PM-215E

Pocket Optical Power Meter

User Manual

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Table of contents

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2. Introduction

The **PM-215E Optical Power Meter** is a small, pocket-size low-cost item. The small size does not prevent the optical meter fulfilling all the technical requirements for field equipment. The unit can be easily carried in the pocket or on a belt. It can be placed within rack mount ODF's with the display on the top or on the side. The Li-pol rechargeable battery ensures a long-term working time with a minimum lifetime of 2 years. The unit can store 100 measurements which can be uploaded to a PC and managed with SmartProtocol software.

The instrument can be used separately to measure absolute or relative optical power in optical networks or with the **LS-215E Optical Light Source** for optical loss measurement on single mode and multimode fiber cable at six wavelengths.

3. Features

- Portable power meter or USB probe
- Small size, light weight, display backlight
- New faster hardware
- Option for Bluetooth or WIFI module
- Supports SM and MM fiber testing
- More than 20 working wavelengths
- Internal two levels memory for up to 100 measurements
- Comes with its own PM215E application for setting, data transfer
- USB-C port for control, charging, and data transfer
- Build-in Li-Pol rechargeable battery
- Battery status indicator, Auto Off function

4. Application

- Absolute or relative optical power measurement.
- Optical network testing.
- Measurement output power of optical transmitters.
- Measurement input power at optical receivers.
- Measurement attenuation in fiber cabling, in connection with the LS-215E Optical light source
- Measurement Insertion loss of connectors, splices, adaptors, switches and other fiber optic components.
- Easy and quick identification of failure points in fiber optic networks

5. Accessories

5.1.　Standard

- Universal input 2.5 mm adapter (TE-ADP-250)
- FC (TF-ADP-FC), LC (TF-ADP-LC), SC (TF-ADP-SC) adapters
- Power charging adapter
- Traceable calibration certificate
- Hard carrying case (TE-HC-01)
- USB cable

5.2.　Optional

- Universal SFF input 1.25 mm adapter (TE-ADP-125)
- Master patchcords
- Master adapters
- Soft case (TE-EVA-215E)

Standard				Option
TE-ADP-FC	TE-ADP-LC	TE-ADP-SC	TE-ADP-250	TE-ADP-125

TE-HC-01   Power charging adapter

6. Specifications

Specifications:			Notes:
Photodetector	1mm InGaAs		
Working wavelengths	850, 980, 1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1430, 1450, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610, 1625 nm		**1383 nm - water peak** displayed wavelengths can be customized
Uncertainty	± 5%		1310, 1550 nm at -20 dBm
Resolution	0.01		
Dynamic range	-60 dBm to +10 dBm		CWDM, 1300 nm, 1625 nm
	-52 dBm to +10 dBm		850 nm
Dimensions	24×47×71mm		Including 2.5 mm universal adapter
Weight	Less than 90g		
Temperature	Operating	-10 to +50°C	
	Storage	-40 to +70°C	
Humidity (non cond.)	0-95%		
Battery working time	> 75hrs		Between charges

7. Safety information

The PM-215E power meter emits no optical power itself and does not pose any hazard to the user.

WARNING

- Never use magnifying devices to inspect optical fiber ends unless you are certain that no optical power is being emitted.
- Only use magnifying devices with built-in infrared filters to ensure safety.
- During operation, testing, or maintenance of a fiber optic system, never look directly into an active fiber optic cable. Infrared radiation may be present and can cause permanent eye damage.
- Avoid any direct exposure to the optical beam.
- Do not activate the laser unless a fiber is attached to the optical output connector.
- Under no circumstances should you look into the end of an optical cable connected to an active optical output, as laser radiation can cause serious eye injury.

8. Maintenance

8.1.   Battery maintenance

The PM-215E comes equipped with a charger and internal battery pack.

- Before using the PM-215E for the first time, fully charge the battery pack.
- Use the provided USB charger, cable, and port to charge the device.
- Only charge the battery when its status is at 30% or lower. The recommended charging time is between 4 and 7 hours.
- Avoid fully charging the battery pack before storing the PM-215E; an optimal storage charge level is around 70%.
- If you do not plan to use the PM-215E for an extended period, charge the battery pack once every six months.
- The battery pack is a consumable item, and frequent charging and discharging will reduce its lifespan. For a replacement, please contact OPTOKON.
- The battery status indicator shows the current energy level. When fully charged, the status will indicate as such by showing a full battery.


Battery status
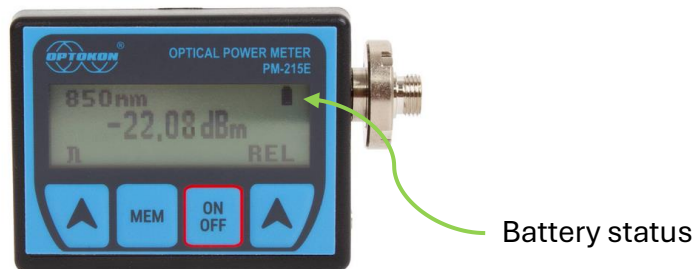
8.2.   Device maintenance

- During storage and transport, keep the instrument in its carrying case to protect it from impact, vibration, dust, and moisture.
- Whenever possible, avoid exposing the instrument to direct sunlight.
- Clean the instrument housing with alcohol or other approved cleaning agents. Do not use acetone or other strong solvents, as these may damage the casing.
- The instrument is resistant to typical dust and moisture exposure but is not waterproof. If moisture does get inside, carefully dry the instrument before using it again.

## 8.3.   Optical connector maintenance

- Cleanliness directly impacts the performance of optical fiber systems.
- Ensure all connectors and fiber end faces are clean before testing.
- Clean all connectors, adapters, and attenuators thoroughly before making any connections.
- Use appropriate optical cleaning supplies to keep connectors and adapters free of contaminants.
- The following cleaning materials are recommended as part of your cleaning kit:
  - o Lint-free laboratory wipes
  - o Pressurized isopropyl alcohol dispenser
  - o Lint-free pipe cleaners
  - o Clean, dry, oil-free compressed air

9. Operating the device
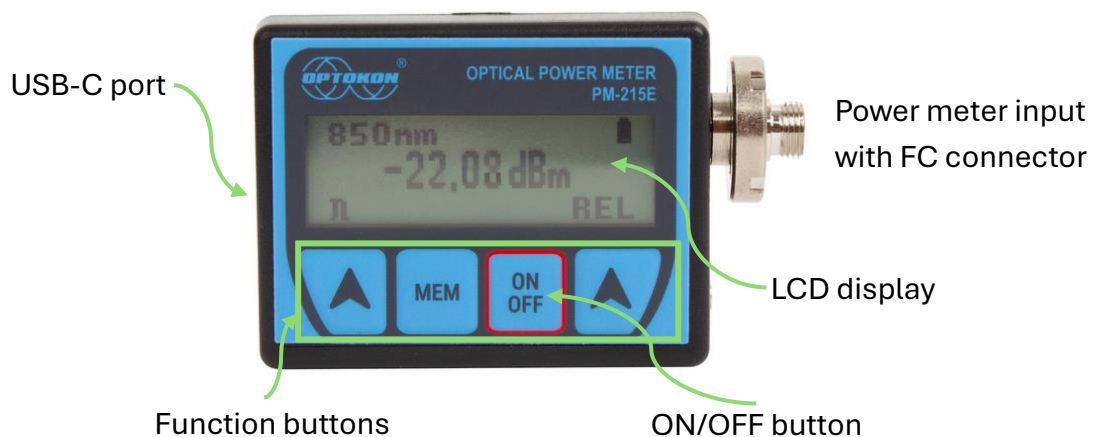
9.1.   Powering the device on

Press the "ON/OFF" button to turn the unit on or off. After the device turns on, it displays its type, firmware version, and serial number on the screen briefly.
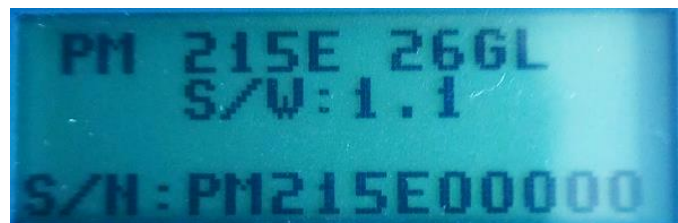
If you hold the "ON/OFF" button at power on instead of pressing it, it will activate the display backlight.
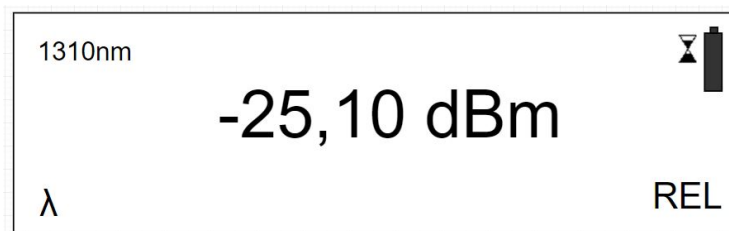
9.2.   Automatic shutdown

The automatic shutdown feature (Auto OFF) turns the device off after 5 minutes of inactivity.

To enable this feature, press the "ON/OFF" button, and at the shutdown screen, press the right arrow button to enable or disable the Auto OFF feature.

 If Auto OFF is enabled, the unit will display an hourglass (⏳) symbol next to the battery charge indicator.

9.3.   Menu #1 – Absolute power measurement mode

In absolute power measurement mode, the display shows the optical signal's absolute value in dBm units. This screen appears when the instrument is powered on, along with information about the device type, serial number, and firmware version.

Use the "**λ**" button to select the desired wavelength.
By default you can select from the following wavelengths:
  850, 1300, 1310, 1490, 1550, 1625nm.

On pressing the "**REL**" button, they device will perform the following:

1. Activates relative power measurement mode (in dB units).
2. Recalls the last set reference for the selected wavelength.
3. Opens menu #2.

9.4. Menu #2 – Relative power measurement mode

When the relative power measurement mode is active, the display shows the optical insertion loss value in dB units, based on the previously set reference.

```
1310nm                              ▮
            -25,10 dBm
ABS                               REL
```
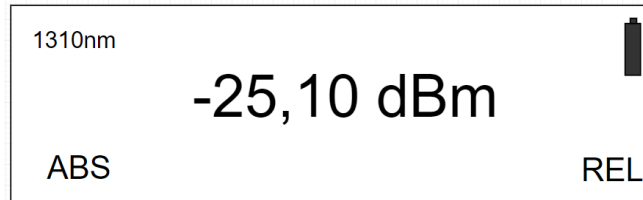
Press the "**ABS**" button to return the unit to menu #1 – absolute power measurement mode.

Press the "**REF**" button to set and store a new reference measurement for the currently selected wavelength. You must confirm on the following screen that you want to take a new reference measurement.

```
            SET NEW
            REFERENCE

CONFIRM                           NO
```

9.5.   Working with internal memory

The PM-215E memory has a structured, two-level organization. The results are stored in memory positions (MEM) in folders called Cable (CAB).

A maximum of 100 results can be stored in the internal memory. This number is shared between CAB and MEM items, this means that for example, if 50 CAB folders exist, each one can hold only 2 memory positions and vice versa, if 2 CAB folders exist, each can hold 50 memory positions.

To access the internal memory, press the "**MEM**" button.

Use the arrow buttons to select the function you want to execute, press the "**MEM**" button again to execute the selected function.
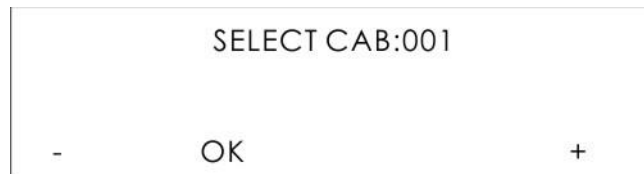
9.5.1. Save result

Select the "**SAVE RESULT**" function in the internal memory menu and press "**MEM**".

Use the "**+**" and "**-**" buttons to select the CAB folder you want to save the result to and confirm by pressing the "**OK**" button (mapped to "**MEM**").

```
              SELECT CAB:001


    -            OK                      +
```
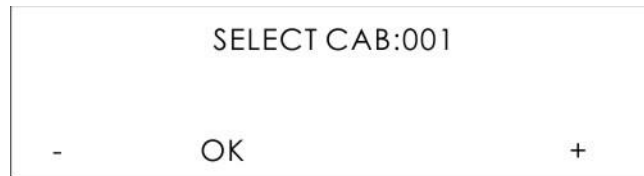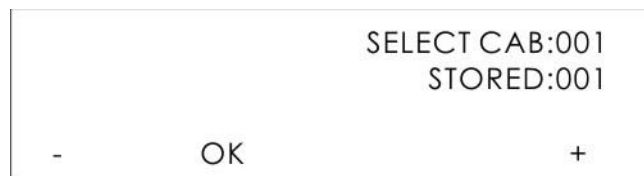
Use the "**+**" and "**-**" buttons to select the memory position within the CAB folder and confirm by pressing the "**OK**" button. The measurement will be saved to the selected memory position.
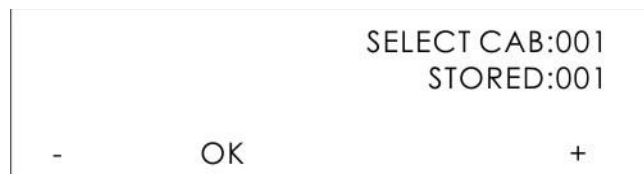
```
              SELECT CAB:001


    -            OK                      +
```

9.5.2. Browse results

Select the "**BROWSE RES.**" function in the internal memory menu and press "**MEM**".

```
                      SELECT CAB:001
                        STORED:001

    -        OK                         +
```

Use the "**+**" and "**-**" buttons to select the CAB folder you want to browse and confirm by pressing "**OK**". The number of items stored in each folder is displayed as you browse through them.

```
                      SELECT CAB:001
                        STORED:001

    -        OK                         +
```

Use the "**+**" and "**-**" buttons to select the memory position you want to view. The stored value at each memory position will be displayed as you browse through them. Press "**OK**" to exit the memory browser.

```
 1310 nm             SELECT CAB:001
 -21.36 dBm              MEM:001
 +16.74 dB
    -           OK                      +
```
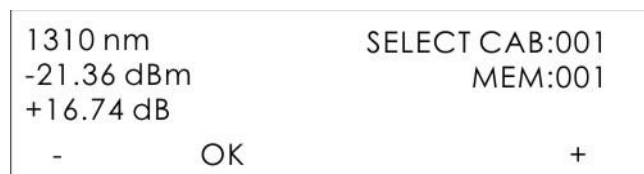
9.5.3. Upload data

Connect the PM-215E unit to a computer using the included USB cable.

Select the "**UPLOAD DATA**" function from the internal memory menu and press "**MEM**". Data in the internal memory will be uploaded through the USB serial link into the connected computer.
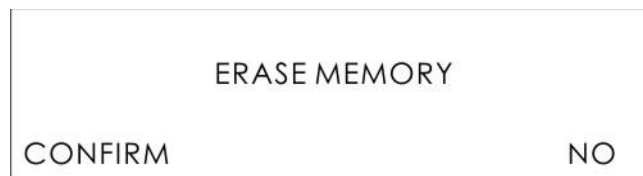
To create a measurement protocol, use SmartProtocol PC software.

9.5.4. Erase memory

Select the "**ERASE MEMORY**" function in the internal memory menu and press "**MEM**".

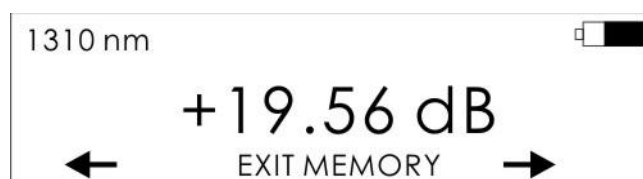Confirm memory erasure by pressing "**CONFIRM**", cancel by pressing "**NO**".

After confirmation all memory contents will be erased.

9.5.5. Exit memory

Select the "**EXIT MEMORY**" function in the internal memory menu and press "**MEM**".

You will exit out of the internal memory browser.

## 9.6.   Changing accessible wavelengths

By default, the device is configured to display 850, 1300, 1310, 1490, 1550, and 1625 nm wavelengths. The wavelengths accessible in the interface can be changed from a list of supported wavelengths. You can do this using the PM-215E application or directly on the device.

To change the wavelengths on the device itself follow these steps:

1. Press "ON/OFF", you can access additional settings from the shutdown screen:
   a. λ – change accessible wavelengths
   b. ⏳ - automatic shutoff settings

2. Press "λ" to display the wavelength settings
   a. Use the left and right arrows to switch between wavelengths
   b. ON/OFF next to the wavelength indicates if it is displayed in the interface or not
   c. Press "CHANGE" – "MEM" button – to enable or disable the currently selected wavelength
   d. Press "SAVE" – "ON/OFF" button – to save changes and leave the menu
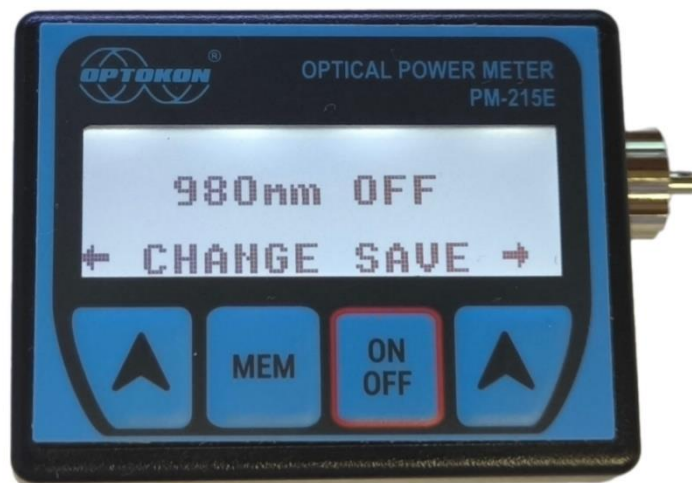
10. Insertion loss measurement

10.1. Basic theory

Loss measures the signal degradation in a fiber optic cable. In this process, a light source injects an optical signal at a specific wavelength into the fiber, and a power meter measures the received signal at the same wavelength.

According to EN 61300-3-4, two measurement methods are used:

- **Method C2** – Insertion method with direct coupling to the power meter
- **Method C3** – Insertion method with an additional test patch cord

Power measurement forms the basis of optical testing, determining the power budget of a fiber optic link by comparing the transmitter's power with the receiver's sensitivity. This difference represents the maximum acceptable loss, influenced by factors such as fiber attenuation, dirty connector faces, connector misalignment, splice loss, and sharp fiber bends.

The "end-to-end" loss test is the most common acceptance test for power loss in fiber optic links. This test measures the power difference between the input and output of the link. The PM-215E optical power meter and LS-215E light source are used for this test, with the LS-215E as the transmitter and the PM-215E as the receiver.

The "end-to-end" test includes two steps:

1. Setting the reference
2. Measuring the loss

10.2. Method C2

In Method C2, a single master patch cord is used to set the reference, with its attenuation set to 0.
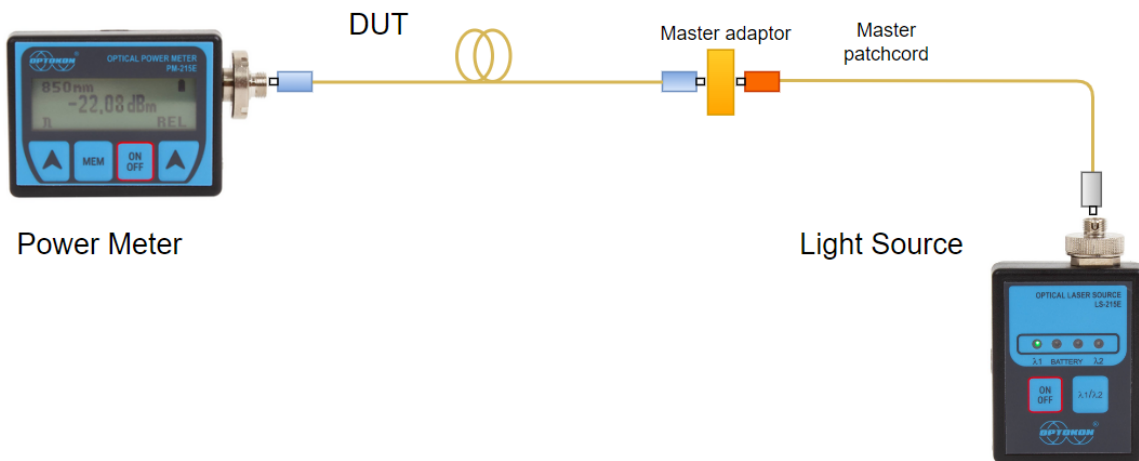
10.2.1. Setting the reference

1. Connect the master patch cord to the power meter (PM-215E).
2. Connect the other end of the master patch cord to the light source (LS-215E).
3. Power on the light source and set the required wavelength by pressing "**λ**."
4. Power on the power meter and select the appropriate wavelength range by pressing "**λ**."
5. On the power meter, activate the relative power measurement mode by pressing "**REL**."

6.   Set and store the new reference for the selected wavelength by pressing "**REF**," then "**CONFIRM**."

10.2.2.   Loss measurement

1.   Do not disconnect the master patch cord from the light source.
2.   Disconnect the master patch cord from the power meter port.
3.   Connect the device under test (DUT) between the power meter port and the master patch cord that is attached to the light source. An extra master adapter is required.
4.   The power meter display will report the loss in dB.

10.3.   Method C3

In Method C3, two master patch cords are used to set the reference. This method cancels the effects of the master patch cords and one adapter for all subsequent measurements.

10.3.1.   Setting the reference

1. Connect the first master patch cord to the power meter (PM-215E).

2. Connect the second master patch cord to the light source (LS-215E).
3. Use the master adapter to connect the two fiber ends.
4. Power on the light source and select the appropriate wavelength by pressing "**λ**."
5. Power on the power meter and select the corresponding wavelength by pressing "**λ**."
6. Activate the relative power measurement mode by pressing "**REL**."
7. Set and store the new reference by pressing "**REF**," then "**CONFIRM**."
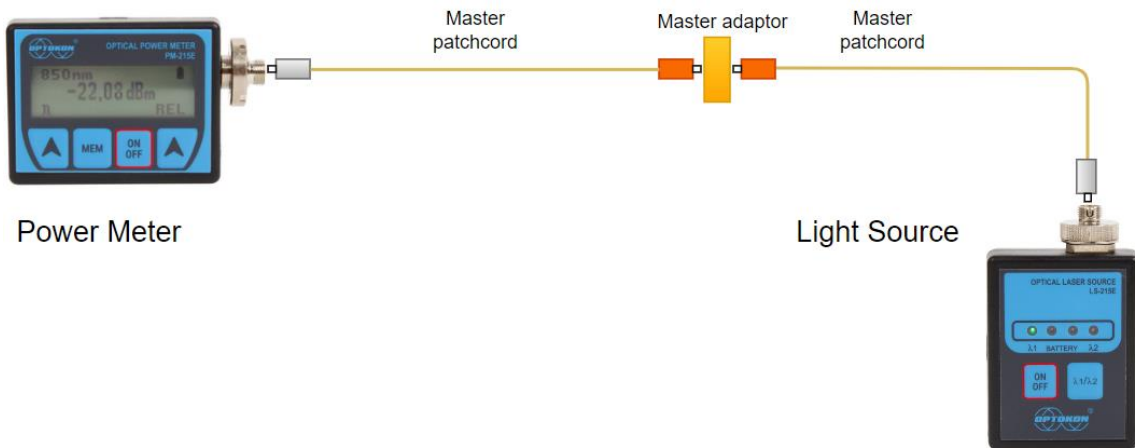
10.3.2. Loss measurement

1. Do not disconnect the master patch cords from the light source and the power meter.
2. Disconnect one master patch cord from the adapter.
3. Connect the trace to be measured between the master patch cords. An extra master adapter is required.
4. The power meter display will report the loss in dB.
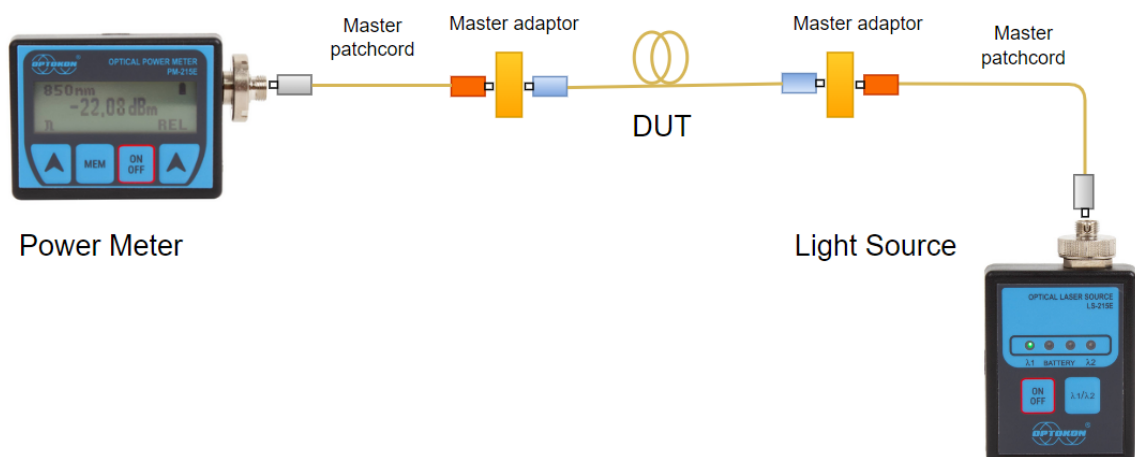
11. Remote control and data transfer

You can control the PM-215E power meter from a connected PC using these methods:

1. Using a terminal application (Hyper Terminal, Putty, Tera Term, etc.)
2. Using the OPTOKON provided PM-215E control application

11.1. Terminal application

1. Find which COM port the power meter reports as (e.g. using Device Manager)
2. Start the terminal application of your choice
3. Open a connection to the device COM port at 19200 baud, 8n1
4. Control the device using the following commands
   • Single characters, without pressing Enter, does not echo

| Command	Meaning	Notes
v	Actual value of display	Outputs to terminal
r	Reference	
l	Actual wavelength	
n	Type and serial number	
1	Simulation of pushing first button	Outputs to PM-215E display
2	Simulation of pushing second button	
3	Simulation of pushing third button	
0	Home key	Returns back to menu #1

11.2. Power meter control application

1. Download the application from:
   https://www.optokon.com/clanek/37-stazeni-manualu-a-ovladacu-pro-merici-pristroje - OPTOKON Power Meter Control Software
2. Connect the power meter to the PC using the included UCB cable and start the application
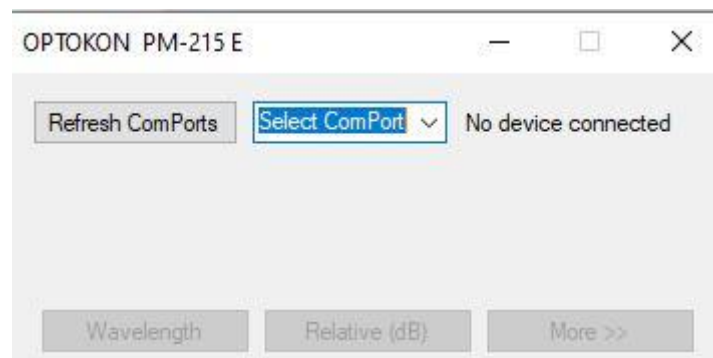
3. Select the COM port the device is connected to, the application will connect, display the device model and serial number and start mirroring the device display in the application window
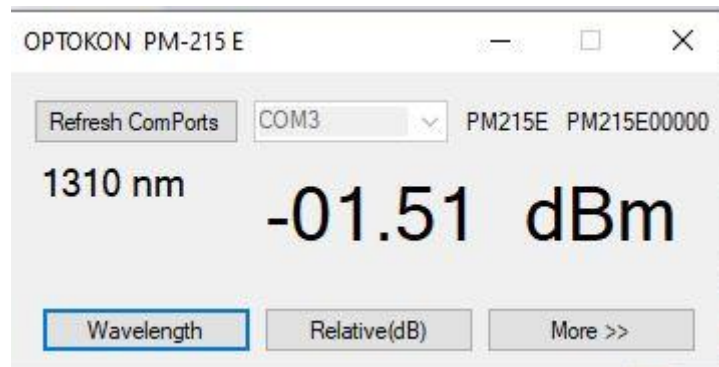
4. From the main view you can cycle through the wavelengths, switch between relative and absolute mode, and set a reference measurement
5. To view more options, click the "More >>" button
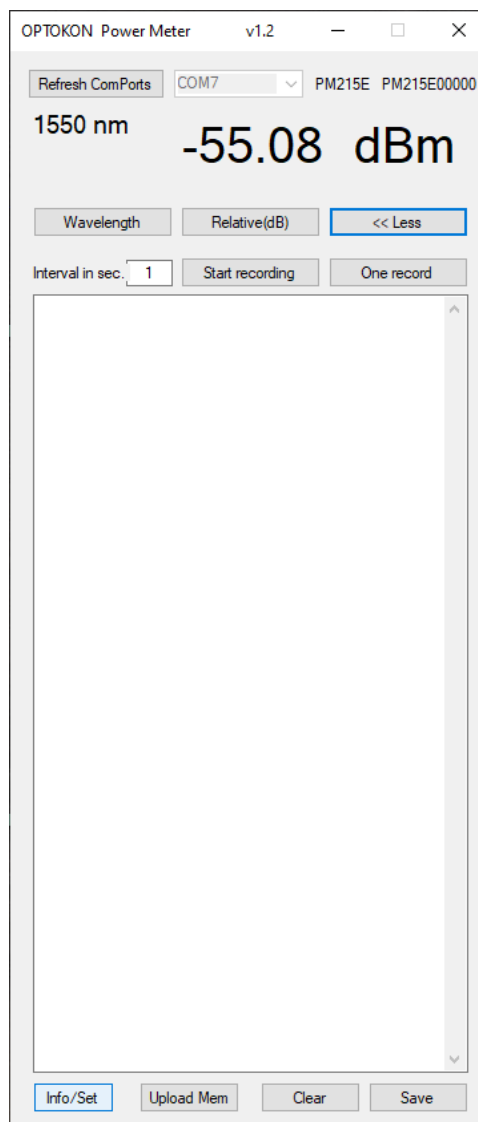
6. On this extended screen you can perform interval measurements, initiate memory uploads, and save data from a memory upload, or an interval measurement to a text file

7. To change advanced settings of the power meter, press the "Info/Set" button
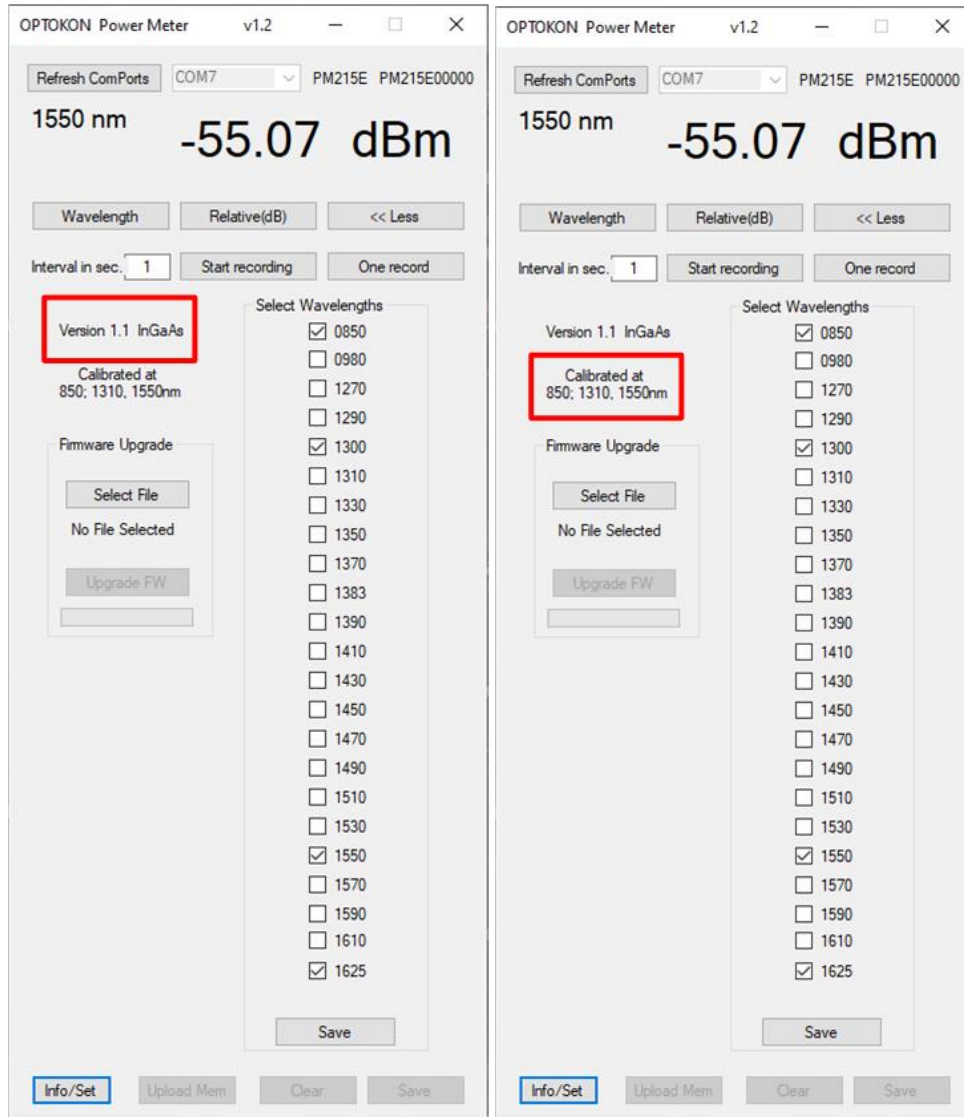
8. The "Info/Set" view displays important device information, such as the version of the firmware and the wavelengths the device was calibrated at

9. Using the "Firmware Upgrade" box you can upload a new firmware to the device, this is limited only to **official firmware released by OPTOKON**

10. Using the "Select Wavelengths" box you can toggle which wavelengths from the list of supported are displayed in the power meter interface, confirm by pressing the "Save" button

12. dB to %, dBm, mW conversion table

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 and service center

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