

User manual for WM-E2S® electricity metering modems



Rev: 2.75.8

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Document specifications

This documentation was made for presenting the installation and configuration steps of the **WM-E2S[®]** (Itron[®] meter compatible) energy metering modem.

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Hardware Type/Version:	WM-E2S[®] modems for the ITRON ACE6000, ACE8000, EM600 (E620), SL7000 electricity meters
Hardware Version:	V 2.0 TELIT xE910 / V 3.0 TELIT xE910 / V 5.0.2 QUECTEL xG9x / V 5.10 TELIT xL865 / V 5.20 QUECTEL EC200x
Firmware Version:	for v2 and v3 version Telit Modem: V 2.4.51 / V 2.5.64 TLS for v5 version Quectel Modem: from V 5.3.46.0 Standard / TLS up to V 6.0.8.0
WM-E Term[®] config. software version:	V 1.4.27
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Chapter 1. Introduction

The **WM-E2S®** modem is suitable for remote reading of electricity meters on LTE-based cellular networks.

You can save money by using our modem, because there is no further need of manual readout of the meter systems.

Wireless communication

The 4G LTE version has 2G fallback feature (or 3G/2G fallback for request). Therefore, in case of outage or inaccessibility of the 4G network it is communicating further on the 2G (or 3G) network.

Some LTE Cat.M / Cat.NB versions also having 2G “fallback” feature.

The modem can be also configured to GSM-CSD connection to initiate the CSD data calls.

The modem includes a removable SIM card and it has independent operation from mobile service providers.

The modem has been designed to provide transparent data link and data readout from the E-meter and to transmit data to the HES / central server.

The communication module is a part of the Smart Metering concept. The device provides a SIM-card independent- and mobile operator independent solution.



Design and installation

This modem was especially developed for 3-phase **Itrón® ACE6000, ACE8000, EM600 (E620)** and **SL7000** energy meters, which can be connected to the meter by its design and its connection interface and can be installed into the meter enclosure's terminal cover. The modem can be snapped into the terminal cover of the meter.

The device can be also installed as an external modem – due an optional 35mm DIN-rail adapter (order option) - which allows to fix/mount the device.

Operation properties, features

The modem is suitable for reading the meter's actual and stored consumption values, access the recorded event log, read the load profile data, and read or modify the

parameter set of the meter - remotely. The date readout from the meter takes place in "PULL" mode, when the modem provides transparent communication between the meter and the electricity provider's measurement center (HES).

Data is sent via the mobile network corresponding to the selected module.

The modem can be accessed remotely through the cellular network (by using its cellular communication module) and it is able to send data on the Internet by using an APN.

Connection options

The interface connection can be via:

- Serial RS232 port (RJ45)
- or
- RS485 port (RJ45)

Power source

The device can be powered from DC power (8-16V DC) of the meter's RJ45 cable connection (10V DC).

Supercapacitor

The device can be equipped with internal supercapacitor part (order option), which prevents the intermittent power cuts also help decrease power peaks. This electronic part enables to keep the module in operation during small power outages and corresponding LastGASP immediate SMS notification of the outage (to the HES).

After a few minutes of charging, the supercapacitor becomes capable of normal operation and even frequent data transmission.

When the supercapacitor will be exhausted (after a power outage), it must be charged before usage. Therefore the modem can be automatically started after this and able to send data again.

Configuration

The modem is configurable via TCP/UDP port remotely (or via local serial connection) and operating on the wireless network by configuring the APN, username and password (APN information is provided by your local mobile operator).

All settings can be configured with our WM-E Term® administration software. The configuration is possible by one device or for a group of devices.

The WM-E Term® tool is password protected and user management is also possible. The configuration tool requires Windows® platform to be executed, and it is available in English, German, French, Spain, Czech, Polish and Hungarian language as well.

Firmware refresh

The WM-E Term® also provides safe firmware change for one device or a group of devices – by locally or remotely.

Security

The modem performs HW identification during firmware replacement and when starting its operation. The modem is protected against installing a 3rd party made or a modified firmware. Likewise, the modem cannot be operated from a 3rd party made or a modified firmware due to its integrity and compatibility checking.

The external flash- and the internal flash content of the device are encrypted.

This product's firmware is encrypted and with a unique AES-256 encryption key therefore its prevented against uploading or using any 3rd party made or modified firmware.

data from other devices. The modem cannot be upgraded by any other 3rd party firmware – its safe.

The modem uses a special and unique communication protocol. The data communication with the meter and the meter readout is also safe due to the applied double checksum when recepting any communication package or the data telegram. The control port of the modem is encrypted by AES - optional.

The modem can be configured to be used with a unique configuration password and an optional communication password during its operation to increase the security to high level.

The TLS protocol prototected firmware can be chosed and uploaded (by request) to increase the security to maximum.

Status and notification

The modem is continuously monitoring the mobile network and device communication health, and can send status information (signal strength, QoS).

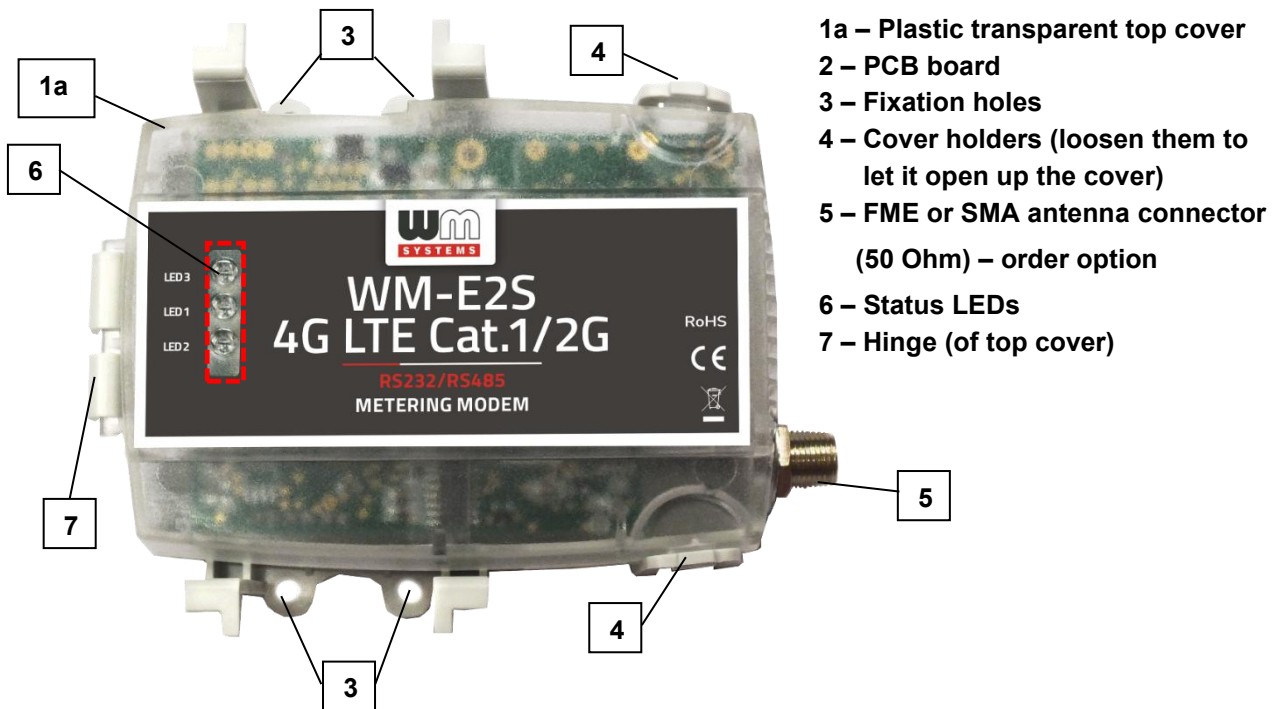
By the configured features, the device is able to send SMS alarm notification, Last Gasp notification – depending on the used cellular network and mobile operators (if the SMS notification is not disallowed on the network, then it can be used).

Certificate

According to the CE certification, the modem complies with the Radio Equipment Directive (ReD) standard 2014/53/EU – part 3.a, 3.b, 3.c and ReD Cybersecurity part 3.3(d). The product is RoHS and CE certified.

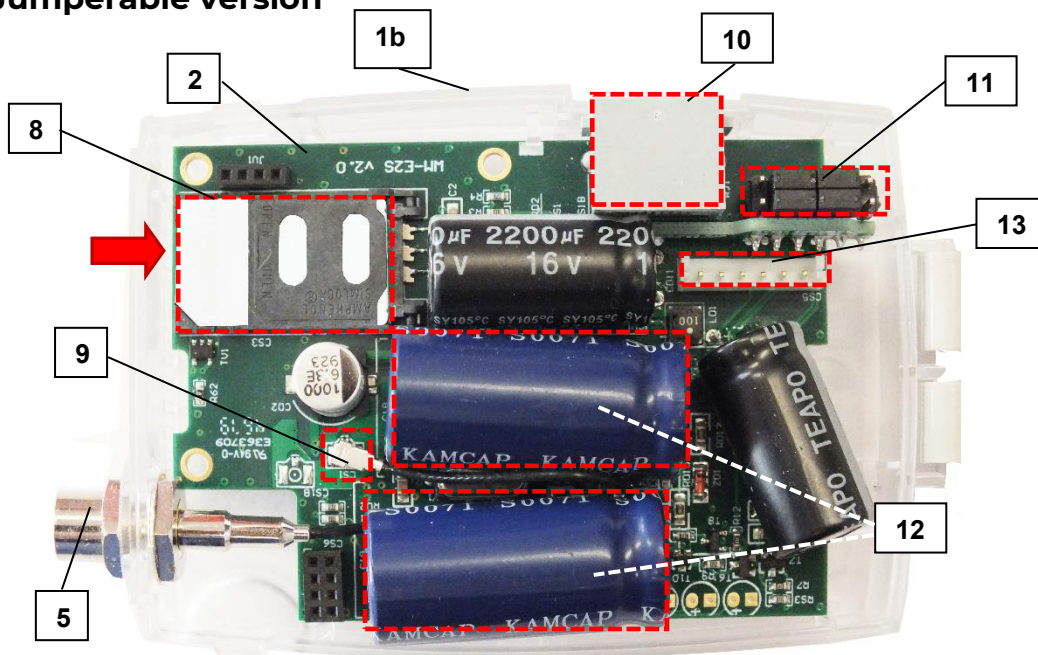
Chapter 2. Connections

2.1 External outfit

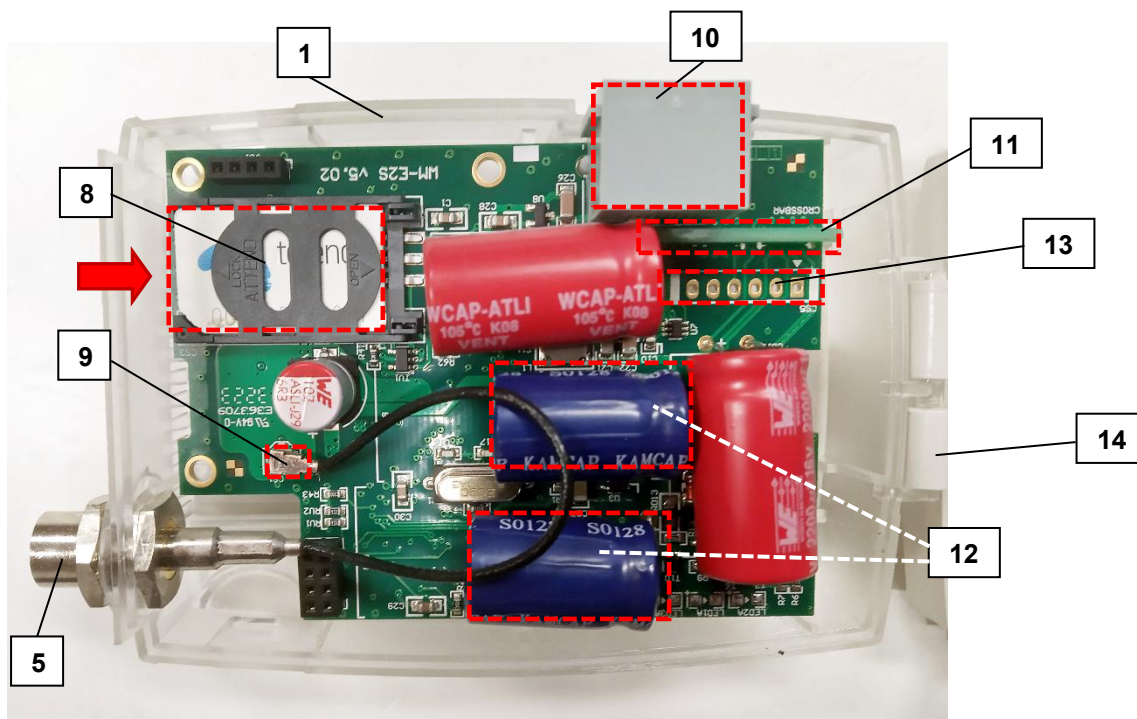


2.2 Internal connections

2.2.1 Jumperable version



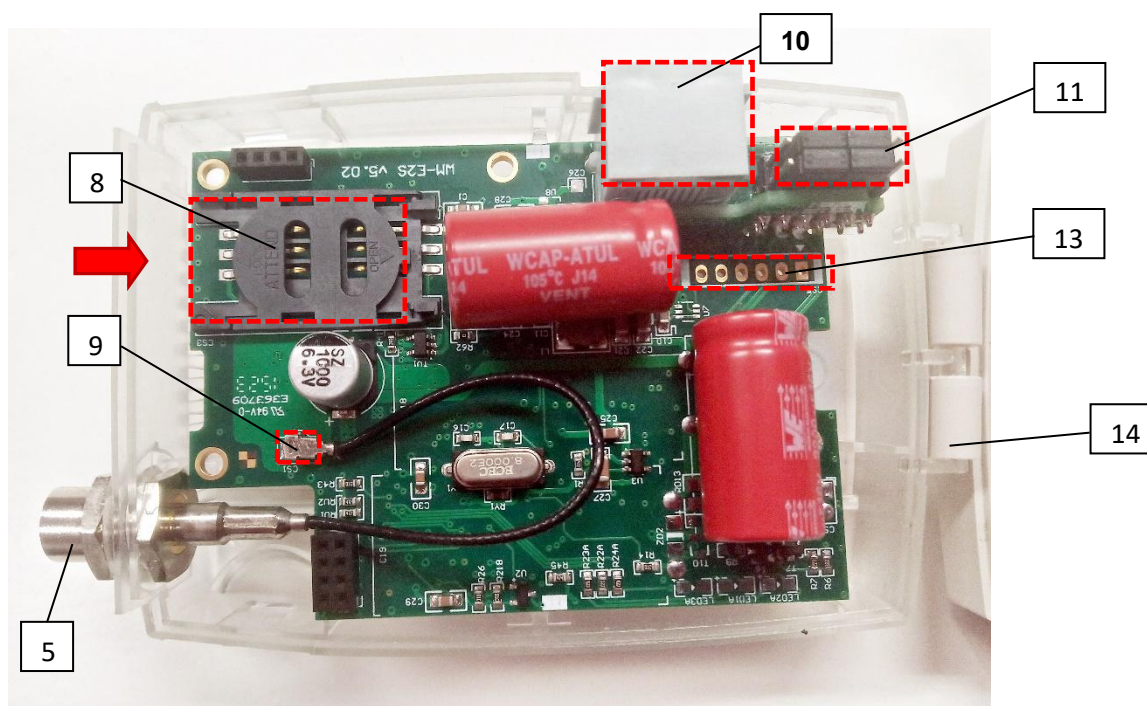
2.2.2 Jumperless version



- 1b – Plastic transparent bottom cover part (white)
- 8 – SIM card slot (push left and spin up)
- 9 – Internal antenna wire (with U.LF – SMA / FME connection)
- 10 – RJ45 connector (data and DC power)

- 11 – Jumper crossboard (for the proper meter communication / compatible cable pinout)
- 12 – Supercapacitor parts
- 13 – External connector (do not use!)
- 14 – Holder of the top cover (part of modem enclosure)

2.2.3 Modem without supercapacitor



2.3 Jumper version – port mode choose

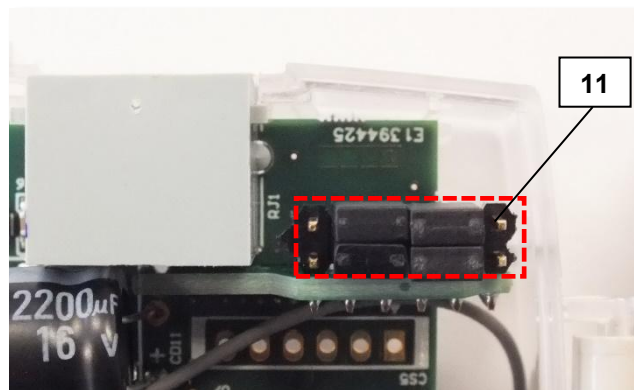
The modem can be ordered in a version with or without a jumper. The advantage of the jumperable version is that the RS232 or RS485 mode can be free to set by the requirements. While the jumpreless version provides a fixed / non-changeable connection – which must be selected at ordering - according to the required meter type - i.e. a fixed RS232 or RS485 connection should be chosen for the exact meter type. (To choose the right model and pinout, contact our Sales!)

The jumperable version is delivered pre-jumpered, but it may be necessary to use another method to connect the electric consumption meter. Therefore, the RS232/RS485 data connection settings of the modem must be checked and, if necessary, jumpered before use, by short-circuiting the corresponding pins of the jumper panel (11) next to the RJ45 connector (using the help shown on the jumper panel) - perform the jumpering.

RS232 mode selection

All the 4 jumpers are located on the inner two lines of pins and the bottom line pins are free (as it can be seen in the photo).

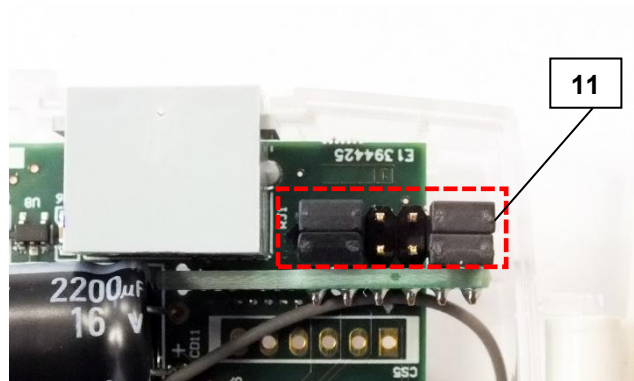
The modem is configured to RS232 mode.
Further data connection settings can be initiated by the WM-E Term® software.



RS485 mode selection

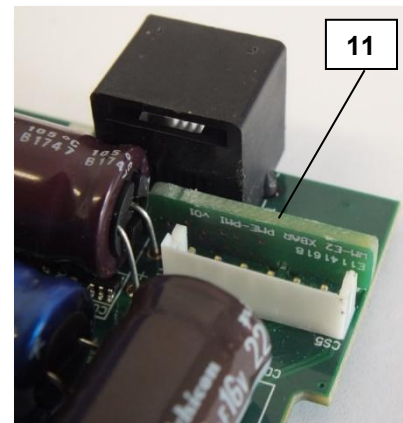
All the 4 jumpers are located on the two sides, in two lines of pins and the top line pins are free. The jumpers must be used as it is shown in the picture.

The modem is configured to RS485 mode.
Further data connection settings can be initiated by the WM-E Term® software.



2.4 Jumperless (crossboard) version

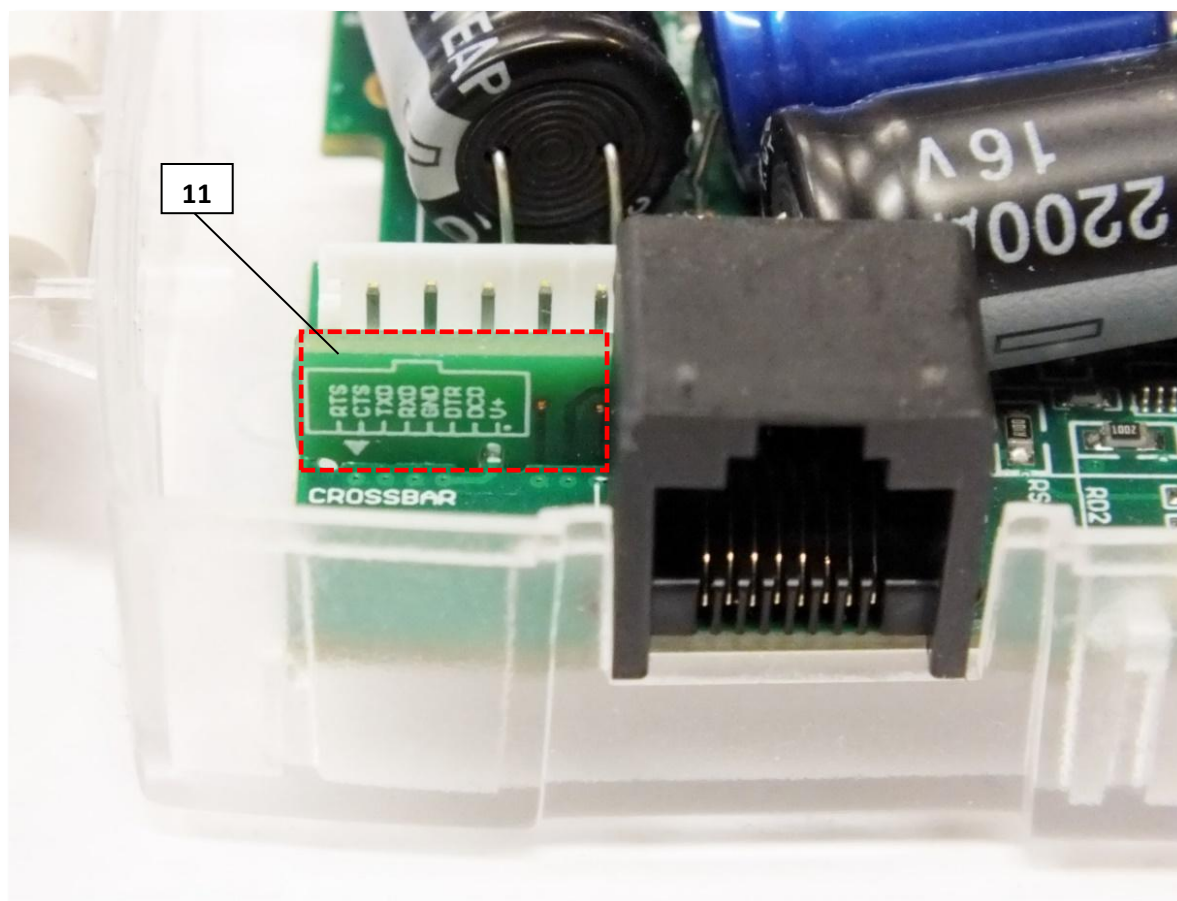
The modem can be ordered in jumperless version (crossboard soldered to the PCB, instead of a jumper board). It has a pre-defined connection according to the meter type. Therefore, there is no need for manual jumpering of the device, all settings can be done by the WM-E Term® configuration software directly – or even by remotely.



We can provide crossboard version in the modem for the following meter types:

- ITRON® ACE6000, ACE8000 meters
- ITROL® EM600 (E620) meters
- ITROL® SL7000 meters
- Landis+Gyr® ZMG416 meters
- PME-PMI® meters

or we can make for any other meter (ask our sales)



Jumperless, crossboard version

ltron® meter - RS232 Connector pinout

RJ45	Pin 1	+ 10 V	Pin 5	TX-RS232
	Pin 2	RTS-RS232	Pin 6	GND
	Pin 3	CTS-RS232	Pin 7	DTR-RS232
	Pin 4	RX-RS232	Pin 8	DSR-RS232
Power Supply	10 Volt Power Supply 			

ltron® meter – RS485 Connector pinout

RJ45	Pin 1	+ 10 V	Pin 5	TxD_P-RS485
	Pin 2	RxD_N-RS485	Pin 6	GND
	Pin 3		Pin 7	TxD_N-RS485
	Pin 4	RxD_P-RS485	Pin 8	
Power Supply	10 Volt Power Supply 			

RS485 interface description

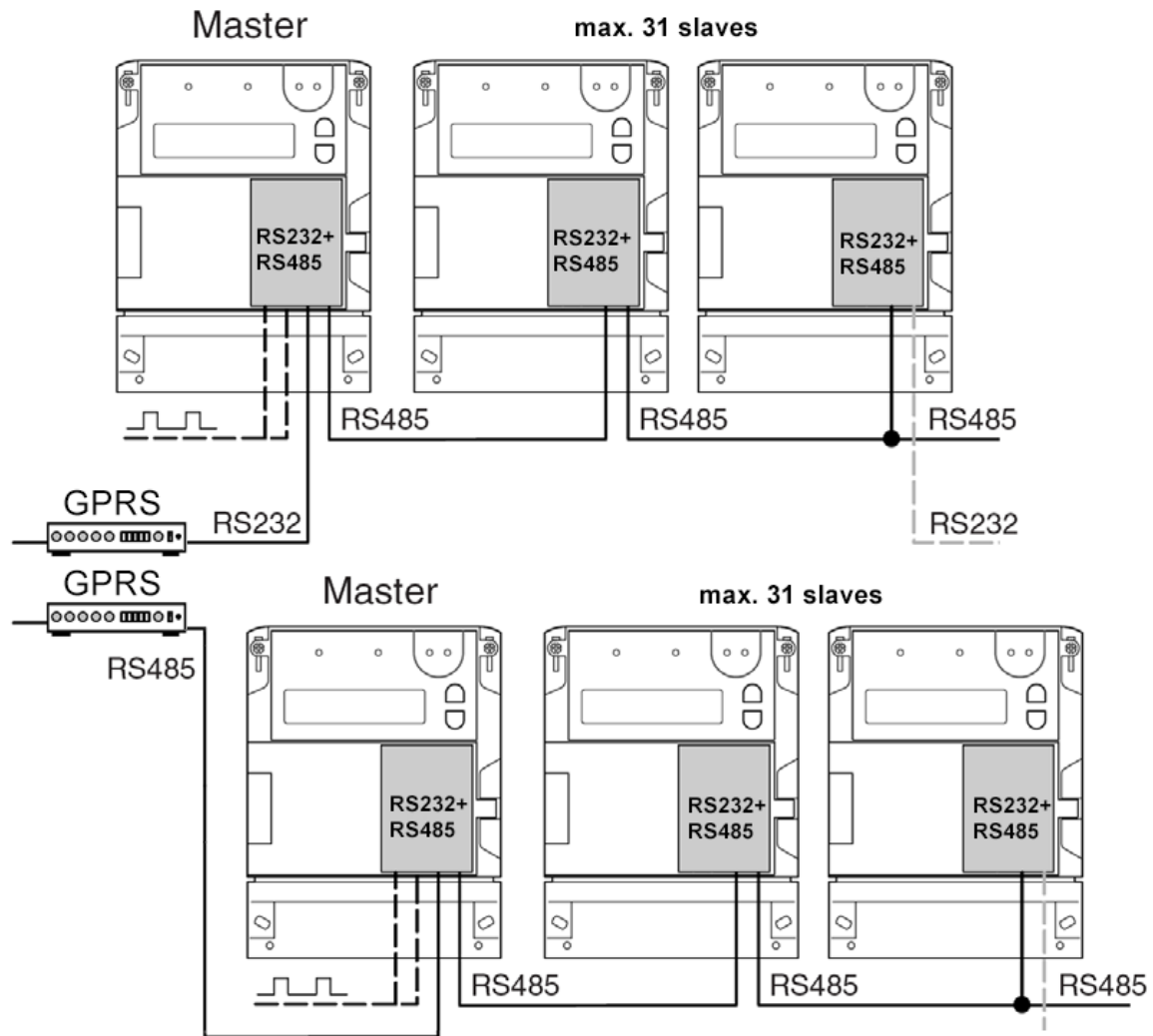
Symmetric, serial and asynchron 4-wired cable connection. The master in 2-wire cable mode, which can be configured by configuration software (provided) - Standard ISO-8482. Maximal 31 meter can be connected.

The maximal data transmitting speed rate is 9 600 bps. Maximal wire length:

<=550 m, max. 9,600 bps, max. 31 meter

<=1000 m, max. 9,600 bps, max. 15 meter

Attention! External power surge protection is needed to apply in case of using longer cabling. If the RS485 bus is not properly closed, this can disturb the normal/proper operation.



2.5 Installation steps

Step #1: Remove the top cover or the meter (18) by loosening its screws.

Step #2: Ensure that the modem is not powered – remove the RJ45 connection cable (14) from the meter side.

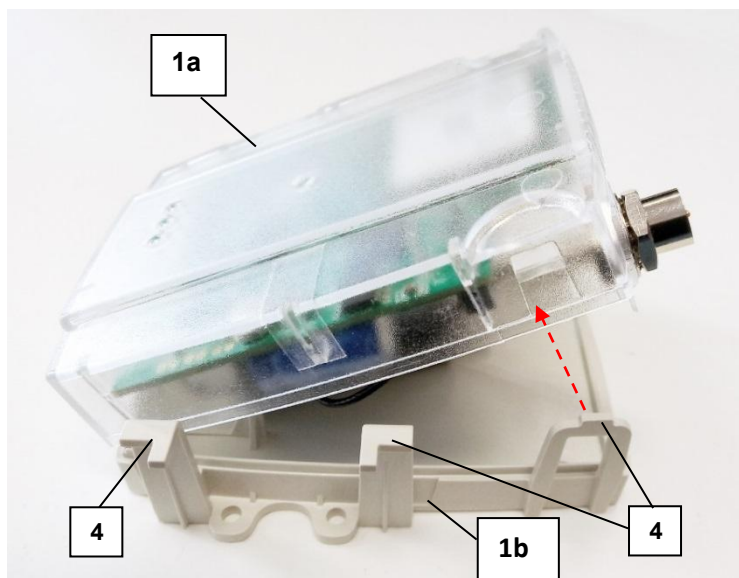
Step #3: Loosen the cover holders (4) of the plastic enclosure's white part (1b) at the edges, while pull the plastic top cover (1a) - from right-down to left-up direction – from the antenna connector side, and open the cover, until the PCB (2) will be free to touch.



Step #4: Now the PCB (2) will be on the left side – see the photo.

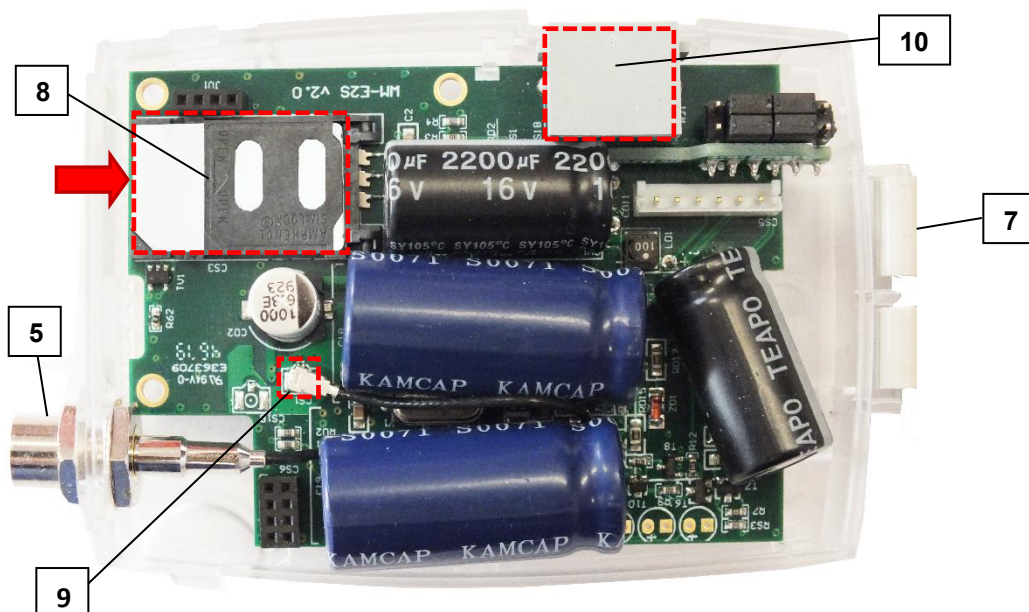
Step #5: Slide and open up the plastic SIM card holder (8) - push from left to right, and spin it up until release.

Step #6: Insert a replaceable and active SIM card (with APN) into the SIM-holder (8) - the chip looks down, the cutted edge of the SIM is oriented to outside – to the antenna connector).



Step #7: Close down the SIM holder (8) and push it from right to left until it is fastened.

Step #8: Ensure that the internal antenna U.FL - black - cable is connected to the U.FL connector (9)!



Step #9: Close back the PCB-side of the enclosure (transparent plastic) part (1a) to the white plastic part (1b) from left to right - according and taking patient of the proper closure at the ears (4) - until the cover will be fastened (you will hear a click sound when it is closed).

Step #10: The data connection between the modem and Itrón® meter is assured by the RS232/RS485 interface (RJ45, signed with nr. 10 on the figure), then it can be used with the grey RJ45 cable - provided.

Step #11: Place and insert the modem into the meter (under the meter's terminal cover) and fix the device to the meter – according to the meter's installation manual.

(By optionally the modem can be ordered with DIN-rail adapter (which is fixed to the bottom side of the modem enclosure), therefore you can also use the modem as an external device).

Step #12: Mount the FME (or SMA) antenna (15) to the antenna connector (5) and the communication antenna (15). (If you are using an SMA antenna, then you can use a SMA-FME converter adapter (17) to mount the SMA antenna to the FME connector).

Step #13: For configuring the modem, connect the device to the computer by an RJ45 cable and the USB/RS232 DONGLE adapter, and configure the jumper positions to RS232 modem.

Important! *Note, that the modem directly can be configured only in RS232 mode. For RS485 mode configuration you should use an RS485 USB-Dongle (order option).*

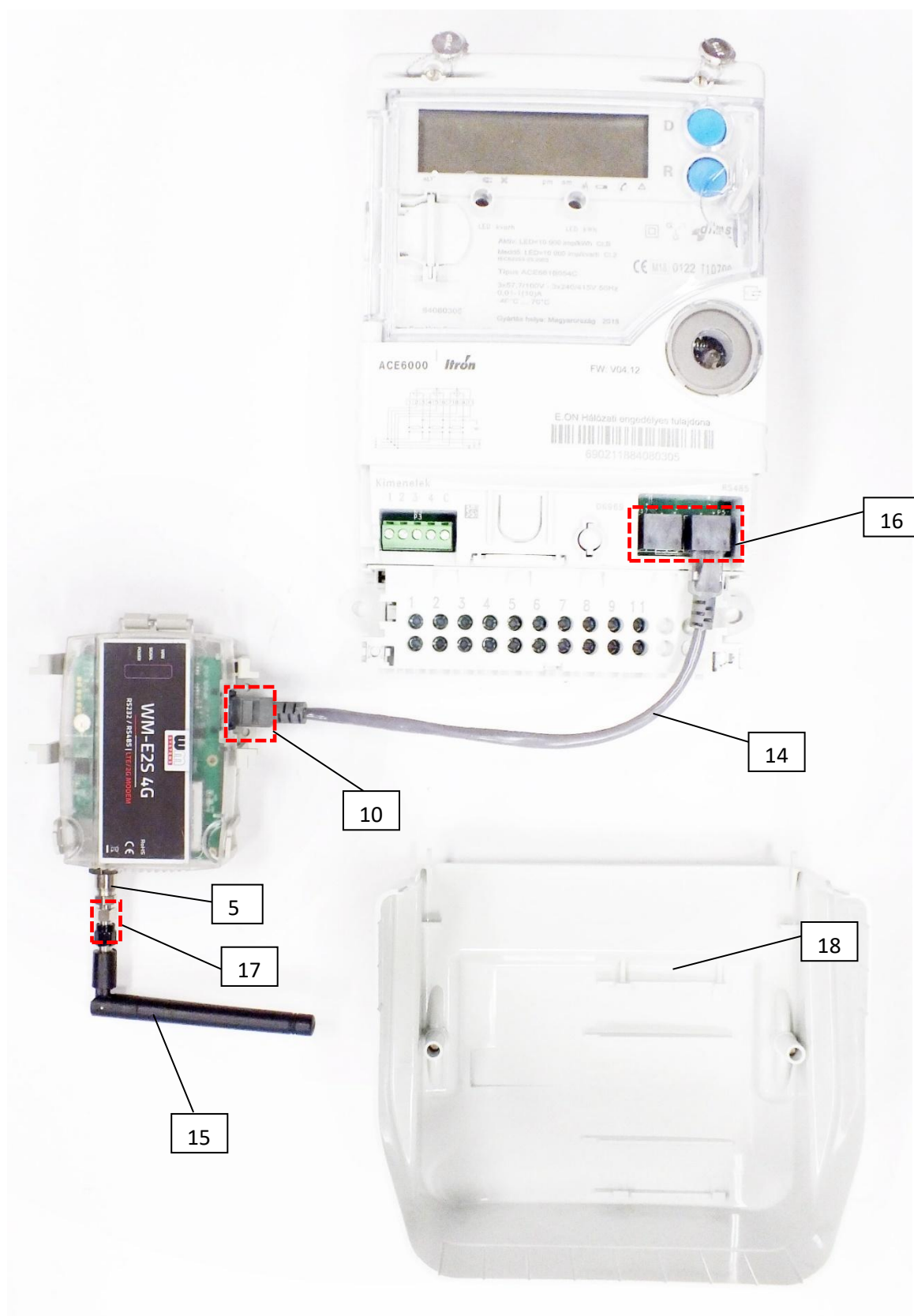
Step #14: Configure the modem with the WM-E Term® software.

Step #15: After the configuration, do the jumpering (11) according to the meter requirements. (Close the jumper pairs according the hints of the PCB):

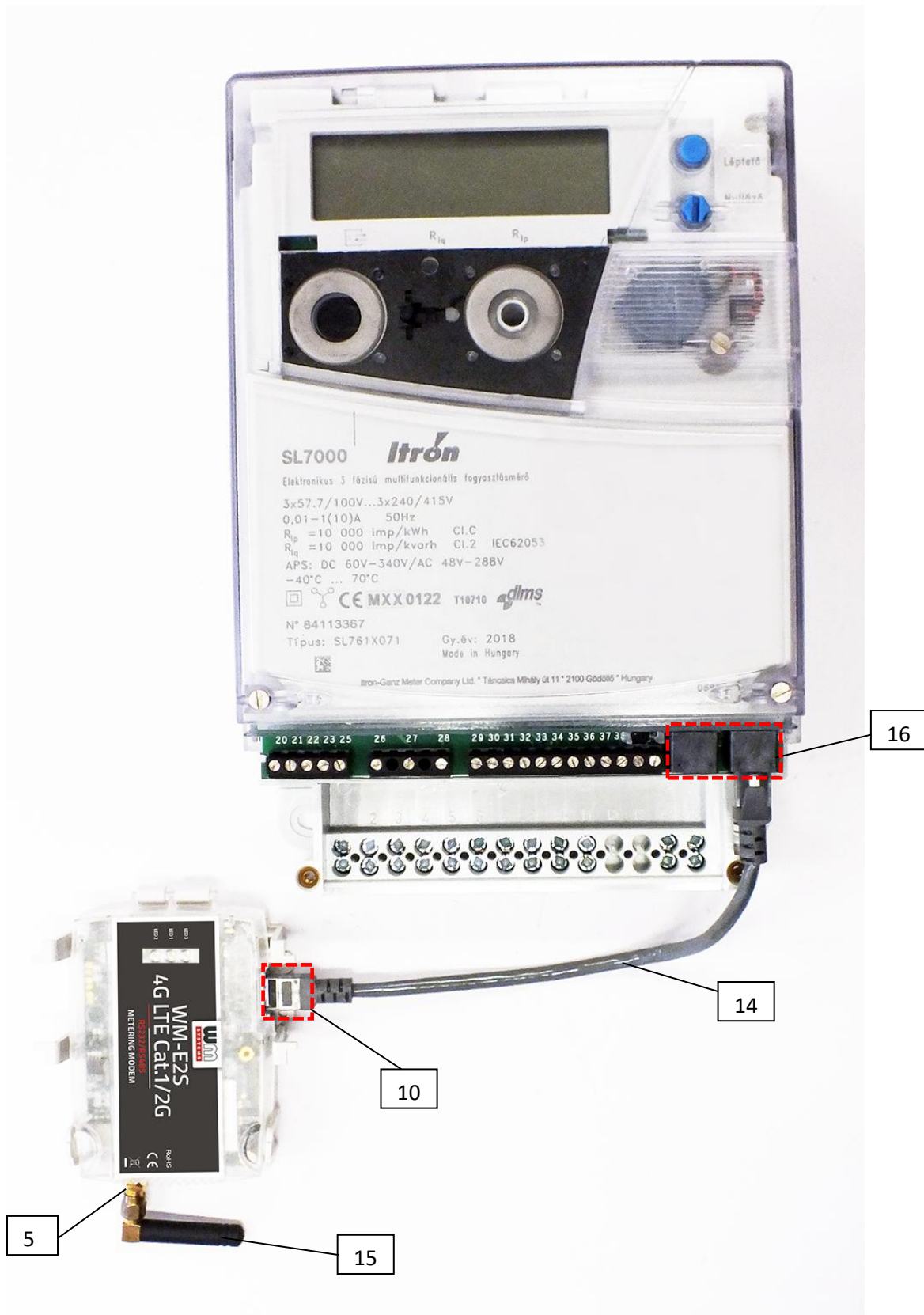
- RS232 mode: the jumpers are closed on the internal pin pairs, the edge pins are free
- RS485 mode: the edge pin pairs are closed by jumpers, the internal pins are free

(If you are using a crossboard version instead of a jumper board, then the jumpering is not necessary to make.)

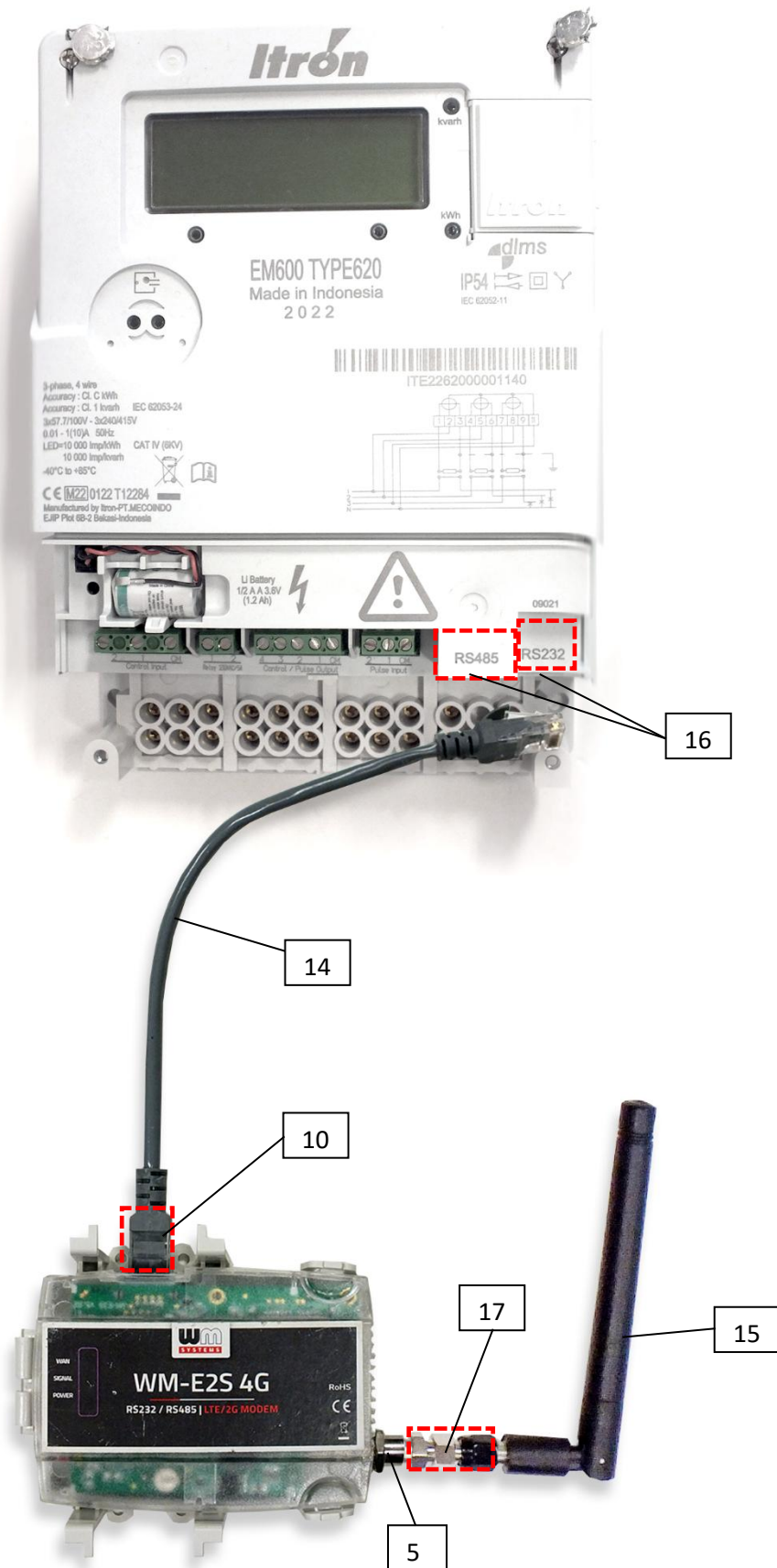
Step #16: Reconnect the RJ45 cable to the meter. (If the modem will be connected on RS485 port with the meter, then the jumper settings must be modified to RS485 mode!)



ITRON ACE6000 ↔ WM-E2S modem connection



ITRON SL7000 ↔ WM-E2S modem connection



ITRON EM600 (E620) meter ↔ WM-E2S modem connection

Step #17: The data connection between the modem and the Itron® meter can be initiated on the RS232 or RS485 interface by using 1:1 cable connection, which can be made by using grey RJ45 cable (14) of the modem – connect it to the RJ45 port (10).

Step #18: Connect the other side of the RJ45 cable to the meter's RJ45 connector (16) according to the meter type, and readout port of the meter (RS232 or RS485). Then the modem will be powered by the meter. It begins its operation, check LED signals.

Step #19: Place back the meter's terminal cover (18).

2.5 Status LED signals

If the WM-E2S® modem was not supplied by power source since a long time, it needs to be charged before the usage/installation. The charge takes about ~2-5 minutes if the supercapacitor was exhausted / discharged.

OPERATION LED SIGNALS - IN CASE OF CHARGING SUPERCAPACITORS

LED	Description
LED 3	During the charging of the exhausted supercapacitors, only green upper LED will flashing quickly. Only this LED is active during the charge. Wait until the device will be fully charged.

Important! The LED number we've listed here are the same as can be found on the PCB LED title (as LED3 (**green**, top), LED1 (**blue**, middle), LED2 (**red**, bottom)).



At the first power on - during the charge – the **green** LED is flashing quickly. After a few minutes the LED will be blank, then qill be flashing quickly again. When the **green** LED will be flashing slowly and the other LEDs will be lighting according the NORMAL operation, then the modem will be charged completely and it will be ready for congfiuring and to operate.

OPERATION LED SIGNALS – IN CASE OF NORMAL OPERATION

Factory default LED signals:

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

LED identifier	Events
LED 3 E-meter status	- During the transparent TCP/IP meter communication: twice per second. - At finish of the transparent communication: led is blank. - According the IEC meter status: the LED will be active. - In case of configuring the Multi Utility mode: led will be active.
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 and 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 lighting continuously
LED 2 SIM status / SIM failure or PIN failure	- Continuously lighting, until the device is not on the cellular network and RSSI cannot be detected (SIM okay) - After SIM initialization, when SIM PIN is okay: led is active - If there is no SIM detected or SIM PIN is wrong: blinking once per second The RSSI (signal strength) value is signed also by this led. - In case of invalid RSSI value or AT command timeout: LED continuously flashes slowly (lighting for 2 seconds, quick blank and it repeats) In case of valid RSSI value (Received Signal Strength Indicator) the LED is 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
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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..LED3) 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
Firmware status
Network status and access technology
Meter status with IEC polling
AMM (IEC) client state (not usable here)

LED status	Events
Firmware status	• When the modem firmware was started, the led will be turned on (lighting). • When the meter $\leftrightarrow$ modem connection was built up then the led will be flashing 2x per seconds.
Network status and access technology	• Network registration: <i>the led is active (lighting).</i> • During network searching: <i>the led is flashing 1x per seconds.</i> • When it was connected to the network and the IP connection is okay: <i>the led is flashing 2x per seconds.</i> • If the mobile access technology was changed – it will be signed by quick flashing: ○ 2G $\rightarrow$ 2 flashing / seconds ○ 3G $\rightarrow$ 3 flashing / seconds ○ 4G $\rightarrow$ 4 flashing / seconds • If there is no available network: <i>the led is inactive (blank)</i>
Meter status with IEC polling – Meter status during the IEC communication	• When the modem $\leftrightarrow$ meter starting the communication, <i>the led will be flashing 1x per seconds.</i> • When the meter is answering to the modem during the communication, it will <i>turns on the led.</i> • When the modem $\leftrightarrow$ meter cannot communicate with each other, <i>the led will be turned off.</i>
AMM (IEC) client state	• By general or in case of closing the modem $\leftrightarrow$ EI client communication the <i>LED is turned off.</i> • In case of building up the modem $\leftrightarrow$ EI client** connection the <i>led is flashing shorty 1x per seconds (then 1 second of pause will be progressed between the flashings)</i> • In case of EI client** login request attempt– <i>the led is flashung 1x per seconds.</i> • When the connection was built up successfully between the EI client** $\leftrightarrow$ modem– <i>the led is active (lighting).</i>

**The EI client is the transparent output TCP channel from the modem to the EI server

LED SIGNALING DURING FIRMWARE UPDATE During the firmware uploading the LEDs are operating as it is normal – there is no significal LED signal for the FW refresh progress.

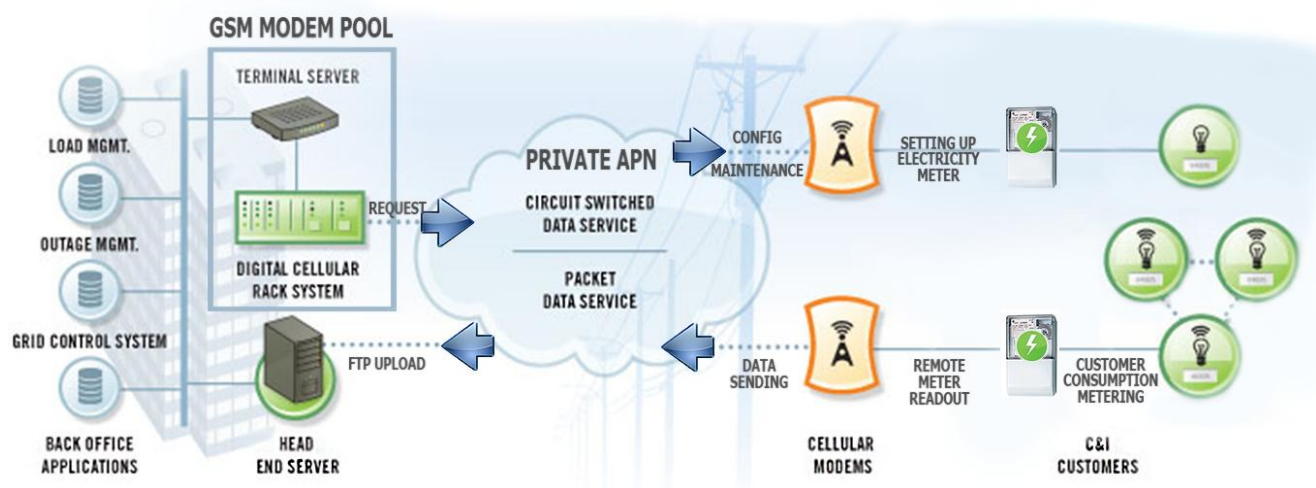
After the FW installation all LEDs will be blank. Then the modem will be restarted automatically, and will be operating by the new firmware.

At starting the **LED3** will be flashing quickly by **green** for 15 seconds. The starting requires 2-3 minutes while the modem will be available on its interfaces.

Afterall, the LED will be operating ordinary as it is listed in the LED operation behaviour description.

2.6 Operation of the modem

The complete readout and data sending mechanism to the HES centre and the other direction for the configuration and maintenance tasks can be realized on the defined paths.



There is another option and meter data sending mode to initiate a remote readout automatically in pre-defined intervals. It is also possible to start the data sending in case of different events (e.g. removal of meter cover, incoming SMS message from the centre).

In this situation, the modem is connected to the mobile data network only during the time of the data transmission.

The device needs to be connected to cellular network for the proper operation.

2.7 LED operation during CSD call

During the CSD call two operation option types can be used:

- a.) When the meter would be read out / configured in transparent mode
- b.) When modem configuration / firmware refresh is attempted to make

When the meter would be read out / configured in transparent mode:

- The GSM / GPRS status configured LED will be continuously lighting during the CSD call.
- The e-Meter status configured LED will be operating according the CSD call status by the following:
 - Will be flashing twice per seconds from the connection attempt until closing the connection
 - If the meter interface is not configured to 9600 baudrate, then it will be lighting continuously from the connection attempt until closing the connection
 - After the connection close the LED will be switched off

When modem configuration / firmware refresh is attempted to make

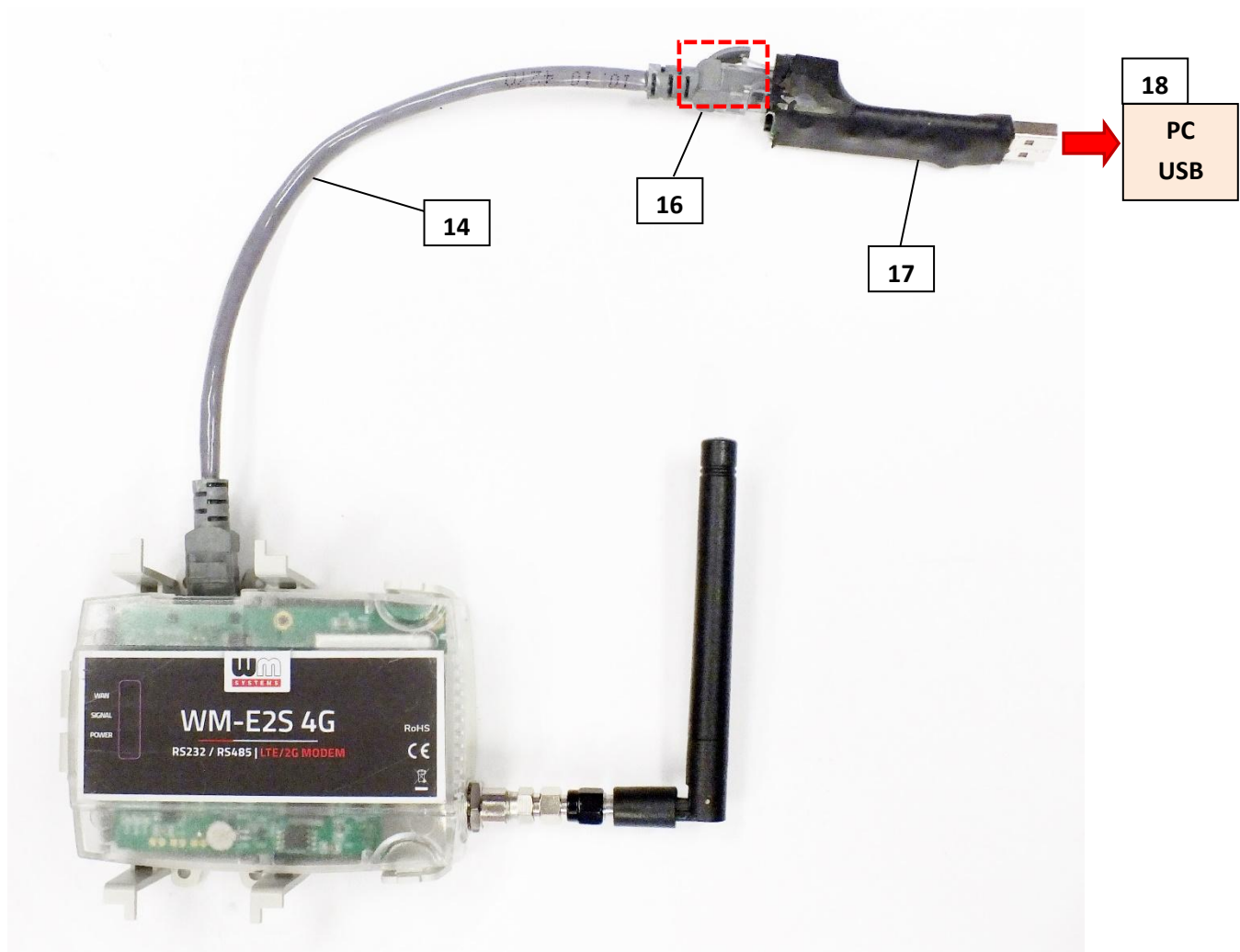
- The GSM / GPRS status configured LED will be continuously lighting during the CSD call.
- The other LEDs will not change their operation because of the CSD mode

Chapter 3. Modem Configuration

3.1 Configuration

The modem is uploaded with default configuration, but before the first usage the current settings should be checked and the configuration should be updated (e.g. APN name, etc.). The WM-E Term® software is usable to perform the modem settings.

Before the configuration, you have to remove the meter $\leftrightarrow$ modem RJ45 connection cable's (14) meter side (16) from the RS232/RS485 port of the meter. Connect the modem by the USB/RS232 DONGLE® adapter (17) to your computer's USB port by following the next hints.



Important! Note that until the configuration the modem is not connecting to the meter, therefore it cannot readout parameter values through the RJ45 interface during the configuration.

The configuration can be made by CSData call (by selecting a mobile access technology which uses 2G network). Or you can do it through mobile internet (TCP) connection – therefore you don't need to connect the modem to your PC.

Important! *During the configuration, the power supply of the modem is assured by this converter board, on USB connection. Some computers can be sensitive for USB current changes. In this case you should use an external power supply with special connection.*

For the serial cable connection configure COM port settings of the connected computer according to the modem serial port properties. In the Windows® it can be found in the **Start / Control Panel / Device Manager / Ports (COM and LTP)** menu Properties:

- *Baud: 9600*
- *Databits: 8*
- *Parity: No*
- *Stopbits: 1*
- *Bandwidth control: no*

Warning!

If the COM port will not be visible after connecting the device to the computer, and you cannot find the COM port number in the Windows Device Manager, then you need to install the proper driver - *FTDI VCP* – to your computer, which can be downloaded from here:

<http://www.ftdichip.com/Drivers/VCP.htm>

For the proper communication of the modem, you have to configure the APN settings of the SIM – as PIN code, APN, username and password. These all can be configured by using the WM-E Term® software through the RJ45 connection.

Alternatively, you can enable there the **PDP by EPS** option, when the mobile operator provided APN name will be used.

In case of using the Chip SIM (eSIM), enable the **eSIM** option there.

For the successful operation of the communication module it is necessary to have appropriate signal strength.

If you want to readout the meter parameter values during the PC-modem connection, after the RJ45-configuration you made, then you should select a different configuration port to the meter as TCP/IP or Optical, etc.

For newer modem firmware versions it is mandatory to use the **Communication password** for the modem configuration. Ask your sales about the default password of your modem type! You can check the written password by the Show option at right.

(Note that you can change the communication password of the modem anytime by

choosing the  icon from the menu.)

Over the parameter settings of meter, modem and communication, etc., you can also test the modem communication and execute AT-commands on the modem by the WM-E Term[®] configuration program - see *AT commands* description for the description useful commands.

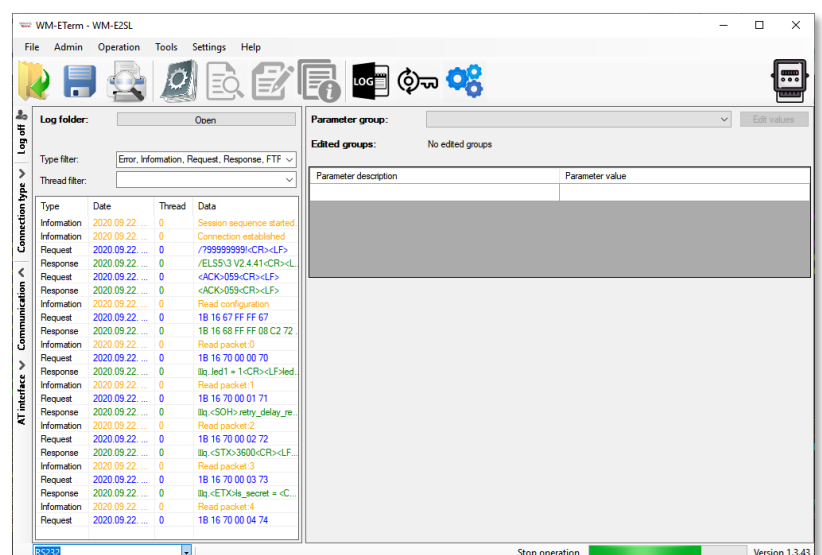
3.2 Configuring the modem by WM-E Term[®]

The Microsoft .NET framework runtime environment is required on your computer.

For modem configuration and testing you will need an APN/data package enabled, active SIM-card.

The configuration is possible without a SIM card, but in this case the modem is performing restart periodically, and some modem features will be not available until the SIM card is inserted (e.g. remote access).

If the WM-E2S[®] modem was not supplied by power for a long time, it needs to be charged



before usage. It takes about ~2-5 minutes to charge if the supercapacitor was exhausted / discharged.

Download the WM-E Term® software to your computer by a browser from the following link: https://www.m2mserver.com/m2m-downloads/WM_ETerm_v1_4.zip

Extract the .zip file to a directory and execute the **WM-ETerm.exe** file.

The configuration software is supporting the usage of user accounts and the password change feature.

You can login to the software by a password. Read the **WM-E Term® User Manual** for further details!

WM-E term User Manual:

https://m2mserver.com/m2m-downloads/WM-E-TERM_Manual_for_WM-E2S_WM-E2SL_V1_97B.pdf

Basic configuration file for Itron meters – with RS232 or RS485 mode:

<https://m2mserver.com/m2m-downloads/WM-E2S-STD-DEFAULT-CONFIG.zip>

3.3 Parameter configuration

For first load the sample configuration file in the WM-E Term® software.

Then reconfigure the device's parameters – as cellular communication settings (APN, APN username, password and PIN code, network usage method, communication port - RS485 settings).

After all, you have to send the settings by the WM-E Term® software to upload to the modem.

Read the **WM-E Term® User Manual** for parameter description details!

Main settings:

1. Choose the **Parameter read**  icon to connect to read out the current settings of the modem.

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.

3. Choose Then 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 exchange.

4. If you have to use *SIM PIN* then choose the **Mobile network parameter group**, and add the **SIM PIN** to the field. Here you can change a **Frequency band** to **4G only** or **LTE to 2G** (for fallback feature), etc. You can also select here a dedicated mobile network provider (auto or manual). Push then the **OK** button.

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 115200** (or use the standard **9600**), **Fixed 8N1** data format (by checking the box at the meter). Confirm the setting with the **OK** button.

6. For configuring the RS485 parameters, open the **RS485 meter interface parameter group**, configure the **RS485 mode** to the right value:

- **2-wire** – means half duplex 2-wire pinout
- **4-wire** – means full duplex 4-wire pinout
- **Disable** – RS485 will be used automatically (for modem versions which are having only RS232 cable, it is recommended to configure this mode).

**In case of firmware v2 this parameter is used automatically - controlled by the current firmware. Only in case of firmware v5 can be used the configured parameter setting.*

7. 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 options

- To refine the module 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!

3.4 Configuring from CSD connection

If the modem restarts due to an incorrect configuration, it is possible to access it with a CSD call. Its operation can be fine-tuned in the WM-E Term software with a value that can be specified in the **PDP connection delay** field in the **APN** parameter group. For more information, see Chapter 3.1 of the *WM-E Term User Manual*.

3.5 Data control direction (DCD) feature

In case of using the Itrón® SL7000 meters or other Itrón® meters (through RS232 connection), you can use the **DCD** feature to declare the direction of the data control – according the following parameter setting.

For configuring the **DCD** feature, choose the **RS485 interface settings** parameter group.

Note that it is valid for the RS232 port!

DCD parameter values:

- **Fix 0** (provides logical 0 value as result for the connected meter)
- **Fix 1** (provides logical 1 value as result for the connected meter)
- **Standard**
- **Inverted** (opposite direction)

3.6 Automatic network reconnection

If the mobile network provider drops the modem from the cellular network due to the device's network inactivity, there are available parameters if these are set, then automatic and periodical connection rebuild can be caused.

If the network provider sends a message to the modem that the data connection has been lost, the connection will be restored automatically. If you do not send a message, you can choose from these two workarounds to follow:

a.) Active mode - Use periodical ping, set the ping:

1. For setting this, set the **Watchdog** parameter group's ping parameters as **Ping IP-address, Number of ping retries, Ping wait-time (for reply)** and **Wait-time (for next)**.
2. If there is no ping response, it reconnects to the network after the time interval specified in the **Seconds, GPRS connection closed and restored after this time** parameter.

Attention! *In case of frequent ping using, the data traffic will be higher, but the chances are higher that the device will remain on the cellular network.*

b.) Passive mode - If you don't use the ping - set the connection retry:

1. For setting this, use the **Watchdog** parameter group's **Seconds, gprs connection closed and restored after this time** parameter.
2. Here you can define that after the network drops out the modem, how long does the modem wait before trying to reconnect to the mobile network again. Ask your mobile provider about the offered settings.

Attention!

If there is less data traffic and there is no ping configured, the device may not stay on the network for a long time. If you set this parameter to a low value that can cause frequent network reconnections.

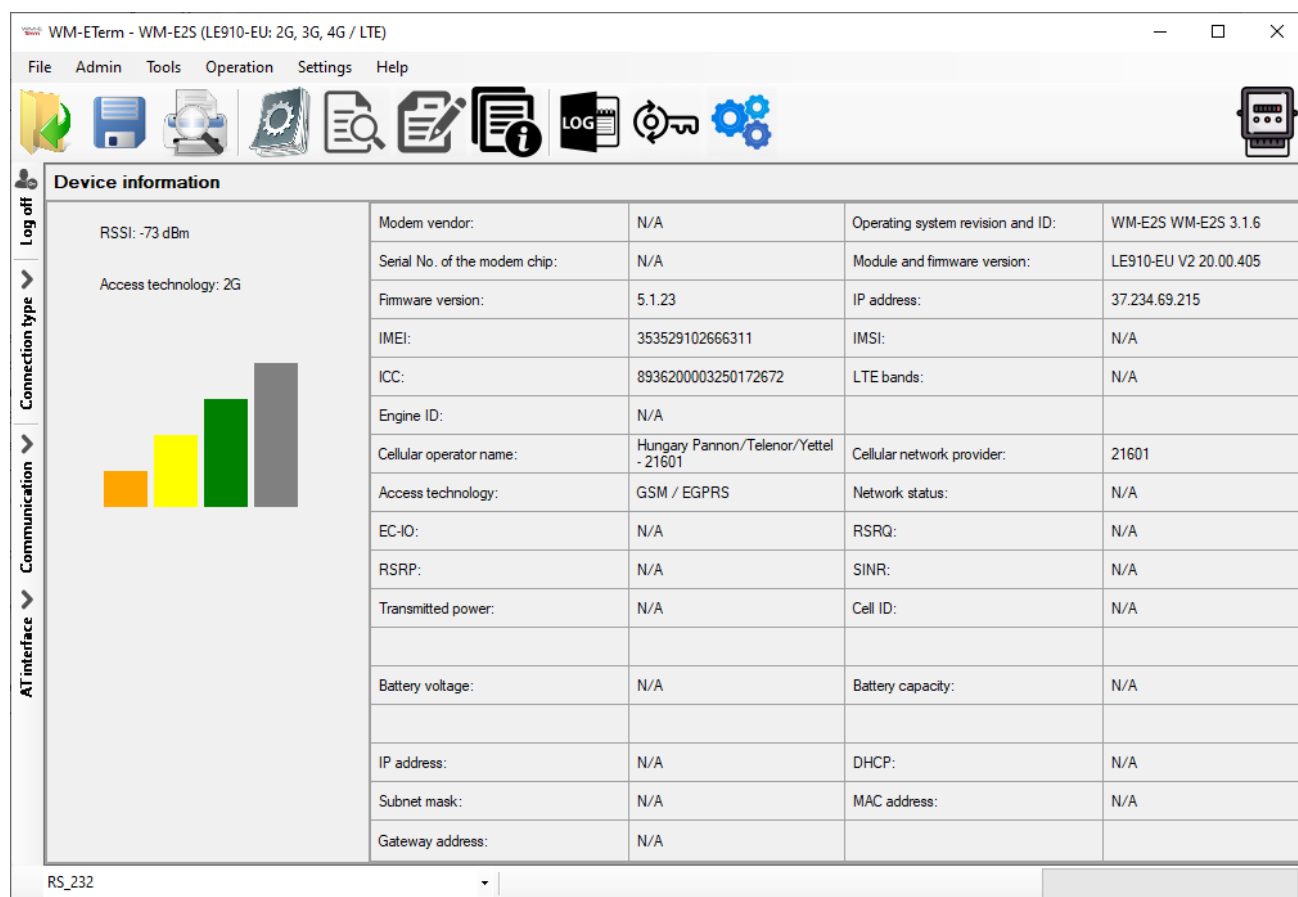
Therefore under no circumstances should you set this value lower than what your mobile service provider recommends. (e.g. there are mobile network providers that limit the number of times a modem can logon to the network in a given time).

3.7 Signal strength

Check signal strength of the cellular network in the *WM-E Term*® software **Device Information** menu or by using the  icon. At the end of the process, the current status information will be updated.

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).



The screenshot shows the WM-E Term software interface. The title bar reads "WM-E Term - WM-E2S (LE910-EU: 2G, 3G, 4G / LTE)". The menu bar includes File, Admin, Tools, Operation, Settings, and Help. The toolbar contains icons for File, Admin, Tools, Operation, Settings, Help, and a mobile device icon. The left sidebar has a vertical menu with "Log off", "Connection type", "Communication", and "AT interface". The main window displays "Device information" on the left, showing RSSI: -73 dBm and Access technology: 2G, along with a bar chart. The right side of the window contains a table of device information.

Modem vendor:	N/A	Operating system revision and ID:	WM-E2S WM-E2S 3.1.6
Serial No. of the modem chip:	N/A	Module and firmware version:	LE910-EU V2 20.00.405
Firmware version:	5.1.23	IP address:	37.234.69.215
IMEI:	353529102666311	IMSI:	N/A
ICC:	8936200003250172672	LTE bands:	N/A
Engine ID:	N/A		
Cellular operator name:	Hungary Pannon/Telenor/Yettel - 21601	Cellular network provider:	21601
Access technology:	GSM / EGPRS	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		

At the bottom left, the status bar shows "RS_232".

3.8 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.

3.9 Restart the modem

There cannot be found a direct option for modem restart in WM-E Term. But it is very easy to push the modem to be restarted.

1. Choose any parameter from the read out values.
2. Change a parameter value
3. Push to the **Save** button.
4. Send the settings by **Parameters Write** icon to the modem.
5. At the end of the writing process, the modem will be restarted.
6. The restart of the device is signed by the **LED3**, which will be flashing quickly by **green** for 15 seconds. The starting requires 2-3 minutes while the modem will be available on its interfaces.
7. Afterall, the LED will be operating ordinary as it is listed in the LED operation behaviour description.

3.10 Two meter readout ports

Every WM-E modem has two ports for meter communication, configuration and FW updates. You can configure all the two to control their operation by its priority.

The first port is, the **Utility communication port for (Primary)**, which you can use for meter readout and configuration. This port has higher priority for meter readout over the secondary port, therefore the operation of this primary port will always override the secondary port's operation (e.g. if you configured these ports and when the meter will be read out via the primary port (**Utility comm. port**), then the secondary port's operation (**Customer comm. port**) will be hanging – e.g. meter reading – until the primary port is not finished with the current read out.

This prioritization at operation is not effecting the firmware updates or configuration processes of the modem.

The second port, the Customer communication port for (Secondary)* can be also used with lower priority for meter communication, configuration and FW updates.

Important! *The two ports should be set to different port numbers.*

This feature can be configured in the WM-E Term software in **Standard settings** mode, or you can also edit it in **Advanced settings** mode in the **M2M** parameter group.

Important! *Note, that this feature is available in modem firmware v5.3.4.1 or in newer firmware versions!*

3.11 Automatic protocol detect and switch

The **Data format for meters** value (E-Meter serial port) can be configured in the WM-E Term software in **Standard settings** mode, or you can also edit it in **Advanced settings** mode in the **Transp. / NTA** parameter group.

Over the usual data formats (as 7E1, 8N1, 7O1, 7N2, 8E1, 8O1, 8N2) you can choose the **'Auto'** mode setting.

In this case, the first data packet of the incoming connection is checked by the firmware. It will automatically decode the incoming communications and if it is detecting that as IEC protocol, then the modem will switch to data mode **7EI** towards the meter. In all other cases, the data mode remains at **8NI** mode.

Important! *Note, that this feature is available in modem firmware v5.3.4.1 or in newer firmware versions!*

3.12 Syslog feature

The Syslog feature is available starting from firmware version v5.3.48.

This feature can be used to retrieve historical information from the modem at the customer's site for troubleshooting or for investigating certain anomalies.

Syslog logging supports two functions:

- Developer syslog
- User syslog

The syslog entries have been divided into categories, which were defined based on the firmware's functions.

The Syslog feature can be downloaded from the following URL:

https://m2mserver.com/m2m-downloads/WM-ExS_Syslog_feature_Description_EN.pdf

The Syslog feature can be configured at WM-E Term, **Syslog** parameter group.

Chapter 4. AT command settings - description

(Configuring the Modem by AT commands)

4.1 General information about the commands

In this part of the documentation we have collected the standard Hayes™ AT commands which you can use for programming the modem manually with any terminal application.

During the configuration the modem accepts commands with upper or lower case characters. The modem accepting commands in N81 or E71 format.

When you are attempted to use AT commands for the modem, first you have to declare the modem interface and GPRS settings.

For the GPRS communication settings you can use the AT command syntax at table – Chapter 3. The AT commands and parameter values must be divided with semicomma: e.g. Command;answer;timeout(msec)

The minimal modem configuration settings for connectiong an Itrón® meter:

- AT+0 enabling the 9600,8,n,1 operation for the modem
- AT&W saving the settings

4.2 AT command set

The AT+ command can be used individually, these cannot be chained!

AT+ command	Description
ATA	The modem is receiving the incoming call – <i>local interface only</i> The modem answers for the call after ther third ringing.
ATD	Dial command – <i>local interface only</i> The modem connects to the network and performing a call to the defined phone number, e.g.: ATDT 12345 123456^m "D" = dial, "T" = tone (compatible mode), ^m = carrier return.
ATE	Commmand local Echo

ATE0	Local Echo off
ATE1	Local Echo on (echo)
ATH	Hang up command – <i>local interface only</i> The modem is disconnecting the dial connection.
ATI	Module identification (example for the answer: WM-E2 2G V2.44)
ATO	Return to online state command - <i>local interface only</i> The modem switches back from command mode to data mode
ATQ	Silent mode You can allow to the modem that it doesn't send the results
ATQ0	Silent mode off – it does NOT send the results
ATQ1	Silent modem on – it sends the results
ATV	Verbose mode (Turned off) means a number Text or numeric format.
ATV0	Verbose mode disabled: number
ATV1	Verbose mode enabled: text
ATX	Connection (CONNECT) result codes Generated code by the modem when connecting or hanging up the connection.
ATX0	Selects the basic code set
ATX1	Selects the extended code set
ATX2.3.4	Same as ATX1
ATZ	Modem Reset Resets the modem without changing any parameters.
AT&C	Carrier control This parameter defines the operation of pin 1 (DCD) of the 9-pin RS232C interface.
AT&C0	Always ON
AT&C1	Fixed to this settings – DCD turning on, when online
AT&C2	in command mode is OFF – DCD is turned on only when the modem is online
AT&D	Determines how the ME responds if the pin 4 (DTR) is changed from ON to OFF state during data connection (the firmware is supporting, but it is not wired by default)
AT&D0	Ignores the status of the DTR line – eg. not connected
AT&D1	DTR ON→OFF: Change to command mode while retaining the data connection. (like +++ escape sequence)
AT&D2	DTR ON→OFF: Disconnect the data connection (only for CSD)
AT&K	Flow-control selection (hardware configuration must matche with settings)
AT&K0	DCD and DTR line can be used for signaling
AT&K3	RTS and CTS line can be used

AT+I	Reports modem type, firmware version number, local settings E.g. WM-E2S v2.48
AT+IP?	Reports current GPRS Listen mode address E.g. IP: 192.168.0.100
AT+R	Resets modem and causes the modem to execute a 10 second power cycle
AT+S	Displays Signal Strength Toggles on / off (default off).
Remote AT+S	Reports the last known signal strength

4.3 Commands which can be used only for the local interface

AT+ parancs	Leírás
AT+CBST?	Signaling format This command gives information regarding the cellular network bearer channel. Response: 7,0,1 (9600 bps rate, Asynchronous, Non transparent).
AT+CBST=n,0,1 n=0 n=4 n=6 n=7 n=70 n=71	CBST change analog auto baud (automatic baud rate selection) V.22bis V.32 V.32 V.110 or X.31 V.110 or X.31
AT+CPIN?	SIM card PIN-code status report
AT+CLCC	Reports the current CSD call list
AT+COPS	Reports the mobile operator and network registration status
AT+CIMI	Delivers the International Mobile Subscriber Identity (IMS)
AT+CGSN	Delivers the International Mobile Equipment Identity (IMEI)

4.4 Modem result codes

Number (VO)	Answer (VI)	Legend
1	OK	Command line executed without errors.
2	CONNECT	Connection.
3	RING	Ringing signal detected.

4	NO CARRIER	Carrier lost or never present.
5	ERROR	Invalid Command.
6	NO DIAL TONE	No dial tone detected.
7	BUSY	Busy signal detected.
8	NO ANSWER	No answer from remote modem.

4.5 Configure the TCP/IP (GPRS) connection

Check the modem answer by executing the AT+I command and listen for the answer!

The execution of the following commands are necessary for the TCP/IP (GPRS) connection settings:

AT+ command	Legend
AT+CGDCONT=1,"IP","APNNAME"	Change the APNNAME part to the APN name you are attempted to use
AT+CGDCONT?	Checking the current APN settings

4.6 Configuring the modem by SMS text messages

Important! Note, that this feature is available since modem firmware version v5.3.46.

It's possible to control the modem by sending SMS text notification commands tot he device.

For the configuration, a password authentication is necessary in every SMS command.

Note, that by default the CSD configuration password is not set on the modem. Thereful, the modem is open for remotely configuring by anyone. Only in this case (when no password was set) you don't need to use the "**pw=**" command. But, if you are using a CSD password for configuring, then you have to start every SMS command with the "**pw=**" command tag.

If you want to protect the modem against unauthorized personnel connection, on CSD connection we highly suggest you to configure a CSD password for the modem by security reasons.

A password can be given from the WM-E Term configuration or by sending the following SMS command to the modem:

cmd=csd.password = *password*

Important! *Note, that the password length can be max. 31 character long.*

Important! *If you are using CSD Password parameter (in case of CSD connection), the modem can authenticate on CSD connection only with this password. Without the CSD password it is not possible to access the modem on CSD. If you already set this, you cannot access the modem via WM-E Term.*

Then the device will respond with the result in SMS notification and the new password will be valid.

Important! *Later, if you want to access the modem via WM-E Term, you should not use any password on CSD. For this use this command via SMS and leave the password value empty:*

cmd=csd.password =

If a password is already configured (by the **csd.password** parameter) on the modem, then at every SMS command the correct password authentication must be used by using the following command syntax.

pw=<password>.<command>

Syntax part	Syntax description
<password>	The password specified in the previously mentioned <i>csd.password</i> parameter must be entered.
<command>	SMS commands - the useable commands are detailed in the rest of this description.

IMPORTANT!

- The SMS command message must start with the "**pw=**" string, then the SMS command message must continue with the password specified in the configuration. If the password specified in the SMS is not the same as the one set in the modem configuration, then the SMS command cannot be processed.
- At value addition there must be placed a *space* character before and after the "=" (quotation mark), so " = " must be used), because if the space characters are missing, only the previous value will be interpreted, the complete command will not be interpreted correctly.
- Note, that when using "**pw=**" command, there is no *space* character afterwards
- The password must be followed by the "." (point character). If the SMS message does not continue with a "." character, then the SMS command cannot be processed either.
- This "." string must be followed with a command. If there is no password configured, then the first part can be omitted. Therefore always use it like this:
pw=<password>.<command>
- Note, that when using "**cmd=**" command, there is no *space* character afterwards. Only values must be defined with using " = " value additon – so using spaces before and after the quotation mark.
- There should be no enter or space character before an issued command.
- In some commands the "?" (question mark) can be used for readout a parameter.
- Multiply parameters can be executed by a separation string which is "\r\n". Among these string(s) more commands can be executed in one step (by one SMS command) – so you can use more separator tags in on SMS text. This string can be combined with the question mark („?”) if you want to readout parameters as: **\r\n?**
- An SMS message can be maximum 160 characters long. Beyond this size, the SMS command will be fragmented and its processing will not work completely or partially.

Later, if you want to **change a valid password**, then you should send an SMS command by using at first authentication and then change the current password by using this syntax: **pw=password.cmd=csd.password = new_password**

Syntax for command if there is no password:

cmd=command = value

Syntax for command if there is a password used:

pw=password.cmd=command = value

List of SMS commands <command>

Command	Command description
cmd=AT&F	Modem configuration reset. After setting the configuration, the modem sends an SMS response: "Configuration structure reset result: <error_code>" For understanding the result codes, see <i>error_code</i> part below.
cmd=ATR	Modem Restart command. Before restarting the device, it sends the following SMS notification: "Device reset requested after SMS answer"
cmd=mread	IEC register values registers can be read out with this command, as: - C.1.0 (IEC meter address), - 0.9.2 (IEC meter current date), - 0.9.1 (IEC meter current time) This command only makes sense if the modem is connected to a meter from which the mentioned registers can be read out properly. The response format will be the following: "(<C.1.0>)\r\n<0.9.2>\r\n<0.9.1>\r\n"
cmd=certreset	With this command, <u>if the modem uses TLS</u>, you can reset TLS parameters to their default values. Then the firmware sets the the following parameter values to 0:

	<u>from Device Manager parameter group :</u> - dm.tls_enable (Device Manager TLS enable) - dm.cert (Device Manager Certificate bank) - dm.ca_cert (Device Manager CA certificate bank) - dm.verify (Device Manager certification verification) <u>from Transparent / NTA parameter group :</u> - tm.tls_enable (Transparent mode TLS enable) - tm.cert (Transparent mode certificate bank select) - tm.ca_cert (Transparent CA certificate bank select) - tm.verify (Transparent mode certificate verification) The SMS response is as follows: “Configuration structure reset result: <error_code>” For understanding the result codes, see <i>error_code</i> part below.
cmd=?<config_parameter>\r\n?<config_parameter>...	Multiply parameter value query (read out). After the “cmd=?” string, you can specify a modem parameter. If you want to read more parameters, then the “\r\n?” string must follow the parameter name. This string does not need to be present for the last parameter. After processing the command, the firmware will return the values of the parameters to be read line by line in the following format: <config_parameter> = <config_parameter_value>\r\n

cmd=<config_parameter> =<config_parameter_value>\r\n<config_parameter> =<config_parameter_value>\r\n...	Multiply parameter value configuration. After the “cmd=” string, new parameter name and values can be configured in the SMS text message with parameter name and value (similarly to a WM-E Term configuration file – open a CFG file for better understanding). The “\r\n” string must be at the end of the lines if you want to modify several parameters at once. After processing the command, the firmware gives the following response: "Configuration structure changed result: %d", error_code
--	--

The table above shows that the return value answers include the save/write configuration result:

<error_code> value	<error_code> description
0	Write / save completed successfully.
-1	The CRC checksum stored in SPI flash memory and the CRC checksum stored in RAM memory do not match.

SMS text command examples:

SMS text command content	SMS notification answer
pw=password.cmd=?conn.apn_name	Using password authentication, then query a parameter value with using the question mark before the next command. <u>Answer example:</u> conn_apn_name = wm2m
pw=password.cmd=conn.apn_name = net	Using password authentication, then confuring a parameter.

	<u>Answer:</u> Configuration structure changed result: 0
pw=password.cmd=AT&F	Using password authentication, and requesting a modem configuration reset to default values. <u>Answer:</u> Configuration structure reset result: 0
cmd=ATR	Using password authentication, and requesting a modem reset. <u>Answer:</u> Device reset requested after SMS answer
pw=password.cmd=?conn.apn_name\r\n?conn.apn_user\r\n?conn.apn_pass	Using password authentication, and multiply query of parameters by using the \r\n separator tags between question marks „?” (to read out values) and parameter names: <u>Answer example:</u> conn.apn_name = wm2m\r\n conn.apn_user = username\r\n conn.apn_pass = password\r\n
pw=password.cmd=conn.apn_name = name\r\nconn.apn_user = user\r\n?conn.apn_pass = pass	Using password authentication, and multiply parameter configuration by using the \r\n separator tags between parameter names: <u>Answer:</u>

	"Configuration structure changed result: %d", error_code
--	---

For the useable parameter names and values, please see the [Modem Parameter Description](#) document.

Chapter 5. Support

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

E-mail: iotsupport@wmsystems.hu

5.1 Contact the support line

For the proper identification of the modem you should use the sticker on the device, which contains important information for the call center.

Attach the modem related important information – marked - of modem identifiers to the problem ticket, which will help resolving the problem! Thank you!

5.2 Product Support

Documentation and released firmware for the product can be accessed via the following link.

<https://www.m2mserver.com/en/product/wm-e2s/>

Online product support can be required here:

<https://wmsystems.atlassian.net/servicedesk/customer/portal/70/user/login?destination=portal%2F70>

Chapter 6. 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.