

M2M PRO4 MODEM®

Installation Guide

v0.92



2020-02-17

Document specifications

This document was made for the **M2M PRO4 MODEM®** device and it contains all relevant installation steps of the device.

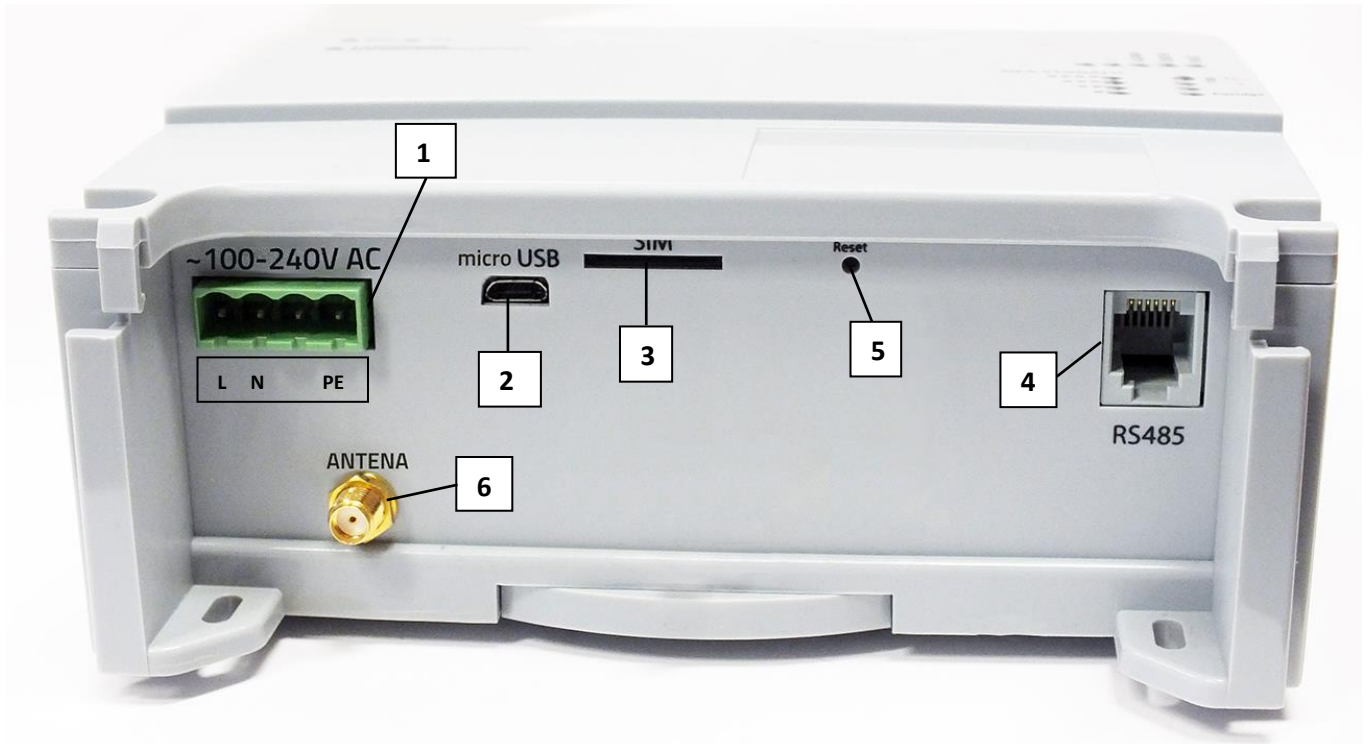
Document category:	Installation Guide
Document subject:	M2M PRO4 MODEM®
Author:	WM Systems LLC
Document version No.:	REV 0.92
Number of pages:	34
Hardware version:	BE008x
Linux Kernel:	4.14.23
OpenWRT software version:	202002071
Document status:	FINAL
Last modified:	17 February, 2020
Approval date:	17 February, 2020

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1. Wiring and Preparation

1.1 Description of interfaces



- 1 – **~100 - 240V AC** power input plug (4-pins terminal block), the pinout from left-to-right is the following: L, N, -, PE
- 2 – **micro USB** connector (PC connection - for configuration, alternative DC power input)
- 3 – **SIM** (2FF-type mini SIM card slot, push-insert SIM holder)
- 4 – **RS485** port (isolated RS485, half-duplex data interface, RJ12 connector), for up to 31 meter connection
- 5 – **Reset** button (hole) – has multiple features, see *Reset features* chapter later
- 6 – **ANTENA** – Antenna connector for 4G LTE wireless network usage, SMA-M, 50 Ohm

1.2 Safety declaration

The device must be used and operated according to the related user manual.

The installation can be carrying out only by a responsible, instructed and skilled person by the service team, who has enough experience and knowledge about carrying out the wiring and installing a modem device.

Its prohibited to touch or modify the wiring or the installation by the user. It is prohibited to open the device enclosure during its operation or under power connection.

It is also prohibited to remove or modify the device PCB. The modem and its parts must not be changed by other items or devices.

Any modification and repairation is not allowed without the permission of the manufacturer. It all causes the loss of product warranty.

Caution!

Only a certified expert or the manufacturer is allowed to open the enclosure!



By general the device is using AC mains. 100-240V AC, 50Hz, electric shock hazard inside the enclosure! DO NOT open the enclosure and DO NOT touch the PCB.

(Consumption: Min. 2W / Average: 3-4W / Max: 10W)

The IP51 immunity protection will be effective only in case of under normal usage and operation conditions with unharmed hardware conditions by using the device in the provided enclosure/chassis.

Deliberate damage or occing casualty of the device means the loss of product warranty.

To ensure general safety, please follow the following guideline!

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools and chassis components away from walk areas.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

Safety with Electricity

Follow this guideline when working on equipment powered by electricity.

- Read all the warnings in Safety Warnings.
- Locate the emergency power-off switch for your installation location. If an electrical accident occurs, you can quickly turn off the power.

- Disconnect all power before:
 - Installing or removing a chassis
 - Working near power supplies
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- Do not work alone if hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Never open the enclosure of the modem's internal power supply.
- If an electrical accident occurs, proceed as follows:
 - Use caution; do not become a victim yourself.
 - Turn off power to the device.
 - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.
 - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It may occur if electronic printed circuit cards are improperly handled and may cause complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing modules:

- Ensure that the modem chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.

Caution: For the safety of your equipment, periodically check the resistance value of the antistatic strap. It should be between 1 and 10 megohms (Mohm).

Warning!

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Warning: Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

Warning: In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons. Statement 332

Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

Warning: Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

Warning: Read the installation instructions before you connect the system to its power source. Statement 1004

Warning: This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 20A. Statement 1005

Warning: This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017

Warning: The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019

Warning: This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning: This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Warning: Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Warning: To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: Statement 1047

Warning: Installation of the equipment must comply with local and national electrical codes.

Warning: To prevent airflow restriction, allow clearance around the ventilation openings to be at least: 3 inches (7.6 cm). Statement 1076

Warning: Hot surface. Statement 1079

Caution: This metering modem can only be accessed by service personnel or by users who have been instructed about the reasons for the restrictions applied to the location. Access is through the use of a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location.

Caution: Be aware of the size and weight of the metering modem when mounting. Ensure that the mounting location has a stable flat surface and can safely support the weight of the device.

1.3 Mounting, fixation

The device enclosure (unit) contains a DIN-Rail fixation due its case, which is to be intended to mount to DIN-35 rail or using a 3-point fixation by screws, or using the hook (in hanging position).

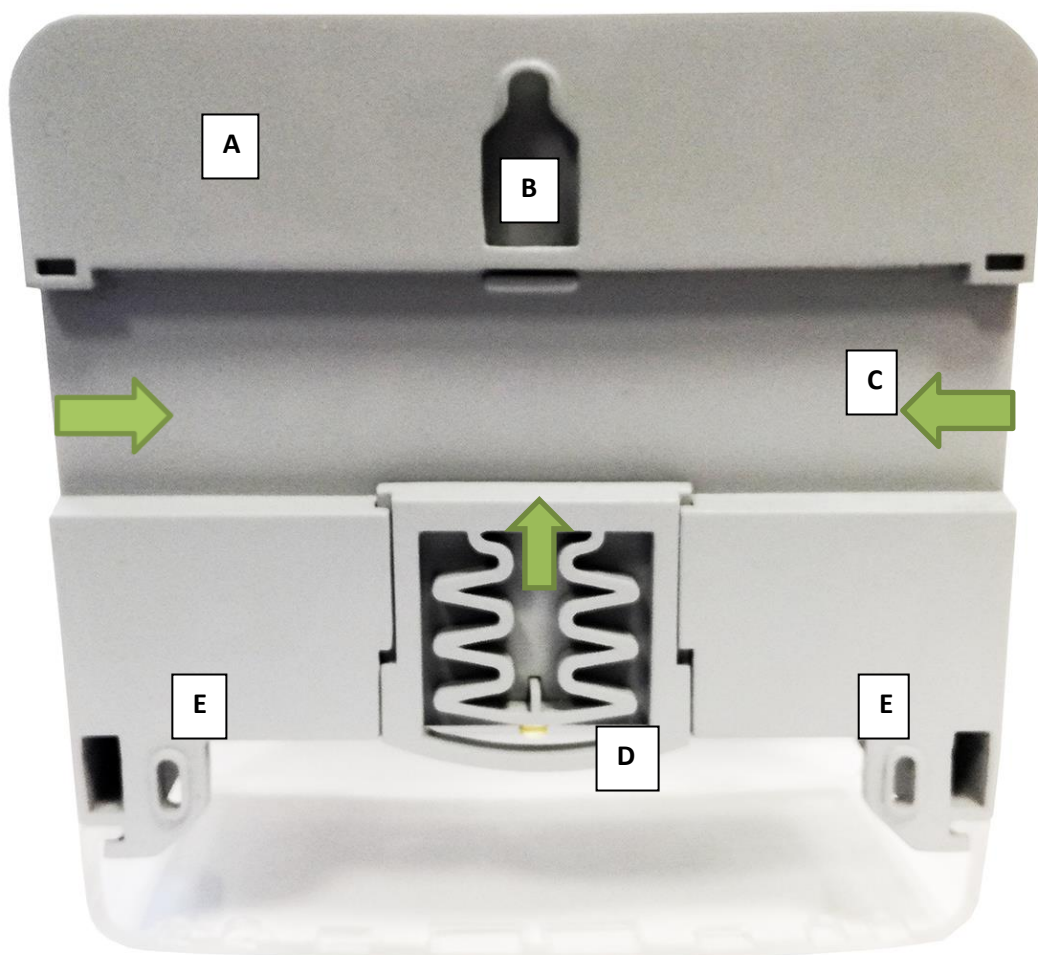
You can also mount the enclosure to wall, place into server rack or similar fixation opportunity.

The unit must be mounted inside a cabinet by the listed fixation points, in vertical orientation.

Please note that close metal parts, the cabinet metal material and the industrial conditions as the usage of high rate power or other external gained radio frequency signals can cause radio signal disturbance and could cause weak wireless signal at reception or data transmitting or could cause less effective signal reception, weak wireless fidelity. In any of these, we recommend you to test the wireless signal reception and quality and if it is necessary use external, magnetic mount antenna which is leaded outside of the cabinet and placed onto the cabinet's surface – to ensure enough reception.

Figure of bottom side of the unit enclosure

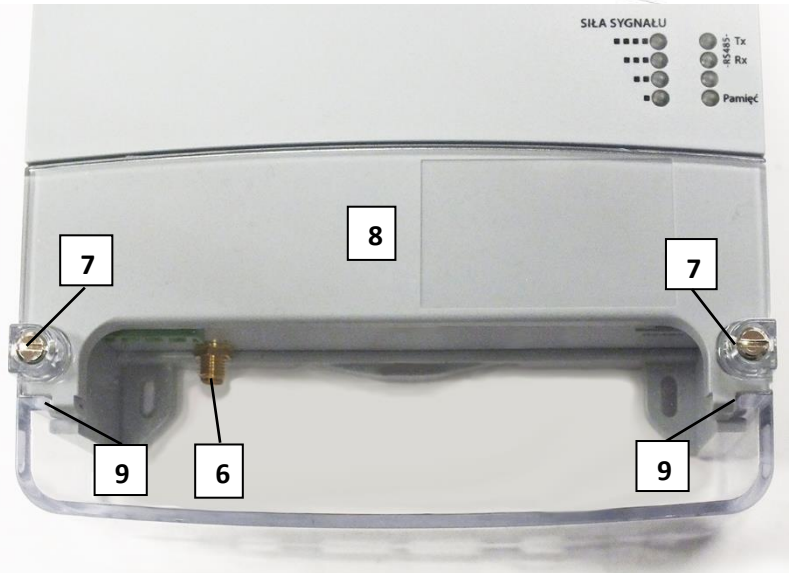
- A – Device housing case back plate
- B – Hook for fixation to wall/mount
- C – DIN-rail sleede for fixation
- D – DIN-rail position holder (release/fixate)
- E – Additional hooks for fixation to wall/mount



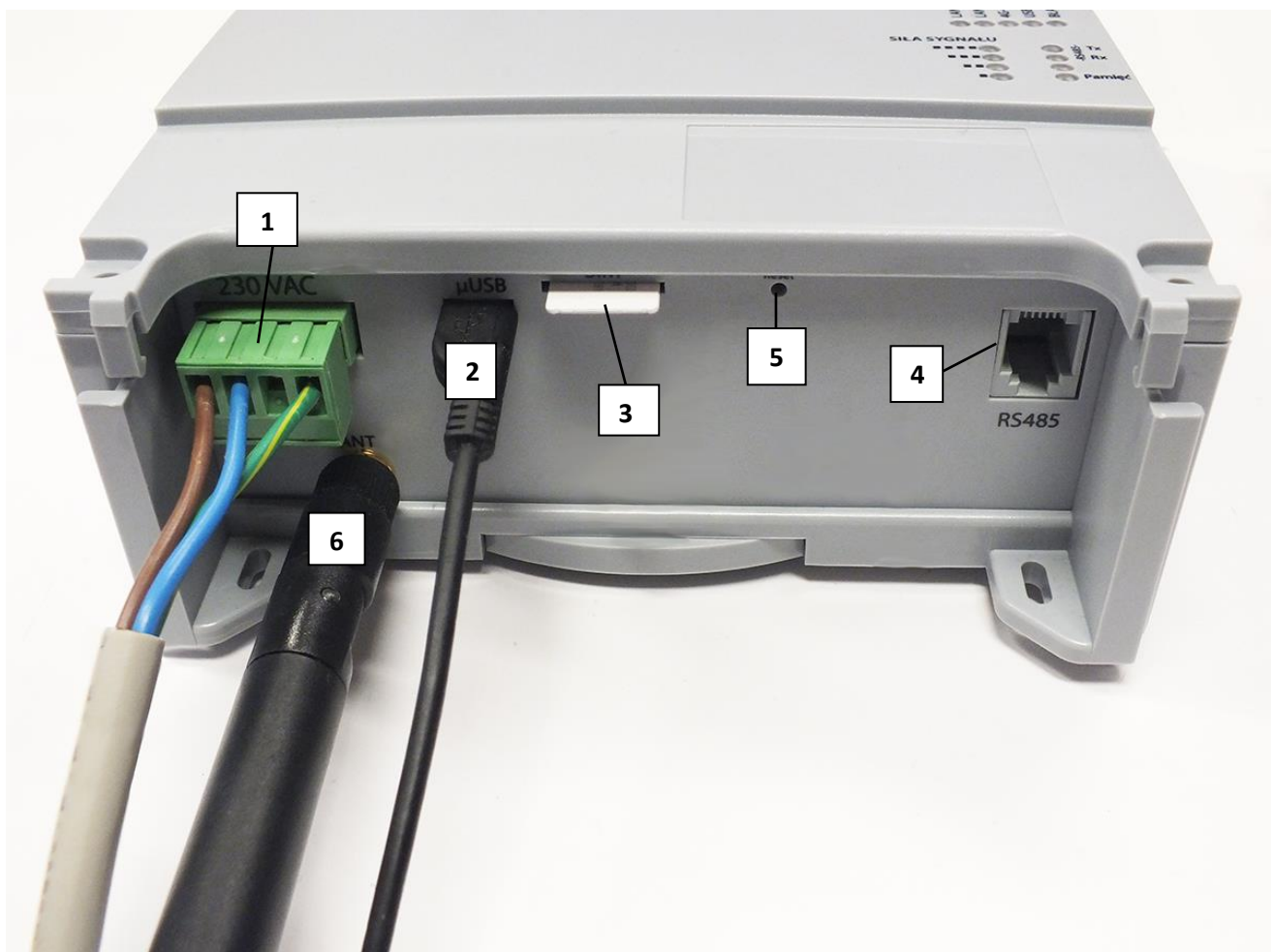
1.4 Cabling, wiring

1. **Remove the plastic, transparent port protector** part (No. 8) by releasing the two screws (No. 7) from the top of the enclosure and slide up the plastic part carefully from the protector's rails (No. 9), then remove it from upside direction. Now you can free to connect wires and cables to the ports and interfaces.
2. **Mount a 4G LTE antenna** to the **ANTENA** titled (no. 6) SMA antenna connector. Twist the antenna to the connector until it is fastened.

You can use 4G LTE wireless antenna with 3-6dB, 9dB or more gained versions. RG174 cable SMA antenna with magnetic mount can be used for external usage. The antenna must be placed and oriented that it should has a some clearance in any direction.



3. **Insert and push** an activated **mini SIM card** to the **SIM** titled card holder (No. 3), top SIM holder. Insert by following the hints of SIM card figure for the proper orientation. (The SIM chip-side will be face down and the cutted edge towards to inside and push until it sleeves).



4. You can use the **micro USB** (No. 2) connector with a *microUSB-to-USB* cable connection as **USB LAN** - instead for configuring or access the device.
5. You can use the **micro USB** port (No. 2) to power the **modem by DC power (5V)** instead of using the *100-240V AC* power (as an alternative way for powering).

6. By default, the modem has an installed OpenWRT® operating system which is ready to use and configure to your SIM card APN and for you usage requirements.
7. **Plug the 100-240V AC power supply connector to the 100..240V AC** interface (No. 1), then **plug the power cable to the external electricity plug** – according the orientation of the power connector and the pinout (from left-to-right: L, N, -, PE), where L=phase, N=neutric, PE=ground. Add a stable AC power to the device.

Current / power consumption (AC power source) – mains input

- Power supply / Voltage range: ~100-240V AC, 50 Hz
- Current: 0.1A at ~100-240V AC Consumption: 3W - 10W

In case of presence of ~5V DC (by using the USB interface for alternative power source) (No. 2 interface) to connect DC supply power for the device – instead of using the AC power input (No. 1. interface), the following declared current values are the valid.

Current and power consumption (AC power source / mains)

- Power supply / Voltage range: 5 VDC
- Current: 800mA at 5V DC
- Consumption: 3W - 10W

The following cables are not part of the accessories of the delivered package

Use the following hints and the recommendation to choose useful cable and type to prepare the necessary connection(s) according to your requirements.

AC cable (optional):

The power cord 70 cm type, OMYA 4 x 1 mm², voltage Insulation min. 500 V, maintaining colors and ends with the power supply enabling connection to a 240 V AC

Function: ~100-240V AC power supply to the modem

Pins must be wired for usage: L, N, -, PE (see schematic for pinout)

RS485 cable:

Type: 2 + 3x LgY 0.75 mm²

Connector type: RJ12

Function: / R485 connector to external IEC1107 or DLMS/COSEM protocol compatible utility meters

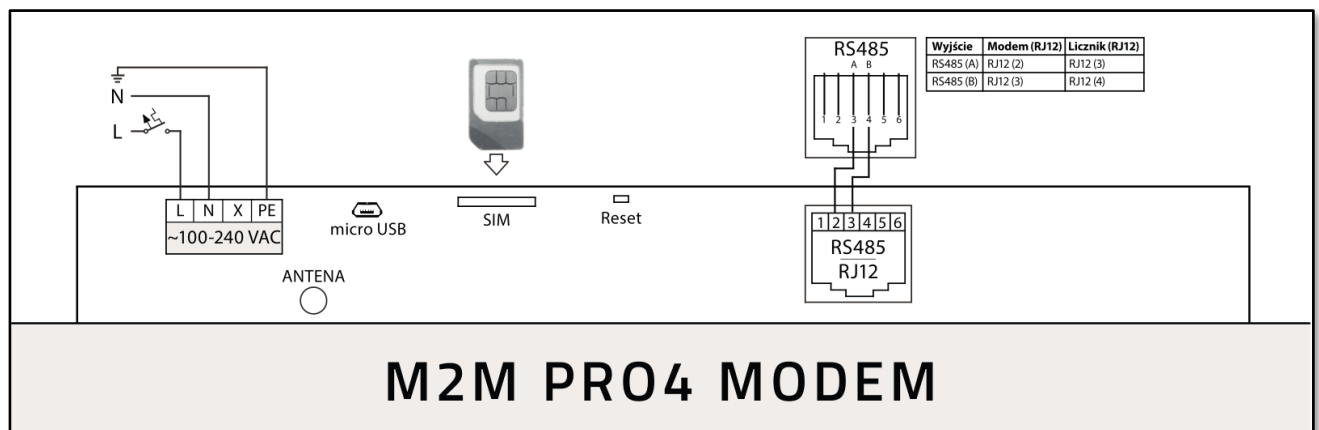
microUSB-USB configuration cable:

Type: microUSB-to-USB cable

Connector type: USB 2.0 micro Type-B connector

Function: for configuration – connecting the device to a computer or provide alternative power source: DC power (5V DC)

Schematic figure of wiring, interfaces, pinout



1.5 Important notes

- The modem has 4G wireless transmission capabilities and 2G/3G fallback in case of the unavailability of the 4G network. In this case, the device will operating on the 3G or 2G network. When the 4G network will be available again, the device will switch back to the 4G network. This feature is configurable for the **WAN** interface of the device.
- You have to use the **LTE antenna** for the sake of a stable wireless network operation. You can check the current signal reception and wireless availability in the *OpenWRT® / LuCI® system's Overview* menu.
- The available APN settings will be assured by the SIM card provider mobile operator or your mobile internet service provider. Ask them about **APN**, password, **SIM PIN** and further necessary information for the configuration.
- When configuring the **SIM #1 APN** or **PIN** settings, after the saving, the modem will not restart its module automatically with the new settings. You need to restart the modem by the **Restart WAN** button in the OpenWrt® menu at **Network / Interface settings**.
- The utility meter readout through the **RS485** port is possible only by using and connecting IEC1107, DLMS compatible (IEC 62056-21, IEC 62056-31 supported) devices.
- You have to configure the RS485 meter connection settings at the **Network/IEC scheduler** menu item.

1.6 Understanding the LED signals

The device has 16 LEDs to assign the modem's current status, the communication, connection. These LEDs are located in four groups:

- Operation status LEDs (**Group A**)
 - **MOC** – Power source connected / mains on
 - **WL** – The modem has started
 - **LADOWANIE SUPERKONDENSATORA** (in case of exhausted super-capacitor part which shows the process of the recharge – when the charge has been finished, the LED will be blank again)
- Connectivity LEDs (**Group B**)
 - **4G-WAN** – wireless network connection and access
 - **USB** connection (on the micro USB port)
 - **BŁĄD** – for sign possible failures, kernel-level events, stand-by mode
- Cellular network signal strength indication LEDs (**Group C**)
 - **signal 1** to **signal 4**: wireless signal reception (higher is better)
- Data connections and activity LEDs (**Group D**)
 - **RS485 TX** - connection and activity (data transmitted) - on the RJ12 connector
 - **RS485 RX** - connection and activity (data received) - on the RJ12 connector
 - **Pamięć** – memory activity (data read, write in the non-volatile memory)

The power indication group (group **A**) and signal level leds (**group C**) are is fixed, but the other 9 LEDs (**group B** and **group D**) are reconfigurable.



2. Installing the modem

2.1 The very first startup

The modem has a super-capacitor part inside, which protect the device against possible shorter power outages. It can also provide RTC backup for the device, up to 2 days. Therefore, this supercap component can be charged and it can be exhausted after an outage or if you store the modem for months without connecting power source or using.

Start the device by the adding the **AC power** (No. 1) or *DC power* (via USB port at No. 2) source and **pushing** the **Reset** button (No. 5) for **2 seconds** by a sharp object (e.g. by a pen) – while the **ON** led will be also active (**the PWR and ON** leds are lighting by **green** colour) – then you can release the **Reset** button.

Then the modem will start immediately and charging the supercapacitor (**LADOWANIE SUPERKONDENSATORA** led will be also active – by **yellow** colour).



Next time you don't need to push the **Reset**. You can stop it by removing the power source and start it by adding the power source.

2.2 Normal startup

The modem has a pre-installed system (which contains the device firmware and the pre-configured OpenWrt® system).

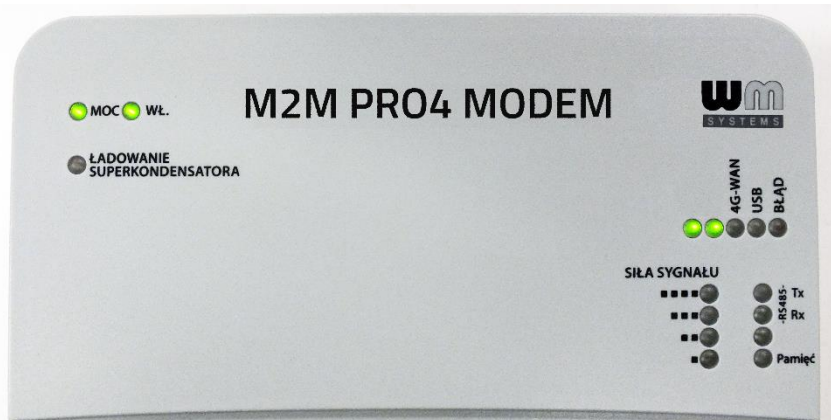
After adding the power source to the modem, you will just need to configure some necessary and unique settings for your SIM card, network access, and some other required connection parameters.

Start the modem by the following sequence.

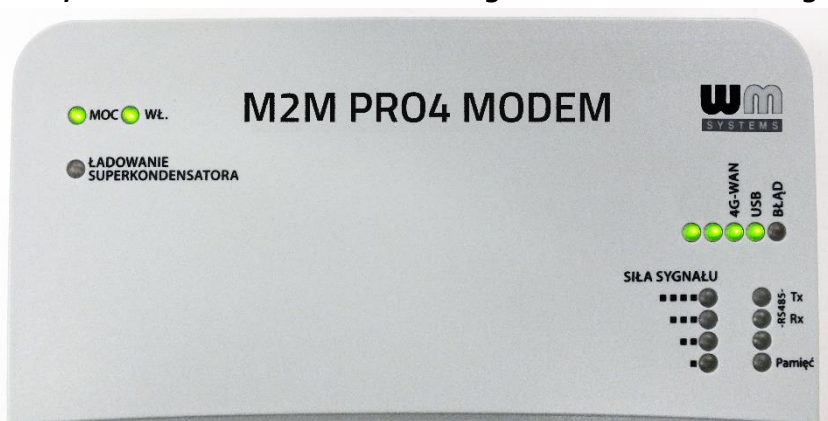
1. Ensure that you have inserted an activated **SIM card** into **SIM** holder (No. 3) in the right position. The usage of **SIM** holder is obligatory for using the wireless communication.
2. Ensure that **antenna is mounted** to the SMA interfaces (No. 6).
3. After plugging the **AC power source** (No. 1), the modem begins to perform booting – the LED signals are always showing the current activity during the operation. The system start needs about 40-50 seconds while it will be ready for usage, network communication.
4. During the boot, the modem begins to operate, whereas its LED signals are showing the current activity during the operation.

During the boot sequence:

- a.) The **MOC** (power) and **WL** (ON) leds are also active (lighting by **green**).
- b.) Then the first two connection LEDs are (untitled on the following figure) lighting for ~10 seconds during the firmware start.



- c.) Then the **4G-WAN**, **USB** leds will be also flashing for 30 seconds during the boot process.



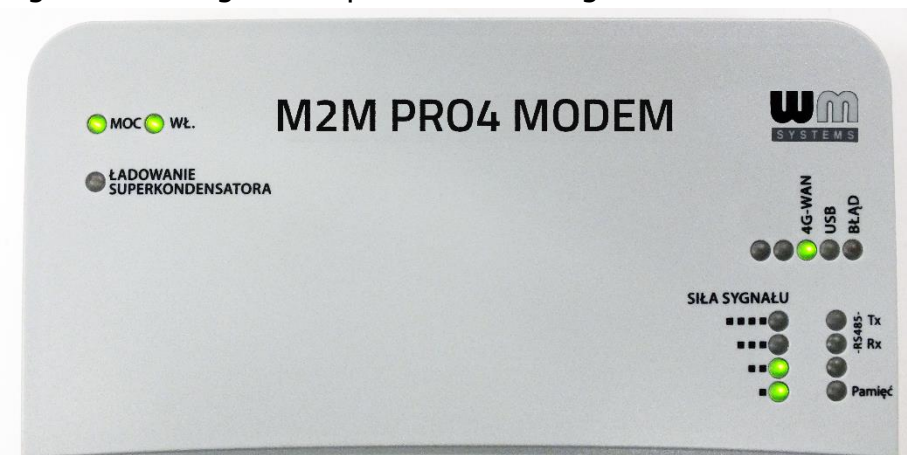
d.) At the end of the boot process, only the **4G-WAN**, **USB** leds will be flashing for 5-10 seconds.



e.) When the connectivity LEDs are not blinking anymore the load of the system has been finished.

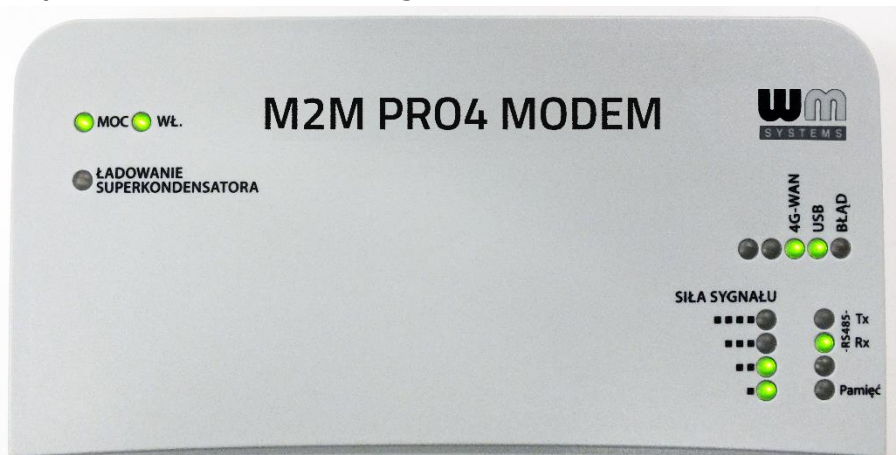


f.) The **SIŁA SYGNAŁU** (SIGNAL LEVEL) low LED(s) are blinking which means the modem tries to connect to the wireless network. If it was configured properly (APN, password and SIM PIN is matching) and the network registration was also succesful, the **4G-WAN** led will be lighting with the **SIGNAL LEVEL** leds will be also lighting (by signing the current wireless signal strength). This means that the modem is already connected to the cellular network and it has enough wireless signal reception for the usage and wireless data transmitting.



g.) If you already connected the **USB** cable, the USB led will be active.

- h.) The **RS485 RX** led (in case of meter data receive) or the **RS485 TX** led (in case of sending data to the meter) will be active – which signs the data traffic, modem \leftrightarrow meter activity.



When the **USB** led is active during the load of the system, this signs that the device is already accessible on its **USB** interface – it is possible for you login at the LuCi[®] web user interface (or connect to the modem via SSH).

2.3 Local access via USB connection

1. Download, unpack and install the USBLAN driver for using the USB connection:
https://www.m2mserver.com/m2m-downloads/USB_Ethernet_RNDIS_DRIVER.zip
2. After you've connected the USB to micro-USB cable, you can add the driver in the Windows[®] / **Start / Control Panel / System / Device Manager**. Find the **Network Cards**, extend it and you will find the „**USB Ethernet / RNDIS Gadget**”. Double click on the entry and choose the **Driver** tab, and the **Refresh** button, then browse the uncompressed file's directory then **Install** the driver.)
3. Build a connection between the PC and the modem with a microUSB-to-USB cable.
4. Configure the **USB-Ethernet interface** IP address on your PC for the „**USB Ethernet/RNDIS Gadget**” and setup the next fixed ipv4 address: 192.168.10.10, subnet mask is: 255.255.255.0 – connect these settings.

(You can ping the device through the USB connection on its IP address.)

5. The **USBLAN** interface IP address is **192.168.10.1**

For connecting to the modem on web interface use the <https://192.168.10.1> URL.

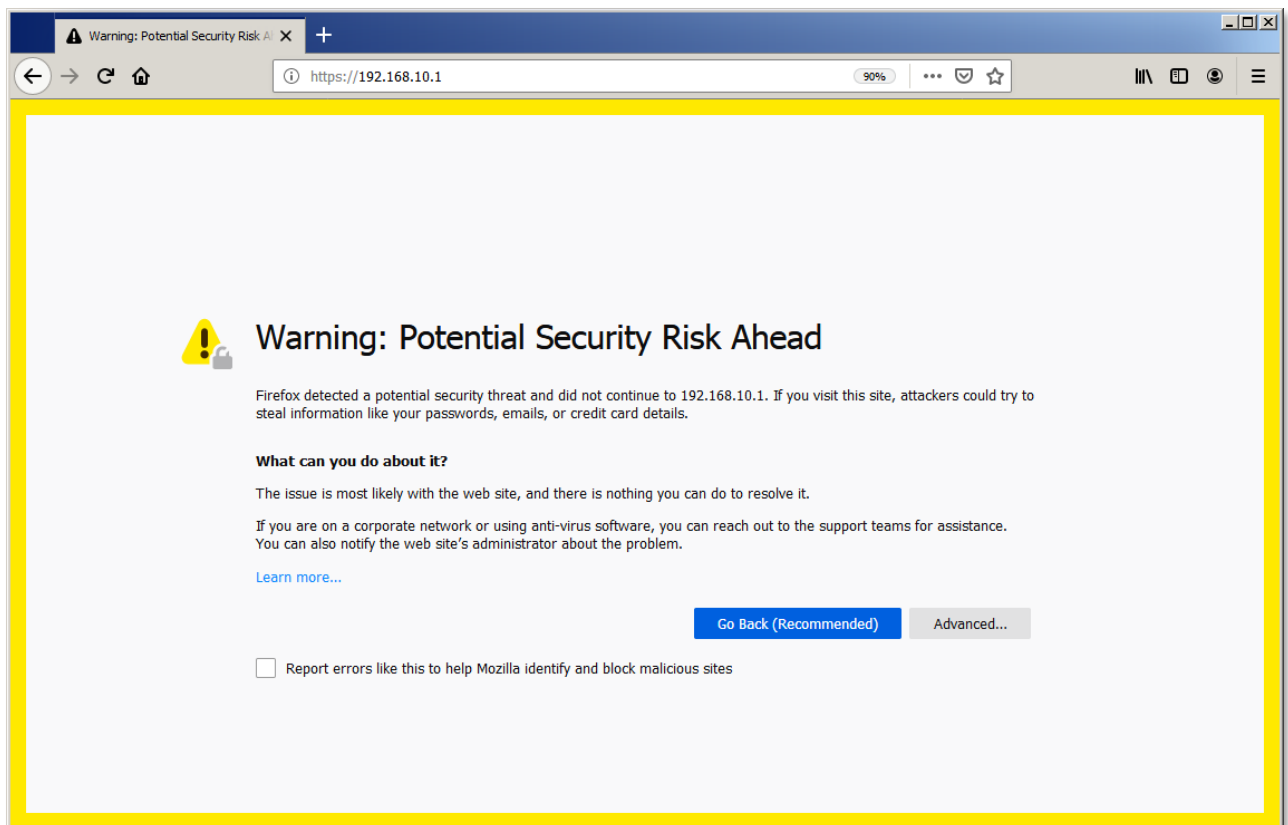
2.4 Web user interface and Login

1. The modem's **local web user interface (LuCi®)** is reachable through the **Ethernet** or **USB** interface – on the default addresses.

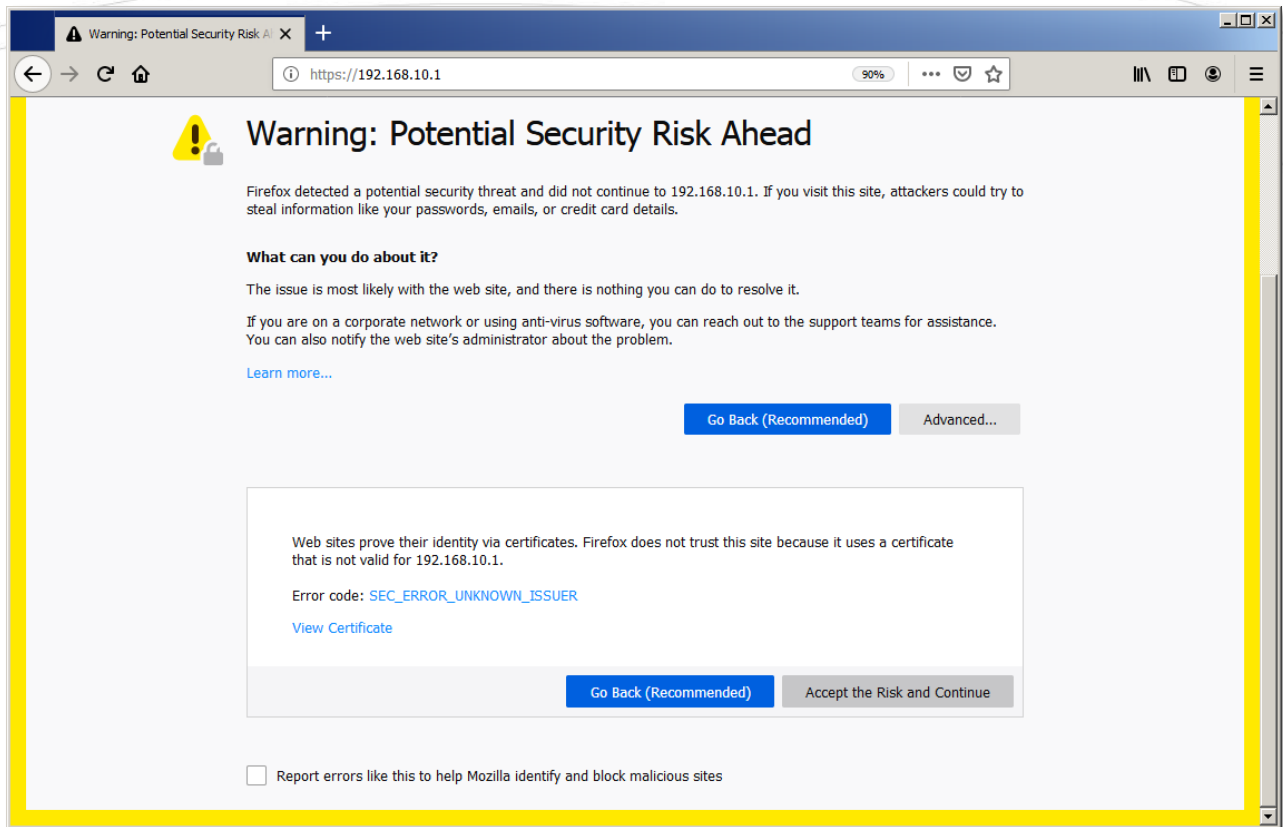
Attention!

For accessing the web user interface we recommend to use the Mozilla Firefox® web browser. Other browsers cannot be used.

2. Enter the default web user interface (LuCi®) of the modem.
The **USB** web interface default **URL** is: <https://192.168.10.1>
3. Use the Mozilla® browser! In your browser window you will get a security risk message. Ignore the security message and choose the **Advanced** option here.

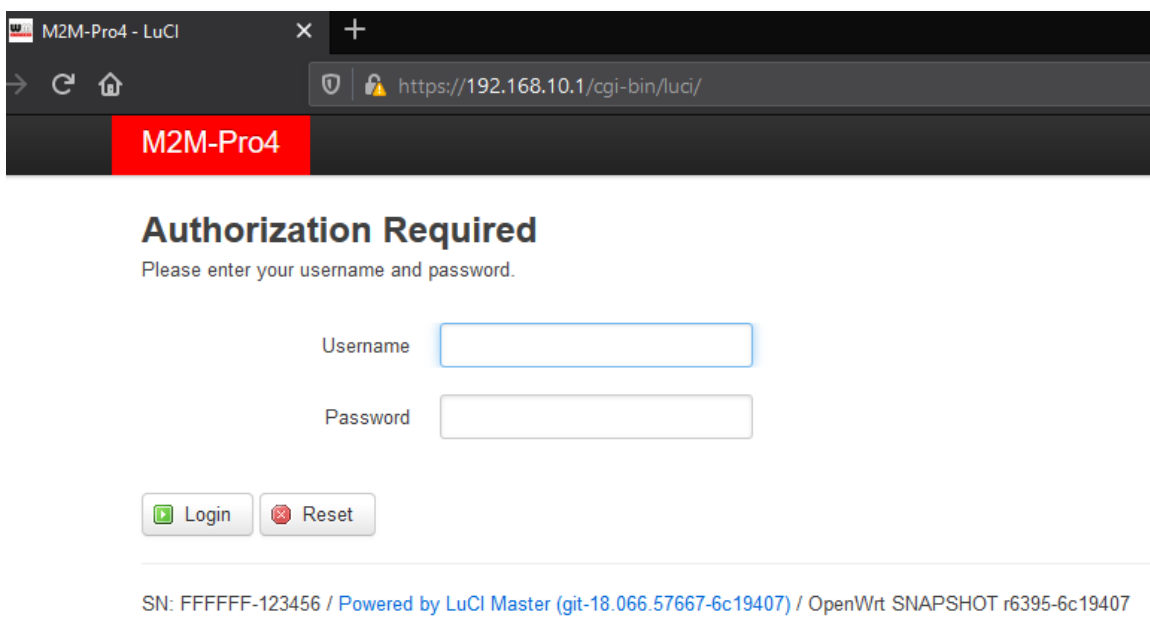


4. Then click on the **Accept the Risk and Continue** button to access the modem webpage.



5. The OpenWRT® system's LuCI® web interface has loaded into your browser. Now fill the **Username** and **Password** fields and click on the **Login** button for the entry.

- **Username: root**
- **Password: wmrpwm2m**



2.5 SSH access

The modem can be accessed through SSH connection, when it is available on its IP address – by a terminal utility (e.g. the *putty* tool).

Putty is a free tool which can be downloaded from the following URL:

<https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html>

The modem can be accessed on SSH at the **192.168.10.1:22** (port nr. 22 - on **USB** interface).

Allow to access the device, ignore the security breach message in your computer in the pop-up window.

Choose Accept (Yes) at the Putty or other SSH terminal's Security Alert of the RSA2 key of the modem to allow and trust the connection – by security reasons.

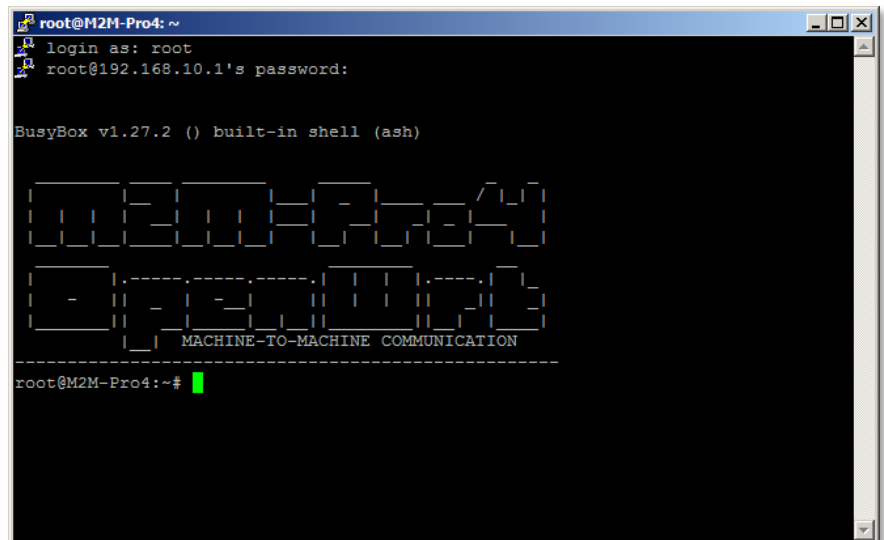
SSH login data:

- **Login as:** *root*
- **Password:** *wmrpwdM2M*

Now you are logged into the OpenWrt®'s Linux command line.

The operating system uses the embedded Micro uCLinux, kernel

4.4 version, therefore you can use standard and compatible Linux commands – if you want.



```
root@M2M-Pro4: ~
login as: root
root@192.168.10.1's password:

BusyBox v1.27.2 () built-in shell (ash)

-----
                    MACHINE-TO-MACHINE COMMUNICATION
-----

root@M2M-Pro4:~#
```

2.6 Wireless access

Before using the wireless access you need to **setup** the SIM card's current **APN** properties at the OpenWrt® web interface.

You have to configure these settings (SIM and APN) for connecting to the wireless network properly.

1. Choose the **Network / Interfaces** menu, **WAN** interface, **Edit** button.

The screenshot shows the M2M-Pro4 web interface. At the top, there is a navigation bar with the following items: M2M-Pro4, Status, System, Services, Users, Network, Statistics, Logout, and an AUTO REFRESH ON button. The main heading is "Interfaces". Below it is "Interface Overview".

Network	Status	Actions
USBLAN usb0	Uptime: 0h 9m 40s MAC-Address: 7E:4A:28:17:D1:96 RX: 488.28 KB (5266 Pkts.) TX: 960.91 KB (2748 Pkts.) IPv4: 192.168.10.1/24	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>
WAN wan	RX: 0 B (0 Pkts.) TX: 0 B (0 Pkts.)	<input type="button" value="Connect"/> <input type="button" value="Stop"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>

Below the table is a button "Add new interface...". At the bottom right, there are three buttons: "Save & Apply", "Save", and "Reset".

2. Add the **SIM #1 APN** (APN setting of your SIM card)

The screenshot shows the M2M-Pro4 web interface. At the top, there is a navigation bar with the following items: M2M-Pro4, Status, System, Services, Users, Network, Statistics, Logout, UNSAVED CHANGES: 11, and an AUTO REFRESH ON button. The main heading is "Interfaces - WAN".

On this page you can configure the network interfaces. You can bridge several interfaces by ticking the "bridge interfaces" field and enter the names of several network interfaces separated by spaces. You can also use VLAN notation `INTERFACE.VLANNR` (e.g.: `eth0.1`).

Common Configuration

General Setup | **Advanced Settings** | Firewall Settings

Status 4g-wan

Uptime: 2d 0h 20m 50s
MAC-Address: 00:00:00:00:00:00
RX: 19.45 KB (224 Pkts.)
TX: 615.03 KB (10001 Pkts.)
IPv4: 10.255.224.179/32

Protocol:

Wireless network:

Mobile country code:

Mobile network code:

Dual SIM:

SIM #1 APN:

PIN:

SIM #1 PAP/CHAP username:

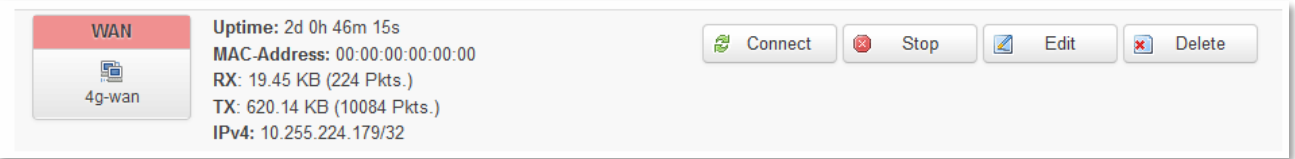
SIM #1 PAP/CHAP password:

Dial number:

3. If you have **PIN** code on the SIM card that you are using, add the right PIN here. (Ask your Mobile Operator about the SIM info.)
4. If that is necessary to use *username* (**SIM #1 PAP/CHAP username**) or *password* (**SIM #1 PAP/CHAP password**) for the wireless network access, consult with your mobile provider and change the settings here, please.
5. Check that **Protocol** must be *PPP-4G* - if its not configured, choose this and push to the *Switch protocol* button and configure the APN, SIM settings.
6. In case of roaming change the **Mobile country code** (MCC) settings to the related country code please.
7. If you are attempting to use a dedicated cellular network, configure the MNC field (**Mobile network code**) please, according the needs. You will found the current valid and useable MCC / MNC settings on this official website: <https://mcc-mnc-list.com/list>
8. Click on the **Save & Apply** button to store the settings and configuring APN for the modem.
9. Soon the wireless module will be configured regarding the settings. Now the modem will try to connect and register the SIM card to the network. The availability of the mobile network is assigned by the **4G-WAN** LED (lighing by **green**).
10. When it has sucessfully registered to the given APN, the **4G-WAN** LED will lighting by green and the **SILA SIGNALU** (SIGNAL LEVEL) will be also signed according to the signal reception (it is lighing by **green**).



If the module with the SIM card was connected, the module is immediately generating data traffic on the network where the Rx/Tx values will be continuously growing/changing for the **Interface status** at the **Interfaces / Interface Overview** part for the **WAN** interface.



This means that the wireless Internet connection (**4g-wan**) is already active.

2.7 LED indication

The default LED signal indication is listed here. The B-D group of LEDs can be changed if you need in the OpenWrt® web interface.

Description	Colour	Reconfigurable	No light	Flashing	Continuously light
Group A					
MOC	Green	No / FIXED	No power	N/A	AC Power supply OK
WL	Green	No / FIXED	The modem's power supply removed	N/A	Power supplied / The device has been started
LADOWANIE SUPERKONDENSATORA	Yellow	No / FIXED	Supercap/Battery is fully charged (no need to charge)	N/A	Supercap/Battery is exhausted and it is currently charging
Group B					
-	White	Yes, Programmable	Inactive	No	No
-	White	Yes, Programmable	Inactive	No	No
4G-WAN	Green	Yes	Inactive transmission channel on cellular network, module not/not properly configured	-	Active data transmission on the 4G LTE cellular network
USB	Green	Yes	No connection to the USB port	Data flow, alternative DC Power	Connection to the USB port, DC powered
BLAD	Red	Yes	No	Error	Error
Group C					
SILA SIGNALU (■■■■,■■■■,■■■)	Green	Yes	<u>Cellular network signal strength</u> 4 signal – Signal is above 97dBm (very good reception) 3 signal – Signal is above 85dBm (average reception) 2 signal – Signal is above 65dBm (poor reception) 1 signal – Signal is below 50dBm (weak reception) 0 signal – No signal (no reception)		

Group D					
RS485 TX		Yes, Programmable	RS485 data transmission (transmit: TX)	Outgoing data flow, data transmitting via the RS485 port	No
RS485 RX		Yes, Programmable	RS485 data reception (receive: RX)	Incoming data flow, receiving data via the RS485 port	No
-		Yes, Programmable	Inactive	No	No
Pamięć		Yes, Programmable	No activity at flash memory	Data read from /write to the non-volatile memory	No

2.8 Power On / Super-capacitor charging mode

Normal operation (AC or DC power supply connected)

The normal usage is assigned, when you are adding power supply to the **100..240V AC** or **12..24V DC (USB)** connector.

The modem's **MOC** (Power) LED will lighting by **green** and then the **WL** (ON) LED will also lighting by **green** colour when the system has started.

There should be LED activity on the **USB** interface – if you are connected by USB cable with your PC.

When the wireless network registration was successful and the modem is operating on the 4G network, the **4G-WAN** LED should is also active (lighting by **green**).



No Power supply / Power supply removed / Power line outage

If the DC power supply was removed or in case of a detected electricity / power outage, after min. 5 seconds the modem will be disconnecting all interfaces, file systems and will be halted.

This plus operation time is possible due to the internal super-capacitor component – which provides safe backup power for short time outages.

During the shutdown process only the **WL** (ON) LED will be lighting by **green**, but the **MOC** (Power) LED will be **blank**.

When the shutdown process has been finished, **all LEDs will be inactive**.



Replug power input, connect power supply / Stabilizing the power

In case of providing the power source (replugging the power supply) or stabilizing the outage of the power source, the modem will getting enough power again and automatically starting.

During these the **MOC** (Power) and **WL** (ON) LEDs will be active (lighting by **green**).

Because the supercapacitor was used previously, it needs to be charged - therefore the **LADOWANIE SUPERKONDENSATORA** led will be also active during the charging process (lighting by **yellow**).



2.9 Service features

The modem has various **service features** which can be controlled manually - just for the case – which can be initiated by **pushing** the **Reset** button (no. 5).

By any reason, if you need to *stop* or *start* the device immediately or you cannot login into the system, you can start or stop it manually here. It is useful when the modem was misconfigured or the installation process failed, IP address or the password was loosen.

Here we've listed all Service features of the **Reset** button which can be selected by manually.

Push RESET	Legend	LED / signal
2 sec	START the modem (when it was stopped before, AND the device has power source)	the WL (ON) led will lighting (green)
6 sec	Power off / STOP the device (if it was operating)	all LEDs will inactive, only the MOC (Power) led is active (green)
4 sec	SERVICE MODE MENU of the modem (if the device is operating) – the menu is active for 1 minute	the BLAD led will lighting by red , while the service mode is active

The modem **Service menu** has 4 modes (the **menu is active for 1 minute only**, while you can be select a mode from the menu by **pushing the Reset button until 1sec**).



The following modes can be selected from the menu, here:

- MENU ITEM 0 (no short push) – **reboot**
- MENU ITEM 1 (1x short push) – **restoring the default configuration**
- MENU ITEM 2 (2x short push) – **restoring the factory configuration**
- MENU ITEM 3 (3x short push) – **exit from menu**

Then after the selection, the choosed menu item number is flashed by the **BLAD** led (e.g. flashing twice in case of selecting the MENU ITEM 2).

Then you need to **confirm** the choosen menu item for executing by a longer **6sec Reset** push.

Some examples:

a.) RESTART the modem:

- The modem must be operating
- Push the **RESET** button for **4sec** (entering the service mode) – **BLAD** led is lighting (**red**)
- Push the **RESET** button again for **6sec** (selected: mode 0 (*restart*) and confirm your selection)
- The modem will restarts itself immediately

b.) Restoring the DEFAULT configuration to the modem:

- The modem must be operating
- Push the **RESET** button for **4sec** (entering the service mode) – **BLAD** led is lighting (**red**)
- Push the **RESET** button again **once** for **1sec** (selected: mode 1 (*restoring default config*))
- **BLAD** led (red) is flashing **once** per second
- Push the **RESET** button again for **6sec** (confirm your selection)
- The modem will delete the current configuration and restoring the *default configuration* and restarting itself with loaded *default configuration* – if the default config doesn't exists, it is restoring the *factory config*.

c.) Restoring the FACTORY configuration to the modem:

- The modem must be operating
- Push the **RESET** button for **4sec** (entering the service mode) – **BLAD** led is lighting (**red**)
- Push the **RESET** button again **twice** for **1sec** with a short pause (selected mode: 2 (*restoring factory config*))
- **BLAD** led (red) is flashing **twice** per second
- Push the **RESET** button again for **6sec** (confirm your selection)
- The modem will delete the current configuration and restoring the *factory configuration* and restarting itself with the original configuration.

2.10 Alternative installation of the OpenWrt® system

By default, we deliver the *Pro4 Modem* device with the pre-installed OpenWrt® system. But, if it is necessary, the device can be reinstalled from a connected USB stick, through an OTG cable (*micro-USB to USB-A*).

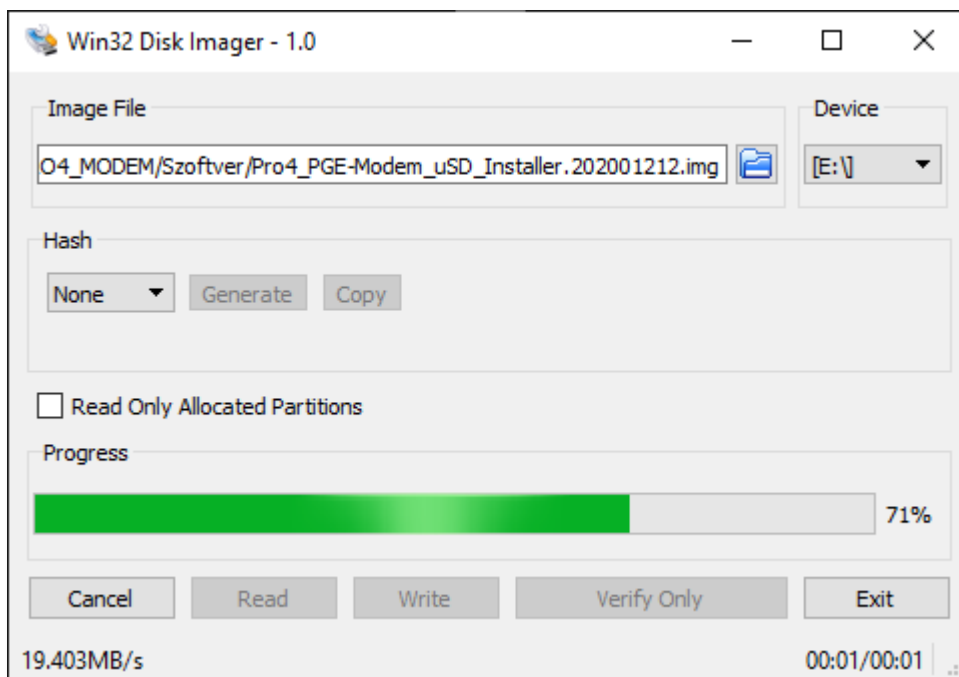


Micro USB - USB

The device firmware must be written to a USB drive/stick by the *Win32 Disk Imager* tool. The software can be downloaded from its website: <https://sourceforge.net/projects/win32diskimager/>

Download the device firmware - uSD installer version - from our website and unpack the file (uncompress the file which now has .img extension).

Start the *Win32 Disk Imager* tool and browse the unzipped IMG (image) file on your computer, select the USB device's drive name (be careful at selection because all content will be stored from the selected drive!) and push the **Write** button. The image file will be stored on the USB stick.



Connect the USB stick to a the cable to the modem device and power on the modem.

The modem will install the device from the USB stick – which will be signed by the device's led signals. After the installation it will reboot. Remove the OTG cable and the USB stick and connect the normal micro-USB to USB cable to your PC and the modem, and configure the modem.

3. Modem configuration (main important settings)

Important!

The modem has been uploaded by a pre-configured system. Check the configuration, and if the settings are not match with your expectations, please change the configuration settings and save them. The modem will be automatically apply your settings.

When you have logged in, at the startup screen (**Status/Overview**) the web interface can be seen with all relevant information and the current status of the modem.

The M2M Software version should be **202002071** or newer. If it has an older version, then refresh the firmware, please. (Check the User Manual for further steps).

The screenshot shows the M2M-Pro4 web interface. At the top, there is a navigation bar with the title 'M2M-Pro4' and several menu items: Status, System, Users, Network, Statistics, and Logout. An 'AUTO REFRESH ON' button is located in the top right corner. The main content area is divided into three sections: Status, Memory, and Network. Each section contains a table of key-value pairs. The Status section includes fields like Hostname, OW Model, OW Firmware Version, M2M Hardware Version, M2M Software Version, Kernel Version, Local Time, Uptime, and Load Average. The Memory section shows Total Available, Free, and Buffered memory usage with progress bars. The Network section lists Modem Model, Modem Revision, IMEI, SIM ID, Modem RSSI (with a progress bar), Network Name, Network Code, and Cell ID.

Status	
System	
Hostname	M2M-Pro4
OW Model	Olimex A20-Olinuxino Micro
OW Firmware Version	OpenWrt SNAPSHOT r6395-6c19407 / LuCI Master (git-18.066.57667-6c19407)
M2M Hardware Version	BE008x
M2M Software Version	202001223
Kernel Version	4.14.23
Local Time	Wed Jan 22 09:55:39 2020
Uptime	0h 18m 51s
Load Average	0.04, 0.17, 0.25
Memory	
Total Available	207692 kB / 250752 kB (82%)
Free	203480 kB / 250752 kB (81%)
Buffered	4212 kB / 250752 kB (1%)
Network	
Modem Model	LE910-EU V2
Modem Revision	20.00.403
IMEI	351622075718086
SIM ID	8936200003250175493
Modem RSSI	13 / 31 (41%)
Network Name	Telenor HU
Network Code	21601
Cell ID	0

You have to configure the 4G connection and APN/password (for SIM).

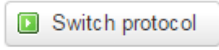
SIM/APN settings: In the OpenWrt menu, choose the **Network / Interfaces** menu, **WAN** interface, **Edit** button.

1. Ask your *Mobile Operator* about the SIM card information.
2. Add the **SIM #1 APN** settings according the SIM card info – ask with your mobile provider.
3. Check and add the **PIN** settings and **username, password** settings if you have to use them on the current cellular network (if your SIM card using these).
4. Store the wireless network settings by the **Save & Apply** button.
5. Soon the wireless module will be configured regarding the settings. If the module with the SIM card is operating network traffic Rx/Tx values will be continuously growing/changing at Interface status: **Interfaces / Interface Overview** part, wher **WAN** interface means the public wireless Internet connection (as *lte-wan*) – which assigns the physical 4G module.

Important!

In case of network outage, the wireless and wired data and interface connections, sessions will be reconnected as the power source established and the network is reachable.

IP settings:

1. By default the device IP address is *static*, the default IP address is: 192.168.10.1.
2. If you want to switch the **USB-LAN** interface (**usb0**) at network settings - at the **EDIT** part - to *dynamic* (at **Protocol** field), then the modem will waiting for an IP address on the network.
3. If you want to use the local *DHCP server* – to allow to add IP addresses by the modem for the connecting external networking devices – then the right setting is the *Static Address*, and the **IP address** should be also changed, and you have to uncheck the *DHCP disabled* option for the **USB-LAN** interface to allow the DHCP server.
4. In case of using **DHCP server**, you can define the IP range (**Start, Limit**) and you can define **IPv4 netmask** for your network.
5. When changing the **Protocol** field, you will need to push the  button.
Save your settings by the **Save & Apply** button.
Then the bridged **USB-LAN** interface IP address will be changed according your request due to the new settings.
6. Further detailed settings can be found in the *User Manual* document.

4. Support

4.1 Contact support

If you have any questions concerning the usage of the device, contact us at the following contact:

E-mail: iotsupport@wmsystems.hu

Phone: +36 20 3331111

Online product support can be required here at our website:

<https://www.m2mserver.com/en/support/>

For the proper identification of your device, use modem sticker and its information, which contains important information for the call center.

Due to the support questions, the product identifier is important for resolve your problem. Please, when you are attempting to tell us an incident, please send us the IMEI and SN (serial number) information from the product warranty sticker (located on the front face of the product housing).

The documentation and software release for this product can be accessed via the following link:

<https://www.m2mserver.com/en/products/m2m-pro4-modem/>

4.2 GNU/Linux license and open source code

The modem operating system and OpenWrt[®]/Luci open source code is available on our website at the product site. The modem's software is under GNU/Linux licensing.

Product URL: <https://www.m2mserver.com/en/products/m2m-pro4-modem/>

There at the **Downloads** tab at the middle on the modem website, at the **Source Code** part you will found the **source code** of the modem software and **GNU/Linux license notice**.

6. Device data and certification

5.1 Datasheet of the device

Power	Voltage / Current	<ul style="list-style-type: none"> • Dual Power / Mains: AC power supply from 100..240V AC, 50 Hz, 600mA current / alternative 5V DC mains (via USB powered conn.)
	Consumption	<ul style="list-style-type: none"> • Average: 3-4W • Max.: 10W
System	Performance	<ul style="list-style-type: none"> • T2 Dual-Core Cortex-A7 ARM 700MHz processor / 128MB memory / non-volatile memory for data storage
Wireless LTE module	Module Type / Release	<ul style="list-style-type: none"> • Telit LE910C1-EU • LTE FDD Cat.1 3GPP release 9 compliant
	Bands / Frequency (MHz)	<ul style="list-style-type: none"> • GSM/GPRS: B3(1800), B8(900) • UMTS: B1(2100), B3(1800), B8(900) • LTE: B1(2100), B3(1800), B7(2600), B8(900), B20(800), B28A(700)
	Speed (DL/UL)	<ul style="list-style-type: none"> • LTE Cat.1: 10/5 Mbps • HSPA+ Cat.20/Cat.6: 42/5.7 Mbps
	Interface / Antenna	<ul style="list-style-type: none"> • The wireless module is assembled on the motherboard • SMA 50 Ohm antenna connector
Interfaces	SIM card	<ul style="list-style-type: none"> • SIM card slot: 2FF type mini SIM card - internal protection against spontaneous falling out
	RS485 port	<ul style="list-style-type: none"> • Isolated RS-485 data interface (RJ12, half duplex, 300 - 19 200bps) for 1 to 31 protocol compatible utility meters (IEC1107 or DLMS/COSEM)
	microUSB port	<ul style="list-style-type: none"> • microUSB connection (for alternative DC power source, local configuration)
User interface	OS / Services	<ul style="list-style-type: none"> • OpenWrt® embedded device operating system, WebGUI (LuCi®) interface • Meter protocols: IEC1107, DLMS/COSEM (IEC 62056-21, IEC 62056-31) • Network protocols: TCP, ser2net, FTP, NTP time sync, SSHv2 access • Server connection: FTP service (automatic data upload through WAN connection)
	Security	<ul style="list-style-type: none"> • Diagnostic and monitoring of operation parameters • Modem event logging • Safe and local storage of data in the non-volatile memory • Super-capacitor protection against power outage, RTC backup up to max. 2 days
	Remote Access / Remote Configuration	<ul style="list-style-type: none"> • Configuration: web user interface (configuration, firmware replacement) via local or remote TCP connection • Remote access and CLI: SSHv2 (remote configuration software replacement, monitoring) • Management: TR-069 protocol (for remote management and configuration, firmware updates)
Environment	Operation/Storage temperature	<ul style="list-style-type: none"> • from -35°C to +55°C, at 0 to 95 rel. humidity • from -40°C to +80°C, at 0 to 95 rel. humidity
Construction	Enclosure	<ul style="list-style-type: none"> • IP51 plastic housing, sealable terminal cover, DIN-rail mounting supported • 16 status LEDs
	Dimensions/Weight	<ul style="list-style-type: none"> • 150 x 150 x 58 mm / 310 gramms (with terminal cover) • 150 x 130 x 58 mm / 270 gramms (without terminal cover)

5.2 Wireless Module certification

DocuSign Envelope ID: CF00377E-AF0B-4539-B371-0E50E5DB76E6



EU DECLARATION OF CONFORMITY [20582DOC00148A]

- 1 **LE910C1-EU** (product name)
- 2 Telit Communications S.p.A. – Via Stazione di Prosecco, 5/B – 34010 Sgonico TRIESTE – ITALY (manufacturer)
- 3 This declaration of conformity is issued under the sole responsibility of the manufacturer
- 4 Dual-Band 2G E-GSM900/DCS1800, Three-Band 3G FDD I, FDD III, FDD VIII, Six-Band LTE FDD 1, FDD 3, FDD7, FDD 8, FDD 20, FDD 28A and GNSS L1, E1, G1, B1I wireless module
SW Version(s) 25.20.222



Operating frequency bands and related max radio-frequency power transmitted:
GSM/GPRS: 33.5 dBm (E-GSM 900); 30.5 dBm (DCS 1800)
3G: 25.0 dBm
LTE: 25.0 dBm

- 5 The object of the declaration described above is in conformity with the relevant Community harmonisation: European Directive 2014/53/EU (RED)
- 6 The conformity with the essential requirements set out in Art.3 of the 2014/53/EU has been demonstrated against the following harmonized standards:

Harmonized Standard reference	Article of Directive 2014/53/EU
EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013 EN 62311:2008	3.1 (a): Health and Safety of the User
Draft EN 301 489-1 V2.2.0, Draft EN 301 489-19 V2.1.0 Draft EN 301 489-52 V1.1.0	3.1 (b): Electromagnetic Compatibility
EN 301 511 V12.5.1, EN 301 908-1 V11.1.1, EN 301 908-2 V11.1.2 EN 301 908-13 V11.1.2, EN 303 413 V1.1.1	3.2: Effective use of spectrum allocated

- 7 The conformity assessment procedure referred to in Article 17 and detailed in Annex III of Directive 2014/53/EU has been followed with the involvement of the following Notified Body:
Dekra Testing and Certification, S.A.U., Parque Tecnológico de Andalucía, C/ Severo Ochoa 2, 29590 Campanillas – Málaga – SPAIN, Notified Body No: 1909

Thus, **CE** is placed on the product

- 8 The product can be considered compliant to the essential requirements set out in Art.3 of 2014/53/EU only in combination with the above-mentioned SW version(s).
- 9 The Technical Documentation (TD) relevant to the product described above and which supports this Declaration of Conformity, is held at: Telit Communications S.p.A., Via Stazione di Prosecco, 5/b - 34010 Sgonico – TRIESTE – ITALY

Trieste, 2018-12-10

DocuSigned by:
Antonino Sgroi
VP Cellular, R&D
Antonino Sgroi

EU-Type Examination Certificate No. 57536RNB.001A1

Technical Documentation: LE910Cx-EU_57536_Rev1.1

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Nr. R.E.A. TS-120027

Società soggetta all'attività
di direzione e coordinamento
da parte di Telit Communications PLC
con sede in Londra (art.2497 bis C.G.)

Società con socio unico
(Telit Communications PLC)

6. Legal notice

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Warning

Any errors occurring during the program update process may result in failure of the device.