA.

Mark all packages: Attention: TEST INSTRUMENT REPAIR.

For items not covered under warranty (such as dropped, abused, etc.) repair cost quote available upon request.

*Note: Prior to returning any test instrument, please check to make sure batteries are fully charged.*

### **Tempo Communications**

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