

# Instrument User Manual

KI6512 / T6512 100GBASE LAN WDM-LR4/ER4 Power Meter

## 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.

This Kingfisher International product is guaranteed against defective components and workmanship for a period of 1 year from the date of delivery, unless specifically stated in the original purchase contract or agreement. This warranty excludes optical connectors or incorrect use.

The warranty will be voided if the following instance happens:-

- 1) Dismantling the instrument.
- 2) The instrument has been immersed in water or subjected to extreme environmental conditions.

Liability is limited solely to repair of the equipment.

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## 1. Introduction

The instrument is an easy and economical handheld Wavelength Selective Power Meter for 100GBASE LR4 / ER4 systems.

It scans and stores the absolute or relative power levels of all 4 LR4 / ER4  $\lambda$  in less than 0.8 seconds. These results can be viewed in graphical or numerical form, and stored for later recall or transfer.

It also has a basic dB / dBm power meter for 850, 1310 and 1550 nm on multimode and single mode fiber.

The small instrument has good ergonomics, with a large, sunlight readable and backlit color display, and a well laid out and easy to use front panel.

Data Management Software enables stored test data to be downloaded to PC.

Applications of the instrument include the following:

- $\lambda$  Selective Power Meter for 100GBASE LR4 / ER4 systems.
- Additional power meter for 850 / 1310 / 1550 nm MM/SM.

For application support, please visit [www.kingfisherfiber.com](http://www.kingfisherfiber.com) to see our comprehensive Application Notes written to support instrument users or an updated version of this manual. FAQ can be found in the “Support” section of our website.

Look at [ww.kingfisherfiber.com](http://ww.kingfisherfiber.com) to find distributor and service center details from the Contact Us section.

Otherwise, if you are having difficulties, please feel free to contact [sales@kingfisher.com.au](mailto:sales@kingfisher.com.au) for application support.

## 2. Instrument Features


- Compact, rugged & light weight
- Simple to use
- Fast measurement speed
- Auto display all 4 LR4 / ER4  $\lambda$  simultaneously
- AUX port for 850, 1310, 1550 nm MM / SM
- Backlit, sunlight readable color display
- Numeric or graphical display modes
- Internal memory for 1000 test records
- Test data transfer via USB port
- Programmable auto shut off
- External power / charging via mini-USB port
- LED indicator battery charging status
- 1 year warranty
- Low cost

### 3. Specifications

Parameters	Value		
<b>Technical</b>			
<b>LR4/ER4 port ( SMF ):</b>			
Wavelengths (nm)	Min	Center	Max
Channel 1	1294.53	1295.56	1296.59
Channel 2	1299.02	1300.05	1301.09
Channel 3	1303.54	1304.58	1305.63
Channel 4	1308.09	1309.14	1310.19
Fiber type	SMF		
Damage level (dBm)	+27		
<b>AUX port:</b>			
Wavelengths (nm)	850	1310 & 1550	
Fiber type	50/125 um, MMF	9/125 um, SMF	
Damage level (dBm)	+14.5		
<b>Common for both LR4/ER4 &amp; AUX ports:</b>			
Measurement range (dBm)	-40 ~ +11		
Accuracy (dB)	±1 <sup>1</sup>		
Resolution (dB)	±0.01		
Measurement speed (second)	< 0.8		
<b>General</b>			
Optical connector/ interface	LC/PC		
Display	2.8" Color LCD with backlight		
Display unit	dBm, dB		
Display resolution	0.01 dB		
Memory	1000 records of 18-λ tests in internal memory		
PC interface	Data transfer via USB		
Battery type	Built-in rechargeable Li-Polymer		
Battery life	7 hours		
Auto off function	Programmable (5~600 min after last key pressed)		
Charging time	180 min		
Flat battery performance	Unit works when charging a flat battery		
External power /charging	Via USB port		
Operate / Storage / Relative humidity	-20 ~ 55 °C / -10 ~ 50 °C / ~90% @0~40°C		
Size / Weight	155 x 78 x 34 mm (6.10 x 3.07 x 1.34") / 0.35 kg (0.77 lb)		

Note 1: At -40 ~ +10 dBm, (1295.56, 1300.05, 1304.58, 1309.14nm) ±1.03nm, (1310, 1550nm)±50nm

## 4. Safety

	<p>Take appropriate eye-safe precautions when handling live fibre.</p>
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### **Avoid condensation**

The instrument is resistant to normal dust and moisture, however it is not waterproof. If moisture gets into the instrument, remove the batteries and dry it out carefully for at least one hour before using it again.

### **Storage**

The equipment can be stored at the specified temperatures and relative humidity. Protect the unit from temperature extremes that may cause condensation within it.

Make sure to switch off the instrument whenever it is not in use. Keep the optical connector covered with the dustcover at all time.

## 5. Instrument Layout

Display



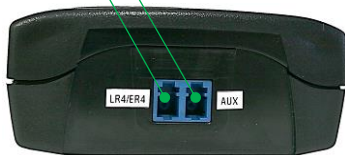
Keypad

Product label



AUX port

LR4/ER4 port



USB connector

Charging indicator



**Note:** The instrument comes with an installed rubber holster

## 6. Operation instructions

### 6.1. General functions of instrument keys

Keypad	Functions
[Backlight]	ON / OFF Instrument, see section 6.2. ON / OFF LCD display backlight, see section 6.3
[PM]	Perform 850, 1310, 1550 nm measurement (AUX port), see section 6.7
[LWDM]	Perform LR4/ER4 measurement – single wavelength display mode, see section 6.4
[SCAN]	Perform LR4/ER4 measurement - multi wavelength display mode, see section 6.5
[dB/dBm]	Select absolute or reference measurement mode, see section 6.8
[Graph]	Display LR4/ER4 measurement result in graphical format, see section 6.6
[Save]	Save LR4/ER4 measurement result to instrument memory, see section 6.9
[Recall]	Retrieve saved data from instrument memory, see section 6.10
[ENTER]	Confirm option selection or data entry
[ESC]	Cancel selection or quit data entry without saving
[Menu]	Instrument setup, see section 6.11
[▲]	Up arrow, “+”/ “-” selection
[▼]	Down arrow, “+”/ “-” selection

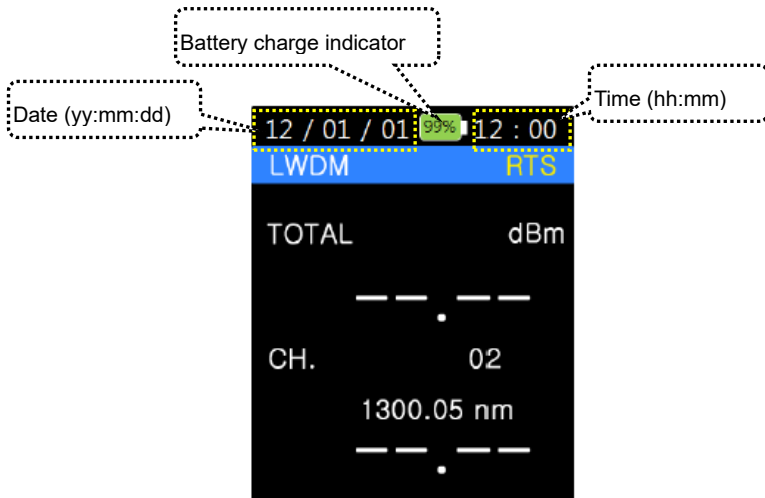


## 6.2. Switching Instrument ON / OFF

To switch **ON** instrument, press and hold [Backlight] until the initialization screen below is displayed, released the keypad.



When initialized, the instrument will be defaulted to LR4/ER4 Measurement – single wavelength display mode; see picture below for instrument display.



To switch **OFF** instrument, press and hold [Backlight]. Instrument will be switched off shortly after the display below is seen.



**KI 6512**

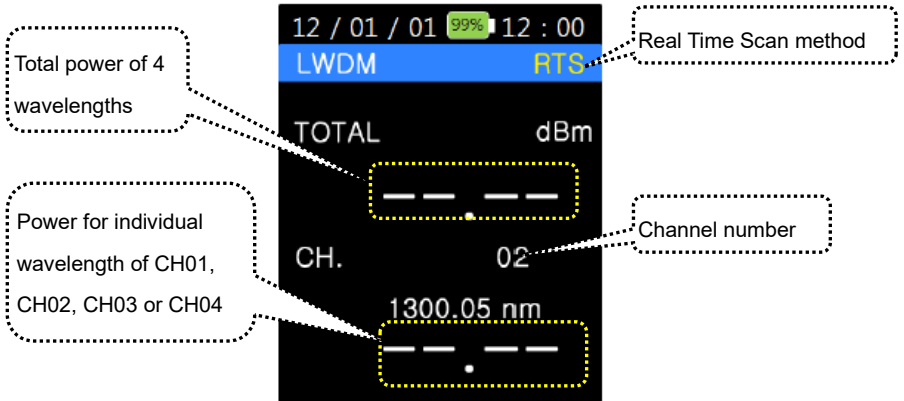
*Powering  
down*

### **6.3. Switch Instrument LCD backlight ON / OFF**

The instrument's LCD backlight can be toggled ON or OFF by pressing [Backlight]. Backlight will turn off automatically approx. 30 seconds after the last key-press.

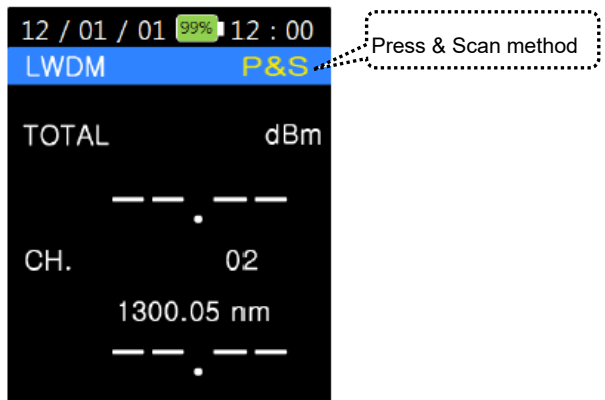
### **6.4. LR4/ER4 Measurement – single wavelength display mode**

Connect a SMF to “LR4/ER4” port (see section 5) of instrument. Press [LWDM] to perform optical power measurement for the LR4/ER4 channels/wavelengths. See below for instrument display.



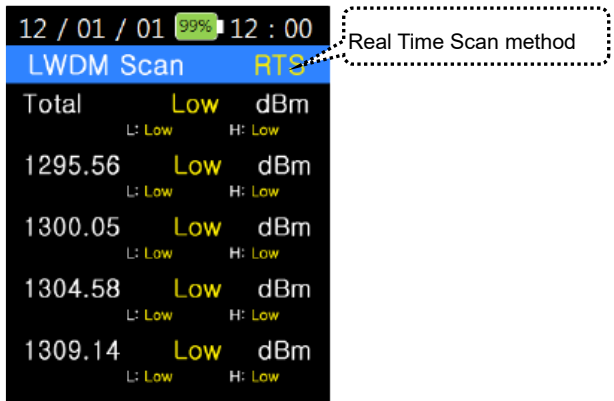
In this mode, the total power for all the four LR4/ER4 channels, and the power for only 1 of the four channels are displayed. Use [▲] or [▼] to change channel.

Measurements method can be switched from RTS (Real Time Scan – continuous strobe) to P&S (Press & Scan - single strobe), see instrument display in P&S method below. See section 6.11.7 for setup selection of RTS/P&S method.



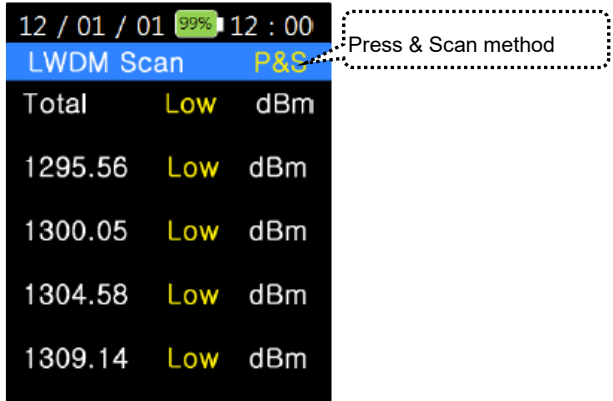
## 6.5. LR4/ER4 measurement – multi wavelength display mode

Connect a SMF to “LR4/ER4” port (see section 5) of instrument. Press [SCAN] to perform optical power measurement for the four LR4/ER4 channels/wavelengths. In this mode, total optical powers of all channels/wavelengths, and power of each individual channel/wavelength are displayed simultaneously, see below for instrument display. If RTS method (see section 6.11.7 for setup selection of RTS/P&S methods) is selected, L (min) & H (max) of the measured powers of each channel/wavelength are displayed too.



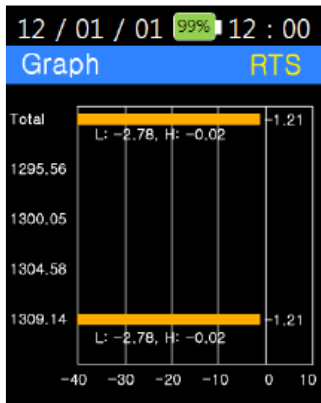
User can choose to display individual channel/wavelengths which had been measured with power only, see section 6.11.8 for Scan Display option setup.

Measurement method can be switched from RTS (Real Time Scan – continuous measurement) to P&S (Press & Scan – one-time measurement, see instrument display of this method below). See section 6.11.7 for RTS/P&S option setup.



## 6.6. Graphical display mode (applicable to LR4/ER4 measurement only)

Press [SCAN] followed by [Graph] to display the optical powers of the LR4/ER4 wavelengths in graphical format, see picture below for an example.

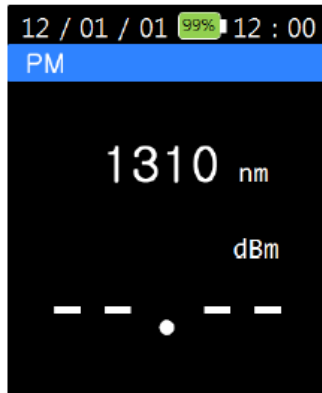


Press [Graph] again will switch the display back to multiple-wavelength format as shown in section 6.5.

**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

## 6.7. 850/1310/1550 nm measurement Mode

Connect a fiber (50/125um MMF for 850nm, 9/125um SMF for 1310 & 1550 nm) to “AUX” port (see section 5) of instrument. Press [PM] to perform optical power measurement. See instrument display below.



Measurement result of 1 wavelength will be displayed at a time. Use [▲, ▼] to change wavelength.

## 6.8. Measurement unit (dB/dBm) Selection

Press [dB/dBm] to toggle between absolute (dBm) and reference (dB) mode. When switching from dBm to dB, the displayed value will become “0.00” and the last meter reading/s will be used as the reference value/s.

## 6.9. Saving Data to Instrument (applicable to LR4/ER4 measurement only)

A maximum of 1000 data records can be saved; each data record contains time stamp, individual & total powers for 4 wavelengths.

Press [SCAN] to display test measurements on instrument, press [Save] to go to the instrument display below. Press [ENTER] to save data or [ESC]

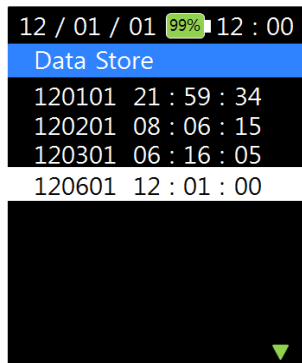
to quit without saving.



**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

## 6.10. Retrieving data saved in instrument

Press [Recall] to go to the display below.

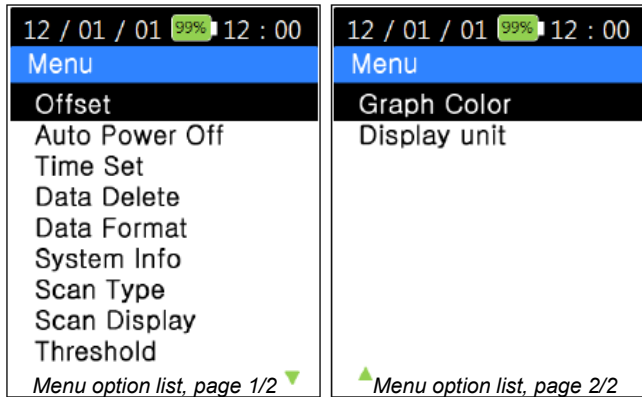


Use [▲, ▼] to highlight the desired data record file followed by pressing [ENTER]. Saved data will be retrieved and displayed on instrument.

Press [Graph] to toggle data display between graphical and tabular (multiple-wavelength) format.

## 6.11. Instrument Setup

Press [Menu] to display the instrument setup options available in 2 pages as show below.



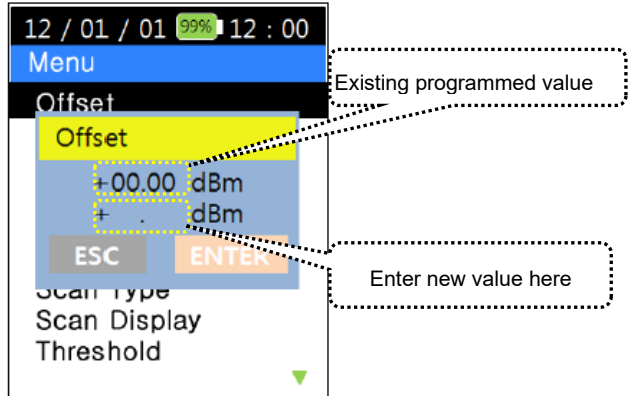
Use [▲, ▼] to scroll between pages and to highlight the option to be selected, press [ENTER] to confirm selection or [ESC] to quit Menu option list.

### 6.11.1. Offset option (applicable to LR4/ER4 measurement only)

Power measurements for LR4/ER4 wavelengths can be offset by a pre-programmed value via this option.

When selected, the instrument display below can be seen.



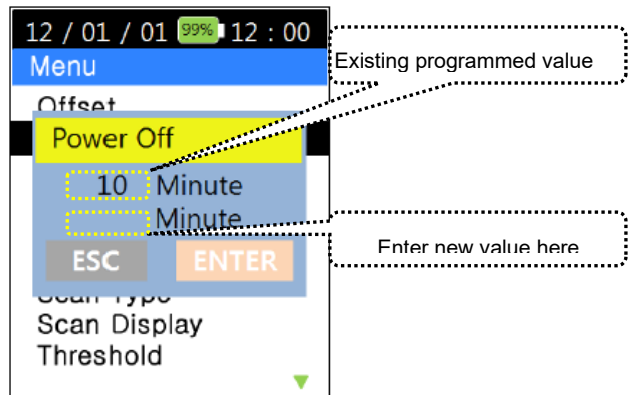


Use numerical keys to input the desired offset value (between -25.99 ~ +25.99 dBm). Use [▲ or ▼] to select “+” or “-” sign. Press [ENTER] to save setting or press [ESC] to return to Menu option list without saving.

**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

### 6.11.2. Auto Power Off option

Use this option to program the time elapsed before instrument is switched off automatically after the last key-press. When selected, the instrument display below can be seen.

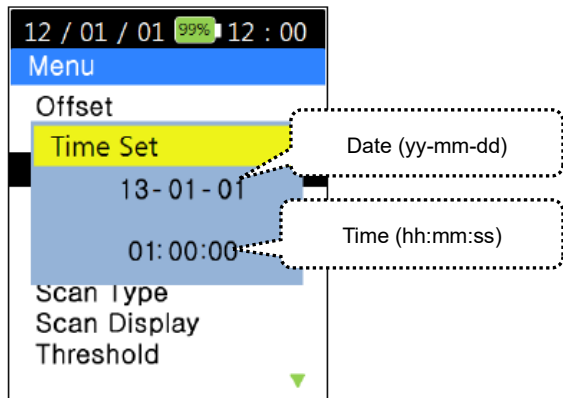


Use numerical keys to input the desired value (between 5 ~ 600 minutes)

and press [ENTER] to save setting or press [ESC] to return to Menu Option list without saving.

### 6.11.3. Time Set option

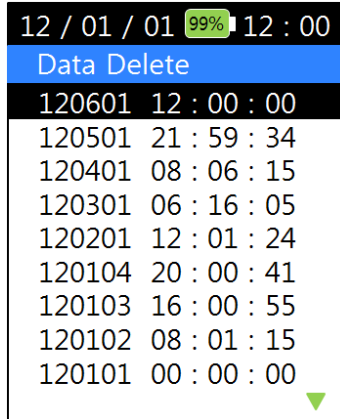
Use this option to set date and time of instrument. When selected, an instrument display below can be seen.



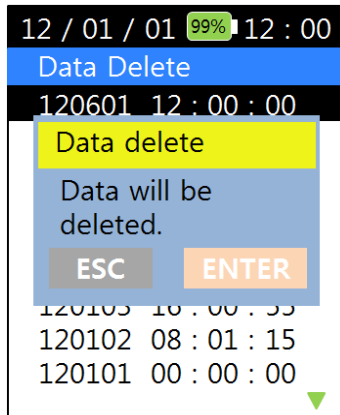
Use the numerical keys to enter date followed by time, and press [ENTER] to save setting or press [ESC] to return to Menu option list without saving.

### 6.11.4. Data Delete option

Use this option to selectively delete data records in instrument memory. When the option is selected, all data records in memory will be listed as below.



Use [▲, ▼] to highlight the data record to be deleted and press [ENTER] to select the data record.

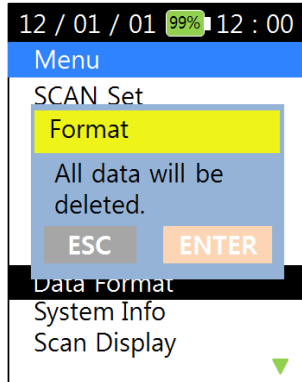


Press [ENTER] to delete or press [ESC] to quit without deleting and return to the data record list.

Press [ESC] to return from data record list to Menu option list.

### 6.11.5. Data Format option

Use this option to delete all data records saved in instrument memory. When selected, the instrument display below can be seen.



Press [ENTER] to proceed or press [ESC] to return to Menu option list without deleting any data record

### 6.11.6. System Info option

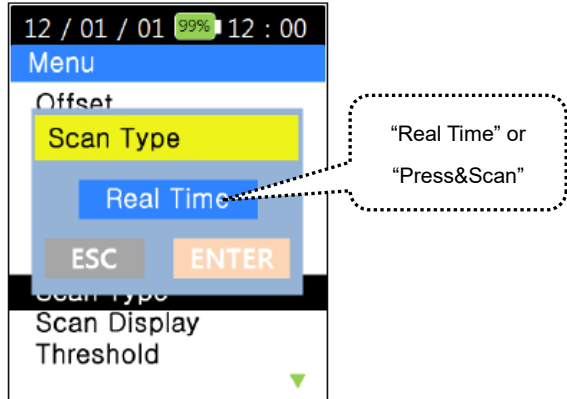
Use this option to display information about the instrument on PN (Part number), SN (Serial Number), HW (Hardware version), FW (Firmware version).

### 6.11.7. SCAN Type option (applicable to LR4/ER4 measurement only)

Use this option to configure instrument to perform measurement in 1 of the 2 methods below;

- i. **RTS** method: Real Time Scan – *continuous measurement*
- ii. **Press &Scan** method: *one time measurement*

When this option is selected, the instrument display below can be seen.



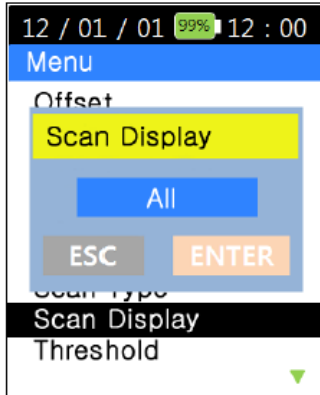
Use [▲, ▼] to select “Real Time” or “Press&Scan”, press [ENTER] to save selection or [ESC] to quite without saving.

**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

### **6.11.8. Scan Display option** (applicable to LR4/ER4 measurement only)

Use this option to configure instrument to display measurement result in 1 of the 2 modes below.

- i. **All mode:**  
Display total power of all channels/wavelength & powers of all the individual wavelengths.
- ii. **Measured mode:**  
Display total power of all channels/wavelength & only individual wavelengths which had been measured with power.

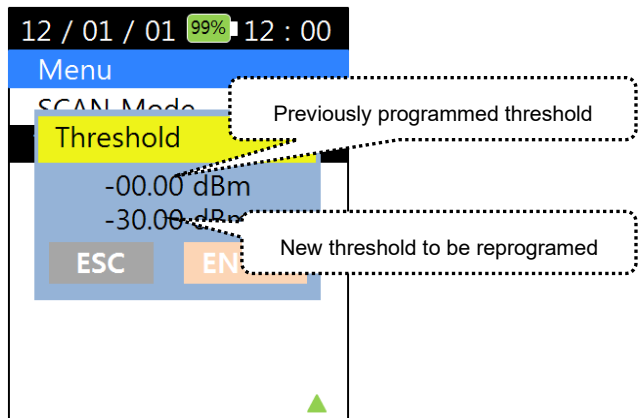


**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

**6.11.9. Threshold option** (applicable to LR4/ER4 measurement only)

Use this option to program the threshold level which is visible when the measurement result is presented in graphical format.

When selected, the instrument display below can be seen.



Use numerical keys to input the desired value. Use [▲ or ▼] to select “+”

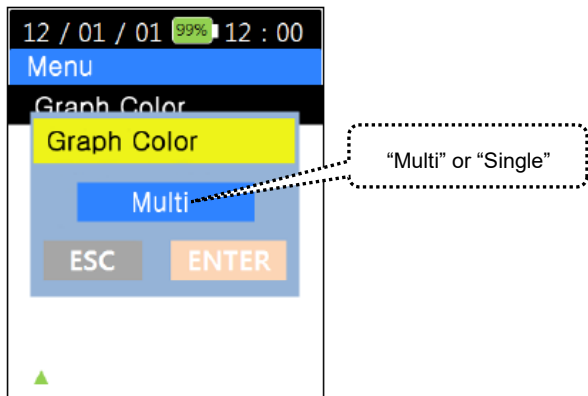
or “-” sign. Press [ENTER] to save setting or press [ESC] to return to Menu option list without saving.

**Note:** This function does not apply to 850, 1310 & 1550 nm measurement.

#### **6.10.10. Graph Color option** (applicable to LR4/ER4 measurement only)

This option provides choices for displaying graphical measurement results in different color format.

When selected, the instrument display below can be seen.



Use [▲, ▼] to select, “Single” (displays peak wavelengths displayed in same color) or “Multi” (peak wavelengths in different colors), press [ENTER] to save setting or [ESC] to quit without saving.

**Note:** This function does not apply to 850, 1310 & 1550 nm measurement

#### **0.11. Display Unit option**

Use this option to configure the instrument to display channels as wavelength or frequency.

When selected, the instrument display below can be seen.




Use [▲, ▼] to select, “Wavelength nm” (channel will be displayed as wavelength) or “Frequency THz” (channel will be displayed as frequency in THz), press [ENTER] to save setting or [ESC] to quit without saving.

## 7. Charging of Instrument

Connect instrument to PC or USB-charger using the provided USB-cable. The Charging indicator LED (see section 5, Instrument Layout) will light up to indicate the charging status as described below;

Red – charging is in progress

Green – instrument is fully charged

The battery indicator,  on instrument display indicates that the instrument is being charged.

**Note:** The instrument with a totally discharged battery is still fully functional while being charged via USB.



## 8. Packaging Content

Item Description	Quantity
Optical WDM-LR4/ER4 Power Meter	1
User manual	1
USB cable	1
CD (Data Management Software)	1
Carry strap	1
Carry pouch	1
Calibration certificate	1
QA certificate	1

## 9. Maintenance

1. Keep the sensor's surface in the optical connector clean and free of dust or other contaminant by cleaning them regularly.
2. Do not use unclean or nonstandard adapters.
3. Change adapter carefully if necessary and keep any spare adapter in dirt/dust free environment.
4. When the instrument is not in use, keep the optical connectors covered with dust caps at all the time. Exposing the sensor for a long period of time will allow dust to be accumulated on surface of the sensor; this will in turn result in measurement inaccuracy.
5. Consider leaving test cords connected to the instrument at all times. This will prolong the life of the instrument's optical connector.