WM-E8S®
smart metering modem

User Manual

Document specifications

This document was completed for the **WM-E8S®** modem device and contains the details of installation, configuration for usage of the device.

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Chapter 1. Technical data

1.1 Power voltage / Current ratings

- **Power Voltage / Ratings:** ~85..300VAC (47-63Hz) / 100..385VDC
- **Current:** Stand-by: 20mA @ 85VAC, 16mA @ 300VAC / Average: 25mA @ 85VAC, 19mA @ 300VAC
- **Consumption**: Average: 1W @ 85VAC / 3.85W @ 300VAC

1.2 Cellular module(s)

- **Cellular modules (order options)**
  - **SIMCom A7672SA**
    - LTE: B1(2100) / B2(1900) / B3(1800) / B4(1700) / B5(850) / B7(2600) / B8(900) / B28(700) / B66(1700)
    - GSM/GPRS/EDGE: B2(1900) / B3(1800) / B5(850) / B8(900)
  - **SIMCom A7676E**
    - LTE: B1(2100) / B3(1800) / B8(900) / B20(800) / B28(700) / B31(450) / B72(450)
    - GSM/GPRS/EDGE: B3(1800) / B8(900)
  - **SIMCom SIM7070E**
    - LTE Cat.M: B1(2100) / B2(1900) / B3(1800) / B4(1700) / B5(850) / B8(900) / B12(700) / B13(700) / B14(700) / B18(850) / B19(850) / B20(800) / B25(1900) / B26(850) / B27(850) / B28(700) / B31(450) / B66(1700) / B72(450) / B85(700)
    - LTE Cat.NB: B1(2100) / B2(1900) / B3(1800) / B4(1700) / B5(850) / B8(900) / B12(700) / B13(700) / B18(850) / B19(850) / B20(800) / B25(1900) / B26(850) / B28(700) / B31(450) / B66(1700) / B85(700)
    - GSM/GPRS/EDGE: B2(1900) / B3(1800) / B5(850) / B8(900)
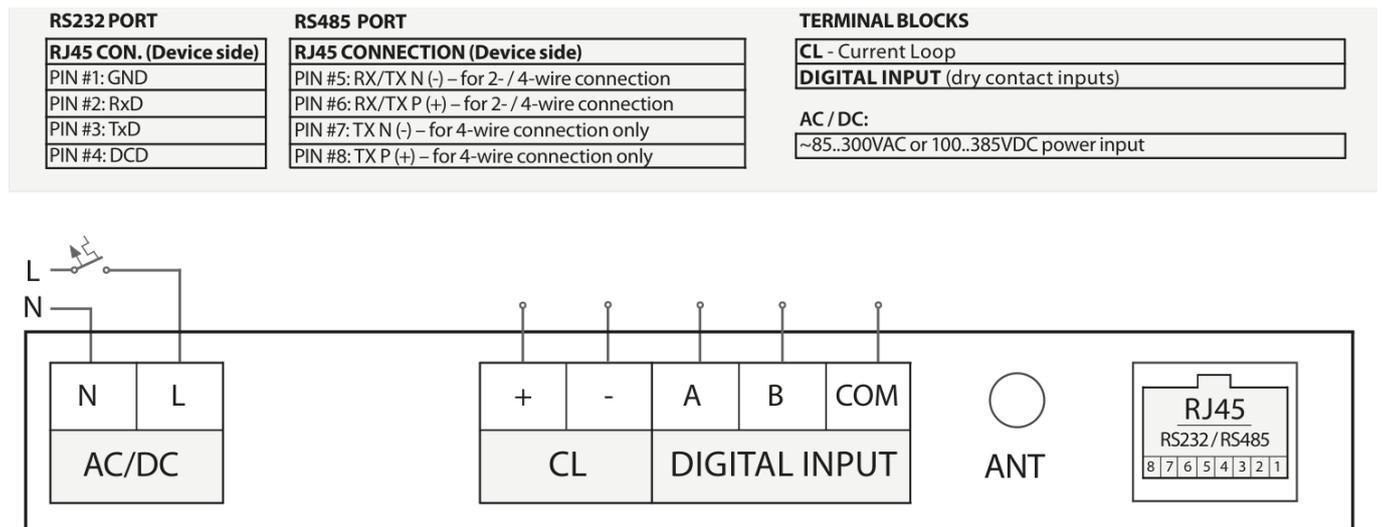
1.3 Product variations

The modem can be ordered in several variations:

- without alternative RS485 (terminal block) interface, without MBus (terminal block) interface

- with alternative RS485 (2-wire, terminal block)
- with MBus (terminal block) interface, up to 4 Mbus meters/devices
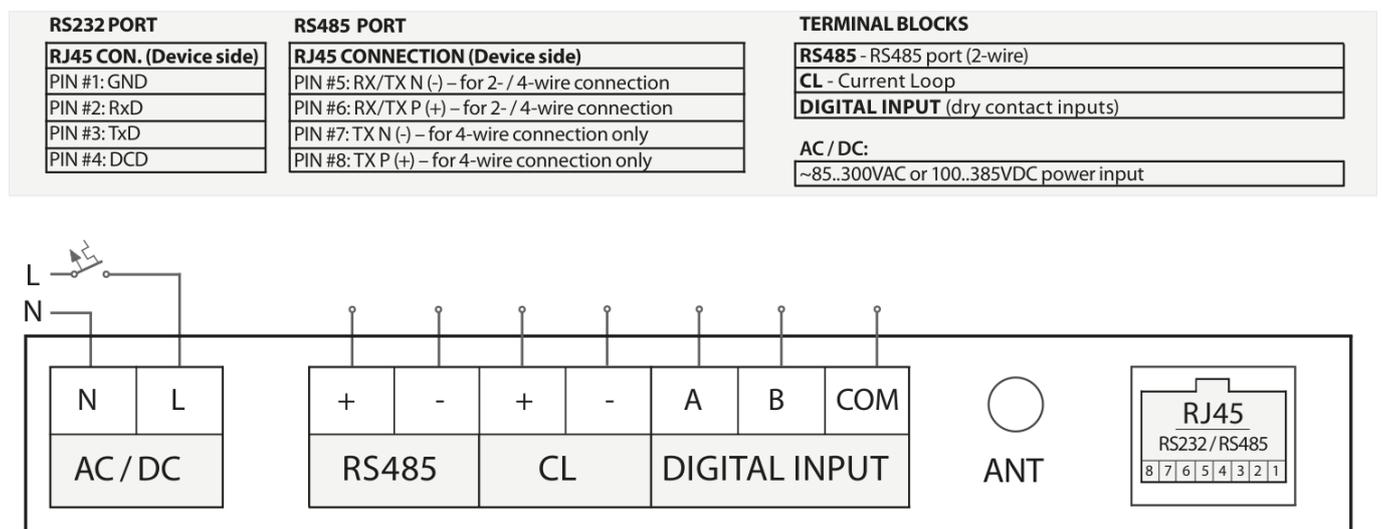
1.4 Power on the modem

The WM-E8S modem can be powered from ~85..300VAC / 100..385VDC power source at the N (neutric) and L (line/phase) AC connection pins (CN1 connector).

RS232 PORT	RS485 PORT	TERMINAL BLOCKS
RJ45 CON. (Device side)	**RJ45 CONNECTION (Device side)**	**CL** - Current Loop
PIN #1: GND	PIN #5: RX/TX N (-) – for 2- / 4-wire connection	**DIGITAL INPUT** (dry contact inputs)
PIN #2: RxD	PIN #6: RX/TX P (+) – for 2- / 4-wire connection	**AC / DC:**
PIN #3: TxD	PIN #7: TX N (-) – for 4-wire connection only	~85..300VAC or 100..385VDC power input
PIN #4: DCD	PIN #8: TX P (+) – for 4-wire connection only	

The RJ45 connector's RS485 port wiring can be ordered as 2- or 4-wired.

1.5 Alternative RS485 connection – order option

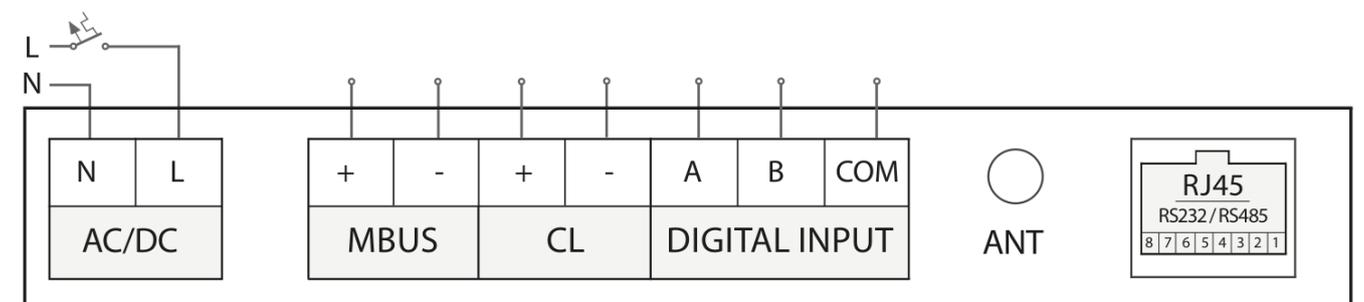| RS232 PORT	RS485 PORT	TERMINAL BLOCKS
RJ45 CON. (Device side)	**RJ45 CONNECTION (Device side)**	**RS485** - RS485 port (2-wire)
PIN #1: GND	PIN #5: RX/TX N (-) – for 2- / 4-wire connection	**CL** - Current Loop
PIN #2: RxD	PIN #6: RX/TX P (+) – for 2- / 4-wire connection	**DIGITAL INPUT** (dry contact inputs)
PIN #3: TxD	PIN #7: TX N (-) – for 4-wire connection only	**AC / DC:**
PIN #4: DCD	PIN #8: TX P (+) – for 4-wire connection only	~85..300VAC or 100..385VDC power input

The RJ45 connector's RS485 port wiring can be ordered as 2- or 4-wired.

The alternative RS485 connector has 2-wires. The two RS485 interfaces (primary RS485 port and left terminal block RS485) are parallelised.

1.6 MBus connection - order option

The RJ45 connector's RS485 port wiring can be ordered as 2- or 4-wired.

The modem's Mbus master connection can be used for max. 4 slave devices, which can be connected to the MBus +/- pins. The modem provides 24-36V DC power for the connected Mbus devices.

RS232 PORT		RS485 PORT		TERMINAL BLOCKS
RJ45 CON. (Device side)		**RJ45 CONNECTION (Device side)**		**MBUS** - Mbus Master for max. 4 slave devices (24V..36V provided)
PIN #1: GND		PIN #5: RX/TX N (-) – for 2- / 4-wire connection		**CL** - Current Loop
PIN #2: RxD		PIN #6: RX/TX P (+) – for 2- / 4-wire connection		**DIGITAL INPUT** (dry contact inputs)
PIN #3: TxD		PIN #7: TX N (-) – for 4-wire connection only		**AC / DC:**
PIN #4: DCD		PIN #8: TX P (+) – for 4-wire connection only		~85..300VAC or 100..385VDC power input

WM-E8S

1.7 Current loop connection

The modem current loop connection can be performed on the CL +/- connection pins.
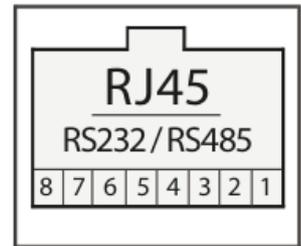
1.8 Digital input (DI) connection

The modem can receiver 2 digital inputs on the A, B and COM connection pins. Testing the digital inputs: short must be made between the COM and A or COM and B.

1.9 RS232/RS485 connection (RJ45 connector)

The modem RS232/RS485 connector is wired to the RJ45 connector.

*The RS232 uses the pin nr. 1, 2, 3 and pin nr. 4 for DCD Control

The RS485 (for 2-wire connection) uses the pin nr. 5, 6

The RS485 (for 4-wire connection) uses the pin nr. 5, 6, 7, 8

The modem uses the TCP port nr. 9000 for the transparent communication and the port nr. 9001 for configuration. The MBus is using the TCP port nr. 9002 (speed rate should be between 300 and 115 200 baud).

*The RS232 port can be also used for the configuration of the modem.

1.10 Modem configuration

The modem has a pre-installed system (firmware). The operational parameters can be configured with the WM-E Term® software (through its RJ45 connector).

The manual for the settings of the WM-E Term® software (for SIM APN configuration and force the modem into each cellular/mobile communication technology are described in the Chapter 3.4).

Further settings can be found in the software's user manual:
https://m2mserver.com/m2m-downloads/WM-E-TERM_User_Manual_V1_94.pdf

Chapter 2. WM-E8S modem construction

WM-E8S modem, assembled with housing and IP52 protected transparent cover
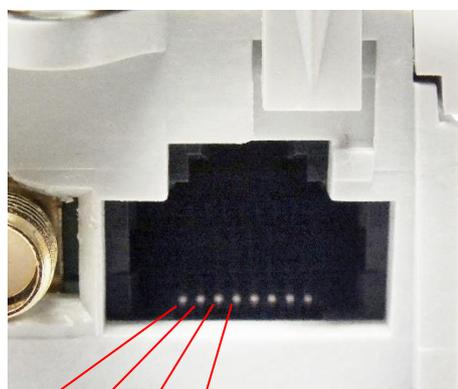

WM-E8S modem in internal terminal enclosure – with SIM-LED board is on top

2.1 Configuration cable / connection

Use the RJ45 connector for meter connection (for RS232 or RS485 connection) or serial connection (in RS232 mode) for configuration to the PC.

The pinout of the device's RJ45 port can be seen below.

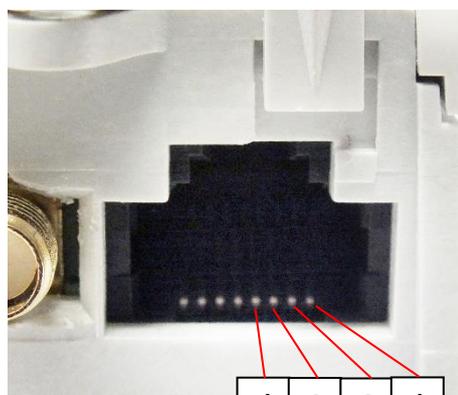RS485 2- or 4-wire connection:

Configure the modem for RS485 meter connection – 2-wire or 4-wire mode:

PIN #5: RX/TX N (-) – for 2-wire and 4-wire connection

PIN #6: RX/TX P (+) – for 2-wire and 4-wire connection

PIN #7: TX N (-) – for 4-wire connection only

PIN #8: TX P (+) – for 4-wire connection only

8	7	6	5

Serial RS232 connection:

PIN #1: GND

PIN #2: RxD (receiving data)

PIN #3: TxD (transmitting data)

PIN #4: DCD

Make serial connection from the modem to a PC or a meter by wiring RJ45 connector's Pin #1, Pin 2, and Pin #3 – optionally pin nr. #4.

4	3	2	1

2.2 Prearing to start the device

Step #1: In powered off status, ensure that the plastic terminal cover (marked by „I") is placed on the device enclosure („II") before continue.

Step #2: An active SIM card (2FF type) must be inserted to the modem's SIM holder. Take care to the direction of insertion (follow the hints of the next photo). The proper orientation / direction of the SIM can be seen on the product sticker.

Step #3: Connect the wired serial cable to the RJ45 connector (RS232) according to the pinout above.

Step #4: Attach an external LTE antenna (800-2600MHz) to the SMA antenna connector.

Step #5: Add ~85-300VAC or 100-385VDC power voltage to the AC/DC titled connector and the device will starting its operation immediately.

⚠️ **Caution! Please consider the following, ~85-300VAC or 100-385VDC electric shock hazard inside the enclosure! DO NOT open the enclosure and DO NOT touch the PCB or its electronical parts!**
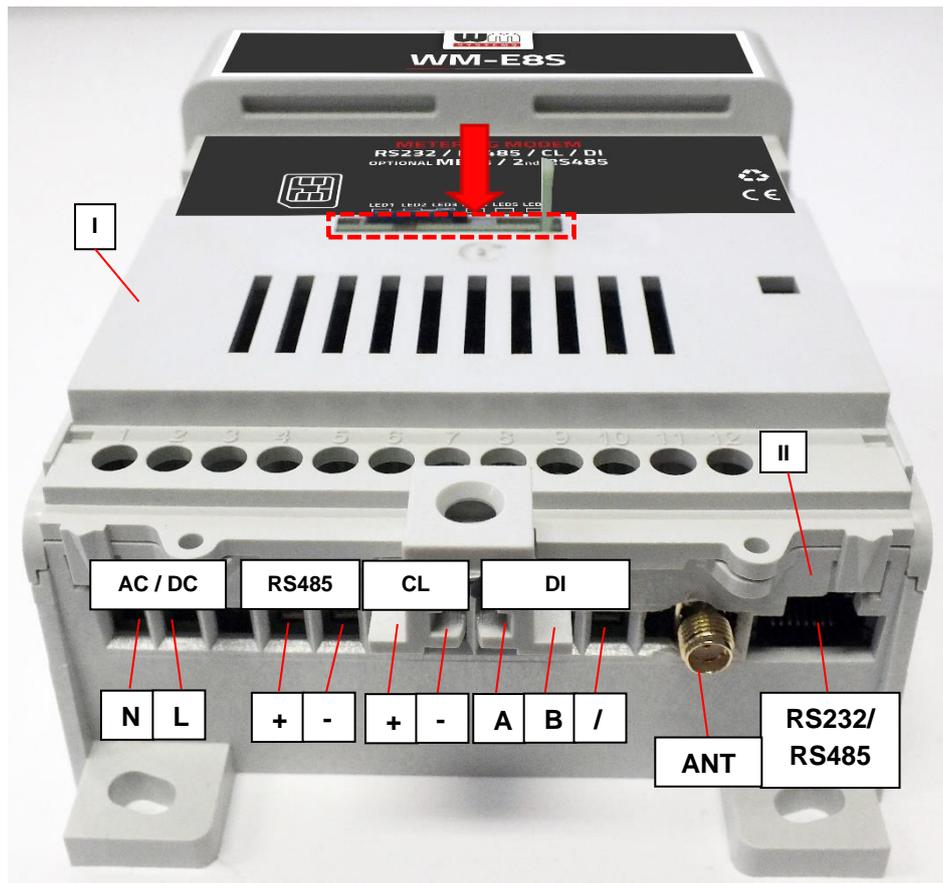
* Instead of optional, alternative RS485 terminal connector shown in the picture, the modem can be ordered with an Mbus interface also.

AC/DC: connect ~85..300VAC or 100..385VDC power

/: GND of Digital inputs (DI)

RS485: Instead of the secondary (left terminal block) RS485 port you can order MBUS port (order option)

<u>**SAFETY CAUTION!**</u>

The IP52 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.

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 the 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 device and it's 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.

2.3 Status LED signals

*At the first power-on - during charging of the supercapacitors - **LED 3** starts flashing quickly by **green**, while **LED 6** blinks once every 2 seconds by **green**.*

*After a few minutes, when the device is charge has been finished the **LED3** will be changed to blank. Then the device is starting, ready for configuration and for normal operation. This is indicated by the described LEDs operation according to operational / normal operating conditions.*

OPERATION LED SIGNALS - <u>IN CASE OF CHARGING SUPERCAPACITORS</u>

LED	Description
LED 3	When the devices at first switched on, during the charging progress the **LED 3** flashing quickly by **green**. In this mode any other LEDs are inactive. Wait until the device is charged, which will be indicated by changing the LED signals.
LED 6	Indication of normal operation. The **LED6** blink once every 2 seconds by **green**.

OPERATION LED SIGNALS – <u>IN CASE OF NORMAL OPERATION</u>
<u>Factory default LED signals:</u>

In the case of charged supercapacitors, the following LED operation applies.

LED identifier	Events

LED 1
GSM / GPRS status
	• **During** network **registration**: led is *active*
	• **During** network **searching**: *blinking once per second*
	• When **connected to the network** and the **IP connection** is okay: *blinking twice per second*
	• When the mobile **network** access technology was **changed**: *quick flashing will be relied:*
	    ○ 2G → *2 flashing per second*
	    ○ 3G → *3 flashing per second*
	    ○ 4G LTE → *4 flashing per second*
	• If **there is no available cellular network** detected: the led will be **blank**
	• **During the CSD call and IP data forwarding, the LED is ligthing continuously**

LED 2
SIM status / SIM or PIN failure)
	• Continuously lighting, until the device is not on the cellular network and RSSI cannot be detected (SIM okay)
	• When the **SIM PIN is** okay: led is **active**
	• If there is **no SIM** detected or **SIM PIN is wrong**: *blinking once per second* (slow flashing)
	• **The RSSI (signal strength) value is signed also by this led. Flashing by "N" times in every 10-15 seconds, depending on the RSSI refresh period. The RSSI value can be 1,2,3 or 4 on the current cellular network.**
	The numbers of RSSI flashing is different on every available network technology, by the following:
	    ○ **on 2G network:**
	        ○ **1 flashing: RSSI >= -98**
	        ○ **2 flashings: RSSI between -97 and -91**

	○ **3 flashings: RSSI - between 90 and -65** ○ **4 flashings: RSSI > -64** ○ **on 3G network:** ○ **1 flashing: RSSI >= -103** ○ **2 flashings: RSSI between -102 and -92** ○ **3 flashings: RSSI - between 91 and -65** ○ **4 flashings: RSSI > -64** ○ **on 4G LTE network:** ○ **1 flashing: RSSI >= -122** ○ **2 flashings: RSSI between -121 and -107** ○ **3 flashings: RSSI between -106 and -85** ○ **4 flashings: RSSI > -84** ○ **on LTE Cat.M1 network:** ○ **1 flashing: RSSI >= -126** ○ **2 flashings: RSSI between -125 and -116** ○ **3 flashings: RSSI between -115 and -85** ○ **4 flashings: RSSI > -84** ○ **on LTE Cat. NB-IoT (Narrow Band) network:** ○ **1 flashing: RSSI >= -122** ○ **2 flashings: RSSI between -121 and -107** ○ **3 flashings: RSSI between -106 and -85** ○ **4 flashings: RSSI > -84**
LED 3 **E-METER status**	**In normal operation** (in case of charged supercapacitors), the **LED is inactive** - The LED is **only active during DLMS communication**
LED 4 **E-METER RELAY status**	**By default, the LED is inactive** **The LED only turns on during M-Bus communication**
LED 5 **MBUS status**	**By default, the LED is inactive** **In case of transparent communication** and during configuration, the **LED flashes**
LED 6 **FIRMWARE status**	**Normal operation indication:** flashes once every 2 seconds by **green** - In case of a firmware update, the distinct LED indication is not currently implemented.

Over the factory defaults, the operation and the sequence of the LED signals can be changed by the **WM-E Term®** *configuration tool, in* **Standard Meter Interface** parameter group.

There you can define one of the following functions of the leds (LED1..LED6) according the next list:

Selectable LED status (in the WM-E Term program)
Not used
GSM / GPRS status
SIM status (wrong PIN flashing slow or without SIM)
E-meter status
E-meter relay status (not usable here)
M-Bus status (not usable here)
Firmware status
Network status and access technology
Meter status with IEC polling
AMM (IEC) client state (not usable here)

LED SIGNALING DURING FIRMWARE UPDATE

During the firmware upload, the LEDs indicate normal operation - there is no distinct indication during the firmware update.

After installing the firmware, all LEDs will be turned off. Then the modem will be automatically restarted with the new firmware.

The start-up is indicated by fast **green** flashing of **LED3** for 15 seconds. It takes 2-3 minutes to start, before the modem becomes available on its interfaces.

From then on, during the operation of the device, the LEDs continue to flash according to the listed states.

2.4 Configuration the device

Step #1: Download the **WM-E TERM** configuration software to your computer by this link: https://m2mserver.com/m2m-downloads/WM_ETerm_v1_3_80.zip

Step #2: Unpack the .zip file into a directory and execute the **WM-ETerm.exe** file. (The Microsoft® .Net Framework v4 must be installed on your computer for the usage).

Step #3: Login to software with the following creditentials:

Username: ***Admin***   Password: ***12345678***

Step #4: Choose the **WM-E8S** and push to the <mark>**Select**</mark> button there.

Step #5: On the left-side of the screen, click on **Connection type** tab, choose **Serial** interface.

Step #6: Add a name for the profile at the **New connection** field and push to the <mark>**Create**</mark> button.

Step #7: In the next window the connection settings will appear, where you have to define the connection profile parameters.

Step #8: Add the real **COM port** of the device connection according to the available serial/USB port, the **Baud rate** should be ***9 600 bps*** *or greater*, the **Data format** should be ***8,N,1.***
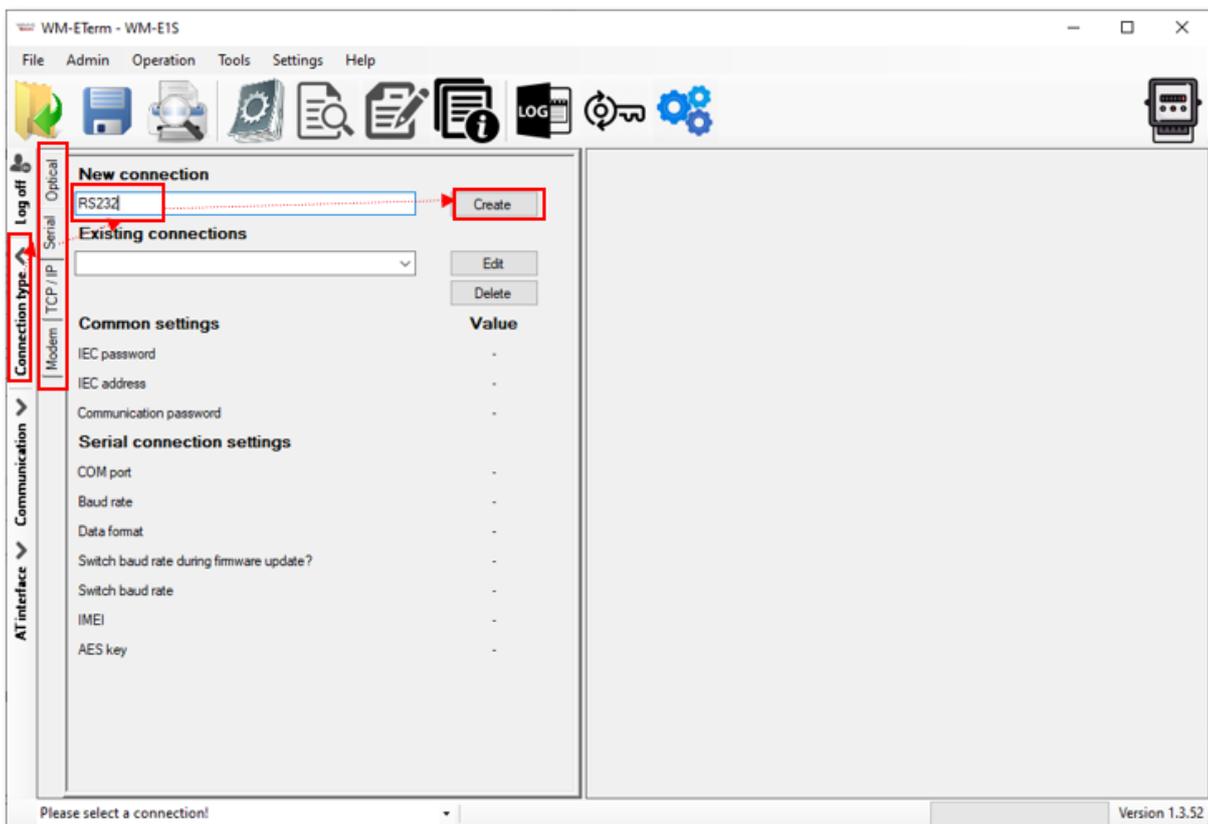
Step #9: Click on <mark>**Save**</mark> button to save the connection profile.

Step #10: Choose the saved connection profile at the bottom of the screen to connect to the modem before readout or configure the settings!

| Please select a connection! ▾		Version 1.3.43

Step #11: Click on the **Parameters Read** icon in the menu to readout the data from the modem. Then all parameter values will then be read out and visible here by selecting a parameter group. The progress will be signed by the indicator bar on the right-bottom side of the screen. At the end of the readout push to the **OK** button.

Step #12: Then select the required parameter group and push to the **Edit values** button. The editable parameters of this group will appear on the screen (bottom side).

Main settings:

Step #1: Choose the **Parameter read** icon to connect to readout the current settings of the modem.
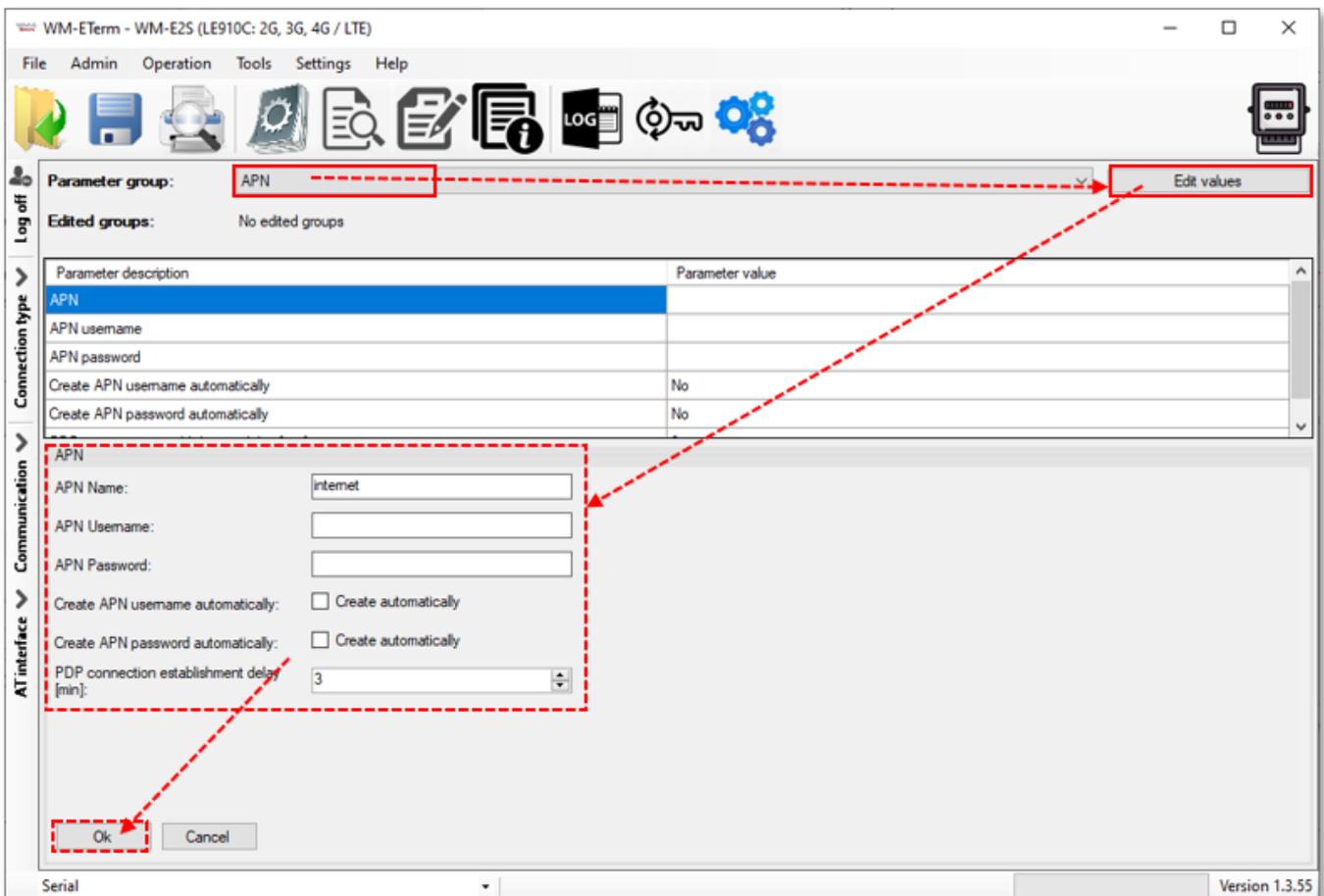
Step #2: Choose the **APN** *parameter group*, and push the **Edit settings** button. Add the ***APN server name*** value, if necessary give the ***APN username*** and ***APN password*** values and push the **OK** button.

Step #3: Then choose the **M2M** *parameter group,* and push the **Edit settings** button. At the ***Transparent (IEC) meter readout port,*** give the ***PORT number***, by which you try to readout the meter. Add this ***PORT number*** to the ***Configuration and firmware download***, which you want to use for remote parameterization of the modem / for the further firmware exhange.

Step #4: If the SIM uses a *PIN code*, then choose the **Mobile network** p*arameter group*, and add the ***SIM PIN*** to the field. Here you can change the ***Frequency band*** *settings* to ***4G only*** or **LTE to 2G** (for fallback feature), etc. You can also select here a dedicated mobile network provider (auto or manual). Then push to the **OK** button.

Step #5: For configuring the **RS232 serial port** and transparent settings, open the **Trans. / NTA** parameter group. Basic device settings are the **Multi utility mode**: *transparent mode*, **Meter port baud rate**: from *300 to 19 200 baud (or use the default 9600 baud)*, **Fixed 8N1 data format** (by checking the box at the meter). Confirm the setting with the **OK** button.

Step #6: For configuring the **RS485 parameters**,

- Open the **RS485 meter interface** *parameter group*. Here configure the **RS485 mode** to the right value according to the cable version you use (*2-wire* or the recommended ***4-wire***).
- In case of using the **alternative RS485 terminal block** connector, the setting must be **2-wire**! (Otherwise it will be not working.)
- **The operation of the RJ45 port's RS485 interface and the terminal block RS485 interface are parallelised!**
- **In case of using RS232 mode only, disable the RS485 port here.**

Push the **OK** button.

Step #7 (optional): If you have ordered the device with **Mbus** interface, for the settings of the transparent Mbus port, choose the **Secondary transparent** parameter group and set the **Secondary transparent mode** to value **8E1**.

Step #8: When you have finished, choose the **Parameter write** icon to send the changed settings to the modem. The status of the configuration process can be seen at the bottom of the screen. At the end of the upload, the modem will be restarted and operating according to the new settings.

Further optional settings:

- To refine the modem handling choose the **Watchdog** *parameter group*.
- Save the current last good configuration at the **File/Save** menu item. Later you can distribute this setting (file) to another modem device by one click.
- Firmware refresh: choose the **Devices** menu, **Single Firmware refresh** item by choosing the appropriate firmware file (with .dwl file extension).

Attention! Ask our sales about the available newest firmware!

2.5 Connecting to a meter

After the successful configuration, disconnect the RS232 cable from your PC and use an RS232 cable or a RS485 cable (2-wire or 4-wire) from the RJ45 port to the meter – which has the primary RS485 port also.
Optionally you can also use the secondary RS485 port (of the terminal block).
Any further settings can be perfomed by hints of the WM-E Term User Manual:
https://www.m2mserver.com/m2m-downloads/WM-E-TERM_User_Manual_V1_93.pdf

2.6 Signal strength

Check signal strength of the cellular network in the *WM-E Term*® software **Device Information** menu or by using the icon. Check RSSI value (at least it should be yellow – which means average signal strength – or better if it is green). You can change

the antenna position while you will not receive better dBm values (the status must be readout again for refresh).

Device information				
RSSI: -69 dBm	Modem vendor:	N/A	Operating system revision and ID:	WM-E2S E2S_STD_BL B2.60
	Serial No. of the modem chip:	130194270000342434	Telit modul and firmware version:	LE910-EU1 20.00.413
Access technology: 2G	Firmware version:	V2.4.41	IP address:	N/A
	IMEI:	356611075541684	IMSI:	N/A
	ICC:	8936200003250172672	LTE bands:	N/A
	Engine ID:	N/A		
	Cellular operator name:	Hungary Pannon/Telenor - 21601	Cellular network provider:	21601
	Access technology:	GSM	Network status:	N/A
	EC-IO:	N/A	RSRQ:	N/A
	RSRP:	N/A	SINR:	N/A
	Transmitted power:	N/A	Cell ID:	N/A
	Battery voltage:	N/A	Battery capacity:	N/A
	IP address:	N/A	DHCP:	N/A
	Subnet mask:	N/A	MAC address:	N/A
	Gateway address:	N/A		

RS232   Version 1.3.43

2.7 Power outage management

The firmware version of the modem is supporting the LastGASP feature, which means that in case of power outage the modem's supercapacitor allows to operating further the modem for a short time (a couple of minutes).

In case of detecting the loss of mains/input power source, the modem generates a "POWER LOST" event and the message will be immediately transmitted as an SMS text to the configured phone number.

In case of recovering the mains/power source the modem generates the "POWER RETURN" message and sending by SMS text.

The LastGASP message settings can be enabled by the WM-E Term® application – in the **AMM (IEC)** *parameter group* part.

Chapter 3. Support

If you have a technical question regarding the usage You can find us on the following contact possibilities:

Email: support@m2mserver.com

Phone: +36 20 333-1111

3.1 Support

The product has a identification void which has important product related information for the support line.

Warning! *Damaging or removing the void sticker means the loss of product guarantee.*

Online product support available here: https://www.m2mserver.com/en/support/

3.2 Product Support

The documents and information related on the product are available here.
https://www.m2mserver.com/en/product/wm-e8s/

Chapter 4. Legal notice

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Warning

Any fault or upcoming error during the software upload/refresh can lead to the device breakdown. When this situation happens call our specialists.