KI7300 / 7700 Series
Loss Test Set

KI7400 / 7800 Series
Light Source

KI7600 Series
Power Meter

OPERATION & MAINTENANCE GUIDE

KINGFISHER INTERNATIONAL

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: Optical Loss Test Set, Light Source, Power Meter
Model Number: KI7300/7700 Series, KI7400/7800 Series, KI7600 Series
Product Options: *This declaration covers all options of the above product(s)*

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

Optical Loss Test Set and Power Meter conform to:

IEC 61315:2005 Calibration of fibre-optic power meters

EMC	**Limit**
IEC 61326:2002 / EN 61326-1:1997+A1:1998+A2:2001+A3:2003	
IEC CISPR 11: 2004/ EN 55011:1998+A1:1999	Limits applicable to Group 1 Class B equipment
IEC CISPR 16-1:1999	Limits applicable to Class B equipment
IEC CISPR 16-2:1999	Limits applicable to Class B equipment
IEC 61000-3-2: 2005/EN 61000-3-2:2006	
IEN 61000-3-3:2002/EN 61000-3-3:1995	
IEC 61000-4-2:2001 / EN 61000-4-2:1995+A1:1998+A2:2001	4kV CD, 8kV AD
IEC 61000-4-3:2002/ EN 61000-4-3:2002	3V/m, 80-1000MHz
IEC 61000-4-4:2004/EN 61000-4-4:2004	1kV signal lines, 2kV power lines
IEC 61000-4-5:2005/EN 61000-4-5:2006	1kV line-line, 2kV line-ground
IEC 61000-4-6:2004/EN 61000-4-6:1996+A1:2001	3V, 0.15-80 MHz
IEC 61000-4-11:2004/EN 61000-4-11:2004	0.5 cycle/100%/each polarity
ICES-001: 2006 (Canada)	
CFR 47 FCC Part 15, Subpart B (Class B) (USA)	
FCC registration number: 90891	

Safety

Laser/LED products conform to:

IEC 60825-1:2001 Safety of laser products-Equipment classification, requirements and user's guide

IEC 60825-2:2005 Safety of laser products-Safety of optical fibre communication systems (OFCS)

CFR 21 part 1040.10 (USA) Performance standards for light-emitting products- Laser products

Supplemental Information:

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

2007-September -14
Date

Bruce Robertson
Name

Technical Director
Title

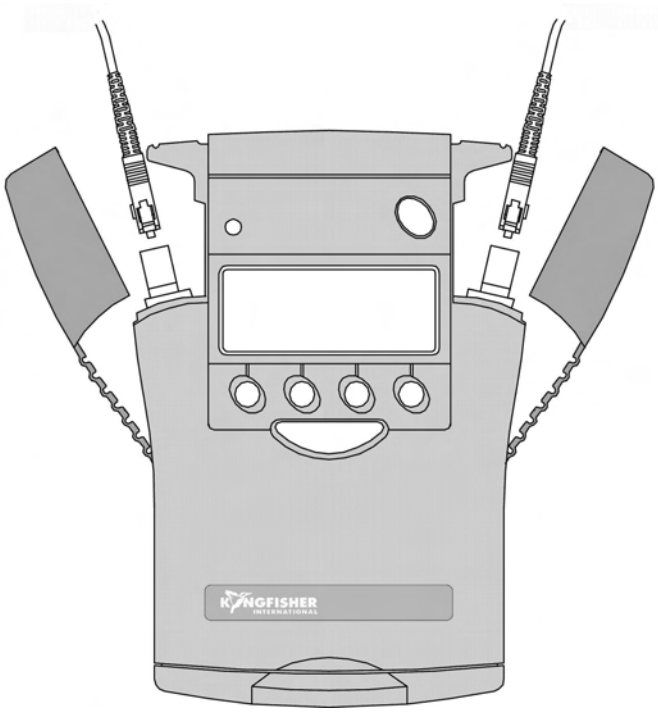
For further information, please contact your local Kingfisher International sales office, agent or distributor.

Revision: E

Issue Date: 2007- September -17

OPERATION MANUAL

KI7400C/7800C Series Optical Light Source
KI7600C Series Optical Power Meter
KI7300C/7700C Series Optical Loss Test Set



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

CE

6th Edition, Feb 2011

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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 us for service or calibration, please download and complete the **Return Material Authorization Form** located on the **Support** page on our web site.

To avoid delays and minimise disruption for our customers, we offer 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 KI7000C Series Optical Power Meter, Optical Light Source and Optical Loss Test Set are used to test all types of fiber optic systems, offering exceptional level of convenience and productivity. Compact, robust, reliable and simple to operate, this is the ideal equipment for field or laboratory use by installers, technicians and engineers.

Typical applications:

- Attenuation testing
- System power testing
- Continuity testing with the test tone features
- Quality assurance and acceptance testing
- Telecom construction and maintenance, CATV, LAN and R&D applications
- Full CWDM, DWDM and out of band testing capability

All instruments are compatible with other equipment with Autotest mode. All series have options for high performance single mode fiber testing, while KI7800C Series Optical Light Source and KI7700C Series Optical Loss Test Set have options for multimode.

A convenient menu-driven interface guides the user through operational sequences with hidden keypad access to advanced functions.

The interchangeable optical connectors are protected by a snap on cover and are easily disassembled for cleaning. A wide variety of connector styles are available as an option.

The design of the instrument includes shock absorbing corners for drop protection and tough polycarbonate housing. The latest materials and methods have been used to produce an elegant, yet rugged instrument.

These instruments feature very long battery life of 360 hours for the meter, and 190 hours for the source. Alternatively, instruments can be used with optional external power supply OPT103B or powered via USB cable.

Automated testing using external PC software

KITS™ reporting software allows real-time instrument control and data download, and is easily customised to suit most languages and reporting requirements. Real time display, data logging and label printing functions are included. KITS™ enables merging of test results from multiple instruments and supports bi-directional testing for one way equipment using successive measurements.

Optical Power Meter:

Superior measurement confidence is achieved with a unique Total Uncertainty Specification, which covers the full temperature, measurement and connector range.

Warm up period, range-changing delays and user dark current zeroing are eliminated.

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 can be performed using the max/min recording function. The display can show dBm, dB and linear units, and can be put on hold for convenient data recording.

Standard power meters work with fiber core diameter up to 200 micron, with both PC and APC polish connectors.

Various detector options include Indium Gallium Arsenide (InGaAs), Germanium (Ge), Silicon (Si) and its attenuated versions.

The InGaAs detector is the most common detector for general use.

Power meter calibration options are available from 635 nm to 1650 nm, which cover all popular application wavelengths, including CWDM calibrations from 1270 nm to 1610 nm in 20 nm increments. Power range is from +27dBm to -70dBm.

The KI7601C power meter range includes a 635 nm visible laser for extra convenience when locating faults.

Optical Light Source:

Multi- wavelength sources have switchable wavelengths through one port, which makes operation faster.

Laser sources at 1310/1390/1490/1550/1610/1625 are used for testing single mode fiber systems.

LED sources at 850 / 1300 nm are used for testing multimode fiber systems.

The 1300 nm LED can also perform short distance single mode testing. Light source features re-connection repeatability of 0.1dB. Combined with their excellent stability, this provides more accurate measurement results.

Optical Loss Test Set:

These instruments incorporate traceable Optical Power Meter and multi wavelength Optical Light Source in one convenient package, thus reducing operational and equipment inventory costs for larger work groups.

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.

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 malfunctioning instrument to an authorised Service Centre for repair and calibration.

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 & 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 units from temperature extremes that may cause condensation within it.

Safety

Power Meter 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.

Line Power Requirements

This equipment operates at line power, when applied to the optional external power supply OPT103B.

LIGHT SOURCE SAFETY SUMMARY

Laser and LED Safety Information

Laser	Fabry-Perot or DFB semiconductor laser
Wavelength	Part number specific
LED	Surface emitting semiconductor LED
Wavelength	Part number specific
Max CW output power[1]	1mW
Beam waist diameter	9 µm
Numerical aperture	0.1
Laser Class according to	
IEC 60825-1 (2001) – International	
21 CFR 1040.10 (1995) – USA	
635 nm	Class 2
850-1625 nm	Class 1
Maximum permissible CW output power[2]	
IEC 60825-1 (2001) – International	
635nm, class 2	1mW
1310nm, class 1	15.6mW
1550nm, class 1	10 mW
21 CFR 1040.10 (1995) – USA	
635nm, class 2	1mW
1310nm, class 1	2mW
1550nm, class 1	8.1mW

Note 1: Maximum CW output power is defined as the highest possible optical power that the source can produce at its output connector. Refer to specification sheet for actual operating power

Note 2: Maximum permissible CW output power is the highest optical power that is permitted within the appropriate laser class. Refer to specification sheet for actual operating power

In the USA, laser / LED sources specified by this data sheet are classified as Class 1 and 2 according to 21 CFR 1040.10 (1995).

Internationally, the same laser sources are classified as Class 1 and 2 according to IEC 60825-1 (2001).

WARNING!

Optical power levels in fiber optic systems can cause permanent eye injury and damage to eyesight.

Never look into the end of an optical cable or connector, which might be attached to an active source.

Do not enable a laser when there is no fiber attached to the optical output connector.

Optical magnifying instruments (eg microscope) increase eye hazard.

Disconnect the source before using an optical magnifier.

The laser module has a built-in safety circuitry which will disable the optical output in the case of a fault condition, however, this cannot be guaranteed. An equipment assurance program is recommended to check for safe laser operation.

BATTERY AND EXTERNAL POWER

These instruments are powered by two 1.5 V dry Alkaline 'C' size batteries.

About 30 % capacity is obtained when using two 1.5V 'AA' alkaline batteries and supplied 'AA' to 'C' size battery adaptors or 50% capacity when using two 1.2 V rechargeable NiMH 'C' size batteries.

Instrument Function	Battery run time in hours:
Optical Power Meter	360
Optical Light Source	190 in Autotest

When the batteries are low, the low-battery indicator is shown on the display. At this stage, there is approximately enough energy for another 10 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 base of the instrument, remove the batteries, insert new ones (check polarity) and close the cover again.

For operation of the instrument by external power, use AC adaptor OPT103B or connect to computer via USB cable.

Suitable external power packs are easily available and must meet the following requirements:

- Comply with safety regulations and rated for local mains supply voltage
- Regulated or unregulated DC output 6-12V at 300mA max
- Connection polarity:+ ve pin

Use of the external power supply disconnects the batteries as a safety precaution, since accidental charging of alkaline cells is hazardous. Rechargeable batteries must be removed for charging by an external charger.

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! Some batteries contain toxic heavy metals, so please dispose of them by returning to a re-cycling centre. Batteries purchased from Kingfisher agents can be returned to them for appropriate disposal.

OPTICAL CONNECTOR

To access the optical connectors, grasp a top corner(s) of the instrument, and pull off the cover(s).

Each optical port is mounted on a swivel, which allows the connector to be angled outwards for accessibility, and then pushed back and covered with the snap cover to provide dirt and drop protection.

Different styles of standard and optional connector adaptors can be easily fitted by the user.

The supplied standard connector adaptors have ceramic sleeves to avoid connector metal dust contamination.

CAUTION! Do not use damaged or incompatible connector adaptors.

When not in use, keep the test ports and connectors covered. To minimize connectors wear, instrument can be stored without removing the test leads. Never touch connector tips with your fingers, since body oils and dirt can impair its performance.

WARNING! Remove batteries before using a microscope to inspect instrument connectors.

Power Meter:

This port can be used with both PC and APC connector styles.

Bare fiber adaptors must achieve fiber eccentricity of ± 100 microns, and an 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 glass fiber end when using bare fiber adaptors, or the instrument will be permanently damaged

Light Source:

A Light Source is either PC or APC connector-specific. This is determined when ordering the instrument, and can only be changed at the factory.

CAUTION! The use of bare fiber adaptors with the source is not recommended as permanent instrument damage will occur, and very unstable measurements are likely.

OPTICAL CONNECTOR

How to clean the optical connectors

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

CAUTION! Never use abrasive cleaners or permanent connectors damage may occur.

Power Meter:

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.

First remove interchangeable connector adaptor, then use a soft brush, alcohol, air can or 'Blu Tac' to clean glass interface.

Light Source:

WARNING! Disable source when cleaning optical interfaces.

To clean the interface without removing the adaptor, use a "stick" style connector cleaner. This cleans both the adaptor and end face in one operation.

Alternatively, first remove the interchangeable adaptor to access the glass interface. Then blow away any dust or dirt with compressed air. If this is not sufficient, then clean the interface by rubbing a lint-free lens cloth over the surface using small circular movements.

Pull off instrument connector cover(s). To install a connector 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 the release button on the back 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.

Install the batteries, or plug in external power into the socket at the top of the instrument or connect instrument to the computer.

To switch on the instrument for permanent operation, press and hold [POWER] for 3 seconds until 'Perm' is displayed. The display will briefly show firmware version. To view all display segments during instrument turn-on, hold down the first button on the left at the bottom of the display. To turn the instrument off, press [POWER] again for 2 seconds. If the battery is low, this will be indicated with a battery symbol on the display.

Should the instrument fail to turn on, the microprocessor may need re-booting. To do this, remove the batteries and any other external power for at least 40 seconds.

Note that hidden keypad is accessed by lifting up the hinged display cover.

To backlight the display temporarily, press light button ☼ (second on the right, bottom row on the hidden keypad). To illuminate continuously, press and hold down light button for 3 seconds.
To disable or enable a buzzer, press and hold down [↱] on hidden keypad for 3 seconds.

To add the carry strap, slip the end of the strap through the slit on the curved section at the back of the instrument, and secure the buckle.

Power Meter:

After turn-on, Power Meter will perform a self-calibration sequence, and then display absolute power in dBm at the previously set wavelength. If 'HI' or 'LO' are displayed, the input is out of range.

The Power Meter requires no warm up, and no user adjustment of dark current to achieve its specified performance.

Light Source:

After instrument turn-on, press [Source] to enable Light Source.

On the KI7700C and KI7800C Series instruments, the light source requires a warm up period at the set wavelength for 15 min to achieve specified stability.

For KI7300C and KI7400C series instruments, the light source achieves specified stability without any warm up period.

AUTOTEST OVERVIEW

Autotest performs automated loss measurement and wavelength detection by data exchange between the Light source and Optical Power meter.

Autotest remains synchronised for about 8 seconds after disconnection, so the user can change optical connections without re-starting Autotest each time thus achieving productivity gains. Autotest reduces source warm up drift and battery consumption compared to manual operation.

To realise the full benefit of Autotest, please use the KITS™ software to achieve real-time data acquisition to facilitate acceptance testing and reporting in the field. Free KITS™ software available on our website includes a comprehensive on-line manual with full operating sequences.

Instruments compatibility

Any Kingfisher equipment featuring Autotest is compatible, eg. any Autotest source / loss test set can be used with any Autotest meter for one direction loss testing as long as both instruments have matching wavelengths.

Initiating Autotest operation

Connect Light source to the Power meter with test lead and turn on the instruments. On Light source, press [AUTOTEST]. The meter automatically sets to the correct wavelength and displays the absolute power in dBm, with the operating wavelength shown at the top right.

In Autotest, the display rotates through all source wavelengths. To lock a display, press – side on [-/+]. In this mode, “nm” will be flashing to show that the selected wavelength is locked. The nominal source power transmitted from the source is on the left hand side of the power meter display. Pressing [Abs/Rel] will make meter to display measured optical power in dB R with the reference value shown on the left side.

To exit Autotest, press [MENU] on Light source or disconnect patch lead for more than 8 seconds.

Wavelength selection mode

If the required regular testing uses fewer wavelengths than the Light source has available, then it may be convenient to reduce the number of active Autotest wavelengths. For example, instead of the source rotating through 1310 / 1490 / 1550 / 1610 nm, it can be set to test at 1310/1550 nm only.

To switch wavelengths on/off:

- press [SOURCE] and then [-/+] to select wavelength.
- to check whether selected wavelength is switched on/off, press right hand button below the screen, its status will be indicated as ‘IN’ or ‘OUT’.
- on hidden keypad, press [↱] till ‘Shift’ comes on LCD, then right hand button below the screen to change status of selected wavelength.

Autotest operates only with wavelengths selected as ‘IN’.
Selected settings will be retained at the next turn on.

LOCAL AND REMOTE REFERENCE METHODS

Local and Remote Reference methods.

Instruments should be referenced prior to making loss measurements, both local and remote reference methods are supported.

The remote reference method is useful for long distance testing. Although this method has slightly lower accuracy compared to local referencing, it is quite adequate for general link loss testing.

The local reference method provides high accuracy and is very efficient for short distance loss testing, where both ends of the system can be accessed readily by one meter, eg. patch leads testing.

Note: when setting the reference value, use test leads with a similar fiber type to the system under test. This is particularly important for multimode systems. Also, connector loss between the patch lead and source port will be added to the final loss measurement, so care should be taken to use test leads in good condition with clean connectors.

Note: the number of test leads used when taking reference is a function of test requirements

Remote Reference method

- Connect Light Source port to the Power Meter port.
- Select [POWER], [Autotest], [Abs/Rel] and [Set Ref] for 3 seconds. Meters will briefly display 'BUSY' and then 0.00 dB R.

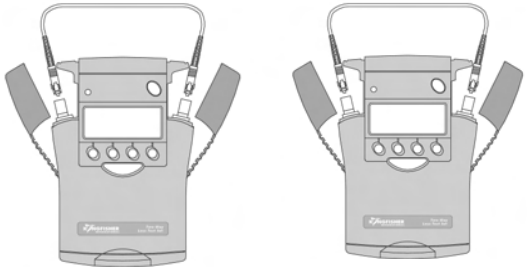


Figure 1. Remote reference set up-two Loss Test Sets

LOCAL AND REMOTE REFERENCE METHODS

Local Reference method

- Connect the Light Source to the Power Meter.
- Select [POWER] on both instruments
- On Light source, press [Auto test]
- On Power meter, press [Abs/Rel] and [Set Ref] for 3 seconds.
  Meter will briefly display 'BUSY' and then 0.00 dB R.

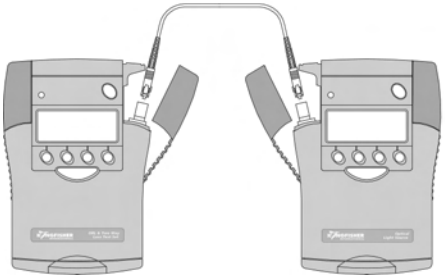


Figure 2. Local reference set up – Light Source and Power Meter

MEASURING ONE WAY LOSS IN AUTOTEST

This method is applicable for loss measurements in the set up where data communication is one way only. Testing on one fiber can be achieved with:

- single Loss Test set
- Light Source and Power Meter

Alternatively, two Loss Test Sets used for simultaneous loss testing on two fibers will ensure higher productivity.

After instruments have been referenced:

- connect the device under test (DUT) to the Light Source and Power Meter
- press [Autotest]

Power Meter will now display insertion loss in dB R at all available source wavelengths.

Simultaneous loss measurements on two fibers.

Two Loss Test Sets will support simultaneous loss testing on two fibers in the set up as below:

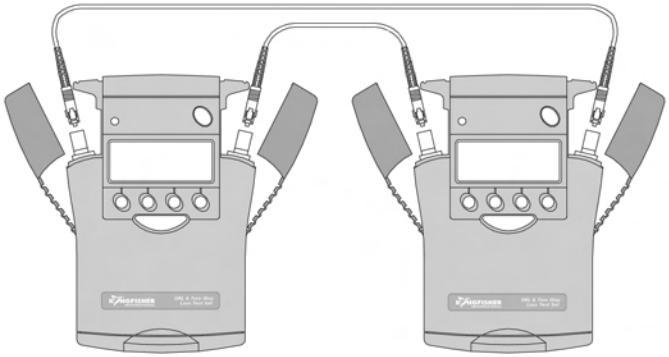


Figure 3. Set up for simultaneous loss testing on two fibers

Note: the results will be stored on both instruments and then merged later, so records management needs extra care.

POWER METER MANUAL OPERATION

This section refers to manual operation of KI7600C Series Power Meter and KI7300C/7700CSeries, Power Meter section. In the Loss Test Set, Power meter section can be operated with external light source or in combination with Light source section of the instrument to measure Tx / Rx absolute power levels, to perform continuity or loss testing.

The instrument will link Light Source and Power Meter wavelengths when both sections used in combination.

To measure the operational power level in a fiber optic system, the Power 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.

- To use Power meter section of Loss Test set as individual instrument, turn on Loss Test Set and select [Power Meter]. Power meter will be operational at the last used wavelength.
- To scroll wavelengths, press [-/+]. The display will show nominal wavelength in nm.
- To toggle absolute / relative display mode, press [Abs/Rel]. Measured optical power will be displayed in ‘dBm’ or ‘dB R’.
- To set reference, press [Abs/Rel] and then [Set Ref] for 3 seconds.
- When in relative mode, the reference value is displayed on the left hand side of the display.
- To stop / start display update, press [Hold]. The symbol will flash when the display is on hold.
- To toggle log / linear display mode, press [dB/W] on the hidden keypad.
- To display minimum and maximum recorded power for selected wavelength, press [↱] and then [Max/Min] on the hidden keypad. Press [↱], then [Max/Min] and hold for 3 seconds to re-start the recording process. This function re-sets automatically when instrument parameters are altered, making it handy data logging function for the field use.
- If the meter detects a test tone between 150 and 9999 Hz, the display will change to show the actual measured modulation frequency in 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 be used to check the actual modulation frequency of test sources (between 150 and 9999 Hz).

LIGHT SOURCE MANUAL OPERATION

This section refers to manual operation of KI7400C/7800C Series Light Source and KI7300C/7700C Series Loss Test Set, Light Source Section. After instrument turn on, the display shows 'Source off'. To turn on the source emitter, press [Source].

The source is scrolled or turned off using [-/+].

The active wavelength is shown on the right hand side of the display and source power level is at the left hand side. Press [Source], then [Mod] to display modulation frequency.

To change modulation frequency, press [Source], then [↱] and [KHz] on the hidden keypad. Use [+/-] to scroll available modulation frequencies: 0.27 KHz, 1 kHz, 2 kHz, then press [Set] to store.

Laser Output Power Adjustment

To adjust laser output power, turn the laser on, then select [↱] and [Level] on the hidden keypad.
Press [-/+] to adjust the level, then [Set] to save. This function does not operate in Autotest mode and is not available on LED sources.

Visible Laser Operation (KI7601C instruments only)

Visible laser is a useful low skill fault finding tool and is either PC or APC connector-specific. This is determined when ordering the instrument, and can only be changed at the factory.

The visible laser works equally well in single mode and multimode systems. Although red light is visible at the fiber end up to about 5km, best performance will be achieved over distances of less than 1km.

If the laser light is inserted into a faulty system, the fault point will glow red visible through 3mm patch lead jackets. Please note this should be tested before proceeding as some types of patch lead jackets absorb light. It is also generally possible to locate faulty connectors in the same way.

To switch on the visible laser, press [POWER] then [SOURCE]. To turn off the laser, press [-/+].

To improve visibility, the laser is modulated at 2Hz. To change modulation frequency, press [↱] and [KHz] on the hidden keypad. Use [+/-] to scroll available modulation frequencies: 0.27 KHz, 1 kHz, 2 kHz, then press [Set] to store.

WARNING!

The KI7601C visible laser, classified as Class 2, is eye safe as long as magnifying devices are not being used.

RECORDING, STORING, RECALLING READINGS AND CLEARING MEMORY

KI7000C Series instruments provide several options for storing and recording data:

- **Meter Reference Value**

The power meter reference value for each wavelength is stored in non-volatile memory. It is displayed on the left of the display when in relative mode.

- **Meter Display Hold**

To hold the display at its current value, press [HOLD]. To continue updating the display, press [Hold] again.

- **Automatic MAX / MIN Recording**

To display the minimum and maximum recorded power meter over a period, press [↱] and [Max/Min] on hidden keypad. The display will show the maximum and minimum values in sequence. To re-set, press [↱], [Max/Min] and hold for 3 seconds. This function also re-sets when instrument parameters are altered.

Note: This function records drift, but may not be suitable to record transients faster than 1 Hz, due to the integrating data converter.

User Memory

The non-volatile user memory stores test data, which can then be displayed or downloaded to the spreadsheet in the KITS™ software.

Overview of stored data:

Data stored in Autotest mode - One Way loss testing:

- light source serial number, nominal output power, dBm and operational wavelengths, nm
- measured optical power in dBm, dB R and power meter reference value, dBm

Data stored in Power meter mode:

- measured optical power in dBm, dB R and power meter reference value, dBm
- detected wavelength, nm

Data stored in Light source mode:

- nominal output power, dBm
- operational wavelength, nm

In KI7300C/7700C/7600C Series instruments, the following functions are available:

- Recording and storing data
- Recalling stored data
- Clearing memory

RECORDING, STORING, RECALLING READINGS AND CLEARING MEMORY

Recording and storing data

To access memory locations, press [◄►]. To exit, press [Exit].
To record, press [M+]. Data will be stored in the next available location. In Autotest, all test data will be stored in one location and 'busy' will be displayed while it is being recorded. If display is in Hold mode, data on selected wavelength will be stored. To record data at a particular location, press [◄►], then [-/+] to select the location, [Set] and [M+]. This will overwrite any previous data stored there.

Recalling stored data

Note: return to 'Menu' to recall data recorded in Autotest mode. For KI7600C/7300C/7700C Series, data recorded in Power meter and Light source modes can be accessed in one of these modes or via 'Menu'.

To recall recorded data, press [MR] and [-/+] to specify location.

For data recorded in Autotest, press [-/+] to view measurements at all source wavelengths.

For each wavelength, to step through all available Autotest measurements, select [MR], [-/+] and then press [◄►] repeatedly.

To display recalled value in dB R, press [Abs/Rel].

Clearing memory

A full memory at a particular location is indicated by activated buzzer. To clear all stored data at selected location, press [MR] and [Exit] simultaneously for 3 seconds. The buzzer will sound and display will show 'clr'.

Memory capacity (in Autotest)

Working memory capacity is determined by the configuration of your instruments. The capacity of one instrument is illustrated in Table 1, the combined capacity of the instrument pair (eg. two Loss Test Sets) is 'No of readings' x 2:

Mode	No of source wavelengths	No of readings
Autotest	2	3.408
Autotest	4	1.962

Figure 4.Memory capacity of a single Power Meter /Loss Test Set

PC INTERFACE AND EXTERNAL SOFTWARE

The KI7000C Series instruments feature USB interface and can be remotely accessed and controlled from an external PC. When instrument is controlled from PC, USB symbol will be displayed and auto power-off will be defeated.

KITS™ software

Free KITS™ software available on our website www.kingfisher.com.au enables instrument control and transfer of live or stored data to an Excel spreadsheet, making it ideal for data logging and reporting in the field. KITS™ is can be easily customised to change language, terminology or to add new reporting features.

Functions currently supported by KITS™ are:

- Live Power Meter display
- Two Way loss reporting by merging one direction data
- Spreadsheet to record loss measurements with direct click-and point data insertion or memory download
- Data logging with graph and statistical information

CARE OF YOUR INSTRUMENT

- Follow the directions in this manual on optical connectors care.
- During prolonged storage, remove batteries to eliminate the possibility of acid leakage. Use only high quality sealed alkaline or NiMH batteries.
- 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 strong sunlight.
- Clean the instrument case using soft damp cloth. Do not use alcohol or any solvents, otherwise paint will be damaged.
- The instrument housing is made of tough polycarbonate material with impact absorbing rubberised corner features, and is therefore drop resistant.

  CAUTION! Input optical power must not exceed the damage level specified for each detector type.

ACCURACY CONSIDERATIONS

Keep optical connectors clean and in good condition.

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

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

Power Meter:

Using an APC connector at the power meter interface will allow to reduce line reflections and to improve measurement stability in the laser based single mode systems. This is important when measuring small connector losses.

Light Source:

Light source power may drift. When you have finished a test, go back to the start position to check if the light source power is still within acceptable limits. Note that specifications are for typical drift and warm up period, but the actual drift will vary between instruments and test situations.

With exception of KI7300C and KI7400C Series, most available laser sources are sensitive to reflections. Varying reflections can induce laser source instability of around 0.3 dB. This is very difficult to verify without a special test system, but can cause errors. Reduced reflection will result in improved repeatability.

Due to emitter center wavelength uncertainty (eg ± 20 nm), fiber attenuation may vary with different light sources.

DWDM Loss and Power Measurements

The DWDM bands are typically within 1525 ~ 1610 nm band. For this application, an InGaAs detector calibrated at 1550 nm gives good absolute accuracy at all DWDM wavelengths. Testing optical loss at 1610 or 1625 nm is common, since this represents the worst case attenuation in most systems.

High power InGaAs detectors may be required to measure the system power level.

CWDM Loss and Power Measurements

The CWDM band is from 1270 ~ 1610 nm at 20 nm spacing, however, 1490 ~ 1610 nm is more common since it avoids the water absorption peak at 1383 nm.

The most common operating wavelengths for FTTH PON systems are currently 1310 / 1490 / 1550 nm.

As in DWDM application, an InGaAs detector gives good absolute accuracy.

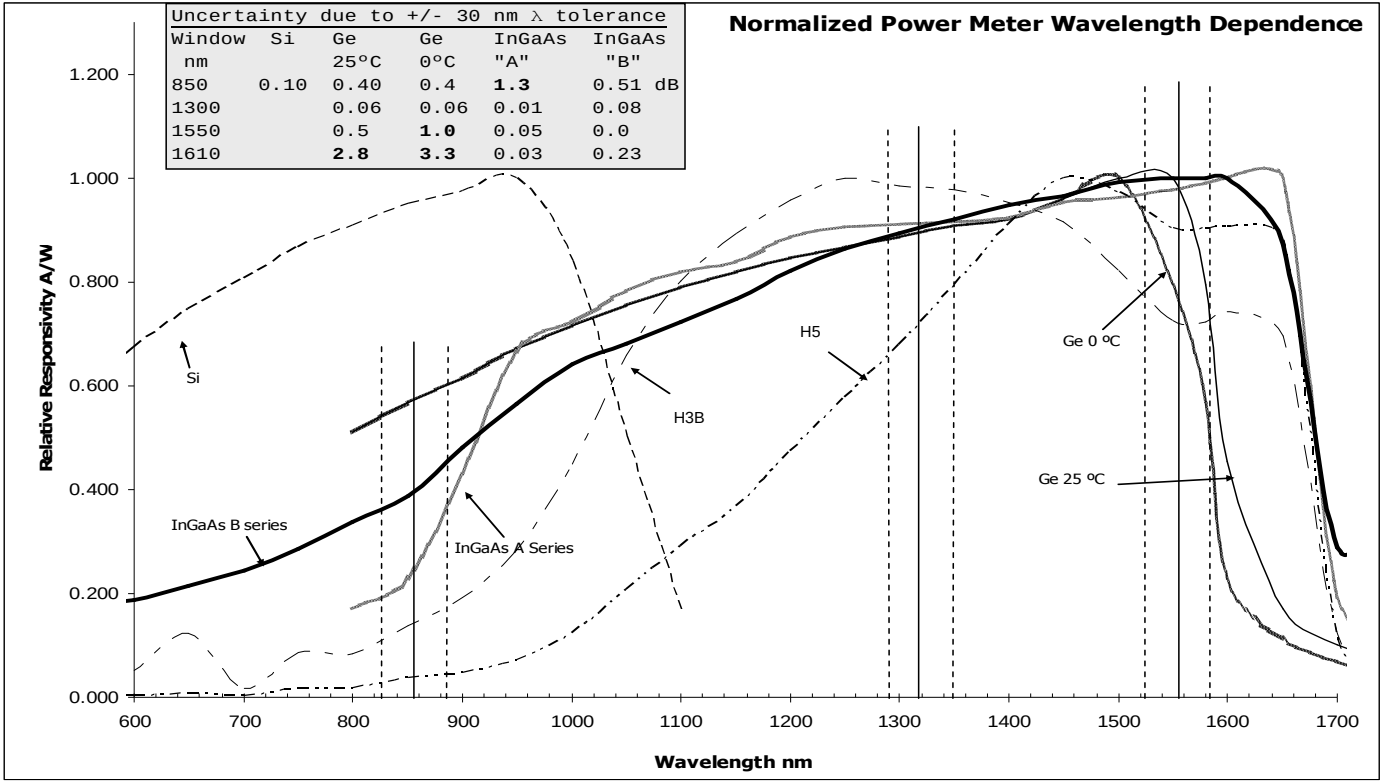
Because of the broad operating wavelengths encountered, the power meter calibration wavelength needs to be matched to the measured wavelength, or absolute errors may be excessive.

Many systems are measured at 1390 nm to test for the water peak, and at 1625 nm to measure the high end attenuation limit.

At 1625 nm, the fiber attenuation is actually very sensitive to wavelength, since the silica infra-red absorption zone is reached. So the wavelength tolerance of this particular laser is a major issue, especially since many older source instruments have a tolerance of 30 nm.

ACCURACY CONSIDERATIONS

Uncertainty due to +/- 30 nm λ tolerance					
Window nm	Si	Ge 25°C	Ge 0°C	InGaAs "A"	InGaAs "B"
850	0.10	0.40	0.4	**1.3**	0.51 dB
1300		0.06	0.06	0.01	0.08
1550		0.5	**1.0**	0.05	0.0
1610		**2.8**	**3.3**	0.03	0.23



DEFINITION OF TERMS

Power Meter

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, including 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, including noise and drift (connectors and test leads must be absolutely clean and undamaged).

Autotest Sensitivity: The power level below which Autotest does not work.

Light Source

Output Power: The CW output power at the specified wavelength, at the end of a reference cable.

Power Uncertainty / Repeatability: Uncertainty in power level at the end of a reference cable.

Short / Long Term (Power) Stability: In CW mode, the uncertainty of the power level observed over a given time, compared to the mean power during this time. Measured with an averaging optical power meter, a 9/125µm fiber, at constant temperature, within a specified temperature window, and at line voltage.

Center wavelength: The wavelength representing the centre of mass of the selected peaks:

$$\lambda \text{ CW} = (1/\text{Po})\Sigma(\text{P}_i \lambda_i),$$

where Pi and λi are the power and wavelength of each spectral component and Po is the total power.

Spectral Bandwidth: FWHM (full width at half the maximum) describes the spectral width of the half-power points of the laser, assuming a Gaussian envelope of the spectral power distribution. The half-power points are those where the power-spectral density is one half of the peak amplitude of the Gaussian curve:

$$\Delta\lambda_{RMS} = \left(\frac{\Sigma P_i \lambda_i^2}{P_{total}} - \lambda_{center}^2 \right)^{1/2}$$

and

$$\Delta\lambda_{FWHM} = M \Delta\lambda_{RMS}$$

where: λ = center wavelength of laser diode (in vacuum)

P = ΣP_i = total power, in watts

P = power of i^{th} longitudinal mode

λ = wavelength of i^{th} longitudinal mode (in vacuum)

M = multiplication factor; for a source with a Gaussian envelope $M = 2.35$; for other types of spectra, use $M = 2.35$ as well

SPECIFICATIONS

Size:	190 x 130 x 70 mm, 7.5" x 5.1" x 2.8".
Weight:	500 gm, 1.1 lb. Shipping 1.5 Kg, 3.3 lb.
Operating/ Storage:	-15 to 55 °C / -25 to 70 °C.
Power:	2 alkaline 'C' cells 7.6 A/hr, (or 2 'AA' cells - using supplied adaptor) or external 9V DC with 2.5 mm '+ve' pin. Selectable auto-off, low battery indicator and back lit display.
Battery life:	360 hrs Power Meter/190 hrs laser in Autotest
Case:	Polycarbonate, 1 meter drop tested.
Display:	4 digit high contrast LCD
Resolution:	Log: 0.01 dB. Linear: 3 digits (100 – 999) or 0.01 nW.
Tone detection:	150 ~ 9999 Hz ±1%.

SPECIFICATIONS: Power Meter

Power Meter: - KI7600C

Detector Type	Response λ nm	Damage Level dBm	Calibration λ nm	Power Range dBm	Autotest Sensitivity dBm	Mid range Linearity[1] dB	Calibration Accuracy[2] %	Polarisation Sensitivity dB	Total Uncertainty[3] dB
InGaAs	800 ~ 1700	+15	*780, 820, 850, 980,* 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+5 ~ -60* +5 ~ -70	*-40* -50	0.02	1% (0.06 dB)	<0.005	0.3
Ge	600 ~ 1650	+15	*780, 820, 850, 980,* 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+10 ~ -60* +10 ~ -70	*-40* -50	0.04	1% (0.06 dB)	<0.005	0.5
H3B (InGaAs)	800 ~ 1700	+30[4]	*820, 850, 980,* 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+27 ~ -40* +27 ~ -50	*-20* *-30*	0.02	1 % (0.06 dB)	<0.005	0.3
H5 (InGaAs)	800 ~ 1700	+25	*820, 850, 980,* 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+15 ~ -50* +15 ~ -60	*-30* -40	0.02	1 % (0.06 dB)	<0.005	0.3
					typical	typical		typical	max

Power Meter: - KI7600CXL

Detector Type	Response λ nm	Damage Level dBm	Calibration λ nm	Power Range dBm	Autotest Sensitivity dBm	Mid range Linearity[1] dB	Calibration Accuracy[2] %	λ Sensitivity ±30nm [5]	Polarisation Sensitivity dB	Total Uncertainty[3] dB
5 mm Ge	600 ~ 1650	+15	***780, 850,*** **1300, 1310, 1390, 1490,** 1550, 1590, 1610, 1625	*+10~ -35* +10~ -40	*-40*	0.04	1% (0.06 dB)	0.04	<0.005	0.5
5 mm Si	350 ~ 1100	+10	***635,650,660,780,850,980***	*+5 ~ -60*	*-40*	0.02	1 % (0.06 dB)	0.03	<0.005	0.3
					typical	typical			typical	max

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

SPECIFICATIONS: Power Meter

Note 2: Calibration condition: non coherent light, -35 ± 5 dBm, 21 ± 3 °C, ± 1 nm, 10 ± 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 type up to 200 µm core diameter.
Note 4: H3B can sustain the damage level for 2 minutes
Note 5: At calibration wavelengths in bold type.

SPECIFICATIONS: Power Meter

Power Meter Section: - KI7700C

Detector Type	Response λ nm	Damage Level dBm	Calibration λ nm	Power Range dBm	Autotest Sensitivity dBm	Mid range Linearity dB	Calibration Accuracy %	Polarisation Sensitivity dB	Total Uncertainty dB
Si	350 ~ 1100	+15	635, 650, 660, 780, 850, 980	+0 ~ -70	-47	0.02	2 % (0.09dB)	<0.005	0.3
InGaAs	800 ~ 1700	+15	*780, 850,* 1300, 1310, 1390,1490,1550, 1610, 1625,	*+5 ~ -60* +5 ~ -70	*-40* -50	0.02	2 % (0.09 dB)	<0.005	0.3
H5 (InGaAs)	800 ~ 1700	+25	*850,* 1300, 1310, 1390,1490,1550, 1610, 1625,	*+15 ~ -50* +15 ~ -60	*-30* -40	0.02	2 % (0.09 dB)	<0.005	0.3
H3B (InGaAs)	800 ~ 1700	+30[4]	*850,* 1300, 1310, 1390,1490,1550, 1610, 1625	+27 ~ -40 +27 ~ -50	*-25* *-30*	0.02	2 % (0.09dB)	<0.005	0.3
					typical	typical		typical	max

Power Meter Section: - KI7300C

Detector Type	Response λ nm	Damage Level dBm	Calibration λ nm	Power Range dBm	Autotest Sensitivity dBm	Mid range Linearity[1] dB	Calibration Accuracy[2] %	Polarisation Sensitivity dB	Total Uncertainty[3] dB
InGaAs	800 ~ 1700	+15	*780, 820, 850,* 980, 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+5 ~ -60* +5 ~ -70	*-45* -50	0.02	1% (0.06 dB)	<0.005	0.3
H3B (InGaAs)	800 ~ 1700	+30[4]	*820, 850,* 980, 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+27 ~ -40* +27 ~ *-50*	*-25* *-30*	0.02	1 % (0.06 dB)	<0.005	0.35
H5 (InGaAs)	800 ~ 1700	+25	*820, 850,* 980, 1270, 1290, 1300, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625, 1650	*+15 ~ -50* +15 ~ -60	*-35* -40	0.02	1 % (0.06 dB)	<0.005	0.3
					typical	typical		typical	max

SPECIFICATIONS: Light Source

Light Source Section: - KI7300C

	1310/1550 nm Laser	Other Lasers	Comments
Fibre type	9/125µm	9/125µm	
2 λ source power 3 or 4 λ power	0 dBm -7dBm	- 4 dBm -7 dBm	± 1 dB
Short term stability	0.03 dB	0.05[1]dB	15 min, max no warm-up, Δ 3 °C
Stability, over temp	0.2 dB	0.2 dB	Max, over temperature
λ tolerance	20 nm	6.5 nm	At 25 °C
λ width	3 nm	< 1 nm	FWHM, typical
λ nm / °C	0.4	0.1	Typical
Reconnection repeatability	0.1 dB		95% confidence
Modulation	270 Hz, 1, 2 KHz ± 2 %		
Laser output	Adjustable over 6 dB in 0.01 dB steps		

Note 1: For ORL < -25 dB

Light Source section: - KI7700C

	1310/ 1550 nm	Other Lasers	LED	Comments
Fibre type	9/125µm	9/125µm	62.5/125µm	
2 λ source power 3 or 4 λ power	0 dBm -7 dBm	-4dBm -7 dBm	-23 to 62.5µm -38 to 10µm	± 1 dB for laser ± 3 dB for LED
Short term stability	0.04[1]dB	0.06[1] dB	0.01 dB	15 min, ± Δ 2°C after warm-up,
Stability, over temp	0.6 dB	0.6dB	0.35 dB	Typical, over temperature
λ tolerance	20 nm			At 25 °C
λ width	3 nm	< 1 nm		FWHM, typical
λ nm/°C	0.4	0.1	0.4	Typical
Mode Controlled Source	N/A	N/A	Mode controlled[2]	
Reconnection repeatability	0.1 dB		0.05 dB	95% confidence
Modulation	270 Hz, 1, 2 KHz ± 2 %			
Laser output	Adjustable over 6 dB in 0.01 dB steps			

Note 1: For ORL < -25 dB
Note 2: Multimode source mode distribution @ 50/125 is compliant with the following standards: IEC 61280-4-1 {Ed.1.0}, TIA/EIA 526-14A and TIA TSB-178

SPECIFICATIONS: Light Source

Light Source: - KI7400C

	1310/1550 Laser	Other Lasers	1310/1550 LED[2]	Comments
Fibre type	9/125µm	9/125µm	9/125µm	
2 λ source power 3 or 4 λ power	-4 dBm -7 dBm	-4 dBm -7 dBm	-20dBm	± 1 dB
Short term stability	0.03[1]dB	0.05[1]dB	0.03dB	15 min, max no warm-up, Δ 3 °C
Long term stability	0.2 dB	0.2 dB	0.2 dB	Max, over temperature
λ tolerance	20 nm	6.5 nm	20 nm	At 25 °C
λ width	3 nm	< 1 nm	35/48	FWHM, typical
λ nm / °C	0.4	0.1		Typical
Reconnection repeatability	0.1 dB			95% confidence
Modulation	270 Hz, 1, 2 KHz ± 2 %			
Laser output	Adjustable over 6 dB in 0.01 dB steps			

Note 1: For ORL < -25 dB
Note 2: 1300/1550 LED operating temperature is 0 to 55º C

SPECIFICATIONS: Light Source

Light Source: - KI7800C

	1310/ 1550 nm	Other Lasers	850/1300 LED	Comments
Fibre type	9/125µm	9/125µm	62.5/125 µm	
1- 2 λ source power 3 -4 λ source power	0 dBm	-4 dBm -7 dBm	-23 to 62.5µm -35 to 10µm	± 1 dB for laser ± 3 dB for LED
Short term stability	0.04[6] dB	0.06[6]dB	0.01 dB	15 min, ± Δ 2°C after warm-up,
Stability, over temp	0.6 dB	0.6 dB	0.35 dB	Typical, over temperature
λ tolerance	20 nm	20 nm		At 25 °C
λ width	3 nm	< 1 nm		FWHM, typical
λ nm/°C	0.4	0.1	0.4	Typical
Mode Controlled Source	NA	NA	Mode controlled[2]	
Reconnection repeatability	0.1 dB		0.05	95% confidence
Modulation	270Hz, 1KHz, 2KHz ± 2%			
Laser output	Adjustable over 6 dB in 0.01dB steps			

Note 1: ORL< - 25dB

Note 2: Multimode source mode distribution @ 50/125 is compliant with the following standards: IEC 61280-4-1 {Ed.1.0}, TIA/EIA 526-14A and TIA TSB-178

ORDERING INFORMATION

Power Meter: KI7600C Series

InGaAs Power Meter	**KI7600C - InGaAs**
Germanium Power Meter	**KI7600C-Ge**
InGaAs Power Meter, visible laser, PC	**KI7601C - InGaAs**
InGaAs Power Meter, visible laser, APC	**KI7601C - InGaAs-APC**
H3 Power Meter	**KI7600C - H3B**
H3 Power Meter, visible laser, PC	**KI7601C - H3B**
H3 Power Meter, visible laser, APC	**KI7601C - H3B-APC**
H5 Power Meter	**KI7600C - H5**
H5 Power Meter, visible laser, PC	**KI7601C - H5**
H5 Power Meter, visible laser, APC	**KI7601C - H5-APC**

Light Source: KI7400C Series

1310 / 1550 nm laser, PC	**KI7402C**
1310 / 1550 nm laser, APC	**KI7402C – APC**
1310 / 1490 / 1550 nm laser, PC	**KI7427C**
1310 / 1490 / 1550 nm laser, APC	**KI7427C-APC**
1310 / 1550 / 1625 nm laser, PC	**KI74010C**
1310 / 1550 / 1625 nm laser, APC	**KI74010C-APC**
1310 / 1390 / 1550 / 1625 nm laser, PC	**KI74015C**
1310 / 1390 / 1550 / 1625 nm laser, APC	**KI74015C-APC**
1310 / 1490 / 1550 / 1625 nm laser, PC	**KI74016C**
1310 / 1490 / 1550 / 1625 nm laser, APC	**KI74016C – APC**
1310/1550 nm LED, PC	**KI7419C**

Power Meter: KI7600CXL Series

Large area Ge Power Meter	**KI7600CXL - Ge**
Large area Si Power Meter	**KI7600CXL - Si**

Light Source: KI7800C Series

850 nm, LED, & 1310 nm laser, PC	**KI7804C**
1310 / 1550 nm laser, PC	**KI7822C**
1310 / 1550 nm laser, APC	**KI7822C-APC**
850 nm LED & 1310 / 1550 nm laser, PC	**KI7823C**
850 nm LED, PC & 1310 / 1550 nm laser, APC	**KI7823C - PC/APC**
850 / 1300 nm LED, & 1310 / 1550 nm laser, PC	**KI7824C**
850 / 1300nm LED, PC & 1310 / 1550 nm laser, APC	**KI7824C - PC/APC**
1310 / 1490 / 1550 nm laser, PC	**KI7827C**
1310 / 1490 / 1550 nm laser, APC	**KI7827C-APC**
1310 / 1550 / 1625 nm laser, PC	**KI78010C**
1310 / 1550 / 1625 nm laser, APC	**KI78010C – APC**
1310 / 1550 / 1650 nm laser, PC	**KI78011C**
1310 / 1550 / 1650 nm laser, APC	**KI78011C – APC**
1310 / 1490 / 1550 / 1625 nm laser, PC	**KI78016C**
1310 / 1490 / 1550 / 1625 nm laser, APC	**KI78016C-APC**

ORDERING INFORMATION

KI7300C Series Loss Test Set:

1310 / 1550 nm laser PC, InGaAs Meter	**KI7303C - InGaAs**
1310 / 1550 nm laser APC, InGaAs Meter	**KI7303C - InGaAs-APC**
1310 / 1550 nm laser PC, H3B Meter	**KI7303C - H3B**
1310 / 1550 nm laser APC, H3B Meter	**KI7303C - H3B-APC**
1310 / 1550 nm laser PC, H5 Meter	**KI7303C - H5**
1310 / 1550 nm laser APC, H5 Meter	**KI7303C - H5-APC**
1310 / 1490/1550 nm laser PC, InGaAs Meter	**KI7307C - InGaAs**
1310 / 1490/1550 nm laser APC, InGaAs Meter	**KI7307C - InGaAs – APC**
1310 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI73010C - InGaAs**
1310/ 1550 / 1625 nm laser APC, InGaAs Meter	**KI73010C - InGaAs-APC**
1310 / 1390 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI73015C - InGaAs**
1310 / 1390 / 1550 / 1625 nm laser APC, InGaAs Meter	**KI73015C - InGaAs-APC**
1310 / 1490 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI73016C – InGaAs**
1310 / 1490 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI73016C – InGaAs-APC**

KI7700C Series Loss Test Set:

850 nm LED PC, Si Meter	**KI7701 - Si**
850 / 1300 nm LED PC, InGaAs Meter	**KI7704C - InGaAs**
1310 / 1550 nm laser PC, InGaAs Meter	**KI7722C - InGaAs**
1310 / 1550 nm laser APC, InGaAs Meter	**KI7722C - InGaAs-APC**
1310 / 1550 nm laser PC, H3B Meter	**KI7722C - H3B**
1310 / 1550 nm laser APC, H3B Meter	**KI7722C - H3B-APC**
1310 / 1550 nm laser PC, H5 Meter	**KI7722C - H5**
1310 / 1550 nm laser APC, H5 Meter	**KI7722C - H5-APC**
1310 / 1490/1550 nm laser PC, InGaAs Meter	**KI7707C - InGaAs**
1310 / 1490/1550 nm laser APC, InGaAs Meter	**KI7707C - InGaAs-APC**
1310 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI77010C - InGaAs**
1310 / 1550 / 1625 nm laser APC, InGaAs Meter	**KI77010C - InGaAs-APC**
1310 / 1390 / 1550 / 1625 nm laser PC, InGaAs Meter	**KI77015C - InGaAs**
1310 / 1390 / 1550 / 1625 nm laser APC, InGaAs Meter	**KI77015C - InGaAs-APC**
1310 / 1490 / 1550/1625 nm laser PC, InGaAs Meter	**KI77016C - InGaAs**
1310 / 1490 / 1550/1625 nm laser APC, InGaAs Meter	**KI77016C - nGaAs-APC**

ORDERING INFORMATION: KI7300C/7700C Series, KI7400C/7800C Series, KI7600C Series

Standard Accessories:

ST, FC, SC metal-free optical connector adaptors, KITS™ PC software and USB cable, user manual, C size batteries, 'AA'-to-'C' size battery converter, calibration certificates, carry strap, leather pouch and protective holster.

Optical Connectors:

These instruments have interchangeable optical connectors. The power meter works with both PC and APC connectors. The light source ferrule type is fixed and customer specified as either PC or APC. Green is associated with APC connectors.

Optional Interchangeable Connector Adaptors:

Description	P/N	Description	P/N
E2000/LSH, blue	**OPT060**	D4	**OPT055**
E2000/LSH, green	**OPT060G**	Universal 2.5mm	**OPT081**
LSA/DIN 47256	**OPT071**	SMA 905/906	**OPT082**
LC / SC, metal body	**OPT076**		
MU	**OPT080**		

Optional Accessories:

Description	P/N
Power Pack, IEC 100~240V 2.5mm plug	**OPT103B**
Carry case, 2 instruments	**OPT153**
Carry case, including Cletop, cleaning sticks and microscope	**OPT154**

ORDERING INFORMATION: KI7600CXL Series

Standard Accessories:

KITS™ PC software, USB A/B cable, user manual, C size batteries, 'AA'-to-'C' size battery converter, calibration certificates, carry strap, leather pouch and protective holster.

Optical Connectors:

The power meter works with both PC and APC connectors. The light source ferrule type is fixed and customer specified as either PC or APC. Green is associated with APC connectors.

To order KI7600CXL Series Optical Power Meter, please specify instrument and at least one optional interchangeable connector adaptor.

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**	MPO	**OPT227**
Universal 2.5mm	**OPT225**	SMI	**OPT231**
Toslink	**OPT230**	POF cable, mini Toslink, HFBR series, 2.5, 1.25mm	

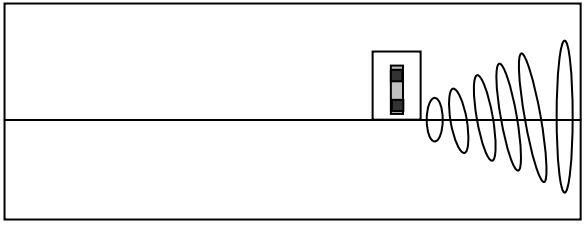
Optional Accessories:

Description	P/N
Power Pack, IEC 100~240V 2.5mm plug	**OPT103B**
Carry case, 2 instruments	**OPT153**
Carry case, including Cletop, cleaning sticks and microscope	**OPT154**

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

All Calibrations

To enable calibration mode, open the battery compartment, remove the anti-tamper label, and insert a 2.54 mm (0.1") pitch programming shunt. Manipulation of the shunt is easier with needle nose pliers. The instrument will display 'CAL' and installed options.



View Inside Battery Compartment

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.

Before commencing calibration:

- Clean all 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 aperture in the battery compartment.
- Do no forget to update your calibration records, and schedule the next calibration service.

System Rollback (version 5.0 and above)

In the event of wrong calibration constants being entered and stored, or the instrument becoming otherwise corrupted, all factory settings can be restored. To restore all factory settings, first enter 'CAL' mode then press and hold [MR] for 3 seconds.

Power Meter Calibration:

Calibration is a transfer process. It is performed by setting up a single mode laser source at a stable, but non-critical power level between -10 and -30 dBm, and adjusting the meter reading to the same value as that shown by a reference meter.

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

To display existing calibration offsets:

- Put the instrument in calibration mode.
- Press [Power Meter] and [-/+] to set the wavelength, then [↱] and [Max/Min] twice to display the current offset.
- Record the offsets, re-enter or adjust offset values for each wavelength.

To calibrate the meter at the selected wavelengths:

- Measure and record the source power using the reference meter.
- Transfer the same power level to the meter to be calibrated, press [↱] and [Max/Min] to display power, then [-/+] to adjust the reading to match the noted reference reading.

  Note: The optical power is measured only when entering this mode. It is not continuously updated. (Firmware version 5.00 and above continuously updates the measured power).
- Press [↱] and [Max/Min] to read and note the new stored calibration offsets, and then [Set] to store and exit, or [Exit] to abandon and exit.
- Check the source power with the reference meter to ensure source drift is within limits.

Remove the programming shunt, and place a new sticker over the aperture.

CAUTION! Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

The emitter power level can be re-calibrated, and the current checked as described below. You will need a power meter with appropriate calibrated wavelengths, single mode test leads, an anti-tamper label, and a 2.54 mm (0.1") programming jumper.

Check the calibration certificates on your reference equipment to ensure current validity.

- Put the instrument in calibration mode.
- Connect a calibrated power meter with a known good patch lead (the patch lead loss forms part of the calibration condition).
- Press [Source], leave in, and then press [↱] and [Level]. The display will now show the expected power level, cal factor (main display) and laser current in mA (top right). Note the existing values for future reference. Set meter wavelength to match.
- Adjust the [-/+] button to change the source output level, to match the displayed level on the source display, or to re-enter a known cal factor (The laser current can not go above a level that has been set for the individual laser during manufacture).
- Note new calibration values and laser currents for future reference, then press [Set] to store settings and exit, or [Exit] to exit without storing settings.
- Remove the programming shunt, and place a new sticker over the aperture.

Opening the Instrument

Caution!

- Do not open unless the 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

- Use static protected procedures.
- Remove the batteries and leave the battery cover open. Pull open the optical connector covers.
- Place the instrument face down on a soft mat and undo the 6 screws in the rear housing.
- The instrument can now be gently pulled apart. The instrument will come into two halves joined by a ribbon cable. The optical section is located in the upper half, with the microprocessor, supply, calibration constants and controls in the lower half.
- Hinged display cover removal can be done at this point.
- The ribbon connector can be disengaged to completely separate the instruments halves.
- Further disassembly from this stage should be easily apparent to a technician.
- Re-assembly is the reverse of the previous procedure. Ensure that the ribbon cable connectors are properly secured so they cannot shake loose. This will be either a moulded rubber retainer, or adhesive tape.

  General electrical parameters are as follows:

  Vss to GND = 3V3, -Vss = -3V3, battery power down current about 0.2 mA, active power meter current about 20 mA.

PERFORMANCE VERIFICATION TESTS

All tests can be performed without access to the interior of the instrument.

The test procedures described in this section are for performance verification of a KI7303C InGaAs Loss Test Set.

Due to the large number of 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 test 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 this 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 that were 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.

Make sure 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'.

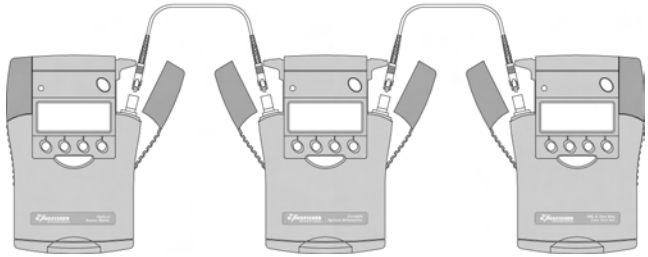
Make sure that all patch cords are fixed to the table so that they won't move during measurements.

Ensure that the ambient conditions are in the following ranges:
Temperature: 21 ± 3 ºC
Relative humidity: 45 to 75 %

Power Meter Section

Accuracy Test

1. Connect the equipment as shown in Figure 5:



LTS / Power Meter **Attenuator** **Source**

Figure 5. Test set-up for the Power Meter section Accuracy Test

2. Switch on all instruments.
3. Set all instruments to 1310 nm.
4. Change the attenuation of the attenuator until the reference power meter displays -10.00 dBm. Note the attenuator setting in setting 1 of Table 4.

   If the light source is not powerful enough to give -4.00 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 (last reading not relevant to H series power meters).
5. Measure the DUT:

   Re-connect the attenuator output cable to the DUT power meter port, and select the 1310nm on DUT.

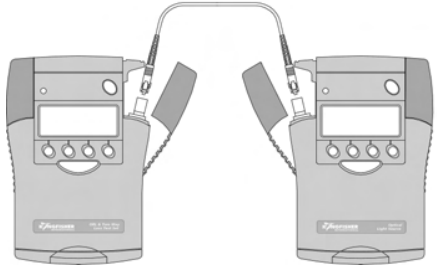
   Set the attenuator to its value for setting 1. Note the displayed power level of the DUT in the test record.

   Repeat the above for attenuator settings 2~5.
6. Repeat the Power Meter Accuracy Test at 1550 nm.

Light Source Section

Output Power (CW) Test

1. Connect the equipment as shown in Figure 6.



Power Meter **LTS / Source**

Figure 6. Test set-up for Output Power (CW) and Short Term Stability Tests

2. Switch on the instruments.
3. Set instruments to 1310 nm.
4. Note the measured power level value in the test report in Table 5
5. Repeat the above on 1550 nm

Short Term Stability Test (optional)

1. Connect the equipment as in Figure 6.
2. Set instruments to 1310 nm.
3. Let the light source to warm-up for 15 minutes, then note the power.
4. Record the optical power every 30 seconds for 3 minutes.
5. Calculate max – min value (< 0.1 dB).
6. Note this figure in Table 5

Time	Measured power, dBm	Drift, dB	Tick max / min values
00 sec		0.00	
30 sec			
60 sec			
90 sec			
120 sec			
150 sec			
180 sec			

Alternatively, the instrument max/min recording function can be used to record the data.

Light Source Section

Centre wavelength and Spectral Bandwidth (FWHM) Test (optional).

1. Connect the equipment as shown in Figure 7.
2. Switch on the instruments and allow to fully warm up.
3. On Light Source, enable the source and set the wavelength to 1310 nm.
4. On the OSA, press the [Instr Preset] key.

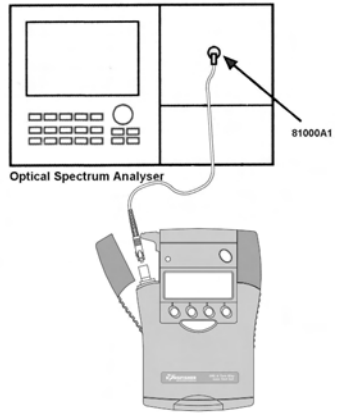


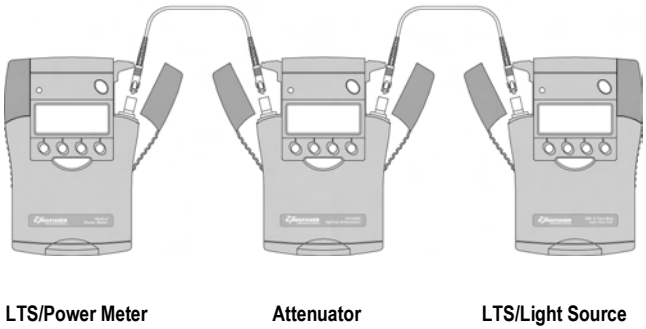
Figure 7.Test set-up for centre wavelength and spectral bandwidth test

5. Press [Auto/Meas] and wait until 'End of Automeasure' is displayed.
6. Choose [User] and select the type of source to be measured (FP for Fabry Perot laser).
7. To show the display in linear mode:
   a. Press [Menu].
   b. Press [Amptd] on the left side of the display.
   c. Press [Linear] on the right side of the display.
8. To ensure interference free reading of the display it is advisable to stop the repeating calculations.
   Press [User].
   Press [Single Sweep].
   If the trace on the display is not clear, you can change resolution by using the span key.
9. From the displayed measurements check and note the values for "Centre wavelength" and "FWHM" (Spectral Bandwidth) in Table 6.
10. Repeat the test with the DUT wavelength set to 1550 nm.

Verification of Autotest range, tone detector and linearity test

Test below is to verify Autotest range, tone detector operation and linearity for Loss Test Set/Light Source and Power Meter. To test Power Meter absolute accuracy, refer to Accuracy Test, Power Meter Section.

1. Connect the equipment as shown in Figure 8. A single LTS can also be used, with connections to both ports.



LTS/Power Meter **Attenuator** **LTS/Light Source**

Figure 8. Test set up for Range and Linearity Test

2. Switch on all instruments.
3. Set the Light Source to 1310nm and allow to warm up. Press [Autotest].
4. On the attenuator, set the wavelength to1310nm and attenuation to 5 dB.
5. Make sure that Autotest is updating. Note the measured optical power at 1310 nm.
6. For single mode instruments, repeat the power readings for attenuator settings of 15 dB, 25 dB and 35 dB. For instruments with H series meter, repeat the readings for an attenuator setting of 15 dB only.
7. For multimode instruments, repeat the power readings for attenuator settings of 15 dB, 20 dB.
8. Repeat the above for 1550nm as required, however, this test typically only needs performing at one wavelength.

Instrument / Accessories	Recommended Model	Required Characteristics	Alternative Model
Optical Light Source	KI7402C		KI7400C, KI7800C
Optical Power Meter	KI7600C		KI7700C
Optical Attenuator	KI7013B		KI7013B
Connector adaptors			
SMF patch leads			
For optional test only			
Optical Spectrum Analyser	71450B		71452B, (8164xA,B)
Connector Adaptors			
SMF patchleads			

Table 1: Required Equipment for KI7300C Series Performance Verification Tests

PERFORMANCE VERIFICATION TESTS

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 KI7300C Series Loss Test Set

PERFORMANCE VERIFICATION TESTS

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

Accessories:
SMF patchleads
Connector adaptors

Table 3: Equipment Record for Performance Verification Tests

Model: Report No.: Date:

Total Uncertainty / Accuracy Test							
	Test Wavelength = nm						
Setting Number	Power Meter reference value	Attenuator Setting		Minimum specification (-0.3 dB of Ref.)	DUT measurement results		Maximum specification (+0.3 dB of Ref.)
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	

Table 4: Accuracy Test Record for KI7300C Series, Power Meter section

Note 1: This is for the KI7303C-InGaAs. For the H series instruments, increase by ±0.2 dB.

Model: Report No.: Date:

Output Power (CW) Test				
Wavelength	Minimum Specification	Measurement Results		Maximum Specification
1310 nm	-1.00 dBm		dBm	
1550 nm	-1.00 dBm		dBm	
			dBm	
			dBm	
			dBm	
Measurement Uncertainty			dB	
Optional Short-Term Stability Test				
1310 nm			dBpp	(0.10 dBpp) 0.04 dBpp typical
1550 nm			dBpp	(0.10 dBpp) 0.04 dBpp typical
			dBpp	(0.10 dBpp) 0.04 dBpp typical
			dBpp	(0.10 dBpp) 0.04 dBpp typical
			dBpp	(0.10 dBpp) 0.04 dBpp typical
Measurement Uncertainty			dB	

Table 5: Output Power Test and Short Term Stability Test Record for KI7300C Series, Light Source section

Model: Report No.: Date:

Centre wavelength and Special Bandwidth (FWHM) Test (optional)				
Wavelength	Minimum Specification	DUT Measurement Results		Maximum Spec.
Centre wavelength				
1310 nm	1290.00 nm		nm	1330.00 nm
1550 nm	1530.00 nm		nm	1570.00 nm
			nm	
			nm	
			nm	
Spectral Bandwidth				
1310 nm			nm	(6nm) 3 nm typical
1550 nm			nm	(6nm) 3 nm typical
			nm	
			nm	
			nm	
Measurement Uncertainty			dB	

Table 6. Centre wavelength and Special Bandwidth (FWHM) Test Record for KI7300C Series, Light Source section

Model:	Instrument Connector: APC [ ] PC [ ]	Report No.:		Date:	
Fiber Type: Single mode [ ] Multimode [ ]					
Range and Linearity Test					
No	Attenuator setting	Power Meter Reading	Linearity Calculation	Acceptable Linearity Range[1]	
1	5.00 dB		-		
2	15.00 dB		No 2 – No 1 =	9.50 ~ 10.50	
3	20.00 / 25.00 dB		No 3 – No 2 =	4.50 ~ 5.50 / 9.50 ~ 10.50	
4	35.00 dB		No 4 – No 3 =	9.50 ~ 10.50	

Table 7: Test Record for Autotest Performance Verification Tests, KI7300C Series

Note1: The linearity range here is typically limited by attenuator linearity, rather than instrument performance.

QUICK REFERENCE GUIDE: KI7600C Series Optical Power Meter

MANUAL OPERATION

- To remove interchangeable connector adaptor, press button on rear of case and pull off adaptor. This may be easier with a test lead attached.
- To defeat auto power-off**,** hold [POWER] for 3 seconds at turn on until 'ON' and 'Perm' are displayed.
- Low battery is indicated with a battery symbol.
- To select operational wavelength, press [Power Meter] [-/+].
- To set reference, press [ABS/REL] and hold [SET REF] for 3 seconds. Meter displays about 0.00 dB R.
- To stop / start display update, press [HOLD].
- If a test tone is detected, meter will display 'Hz.'
- To toggle log / linear display mode, press [dB/W].
- To display minimum and maximum recorded power for selected wavelength, press [↱] and [Max/Min]. Press [↱] [Max/Min] and hold for 3 seconds to re-start recording.

AUTOTEST OPERATION

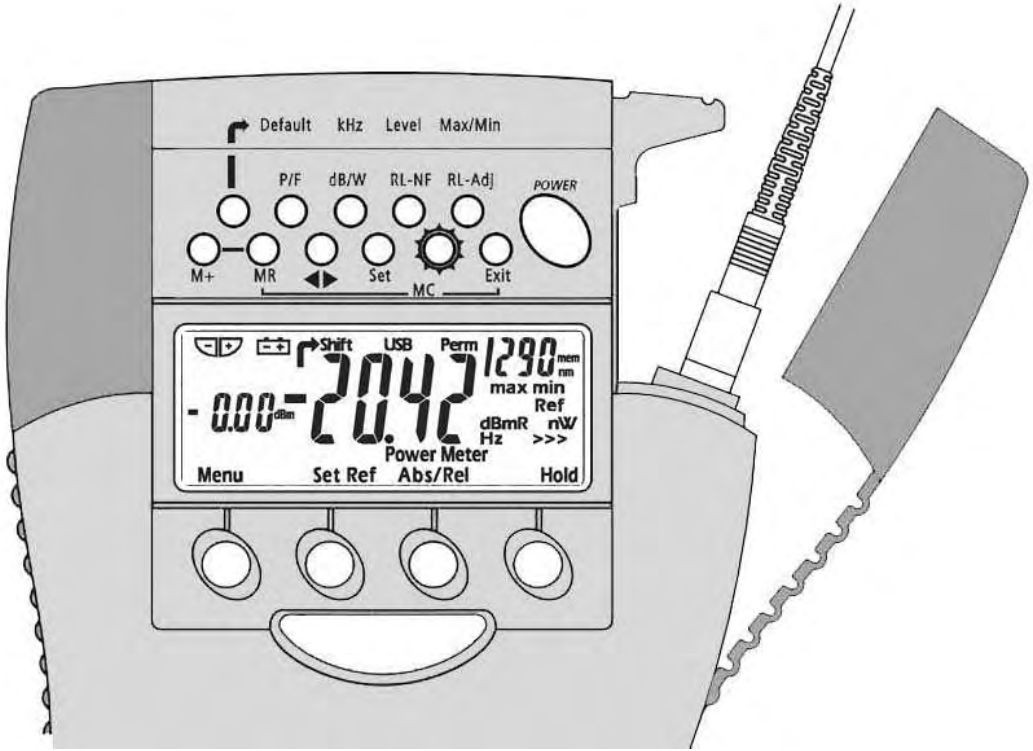
- To initiate Autotest, connect Power Meter to Light Source and press [Autotest] on Light Source.
- To show one wavelength only, scroll [-/+]. Press [Menu] to exit.
- Autotest remains for 8 seconds after signal loss, to allow quick connection change.
- To exit Autotest, remove test lead for >8 seconds, or on the Light Source, press [MENU].

MEMORY OPERATION

- Data can be stored in Power Meter and Autotest modes, however, memory recall and cancel functions are not available in Autotest.
- To clear all memory, press both [MR] and [Exit] simultaneously for 3 seconds. 'clr' will display.
- To store in next default location, press [M+].
- To change next store location, press [◄►] [-/+] [Set]
- or [Menu].
- To recall, press [MR] and [-/+] to scroll memory.
- Exit Autotest and enter Power Meter mode to read or cancel memory.
- Autotest memory recall: use [-/+] to scroll wavelengths.
- To exit memory display, press [Menu].

VISIBLE LASER OPTION

- Select [POWER], [SOURCE]
- To stop modulation, press [MOD]. To change modulation frequency, press [↱] and [KHz] on the hidden keypad. Use [+/-] to scroll modulation frequencies, then press [Set] to store.
- To turn off laser, press [-/+].


Default
kHz
Level
Max/Min
P/F
dB/W
RL-NF
RL-Adj
POWER
M+
MR
Set
MC
Exit
Shift
USB
Perm
1290
mem
nm
max min
Ref
- 0.00
dBm
20.42
dBmR
nW
Hz
>>>
Power Meter
Menu
Set Ref
Abs/Rel
Hold

QUICK REFERENCE GUIDE: KI7400C / 7800C Series Optical Light Source

MANUAL OPERATION

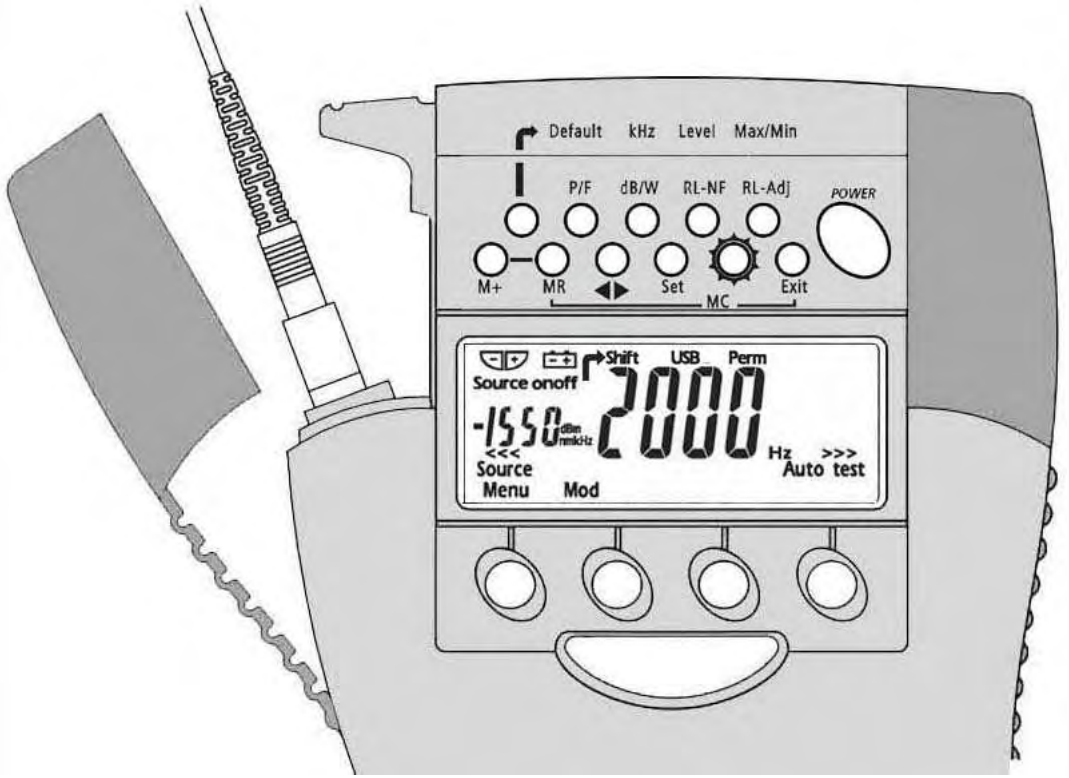
- To remove interchangeable connector adaptor, press button on rear of case and pull off adaptor. This may be easier with a test lead attached.
- To defeat auto power-off, hold down [POWER] for 3 seconds at turn on until 'On' and 'Perm' are displayed.
- Low battery is indicated with a battery symbol.
- To enable source, select [POWER], [Source].
- To change wavelength**,** press [-/+].
- To activate modulation, press [Mod]
- To change modulation frequency, while source is active press [↱] [KHz] [-/+] [Set] or [Menu].
- To change laser power level, while source is active press [↱], [Level], [-/+], [Set] or [Menu].

AUTOTEST OPERATION

- To initiate Autotest, connect Power Meter to Light Source and press [Autotest] on Light Source
- Autotest remains for 8 seconds after signal loss, to allow quick connection change.
- To exit Autotest, remove test lead for > 8 seconds, or press [MENU].

MEMORY OPERATION

- Data can be stored in Source and Autotest modes, however, memory recall and cancel functions are not available in Autotest.
- To clear all memory, press both [MR] and [Exit] simultaneously for 3 seconds. 'clr' will display.
- To store in next default location, press [M+].
- To change next store location, press [◄►] [-/+] [Set] or [Menu].
- To recall, press [MR] and [-/+] to scroll memory.
- Exit Autotest and enter Source mode to read or cancel memory
- Autotest memory recall: use [-/+] to scroll wavelengths
- To exit memory display, press [Menu].


Default
kHz
Level
Max/Min
P/F
dB/W
RL-NF
RL-Adj
POWER
M+
MR
Set
MC
Exit
Shift
USB
Perm
Source onoff
-15.50
2000
Hz
Auto test
Source
Menu
Mod

QUICK REFERENCE GUIDE: KI7300C / 7700C Series Loss Test Set

MANUAL OPERATION

- To remove interchangeable connector adaptor, press button on rear of case and pull off adaptor. This may be easier with a test lead attached.
- To defeat auto power-off**,** hold [POWER] for 3 seconds at turn on until 'ON' and 'Perm' are displayed
- Low battery is indicated with a battery symbol

Power Meter Mode:

- To enter**,** press [POWER METER]
- To select operational wavelength, press [-/+]
- To set reference, press [ABS/REL] and hold [SET REF] for 3 seconds. Meter displays about 0.00 dB R
- To stop / start display update, press [HOLD]
- If a test tone is detected, meter will display 'Hz'
- To toggle log / linear display mode, press [dB/W]
- To display minimum and maximum recorded power for selected wavelength, press [↱] and [Max/Min]. Press [↱] [Max/Min] and hold for 3 seconds to re-start recording.

Light Source Mode:

- To enable source, select [Source].
- To change wavelength**,** press [-/+]
- To activate modulation, press [Mod]
- To change modulation frequency, while source is active press [↱] [KHz] [-/+] [Set] or [Menu].
- To change laser power level, while source is active press [↱] [Level] [-/+] [Set] or [Menu].

AUTOTEST OPERATION

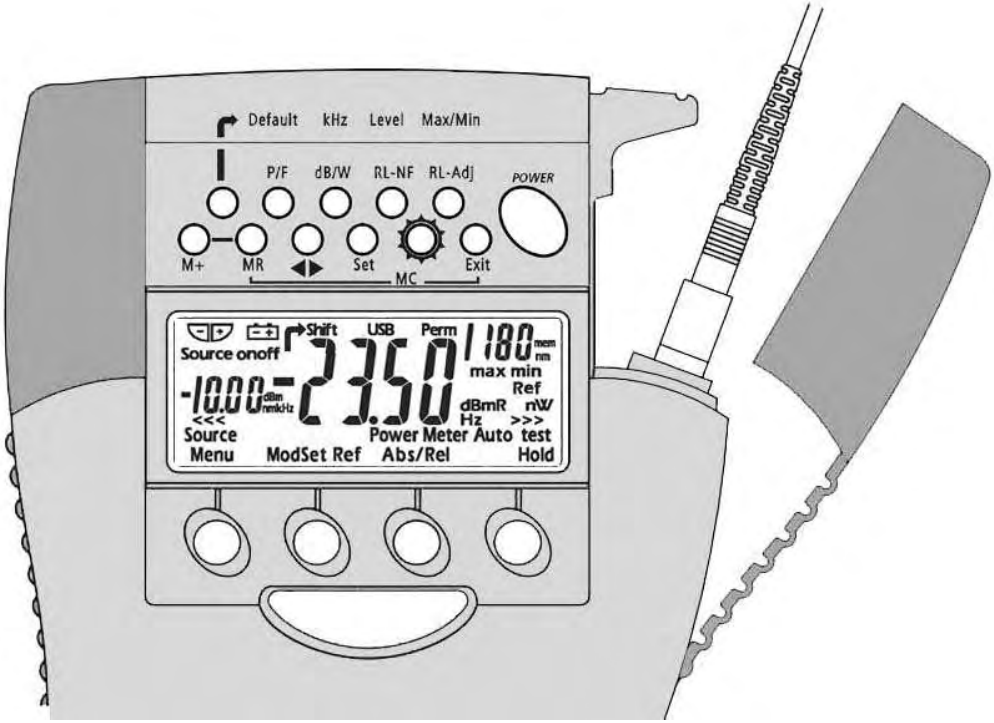
- To initiate Autotest, connect Power Meter section to Light Source section and press [Autotest]
- To show one wavelength only, scroll [-/+]. Press [Menu] to exit.
- Press [Hold] to hold / resume display update.
- Autotest remains for 8 seconds after signal loss, to allow quick connection change
- To exit Autotest, remove test lead for >8 seconds, or on the Light Source, press [MENU]

Measuring One Way Loss in Autotest

- **Reference:** connect Source port to a Power Meter port. Select [Autotest], [Abs/Rel]. Press [Set Ref] for 3 seconds. Meter displays about 0.00 dB R.
- **Loss testing:** after referencing, connect test system to Source and Power Meter ports. Loss will be automatically displayed. Use [-/+] to show one wavelength only.

MEMORY OPERATION

- Data can be stored in all modes, however, memory recall and cancel functions are not available in Autotest and only work in Light Source or Power Meter modes.
- To clear all memory, press both [MR] and [Exit] simultaneously for 3 seconds. 'clr' will display.
- To store in next default location, press [M+].
- To change next store location, press [◄►] [-/+] [Set] or [Menu].
- To recall, press [MR] and [-/+] to scroll memory.
- Exit Autotest and enter Source or Power Meter mode to read or cancel memory
- Autotest memory recall: use [-/+] to scroll wavelengths
- To exit memory display, press [Menu].


Default
kHz
Level
Max/Min
P/F
dB/W
RL-NF
RL-Adj
POWER
M+
MR
Set
MC
Exit
Shift
USB
Perm
Source onoff
max min
Ref
dBmR
nW
Hz
Source
Power Meter Auto test
Menu
ModSet Ref
Abs/Rel
Hold

DISCLAIMER AND 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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Website: http://www.kingfisher.com.au

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