



**VIavi**

# **ORL-85/ORL-85P**

## **SmartClass™ Fiber Optical Return Loss Meters**

### **Operating manual**

BN 2311/98.21

2019.06

English

Please direct all inquiries to your local Viavi sales company. The addresses can be found at:

[www.viavisolutions.com/en-us/contact-sales-expert](http://www.viavisolutions.com/en-us/contact-sales-expert)

A description of additional instrument features can be found at:

[www.viavisolutions.com/en-us/products/network-test-and-certification](http://www.viavisolutions.com/en-us/products/network-test-and-certification)

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Viavi Solutions Deutschland GmbH  
Arbachtalstraße 5, D-72800 Eningen u. A.

Order no.: BN 2311/98.21

Version: 2019.06

Previous version: 2019.03

## **Notes:**

Changes may be made to specifications, descriptions and delivery information.

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# 1 INTRODUCTION

## ORL-85/ORL-85P Return Loss Meter

The SmartClass™ Fiber ORL-85 (optical return loss meter) is a high-performance, easy-to-use instrument for field, laboratory, and production use. It combines three different functions in one field-optimized instrument, including an optical return loss meter, an optical power meter, and a four times wavelength light source.

Up to four lasers with built-in optical isolators are combined to the angled physical contact (APC) optical output, providing easy return loss measurements. High-precision fiber couplers and an automatic zeroing function guarantee outstanding measurement accuracy.

The light source function enables measurements at four wavelengths simultaneously by using sophisticated digital signal processing.

### Optical Return Loss Meters

Several methods can be used to measure Optical Return Loss. The most common methods use either an optical continuous wave reflectometer or an optical time domain reflectometer.

### Optical Continuous Wave Reflectometer (OCWR)

The optical continuous wave reflectometer launches light into the fiber under test and collects backscatter information as well as Fresnel reflections. The light received by the optical continuous wave reflectometer corresponds to the reflected power according to the injected light.

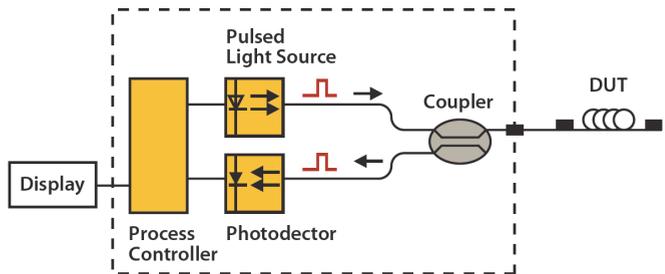


Fig. 1 Patch cord microscope components

## Operating manual update

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Continuing enhancement and further development of the SmartClass family may mean that this operating manual does not cover all the latest functions of your instrument.

If the operating instructions about features supported by your instrument are missing, please visit the Viavi web site to check if additional information is available.

### **To download the latest user manual:**

1. Visit the Viavi web site at <http://updatemyunit.net>.
2. Select your SmartClass™ Fiber model from the product line.
3. Open the download area and download the latest user manual.

## Symbols used in this operating manual

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Various elements are used in this operating manual to draw attention to special meanings or important points in the text.

### Symbols and terms used in warnings

The following warnings, symbols and terms are used in this document in compliance with the American National Standard ANSI Z535.6-2011:

#### NOTICE

Follow the instructions carefully to avoid **damage to or destruction of the instrument**.

#### CAUTION

Follow the instructions carefully to avoid a low or medium risk of **injury to persons**.

#### WARNING

Follow the instructions carefully to avoid **severe injury** to persons.

#### DANGER

Follow the instructions carefully to avoid **death or severe injury** to persons.

---



#### High voltage

Follow the instructions carefully to avoid **damage** to the instrument or **severe injury** to persons.

This safety instruction is given if the danger is due to **high voltage**.

---



#### Laser

Follow the instructions carefully to avoid **damage** to the instrument or **severe injury** to persons.

This safety instruction is given if the danger is due to **laser radiation**. Information specifying the laser class is also given.

---

### Warning format

All warnings have the following format:

#### WARNING

#### Type and source of danger

#### Consequences of ignoring the warning.

- ▶ Action needed to avoid danger.
-

The following elements are used in this operating manual:

✓	<p><b>Requirement</b></p> <p>This requirement must be met first; e.g.</p> <p>✓ The system is switched on.</p>
▶ 1. 2.	<p><b>Instruction</b></p> <p>Follow the instructions given (the numbers indicate the order in which the instructions should be followed); e.g.</p> <p>▶ Select mode.</p>
<i>Italics</i>	<p><b>Result</b></p> <p>Indicates the result of following an instruction; e.g.</p> <p><i>The page opens.</i></p>
<b>Boldface</b>	<p><b>Pages, controls, and display elements</b></p> <p>Screen pages, controls, and display elements are indicated in <b>boldface</b>.</p>
Text in blue	<p><b>Cross references</b></p> <p>Cross references are indicated in blue type. When using the PDF version, just click on the blue text to skip to the cross reference.</p>
[]	<p><b>Instrument keys</b></p> <p>Instrument keys are indicated within square brackets.</p>
[More]	<p><b>Touchscreen buttons</b></p> <p>Touchscreen buttons are indicated within blue square brackets.</p>

## 2 SAFETY INFORMATION

### Warning symbols on the unit

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#### Warning symbols indicating a potential hazard

- ▶ In all cases where the unit is labeled with a warning symbol, the operating manual must be consulted to learn more about the nature of the potential hazard and any action that must be taken.

### Proper usage

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This instrument is intended for measurements on optical fiber devices and systems.

- ▶ Please make sure the instrument is not operated outside the permitted ambient conditions.
- ▶ Always make sure that the instrument is in proper working order before switching it on.

## Laser safety

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### **⚠ WARNING**

#### **Dangerous laser radiation**

**Laser radiation can cause irreparable damage to eyes and skin.**

The maximum permitted power for the ORL-85 means that the optical input signals can reach hazard level.

Bear this in mind when using the ORL-85. In particular, the instrument is equipped with a through channel that transmits all the optical radiation from the input to the output without attenuation, even when the ORL-85 is switched off.

- ▶ Please note that also in broadband mode light is emitted at the unconnected port.
  - ▶ This device is a Class 1 laser product according to DIN EN 60825-1:2007.
  - ▶ Always be aware of the hazard level of the instrument to be connected.
  - ▶ Connect all optical fibers before switching on the radiation source.
  - ▶ Switch off the laser source before disconnecting the optical fibers.
  - ▶ Never look directly into the unconnected port of the instrument, the output of a laser source, or an optical fiber connected to a source or a system.
  - ▶ Always cover unused ports.
  - ▶ Be aware that the emitted light is not visible.
  - ▶ Heed the normal precautions for working with laser radiation and consider local regulations.
-

## Battery operation

---

### **⚠ WARNING**

#### **Explosion danger**

**Short-circuiting the batteries can result in overheating, explosion, or ignition of the batteries and their surroundings.**

- ▶ Never short-circuit the battery contacts by touching both contacts simultaneously with an electrical conducting object.
  - ▶ Only use AA size dry batteries or rechargeable batteries.
  - ▶ Make sure the batteries are inserted with the correct polarity.
- 

## Ventilation

---

### **NOTICE**

#### **Insufficient ventilation**

**Insufficient ventilation can damage the instrument or adversely affect its function and safety.**

- ▶ Ensure adequate ventilation when operating the instrument.
-

## PS4 Universal AC/DC Power Supply

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### Safety class

The PS4 Universal AC/DC Power Supply unit has a protective isolation that conforms with IEC 60950.

### Environmental conditions

#### NOTICE

##### **Ambient temperature too high/low**

**Temperatures outside the operating range of 0 to +40 °C can damage the PS4 Universal AC/DC Power Supply or adversely affect its function and safety.**

- ▶ Only operate the PS4 Universal AC/DC Power Supply indoors.

*The PS4 Universal AC/DC Power Supply must only be operated at ambient temperatures between 0 and +40 °C.*

#### NOTICE

##### **Insufficient ventilation**

**Insufficient ventilation can damage the PS4 Universal AC/DC Power Supply or adversely affect its function and safety.**

- ▶ Ensure adequate ventilation when operating the PS4 Universal AC/DC Power Supply.

#### NOTICE

##### **Condensation**

**Operation in the presence of condensation can damage the PS4 Universal AC/DC Power Supply or adversely affect its function and safety.**

- ▶ Do not operate the PS4 Universal AC/DC Power Supply if condensation has formed.
  - ▶ If condensation cannot be avoided, such as when the PS4 Universal AC/DC Power Supply is cold and is moved to a warm room, wait until the PS4 Universal AC/DC Power Supply Unit is dry before plugging it into the AC power line.
-

## 3 GETTING STARTED

### Unpacking the instrument

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#### Packing material

We suggest that you keep the original packing material. It is designed for reuse (unless it is damaged during shipping). Using the original packing material ensures that the instrument is properly protected during shipping.

#### Checking the package contents

- ▶ Unpack the instrument and check the package contents. For more information see ["Included items" on page 89](#).

#### Checking for shipping damage

After you unpack the instrument, check to see if it was damaged during shipping. This is particularly likely if the packaging is visibly damaged. If there is damage, do not attempt to operate the instrument. Doing so can cause further damage. In case of damage, please contact your local Viavi sales company. Addresses can be found at [www.viavisolutions.com](http://www.viavisolutions.com).

#### Recovery following storage/shipping

Condensation can occur if a instrument that is stored or shipped at a low temperature is brought into a warm room. To prevent damage, wait until no more condensation is visible on the surface of the instrument before powering it up. Do not operate the instrument until it has reached its specified temperature range and wait until it has cooled down if the instrument was stored at a high temperature (see ["Ordering Information" on page 89](#)).

## Instrument overview



Fig. 2 Front view ORL-85

- |   |  |
|---|--|
| 1 | Connector interface  |
| 2 | Test head cover (green for APC connectors)                     |
| 3 | 3.5 inch touchscreen   |
| 4 | Key pad (operator control panel)                               |
| 5 | Battery compartment and stand (on rear of instrument)          |
| 6 | USB 2.0 device port (Type Micro-B)                             |
| 7 | USB 2.0 host port (Type A) and external power supply connector |
| 8 | Ethernet port (RJ-45)  |

## Connector panel



Fig. 3 Connector panel

- |   |                   |
|---|-------------------|
| 1 | Optical connector |
|---|-------------------|



Fig. 4 External power supply connector and communication interfaces

1	Ethernet port (RJ-45)
2	External power supply connector
3	USB 2.0 host port (Type A)
4	USB 2.0 device port (Type Micro-B)

### Power supply

The following power sources can be used to operate the ORL-85:

- Eight 1.5 V dry batteries (Mignon AA size, alkaline type recommended)
- Eight 1.2 V NiMH rechargeable batteries (Mignon AA size, no internal charge)
- PS4 Universal AC/DC Power Supply (optional)
- RBP2 Li-Ion Battery Pack (optional)

**NOTE:** Best Measurement accuracy is achieved when the measurements are performed in battery mode (w/o AC adapter).

## Battery operation

### **⚠ WARNING**

#### **Dangers when handling batteries**

**Handling batteries may be dangerous. Please note the following safety instructions.**

- ▶ Please note the battery operation safety information in the chapter “Battery operation” on page 12.

#### **Replacing batteries**

- ▶ Do not replace individual batteries. Always change all eight batteries at the same time.
- ▶ Always use eight batteries of the same type; i.e. do not mix rechargeable and non-rechargeable batteries.

### **Replacing batteries**



Fig. 5 Replacing the batteries

- |          |                          |
|----------|--------------------------|
| <b>1</b> | RBP2 Li-Ion Battery Pack |
| <b>2</b> | Latch lock               |
| <b>3</b> | AA battery tray          |

The battery compartment is on the back of the instrument.

1. Press down the latch to release and to open the lid of the battery compartment.
2. Insert new batteries in the tray or remove the used batteries from the tray and replace all eight with fresh ones.

**NOTE:** Take care to insert the batteries correctly. The correct polarity is indicated by a diagram inside the battery compartment.

– or –

Insert new or replace the RBP2 Li-Ion Battery Pack.

– or –

Switch from non-rechargeable batteries to rechargeable ones by replacing the battery tray with a new battery pack (or vice versa).

3. Close the battery compartment.
4. Press the **[⏻]** key to switch on.

### Recharging the batteries

The rechargeable RBP2 Li-Ion Battery Pack is recharged when the PS4 Universal AC/DC Power Supply is being used to power the instrument. The instrument switches to trickle charging automatically as soon as the RBP2 Li-Ion Battery Pack is fully charged.

**NOTE:** Rechargeable AA batteries will not be recharged in the instrument. For AA-type rechargeable batteries please use an external charger.

It is not possible to charge the rechargeable AA batteries or the RBP2 Li-Ion Battery Pack via the USB interface.

The instrument is powered by the PS4 Universal AC/DC Power Supply if the PS4 Universal AC/DC Power Supply and the USB interface are both connected.

### Deep discharge

A rechargeable battery that appears to be dead (unit will not turn on even when connected to external power) may well be in a deep discharge state. It can be fully charged with the following charging cycle:

1. Plug in the power cord for 1–1.5 hours.

*Battery should be partly charged now.*

2. Switch the power on.

*If the instrument starts: Let the battery fully charge.*

– or –

*If the instrument does not start:*

Unplug power cord, plug it back in and repeat steps 1 and 2.

**NOTE:** If the battery is completely deep-discharged, this cycle might need to be repeated up to 3 times.

### General tips on using batteries

- Always handle batteries with care.
- Do not drop or damage the batteries or expose them to excessively high temperatures.
- Do not store the batteries for more than one or two days at very high temperatures (e.g. in a vehicle), either separately or inserted in the instrument.
- Do not leave discharged batteries in the instrument for a long time if it is not being used.

### Other basic safety precautions are as follows:

- Do not use PS4 Universal AC/DC Power Supply outdoors or in wet or damp locations.
- Connect the PS4 Universal AC/DC Power Supply to the correct mains voltage, as indicated on the rating label.
- Do not allow anything to rest on the power cord, and do not place the product where people can walk on the power cord.
- Avoid using this product during electrical storms. There may be a remote risk of electric shock from lightning.
- Do not use this product in the vicinity of a gas leak or in any explosive environment.
- Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous, high voltage points, and other hazards. Contact qualified service personnel for all service.

## Environmental protection

Please dispose of any unwanted dry batteries and rechargeable batteries carefully. They should also be removed from the instrument if it is to be discarded. If facilities in your country exist for collecting such waste or for recycling, please make use of these rather than throwing the batteries in with normal trash. You will often be able to return used batteries to the place where you purchase new ones. Any dry or rechargeable batteries that you purchased from Viavi can be returned to one of our Service Centers for disposal.

## Operation from AC power

**NOTE:** Only the PS4 Universal AC/DC Power Supply may be used to operate the ORL-85 from AC power.

### To fit the AC line plug adapter:

1. Select the appropriate AC line plug adapter.
2. Slide the AC line plug adapter into the slot.  
*The PS4 Universal AC/DC Power Supply is ready for use.*

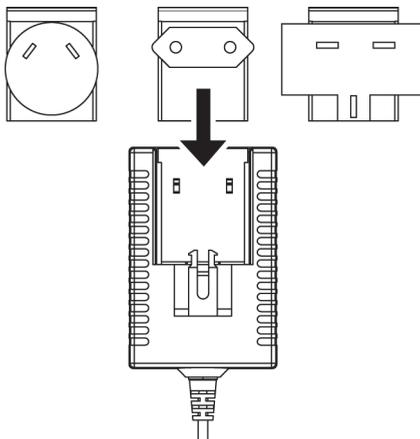


Fig. 6 PS4 Universal AC/DC Power Supply

### To change the AC line plug adapter:

1. Squeeze both sides of the PS4 latch lock (see Fig. 6).
2. Push the AC line plug adapter upwards.
3. Slide a different AC line plug adapter into the slot (see Fig. 7).

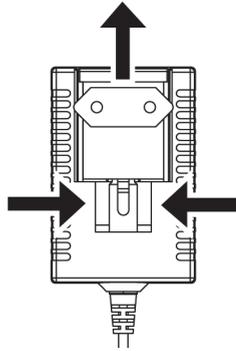


Fig. 7 PS4: Changing the AC line plug adapter

### To operate the ORL-85 from AC power:

1. Connect the PS4 DC power cord to the ORL-85 external power supply connector.  
(The connector is under the cover on the right side.)
2. Plug the PS4 into the AC line socket.  
*The ORL-85 switches on automatically when powered from the PS4.*

**NOTE:** The PS4 provides power even if dry or rechargeable batteries are inserted in the instrument.  
The ORL-85 cannot be powered via the USB interface.

## Connecting optical cables

---

### Mounting test adapters

Viavi provides a number of test adapters for connecting the ORL-85 to the interface to be tested.

You can connect all standard optical connector types to the instrument using these adapters. The test adapters are suitable for connectors with planar (PC) and angled end surfaces (APC). Contact your local Viavi sales company for available adapter types.

The ORL-85 connector type is APC for all versions. Please verify that the patch cord used to connect the ORL-85 has an appropriate connector type.

APC: BN2311/21/23

The PC/APC versions are easily identified by the colors of the name labels on the front:

- PC = blue
- APC = green

**NOTE:** Only single mode fibers (SMF) may be connected to the ORL-85.

**To mount the SENKO test adapter:**

- ✓ The optical connectors are properly cleaned (see “Cleaning the test port” on page 77).
- 1. Open the head cover and remove the protective cap (if still mounted).
- 2. Unscrew the SENKO test adapter and pull it off vertically.
- 3. Place the SENKO test adapter vertically on the optical connector.
- 4. Fix the SENKO test adapter with two screws.
- 5. Repeat the procedure if the instrument is equipped with two ports.
- 6. Fit the fiber optic cable to the test adapter or close the head cover.



Fig. 8 Mounting the SENKO test adapter

## 4 BASIC OPERATION

### Switching the instrument on/off

---

**To switch the instrument on:**

- ▶ Press the [⏻] key to switch on the instrument.

**To switch the instrument off:**

- ▶ Press the [⏻] key to shift the instrument into hibernate mode.
  - or –
  - 1. Hold the [⏻] key to open the power off menu.
  - 2. Tap the [Power Off] button or press the central key to switch off the instrument.

### Operator control panel

---

	Press to go to the homescreen.
	Press to open menu.
	Press to go back within an application or cancel input.
	Press to toggle between the inspect view and the test view.
	Press to switch the instrument on and off. LED glows green when the instrument is on.
	Press an arrow key to: <ul style="list-style-type: none"> <li>• navigate through the menus</li> <li>• change values in the menus</li> </ul> Press the central key to: <ul style="list-style-type: none"> <li>• confirm the selection</li> </ul>
	Press to save results.
	Glows red when battery is low.
	Glows red when a measurement is running in the background.
	Glows orange when battery is charged; flashes orange when battery is charging. Turned off when dry batteries are used or battery bay is empty.

## Menus and display elements

### Home screen

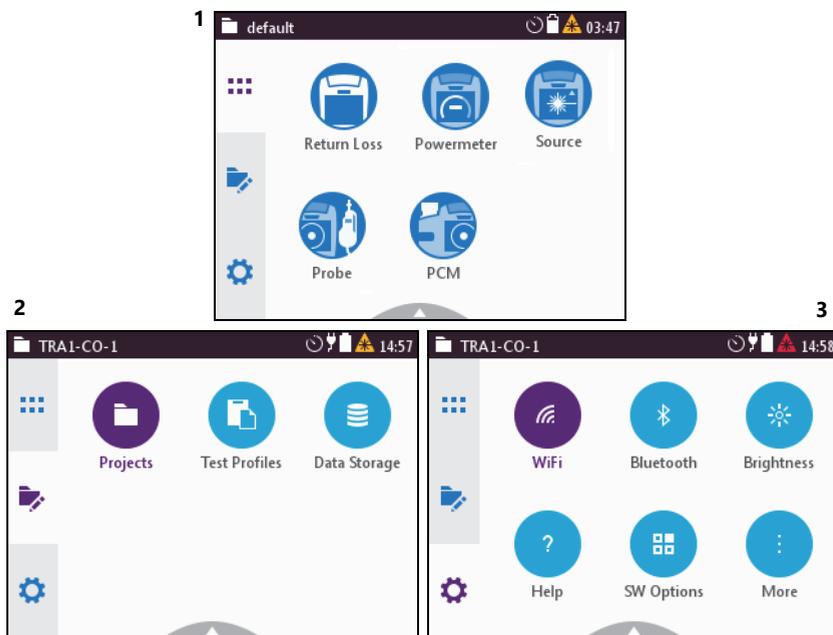


Fig. 9 Home screens: Test applications (screen shows PCM version) (1), Management (2), Settings (3)

	Menu	See page
	<b>Test applications</b> In this menu you can open test applications.	25
	<b>Management</b> In this menu you can: <ul style="list-style-type: none"> <li>• manage projects</li> <li>• define a test profile (not supported yet)</li> <li>• get access to stored data</li> </ul>	35 and 70
	<b>Settings</b> In this menu you can: <ul style="list-style-type: none"> <li>• manage WIFI and Bluetooth settings</li> <li>• change instrument settings</li> <li>• open the help</li> <li>• display instrument information</li> <li>• manage software options</li> </ul>	28

## Test applications

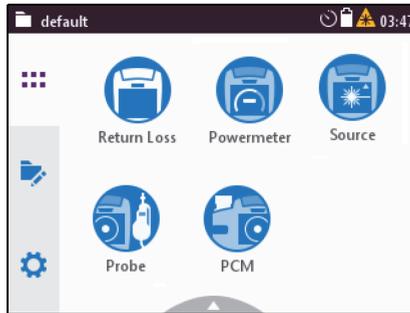


Fig. 10 Test applications (screen shows PCM version)

	<b>Application</b>	<b>See page</b>
	<b>Return Loss</b> To determine the total amount of optical return loss of a fiber link.	38
	<b>Powermeter</b> To install and maintain cables and networks with the broadband power meter.	43
	<b>Source</b> To edit the laser for maintenance and characterization of single-mode and multi-mode networks.	50
	<b>Probe</b> To view and inspect the bulkhead (female) connectors.	60
	<b>PCM (Patch Cord Microscope) (only BN 2326)</b> To view and inspect the patch cord connector of the fiber.	60

## Elements in the top bar

	<p><b>Project title</b> Indicates the title of the active project</p>
	<p><b>WiFi</b> Indicates that Wifi is installed. It does not indicate an active Wifi connection.</p>
	<p><b>Bluetooth</b> Indicates that Bluetooth is installed. It does not indicate an active bluetooth connection.</p>
	<p><b>External power supply</b> The MPOLx-85 is powered by the external AC adapter when this symbol is shown.</p>
	<p><b>Battery status</b> Indicates the battery charge status. If it is not shown, only the AC adapter is active.</p> <ul style="list-style-type: none"> <li> Charge state = 100%</li> <li> Charge state = 25%</li> <li> Battery is charging.</li> </ul>
	<p><b>Auto-Off</b> Indicates whether the instrument turns off within a certain time.</p>
	<p><b>Active laser source</b> Blinking yellow-red indicates that the built-in laser source is active.</p>

## Navigating in the menu

---

- ▶ Press the [**⬆**] key to open the home screen.  
*Depending on the active project type the Projects tab shows the available test applications or the active Workflow project.*
- ▶ Press the [**☰**] key to open the context-sensitive menu.  
*Depending on which application is selected, a different menu opens.*

### To select a menu item:

1. Press the arrow keys to highlight an item.
2. To confirm, press the center key within the arrow keys.  
– or –  
Tap the desired button on the touchscreen.

### To leave a menu without making any changes:

- ▶ Press the [**↶**] key.

**NOTE:** All actions can be operated via the operator control panel or the touchscreen. The following instructions describe only touchscreen operation.

### To toggle between different display modes:

- ▶ Tap the display to toggle between the display modes (context-sensitive).

## Displaying application information

---

The Info menu provides information about the displayed test application.

✓ The instrument is in the chosen application mode.

1. Press the [**☰**] key and tap the [**More**] button.
2. Tap the [**Info**] button.  
*The application information is displayed.*

## Changing System Settings

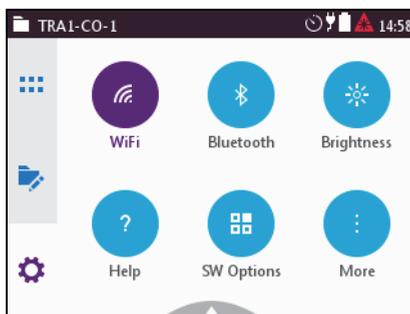
In the **Settings** menu you can change instrument settings, get information and help about the instrument, or update the firmware.

### To open the Settings menu:

✓ The home screen is displayed.

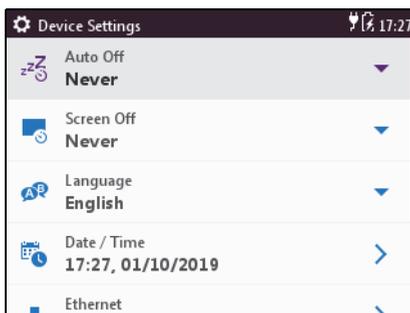
1. Select the  tab.

*The **Settings** menu opens:*



2. In the  menu tap the [More] button.

*More setting options are displayed.*



The following table gives a short overview of the menu items. These are explained in the following sections.

Icon	Function	See page
	<b>WiFi</b> To configure the wireless local area network. The last selected item is displayed in magenta.	32
	<b>Bluetooth</b> To configure the Bluetooth interface.	32
	<b>Brightness</b> To adjust the display brightness.	29
	<b>Help</b> To show device information	29
	<b>SW Options</b> To check and install software options.	Not yet available, 33
	<b>More</b> To access further instrument settings. See following sections.	29

## Adjusting the display brightness

1. In the  menu tap the [Brightness] button.
2. Tap a symbol to change the display brightness.
3. Tap [OK].

## Showing device information

- ▶ In the  menu tap the [Help] button.  
*Information about the hardware and software is displayed.*

## Setting the [Auto-Off] interval

When [Auto-Off] is set, the device will switch off after the selected interval without any user action.

**NOTE:** [Auto-Off] is only active when no external power supply is connected.

1. In the  menu tap the [More] button, then tap [Auto-Off].
2. Select the desired interval.

## Setting the [Screen-Off] interval

When [Screen-Off] is set, the display will switch off after the selected interval without any user action.

**NOTE:** [Screen-Off] is only active when no external power supply is connected.

1. In the  menu tap the [More] button, then tap [Screen-Off].
2. Select the desired interval.

### To switch on the display after it was switched off:

- ▶ Just tap the display to switch it on.

## Selecting a language

1. In the  menu tap the [More] button, then tap [Language].
2. Tap the desired language.  
*After selecting a new language the instrument has to be restarted.*
3. Tap [Yes] to restart the instrument.  
– or –  
Tap [No] to keep the previous language.

## Setting date & time

- ▶ In the  menu tap the [More] button, then tap [Date & Time].

### To set the date:

1. Tap [Date].
2. Tap [Day], [Month], or [Year].
3. Type in the desired value.
4. Tap [OK].

### To set the date format:

1. Tap [Date Format].
2. Select the desired date format.

### To set the time:

1. Tap [Time].
2. Tap [Hour], [Minute], or [Second].
3. Type in the desired value.
4. Tap [OK].

**To set 24-hour or 12-hour time:**

1. Tap [Time Format].
2. Select the desired time format.

**Setting the Ethernet protocol**

- ▶ In the  menu tap the [More] button, then tap [Ethernet].

**To select the IP mode:**

1. Tap the [IP Mode] button.
2. Select the desired Ethernet mode.

**To set the IP address:**

- ✓ The IP mode **Static** is selected.

  1. Tap [IP Address].
  2. Type in the desired IP address.
  3. Tap [OK].

**To set the gateway:**

- ✓ The IP mode **Static** is selected.

  1. Tap [Gateway].
  2. Type in the desired gateway.
  3. Tap [OK].

**To set the netmask:**

- ✓ The IP mode **Static** is selected.

  1. Tap [Netmask].
  2. Type in the desired netmask.
  3. Tap [OK].

**Calibrating the touchscreen**

**NOTE:** Using a pen when calibrating the touchscreen will improve the calibration accuracy.

1. In the  menu tap the [More] button, then tap [Touchscreen calibration].
2. Follow the given instructions.

## Resetting to the factory default values

**NOTE:** Setting the factory default values does not affect your stored measurement results.

1. In the  menu tap the [More] button, then tap [Factory Reset].
2. Tap [Yes] to proceed.
  - or –
  - Tap [No] to cancel.

## WiFi menu (optional)

---

- ▶ In the  menu tap the [WiFi] button.
  - Editable settings are displayed*
  - Enabled: switch WiFi on/off
  - Mode: switch between Ad-Hoc / Access Point
  - Tap [Enabled] to switch WiFi on.
  - Information on enabled wifi connection is displayed*
  - SSID:
  - IP Address
  - Netmask
  - MAC Address
  - Port

## Bluetooth menu (optional)

---

- ▶ In the  menu tap the [Bluetooth] button.
  - editable settings are displayed*
  - Enabled: switch Bluetooth on/off
  - Tap [Enabled] to switch Bluetooth on.
  - Information on enabled bluetooth connection is displayed*
  - SSID
  - MAC Address
  - PIN Code for connection establishment

## Installing a software option

---

1. Connect an USB stick with the corresponding option file.
2. In the  menu tap the [Software Options] button.
3. Press the [] key.
4. Tap [Install from USB].  
*The license key is read in from the root directory of the USB stick.  
The option(s) are installed.*

## Updating the firmware

---

The latest version of the firmware can be downloaded from the Internet.

### To find the latest firmware version:

1. Visit the Viavi web site at <http://updatemyunit.net>.
2. Select your model from the product line.
3. Open the download area and download the latest firmware.  
The downloaded update.exe file needs to be executed on a PC.
4. Unzip and save the individual update files to the root directory of an USB flash drive.

### To start the firmware update:

- ✓ The update files have been extracted and are located on the USB flash drive.
  - ✓ The instrument is fully charged or the PS4 Universal AC/DC Power Supply is connected.
  - ✓ The instrument is switched off and not in hibernate mode.
1. Plug the USB flash drive with the extracted update files into one of the instrument USB ports.
  2. Hold down the [] key and shortly press the [] key to switch the instrument on.  
*The firmware update screen appears.*
  3. Release the [] key.
  4. Press the center key within the arrow keys to start the update procedure.
  5. After Startup, when the Homescreen is displayed, remove the USB flash drive.

## Creating screenshots

---

Screenshots can be stored directly on an USB stick.

### To create a screenshot:

1. Connect a USB stick to one of the USB ports on the right side of the device.  
*The  symbol is displayed at the top of the screen.*
2. Long-press both the  and the  keys.  
*The Save New Screenshot screen is displayed.*
3. Enter a file name and use the pencil button to edit the field.
4. Set the **Add Auto-Increment Number** function **ON** or **OFF**.  
If the setting is **ON**, a number is added to the proposed name, ascending each time that a new screenshot is taken.  
Edit the **Auto-Increment Number** field by tapping the pencil button if you want to change the current number.
5. If you are using both USB ports, select **USB1** or **USB2** by tapping the corresponding button.
6. Tap the  button to store the screenshot on the USB stick.  
A directory named Screenshots\_<device\_type> <serial\_number> is created and the screenshot is saved in PNG format.  
Tap the  button to interrupt the creation of the screenshot.

# 5 MANAGING PROJECTS

Stored Measurements are assigned to a project. Therefore a project first has to be created and set to active. As factory setting one Test-Tool project named **default** is available, which can be edited but not deleted. New projects can be created by copying and changing an existing project or by creating a new one. With the project some basic information like the project name, a description of the project and how the label is build can be saved.

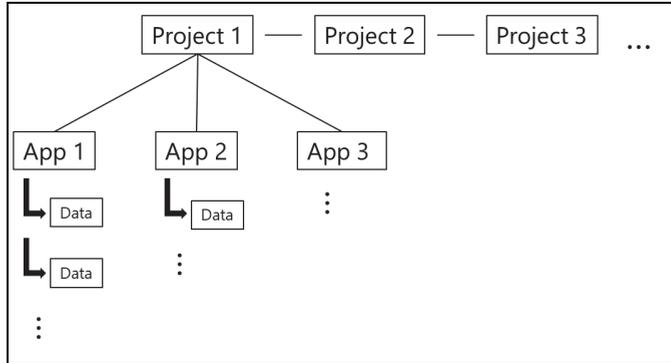


Fig. 11 Project assignments

## Creating a new project

1. Press the **[↑]** key, select  and tap **[Projects]**.  
*The Projects list opens. As factory setting only the Test-Tool project **default** is available.*

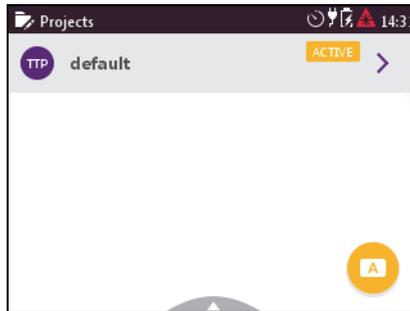
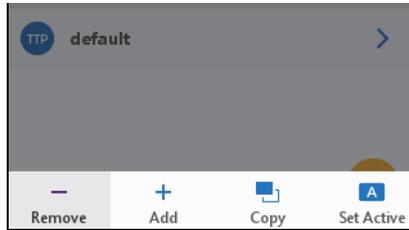


Fig. 12 Projects list with default project.

### Adding a new project:

2. Press the [☰] key.  
*The edit menu opens.*



3. Tap [Add].  
*The title edit menu opens.*
4. Type in the project title and tap ✓.  
*The project is created and displayed in the list.*

### Copying an existing project:

1. Select the project you wish to copy.
2. Press the [☰] key and tap [Copy].  
*The title edit menu opens.*
3. Type in the project title and tap ✓.  
*The project is created and displayed in the list.*

### Editing a project

---

1. Double click the project.  
– or –  
Select a project using the up/down arrow key and press the central key.  
*The edit menu opens:*

<b>Name</b>	Project name
<b>Description</b>	Project description Will be shown in the projects list below the project name.
<b>Label Prefix</b>	Prefix that will be added to the label.
<b>Label Index</b>	Start index for the label
<b>Auto Increment Label Index</b>	When enabled label index will be incremented automatically with each storage.

2. Edit the fields.

*The changes are immediately effective.*

3. Press the button to close the edit menu.

## Deleting a project

---

1. Select the project you wish to delete.
2. Press the key and tap [Remove].
3. Tap [Yes] to permanently delete the project.  
*The project is deleted and removed from the list.*

## Activating a project

---

To assign measurements to a project, the project must be activated. There can always be only one active project.

1. Select the project you wish to activate.
2. Tap the button.  
– or –  
Press the key and tap [Set Active].  
*Allow a few seconds until the label **ACTIVE** is displayed at the selected project.*

**NOTE:** Savings of measurement results are assigned to the selected project.

# 6 RETURN LOSS OPERATION

## General information

---

In the **Return Loss** mode the light source (two to four lasers) and the receiver of the ORL-85 are activated. The wavelengths of the Power Meter unit are locked to the wavelengths of the source and can be selected independently.

In the Return Loss mode a signal is sent to the Device Under Test (DUT) from the internal laser source. The power level reflected from the DUT is measured and compared to the transmitted signal. The result of the return loss is displayed at the ORL-85.

The accuracy of the return loss measurement depends highly on the quality of the optical connection at the ORL-85.

► Take care to keep the test connection very clean.

In the case the display does not show **HIGH dB** with the port open:

1. Clean the test connection (see [“Cleaning the test port” on page 77](#)).
2. To store the internal noise in **Return Loss** mode as reference value, normalize the instrument (see [“Normalization” on page 38](#)).

## Normalization

---

To ensure a high measurement accuracy, it is required to normalize the unit from time to time. This is done with the port open, i.e. no Device Under Test is connected.

### Normalizing the unit

**NOTE:** To normalize for high return loss measurements, connect a mandrel wrap to the test port (> 55 dB) instead of using an open test port.

- ✓ The instrument is in **Return Loss** mode.

  1. Disconnect DUT from test port.
  2. Unmount test adapter from test port, clean fiber surface of test port and mount test adapter.
  3. Close the dust cap, or connect a mandrel wrap.
  4. To turn on the selected lasers, tap the [Laser On/Off] field or press the center key within the arrow keys.

5. Press the [☰] key.
6. Tap the [Normalizing] button.
7. Tap the [OK] button.  
*The normalization will be performed and the display will switch to measurement mode.*  
*The display shows HIGH db.*

**NOTE:** The normalization will be automatically performed for all wavelengths.

## Viewing the normalizing settings

- ✓ The instrument is in **Return Loss** mode.

  1. Press the [☰] key.
  2. Tap the [More] button.
  3. Tap the [Info] button.  
*The normalizing value table is displayed.*

## Pass/Fail mode

---

### Editing the limit in the $\lambda$ -table

- ✓ The instrument is in **Return Loss** mode.

  1. Press the [☰] key.
  2. Tap the [More] button.
  3. Tap the [Edit Limit] button.  
*The Edit Limit-table is displayed.*
  4. Tap the desired wavelength value.
  5. To edit the limit of the preselected wavelength, press the [☰] key and tap the [Edit Limit] button.
  6. Type in the desired value.
  7. Tap the [OK] button.
  8. Press the [↩] key twice.

### Starting the Pass/Fail mode

- ✓ The limit for the **Pass/Fail** mode is set.

  1. Tap the desired wavelength(s).
  2. Press the [☰] key.
  3. Tap the [Pass/Fail] button.

  - ▶ To switch to the **Return Loss** mode, press the [☰] key & tap the [dB] button.

## Switching on/off the laser

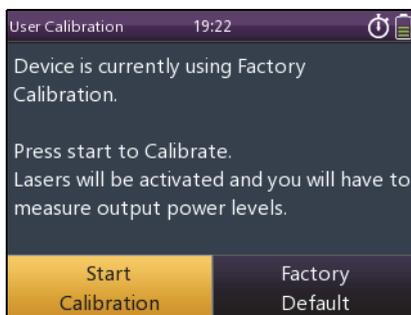
---

- ✓ The instrument is in **Return Loss** mode.
- ▶ To switch on the laser, tap the [Laser On/Off] field.
  - or –
- ▶ Press the center key within the arrow keys.
  - or –
- 1. Press the [≡] key.
- 2. Tap the [Laser on] button.
- ▶ To switch off the laser, repeat one of the above mentioned actions.

## Calibrate the laser manually

---

- ✓ The instrument is in **Return Loss** mode.
- 1. Press the [≡] key.
- 2. Tap the [More] button.
- 3. Tap the [User Calibration] button.  
*The User Calibration menu opens:*



- 4. Tap the [Start Calibration] button.  
*The lasers are activated one after another.*
- 5. Measure the output levels with an external calibrated power meter, and note the correct settings of the particular wavelengths.
- 6. Tap the [Enter Level] button.
- 7. Type in the measured output level for the particular wavelength.
- 8. Tap the [OK] button.
- 9. Repeat steps 6 through 8 as required.
- 10. Tap the [Save] button.

*The instrument is calibrated manually.*

- ▶ To return to the factory calibration mode, tap the [Use Factory Calibration] button in the User Calibration menu.

## Saving Return Loss test results

Before starting a measurement a project must be selected and set to active. Thus, all results are assigned to that project when saved. If no project was defined by the user, the instrument will use the Test-Tool project "default", which is always present (see "Managing projects" on page 35).

Results are stored simply by pressing the [F] key. Each time the key is pressed, the result just displayed will be saved.

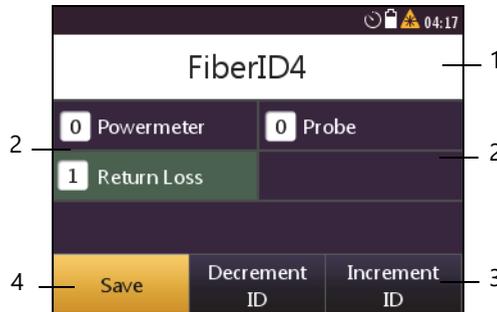
### To save current results:

- ✓ The instrument is in application mode and displays the test results (overview or details) to be stored.

1. Press the [F] key.

*The Save dialog is displayed.*

*As file name the label prefix defined in the project settings is showed on top of the display.*



- 1 Defined label name.
  - ▶ Tap field to edit label name.
- 2
  - Return Loss: Number of already saved return loss results.
  - Powermeter: Number of already saved powermeter results.
  - Probe: Number of already saved probe results.
  - PCM: Number of already saved PCM results.
- 3 Decrease / increase label ID
- 4 Save results

2. To edit the label name, tap the field, edit the name and tap [OK].
3. To change the ID, tap [Decrement ID] or [Increment ID].
4. Press the [↩] key again or tap the [Save] button.  
*The measurement is stored in the current active project.*

**NOTE:** If the label/fiber ID is not changed, the data set will be saved under the same title. Then the Data can be distinguished and sorted by the Timestamp.

## 7 POWERMETER OPERATION

### General information

---

This chapter describes how to use the ORL-85/ORL-85P as a power meter. In Powermeter mode up to two wavelengths can be measured simultaneously. Results can be displayed as absolute level in dBm/Watt, relatively to a reference value in dB or as Pass/Fail indication based on predefined limits.

More information about measuring loss with two instruments set to source and powermeter mode can be found in the chapter “Measuring Loss with Source/Powermeter” on page 56.

### Setting and selecting wavelengths

---

The ORL-85/ORL-85P provides several ways to select a wavelength:

- Auto  $\lambda$  mode: When using an Auto  $\lambda$  capable laser source (like the OLS-85), wavelengths can automatically be detect.
- By tapping the wavelength displayed in the measurement display until the desired wavelength is shown. The wavelengths offered in the table can be defined in the [Edit  $\lambda$  Table] menu.
- By selecting a wavelength from the  $\lambda$  table in the menu. The wavelengths listed in this table are not affected by the **Show** settings in the [Edit  $\lambda$  Table] menu.

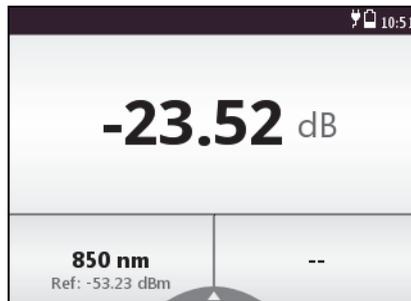


Fig. 13 Measurement display (screen shows actual power level (upper), selected wavelength (lower left) and modulation frequency (lower right))

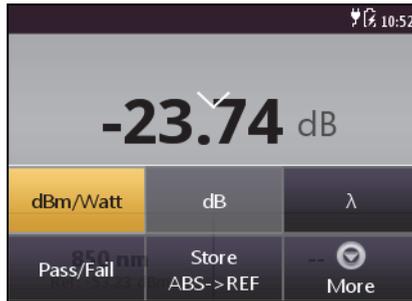


Fig. 14 Measurement display (screen shows the settings menu)

## Creating and editing wavelengths in the λ table

In the [Edit λ Table] menu wavelengths can be added and deleted. Furthermore for each wavelength the reference value and the limit can be defined. The **Show** option defines, if the wavelength is available when tapping through the λ table in the measurement display.

### To open the Edit λ Table:

- ✓ The instrument is in **Powermeter** mode.
  - 1. Press the [≡] key and tap the [More] button.
  - 2. Tap the [Edit λ Table] button.
- The λ table is displayed:*

λ [nm]	Ref [dBm]	Limit [dBm]	Show
1310	+00.00	-06.50	
1490	+00.00	+00.00	✓
1550	+00.00	-06.70	
1625	+00.00	+00.00	✓

### To add a wavelength:

- ✓ The **Edit λ Table** menu in **Powermeter** mode is displayed.
- 1. Press the [≡] key and tap the [Add λ] button.
- 2. Type in the desired value.
- 3. Tap the [OK] button.

### To delete a wavelength:

- ✓ The **Edit λ Table** menu in **Powermeter** mode is displayed.

1. Select the desired wavelength.
2. Press the [≡] key and tap the [Delete λ] button.

**To edit the reference value:**

✓ The **Edit λ Table** menu in **Powermeter** mode is displayed.

1. Select the desired wavelength.
2. Press the [≡] key and tap the [Edit Reference] button.
3. Type in the desired value.
4. Tap the [OK] button.

**To edit the Pass/Fail limit for λ value:**

✓ The **Edit λ Table** menu in **Powermeter** mode is displayed.

1. Select the desired wavelength.
2. Press the [≡] key and tap the [Edit Limit] button.
3. Type in the desired value.
4. Tap the [OK] button.

**To show or hide wavelengths:**

**NOTE:**

A wavelength with a checkmark can be selected by taping the wavelength field on the measurement display. The wavelengths shown in the λ table accessed by the [≡] menu ([≡] > λ) are not affected by the settings.

✓ The **Edit λ Table** menu in **Powermeter** mode is displayed.

1. Select the desired wavelength.
2. To set/remove the checkmark, press the center key within the arrow keys.  
– or –  
Tap the desired wavelength.

**Selecting a wavelength from the λ table**

✓ The instrument is in **Powermeter** mode.

- ▶ Tap the lower left side of the touchscreen until the desired wavelength is displayed.

*If you miss a wavelength you have to add it to the λ table or enable the Show option.*

– or –

Press the [≡] key, tap the [ λ ] button and tap a wavelength.

## Enabling Auto- $\lambda$ mode

Auto  $\lambda$  is a special feature developed by Viavi that allows you to identify wavelengths automatically (from OLS-XX, MTS-2k/4k/6k OTDR CW-source). To do this, the signal is modulated at a certain frequency (by a light source equipped with Auto  $\lambda$ , such as a Viavi OLS-85), which can be detected by a Viavi ORL-85.

In Auto  $\lambda$  mode the detected wavelength will be included in the  $\lambda$  table. As long as the detected wavelength is active, it cannot be deleted from the  $\lambda$  table.

Wavelengths cannot be reliably detected if:

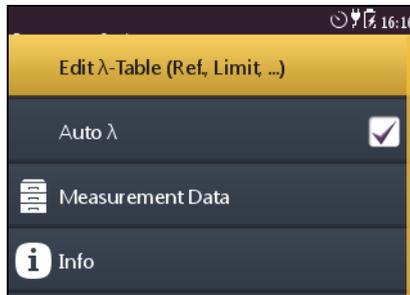
- the receive level is too low,
- wavelength encoding cannot be detected due to interference
- you are measuring the absolute level of a system that does not have wavelength encoding matching Viavi power sources.

### To switch Auto $\lambda$ mode on/off:

✓ The instrument is in **Powermeter** mode.

1. Press the **[☰]** key and tap the **[More]** button.

*The menu opens:*



2. Tap the **[Auto  $\lambda$ ]** button to switch Auto  $\lambda$  mode on/off.

*The checkmark is set or removed.*

### Displaying modulated signals

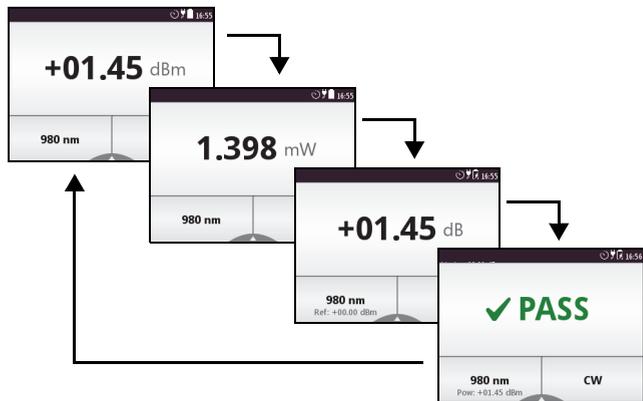
The ORL-85/ORL-85P automatically detects the modulation frequency of light signals modulated at the fixed frequencies of 270 Hz, 1 kHz, and 2 kHz. The detected frequency is shown in the lower right measurement display pane.

## Selecting and changing the power display mode

The ORL-85/ORL-85P provides following display modes:

- absolute power level in dBm or Watt
- power level in dB relatively to a reference value
- Pass/Fail indication based on a limit

1. To toggle between the display modes, tap the power level in the measurement display.



– or –

2. Press the  key and tap the [dBm/Watt] button to toggle between both options.

– or –

Tap the [dB] button.

– or –

Tap the [Pass/Fail] button.

## Displaying relative power level

The actual measured power level relative to a reference value is displayed in relative power display mode. The reference value can be set by defining the actual power level as the reference value or can be edited manually.

### To set the actual power level as reference level:

✓ The instrument is in **Powermeter** mode.

1. Press the  key and tap the [Store ABS->REF] button.

*The actual power level is set as the new reference level. The reference level is displayed underneath the wavelength. Reference power level display mode is activated.*

**NOTE:** The reference level is stored for each wavelength and is saved even when the power is off.

## Saving Powermeter test results

Before starting a measurement a project must be selected and set to active. Thus, all results are assigned to that project when saved. If no project was defined by the user, the instrument will use the Test-Tool project "default", which is always present (see "Managing projects" on page 35).

Results are stored simply by pressing the **[F]** key. Each time the key is pressed, the result just displayed will be saved.

### To save current results:

✓ The instrument is in application mode and displays the test results (overview or details) to be stored.

1. Press the **[F]** key.

*The Save dialog is displayed.*

*As file name the label prefix defined in the project settings is showed on top of the display.*



- 1 Defined label name.
  - ▶ Tap field to edit label name.
- 2
  - Probe: Number of already saved probe results.
  - Powermeter: Number of already saved powermeter results.
  - PCM: Number of already saved PCM results.
  - Return Loss: Number of already saved return loss results.
- 3 Decrease / increase label ID
- 4 Save results

2. To edit the label name, tap the field, edit the name and tap [OK].
3. To change the ID, tap [Decrement ID] or [Increment ID].
4. Press the [↩] key again or tap the [Save] button.  
*The measurement is stored in the current active project.*

**NOTE:** When measuring two wavelengths at a time both wavelengths are stored separately. Thus, the ID is incremented by 2.

**NOTE:** If the label/fiber ID is not changed, the data set will be saved under the same title. Then the Data can be distinguished and sorted by the Timestamp.

## 8 SOURCE OPERATION

### General information

---

Various fiber optic tests (e.g. loss test, fiber identification) require a reliable and stable optical source. ORL-85/ORL-85P devices are high-quality optical sources, which in addition to a stable optical signal have other useful properties, which simplify and shorten the work processes and exclude potential sources of error in measurement setups.

ORL-85/ORL-85P devices include several light sources – i.e. lasers and/or LEDs – which are stabilized using an automatic gain control mechanism. LEDs are typically used for multi-mode fiber measurements. On the other hand, lasers are used for single-mode fiber measurements.

**NOTE:** In this manual, the word laser is used synonymously for laser and LED sources.

The output signals of the light sources may be either continuous wave (CW) or modulated at certain frequencies, i.e. 270 Hz, 1 kHz, or 2 kHz. Viavi power meters (e.g. OLP-3x, OLP-8x, MTS-2k/4k/6k) are capable of detecting these modulation frequencies. This method improves ambient light rejection in certain measurement setups. Additionally, the modulated signals can be used for fiber identification or for confirmation of continuity.

ORL-85/ORL-85P instruments provide the Auto  $\lambda$  feature. When activated, the ORL-85/ORL-85P embeds wavelength ID information into the emitted signal(s). This wavelength ID information can be utilized by a compatible Viavi power meter (e.g. OLP-85) for automatic wavelength setup and for simultaneous reception of multiple wavelengths. This minimizes test time and prevents common errors such as incorrect wavelength setting on the optical power meter.

Furthermore, all ORL-85/ORL-85P instruments provide Auto- $\lambda$ -Multi and Auto- $\lambda$ -Serial modes, which significantly reduce test time compared to manually switching wavelengths.

## Display elements

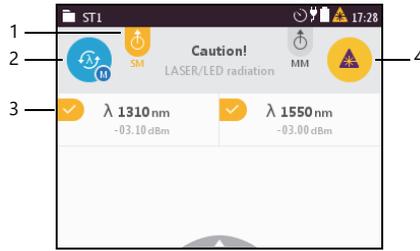


Fig. 15 Source operation display, laser off (left) and on.

1		<p><b>Output port buttons</b> Port not selected / port selected / port selected and laser on ▶ Tap to select/deselect.</p>
2		<p><b>Mode button (modulation)</b> Constant wave &gt; 270 Hz &gt; 1 kHz &gt; 2 kHz &gt; ... ▶ Tap button to skip through options.</p>
		<p><b>Mode button (Auto-λ)</b> Auto-λ (with one wavelength) &gt; Multi-λ &gt; Serial-λ &gt; Auto-λ ▶ Tap button to skip through options.</p>
3		<p><b>Wavelength buttons</b> Wavelength selected / wavelength selected and laser on ▶ Tap wavelength to select/deselect.</p>
4		<p><b>Laser button</b> Laser off / on ▶ Tap button to switch laser on/off.</p>

## Selecting an output port and wavelength

---

1. To select output, tap SM or MM on top of the display.  
– or –  
Press the [☰] key, tap [Output Selection] and tap the desired output.  
*The menu is closed and the measurement display is shown.*
2. To select a wavelength, tap the desired wavelength(s) on the measurement display.  
– or –  
Press the [☰] key, tap [Source Selection] and tap the desired wavelength(s).  
*If Auto-λ is not selected, only one wavelength can be selected.  
To select Auto-λ see "About Auto-λ μoδe .*
3. Press the [↶] key.
4. To turn on the selected lasers, tap the [Laser On/Off] button or press the central key.

## About Auto-λ mode

---

When in one of the Auto-λ modes, the ORL-85/ORL-85P embeds wavelength ID information into the emitted signal(s). This wavelength ID information can be utilized by a compatible Viavi power meter (e.g. OLP-85) for automatic wavelength setup and for simultaneous reception of multiple wavelengths.

### The ORL-85/ORL-85P provides two Auto-λ modes:

- **Multi-λ:** Multi-λ is a proprietary Viavi solution that reduces testing time to a minimum by simultaneously testing at both wavelengths. When activated both wavelength are measured and displayed simultaneously.  
Auto-λ-Multi should be selected every time the optical powermeter supports the Auto-λ-Multi feature.
- **Serial-λ** automatically toggles between the selected wavelengths. Combined with a compatible power meter (e.g. OLP-3x, OLP-85), the power meter automatically sets up with correct wavelength settings.  
Serial-λ should be selected when low levels are expected on the optical power meter or when the power meter doesn't support Multi-λ.

Wavelengths cannot be reliably detected in following situations:

- The receive level is too low.
- The wavelength encoding cannot be detected due to interference.
- You are measuring the absolute level of a system that does not have wavelength encoding matching Viavi power sources.

## Selecting a modulation or Auto-λ mode

Modulation or Auto-λ mode can be selected by the mode button or via the menu. Both ways are described

### Enabling modulation and selecting a frequency

Using the [Mode selection] button:

**NOTE:** A modulation frequency can only be selected when just one wavelength is selected.

1. When two wavelengths are selected first tap one of the wavelengths to deselect it.
2. Tap the [Mode selection] button to toggle between the modulation frequencies (and the Auto-λ mode):



Using the menu:

- ▶ Press the [≡] key, tap the [Modulation] button and tap the desired frequency.  
*The measurement display is shown and the selected frequency is enabled. If Auto-λ was active before, the mode is set to modulation now.*

### Enabling Auto-λ

Using the [Mode selection] button:

- ✓ A modulation frequency is selected.
- ▶ Tap the [Mode selection] button until Auto-λ  is displayed.  
*Auto-λ is enabled now for the selected wavelengths.*

Using the menu:

- ✓ A modulation frequency is selected.
- ▶ Press the [≡] key, tap the [Auto λ] button and tap [Serial-λ].

## Enabling Multi- $\lambda$ or Serial- $\lambda$ (two wavelengths)

**NOTE:** Multi- $\lambda$  and Serial- $\lambda$  can only be enabled when two wavelengths are selected.

### Using the [Mode selection] button:

1. Tap the [Mode selection] button until Auto- $\lambda$   is displayed.
2. Activate more than one wavelength by tapping.
3. Tap the [Mode selection] button to select Multi- $\lambda$  or Serial- $\lambda$ :



### Using the menu:

1. Press the  key, tap the [Auto  $\lambda$ ] button and select the desired Auto- $\lambda$  mode.  
*The measurement display is shown, but still Auto- $\lambda$  is enabled.*
2. Press the  key, tap the [Source Selection] button and switch on both wavelengths.
3. Press the  key.  
*The measurement display is shown and the selected Auto- $\lambda$  mode is enabled.*

## Setting the power level

---

The power level can be set for each wavelength separately and will be stored permanently.

### Changing the power level

1. Press the  key and tap the [Level Adjustment] button.
2. Select SM or MM for single- or multi-mode and tap the level adjustment button of the desired wavelength.  
*The display changes to edit mode.*
3. Press the arrow keys to increase or decrease the power level:
  - left/right arrow keys: change level in 1 dBm steps
  - up/down arrow keys: change level in 0.01 dBm steps.
4. Press the  key to leave edit mode of the selected wavelength.
5. Press the  key again to leave the edit menu.

## Switching on/off the laser

---

- ▶ To switch on the laser, tap the [Laser On/Off] button.
  - or –
  - Press the center key within the arrow keys.
  - or –
  - Press the [≡] key and tap the [Output On] button.
- ▶ To switch off the laser, repeat one of the actions mentioned above.

# 9 MEASURING LOSS WITH SOURCE/ POWERMETER

## General information

---

The ORL-85 offers three different measurement modes.

- **Source Mode:** The instrument works as a laser source.
- **Powermeter Mode:** The instrument works as an optical power meter.

Instead of using the **Loss** test mode which restricts the measurement to a fiber loop, two ORL-85/ORL-85P instruments can be used for remote operation. In this **Source/Powermeter Mode** one instrument (like another ORL-85 or the OLS-85) works as a laser source, while the other ORL-85/ORL-85P works as an optical power meter. Source and powermeter are not locked in this mode.

For information on measurement adjustments on your powermeter device see "Powermeter Operation" on page 43.

## Performing the measurement

---

1. Select the Source application on your source device and the Powermeter application on your powermeter device.
2. Perform the Referencing on the powermeter device:
  - a) Decide for one of the Reference methods (see "Appendix - Referencing Methods" on page 78).
  - b) Connect both devices accordingly.
  - c) Switch on the laser on your source device.
  - d) Press the **[☰]** key and tap the **[Store ABS->REF]** button.
3. Switch the laser source off.
4. Connect your fiber system under test as shown in figure [...].
5. Switch on the laser on your source device.  
*The loss is displayed on the powermeter device.*

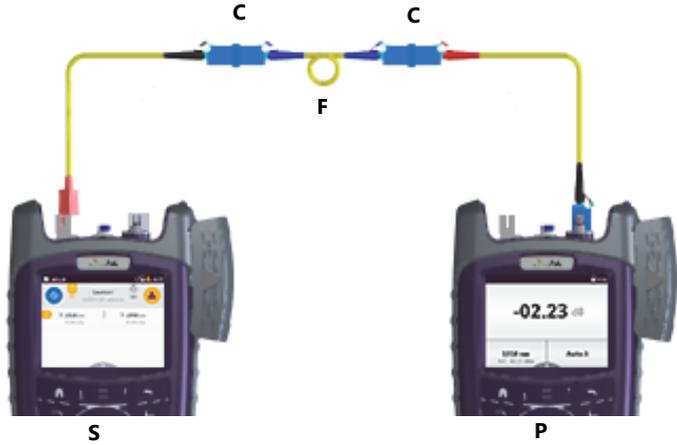


Fig. 16 Performing the measurement (for both directions by switching source and powermeter mode)

<b>C</b>	Connection
<b>S</b>	Source device
<b>P</b>	Powermeter device
<b>F</b>	Fiber system under test

## Viewing test results

The measured loss is displayed in real time.

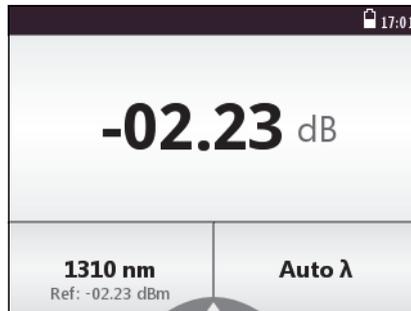


Fig. 17 Result overview over one wavelength

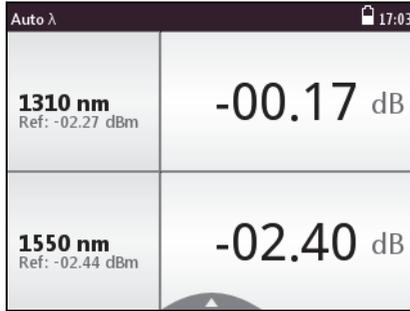


Fig. 18 Result overview over two wavelengths

## Saving Loss test results

Before starting a measurement a project must be selected and set to active. Thus, all results are assigned to that project when saved. If no project was defined by the user, the instrument will use the Test-Tool project "default", which is always present (see "Managing projects" on page 35).

Results are stored simply by pressing the **[F]** key. Each time the key is pressed, the result just displayed will be saved.

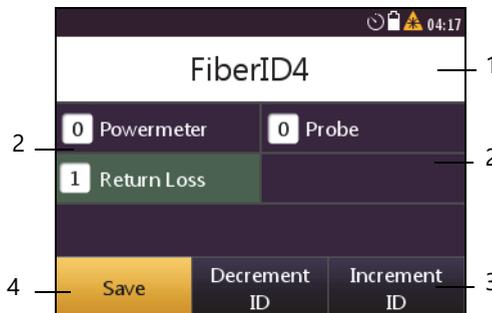
### To save current results:

✓ The instrument is in application mode and displays the test results (overview or details) to be stored.

1. Press the **[F]** key.

*The Save dialog is displayed.*

*As file name the label prefix defined in the project settings is showed on top of the display.*



- 
- 1 Defined label name.
    - ▶ Tap field to edit label name.
- 
- 2
    - Probe: Number of already saved probe results.
    - Powermeter: Number of already saved powermeter results.
    - PCM: Number of already saved PCM results.
    - Return Loss: Number of already saved return loss results.
- 
- 3 Decrease / increase label ID
- 
- 4 Save results
- 

2. To edit the label name, tap the field, edit the name and tap [OK].
3. To change the ID, tap [Decrement ID] or [Increment ID].
4. Press the [R] key again or tap the [Save] button.  
*The measurement is stored in the current active project.*

**NOTE:** When measuring two wavelengths at a time both wavelengths are stored separately. Thus, the ID is incremented by 2.

**NOTE:** If the label/fiber ID is not changed, the data set will be saved under the same title. Then the Data can be distinguished and sorted by the Timestamp.

# 10 PROBE/PCM OPERATION

## General information

---

Dirty and/or damaged connectors are often the root cause of optical network problems. The Probe and PCM applications enable industry standard inspection and automated Pass/Fail testing with report generation of optical connectors/adapters in order to ensure industry standard fiber endface quality and cleanliness.

For best workflow efficiency, there are two variants of fiber microscopes available in the SmartClass™ Fiber family. The integrated Patch Cord Microscope (PCM) which is best suited for inspecting fiber endfaces of patch cords and the external P5000i Digital Probe (see “[Digital Probe](#)” on page 89) which may be either used for bulkhead inspection or patch cord inspection.

The shortest inspection time is achieved when using one of the OLP-87P/OLP-85P models with an integrated PCM for patch cord inspection and a P5000i Digital Probe for bulkhead inspection.

Both applications – Probe and PCM – behave essentially the same and are described together below.

**NOTE:** Only if a P5000i Digital Probe is connected to the instrument is the Probe application fully functional. Select an OLP-87P/OLP-85P version in order to get PCM functionality.

## Patch Cord Microscope (PCM)

---

The PCM is a microscope used to view and inspect patch cord (male) sides of fiber connectors.

In order to support a wide variety of fiber optic connectors the PCM provides an exchangeable FMAE adapter. The dedicated QuickCapture key provides either instant triggering of a Pass/Fail test or freezing the live image. For best workflow adaption the key action is configurable. The dedicated Magnification Control key provides fast toggling between two microscope magnification levels, low magnification for high level inspection of the fiber endface, and high magnification for detailed inspection of the fiber endface.



Fig. 19 Patch cord microscope components

- |   |                           |
|---|---------------------------|
| 1 | FMAE adapter              |
| 2 | QuickCapture™ key         |
| 3 | Focus Control             |
| 4 | Magnification Control key |

## FMAE series adapters for the PCM

SmartClass™ Fiber devices with the PCM use FMAE series adapters to ensure consistent and accurate inspection for a wide variety connectors and applications. All PCM configurations ship with an included 2.5 mm interface. Kitted configurations may include additional FMAE adapters.

## Features available with the P5000i Digital Probe

The P5000i Digital Probe is a portable handheld microscope used to view and inspect both the bulkhead (female) and patch cord (male) sides of fiber connectors, as well as other optical devices, such as transceivers.

The Digital Probe is specially designed to fit and operate comfortably and easily in-hand, allowing the user to inspect hard-to-reach connectors that are installed on the back side of patch panels or inside hardware devices. In order to support a wide variety of fiber optic connectors the P5000i provides an exchangeable FBPT inspection tip. The dedicated QuickCapture key provides either instant triggering of a pass/fail test or of freezing the live image. For best workflow adaption the key action is configurable. The dedicated Magnification Control key

provides fast toggling between two microscope magnification levels - low magnification for high level inspection of the fiber endface and high magnification for detailed inspection of the fiber endface.

The P5000i Digital Probe kit sold with the ORL-85 contains the standard barrel assembly (FBPP-BAP1), standard patch cord tips, and standard bulkhead tips. See ["Accessories"](#) on page 89.



Fig. 20 P5000i Digital Probe components

1	Inspection tip
2	Barrel assembly
3	QuickCapture™ key
4	Focus Control
5	Magnification Control key
6	USB 2.0 connector
7	1.83 m (6 ft) coil cable

### FBPT series tips for the P5000i

The P5000i Digital Probe uses FBPT series inspection tips to ensure consistent and accurate inspection for a wide variety of connectors and applications. These connector-specific and universal inspection tips are interchangeable, which allows the P5000i Digital Probe to interface with different types of fiber connectors.

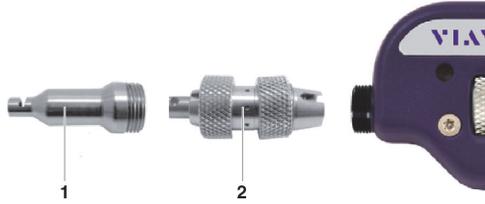


Fig. 21 FBPT series tips for the P5000i

- 
- |          |                 |
|----------|-----------------|
| <b>1</b> | Inspection tip  |
| <b>2</b> | Barrel assembly |
- 

### P5000i connection

The Probe application requires a P5000i Digital Probe in order to be fully functional (see the list of all accessories in “Digital Probe” on page 89).

1. Plug your P5000i into an USB port.
2. Connect the P5000i with the fiber being inspected.
3. Press the **[↕]** key, then tap the **[Probe]** button or use the arrows keys.  
 – or –  
 Press the **[≡]** key, to toggle between the measurement view and the inspection view.  
*The P5000i will display the live view.*

### QuickCapture™ key

---

In order to support different workflows the functionality of the QuickCapture™ key is configurable. Pressing the key will either freeze the live image or start a test:

- |               |   |
|---------------|---|
| <b>Test</b>   | Pressing the key will automatically freeze the live image and perform a test. |
| <b>Freeze</b> | Pressing the key will automatically freeze the live image.                    |

### Camera mode

Set the QuickCapture™ key on the Digital Probe to get a live picture of the result.

**NOTE:** Use the Focus Control key to adjust the focus of the image.

- ✓ The Digital Probe is connected to the instrument.

- ▶ To display the live view, tap the [Probe] button.

## File toolbar

---

### Saving a picture

It is possible to save the frozen picture from the Digital Probe.

1. Press the [F] key.
2. Edit the file name.
3. Tap the [OK] button.  
*File is saved in the preselected group.*

## Configuring the Digital Probe

---

1. Tap the [Probe] button.
2. Press the [≡] key to configure the Digital Probe according to the following description.

### Brightness settings

1. Set the luminosity manually using the arrow keys.
  - or –
  - Tap the key [≡] > [Brightness] to tune the luminosity to the desired value.
2. Tap the [OK] button.
  - or –
  - To confirm, press the center key within the arrow keys.

## Test mode

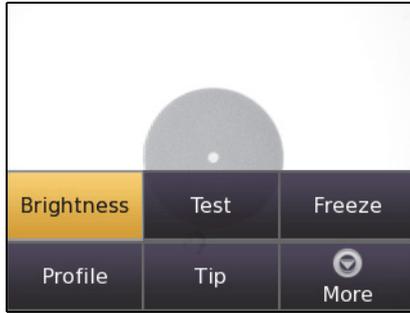
### Launching a test of the connector and fiber end-face

See “Freeze mode” on page 67 for more information on commands available.

**To launch the test with the predefined profile (see “Profile” on page 67):**

1. With the P5000i Digital Probe, use the Focus Control key (see Fig. 20) to adjust the image quality and sharpness.

2. Press the  key and tap the  button.



– or –

Press the QuickCapture™ key on the Digital Probe if the button action is set to **Test**.

*When the test procedure terminates, the information shown on the display depends on the current overlay setting:*

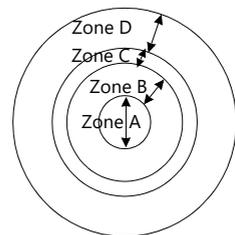
- ▶ Press the  key, and then the  button to change the overlay view. Repeat the action until the desired view appears.

*Three views can be displayed: without overlay, with colored edges, and colored edges with a legend.*

### Overlay

A summary of test results is displayed at the upper right of the screen.

- **Zone A:** Represents the core zone. It is the area surrounding the core
- **Zone B:** Represents the cladding zone. It surrounds the majority of the fiber cladding.
- **Zone C:** Represents the epoxy ring.
- **Zone D:** Represents the ferrule zone. It identifies a portion of the ferrule near and around the fiber.



**NOTE:** To return to a Live image, press the QuickCapture™ key or press the [≡] key and tap the [Live] button to view both the live image and a test result simultaneously.  
 If the test has been passed, the image has a green colored frame. If failed, the frame is red.

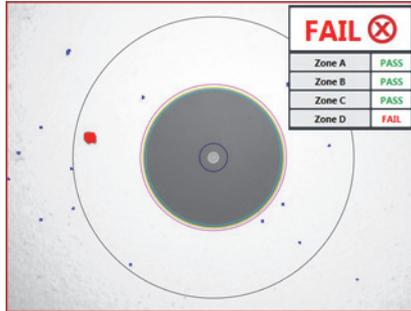


Fig. 22 Pass/Fail analysis – overlay view

### Magnification Control

The Magnification Control allows you to modify the live display from high to low magnification and vice-versa. In the high magnification mode an automatic centering is available.

### Picture selected: Live

**Test** Allows you to launch a (new) test of the connector (see [“Launching a test of the connector and fiber end-face”](#) on page 64)

**Freeze** Allows you to freeze the live image and to save it later on the disk. Once this key is pressed, the freeze image is automatically set to position 2.

### Picture selected: Test

Save allows you to save the selected picture in the current selected group in the disk of the instrument. Press the [R] key, enter a name for the JPG file, and validate.

Overlay allows you to display or hide the limits of each zone and the defaults on image from a test result.

Magnification Control allows you to switch all the images from Digital Probe test results from high to low magnification and vice-versa.

### Saving the test result in a JPG file

Once the test has been performed and the result is displayed on the ORL-85 screen:

1. Click on the key to save a JPG file of the test result in the currently active group on the ORL-85.
2. On the edition keypad, enter the name of the JPG file.
3. Press Enter to validate and save the document.  
*The file is saved in the current active group directory on the ORL-85.*

### Freeze mode

Once the image is acceptable (sharpness, luminosity are tuned correctly), you may freeze the picture. This feature allows you to store the resulting picture in order to compare it later to others or save it in a file. In Freeze Mode the picture has a blue colored frame.

**NOTE:** Freezing a result does not store the picture in a file (see [“Saving a picture” on page 64](#)). The result will be lost if the instrument is shut off.

Depending on the QuickCapture™ key setting, this key allows you to freeze the picture or to start a test.

### Profile

1. Press the key.
2. Tap the **[Profile]** button.
3. Tap the Profile which will be used for the test of the fiber connector:
  - **E2000:** Pass/Fail criteria for precision metal ferrule connectors.
  - **Ribbon\_:** Pass/Fail criteria for single-mode and multi-mode connectors from IEC 61300-3-35 standard.
  - **SM-UPC:** Pass/Fail criteria for single-mode UPC connectors from IEC 61300-3-35 standard.
  - **SM-APC:** Pass/Fail criteria for single-mode APC connectors from IEC 61300-3-35 standard.
  - **SM\_PC:** Pass/Fail criteria for single-mode PC connectors from IEC 61300-3-35 standard.
  - **MM\_:** Pass/Fail criteria for multi-mode connectors from IEC 61300-3-35 standard.
  - **SFP\_:** Pass/Fail criteria for small form-factor pluggables.

Profiles contain the analysis parameters from which Pass/Fail criteria are determined.

## Tip

1. Press the  key.
2. Tap the [Tip] button.
3. Select the tip set on the Digital Probe to connect fiber for inspection and tap on the tip set.

## More

1. Press the  key.
2. Tap the [More] button to view or change the storage location, settings and information of the Digital Probe.

## Saving Probe/PCM results

---

Images can easily be saved by pressing the  key. Each time the key is pressed, the results will be stored.

**NOTE:** Instruments with an integrated patch cord microscope (“PCM”) use a specific app, also called “PCM”, to operate that microscope. Therefore, images taken by the PCM can easily be distinguished from images taken by an external digital probe.

**NOTE:** If the instrument with integrated patch cord microscope is connected to a Digital Probe, the images for the PCM and the Digital Probe will be stored in different folders.

### Background

Every saving covers the complete image and overlay data available, regardless of the current screen contents:

- Two JPEG files for high and low magnification
- One XML file for test result description
- One PGM file (compressed) for failed locations
- One container file

When data is requested by the user (e.g. using SCPI), the provided jpg-file is created just in time by the software. This concept helps to save memory space and allows to maintain sharp zone rings for all resolutions (VGA, QVGA and QQVGA).

**NOTE:** Saved image and overlay data (JPEG, XML, PGM files) can be transferred, displayed and managed via the Smart Reporter software.

1. Select the desired overlay mode.
2. Press the  key.

*In live view this action triggers the snapshot.  
As file name the label prefix defined in the project settings is  
showed on top of the display.*



3. To edit the file name, tap the name, edit it and tap [OK].
4. To change the ID, tap [Decrement ID] or [Increment ID].
5. Press [Save] to save the results.

*The file is saved in the current active group directory.*

# 11 DATA MANAGEMENT

**NOTE:** Results are always stored under the currently selected (active) project. Thus, to display stored results the desired project must be set to active first (see “Managing projects” on page 35).

## Saving results

Saving results is explained in the descriptions of each application.

## Data management of Return Loss and Powermeter tests

### Recalling stored test results

Stored test results are displayed directly from the menu in the chosen application.

✓ The instrument is in the chosen application mode.

1. Press the [☰] key
2. Tap the [More] button.
3. Tap the [Measurement Data] button.

*The list of stored test results is displayed.*

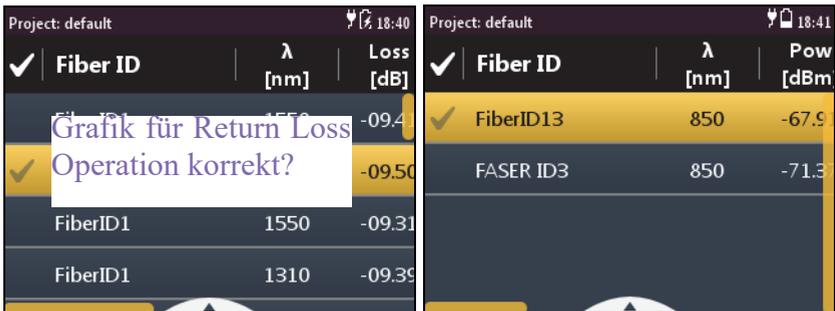


Fig. 23 Measurement data overview: Return Loss Test (left), Powermeter Test (right)

### To show all columns of the overview:

- ▶ Press the right/left arrow keys to show additional information. The displayed information depends on the selected application.

**Measurement Data of ...Test ggf. Inhalte ür Return Loss anpassen?**

<b>Fiber ID</b>	Test label name
$\lambda$ [nm]	Wavelength
<b>Loss [dB]</b>	measured Loss value
<b>Pass/Fail</b>	Passed/failed label
<b>Limit [dB]</b>	Limit value
<b>Ref [dBm]</b>	Reference value
<b>Timestamp</b>	Time and date of the test

**Measurement Data of Powermeter Test**

<b>Fiber ID</b>	Test label name
$\lambda$ [nm]	Wavelength
<b>Pow [dBm]</b>	measured Powermeter value
<b>Pow [Watt]</b>	
<b>Pow [dB]</b>	
<b>Ref [dBm]</b>	Reference value
<b>Pass/Fail</b>	Passed/failed label
<b>Limit [dBm]</b>	Limit value
<b>Auto <math>\lambda</math></b>	optional Auto $\lambda$ mode
<b>Tone</b>	Tone value
<b>Timestamp</b>	Time and date of the test

## Managing test results

### To select/deselect a test result:

There are several ways to select and deselect test results:

1. Tap an entry once to highlight it, tap it again to select it.
2. Use the up/down arrows to highlight an entry and press the center key to select it.
3. Press the key and tap the [Select All] button to select all.
4. Press the key and tap the [Deselect All] button to deselect all.

**NOTE:** The selection state of the highlighted entry toggles. The check mark in the first column shows in light grey when an entry is deselected and in dark grey when it is selected.

**To view test results in full screen:**

- ✓ The measurement data overview is displayed.
- 1. Select one or more test results from the list.
- 2. Press the [☰] key and tap the [View Selected] button.  
*The first selected result will be displayed.*

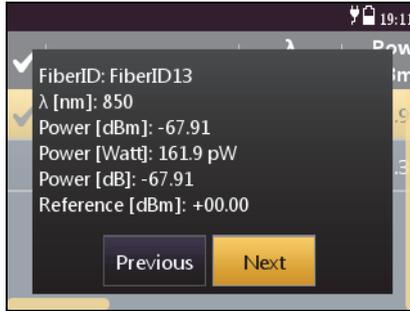


Fig. 24 Powermeter test results

- 3. Press the [☰] key and tap the [Next] or [Previous] button to display other results.

**To sort the test results:**

- ✓ The measurement data overview is displayed.
- 1. Press the [☰] key.
- 2. Tap the [More] button, then tap the [Sort Order] button.
- 3. Select the desired sorting order.

**To show or hide the overview columns:**

- ✓ The measurement data overview is displayed.
- 1. Press the [☰] key.
- 2. Tap the [More] button, then tap the [Show Columns] buttons.
- 3. Tap any column header to toggle its hide/show status.

**To delete stored results from a project:**

- ✓ The measurement data overview is displayed.
- 1. Select one or more test results.
- 2. Press the [☰] key.

3. Tap the [Delete Selected] button.  
*The selected test results are deleted.*

## Data management of Probe and PCM tests

---

### Recalling stored test results

Stored test results are displayed directly from the menu in the **Probe/PCM** application.

- ✓ The **Probe** or **PCM** application is selected.

1. Press the [≡] key.
2. Tap the [More] button.
3. Tap the [Measurement Data] button.  
*The list of stored test results is displayed.*

Fiber ID	Pass/Fail	Profile
FiberID1	--	MM (IE)
FiberID2	FAIL	MM (IE)
✓ Rem7	PASS	MM (IL)
Rem7	--	MM (IE)

#### To show all columns of the overview:

- ▶ Press the right/left arrow keys to show additional information.  
The displayed information depends on the selected application.

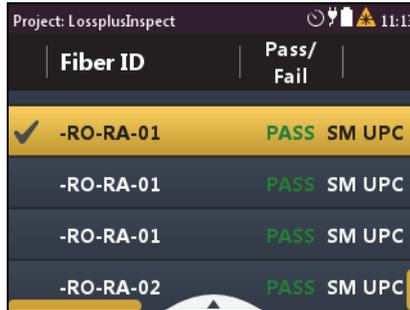
<b>Fiber ID</b>	Test label name
<b>Pass/Fail</b>	Passed/failed label
<b>Profile</b>	Profile label
<b>Adapter</b>	Typ of adapter
<b>Timestamp</b>	Time and date of the test

### Selecting/Deselecting test results

Test results first must be selected before they can be viewed or deleted. A selected entry is flagged by the check mark in the first column.

**To select one test:**

1. To select a test, tap it twice.  
 – or –  
 Press the arrow keys to highlight the test and press the center key  
*The check mark shows the selected test.*



**To select multiple tests:**

- ▶ Repeat step 1 to select multiple entries.

**To select all tests:**

- ▶ Press the [☰] key and tap [Select All].

**To deselect all tests:**

- ▶ Press the [☰] key and tap [Deselect All].

**Displaying test results**

**NOTE:** When selecting multiple tests, all selected tests can be viewed one after another without switching back to the list and selecting another test.

**To display a test result:**

1. Select one, multiple or all tests.
2. Press the [☰] key and tap the [View Selected] button.  
*The test results are displayed in full screen.*

**To view the next test result:**

- ✓ The selected test result is displayed in full screen.

  1. Press the center key.  
 – or –
  2. Press the [☰] key and tap the [Next] button.

### To view the previous test result:

- ✓ The selected test result is displayed in full screen.
- ▶ Press the [☰] key and tap the [Prev] button.

### Sorting test results

- ✓ The measurement data overview is displayed.
- 1. Press the [☰] key.
- 2. Tap the [More] button, then tap the [Sort Order] button.
- 3. Select the desired sorting order.

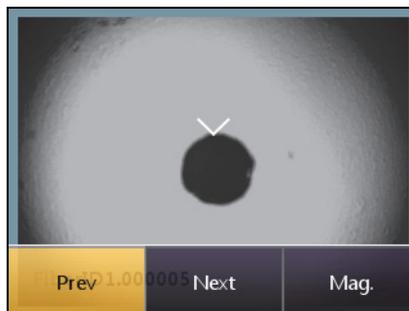
### Show/hiding the overview columns

- ✓ The measurement data overview is displayed.
- 1. Press the [☰] key.
- 2. Tap the [More] button, then tap the [Shown Columns] button.
- 3. Tap any column header to toggle its hide/show status.

### Deleting stored results from a project

- ✓ The measurement data overview is displayed.
- 1. Select one, multiple or all tests.
- 2. Press the [☰] key.
- 3. Tap the [Delete Selected] button.  
*The selected test results are deleted.*

### Actions when viewing images



### To toggle the image magnification low/high

- ▶ Press the [☰] key, then tap the [Mag.] button.  
– or –

Tap the image.

**To move the image to the area of interest:**

- ▶ Sweep the high magnification image with your finger.
  - or –
- Press the arrow keys to move the display to the desired direction.

## Exporting results to USB

---

The export function allows to store CSV files and files used exclusively by the Smart Reporter on a USB stick.

**To export files:**

1. Connect a USB stick to one of the USB ports on the right side of the device.

*The  symbol is displayed at the top of the screen.*

2. Tap the  button.
3. Tap the [Data Storage] button.
4. Tap the [Export Results to USB] button.

*The files are stored in the following directory structure:*

```
storage_<device_type><serial_number>  
<current_date>T<current_time>Z.  
<current_date>T<current_time>Z_<current_date>_001.csv  
default  
<Label>.<Test_No>.<Application>
```

The CSV file contains the results of a measurement/of various measurements. The application file can be processed by the Smart Reporter.

## Making a report

---

In order to make a report, please download the FiberChekPRO™ or SmartReporter software from the Viavi web site <http://updatemyunit.net>.

- ▶ Connect your instrument to your PC via the USB port and follow the instructions on the screen.

# 12 MAINTENANCE



## ⚠ WARNING

### **Dangerous voltage and invisible laser radiation**

**Maintenance or cleaning of the instrument while it is connected or operating may damage the instrument or injure you.**

- ▶ Make sure that the instrument is switched off and disconnected from all power sources and optical radiation sources before maintenance or cleaning.

---

## **Cleaning the test port**

It is a good idea to check that the optical connections are clean and clean them if necessary before starting measurements. Even very small dust particles on the end surfaces of the plugs or in the test adapters can adversely affect the accuracy of the measurement.

1. Switch off the instrument.
2. Remove the test adapter from the optical connection.  
*The plug end surface is now accessible.*
3. Wipe off the plug end surface using a cotton bud soaked in isopropanol.  
*This cleaning method is very effective and leaves no residue.*
4. Blow out the test adapter with clean compressed air (available in spray cans, e.g. anti-dust spray).

**NOTE:** Cover the optical connections with the dust cap whenever they are not in use. This prevents them from getting dirty.

---

## **Cleaning the instrument**

If the instrument gets dirty through use, you can clean it using a soft cloth moistened with a mild solution of detergent.

### **NOTICE**

#### **Water and cleaning fluids**

**The instrument may be damaged or destroyed if water or cleaning fluids penetrate it.**

- ▶ Make sure that water or cleaning fluids do not penetrate the instrument.

# 13 APPENDIX - REFERENCING METHODS

For a fiber loss measurement per length, connection, and splice, the technician must indicate the fiber length, the number of connections, and how many splices are present in the fiber system under test.

There are four additional connections required to perform a test:

- A connection at the local device to the local reference jumper.
- A connection from the local reference jumper to the fiber system under test.
- A connection from the fiber system under test to the remote reference jumper.
- A connection from the remote reference jumper to the remote device.

The reference method chosen (One, two or three jumper reference) will determine how many of these connections are included in the loss measurement and in the loss limit.

**NOTE:** In the following procedures, test-reference jumper cables are assumed to:

- be compliant to IEC 61280-4-1/4-2
- be high-quality and in good condition
- be equal in length and relatively short
- have no end-face damage or debris

Disconnecting the connection at the transmitter of the local or remote ORL-85/ORL-85P after a reference is performed invalidates the reference. Since the connection at the receiver is not glass-to-glass, it can be removed without affecting the reference. Any loss associated with the test-reference jumper cables is automatically considered in the test results.

## Remote Referencing

---

**NOTE:** The figures below display referencing methods (loopback/remote) for single-mode fibers. The contents described apply equally to measurements under multi-mode fibers.

### One jumper cable reference

This reference removes the losses at Connection 1 and Connection 4 from the measurement.



Fig. 25 One jumper reference - unidirectional

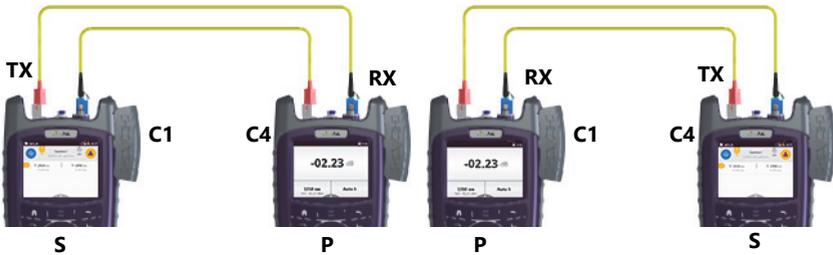


Fig. 26 One jumper reference - bidirectional (switching source and powermeter mode)

<b>C1</b>	Connection 1
<b>C4</b>	Connection 4
<b>TX</b>	Laser source output (Transmitter)
<b>RX</b>	Powermeter input (Receiver)
<b>S</b>	Source device
<b>P</b>	Powermeter device

$$\text{Measured loss} = \Delta_{\text{Conn. 2}} + \Delta_{\text{FiberUnderTest}} + \Delta_{\text{Conn. 3}}$$

This reference removes any loss at the connection between the instrument in source mode and the reference test jumper (both directions). However, the loss at the connection from instrument in source mode's reference jumper to the fiber under test and the connection from the fiber under test to the instrument in powermeter mode's reference jumper will not be referenced out.

### Two jumper cable reference

This reference removes the losses at Connection 1, Connection 2, and Connection 4 from the measurement.

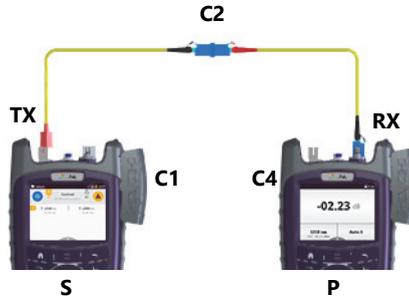


Fig. 27 Two jumper reference - unidirectional

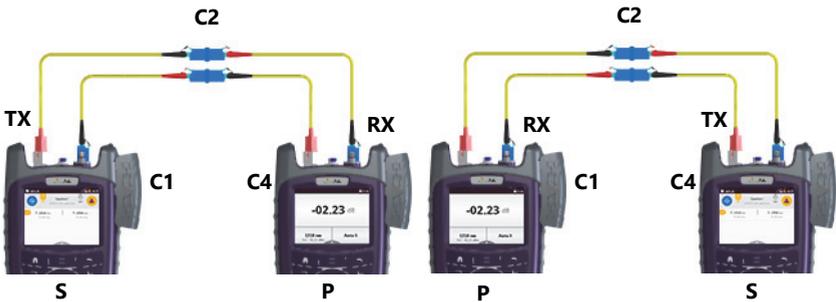


Fig. 28 Two jumper reference - bidirectional (switching source and powermeter mode)

<b>C1</b>	Connection 1
<b>C4</b>	Connection 4
<b>C2</b>	Connection 2
<b>TX</b>	Laser source output (Transmitter)
<b>RX</b>	Powermeter input (Receiver)
<b>S</b>	Source device
<b>P</b>	Powermeter device

The losses ( $\Delta$ ) at  $\Delta_{Conn. 1}$ ,  $\Delta_{Conn. 2}$  and  $\Delta_{Conn. 4}$  are referenced out, so the loss measurement is as follows:

$$\text{Measured loss} = \Delta_{\text{FiberUnderTest}} + \Delta_{\text{Conn. 3}}$$

This reference removes any loss at the connection between the transmitter of the instrument in source mode and a reference test jumper plus the loss at one connection plus a second reference test jumper (both directions). The loss at the second connection that must be present to measure the fiber system under test will not be referenced out.

By performing a two-jumper reference, the loss at this one connection is included in the measured loss.

**Three jumper cable reference**

This reference removes the losses at Connection 1, Connection 2, Connection 3, and Connection 4 from the measurement.

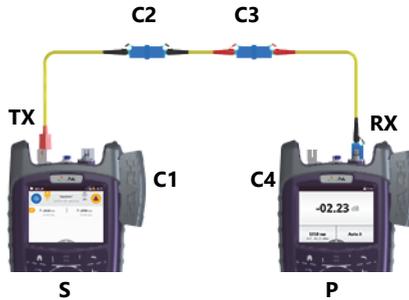


Fig. 29 Three jumper reference - unidirectional

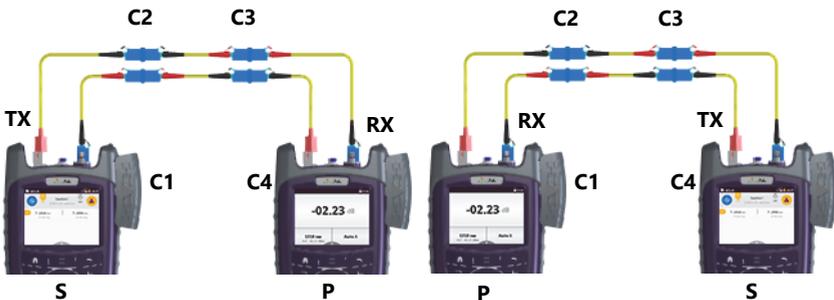


Fig. 30 Three jumper reference - bidirectional (switching source and powermeter mode)

<b>C1</b>	Connection 1
<b>C4</b>	Connection 4
<b>C2</b>	Connection 2
<b>C3</b>	Connection 3
<b>TX</b>	Laser source output (Transmitter)
<b>RX</b>	Powermeter input (Receiver)
<b>S</b>	Source device
<b>P</b>	Powermeter device

The losses ( $\Delta$ ) at  $\Delta_{Conn. 1}$ ,  $\Delta_{Conn. 2}$ ,  $\Delta_{Conn. 3}$  and  $\Delta_{Conn. 4}$  are referenced out, so the loss measurement is as follows:

$$\text{Measured loss} = \Delta_{\text{FiberUnderTest}}$$

This reference removes any loss at all the connections. A third reference jumper is used. Just as with the other test jumpers, the loss of this short reference jumper will not affect the loss measurement.

By using a three-jumper reference, no connection loss is added to the measured loss of the fiber under test.

# 14 REMOTE CONTROL

## Remote Command Documentation

- ▶ Please visit the Viavi web site at <http://updatemyunit.net> for the latest Remote Command Documentation "SCF RC Docs.exe" (self extracting zip-file).

# 15 ENVIRONMENTAL COMPLIANCE

This equipment was tested and found to comply with EN61326-1, IEC 61000-4-2, IEC61000-4-3, IEC/CISPR11. The limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

The authority to operate this equipment is conditioned by the requirements that no modifications be made to the equipment unless the changes or modifications are expressly approved by Viavi.

**NOTE:** To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

**NOTE:** This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## Industry Canada (IC)

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

- 1) This device may not cause interference;
- 2) This device must accept any interference, including interference that may cause undesired operation of the device.

**NOTE:** Device operation in the band 5150-5250 MHz is for indoor use only.

## EU Radio Equipment Directive

In accordance with Article 10.8 of the EU Radio Equipment Directive 2014/53/EU, the following table provides information on the frequency bands and the maximum RF transmit power of this product for sale in the EU:

Frequency range (MHz)	Channels used	Max. Transmit Power (dBm/mW)
2400-2483.5	1-13	ODFM: 19.9 dBm (97.7 mW) CCK: 17.9 dBm (61.7 mW)
5150-5250	36-48	22.9 dBm (195 mW)
5250-5350	52-64	22.9 dBm (195 mW) with TPC <sup>1)</sup> 19.9 dBm (97.7 mW) with TPC
5470-5725	100-140	29.9 dBm (977 mW) with TPC 26.9 dBm (490 mW) non-TPC

1) TPC means Transmit Power Control

# 16 SPECIFICATIONS

## General specifications

Fiber inspection	Via P5000i Digital Probe with auto Pass/Fail analysis
Live image Display	320 x 240 pixels, 8 bit gray, 10 fps High contrast 3.5" TFT color touchscreen
Display resolution	0.01 dB / 0.001 $\mu$ W
Measurement units	dB, dBm, W
Data memory	10000 measurement results
Data readout	Via client USB interface or Ethernet
Remote control capability	Via USB
Electrical interfaces	2 USB Type A, 1 USB Micro-B, Ethernet
Power supply	Four-way power: NiMH, dry batteries, RBP2 Li-Ion Battery Pack, PS4 Universal AC/DC Power Supply 12 V Internal charging for RBP2 Li-Ion Battery Pack
Recommended recalibration interval	3 years
Size (H x W x D) ORL-85	208 x 112 x 64 mm (8.2 x 4.4 x 2.5 in)
Weight	750 g
Operating temperature range	-5 °C to +45 °C
Storage temperature range	-25 °C to +55 °C

## Power meter specifications

Adjustable wavelength range	1260 nm to 1650 nm
Calibrated wavelengths	1310 nm, 1490 nm, 1550 nm, 1625 nm
Photo diode	InGaAs
Fiber types	9/125
Display range	-85 dBm to +15 dBm
Resolution	0.01 dB, 0.001 $\mu$ W
Maximum level	+15 dBm
Intrinsic uncertainty <sup>1)</sup>	$\pm$ 0.5 dB
Overall measurement uncertainty <sup>2) 3)</sup>	1310 nm, 1490 nm, 1550 nm, 1625 nm: $\pm$ 0.60 dB $\pm$ 0.15 nW
Wavelength detection <sup>4)</sup>	Automatic switching and displaying up to 4 wavelengths simultaneously
Modulation detection <sup>4)</sup>	270 Hz, 1 kHz, 2 kHz

- 1) At calibrated wavelengths at reference conditions at -22 dBm (CW), 23 °C ±3 K, 9 μm test fiber with SC/APC ceramic connector.
- 2) -85 dBm to +15 dBm, -5 °C to +45 °C
- 3) Overall measurement uncertainty for 1260 to 1650 nm: ±0.80 dB ±0.15 nW
- 4) With Viavi optical light sources, 800 nm to 1625 nm: level > -60 dBm

## Laser specifications

Laser safety	IEC 60825-1:2007
Laser classification	CLASS 1 LASER PRODUCT
Power setting resolution	0.01 dB
Tracking error	± 1 dB

## Wavelengths

BN 2311/21	1310/1550 nm <sup>1)</sup> , APC
BN 2311/23	1310/1550/1625 nm <sup>1)</sup> , APC

1) Typically ±20 nm

## Wavelength accuracy

1310 nm, 1550 nm	± 20 nm
1490 nm, 1625 nm	± 3 nm
850 nm, 1300 nm	± 20 nm

## Spectral width

1310 nm, 1550 nm, 1490 nm, 1625 nm	< 5 nm
------------------------------------	--------

## Fiber types

Single-mode	9/125
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## Output power range<sup>1</sup>

### Single port instruments

2 wavelengths instruments	
Laser (CW)	-3.00 to 0.00 dBm (± 1 dB)
Laser (Modulated, Auto λ)	-6.00 to -3.00 dBm (± 1 dB)
3 & 4 wavelengths instruments	
Laser (CW)	-6.00 to -3.00 dBm (± 1 dB)
Laser (Modulated, Auto λ)	-9.00 to -6.00 dBm (± 1 dB)

1 CW signal, T = 23 °C ±3 K, including connector, depending on quality of connector applied to the OLS

## Signal stability<sup>1</sup>

Short term	± 0.02 dB (within 15 min.)
Long term	± 0.20 dB (within 8 h)

## Modes<sup>2</sup>

Continuous wave (CW), Modulated (270 Hz, 1 kHz, 2 kHz), Auto  $\lambda$

## Return Loss specifications

	Value	Conditions
Selectable wavelengths <sup>1)</sup>		
BN 2311/21	1310/1550 nm	
Selectable wavelengths <sup>1)</sup>		
BN 2311/23	1310/1550/1625 nm	
Display range	0 dB... +75 dB	
Measurement accuracy <sup>2)</sup>	±0,70 dB	0... +50 dB
Measurement accuracy <sup>2) 3)</sup>	±0,90 dB	+50... +60 dB
Resolution	0,1 dB	

1) Typically ±20 nm

2) Under reference conditions: 20 °C ±3K, 45 % to 75 % rel. humidity,  
Normalization after warm up time of 20 min, FC/APC Connector

3) After normalization with singlemode mandrel wrap that has > 70 dB return loss

1 At ambient temperature range -10 °C to +55 °C,  $\Delta T = \pm 0.3$  K

2 Signal coding for automatic power meter wavelength detection. Works only with Viavi power meters e.g. OLP-85

# 17 ORDERING INFORMATION

## ORL-85/ORL-85P stand alone units

---

### ORL-85

Return Loss Test Set, InGaAs, <b>1310/1550 nm</b> , SC/APC, FC/APC	BN2311/21
Return Loss Test Set, InGaAs, <b>1310/1550/1625 nm</b> , SC/APC, FC/APC	BN2311/23

---

## Included items

---

### Stand-alone units

- SmartClass™ Fiber instrument
- Soft shoulder case for SmartClass™ Fiber + accessories
- Electronic tool kit with Operating Manual, datasheet and Smart-Reporter SW on USB flash drive
- Two optical adapters: SC type, or selectable SC, FC, DIN, ST, LC in universal version
- Quick Start Manual and Safety Instructions
- Eight dry batteries AA size

## Accessories

---

PS4 Universal AC/DC Power Supply for SmartClass™ Fiber	BN 2305/ 90.01
RBP2 Li-Ion Battery Pack for SmartClass™ Fiber	BN 2305/ 90.02
Calibration report	BN 2307/ 90.03
UC4 hands free carrier for SmartClass™ Fiber	BN 2128/01
UC4P hands free carrier for SmartClass™ Fiber with PCM	BN 2128/02
SCASE2 soft shoulder case for SmartClass™ Fiber	BN 2128/03
USB cable USB-A to Micro USB	K 807

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## Digital Probe

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P5000i Digital Probe Microscope with FiberChekPRO software	FBP-P5000I
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## PRODUCT REGULATORY COMPLIANCE

### **Viavi Environmental Management Program**

Superb performance and high quality have always characterized Viavi datacom and telecom measurement technology products. In this same world-class tradition, Viavi has an established, proactive program of environmental management.

Environmental management is an integral part of Viavi's business philosophy and strategy requiring the development of long-term, productive solutions to problems in the key areas of economics, technology, and ecology.

A systematic environmental management program at Viavi is essential in regard to environmental policy and enhances cooperation between ourselves and our business partners.

### **The Viavi Environmental Management Program considers:**

#### **Product design and manufacture**

Environmental restrictions and requirements are taken into account during planning and manufacture of Viavi products. This attention ranges from the raw materials and finished components selected for use and the manufacturing processes employed, through to the use of energy in the factory, and right on up to the final stages in the life of a product, including dismantling.

#### **Hazardous materials**

Viavi avoids or uses with care any hazardous or dangerous material in the manufacturing process or the end product. If the use of a dangerous material cannot be avoided, it is identified in product documentation and clearly labeled on the product itself.

#### **Packaging materials**

Preference is given to reusable or biodegradable single-substance packaging materials whenever possible.

#### **Environmental management partnerships**

Viavi encourages our customers and suppliers who take this responsibility seriously to join Viavi in establishing their own environmental management programs.

## EU WEEE and Battery Directives

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations..



Viavi has established a take-back process in compliance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive, 2012/19/EU, and the EU Battery Directive, 2006/66/EC.

Instructions for returning waste equipment and batteries to JDSU can be found in the WEEE section of **Viavi's Standards and Policies web page** (<https://www.viavisolutions.com/en-us/corporate/legal/policies-standards#sustain>).

If you have questions concerning disposal of your equipment or batteries, contact JDSU's WEEE Program Management team at [WEEE.EMEA@ViaviSolutions.com](mailto:WEEE.EMEA@ViaviSolutions.com).

## EU REACH

Article 33 of EU REACH regulation (EC) No 1907/2006 requires article suppliers to provide information if a listed Substances of Very High Concern (SVHC) is present in an article above a certain threshold.

For information on the presence of REACH SVHCs in Viavi products, see the Hazardous Substance Control section of **Viavi's Standards and Policies web page**.

## EU CE Marking Directives (LV, EMC, RoHS, RE)

This product conforms with all applicable CE marking directives. Please see EU Declaration of Conformity for details.

## California Proposition 65

California Proposition 65, officially known as the Safe Drinking Water and Toxic Enforcement Act of 1986, was enacted in November 1986 with the aim of protecting individuals in the state of California and the state's drinking water and environment from excessive exposure to chemicals known to the state to cause cancer, birth defects or other reproductive harm. For the Viavi position statement on the use of Proposition 65 chemicals in Viavi products, see the Hazardous Substance Control section of **Viavi's Standards and Policies web page**.

## "中国RoHS"

### 《电子信息产品污染控制管理办法》（工业和信息化部，第39号） 附录

本附录按照"中国RoHS"的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

环保使用期限：



本标识标注于产品主体之上，表明该产品或其配件含有有毒、有害物质（详情见下表）。

其中的数字代表在正常操作条件下至少在产品生产日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。

有关正常操作条件，请参见产品用户手册。

产品生产日期请参见产品的原始校准证书。

**有毒、有害物质的类型和所在部件**

元器件 (Component)	有毒、有害物质和元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR <sup>6+</sup> )	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	○	○	○	○	○
内部配线 (Internal wiring)	○	○	○	○	○	○
显示器 (Display)	○	○	○	○	○	○
键盘 (Keyboard)	○	○	○	○	○	○
塑料外壳零件 (Plastic case parts)	○	○	○	○	○	○
配件 (Accessories)	○	○	○	○	○	○

○：代表该部分中所有均质材料含有的该有毒、有害物质含量低于SJ/T11363-2006标准的限值。  
X：代表该部分中所有均质材料含有的该有毒、有害物质含量高于SJ/T11363-2006标准的限值。



North America  
Latin America  
China  
Germany

+1 844-468 4284  
+1 954 688 5660  
+86 21 6859 5260  
+49 7121 86 0

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