



FIBER OPTIC TECHNOLOGY
CALIBRATION LABORATORY

PM-830-FTTX Optical Power Meter

INSTRUCTION MANUAL



Revision 3.0



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1 Introduction

The PM-830(D)-FTTX optical power meter is designed for simultaneous measurement and display of all signals – voice, data and video. The FTTX tester is also perfect for testing PON services during activation and maintenance. The memory capacity allows storage and uploading of up to 2000 measurements. The stored data can be easily exported to Excel, Word or any other application.

Two versions of PM-830-FTTX meter available:

Single port:

The PM-830 version with one input port - designed for measurement at end sides of optical lines, it requires disconnection the active device from the optical lines for measurements. It can't measure upstream signal 1310 nm from ONU (ONT), due to ONU is not connected. External Light Source 1310 nm is required.

Dual port:

The PM-830D version with two optical ports - the dual port tester with IN/OUT optical ports allows measurements of uninterrupted optical lines with the connected active device, pass-through testing mode. The PM-830D-G1 tester is optimized for testing of standards GEPON (Gigabit EPON) and GPON, transmission speed up to 1.25 Gbps. The 1310 nm channel provides correct power measurements of burst type upstream PON signals

The changeable connector/adaptor design allows the simple exchange of optical PC or APC connectors (FC, SC or ST) and easy cleaning of the output connector ferrule after removing the connector adaptor. LC/PC and LC/APC are also available.

2 Features

- Small size, lightweight
- Three simultaneously measured wavelengths
- Pass-through testing
- Absolute and Relative optical power measurement
- Large memory capacity for storing measured data
- USB port
- Powered by two AA batteries
- Built-in charger
- Auto Off
- Battery status indicator
- Easy to use

3 Application

- FTTX optical network measurement
- PON optical network measurement

4 Accessories

4.1 Standard

- Power meter
- FC or SC adapter (can be customized)
- Power charging adaptor
- Rechargeable NiMH batteries – 3
- Traceable calibration certificate
- Hard Carrying case for one tester
- USB connection cable

4.2 Optional

- Master patchcords
- Master adaptors
- TE-HC-03 hard carrying case (for two instruments)
- TE-OB-01 soft case for one tester



TE-HC-03



TE-OB-01

5 Specifications

Photodetector	3x InGaAs	
Working wavelength	1310, 1490, 1550 nm	
Spectral passband	1250-1360, 1430-1500, 1530-1650 nm	other passband width – on request
Isolation (dB)	1550->1490: 35 dB	1490->1310: 50 dB 1310->1490: 60 dB
	1550->1310: 55 dB	1490->1550: 45 dB 1310->1550: 40 dB
Pass-through IL	1.5 dB typ., 2.0 max (1550 nm)	dual port
RL	≥ 50 dB	UPC polished connectors
Uncertainty	± 12 %	typ., @ -10 dBm
Resolution	0.1	
Dynamic range: single port	-45 dBm to +10 dBm	CW: 1310,1490,1550 nm
dual port	-45/-30 dBm to +10 dBm	CW/burst: 1310, CW: 1490 nm
	-35 dBm to +20 dBm	1550 nm
Dimensions	165 x 80 x 40 mm	
Weight	180 g	with battery
Operating temperature	-10 to +50 °C	
Battery working time	> 150 hrs	backlight off
Battery life time	> 5 years	2700 mAh NiMH

Compliant with RoHS-requirements (2002/95/EG, 27.01.2003)

6 Safety information

The PM-830 instrument emits no optical power itself and does not create any hazards to the user. To ensure a high level of operator safety during installation, commissioning and operating the equipment, as well as ensuring that the equipment remains undamaged, it is necessary to consider the following general warnings and recommendations.

- Use only the equivalent connector types to those built into the instrument in order to avoid damage to the instrument components.
- Optical connectors must be clean; in the case that the connectors are not perfectly clean – please clean them according to the procedure described in the technical specification for the relevant connectors.
- Never use magnifying devices to inspect optical fiber ends unless you are sure that no optical power is being emitted.
- Use only magnifying devices with a built-in infra-red filter to ensure safety.
- During operation, testing or maintenance of a fiber optic system, never look into an active fiber optic cable. Infrared radiation may be present and permanent eye damage can result.
- Avoid direct exposure to the beam.
- Do not activate the laser when there is no fiber attached to the optical output connector.

Under no circumstances should you look into the end of an optical cable attached to the optical output when the device is operational. The laser radiation can seriously damage your eyesight.

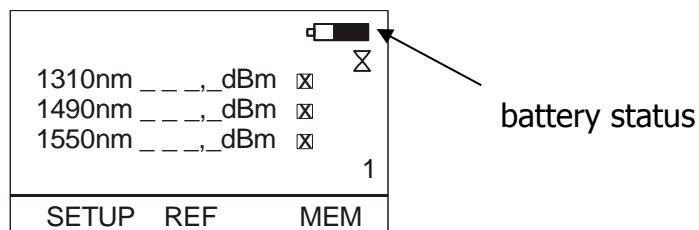
7 Maintenance

7.1 Battery care

The PM-830 comes equipped with a built-in charger and is powered by three NiMH AA batteries (standard accessories).

Never use alkaline batteries!

- Charging – via USB port (PC) or by using external USB power charging adaptor (standard accessories)
- Before using the PM-830 for first time, fully charge the batteries.
- Use only the supplied USB power charging adapter.
- Charging is not recommended until the battery status indicator is 30% or less. The recommended charging time of the batteries is 12 to 14 hrs.
- Fully charge the batteries before storing the PM-830 for a long period. The batteries will lose their charge during storage.
- If you are not going to use the PM-830 for a long period, charge the batteries once every six months.
- The batteries are a consumable. Repeated charging and discharging decreases the lifetime of the batteries.
- To extend the lifetime of the batteries it is recommended that the batteries be completely drained before re-charging – battery refresh. Otherwise the batteries will lose their ability to fully recharge.



7.2 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 the instrument, dry it out carefully before using it again.

7.3 Recommended cleaning and mating instructions

Cleanliness will affect the performance of an optical fiber system. Perform the following procedures prior to installation. Clean all connectors, adapters and attenuators before making any connections. The following cleaning materials are recommended and can 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. Open the protective cap (E2000 only).
4. Press the ferrule and face into the wet spot on the wipe. Using force, twist the ferrule so that a hard wiping action occurs. Repeat twice, using a clean alcohol-moistened wipe each time.
5. 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
6. Close the cap (E2000 only)
7. Discard the used pad.

Attenuators:

1. For an exposed ferrule (in-line type), see the 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 excess alcohol from the pipe cleaner with a clean wipe.
3. Insert the moistened 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.
4. Insert the dry end of the pipe cleaner into either end of the adapter to remove any

residual alcohol. For oversized adapters (biconic), slightly blow the middle of the pipe cleaner for better surface contact. Repeat this step for the opposite end.

5. Blow the adapter dry with clean compressed air.

MATING

SC, MT-RJ, LC:

1. Align the housing key with the slot in the adapter.
2. Push the connector into the adapter until a click is heard/felt indicating that the latching system is engaged. When the SC connector is fully engaged, the white stripes on the side of the housing should be hidden inside the adapter.

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.

E 2000:

1. Align the slots with the key on the adapter.
2. Push the connector into the adapter until it clicks.

ST:

1. Align the ferrule hub key with the slot in the adapter.
2. Insert the connector into the adapter until the coupling nut reaches the adapter housing.
3. Align the bayonet slots on the coupling nut with the pins on the outside of the adapter.
4. Push the coupling nut into the adapter while rotating the coupler nut clockwise to lock the bayonet and secure the connection.

Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the ends of any optical fiber.

8 Instrument and button function description



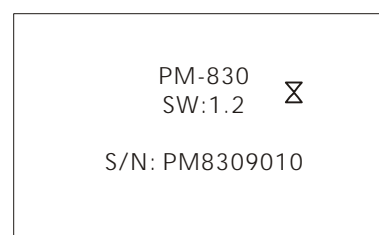
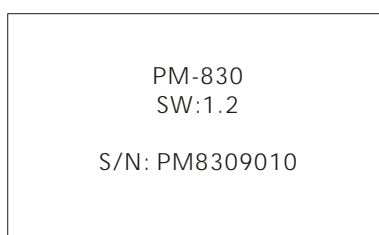
8.1 Operating keys

[ON/OFF]

Press to turn the unit on.

Press to turn the unit off.

After switching on, the type of device, serial number and firmware version will be displayed.



The unit will start up with "AUTO OFF" feature – symbol ⏸ will be displayed.

To disable the AUTO OFF feature, press and hold the ON/OFF key until the symbol ⏸ disappears.

If activated, the unit will turn off after approximately 10 minutes of no activity.

[BL]

Turns the Display Backlight On and Off.

[↑]

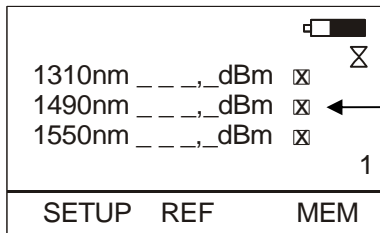
The meaning of these keys depends on the current menu.

8.2 Menu #1 – Absolute power measurement mode

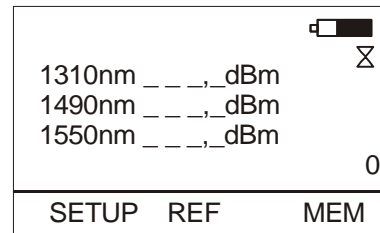
In the absolute power measurement mode the absolute value of the optical signals (1310, 1490 and 1550 nm) in dBm units is shown on the display.

This screen will appear after the instrument is switched on and information regarding the type of device, serial number and firmware version will appear.

Reading the display:



Results of measuring
(PASS, FAIL, WARNING)



Type of selected
pass-through testing mode

[SETUP]

Starts menu.

Goes to menu #2. – Setup menu

[REF]

Activates the relative power measurement mode (unit dB).

Goes to menu #3.

[MEM]

Goes to Memory menu #4.

Starts working with the internal memory.

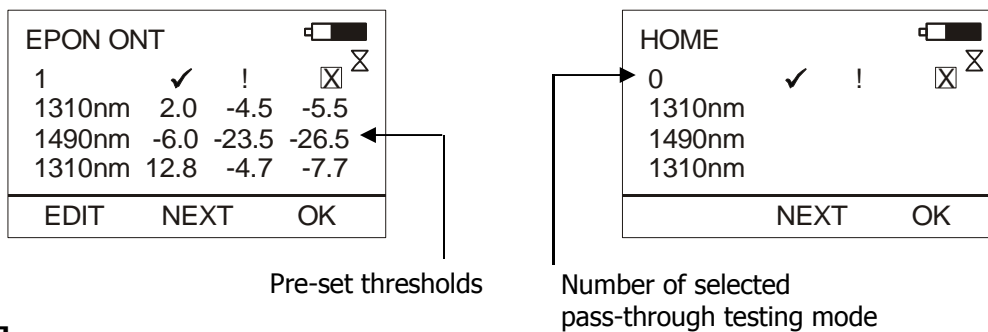
8.3 Menu #2 – Setup menu

8.3.1 Submenu [THRESHOLDS]

In this menu is possible select from "0-15" pass-through testing modes. Mode in. "0" has no pass-through thresholds. In modes "1-15" the operator has the option to edit the marking and the three values of thresholds for each wavelength:

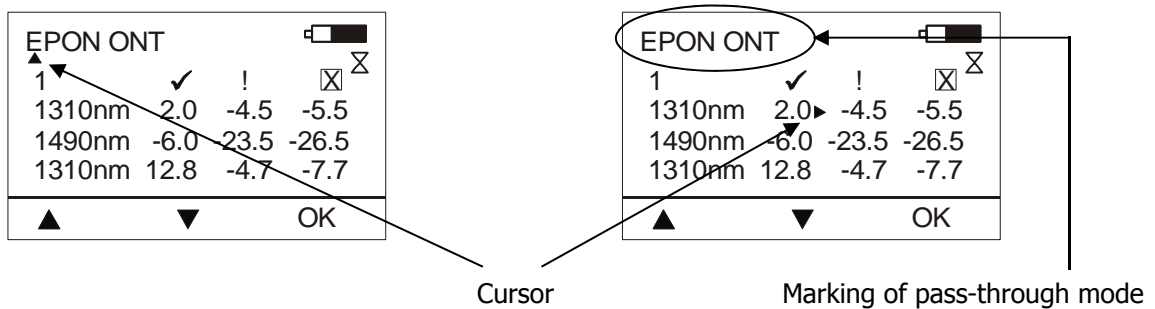
✓ : PASS
 ! : WARNING
 ✕ : FAIL

Reading the display:



[EDIT]

Activates edit menu.



[▲], [▼]

Select appropriate mark or digit.

[OK]

Confirms selected mark or digit.

[ON/OFF]

Returns to main screen.

[NEXT]

Go to next pass-through mode.

[OK]

Confirms selected pass-through mode.

Notes:

- The values of thresholds have to be adjusted individually for each optical line.
- Thresholds depend on optical parameters (Tx transmitting power level / Rx receiving sensitivity) of active network devices (OLT, ONU, CATV amp, etc.)
- Factory pre-set values are given as an example at the most common measuring points in GPON network.

Factory pre-set values:

1 – GPON OLT – central office

Wavelength	PASS ✓	WARNING !	FAIL ✗	Units
1310 nm	-8.0	-22.6	-31.5	dBm
1490 nm	4.0	0.5	-0.5	dBm
1550 nm	23.0	19.3	18.3	dBm

2 – GPON Splitter INPUT

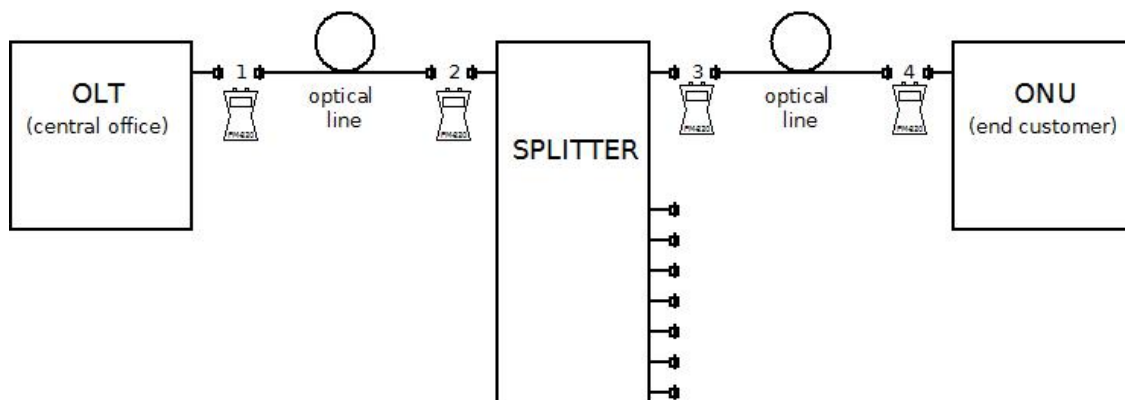
Wavelength	PASS ✓	WARNING !	FAIL ✗	Units
1310 nm	-1.4	-23.0	-24.0	dBm
1490 nm	4.0	-7.5	-10.5	dBm
1550 nm	23.0	11.3	8.3	dBm

3 – GPON Splitter OUTPUT

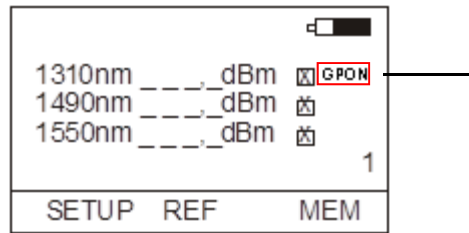
Wavelength	PASS ✓	WARNING !	FAIL ✗	Units
1310 nm	1.0	-6.0	-7.0	dBm
1490 nm	-4.5	-22.5	-25.5	dBm
1550 nm	14.3	-3.7	-6.7	dBm

4 – GPON ONU

Wavelength	PASS ✓	WARNING !	FAIL ✗	Units
1310 nm	2.0	-4.5	-5.5	dBm
1490 nm	-6.0	-23.5	-26.5	dBm
1550 nm	12.8	-4.7	-7.7	dBm



8.3.2 Submenu [xPON]



In this menu is possible to select type of PON network.

[CW]

Continuous wavelengths measuring selection

[GEPON]

GEPON upstream signal measurement selection (2 ms pulse)

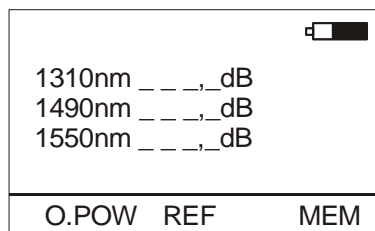
[GPON]

GPON upstream signal measurement selection (0.7 ms pulse)

8.4 Menu #3 – Relative power measurement mode

If the relative power measurement mode is on then the value of the optical insertion loss in dB units (1310, 1490 and 1550 nm) corresponds to the reference.

Reading the display:



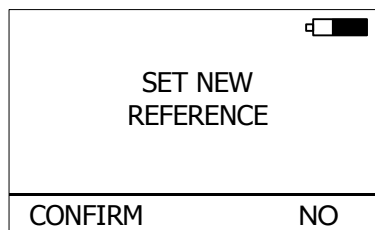
[O.POW]

Returns unit into absolute power measurement mode (unit dBm).
Goes to menu #1.

[REF]

Sets and stores the new reference for all wavelengths.

Note: The new reference must be confirmed by the following screen:

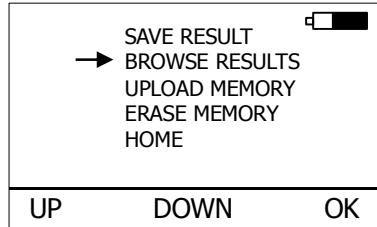


[MEM]

Goes to Memory menu #4. Starts working with the internal memory.

8.5 Menu #4 – Working with the internal memory

This screen will appear after pressing the [MEM] key from Menu#1 or Menu#3

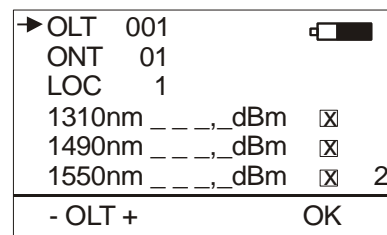
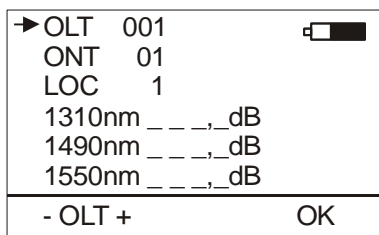


[UP], [DOWN], [OK]

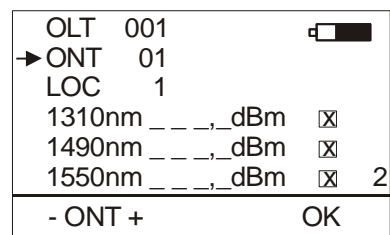
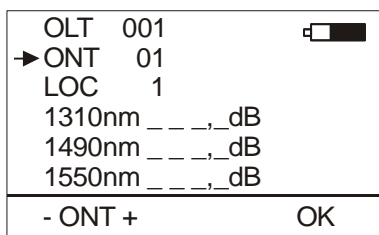
Use these buttons to select the appropriate submenu.

8.5.1 SAVE RESULT

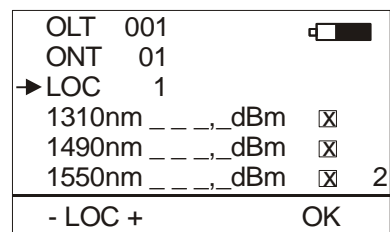
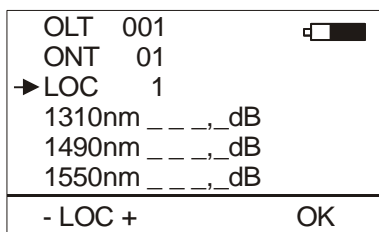
1. By using [UP] [DOWN] select "SAVE RESULT" and press [OK].



2. Select the OLT using [- OLT +] and press [OK].



3. Select the ONT using [- ONT +] and press [OK].

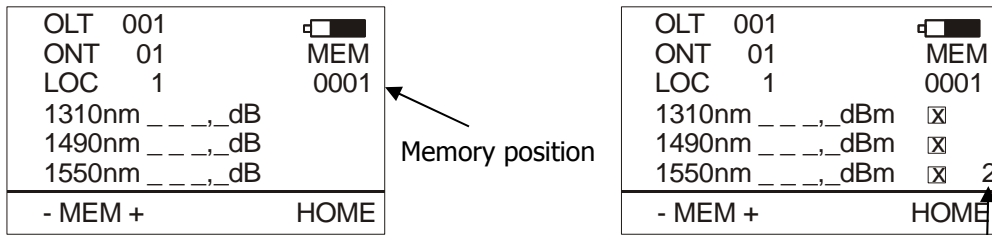


4. Select the LOC using [- LOC +] and press [OK].

Measured values will be stored into the internal memory.

8.5.2 BROWSE RESULTS

1. By using [UP] [DOWN] select "BROWSE RESULTS" and press [OK]

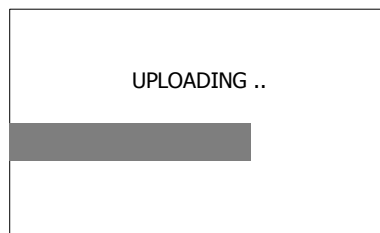


3. Use [- MEM +] to browse through the results.
4. Use [HOME] to return to the main screen.

Number of selected pass-through testing mode

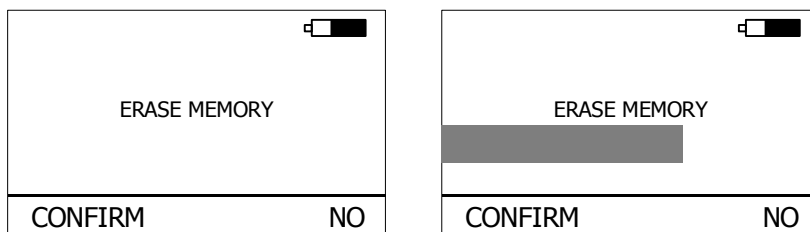
8.5.3 UPLOAD MEMORY

1. By using [UP] [DOWN] select "UPLOAD MEMORY".
2. Press [OK]. All memory content will be sent to the USB port. More information is contained in the chapter "setting up data transfer".



8.5.4 ERASE MEMORY

1. By using [UP] [DOWN] select "ERASE MEMORY" and press [OK].



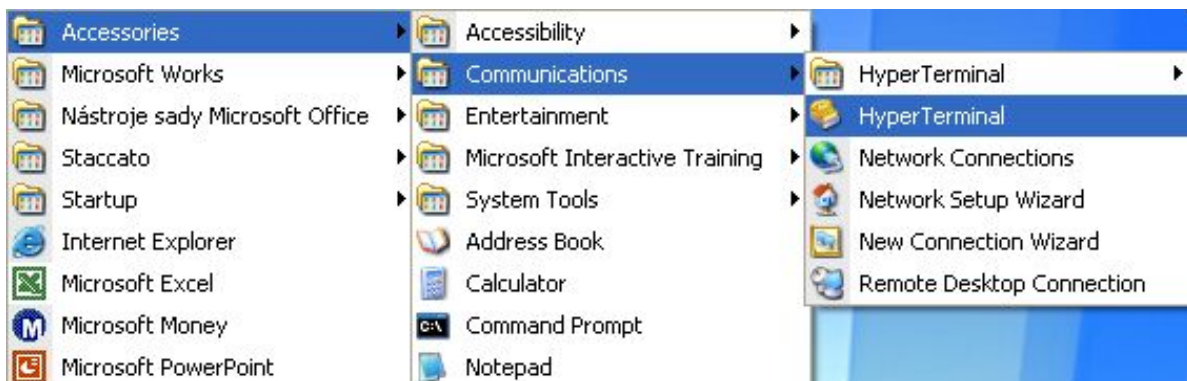
2. Press [CONFIRM] to erase memory or [NO] to return to the main screen.

8.5.5 HOME

1. By using [UP] [DOWN] select "HOME".
2. Press [OK] to return to the main screen.

9 Setting up data transfer

1. Connect the PM-830-FTTX to a PC using the USB cable provided and turn the PM-830 on. The PC will prompt you to install the drivers for new hardware. Use the drivers provided by OPTOKON. These drivers will create a virtual serial com port.
2. Start the Hyper Terminal
Start >> Programs >> Accessories >> Communication >> Hyper Terminal



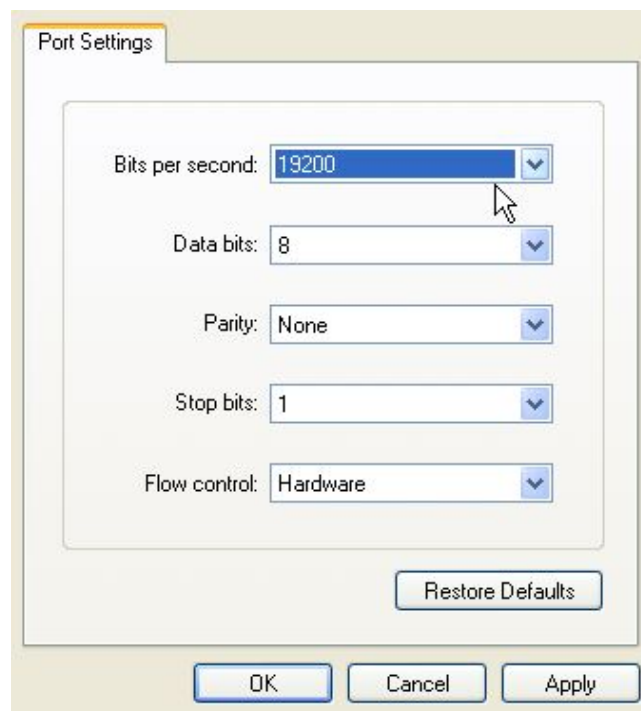
3. Enter the name of a connection, then click on OK.



4. Choose the virtual serial port that the PM-830-FTTX is connected to, then click on OK



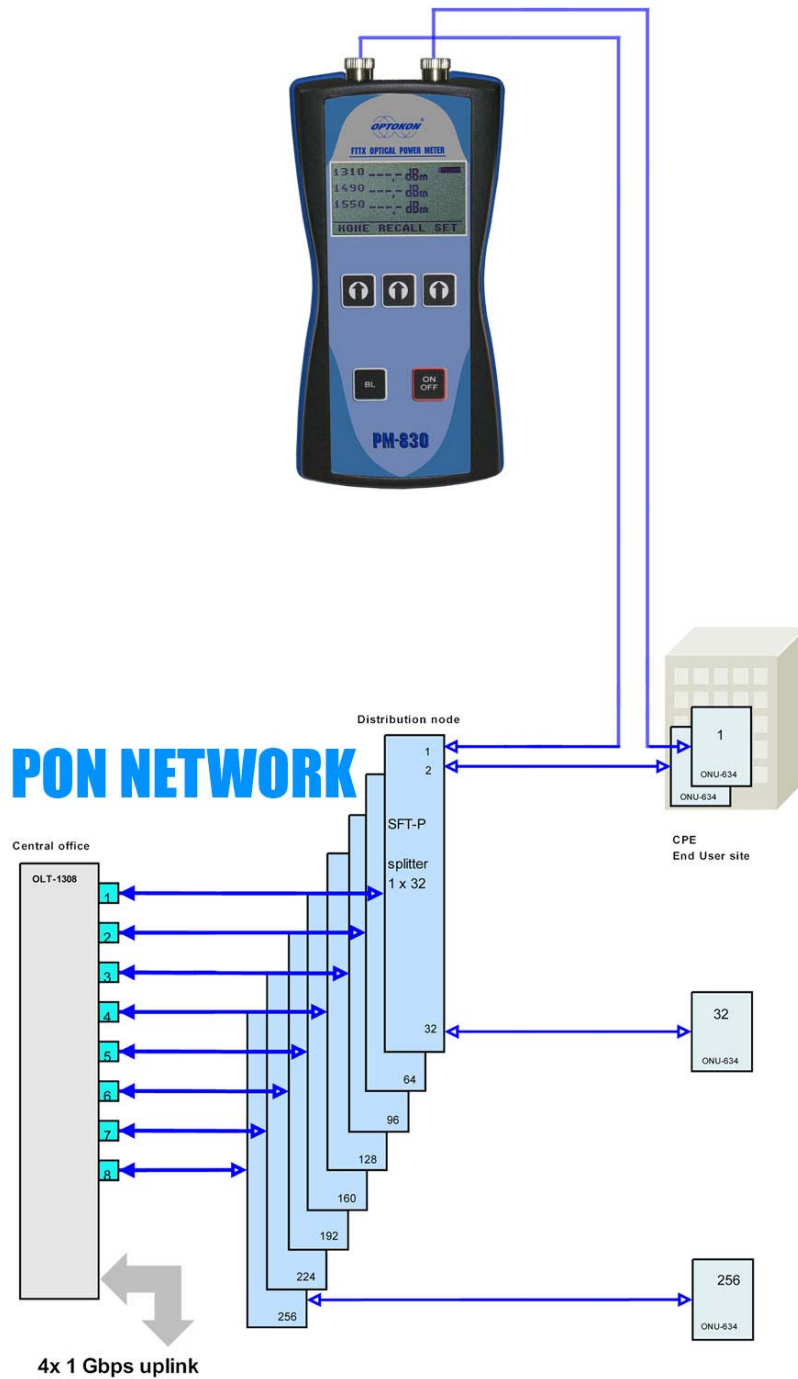
5. Set "Bits per second" to 19200, then click on OK



6. Go to the menu in PM-830-FTTX (chapter 8.5.3 "UPLOAD MEMORY") and send data to PC.

The data from the Hyperterminal window can be easily copied to any other application.

10 Measurement - typical application



11 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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