TKS-CAL

OPTICAL CALIBRATION KITS

SPEC SHEET

Optical calibration kits allow manual calibration and verification of power meters, light sources, attenuators and OTDRs.

KEY FEATURES

- High-performance reference power meter with uncertainty as low as ±0.9 %
- Metrology approved calibration procedures based on ISO-17025 standard
- Calibration and verification of power meters, attenuators, light sources and OTDRs
- Flexible, modular and expandable

VERIFICATION AND CALIBRATION OF FIBER-OPTIC TEST INSTRUMENTS

EXFO's TKS-CAL Optical Calibration Kits for in-house instrument verification put users in control of all their calibration operations. The TKS-CAL kits are used to manually calibrate power meters as well as verify light sources, attenuators and OTDRs without causing any downtime and costly shipping. They are designed to evolve as needs change.

- Absolute power calibration of power meters
- Output power level, stability and central wavelength of light sources
- Insertion loss and linearity of single-mode optical attenuators
- Distance, dynamic range, linearity and dead zone of single-mode OTDRs

All reference standards used in TKS-CAL kits are traceable to national laboratory standards like NIST and METAS.

EASY-TO-USE PROCEDURES

Each TKS-CAL kit includes very detailed explanations as well as step-by-step instructions on how to perform a calibration and verification of fiber-optic test instruments based on ISO-17025 standard. An Excel-based and fully customizable calibration certificate template is also included with each kit. In addition, an instruction guide is included with the basic kit. The TKS-CAL kit instruction guide explains how to determine conformance depending on the specification type and provides the requirements for a proper calibration certificate or test report.

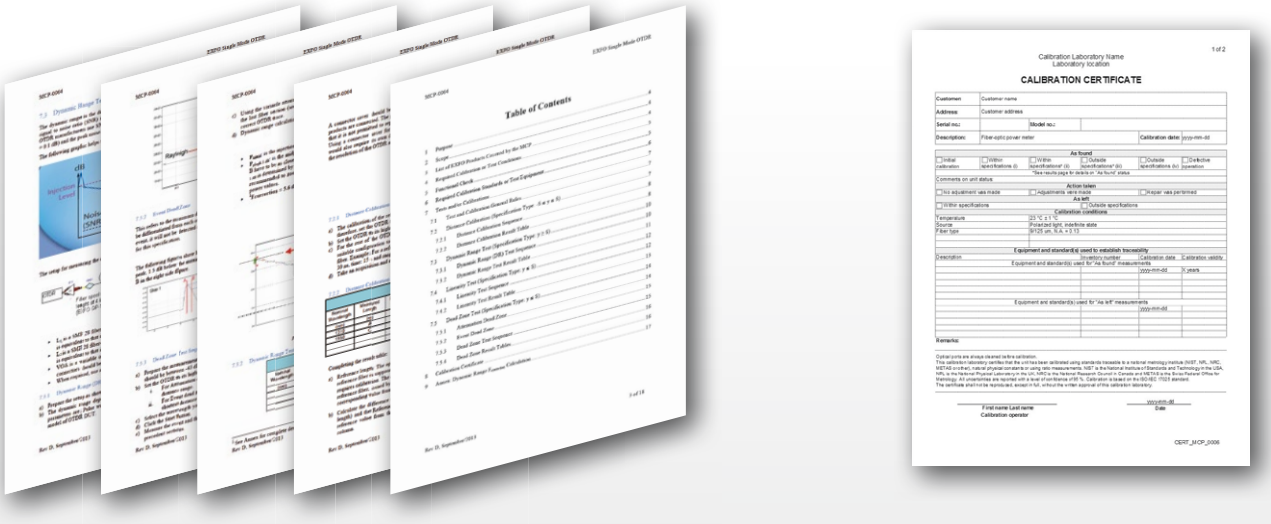
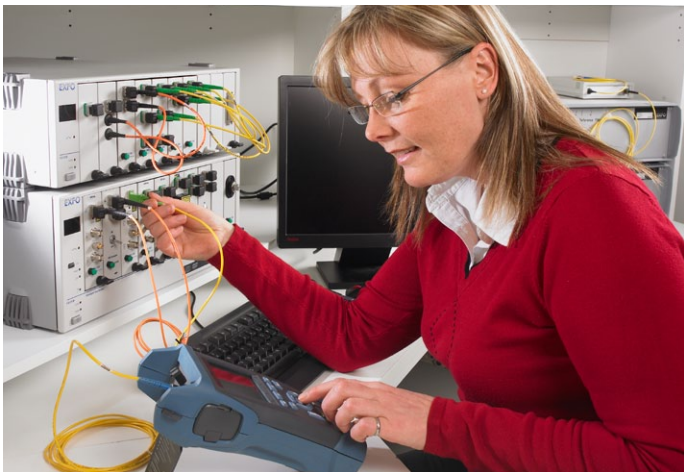


Figure 1. Procedure and calibration certificate

OPTICAL POWER METER CALIBRATION

- Single-mode, 1310 nm and 1550 nm
- Absolute power calibration



Product calibration and specification checks are important steps in ensuring compliance to required quality assurance programs such as ISO-9000. Power meters and other fiber-optic instruments must be periodically verified to guarantee that their optical calibration remains constant over the validity period. Optical-calibration constants are related to the spectral responsivity curve of the detector (amps per watt in terms of wavelength).

Absolute Power Calibration

The power reading of the device under test (DUT), in this case a power meter, is compared to the power reading of a highly accurate reference power meter (IQS-1500) traceable to a primary reference standard at the calibration light source wavelength. The IQS-2400 DFB laser, with its excellent power stability over short periods, is preferred because its central wavelength can be accurately located, and the error due to the spectral width is less than that of a Fabry-Perot laser.

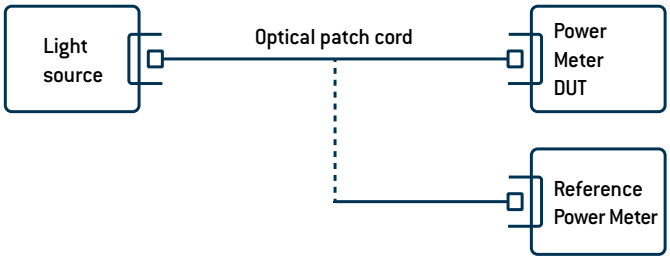


Figure 2. Typical absolute power calibration setup

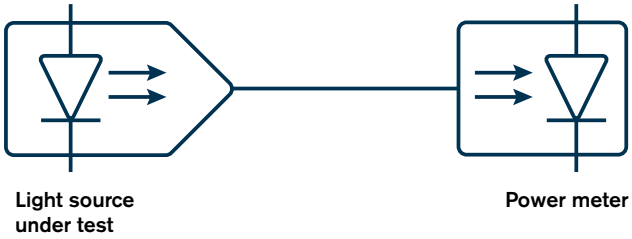
OPTICAL LIGHT SOURCE VERIFICATION

Light sources using semiconductors can be calibrated to ensure they meet their stated specifications. The TKS-CAL kits provide procedures to test all source parameters, namely:

- Output power level
- Power stability
- Central wavelength

Output Power Level and Stability

Source output power fluctuates as a function of time. The source power level and stability must therefore be given for both the short term (e.g., 15 minutes) and the long term (e.g., one, eight or twenty-four hours), depending on the application. To record power stability, the source is connected to a power meter, and its output power is monitored by the power meter as a function of time.



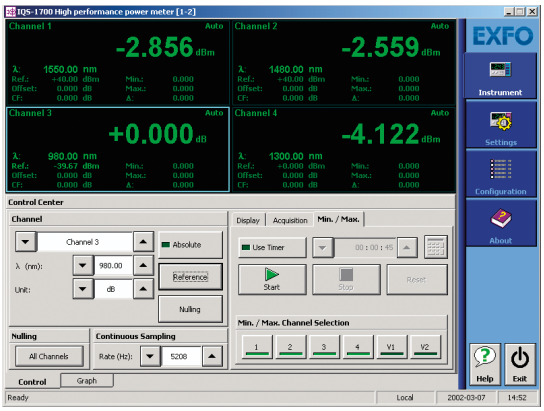


Figure 3. Typical light source power stability with respect to time setup

Central Wavelength

The TKS-CAL kit includes procedures on measuring the central wavelength of light sources in compliance with IEC 61280-1-3. The measurement can be performed using an optical spectrum analyzer or a wavelength meter, depending on the type of light source that must be calibrated.

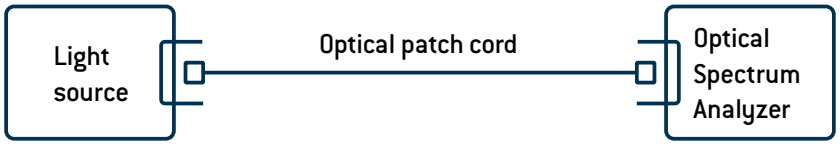


Figure 4. Typical Central Wavelenght Verification Set-up

OPTICAL ATTENUATOR VERIFICATION

The two key parameters that impact the performance of optical variable attenuators are:

- Insertion loss at minimum attenuation
- Optical linearity

It is possible to verify both, by following the step-by-step procedures included.

To test the attenuator's insertion loss, a comparison between the power read with and without the DUT in-line is made, with attenuation set to the minimum. The difference between the two readings yields the insertion loss.

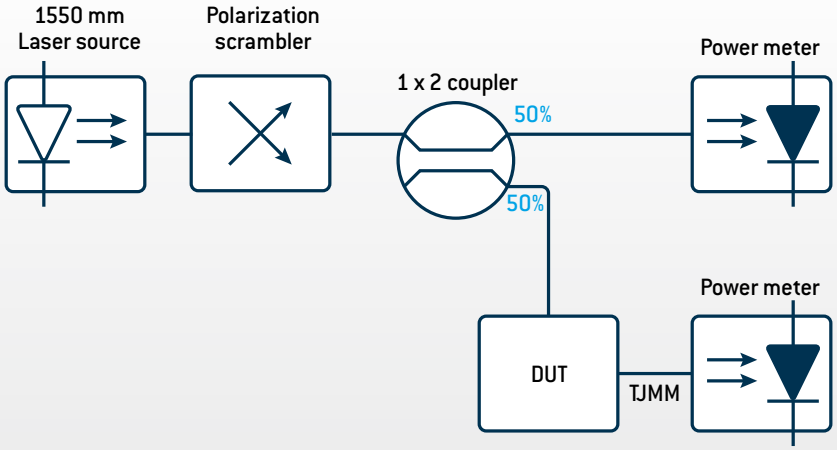


Figure 5. Typical Optical Attenuator Verification Set-up

The optical linearity of the attenuator is tested over the requested attenuation range using the same instruments. The discrepancy between the set attenuation of the DUT and the power meter reading is equal to the linearity error.

OPTICAL TIME-DOMAIN REFLECTOMETER CALIBRATION

Key parameters that impact the performance of an OTDR are:

- distance accuracy
- dynamic range
- linearity
- dead zone

When it comes to performance, EXFO understands the need for precision. For this reason, a procedure to check OTDR performance was included. The procedure was modeled on the IEC OTDR Calibration Procedure, which is performed using calibrated fibers with known range length. This simplified and cost-effective procedure performs distance calibration, dynamic range, linearity and dead zone testing by comparing the readings of the OTDR DUT with the calibrated values of reference fibers or custom jigs included in the OTDR kit.

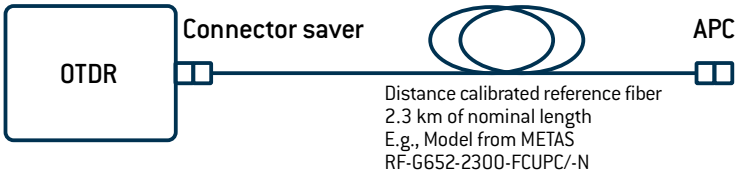


Figure 6. Typical OTDR distance calibration set-up.

	OPM1U	OPM2x	VOAx	OLS1x	OTDR
Platform	IQS-610P-HS	IQS-610P-HS	N/A	N/A	N/A
Modules and Jigs	IQS-1502-Q0-B-89	IQS-1502-Q1-B-xx-01	IQS-9601-03-B06-XX	IQS-5240S-XX	2.3 km calibrated reference fiber
	IQS-2403BLD-23-P4-M5-EA-EUI-89	IQS-2403BLD-23-P4-M5-EA-EUI-89			4.4 km SMF-28 fiber spool
	IQS-2402BLD-CU-P4-M5-EA-EUI-89	IQS-2402BLD-CU-P4-M5-EA-EUI-89			17.6 km SMF-28 fiber spool
	IQS-1722X-FOA-322	IQS-1722X-FOA-322			Dead zone measurement jig
	GP-121535	GP-121535			

Note: When applicable, refer to ordering information for connectors available for each kit.

ORDERING INFORMATION

TKS-CAL-XX-XX-XX-XX

OTDR Options
00 = Without OTDR kit
OTD1 = With OTDR kit

Light Source Options
00 = Without light source
OLS1U = With single-mode light source calibration kit excluding DFBs, with UPC connectors
OLS1A = With single-mode light source calibration kit excluding DFBs, with APC connectors

Attenuator Options
00 = Without attenuator calibration kit
VOAU = With attenuator calibration kit, UPC connectors
VOAA = With attenuator calibration kit, APC connectors

Kit
OPM1U = Basic power meter calibration kit with UPC connectors
OPM2U = High-precision power meter calibration kit with UPC connectors
OPM2A = High-precision power meter calibration kit with APC connectors

Example: TKS-CAL-OPM2U-VOAA-OTD1

EXFO Headquarters > Tel.: +1 418 683-0211 | Toll-free: +1 800 663-3936 (USA and Canada) | Fax: +1 418 683-2170 | info@EXFO.com | **www.EXFO.com**

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