

KI 9600 Series Optical Power Meter

OPERATION & MAINTENANCE GUIDE





DECLARATION OF CONFORMITY
IN ACCORDANCE WITH ISO/IEC 17050:2004



Manufacturer's Name: Kingfisher International Pty. Ltd.
Manufacturer's Address: 30 Rocco Drive, Scoresby, Victoria 3179, Australia

hereby declares, that the products listed below

Product Name:	Power Meter
Model Number:	KI 9600 Series
Product Options:	<i>This declaration covers all options of the above product(s)</i>

comply with the essential requirements of the applicable European Directives:

- Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, amended by 93/68/EEC, and carries the CE marking accordingly
- Directive 2002/95/EC on restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
- Directive 2002/96/EC on waste electrical and electronic equipment (WEEE)

and conform to the following standards and specifications:

MIL-PRF-28800F: 1996 Performance specification-Test equipment for use with electrical and electronic equipment, general specification
IEC 60529: 2001/ EN 60529:1993+A1:2003 Degrees of protection provided by enclosures
IEC 61315: 2005 Calibration of fibre-optic power meters

EMC

IEC 61326:2002 / EN 61326-1:1997+A1:1998+A2:2001+A3:2003
IEC CISPR 11: 2004/ EN 55011:1998+A1:1999
IEC CISPR 16-1:1999
IEC CISPR 16-2:1999
IEC 61000-4-2:2001 / EN 61000-4-2:1995+A1:1998+A2:2001
IEC 61000-4-3:2002/ EN 61000-4-3:2002
ICES-001: 2006 (Canada)
CFR 47 FCC Part 15, Subpart B (Class B) (USA)
FCC registration number: 90891

Limit

Limits applicable to Group 1 Class B equipment
Limits applicable to Class B equipment
Limits applicable to Class B equipment
4kV CD, 8kV AD
3V/m, 80-1000MHz

Supplemental Information:

The product was tested in a typical configuration with Kingfisher International test systems.

2008-March 17

Date

Bruce Robertson

Name

Technical Director

Title

For further information, please contact your local Kingfisher International sales office, agent or distributor.

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KI 9600 Series Optical Power Meter

Congratulations on your purchase of this instrument, which has been engineered to provide the best possible reliability, convenience and performance. To get the best use from your equipment and ensure its safe operation, please spend a few minutes to read this manual.



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PLEASE REFER TO THE CONTROL PANEL PICTURES IN THE QUICK REFERENCE GUIDE SECTION OF THIS MANUAL

KI 9600 Series Optical Power Meter



SERVICE AND SUPPORT

Applications Support

Please visit www.kingfisher.com.au to see our comprehensive **Application Notes** written to support instrument users.

Look at www.kingfisher.com.au to find distributor details from the **Contact Us** section.

Our local agents are able to offer excellent applications advice in your language and time zone.

Please visit our website on www.kingfisher.com.au for a current list of regional service centres.

Otherwise if you are having difficulties please feel free to contact sales@kingfisher.com.au for applications support.

Instrument Service

Qualified personnel must perform adjustment, maintenance or repair of this product. To obtain service, please contact your local Kingfisher International distributor or our office in Australia:

Tel: (61) 3-9757-4100

Fax: (61) 3-9757-4193

Email: sales@kingfisher.com.au

If returning equipment to Kingfisher International for service or calibration, please download and complete the **Return Material Authorization Form** located on the **Support** page on our web site www.kingfisher.com.au.

To avoid delays and minimise disruption for our customers, Kingfisher International offers a fixed price repair service.

For the staff at our fully equipped service and calibration centre, it is their pleasure to keep your equipment performing at its very best.

INTRODUCTION AND APPLICATIONS

The KI 9600 Series Optical Power Meter offers superb measurement confidence, ease of use, high level of convenience and reduced cost of ownership. It can be effectively used by installers, technicians and engineers to test all types of fiber optic systems:

- Tx / Rx absolute power levels in dBm
- Optical loss in dB
- Continuity testing with the test tone features

The interchangeable optical connector is drop and dust protected by a snap on cover. A wide variety of connector styles are available, including 1.25 mm LC and MU styles.

The instruments have very long battery life of 300 hours, thus eliminates requirements for external power packs.

KI9600 Series feature a tough polycarbonate housing with shock absorbent sides and corners, which has passed extensive drop testing.

Calibration can be performed by any suitably equipped laboratory without opening the instrument. The recommended re-calibration cycle is 3 years.

Superior measurement confidence is achieved with a unique Total Uncertainty Specification, which covers the full temperature, measurement and connector range. NATA/ILAC traceable calibration certificate is supplied.

The sensitive optical tone detector displays the actual measured tone frequency in Hz. If a standard tone is detected, the buzzer sounds, which is useful for fiber identification and continuity testing.

Power stability testing is performed using the max/min recording function. The display shows dBm, dB and linear units, and can be put on hold for data recording.

This power meter works with fiber core diameter up to 200 micron, with both PC and APC polish connectors.

Detector options include Germanium (Ge), Indium Gallium Arsenide (InGaAs), wavelength selective and large area detectors.

Special instrument versions available with large area or detector.

Power meter calibration options are available from 470 nm to 1625 nm and power levels from +24 to -80 dBm.

KITS™ reporting software

Free KITS™ reporting software enables manual entry of test data into Excel spreadsheet, making it useful for data logging and reporting in the field. KITS™ can be easily customised to change language, terminology or to add new reporting features. KITS™ can be downloaded from our website www.kingfisher.com.au.

GENERAL SAFETY SUMMARY

The following safety signs and symbols specify general safety precautions which must be observed during all phases of operation, service and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of the instrument. Kingfisher International assumes no liability for the customer's failure to comply with these requirements.

Before operation, review the instrument and user manual for safety instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

WARNING!

The **WARNING!** sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly performed or adhered to, could result in injury. Do not proceed beyond a **WARNING!** sign until the indicated safety conditions are fully understood and met.

CAUTION!

The **CAUTION!** sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part, or all, of the product. Do not proceed beyond a **CAUTION!** sign until the indicated conditions are fully understood and met.

Safety Symbols



The apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.

Initial Inspection

Inspect the shipping container for damage. If there is damage to the container or cushioning, keep them until you have checked the contents of the shipment for completeness and verified the instrument both mechanically and electrically. If the contents are incomplete, mechanical damage or defect is apparent, or if an instrument does not pass the operator's checks, notify the nearest Sales/Service Office.

To check instrument performance, please refer to **Performance Verification Tests** section of this manual.

WARNING! You must return instruments with malfunctions to a Service Centre for repair and calibration.

GENERAL SAFETY SUMMARY

Operating Environment

The range of Kingfisher equipment covered by this manual can be operated at temperatures between -15 °C and +55 °C and at relative humidity of <95 %.

Storage and Shipment

The range of Kingfisher equipment covered by this manual can be stored or shipped at temperatures between -25 °C and +70 °C and at relative humidity of less than 95 %. Protect the unit from temperature extremes that may cause condensation within it.

Safety

This instrument contains no hazardous optical or electrical items. When using this equipment, optical safety precautions should be observed commensurate with the maximum available source power, since most of this power can also be coupled out of the instrument.

WARNING! Observe optical safety when using high power.

Optical safety requirements at high power levels **MUST** be observed or eye damage is likely. Organisations and users operating optical equipment with these power levels **MUST** determine and observe relevant safety precautions, which are beyond the scope of this manual.

BATTERY POWER

This instrument is powered by two 1.5 V dry alkaline 'AAA' size batteries.

Model	Battery run time in hours
KI 9600 Optical Power Meter	300

When the batteries are low, the low-battery indicator is shown on the display. At this stage, there is approximately enough energy for another 40 hours of use.

To save energy, the instrument automatically turns off after 10 minutes without operation.

To change the batteries, open the cover of the battery compartment at the side of the instrument, remove the batteries and insert new ones.

CAUTION!

Do not use lithium batteries or other batteries with a nominal voltage greater than 1.8 V. The instrument may be damaged.

Protect our environment! Batteries purchased from Kingfisher agents can be returned to them for appropriate disposal.

OPTICAL CONNECTOR

To access the optical connector, grasp the top left corner of the instrument, and pull off the cover.

To install an adaptor, align the locating slot on the side of the through adaptor with that on the instrument connector, and press it on.

To remove an adaptor, press button on the front of the instrument and then pull off the adaptor. It is easier to pull off the adaptor with a test lead in place, since this gives better grip.

Different styles of connector adaptor (ST, SC, FC, MU, LC/F3000, E2000/LSH, D4, MU, 2.5mm universal, SMA and LSA/DIN) can be easily fitted by the user.

When not in use, keep the test port and connector covered. Do not touch connector tip with your fingers, since body oils and dirt can impair connector performance.

The supplied standard adaptors have ceramic sleeves and do not cause metal dust contamination, which can cause connector failure and fiber fuse at very high power levels.

CAUTION! Do not use damaged or incompatible connectors.

This power meter can be used with **both PC and APC** connector styles.

Bare fiber adaptors must achieve fiber eccentricity of ± 100 microns, and end tolerance of ± 300 microns relative to the ferrule end.

Preferred bare fiber adaptors consist of a connector with fiber retention device or other end stop.

For regular work with bare fibers, it is preferable to use an alternative arrangement such as a multimode pigtail with a v-groove or mechanical splice.

CAUTION! Do not scratch the detector lens with the glass fiber end when using bare fiber adaptors, or the instrument will be permanently damaged.

How to clean the optical connectors

Always clean the mating connector tip and ferrule before mating, using approved materials.

CAUTION! Do not attempt to clean an optical interface with anything hard that could scratch glass, or permanent instrument damage may occur.

The glass power meter interface does not make contact with the inserted connector - there is a slight air gap. Therefore it will not wear, and only needs occasional cleaning.

To clean, first remove the connector adaptor to access the glass interface, then use a soft brush, alcohol, air can or sticky material such as 'Blu tac' to remove dirt.

POWER METER OPERATION

To switch on KI 9600 Power Meter for permanent operation, press and hold [POWER] during turn-on. The display will briefly show firmware version. 'Perm' on the display indicates that the unit will stay on permanently. Should the instrument fail to turn on, the microprocessor may need re-booting. To do this, remove the batteries for at least 40 seconds. After turn-on, the instrument performs a self-calibration sequence, and then displays absolute power in dBm at the previously set wavelength. If 'HI' or 'LO' are displayed, the input is out of range.

The mode of operation described below is typically used to measure Tx / Rx absolute power levels and to perform continuity testing with the tone detector. To measure the operational power level in a fiber optic system, the meter is used in dBm or linear modes. To measure optical loss or attenuation, the power meter is used in dB mode, and the source power is taken as a reference.

WARNING! Observe optical safety procedures relevant to the power levels being measured

- During instrument turn on:
 - to view all display segments, press and hold down [$\lambda \blacktriangleleft$]
 - to display firmware version, press and hold down [HOLD]
 - to turn buzzer on/off, press and hold down [$\blacktriangleright \lambda$]

- To scroll wavelength, press [$\lambda \blacktriangleleft$] or [$\blacktriangleright \lambda$]. The display shows the nominal wavelength in nm on the top right of the display.
- To toggle logarithmic / relative/ linear display modes, press [dB/dBm/mW]. The display will show 'dB' or 'dBm' or 'nW'.
- To stop / start display update, press [Hold]. The symbol will flash when the display is on hold.
- To set reference, press and hold [Set Ref] for more than 3 sec.
- When in reference mode, the reference value is displayed on the left hand side of the display.
- To display max min recorded power or to re-set this function, press and hold [Max Min].
- If the meter detects a test tone higher than 200 Hz, the display will show the actual measured modulation frequency in kHz.
- Maximum displayed frequency is 2500 Hz.
- If a standard tone is detected (eg 270 Hz, 1 KHz, 2 KHz), a buzzer will sound. This is useful for fiber identification and signalling. The meter can also be used to check the actual modulation frequency of test sources.

CARE OF YOUR INSTRUMENT

- Follow the directions in this manual on optical connector care.
- Use only high quality sealed alkaline or NiMH batteries.
- During prolonged storage, remove batteries to eliminate the possibility of acid leakage.
- During storage and transport, keep the instrument in its carry case to protect against crushing, vibration, dust and moisture.
- The instrument is resistant to normal dust and moisture, however it is not waterproof. If moisture gets into the instrument, dry it out carefully before using it again.
- Where possible, keep instrument away from direct sunlight.
- Clean the instrument case using alcohol or other non solvent cleaning agents. Acetone or other active solvents may damage the case.
- The instrument housing is made of tough polycarbonate material with impact absorbing rubberised sides and corner features and is therefore drop resistant.
- Input optical power must not exceed the damage level specified for each detector type.

ACCURACY CONSIDERATIONS

All Measurements

Keep optical connectors clean and in good condition. APC connectors will generally provide improved power stability on single mode systems.

To reduce the effect of polarisation changes, test leads should be neat, coiled and physically stable.

In multimode systems, modal noise and general uncertainty are much worse than in single mode systems and optimum measurement repeatability will be obtained by use of a mandrel wrap.

Wavelength uncertainty affects power meter calibration. This is significant with a Ge detector in the 1550 nm band (eg > 1560 nm in cold weather).

It is recommended that power meter with Ge detector should not be used for measurements above 1580 nm.

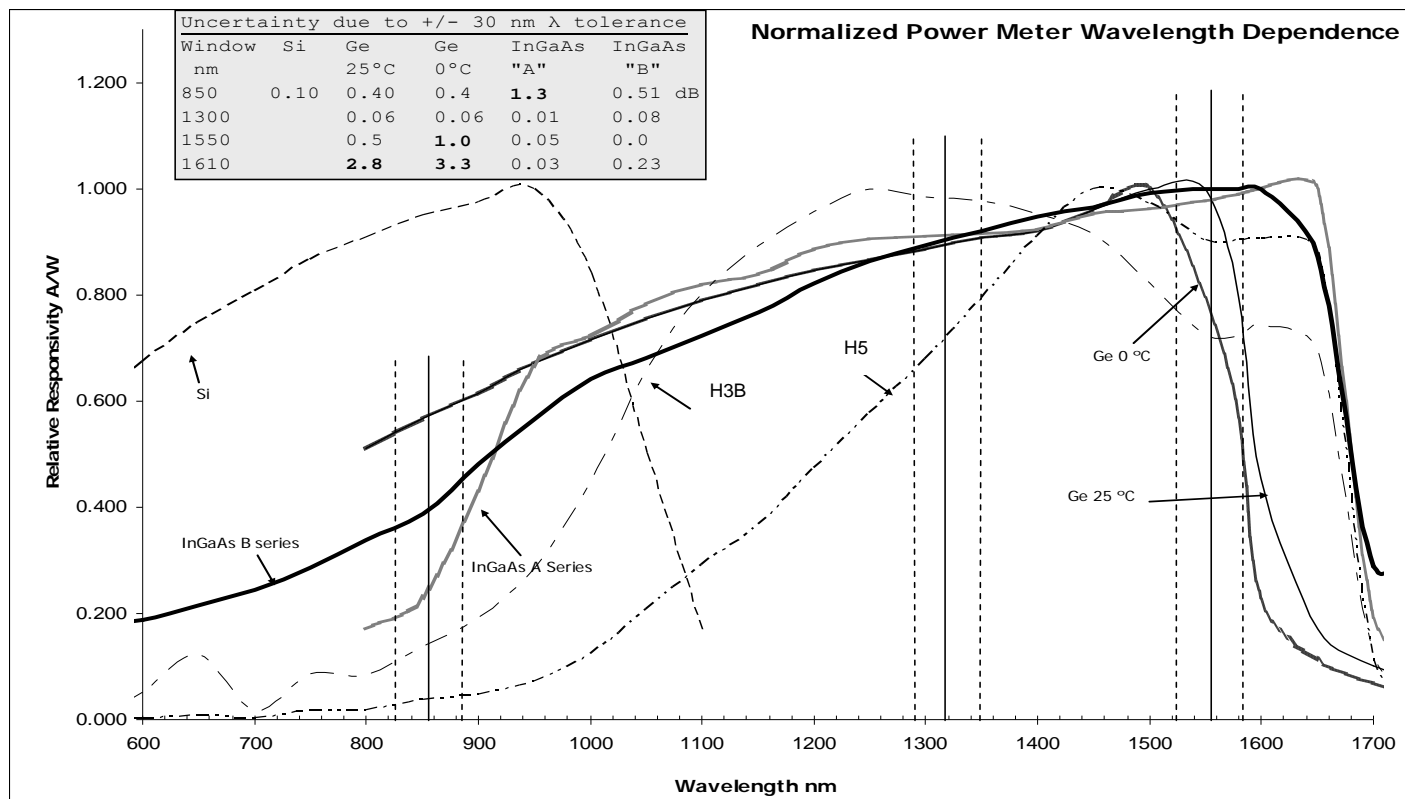
Wavelength sensitivity determines various detector applications: Ge detectors are used for 850 / 1300 nm multimode measurements and

InGaAs detectors are used for general purpose measurements. This issue affects absolute power measurements and may not significantly affect attenuation measurements where the meter was referenced to the same light source.

Ge power meters are inherently non-linear by approximately 0.04 dB and also have temperature dependent calibration drift at 1300 nm of 0.03 dB per 10 °C.

In KI9600 Series instruments, InGaAs B Series detectors are used.

ACCURACY CONSIDERATIONS



DEFINITION OF TERMS

Power Range: the range of input powers for which the instrument can be used.

Maximum Input Power: the input power not to be exceeded to avoid destroying the instrument.

Uncertainty at Reference Conditions: the uncertainty for the specified set of reference conditions, which includes all uncertainties in the calibration chain, from the national laboratory to the test meter (connectors and test leads must be absolutely clean and undamaged). Reference conditions are the conditions during the responsivity calibration.

Total Uncertainty: the uncertainty for a specified set of operating conditions which includes noise and drift (connectors and test leads must be absolutely clean and undamaged).

SPECIFICATIONS

General Specifications:

Size:	124 x 81 x 25 mm, 4.9" x 3.2" x 1"
Weight:	150 gm, 0.3 lb <u>XL Series</u> 160 gm, 0.4 lb <u>Shipping</u> 0.5 Kg, 1.1 lb.
Operating/ Storage:	-15 to 55 °C / -25 to 70 °C.
Power:	2 alkaline 'AAA' cells
Case:	Polycarbonate, 2.5 meter drop tested.
Calibration:	Performed without opening instrument. Recommended calibration cycle: 3 years.
Display:	4 digit high contrast LCD
Resolution:	Log: 0.01dB Linear: 3 digits (100-999) or 0.01 nW
Tone detection:	200~ 2500 Hz $\pm 2\%$.

SPECIFICATIONS

KI 9600 Series Optical Power Meter

Detector type	Response λ nm	Damage level dBm	Calibration λ nm	Power range dBm	Mid range linearity ¹ dB	Calibration Accuracy ² %	Polarisation Sensitivity dB	Total Uncertainty ³ dB	λ Sensitivity ⁵ \pm 30 nm dB
Ge	600 – 1650	+15	660, 850 1300,1310,1390, 1490,1550,1610,1625	+10 ~ -80	0.04	2 %	< 0.005	0.5	0.04
InGaAs	600 – 1700	+15	660, 850 1300, 1310, 1390, 1490, 1550, 1610, 1625	+5 ~ -80	0.02	2 %	< 0.005	0.3	0.03
H3B (InGaAs)	800 – 1700	+30 ⁴	850 1300, 1310, 1390, 1490, 1550,1590, 1610, 1625	+27 ~ -58	0.02	2 %	< 0.005	0.3	0.03
H5 (InGaAs)	800 – 1700	+25	850 1300, 1310, 1390, 1490, 1550,1590, 1610, 1625	+15 ~ -70	0.02	2 %	< 0.005	0.3	0.03
					<i>typical</i>		<i>typical</i>	<i>max</i>	<i>typical</i>

KI9600WS01-Ge

Calibrated wavelengths(nm)	1550
Measurement of 1550nm	
Pass band	1530 to 1625
Isolation of 1490nm band	> 25dB
Isolation of 1310nm band	> 30dB
Max permitted input level	+15dBm
Measurement range	+10 to -70 dBm
Measurement accuracy	
Mid range linearity ¹	0.04 dB
Polarization sensitivity	< 0.005 dB
Total Uncertainty ³	0.5 dB

Note 1: Mid range linearity excludes top 3 dB and bottom 10 dB of range.

Note 2: Calibration condition: non coherent light, -35 \pm 5 dBm, 23 \pm 1 °C, \pm 1 nm, 10 \pm 3 nm FWHM, PC ceramic connector, 100 μ m fiber

Note 3: Includes contributions due to: varying optical connector types, calibration uncertainty, full temperature, dynamic range and fiber core diameter up to 200 μ m.

Note 4: H3B can sustain the damage level for 2 minutes.

Note 5: At calibration wavelengths in bold type

SPECIFICATIONS

KI 9600XL Series Large Area Optical Power Meter

Detector type	Response λ nm	Damage level dBm	Calibration λ nm	Power range dBm	Mid range linearity ¹ dB	Calibration Accuracy ² %	Polarisation Sensitivity dB	Total Uncertainty ³ dB	λ Sensitivity ⁵ \pm 30 nm dB
5mm Ge	600 – 1650	+15	780, 850 1300, 1310, 1490, 1550, 1625	+10 ~ -55 +10 ~ -60	0.04	2 %	< 0.005	0.5	0.04
3.6mm Si	350 – 1100	+10	470, 520, 635, 650, 660, 780, 850, 980	+5 ~ -60	0.02	2 %	< 0.005	0.3	0.03
					<i>typical</i>		<i>typical</i>	<i>max</i>	<i>typical</i>

ORDERING INFORMATION

KI 9600 Series Optical Power Meter:

Ge Power Meter	KI9600B-Ge-MP
InGaAs Power Meter	KI9600B-InGaAs-MP
H3B (InGaAs) Power Meter	KI9600B-H3B-MP
H5 (InGaAs) Power Meter	KI9600B-H5-MP
1550 nm Ge Power Meter	KI9600WS01-Ge

Standard Accessories:

ST, SC, FC connector adaptors, User manual on CD, NATA (ILAC) traceable calibration certificate, carry strap, soft carry pouch.

Optical Connectors:

The power meter works with both PC and APC connectors.

Optional Interchangeable Connector Adaptors:

Description	P/N	Description	P/N
D4	OPT055	LC/F3000	OPT072
E2000/LSH, blue	OPT060	MU	OPT080
E2000/LSH, green	OPT060G	Universal 2.5mm	OPT081
LSA/DIN 47256 blue	OPT071	SMA 905/906	OPT082

To order KI9600XL Series Large Area Optical Power Meter, please specify instrument and at least one optional interchangeable connector adaptor.

KI 9600XL Series Large Area Optical Power Meter:

Large Area Ge Power Meter	KI9600XL-Ge-MP
Large Area Si Power Meter	KI9600XL-Si-MP

Standard Accessories:

User manual on CD, NATA (ILAC) traceable calibration certificate, carry strap, soft carry pouch.

Optional Interchangeable Connector Adaptors:

Description	P/N	Description	P/N
ST	OPT202	FC	OPT204
SC	OPT201	LSA/DIN	OPT207
E2000/LSH	OPT220	SMA905/906	OPT203
D4	OPT206	EC	OPT221
MU	OPT222	MTRJ	OPT223
Biconic	OPT205	Diamond 3.5mm	OPT208
Universal 1.25mm	OPT224	Universal 2.5mm	OPT225

CALIBRATION AND MAINTENANCE

There are no internal user adjustments. Calibration is performed without opening the instrument.

Before commencing calibration:

- Clean all optical connectors very carefully.
- Ensure that all devices have been at a stable room temperature for over an hour, and that the light source is fully warmed up at the wavelength to be calibrated.
- Ensure that all installed batteries are in good working condition.
- When calibration is complete, remove the calibration shunt, and place an anti-tamper label over the hole. Do not forget to update your calibration records and to schedule the next calibration service.

CALIBRATION AND MAINTENANCE

Calibration is a transfer process. It is performed by setting up a light source at a stable, but non-critical power level between 0 and -30 dBm, and adjusting the meter reading to the same value as that shown by a reference meter.

Required are laser and LED light sources with accurate, calibrated wavelengths and good power stability, a power meter with appropriate calibrated wavelengths, single mode and multimode test leads, an anti-tamper label and 2.54 mm (0.1") pitch programming shunt. Check the calibration certificates on your reference equipment to ensure current validity.

To enable calibration mode, remove belt clip and anti-tamper label at the back of the instrument, then insert a 2.54 mm (0.1") pitch programming shunt across pins. Manipulation of the shunt is easier with needle nose pliers.



Figure1. Calibration opening, positioned at the back of the instrument underneath belt clip and covered by anti-tamper label.

Known calibration constants can be re-entered directly without using other equipment. This is useful in case old calibration constants are to be put back.

Record the existing calibration offsets, re-enter or adjust known offsets at this point or calibrate the meter at the selected wavelength as follows:

- Insert the 2.54 mm (0.1") pitch programming shunt across pins. This will put the instrument into calibration mode and instrument will display 'CAL'.
- Press [$\lambda \leftarrow$] or [$\rightarrow \lambda$] to set the wavelength to be calibrated.
- Record the light source power measured by reference power meter.
- Transfer this power level to the meter to be calibrated:

Press [HOLD] to display power reading. Press [HOLD] again to display current offsets. Record the current (old) value. Press [HOLD] again, then [$\lambda \leftarrow$] or [$\rightarrow \lambda$] to adjust reading to match the noted reference reading. Press [HOLD] again to display current offsets. Record the current (new) value.

Note: Toggling the [HOLD] button will show the power reading and the offsets on the display.

- To set the new value, press and hold [dB/dBm/ mW] until the instrument beeps. The display will show 'CAL' and calibrated wavelength.
- Repeat above process for other wavelengths.

CALIBRATION AND MAINTENANCE

Opening the Instrument:

CAUTION!

- Do not open unless warranty has expired and you are authorised to do so. Opening the unit will invalidate any warranty claim.
- This unit contains static sensitive devices. Anti-static handling procedures should be observed at all times when handling internal circuits.
- There are no internal user adjustments. All calibration is performed without opening the instrument. The optical sensor / connector assembly is not user serviceable.

Procedure:

- Open battery compartment and remove the batteries. Pull open the optical connector cover.
- Place the instrument face down on a soft mat, remove belt clip and undo the screws in the rear housing. The instrument can now be gently pulled apart.
- Further disassembly from this stage should be easily apparent to a technician.
- Re-assembly is the reverse of the previous procedure.

General electrical parameters are as follows:

V_{ss} to GND = 3V3, battery power down current about 0.1 mA,
active power meter current about 5 mA.

PERFORMANCE VERIFICATION TESTS

The test procedures described in this section are for performance verification of a KI9600B-InGaAs Power Meter.

Due to various possible instrument configurations, it is not possible to give detailed test procedures for all options in this manual, so some parameters may need adjusting to the appropriate specifications.

Required Equipment: this is the required equipment for the performance tests listed. Any equipment that satisfies the critical specifications of the equipment given in the table may be substituted for the recommended models.

Test Record: results of the performance test may be tabulated on a photocopy of the Test Record provided at the end of the test procedure. It is recommended that you fill out the Test Record and refer to it while doing the test. Alternatively, a soft copy of this manual may be obtained from our web site.

Test Failure: if the equipment under test fails any performance test, return the instrument to the nearest Sales/Service Office for repair.

Instrument Specification: specifications are the performance characteristics of the instrument that are certified, and are the limits against which the equipment under test can be tested.

Any changes in the specifications due to manufacturing changes, design, or traceability to NATA, will be covered in a manual change supplement, or revised manual. Such specifications supersede any previously published.

General Instructions

Perform each step in the order given, using the corresponding test equipment. Use Tables 1 ~ 3 to record general test details.

The SMF / MMF test lead fiber type and PC / APC connector polish must be matched to the instrument type.

Ensure that all optical connections are dry and clean. **DO NOT USE INDEX MATCHING OIL.** For cleaning, use the cleaning instructions given in the section 'Optical Connector'.

Make sure that all patch cords are fixed to the table to avoid movements during measurements.

Ensure that the ambient conditions are in the following ranges:

Temperature: 21 ± 3 °C

Relative humidity: 45 to 75 %

PERFORMANCE VERIFICATION TESTS

Instrument / Accessory	Recommended Model	Required Characteristics	Alternative Model
Optical Light Source	KI3822B		KI7400, KI7800, KI7300A
Optical Attenuator	KI7011B		KI7010A

Table 1. Required Equipment for KI 9600 Performance Verification Test.

PERFORMANCE VERIFICATION TEST

Accuracy Test

1. Connect the equipment as shown in Figure 2:

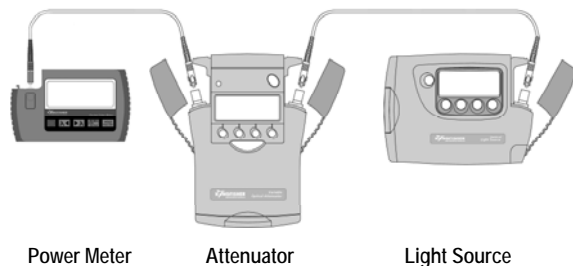


Figure 2. Test set-up for KI 9600 Power Meter Accuracy Test

2. Switch on all three instruments.
3. Set all instruments to 1310 nm.

4. Change the attenuation of attenuator until the optical power meter displays -10.00 dBm. Note the attenuator setting in setting 1 of Table 4.

If the laser source is not powerful enough to give 0.00 dBm, set the attenuator to 2.5 dB and correct the appropriate values in the test report.

Repeat the above for reference power meter readings of -20dBm, -30 dBm, -40 dBm and -50 dBm (settings 2 ~ 5).

5. Measure the DUT:
Re-connect the attenuator output cable to the DUT.
Set the attenuator to its value for setting 1.
Note the displayed power level of the DUT in the test record.
Repeat the above for attenuator settings 2 ~ 5.
6. Repeat the Power Meter Accuracy Test at 1550 nm.

PERFORMANCE VERIFICATION TEST

Model:	Date:
Serial No.:	Ambient Temperature: °C
Options:	Relative Humidity: %
Firmware Revision:	Line Frequency: Hz
Test Facility:	Customer:
Performed by:	Report No:
Special Notes:	

Table 2. General Test Record for KI 9600

PERFORMANCE VERIFICATION TEST

Description		Model	Trace No.	Calibration Due Date
1.	Optical Light Source			
2.	Optical Power Meter			
3.	Optical Attenuator			
4.				
5.				
6.				
7.				
8.				
9.				
10.				

Accessories

Single mode Fiber
Connector Adaptors

Table 3. Equipment Record for KI 9600 Performance Verification Test.

PERFORMANCE VERIFICATION TEST

Model: _____ Report No: _____ Date: _____

Accuracy Test					
	Test Wavelength = _____				
Setting Number	Power meter Reference value	Attenuator Setting	Minimum Specification (-0.3 dB of Reference)	DUT Measurement results	Maximum Specification (+0.3 dB of Reference.)
1.	(~ 10.00 dBm)	_____ dB	(~ 10.30 dBm)	_____ dBm	(~ 9.70 dBm)
2.	(~ 20.00 dBm)	_____ dB	(~ 20.30 dBm)	_____ dBm	(~ 19.70 dBm)
3.	(~ 30.00 dBm)	_____ dB	(~ 30.30 dBm)	_____ dBm	(~ 29.70 dBm)
4.	(~ 40.00 dBm)	_____ dB	(~ 40.30 dBm)	_____ dBm	(~ 39.70 dBm)
5.	(~ 50.00 dBm)	_____ dB	(~ 50.30 dBm)	_____ dBm	(~ 49.70 dBm)
		_____		_____	
		Measurement Uncertainty		_____ dB	

Note 1: Minimum/Maximum Specification is for the KI 9600-InGaAs. For the KI 9600-Ge, increase/reduce by ± 0.2 dB. For the KI 9600-H3B, increase/reduce by ± 0.1 dB.

Table 4. Accuracy Test Record for KI 9600 Series Optical Power Meter

QUICK REFERENCE GUIDE – KI 9600 Series Optical Power Meter

- To remove interchangeable connector adaptor, press the button on the front of the instrument and pull off adaptor.
- To defeat auto power-off, press and hold [POWER] for 3 seconds during turn on. 'Perm' is displayed on the top right of the LCD.
- Low battery is indicated with a battery symbol.
- During instrument turn on:
 - to view all display segments, press and hold [$\lambda \blacktriangleleft$]
 - to turn buzzer on/off, press and hold [$\blacktriangleright \lambda$]
 - to display firmware version, press [HOLD]
- To scroll wavelength, press [$\lambda \blacktriangleleft$] or [$\blacktriangleright \lambda$].
- To switch between logarithmic/relative/linear display modes, press [dB/dBm/mW].
- To stop / start display update, press [HOLD].
- To set reference, press and hold [Set Ref] for more than 3 sec.
- To display max / min recorded power or to re-set this function, press and hold [Max Min].
- If the meter detects a test tone higher than 200 Hz, the display will show the actual measured modulation frequency in kHz.
- If a standard tone is detected (e.g. 270 Hz, 1 KHz, 2 KHz), a buzzer will sound.

DISCLAIMER & WARRANTY

Information in this manual is given in good faith for the benefit of the user. It cannot be used as the basis for claims against Kingfisher International or its representatives, if accidental damage or inconvenience results from use or attempted repair of the equipment.



Kingfisher International products are guaranteed against defective components and workmanship for a period of 3 years from the date of delivery, unless specifically stated in the original purchase contract or agreement. This warranty excludes optical connectors or incorrect use. Opening the instrument will invalidate the warranty. Liability is limited solely to repair of the equipment.

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