OFT-4212

Loss Test Set

User Manual

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1 Introduction

OFT-4212 is a connector assembly test station, equipped with set of Light sources, four channel power meter and control unit with touch display.

This solution provides full automated test of up to four fiber connector with graphical guidance.

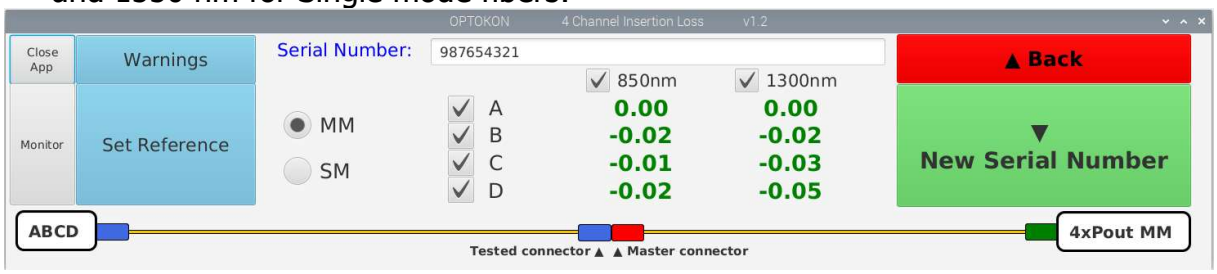
Serial numbers of tested connectors can be entered manually or by code reader.

Measured values are checked if they are within expected range, then displayed in GREEN or RED color as a warning. The automated test consists of three simple steps, Optical power referencing, Entering serial number and Insertion loss measurement. The measured data are automatically stored on local SSD.

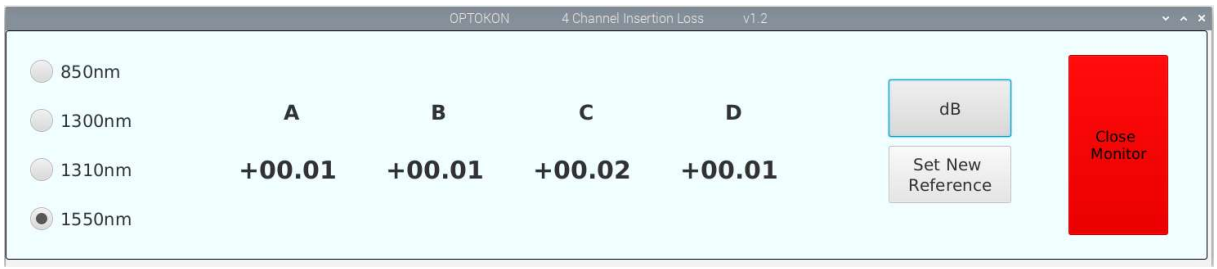
2 Applications:

Automated connector test with Insertion loss at 850 nm and 1300 nm for Multimode, and 1310 nm

and 1550 nm for Single mode fibers:



This device can also serve as a simple Light source and Optical power meter for absolute and relative monitoring:



3 Features

- 4-fibers simultaneous measurements
- Single mode and Multimode application
- Absolute and Relative optical power measurement
- Displayed units: dBm, dB
- Four wavelengths measurement:
    - 850, 1300, 1310, 1550 nm
- Data processing or downloading

4 Specifications

Light source	
Interface	FC/APC
Working wavelengths	850, 1300, 1310, 1550 nm
Wavelength accuracy	± 2.0 nm
Wavelength stability, 24 hrs	± 0.1 nm
Output power	0 dBm
Accuracy	± 0.2 dB
Power meter	
Interface	FC, SC, LC, universal 2.5 mm or 1.25 mm
Photodetector	InGaAs Ø 1mm
Spectral wavelength	850-1700 nm
Calibrated wavelengths	850, 1300, 1310, 1550 nm
Dynamical range	+10 dBm to -65 dBm
Uncertainty	± 5 %
Resolution	0.01
Displayed units	dBm, dB
General	
Dimensions (W x D x H)	455 x 290 x 135 mm
Weight	5.6 kg

5 Safety information

The equipment adheres to the following safety classifications: IEC60825-1 and 21CFR1040: Class 1. This classification applies to both laser and LED options with power levels up to 1 mW and wavelengths above 700 nm. Devices in this category are considered safe for use by technicians during normal viewing conditions, as long as magnifying devices are not utilized.

Before using this equipment, it is the user's responsibility to obtain sufficient training and familiarity with relevant safety issues and work practices. This ensures that the equipment is used safely and appropriately.

WARNING!

The OFT-4212 Power meter does not emit any optical power and does not pose any hazards to the user. However, to maintain a high level of operator safety during installation, commissioning, and operation of the equipment, as well as to prevent any damage to the equipment, it is important to take the following general warnings and recommendations into consideration.

- Installation, commissioning, operation, and servicing of equipment with high power levels should only be performed by authorized personnel.
- Use only connector types that are compatible with the instrument to prevent damage to the instrument components.
- Ensure that optical connectors are clean. If connectors are not perfectly clean, follow the cleaning procedure described in the technical specification for the relevant connectors.
- Avoid using magnifying devices to inspect optical fiber ends unless you are certain that no optical power is being emitted.
- If using magnifying devices, ensure they have a built-in infrared filter for safety.
- Never look directly into an active fiber optic cable during operation, testing, or maintenance. Infrared radiation may be present, which can cause permanent eye damage.
- Avoid direct exposure to the beam.
- Do not activate the laser when there is no fiber attached to the optical output connector.
- Never look into the end of an optical cable attached to the optical output when the device is operational. The laser radiation can cause serious damage to your eyesight.

Infrared radiation is invisible and can cause severe damage to the retina. Do not look into the ends of any optical fiber to protect your eyes from serious harm.

6 Maintenance

6.1 Instrument care

- During storage and transport keep the instrument in its carry case to protect against crushing, vibration, dust and moisture.
- Where possible keep the instrument away from strong sunlight.
- Clean the instrument housing using alcohol or other cleaning agents. Acetone or other active solvents may damage the case.
- The instrument is resistant to normal dust and moisture, however it is not waterproof. If moisture does get into instrument, dry it out carefully before using it again.

6.2 Recommended cleaning and mating instructions

Cleanliness will affect the performance of an optical fiber system. Perform the following procedures prior the installation. Clean all connectors, adapters, and attenuators before making any connections. The following cleaning materials are recommended and may form part of Your cleaning kit:

- Lint-free laboratory wipes.
- Isopropyl alcohol in pressurised dispenser
- Lint free pipe cleaners.
- Clean, dry, oil-free compressed air.

CLEANING

Connectors/Terminators:

1. Fold a clean, new wipe into a 2" by 2" square pad.
2. Moisten, but do not saturate, the pad with alcohol making a spot approximately 1/2" in diameter.
3. Press the ferrule and face into a wet spot on the wipe. Using force, twist the ferrule so that a hard wiping action takes place. Repeat twice, using a clean alcohol-moistened at each time.
4. Press the ferrule end face into a dry spot on the wipe. Using force, twist the ferrule so that a hard wiping action takes place
5. Discard the used pad.

Attenuators:

1. For an exposed ferrule (in-line type), see connector cleaning procedure, blow the other end dry with clean compressed air.
2. Clean bulkhead attenuators only by blowing with clean compressed air.

Adapters:

1. Moisten one end of a lint-free pipe cleaner with alcohol.
2. Remove express alcohol from the pipe cleaner with a clean wipe.
3. Insert the moisten pipe cleaner into either end of the adapter and scrub in and out so that the inside surface of the adapter is wiped by the pipe cleaner. Repeat this step for the opposite end. Insert the dry end of the pipe cleaner into either end of the adapter to remove anyresidual alcohol. For oversized adapters (biconic), slightly blow the middle of the pipe cleaner fog better surface contact. Repeat this step for the opposite end.
4. Blow the adapter dry with clean compressed air.

Connection of connectors:

FC:

1. Insert the ferrule tip into the adapter.
2. Align the key with the slot in the adapter.
3. Push the connector into the adapter until the coupling nut reaches the adapter housing.
4. Screw the coupling nut clockwise into the adapter.

7 Device description

7.1 Front panel

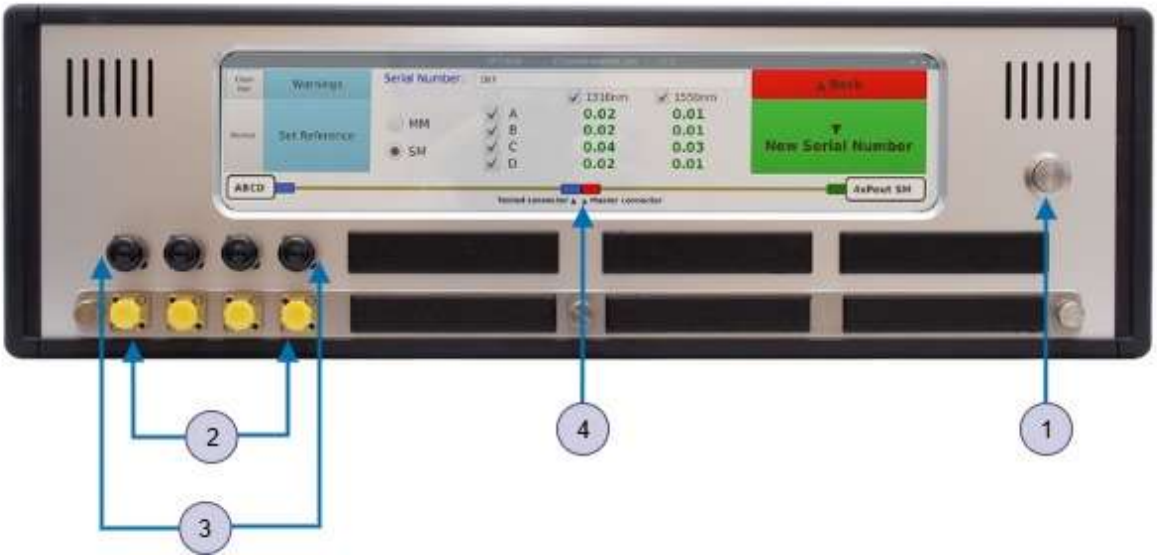


Figure 1: Front panel of OFT-4212

ITEM	DESCRIPTION
1. POWER	Switch ON/OFF
2. P_{OUT}	4x Light source Output
3. P_{IN}	4x Power meter Input
4. DISPLAY	OFT touch display

7.2 Rear panel

Figure 2: Rear panel of OFT-4212

ITEM	DESCRIPTION
1. POWER	AC power socket
2. FUSE	Fuse compartment
3. SWITCH	Main power switch
4. LABEL	Part Number, Serial Number
5. LAN	RJ-45 LAN socket
6. HDMI	HDMI interface
7. USB2	2x USB2 interface
8. USB3	2x USB3 interface

8 Measurement loss

8.1 Basic theory

Loss measures the signal degradation in a fiber optic cable. A light source injects an optical signal of the appropriate wavelength into the fiber and a power meter measures the received signal at the same wavelength.
There are two different measurement methods according to EN 61300-3-4

- Method C2 – insertion method with direct coupling to the power meter
- Method C3 – insertion method with additional test patchcord

Power measurement is the basis of optical testing and determines the power budget of the fiber optic link by comparing the power of the transmitter and the sensitivity of the receiver. This difference is the maximum acceptable loss. Power loss is caused by different phenomena such as attenuation of the fiber, dirty connector mating faces, connector misalignment, loss of splices and other issues such as sharp fiber bends.
The "end to end" loss test is the most commonly used acceptance test for power loss in fiber optic links. The test is based on measurement the power difference at the input and output of the link.
The OFT-4212 Power Meter and OFT-4212 Light Source are used for this test, where the Light Source acts as a transmitter and the optical Power Meter as a receiver.

The "end to end" test includes two steps:

1. Setting the reference
2. Measurement the loss

Important

- Eventual connectors should be cleaned prior to testing (see chapter 6).
- The master cord used to set the reference should be the same type as the patchcords (cables) to be tested (MM: 50/125, 62.5/125 or SM: 9/125).
- It is very important that the connections are not disturbed after the reference value is established.

8.2 Method C2

For method C2 one master cord is used to set the reference. The master cord will be cancelled for all subsequent measurements.

8.2.1 Setting the reference

1. Connect the master cord to the power meter.
2. Connect the second end of the master cord to the light source.
3. Turn on device and application and by pushing **[wavelength]**select the appropriate wavelength.
4. Set the new reference for the selected wavelength - by pushing **[REFERENCE]**.

We recommend turning on the light source for 25 minutes to ensure better stabilization before performing the reference.

8.2.2 Measurement Loss

1. Do not disconnect the master cord from the light source.
2. Disconnect the master cord from the power meter port.
3. Connect the trace to be measured between the power meter port and the master cord that is attached to the light source. An extra master adaptor is required
4. The power meter display will report the value
5. This value represents the difference between the reference and the performed measurement
6. Value of attenuation can be saved in the disk
7. For next measurement, you must repeat references.

8.3 Method C3 – HMA cables measurement

8.3.1 Setting the reference

1. Connect the first master HMA cord to the power meter.
2. Connect the second master cord to light source.
3. Connect the two HMA connectors.
4. By pushing **[wavelength]** select the appropriate wavelength for power meter and light source.

Set the new reference for the selected wavelength - by pushing **[REFERENCE]** or number 2.

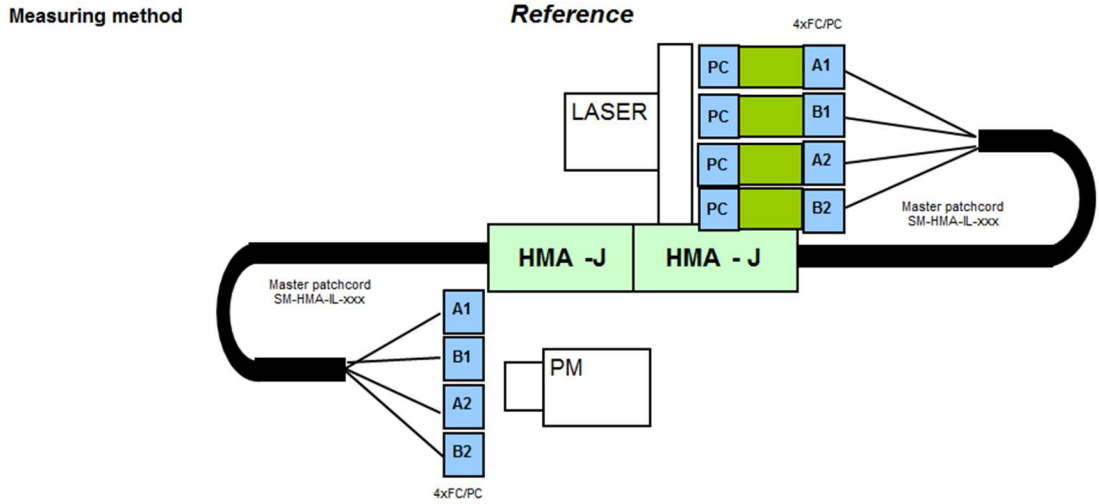


Figure 3: HMA cable reference setting

8.3.2 Measurement Loss

1. Do not disconnect the master cord from the light source and power meter.
2. Disconnect the HMA connectors and connect to fiber for test
3. The power meter display will report the value
4. This value represents the difference between the reference and the performed measurement
5. Value of attenuation can be saved in the disk
6. For next measurement, you must repeat references.

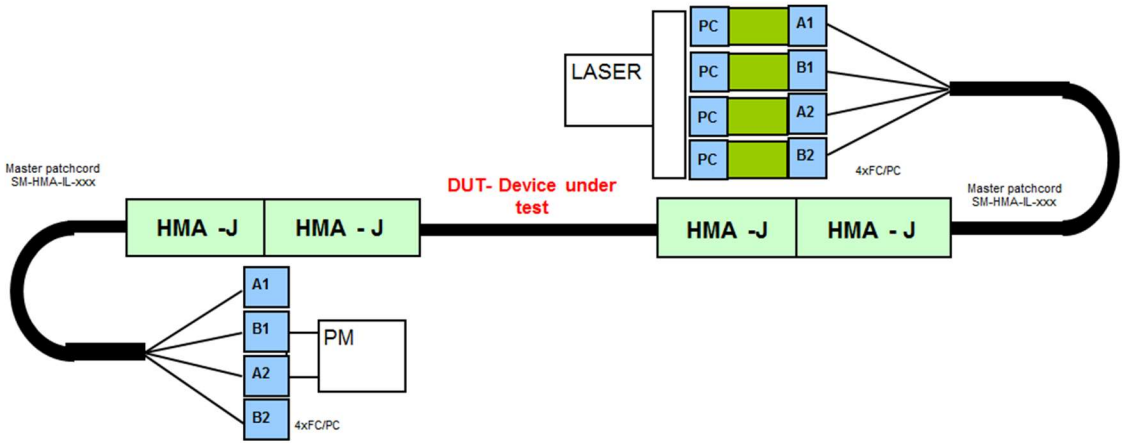


Figure 4: HMA cable measurement

9 Testing procedure

9.1 Turn the device on/off

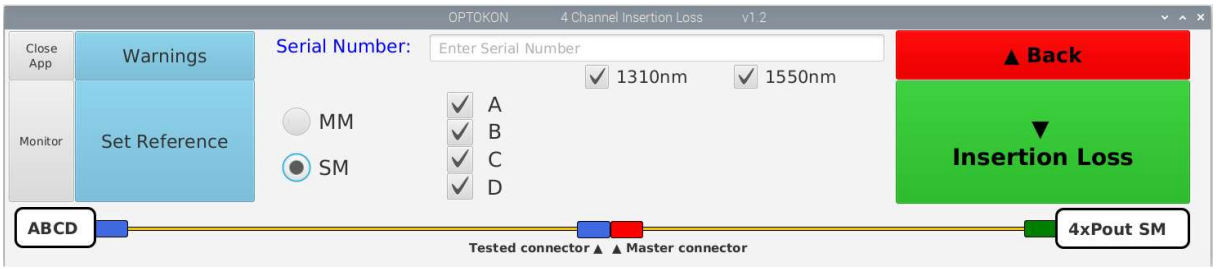
Turn on:
To turn on the device set the Main switch at rear panel into ON position, press the power button at the front panel ⏻ (Figure 1). Device will load its operating system. OFT-4212 has a special application that will run after the start of the operating system. If the application does not start after system boots up, you can run it from the "Applications" menu, "System tools" submenu, "**Power Meter OFT**"

Figure 5: Initial OFT-4212 display

Turn off:
To turn off the device device set the Main switch at rear panel into OFF position, press the power button ⏻

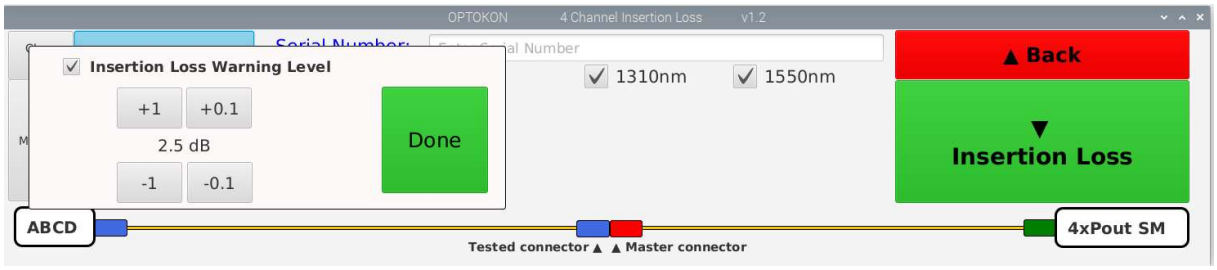
9.2 HMA cable Measurement

1. Connector serial number writing



- Write the Serial number of tested connector
- Define SM/MM fiber type
- Set number of fibers: 2 fibers-A1/B1=AB, 4 fibers A1/B1/A2/B2=ABCD
- Set the testing wavelength

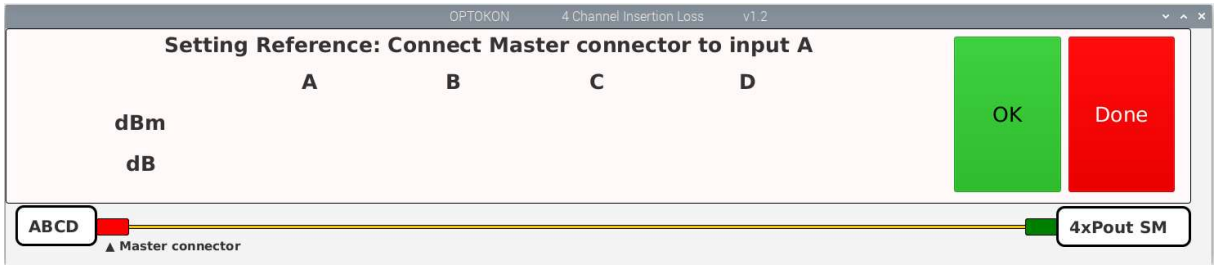
2. Testing tolerancies settings



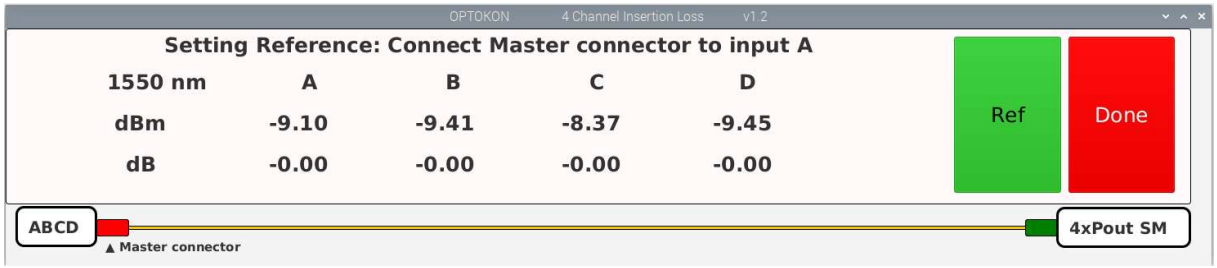
- Use +/- buttons to set required value
- Push Done and go previous screen

3. Insertion Loss Reference settings

- Push Set Reference

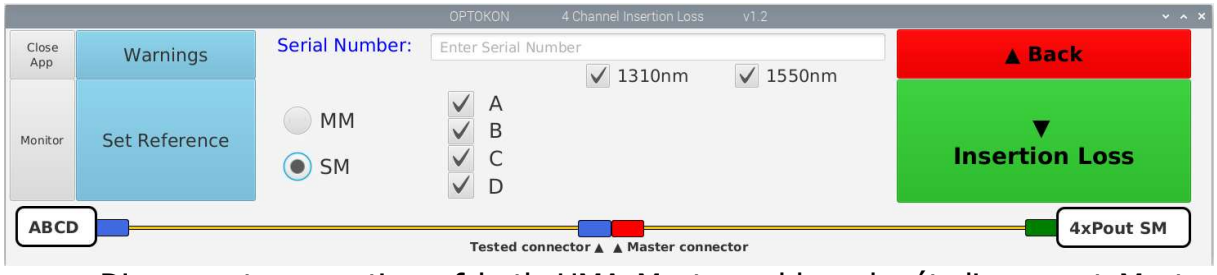


- Connect two Master cables, Fig. 3

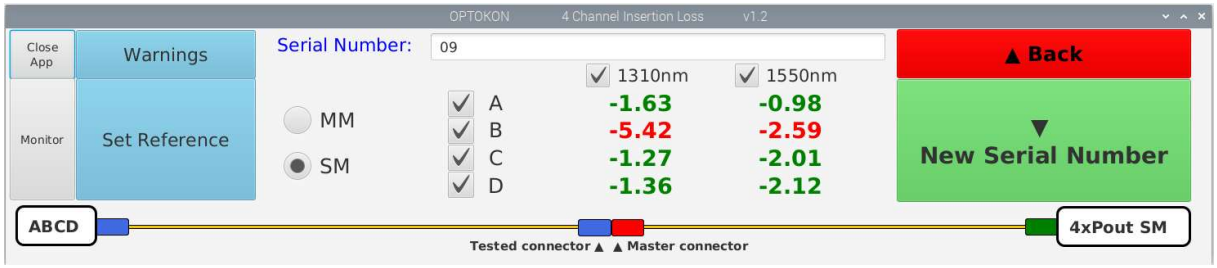


- Push Done

4. DUT measurement

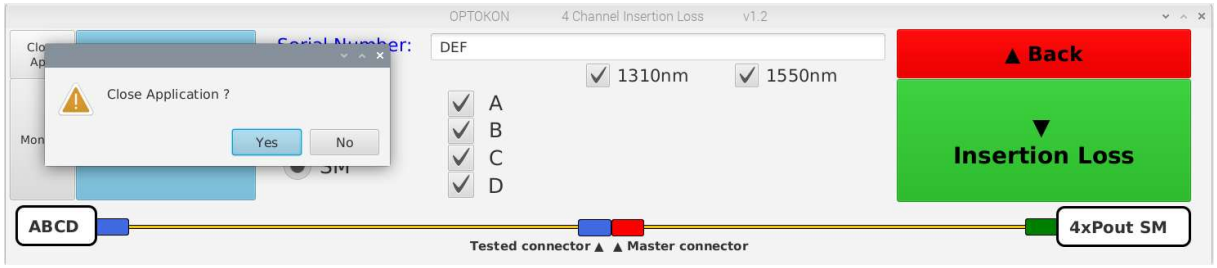


- Disconnect connection of both HMA Master cables, don´t disconnect Master cables connection to LS and PM
- Connect DUT between both Master cables, Fig. 4
- Push insertion Loss

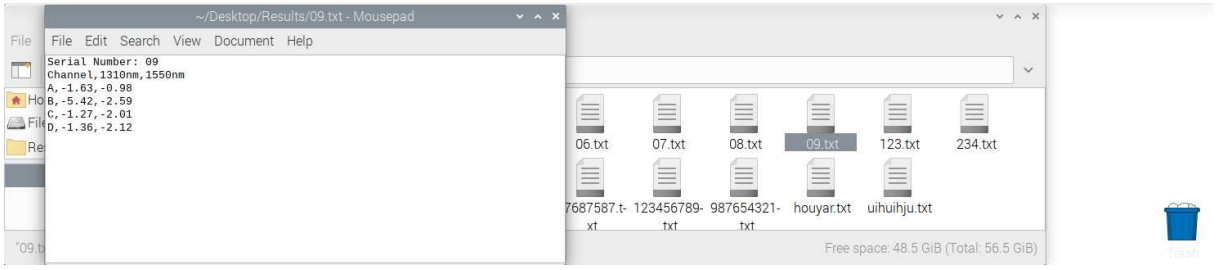


- Check the displayed value
- After pushing New Serial Number – the measured data a are saved into internal Memory

5. Test results reading, data saving

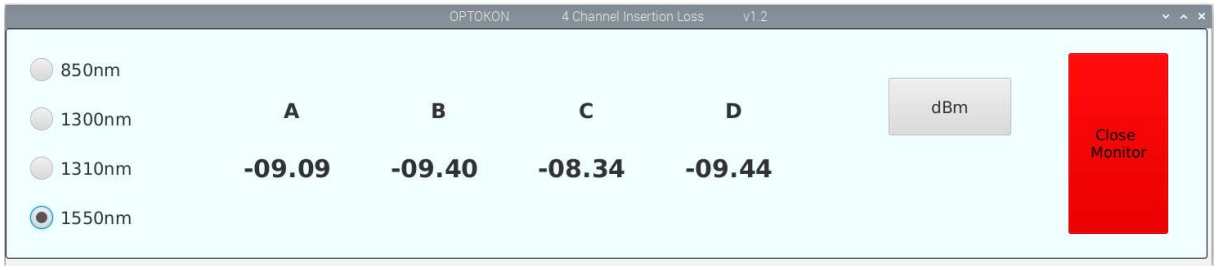


- Go to the Initial screen – Fig. 5
- Push icon Result
- Select required connector Serial Number

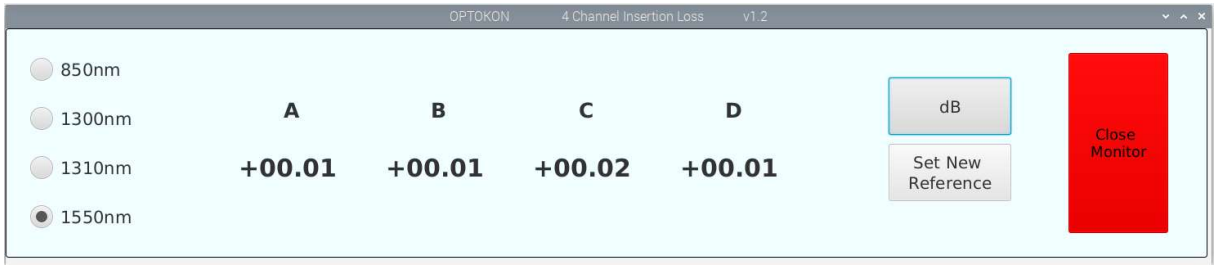


9.3 Monitor function

- Push Monitor button



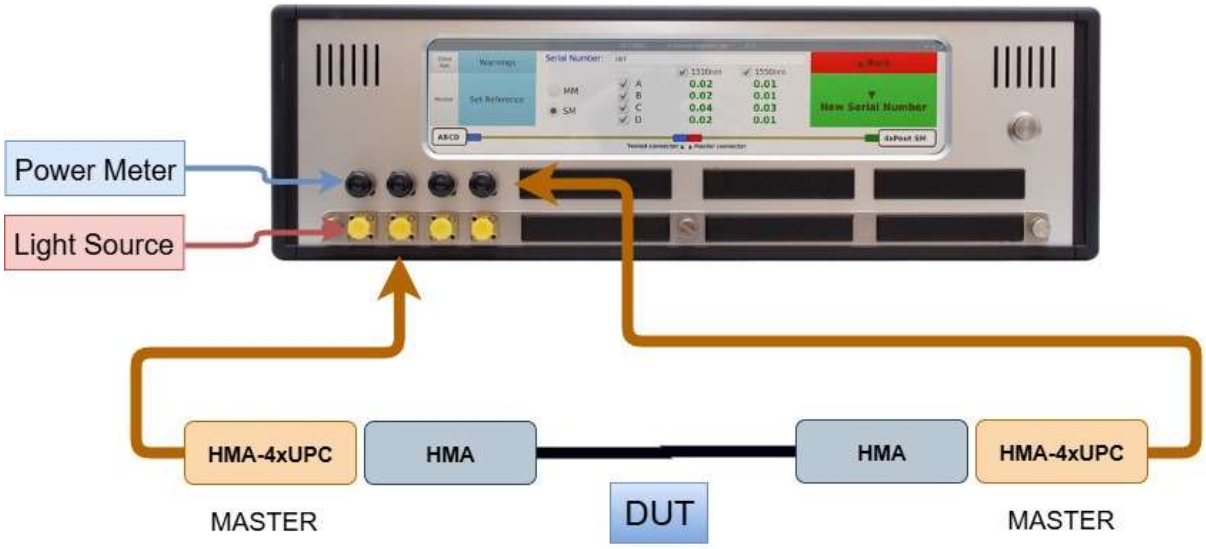
- Select required wavelength
- Select Absolute or Relative value, to be monitored



9.4 Testing setup

9.4.1 OFT-4212-FC-85-30-31-55

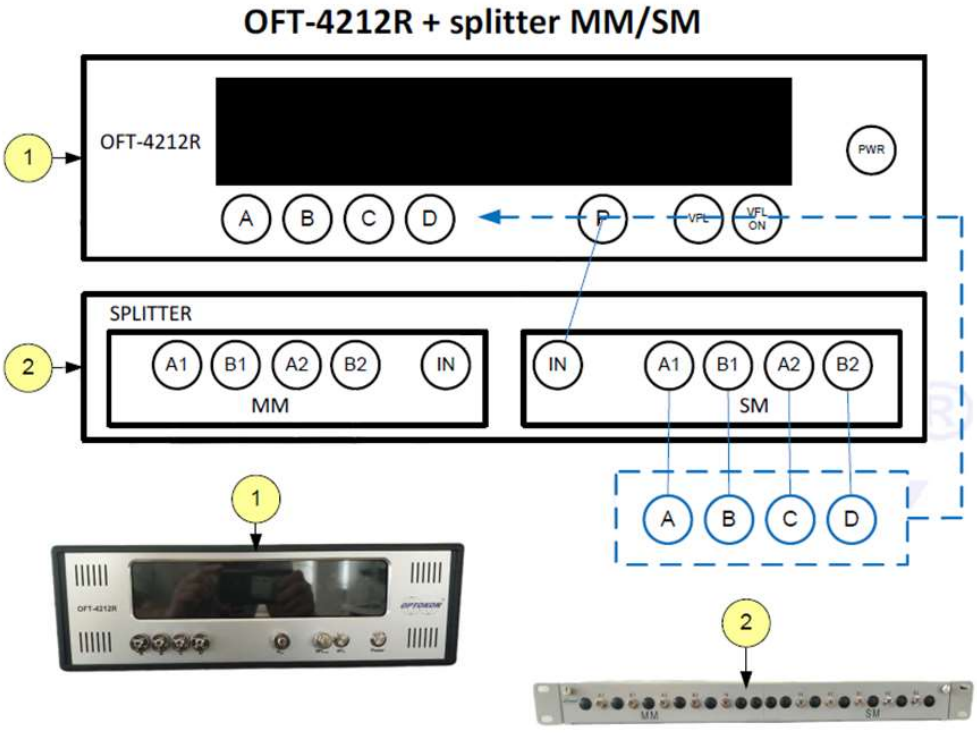
Tester with 4 outputs (LS) / 4 inputs (PM)



9.4.2 OFT-4212R

Tester with 1 output (LS) / 4 inputs (PM) + external splitter

4x output from LS – external splitter unit for testing of multi channels connectors:



10 Service

To ensure the proper operation and long life of the product, the manufacturer OPTOKON, a.s. recommends having the device comprehensively checked and tested in a service center in case of any malfunction of the device:

It is carried out only at the manufacturer's premises or in a service centre authorised by the manufacturer by trained personnel

11 Disposal requirements

At the end of the product's service life, the user is obliged to ensure its environmentally friendly disposal in accordance with Act No. 185/2001 Coll.
Instructions for ecological disposal must be included in the accompanying product documentation, provided that the materials used and the product itself are not classified as environmentally hazardous waste according to Decree No. 93/2016 Coll. and Decree No. 94/2016 Coll.

The crossed-out wheeled bin symbol reminds us that batteries or products with an integrated battery must not be disposed of with household waste within the European Economic Community (EWR), but must be collected separately.

OPTOKON, a.s. will allow free recycling of all electronic equipment if the customer returns the equipment to the collection point designated by OPTOKON, a.s. In the event that a replacement product is not supplied, recycling will be possible at the customer's request for an additional fee. OPTOKON, a.s. will issue a certificate of liquidation.
Logistics and special service costs (dismantling or controlled data destruction) will be calculated separately based on the current market price.
Another option is to entrust the disposal to the operators of compliance schemes with consent to ensure the financing of the management of electrical and electronic equipment.
https://www.mzp.cz/cz/kolektivni_systemy_oeez

12 Power loss and decibels

Loss (dB)	% Loss	dBm	Power (mW)
0	0.0	-50	0.00001
0.1	2.3	-40	0.0001
0.2	4.5	-30	0.001
0.3	6.7	-20	0.01
0.4	8.8	-10	0.10
0.5	10.9	-9	0.13
0.6	12.9	-8	0.16
0.7	14.9	-7	0.20
0.8	16.8	-6	0.25
0.9	18.7	-5	0.32
1	20.6	-4	0.40
2	36.9	-3	0.50
3	49.9	-2	0.63
4	60.2	-1	0.79
5	68.4	0	1.00
6	74.9	1	1.26
7	80.0	3	2.00
8	84.2	5	3.16
9	87.7	7	5.01
10	90.0	10	10.00
12	93.7	12	15.84
15	96.8	15	31.62
20	99.0	17	50.12
30	99.9	20	100.00

13 Calibration, service center

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