# User's Guide to the FHM2A/B01

## Optical Loss Test Set

**Grandway**

光 维 通 信

LET S GO IN THE GRANDWAY

# User's Guide to the FHM2A/B01

## Optical Loss Test Set

## 1 Introduction

### 1.1 General Description

The FHM series optical loss test set combines a power meter and a dual- wavelength laser source, for optical fiber network installation and maintenance. With the large capacity of data storage, it's very convenient for field testing and transferring the test results to PC through USB interface.

## 1.2 Main Features

≫ Three wavelengths (1310nm and 1550nm) combine in one port;
≫ The output of laser source stables at -5dBm;
≫ Laser source supplies CW and modulated 270Hz, 1KHz, 2KHz output;
≫ Laser source transmits wavelength recognition code;
≫ Optical power meter displays linearity and logarithmic optical power values;
≫ Automatic shifting of measurements in optical power meter;
≫ Automatic wavelength recognition and shifting to the measured wavelength in optical power meter;
≫ Storage of 999 sets of tested data in optical power meter;
≫ Screen backlight;
≫ Rechargeable batteries;
≫ LCD displayer supplies;
≫ Auto- off at low voltage;
≫ Auto-off after 10-min no operation(default);
≫ Display of battery capacity;
≫ Auto shut off of charging

## 1.3 Typical Application

≫ Transmitter optical power measurements( dBm and W)
≫  Fiber-link loss testing (dB)
≫ Componet/ Device insertion loss testing( dB)
≫ Fiber indentifications with 270 Hz, 1 KHz, 2 KHz signals
≫ Fiber intallation and maintenance applications
≫ FTTx: testing of passive optical networks.

## 2 Safety Information

| Warnings! |
|---|
| • Never look directly into optical outputs or a fiber while the equipment is on.Invisible laser beam may damage your eyes. |
| • Do not short-circuit the terminal of AC adapter / charger and  the batteries.Excessive electrical current may cause personal injury due to fumes,electric shock or equipment damage. |
| • Connect AC power cord with the equipment and wall socket properly. While inserting the AC plug, make sure there is no dust or dirt on the terminals and both plugs are fully seated. Incomplete engagement may cause fuming, electric shock or equipment damage and may result in personal injury. |
| • Do not operate the equipment near hot objects, in hot environments, in dusty/ humid atmosphere or when condensation is present on the equipment. This may result in electric shock , product malfunction or poor performance. |

# 3 Preparing for Operation

## 3.1 Unpacking the instrument

**Packing material**
We suggest that you keep the original packing material. Using the original packing material is your guarantee of protecting the instrument during transit.

**Checking the package contents**
The standard accessories of FHM2A/B01 are as follows:
- Main unit(including batteries)
- User's Guide
- Quality Check Report
- Carrying Bag
- Interchangeable FC,SC connector for power meter & fixed FC/PC for laser source.
- Charger/AC Adaptor
- PC software
- USB Connecting Cable

**Checking for damage in transit**
After unpacking the instrument, check to see whether it was damaged in transit. This is particularly likely if the outer casing is clearly damaged. If there is damage, do not attempt to operate the instrument or to repair it without authorization. Doing so can cause further damage and you may lose your warranty qualification.

## 3.2 Rechargeable batteries

There is a battery indicator on the screen to show the remaining charge. There are four states the indicator may show    , full,  with 2 blacks, with 1 black and empty . An empty battery indicator means the power is almost out. (See pictures below)

When the battery charge is too low to supply the necessary power, the instrument will automatically switch off.
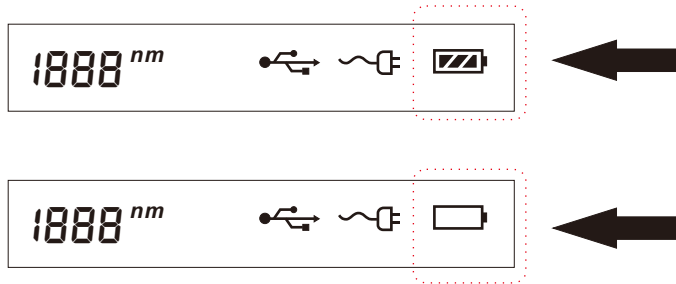
## 3.3 AC adapter operation

There is a DC input jack on the bottom side of the FHM2A/B01 instrument casing into which the output cable of the AC adapter is plugged. And when the AC adapter is plugged in, the indicator on the LCD will be displayed.

$1888^{nm}$
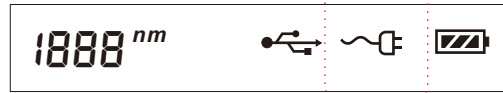
Note:

Make  sure that the operating voltage is within the range of the local AC voltage. eg, Input :AC100-240V,50-60HZ.

Warning: AC adapter supply isn't allowed when "dry batteries" are used in the instrument.

## 4  Specifications

| | | FHM2A01 | FHM2B01 |
|---|---|---|---|
| Power Meter | Calibration wavelength(nm) | 850/1300/1310/1490/1550/1625 | |
| | Connector | Interchangeable FC/SC with PC/APC polishing | |
| | Data storage(items) | 999 | |
| | Display precision(dB) | 0.01 | |
| | Accuracy① | A:±0.2dB±1nW | B:±0.2dB±10nW |
| | Wavelength Recognition | √（input power≥−40dBm） | √（input power≥−20dBm） |
| | Tone Detection | 270Hz/1kHz/2kHz(input power≥−40dBm） | 270Hz/1kHz/2kHz(input power≥−20dBm） |
| | Measuring Range(dBm) | −70 to +10 | -50 to +26 |
| Laser Source | Output wavelength(nm) | 1310/1550 | |
| | Connector | Fixed FC/PC | |
| | Modulation frequencies | 270/1k/2kHz | |
| | Output Power | -5dBm±0.5dB | |
| | Stability Long-term(1h) | ±0.1dB@1310/1550nm | |
| | Stability Short-term(15min) | ±0.05dB@1310/1550nm | |
| | Wavelength Recognizing | √ | |
| General Specification | Auto Power off | √ | |
| | PC interface | USB | |
| | Battery Life | ＞100Hours(laser off) | |
| | Storage Temperature | -20℃~+70℃ | |
| | Operating Temperature | −10℃~+50℃ | |
| | Relative Humidity | ＜90%RH(Non-condensing) | |
| | Dimension(mm) | 168L×76W×43H | |
| | Weight(Gram) | 310 | |
| | Power Supply② | 2pcs *Ni-MH 1.2V,2500mAh; AC/DC Adaptor (Input: AC 100~240V 50/60Hz Output: DC6V/1A) | |

Note:  ① Valid at 1550nm,CW,23±3℃,Relative humidity  70%,with FC/PC connector.
②Don't use AC/DC adaptor and batteries for power supply at the same time.
Before you change the new batteries for meter please fully charge it,If you won't use meter for a long time , take out the batteries.
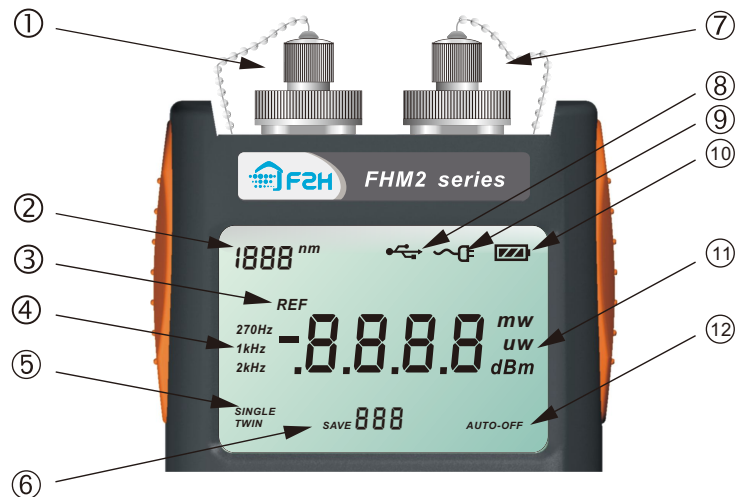
## 5 Getting Started

### 5.1 Introduction of Display, controls panel
#### Keypad

The FHM2A keypad can be divided into two parts, one is used to control light source and the other is used to access a wide range of functions of power meter.
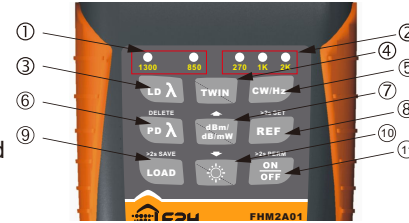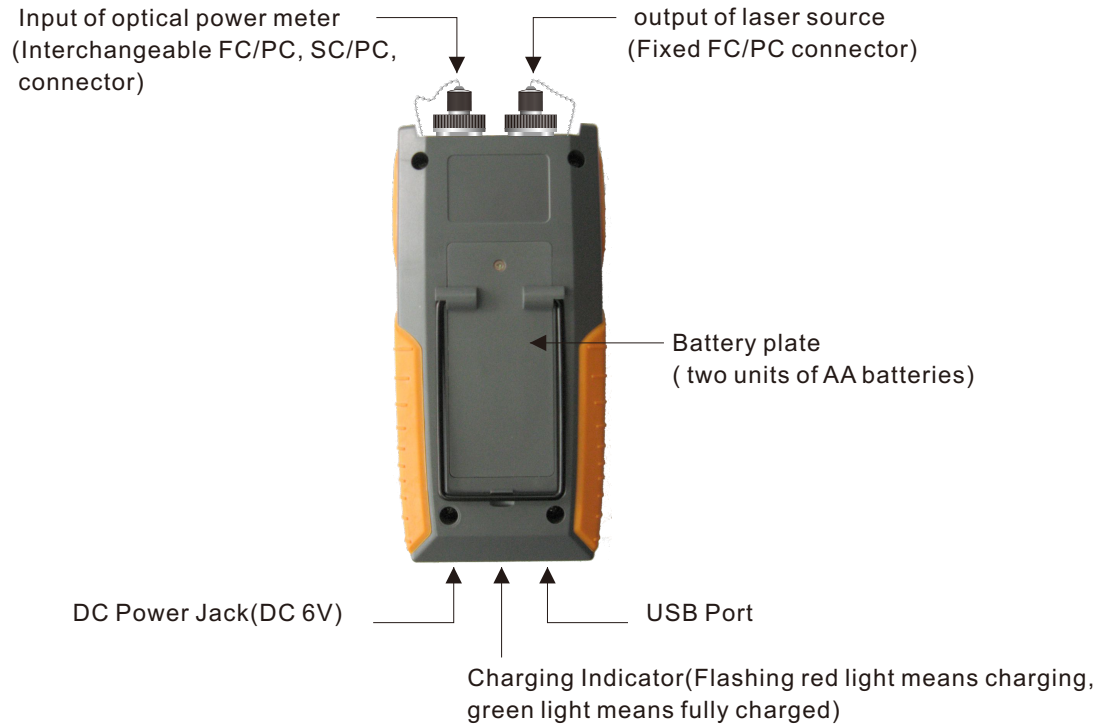


| NO. | Key | Description |
|-----|-----|-------------|
| 1 | ○ 1310  ○ 1550 | LED display of wavelength display on laser source |
| 2 | ○ 270  ○ 1K  ○ 2K | LED display of modulated wavelength display of laser source |
| 3 | LD λ | Wavelength shift key on laser source |
| 4 | TWIN | Switch on/ off the auto-recognition of laser source and power meter |
| 5 | CW/Hz | Modulated frequency and CW shift Key on laser source |
| 6 | DELETE PD λ | Wavelength shift on optical power meter; in "LOAD" mode, it is to delete the value. |
| 7 | dBm/ dB/µW | Unit-shifting key of optical power meter and page-up key in "LOAD" mode |
| 8 | >2s SET REF | Reference value setting key on optical power meter and display current reference value |
| 9 | >2s SAVE LOAD | Load and storage of optical power value |
| 10 | ☼ | Background light key and page-down key in "LOAD" mode |
| 11 | >2s PERM ON OFF | ON/OFF key, long-keypress for over 2 seconds to close the auto-off function |

Laser Source (rows 1-5)
Power Meter (rows 6-11)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫

FHM2 series

1888 nm

REF

270Hz
1kHz
2kHz

-8.8.8.8 mw
uw
dBm

SINGLE
TWIN

SAVE 888

AUTO-OFF

| NO. | LED | Description |
|-----|-----|-------------|
| 1 | *LD* | 1310nm and 1550nm output port(laser source output port) |
| 2 | 850/1300/1310/ 1550/1625nm | Current wavelength tested by the optical power meter |
| 3 | *REF* | Reference value in the optical power meter |
| 4 | 270Hz 1kHz 2kHz | Modulated frequencies identified by optical power meter |
| 5 | **SINGLE** **TWIN** | SINGLE: Auto-wavelength recognition of laser source and optical power meter is off. TWIN: auto-wavelength recognition of laser source and optical power meter is on. |
| 6 | SAVE 888 | Number of the current data in the storage of the optical power meter |
| 7 | *PD* | Input port of optical power meter(optical power meter input port) |
| 8 | ⟿ | State of the USB connection |
| 9 | ⎓ | External power supplier indicator |
| 10 | 🔋 🔋 🔋 🔋 | Signal of battery capacity. Please make the charge when 🔋 flashes to show the insufficient battery capacity.The system shut off automatically when the battery capacity is not enough. |
| 11 | *mw  uw  dBm* | Display of value unit. |
| 12 | **AUTO-OFF** | AUTO-OFF indicator. AUTO-OFF defaults to turn on when the equipment is on. |

Input of optical power meter
(Interchangeable FC/PC, SC/PC,
 connector)

output of laser source
(Fixed FC/PC connector)

Battery plate
( two units of AA batteries)

DC Power Jack(DC 6V)

USB Port

Charging Indicator(Flashing red light means charging,
green light means fully charged)

**5.2 USB interface**

You can use the USB interface to connect the instrument with a PC and download the stored data. There is a socket on the bottom side of the instrument right beside the DC input jack and the  USB cable supplied can be used to connect it to the USB interface of a PC.  When the USB cable is connected, the indicator on the LCD will be displayed.

**5.3 Turning the instrument on and off**

Press the "ON/OFF" key briefly.
The instrument powers on, and backlighting switches on.
Please check the battery capacity if it fails.
Press the "ON/OFF" key briefly again.
The instrument powers off, and backlighting switches off.

## 5.4 Activating the Automatic shutdown function

The instrument powers off automatically if no keypress in 10 minutes.Press the "ON/OFF" key for about 2 seconds to power on the instrument with "Auto-off" function deactivated.

## 5.5 Switching backlighting of the LCD on and off

Press the backlighting key.
Backlighting switches on.
Press the backlighting key again.
Backlighting switches off.
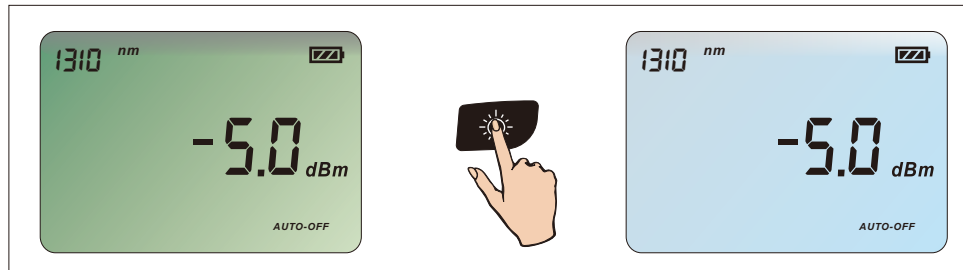
## 6   Measuring the optical power or loss. ( Operation of power meter)

### 6.1   definition of the keys indifferent Mode
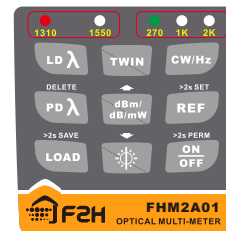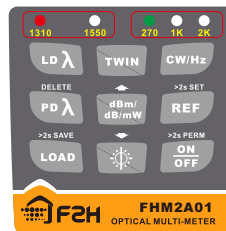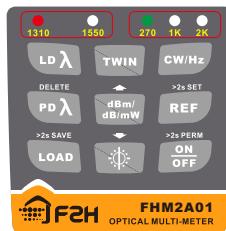


**Key definition in History Data Mode**          **Key definition in Testing Mode**                    **Key definition in Ref. Setting Mode**
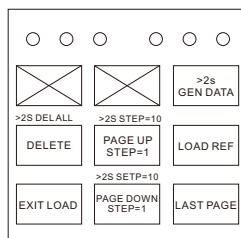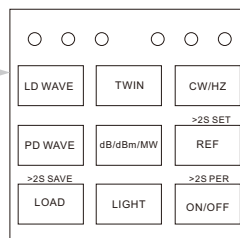
Press **REF** , and operate other keys in 2 seconds to retain "REF" mode, otherwise, it will go back to "Testing Mode"

**ON OFF** to cancle setting

**REF** to save setting
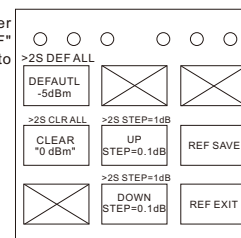
### 6.2 Operating in Testing mode

**6.2.1   The key**  **PD λ** (DELETE)  **for shifting the wavelengths on power meter module.**

Press the **PD λ** (DELETE) to shift among the six wavelengths of 1550nm, 1625nm, 850nm, 1490nm, 1300nm and 1310nm and the corresponding LED will be on. The instrument defaults to 1310nm when it firstly turned on.
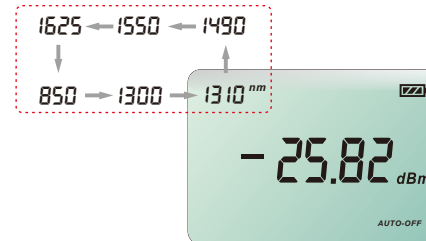


Note: the power meter defaults to auto-recognize the modulated signal of 270Hz, 1kHz and 2kHz and display the signal on the LCD. If the signal is CW, it will not display modulated signal on the LCD.

**6.2.2 the key** [dBm/ dB/mW] **for shifting the units of optical power meter**

The power meter defaults to the unit of "dBm". Press the to shift to "dB" and "mW".

Note: 1). "dB" and "mW" are the unit representing the absolute value of tested power value. If the tested power value is less than 1mW in the unit of "mW", the unit will be shifted to "uW" automatically.

2) "dB" is the relative value of testing power value. Firstly, the user should set a reference value. Then, the current value can be compared by the reference one. The formula is "dB"value equals to "the reference value" minus "the current power value in dBm".
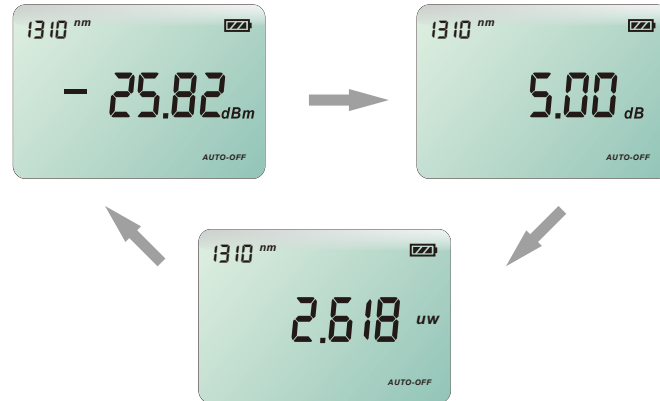
### 6.2.3 The key `>2s SET REF` for setting reference value on optical power meter

The reference value defaults to 0.00dBm on optical power meter module. Long keypress the key for over 2 seconds, the instrument will set the current optical power value as the reference. Short keypress the key is to read the current reference value. The instrument will return to the testing state after two seconds without operation. If there's operation, the instrument will shift to the reference editting state. Please refer to the Second Part of operation.
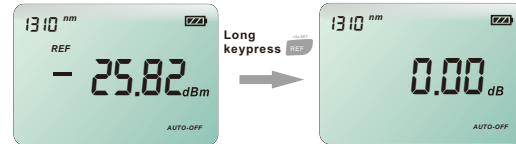
**Note: 1.** Long keypress `REF` for over 2 seconds, the unit will be shifted to "dB" automatically.

**2.** When the input laser power is modulated laser source, it will affect the setting of REF value. Please guarantee the input laser source is CW laser when setting REF value.

### 6.2.4 The key `>2s SAVE LOAD` for loading and storing the optical power values

Long keypress the "load" is to store the current values including the wavelength, values, modulation, states and units being tested. It will list and show the number of the current value from "001" to "999" on the LCD.

Short keypress the key is to check the stored data. The detailed description refers to the Part three of operation enter into the "load" mode("history mode). Press the "load" key again to exit the "history records" mode.
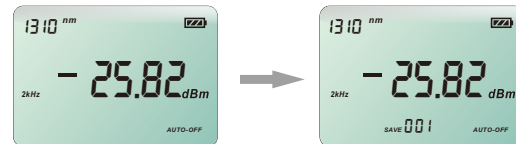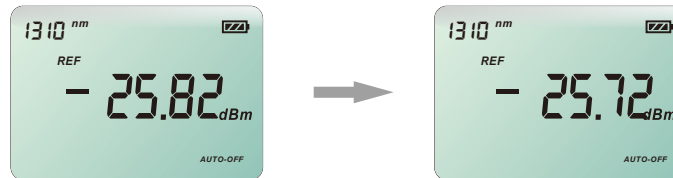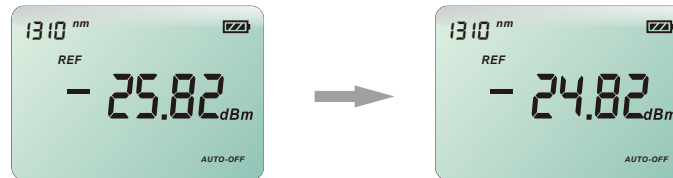
## 6.3  Operating in Ref. Setting mode

Short keypress the key of "REF" is to check the reference value in the current wavelength. If there is no operation, the instrument will return to the testing state automatically after two seconds. If there is any keypress like following operation, the instrument will enter the editting state of reference.

### 6.3.1  " [dBm/dB/nW] " is the key for increasing the reference value

Short keypress  is to increase the current reference value for 0.1dB.

| | |
|---|---|
| 1310 nm  REF  − 25.82 dBm  AUTO-OFF | 1310 nm  REF  − 25.72 dBm  AUTO-OFF |

Long keypress  is to increase the current reference value for 1dB.

| | |
|---|---|
| 1310 nm  REF  − 25.82 dBm  AUTO-OFF | 1310 nm  REF  − 24.82 dBm  AUTO-OFF |

### 6.3.2 " ☼ " is the key for decreasing the reference value.

Short keypress is to decrease the reference value for 0.1dB in the current wavelength.

Long keypress is to decrease the reference value for 1dB in the current wavelength.

### 6.3.3 " LD λ " is the key for setting the reference value to the default one

Short keypress is to set the reference value in the current wavelength to "-5dBm".
Long keypress is to set all the reference values in all wavelengths to "-5dBm".

Note: Setting the reference value to "-5dBm" is to work with the output "-5dBm" of the laser source. Then it can test the attenuation of the circuit.

### 6.3.4 " PD λ " is the key for deleting the reference value

Short keypress is to delete the reference value in the current wavelength to "0.00dBm".
Long keypress is to delete all the reference values in all wavelengths to "0.00dBm".
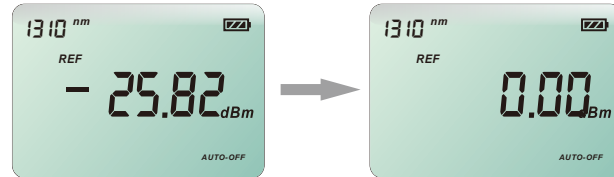
### 6.3.5 " REF " is the key for storing the current reference setting

Press REF is to store the current reference setting in the instrument. The stored data will be saved even the power is cut off. The instrument will return to the measuring state and the unit will return to "dB" after the storage.
Note: the reference value is displayed but not saved before pressing the key "Ref" . No data will be restored if it is not saved by pressing the key before the power is off.

### 6.3.6 " ON OFF " is the key for discarding the reference value of the current setting

Press ON OFF is to discard the reference value of the current setting, and all the setting data are not saved. The instrument will return to the original state. It will back to the measuring state and the unit will be shifted to "dB".

### 6.4  Operating in History Data mode

Short keypress is to check the stored data and enter into the checking state.

### 6.4.1  Press [dBm/dB/mW] is to  page up for checking the data numbered from 001 to 999

e.g. The current value is saved as number 001, short keypress is to check the stored value numbered 999, long keypress for over 2 seconds is to check the stored value numbered 990. Note: if the data are saved less than 10 pieces, long keypressing the [dBm/dB/mW] will make the instrument shift to the last data stored.
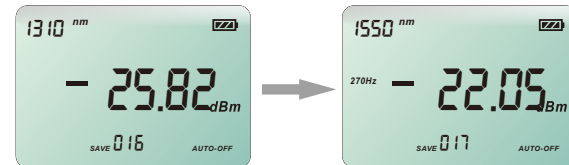
### 6.4.2  Press [☼] is to down the page for checking the data numbered from 001 to 999

e.g. The current value is saved as number 001, short keypress is to check the stored value numbered 002, long keypress  for over 2 seconds is to check the stored value numbered 011.
Note: if the data are saved less than 10 pieces, long keypressing the [☼]    will make the instrument shift to the very first data stored.
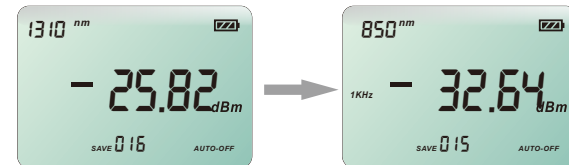
### 6.4.3 [ON/OFF] is the key for checking the last stored data

Press the [ON/OFF] , you can check the last stored data directly.

### 6.4.4 [REF] is the key for checking the reference value of current stored data

If the unit of the stored data is "dB", there must be the reference value corresponding to the stored data. Press [REF] is to check that reference value. If the value is not "dB", it displays "----" on the LCD, which means there are no reference.
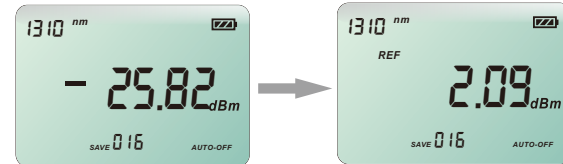
### 6.4.5 [PD λ] is the key for deleting the stored data

Short keypress the [PD λ] is to delete the current stored data displayed on the LCD. Then, the next piece of stored data will be displayed on the LCD. If the data deleted is the only data being saved in the storage, the instrument will return to the measuring state.
Long keypress the [PD λ] is to delete all the stored data and the instrument will return to the measuring state.

### 6.4.6 [LOAD] is the key for exiting the History Data mode

Press [LOAD] is to exit the history data mode and back to the measuring state.

## 7  Operating of Laser Source

### 7.1  The key [LD λ] for shifting wavelengths on laser source module.

Laser source module defaults to be closed when the user turns on the equipment. Press the [LD λ],
the wavelength LED of 1310nm,  1550nm will be on circularily or the wavelength LED will be off.
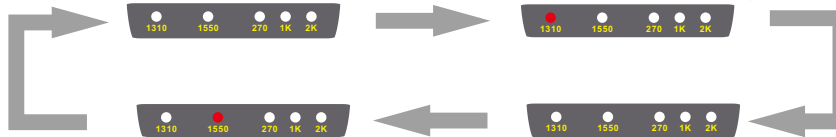


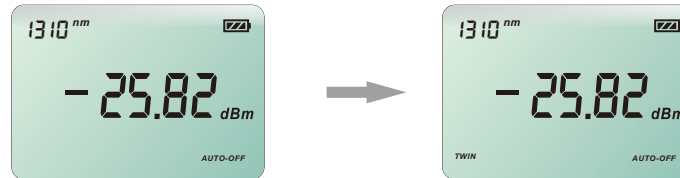Note: It is suggested to turn off the laser source module to save the power of the instrument.

### 7.2 the key [CW/Hz] for shifting modulated wavelength and CW on laser source module.

When the laser source works on any wavelength of 1310nm and 1550nm, press  to select the
modulation of 270Hz, 1kHz and 2kHz circularly and the LED of modulated wavelength will be on
correspondingly. Pressing the key can also turn off the modulation and shift to the CW. Note: the
operation of  cannot work in the condition that the laser source module on FHM2A/B01 is closed.
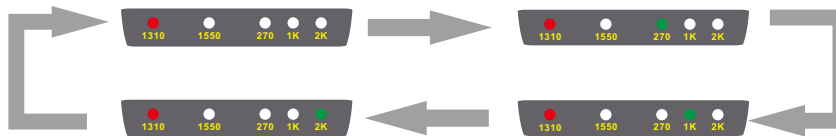
**7.3  The key** TWIN **for switching on or off the auto-recognition code of laser source and power meter**

The auto-recognition and shifting of wavelength can be realized if the FH series intruments are used. Press  is to turn on the auto-recognition code and "TWIN" will be displayed on the LCD. Press  again is to turn off the code.

Note: 1). the code of "TWIN" is on or off at the same time in the laser source and power meter modules of the FHM2A/B01.
2). It is suggested to turn off the "TWIN" code when you don't use it. The output of laser source will be fluctuated.
 3). The function of "TWIN" and Modulation cannot work together. When the "TWIN" is on, modulation of laser source module is closed automatically.
4). Wavelength will be shifted automatically according to the recognition when the "TWIN" of power meter module is on. In another word, the modulated signal of 270Hz, 1kHz and 2kHz cannot be recognized and received at the moment.

## 8 Maintenance

➢  Please disconnect the AC adapter/charger and cover the protective dust cap once you finish using.

➢  It is recommended to clean the connector of the instrument and the patchcord when they get dirty through use. Optical cleaning pads and anhydrous alcohol is recommended. And please be careful not to get the detergent inside the instrument.

## 9 Warranty

**One Year Limited Warranty**
**Grandway** products are warranted against the defective components and workmanship for a period of one year from the date of delivery to the original customer. Any product found to be defective within the warranty period would be returned to **Grandway** authorized service center for repair, replacement and calibration.

**Exclusions**
The warranty on your equipment shall not apply to defects resulting from the following:
- Unauthorized repair or modification including battery replacement
- Misuse, negligence, or accident

**Returning Product**
To return product, you may contact Grandway to obtain additional information if necessary. To serve you better, please specify the reasons for the return.
All delivery and mails should be sent to the following address:

Grandway Customer Service
6F, Xin'an building No. 99 Tianzhou Road
Shanghai, 200233  P.R. China

## Contact Us

Tel:        0086-21-54451260/61/62/63
Fax:        0086-21-54451266
E-mail:    overseas@grandway.com.cn
Technical support e-mail: gwservice@grandway.com.cn
Website:  www.grandway.com.cn