Datasheet and User manual for WM-E1S® metering modem

Document specifications

This documentation was made for presenting the installation and configuration steps of the **WM-E1S**® energy metering modem.

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Hardware Type/Version:	**WM-E1S® modem** **for the Elster® / Honeywell® Alpha A1500, A1700, A1800, A1140/A1160 electricity meters**
Hardware Version:	**V 5.10**
Firmware Version:	**V 5.1.58 / V 5.1.58 TLS**
WM-E Term® config. software version:	**V 1.3.80**
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Chapter 1. Introduction

The **WM-E1S**® modem family is suitable for remote reading of electricity meters on LTE-based cellular networks.

The modem family has several versions to fit for many meter types.

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

Wireless communication

The modem can be ordered with different cellular module types:

- LTE Cat.4 / 3G / 2G module
- LTE Cat.1 module with 2G "fallback"
- LTE Cat.M / Cat.NB module with 2G "fallback"

Over the LTE 4G communication, all versions of the device having a 2G mode or 2G "fallback" feature, therefore in case of outage/inaccessibility of the LTE 4G network, it is further communicating on the 2G network.

Depending on the client's needs, the modem can be set to which network it uses (e.g. only LTE 4G or 3G, etc.) or the best available network (Auto mode).

It can also be set that only GSM-CSData connection - e.g. in the case of a CSData supported module, by initiating CSData calls.

The modem supports multi-operator SIM and the roaming feature.

The device provides a SIM-card independent- and mobile operator independent solution.
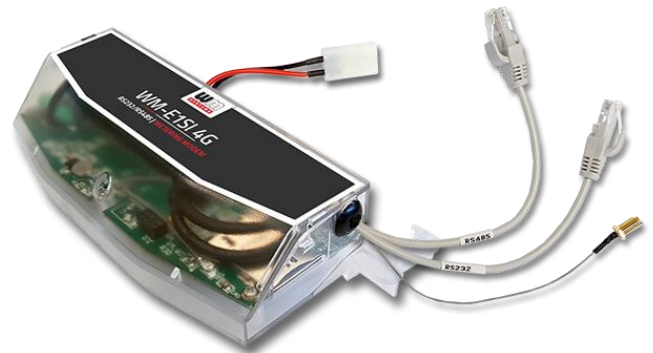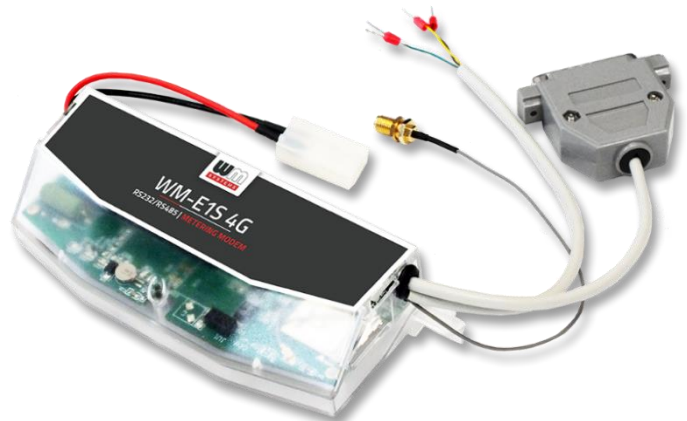
The modem has been designed to provide "Pull" operating mode, which means that the modem has a transparent communication data sending from the meter to the HES (smart metering center/server).

Design and installation

This modem was especially developed for various tpy of 3-phase electricity meters, such as:

- **Honeywell® / Elster® Alpha A1500, A1700, A1800, A1140/A1160 meters**
- **Itron® SL7000, EM600 (E620), ACE6000, ACE8000 meters**
- **Landis+Gyr® ZMG type meters**
- **Saphir® meters**

The modem is available with several data connectors, so it is suitable for connecting any meter with a standard connection.

The modem can be connected to the meter through its RS232, RS485 interface by its design and its connection interface.

The device can be installed under the sealed terminal cover of the electricity meter without replacing the seal certifying the first verification or the non-destructively sealed measuring housing.

This solution also means the possibility of future expansion, which is a great help especially in cases where the installation space is scarce.

Each model of the modem family can be ordered with a housing to be properly fit and mount on each meter type.

It can also be used as an external modem - for a universal meter with any standard connector and it can be fastened due an optional 35mm DIN-rail adapter (order option).

Operation properties, features

The modem is thus suitable for retrieving current and stored measurement data, reading recorded event log and load curve data, and reading and remotely managing meter parameter files.

The device can be accessed remotely via the mobile network and is capable of sending data over the Internet using an APN.

The modem is basically prepared for transparent data transmission between the metering server or metering service provider, with CSData call (only for 2G network setting!) And via mobile internet (TCP) connection ("PULL" mode) suitable for electricity meter registers. and remote reading of load curves, use of standard reading commands, remote reading and modification of the meter / parameters, updating of the meter application firmware.

Over the RS232/RS485 compatible data connection, some models have the 2-Inputs option (for sabotage or relay/tariff switch status). In case of input line presence, the device is able to detect the input signal changes and generating and transmitting SMS alert notification.

Connections

The modem has three internal connectors:

- for RS232 serial data connection
- for RS485 data connection
- for 2 digital inputs

But the modem can be assembled with two connections at once. Therefore, you have to choose the proper connections when ordering the modem.

The device can be ordered by the following connection outfits:

- RS232 (DSUB-9 connector / or RJ45 connector / or RJ12 connector or DSUB-25 interface) – for modem configuration and meter connection
- RS485 (2 or 4-wire connector or RJ12 connector) – for meter connection
- 2 digital input interface (4-pins) – suitable for monitoring of input changes or usable for sabotage detection.

Power source and power outage

The device can be powered from the meter's mains connection (by general 100V-240V AC voltage).

The modem can be connected through the following modes:
   a.) the meter is connected to the 57.7/100V AC power network: the modem must be connected to line voltage (100V, L1..L2 or L2..L3 or L1..L3)
   b.) the meter is connected to the 230/400V AC power network: the modem must be connected to the phase voltage (230V, L1..N or L2..N or L3..N)

In case of the need of using external DC power, the modem can be orderd in DC-voltage version.

Supercapacitor

The modem is also available with a power outage protection by an optional supercapacitor component, which allows to continue the modem operation in case of minor power outage(s).

In case of a power outage, the supercapacitors will discharge by time, and the modem will shut down. When the power supply returns, the modem restarts and sends data over the cellular network, and the capacitor components will be charged).

Configuration and firmware refresh

The modem can be configured locally via RS232 port, remotely with a CSData call (only if you use a setting that also uses a 2G network!) Or via a mobile internet (TCP) connection, and its firmware can be updated. The modem is configurable via TCP 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 administration tool (the WM-E Term® software), but also API available so our partner can easily adapt their current administration environment.

The configuration is possible by one device or for a group of devices.
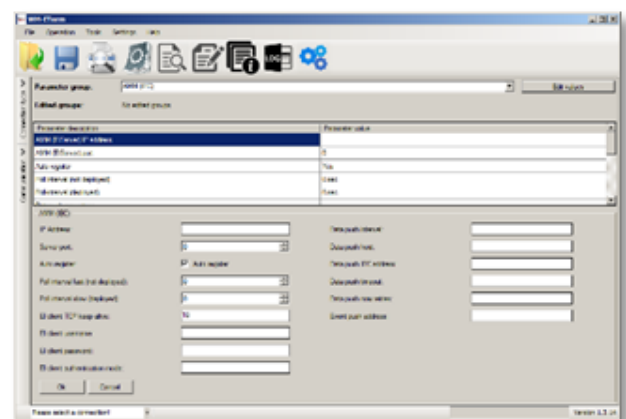
The WM-E Term® tool is password protected and user management is also possible.

The configuration tool requires Windows® platform to run. It is available in English and some local languages as well (as French, German, Spanish, Czech, etc.).

Security

The product's firmware is encrypted and prevented against to upload firmware or data from other devices. The modem cannot be upgraded by any other 3rd party firmware – its safe.

The control port of the modem is encrypted by AES (by option), or can be ordered with TLS protocol usage.

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

All security protocols can be activated/deactivated by authorized client.

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).

The LastGASP SMS notification feature is available by some models for case of reporting the occurred possible power outages.

Certification

The modem is accomplishing with CE standard (Radio Equipment Directive (2014/53/EU)) and safety directives (EN 60950-1) and RoHS declaration and has CE certification.

Chapter 2. Connectors, interfaces

## 2.1 Modem with RS232 (DSUB-9) and RS485 4-wire connector (for Honeywell®, Elster® AS1500, AS1800 meters)
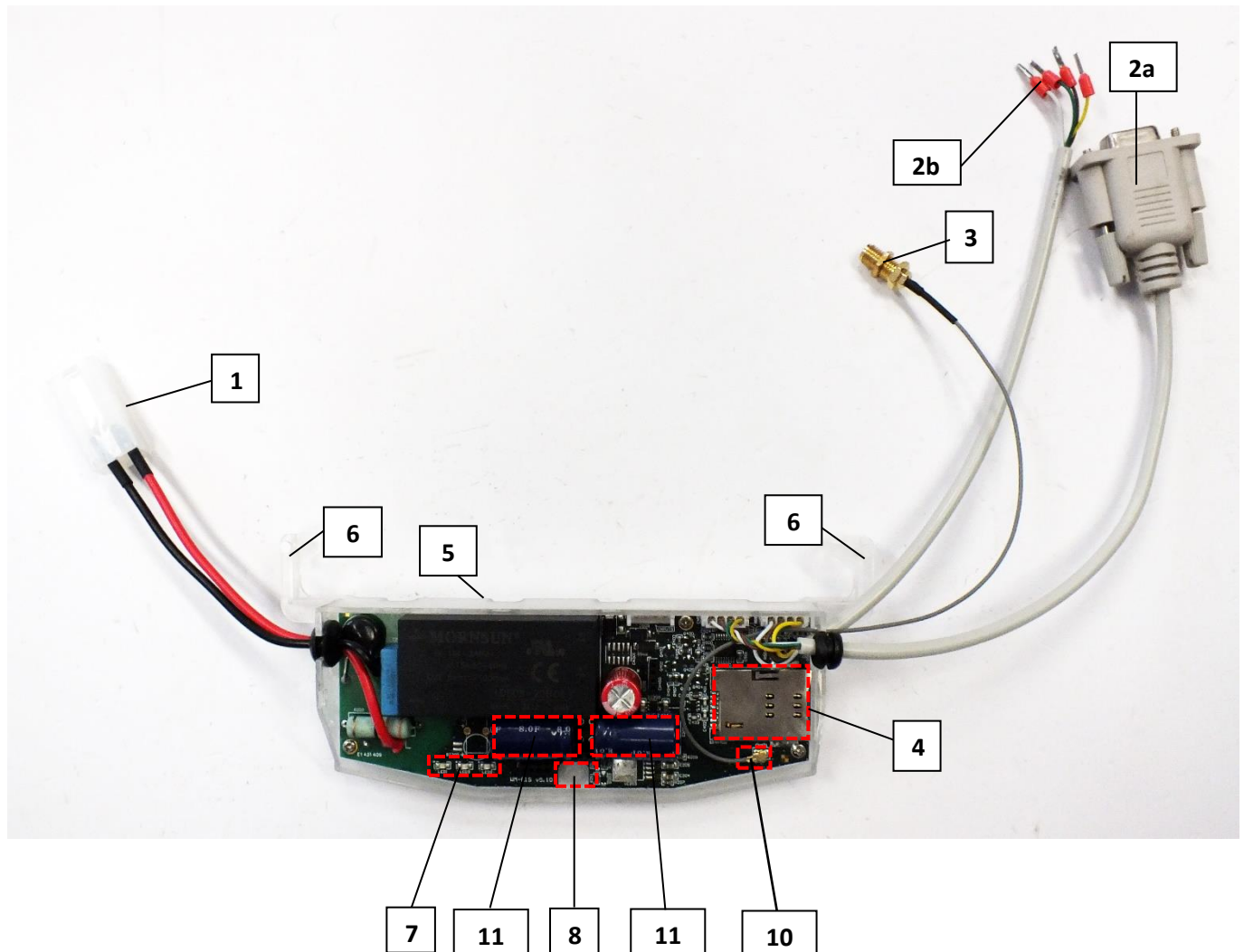
1 – Mains connector (pigtail connector, for the AC power of the meter)

2a – RS232 connector (DSUB9)

2b – RS485 connector (2-pin or 4-pin - order option, wire with sleeve)

3 – Antenna connector (SMA-M, 50 Ohm)

4 – SIM card slot (push-insert)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

6 – Plastic hooks (for mounting the modem, into the Honeywell® / Elster® electricity meter, under the terminal cover)

7 – Status LEDs

8 – Fixation screw of top modem enclosure

10 – U.FL antenna connector

11 – Supercapacitors (order option)

2.2 WM-E1S modem with RS485 connection (4-wire) and 2 digital input connector (for Honeywell®, Elster® AS1500, AS1800 meters)
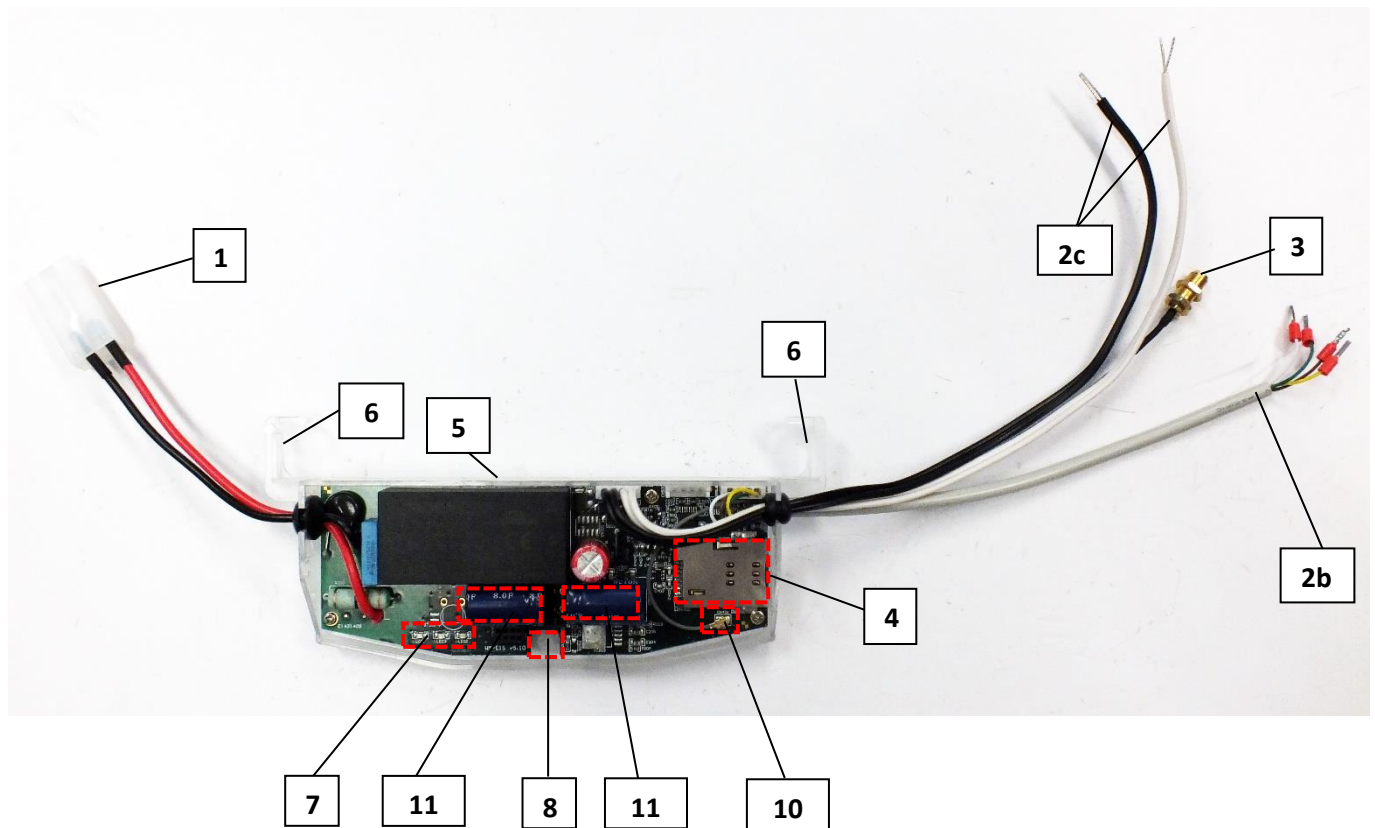
1 – Mains connector (to the meter)

2b – RS485 connector (4-wire)

2c – 2 digital input connector (4-pins)

3 – Antenna connector (SMA-M, 50 Ohm)

4 – SIM card slot (push-push)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

6 – Plastic hooks /ears to fix the modem case into the meter coverage

7 – Status LEDs

8 – Fixation screw of top modem enclosure

10 – U.FL antenna connector

11 – Supercapacitors (order option)

2.3 Modem with RS232 connector (DSUB-25) and 2 digital input connector
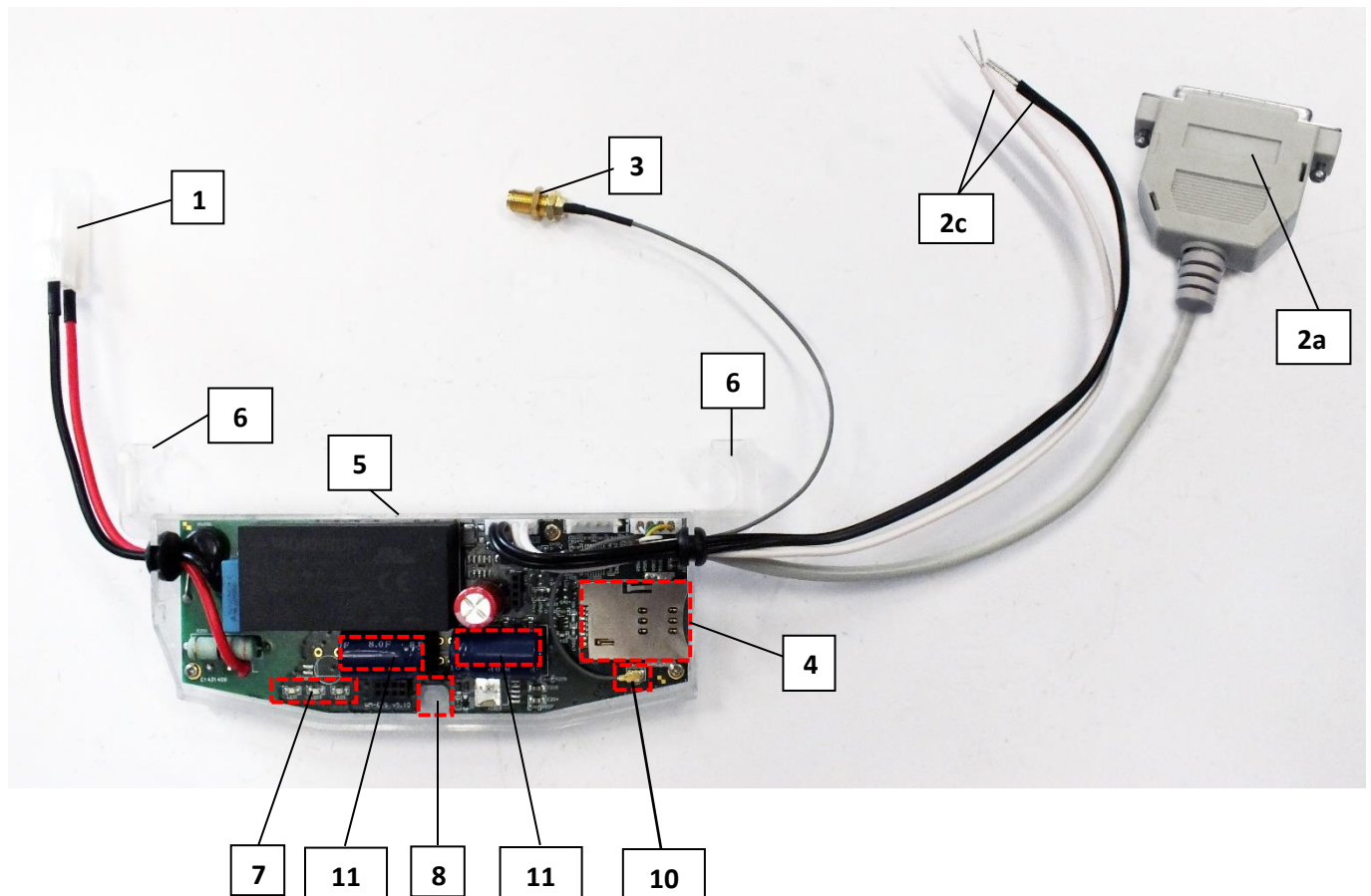
1 – Mains connector (to the meter)

2a – RS485 connector (DSUB25)

2c – 2 digital input connector (4-pins)

3 – Antenna connector (SMA-M, 50 Ohm)

4 – SIM card slot (push-push)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

6 – Plastic hooks /ears to fix the modem case into the meter coverage

7 – Status LEDs

8 – Fixation screw of top modem enclosure

10 – U.FL antenna connector

11 – Supercapacitors (order option)

2.4 Modem with RJ12 connector (RS232)

1 – Mains connector (100V AC - to the meter)

2 – RS232 connector (RJ12 – data connection modem← → meter)

3 – External antenna connector (SMA-M, 50Ω)

4 – SIM card slot (mini SIM, insert-push)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

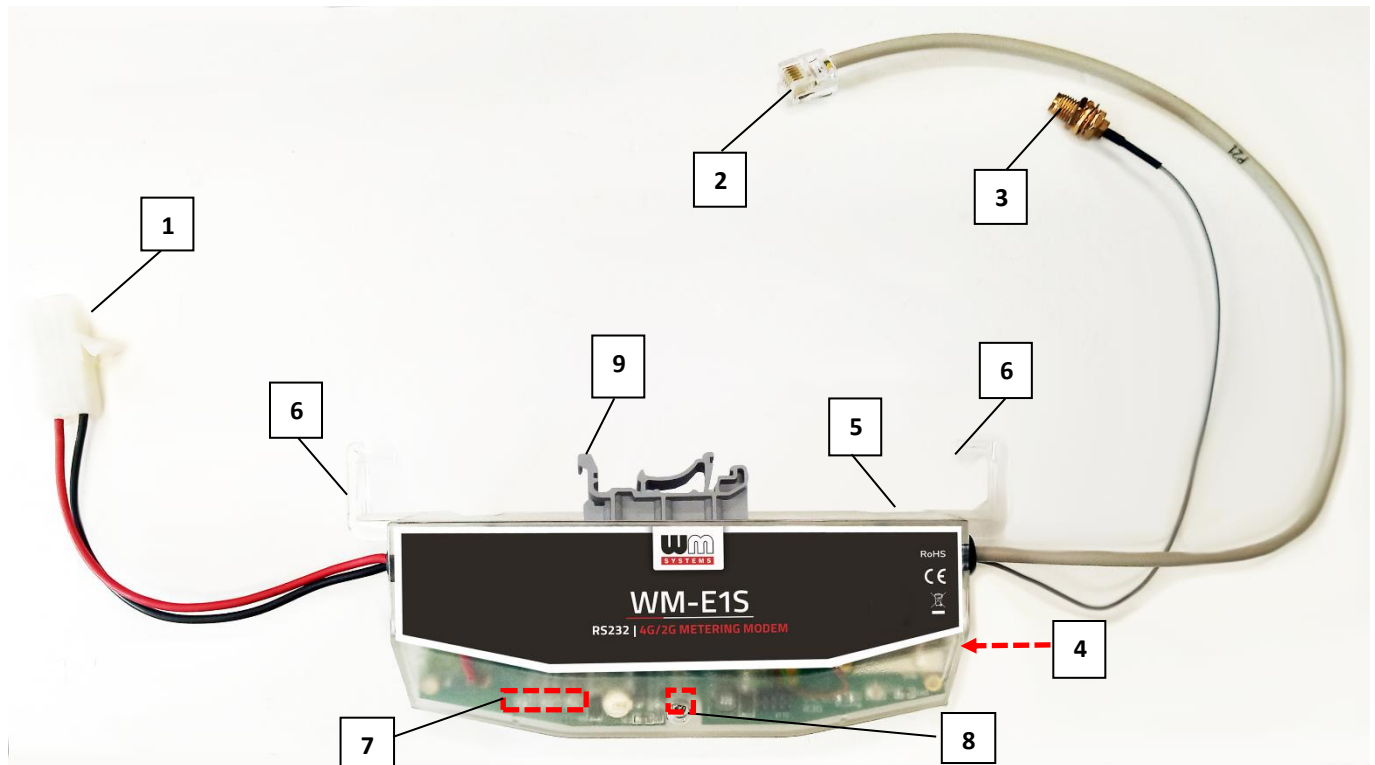**6 – Plastic hooks to fix the modem case into the meter coverage – optional**

7 –Status LEDs

8 – Fixation screw of top modem enclosure

9 – DIN-rail adapter (order option) to fixate/mount to wall

2.5 Modem RJ12 with connection (RS485) for Honeywell® and other type meters

1 – Mains connector connector (pigtail connector for the AC power of the meter)

2 – RS485 connector (RJ12 – for data connection modem← → meter)

3 – External antenna connector (SMA-M, 50Ω)

4 – SIM card slot (mini SIM, insert-push)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

6 – Plastic hooks to fix the modem case into the meter coverage – optional

7 – Status LEDs

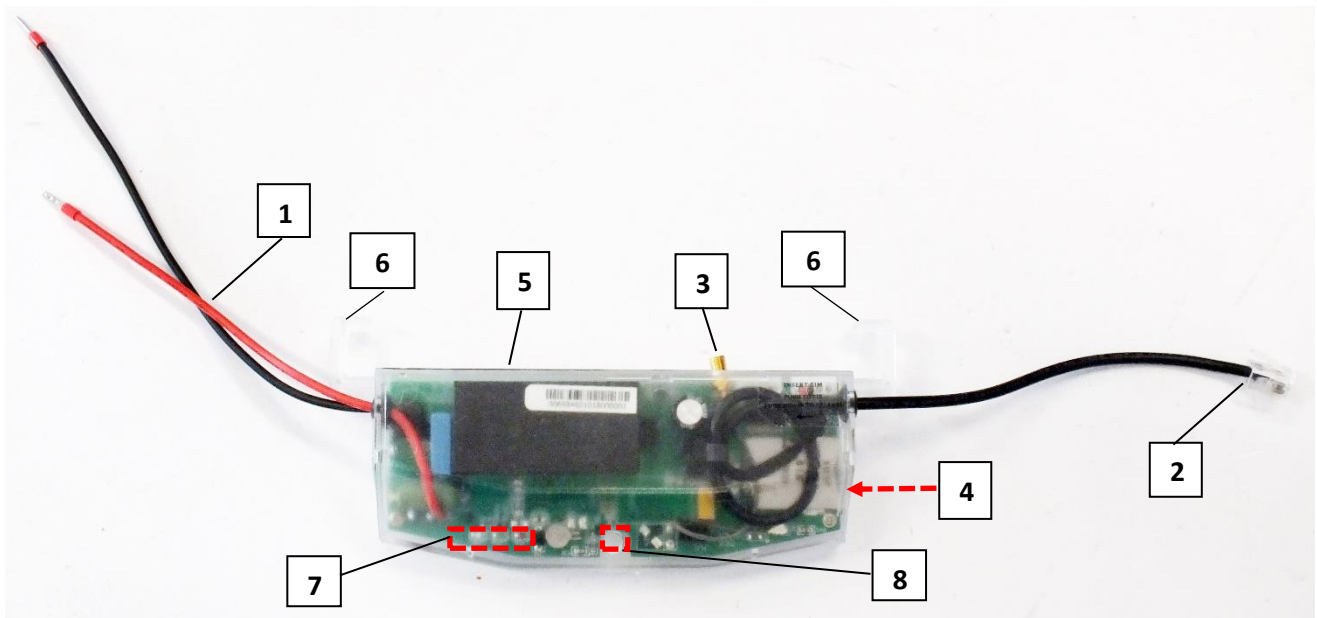8 – Fixation screw of top modem enclosure
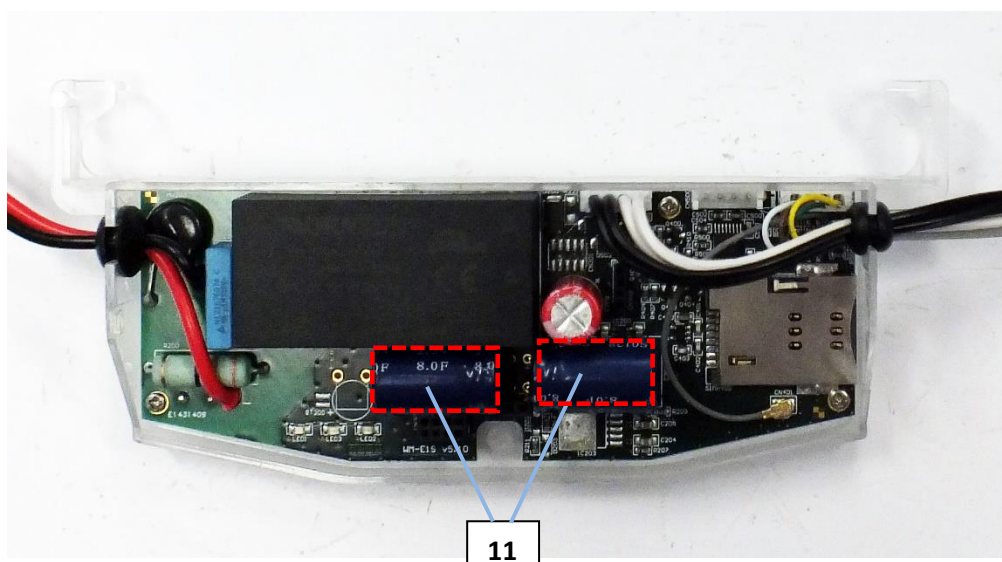
11 – Supercapacitors (order option)

2.6 Universal metering modem with external mounting (with RJ12 connector)
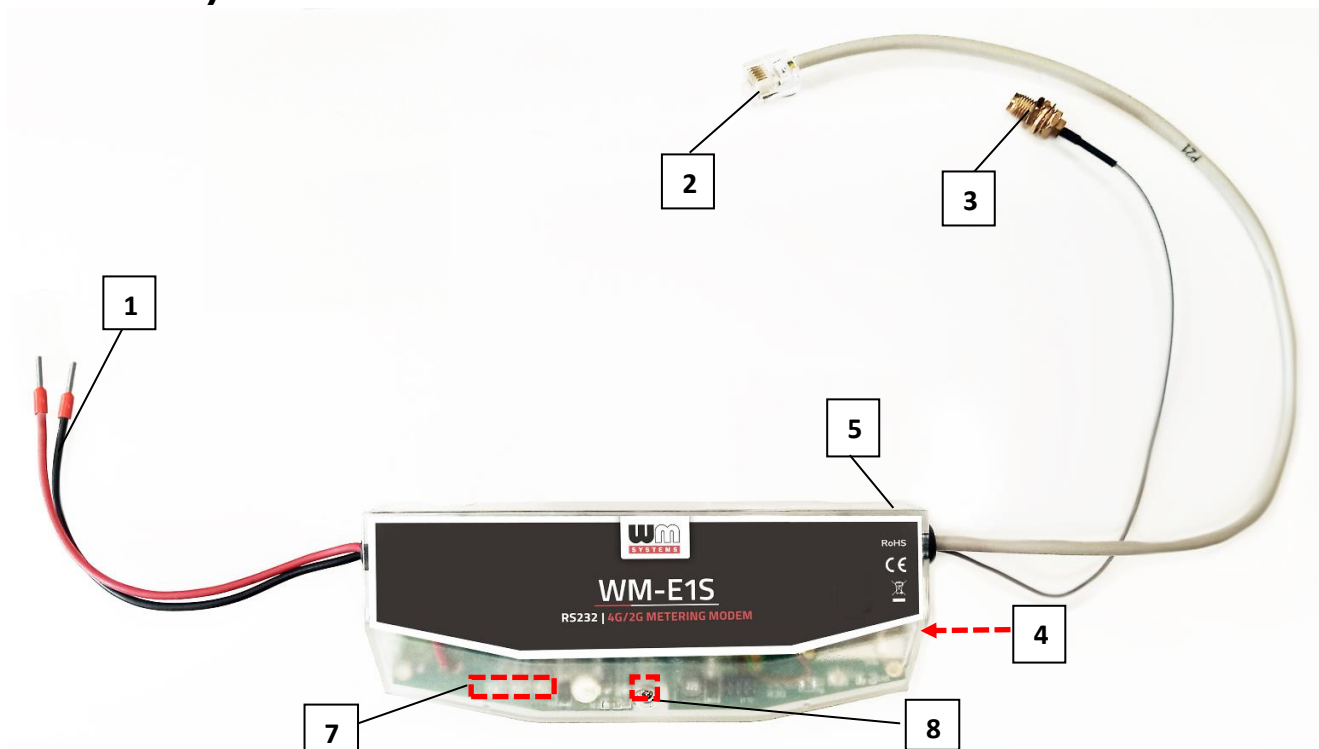
1 – Mains connector connector (pigtail connector for the AC power of the meter)

2 – RS232 (gray) or RS485 (black) connector (RJ12 data connection modem← →

    meter and for the configuration of the modem)

3 – External antenna connector (SMA-M, 50Ω)

4 – SIM card slot (mini SIM, insert-push)

5 – Plastic holder (lower plastic case fixation to the upper plastic case)

6 – Plastic hooks to fix the modem case into the meter coverage – optional

7 – Status LEDs

8 – Fixation screw of top modem enclosure

2.7 Installation steps

Step #1: Remove the meter terminal cover (signed by „I"), loosen the screws (J).

Step #2: Ensure that the device is not powered on, remove the AC connector (1) from the meter.

Step #3: Insert a replaceable and active SIM card (with APN) into the SIM-holder (4) - the chip looks down, and the cutted edge of the SIM looks to the modem. Push the SIM until it will be fastened (you will hear a click sound).
(If it is necessary, the SIM card can be easily removed by pressing the card again, causing the card to be ejected from the tray.)
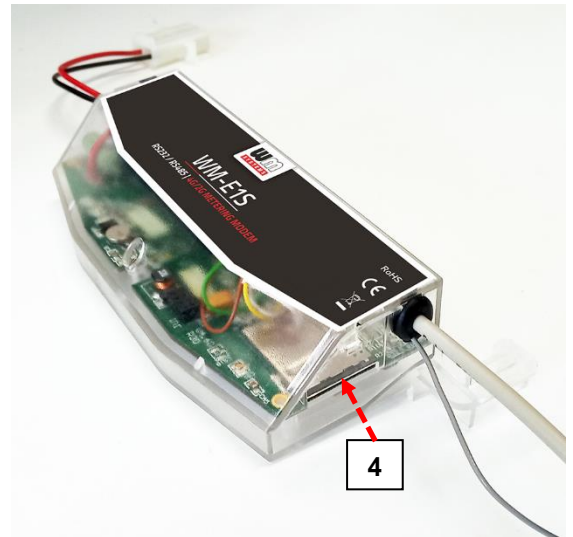
Step #4: Install the modem enclosure (5) and fasten near to the meter – or mount to the wall in a fixed position. You can insert the device into the internal mounting points of the meter - under the meter terminal cover (18) - and attach it to the meter terminal cover according to the meter's user guide.

Step #5: Mount an external magnetic base or stick antenna to the antenna connector (3) corresponding to the communication – e.g. LTE antenna.

Step #6: Connect the modem to your computer with the RS232 cable (2/2a) and an RS232/USB DONGLE converter (for RJ12 cable outfit use an RJ12←→USB adapter).

Step #7: Connect the modem's AC power connector (1) - wire socket connection or "pigtail" connector depending on the version - to the meter power input (for 100-230V AC) or to an external 230V power supply.

Step #8: Configure the modem with the WM-E Term® software.

Note that the modem can be configured only through its RS232 port!

Step #9: After completing the configuration, remove the R232 cable (or RJ12 cable) - labeled with „2" or „2a" - from the USB adapter.

Step #10: Disconnect the modem AC power connector (1) from the meter (or power source). The modem will be shutting down.

Step #11: Make a data connection between the modem and the meter on the interface you want to use (port nr. „2" or „2a" - RS232 data connection, data connection „2a" to the meter RS232 data connector (signed by „G")).

Step #12: If the modem has RS485 wires, then make the data connection between the modem and the meter by the RS485 (2b) connector using the connected data cable.

Step #13: If the modem has digital input wires (of 2 inputs), then connect external devices - to be monitored – to the 2 digital input interface (2c) cables. You can also use it for sabotage. The **black** wires are related for input nr. #1, **white** wires are related for input nr. #2.

Step #14: Connect back the modem's AC power connector (1) - wire socket connection or "pigtail" connector depending on the version - to the meter's power input (for 100-230V AC).
Then the modem will be powered by the meter and the modem will starting its operation and the LED signals are signing the current activity.

Step #15: Place back the terminal cover of the meter (signed by „I") and secure with the screws (J).

2.8 Connecting the modem to the meter (Elster® / Honewywell® Alpha meters)

Step #1: Remove the Elster® A1500 and A1700 Alpha meter's communication module plastic case by releasing the 2 screws from the top of the housing.
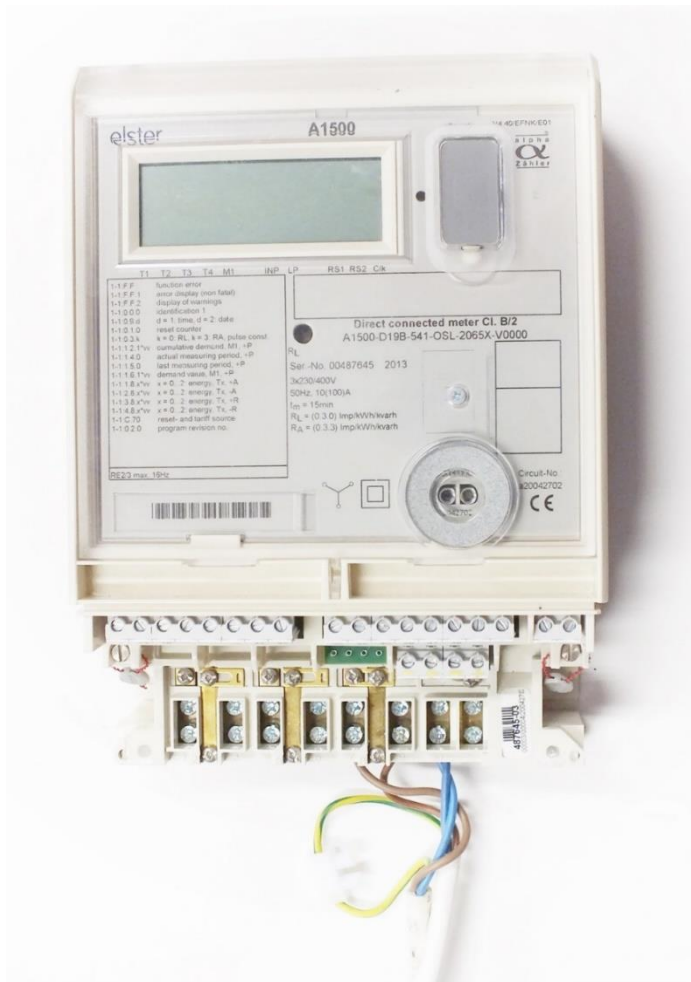
Step #2: Connect to the meter using the data connector.

Connect the RS485 („2b" signed cable 2-pin wire/sleeve (**brown** and **white** wires) to the meter's RS485 input.

If the input has 4-pins, you can also connect all four cables to the place which is marked with „D".

The picture shows the sleeve wire connection, but the modem can also be ordered with a "pigtail" connection. Some meters are prepared to receive a terminal block, in which case connect a 2- or 4-pin terminal block to the sleeves.

Wiring to Elster®/Honeywell® Alpha A1500/A1700 meter
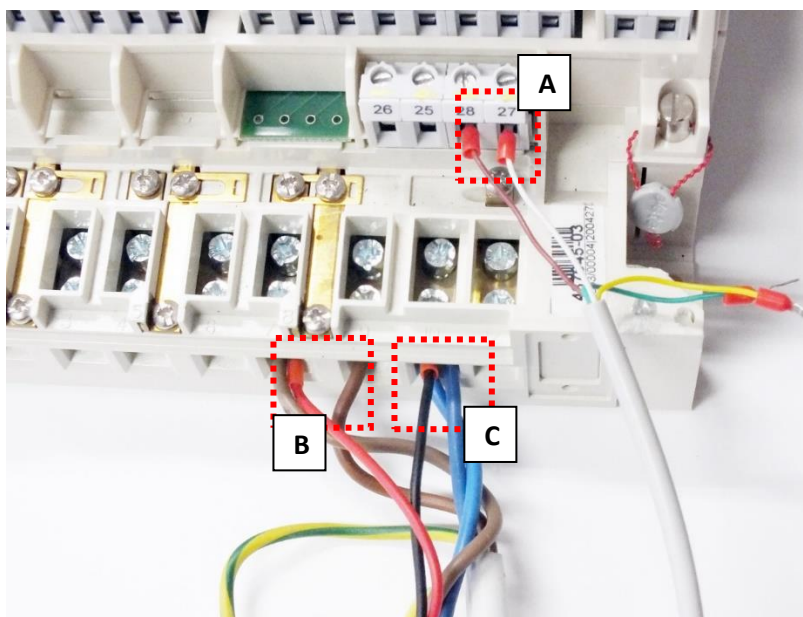
Step #3: Connect the modem's plastic power plug (1) to the meter's two-wire connection (marked by "E" in the following figure). If the AC power connector is not a power plug but a wire end ferrule, connect the wires to the meter phase and ground.
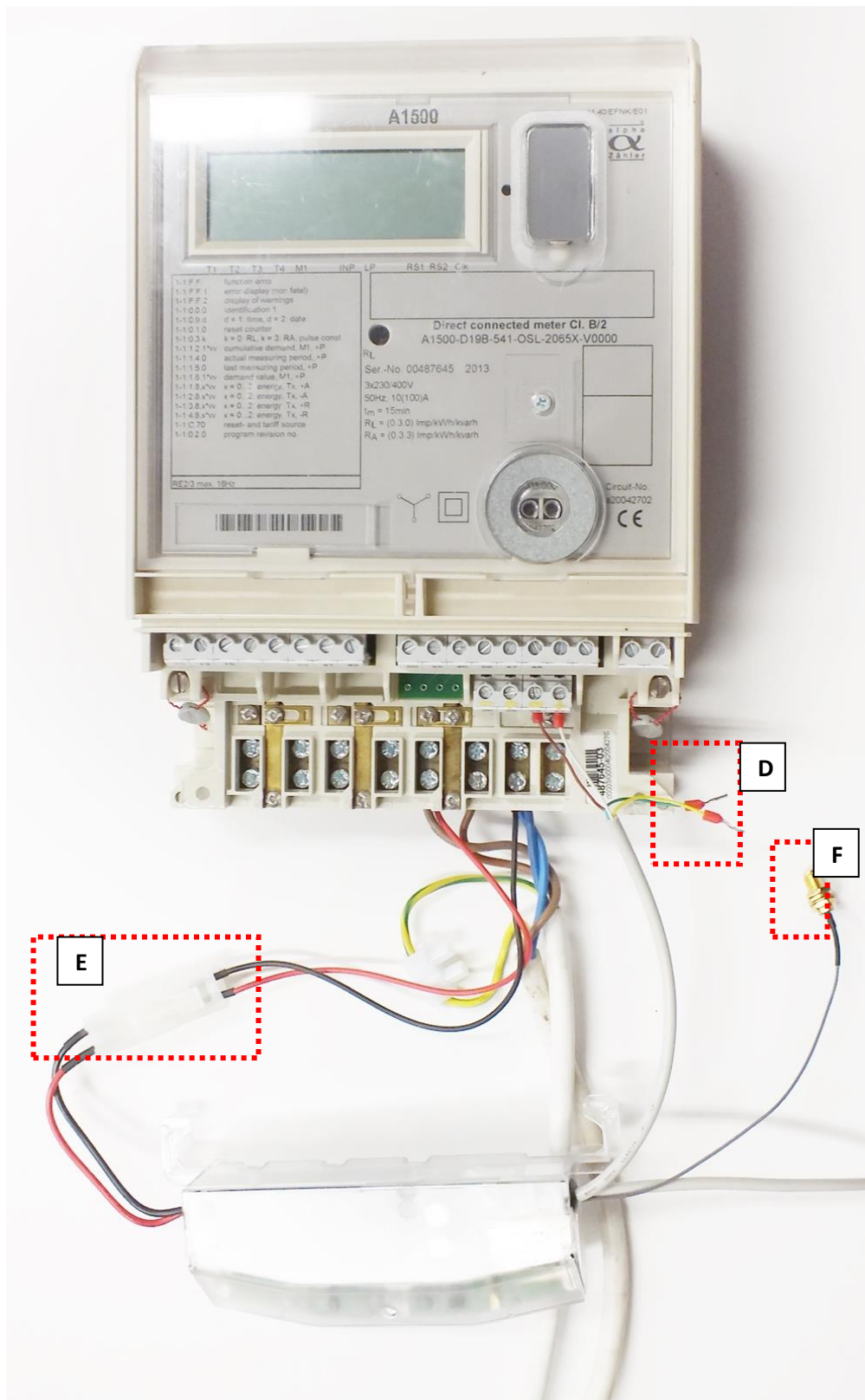
Step #4: If you haven't already done, connect the appropriate antenna (3) to the modem swing connector.

Step #5: Connect the wire end sockets of the modem AC cable (1) to the meter, to the AC power connection points (**red** and **black** wires) - **carefully, because during this, the meter can be under 100-240V AC supply voltage**! Since now, the modem gets its power from the meter.

***Attention!* NEVER remove the device cover when the modem is powered on!**

Step #6: Attach the modem (signed by „I") under the terminal cover of the meter, to the part designed for it (to the tabs (marked "H"), or to another attachment point.
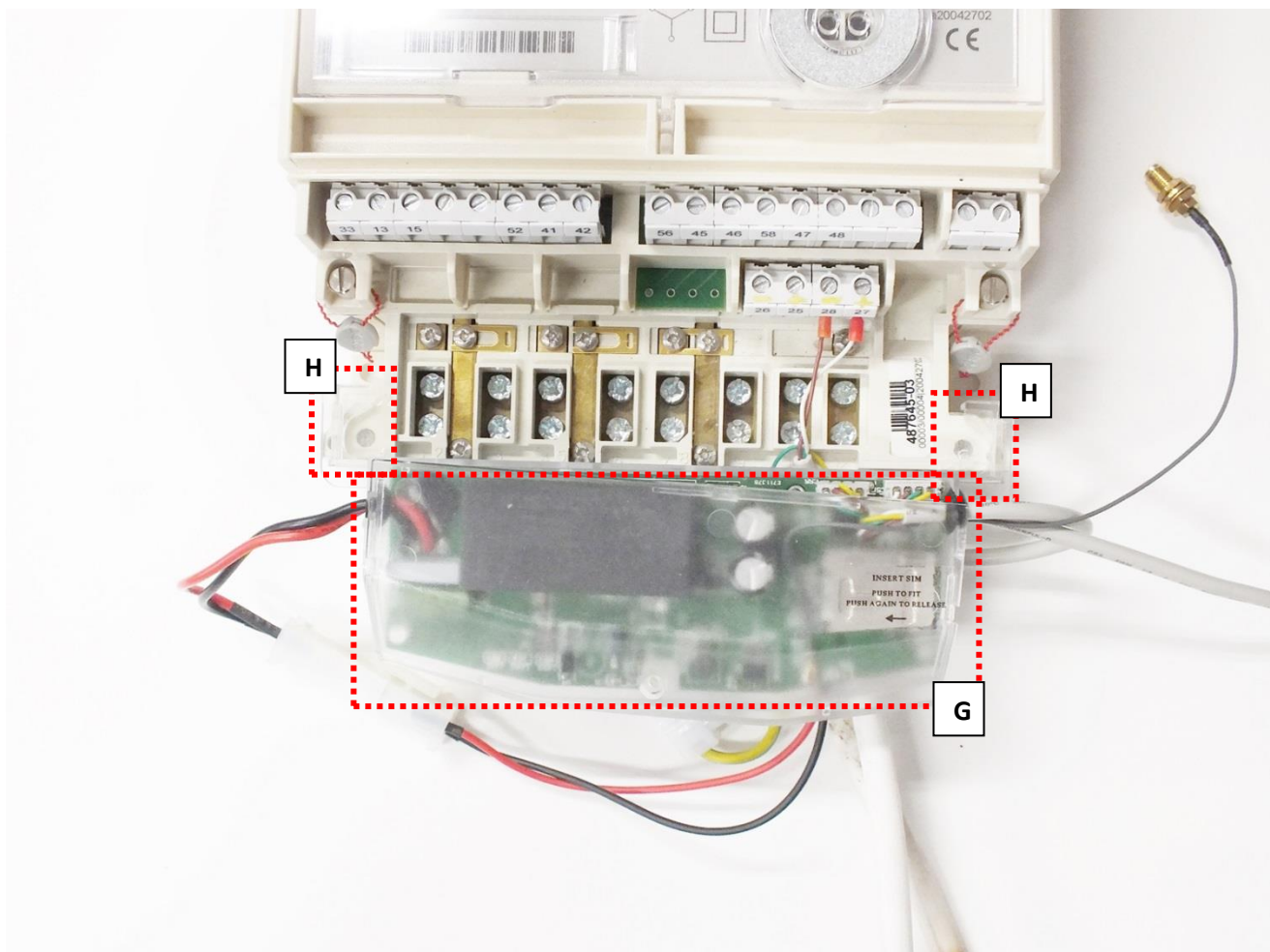
Step #7: Replace the terminal cover (marked by „I") on the meter, slide it on, and secure it with the screws (marked by „J").

elster   A1500   V4.40/EFNK/E01

alpha
α
Zähler

T1 T2 T3 T4 M1   INP LP   RS1 RS2 Clk

1-1:F.F   function error
1-1:F.F.1   error display (non fatal)
1-1:F.F.2   display of warnings
1-1:0.0.0   identification 1
1-1:0.9.d   d = 1: time, d = 2: date
1-1:0.1.0   reset counter
1-1:0.3.k   k = 0: RL, k = 3: RA, pulse const.
1-1:1.2.1*w cumulative demand, M1, +P
1-1:1.4.0   actual measuring period, +P
1-1:1.5.0   last measuring period, +P
1-1:1.6.1*w demand value, M1, +P
1-1:1.8.x*w x = 0...2: energy, Tx, +A
1-1:2.8.x*w x = 0...2: energy, Tx, -A
1-1:3.8.x*w x = 0...2: energy, Tx, +R
1-1:4.8.x*w x = 0...2: energy, Tx, -R
1-1:C.70   reset- and tariff source
1-1:0.2.0   program revision no.

RE2/3 max. 16Hz

Direct connected meter Cl. B/2
A1500-D19B-541-OSL-2065X-V0000

R_L
Ser.-No. 00487645   2013
3x230/400V
50Hz, 10(100)A
t_m = 15min
R_L = (0.3.0) Imp/kWh/kvarh
R_A = (0.3.3) Imp/kWh/kvarh

Circuit-No.
a20042702

CE

I

J   J

2.9 Connecting the modem to the A1800 Alpha meter

Step 1: Take off and remove the Elster® A1800 Alpha meter's communication module plastic case by releasing the 2 screws from the top of the housing (2 side below).

Step 2: Place and insert the modem under the transparent plastic cover of the meter and connect the wires according to the needs.
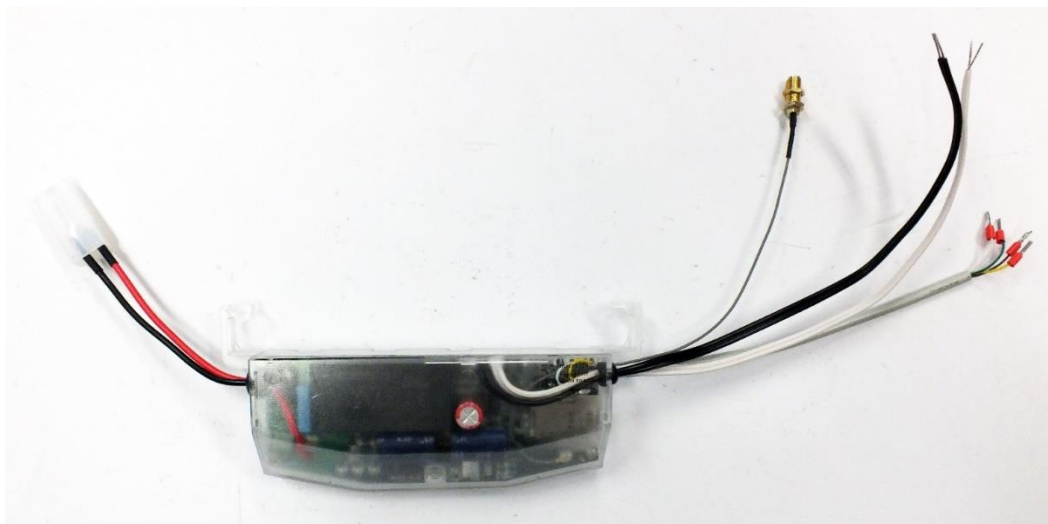
WM-E1S modem with 4-wire RS485 connector and 2 digital inputs (black and white wires)
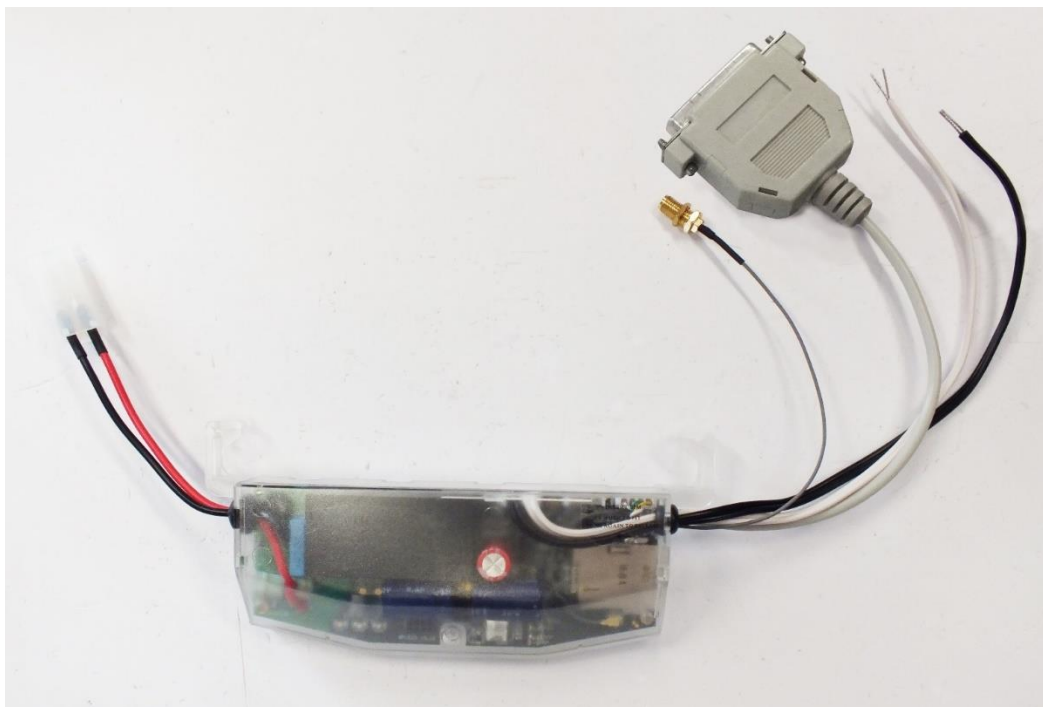
**WM-E1S modem with DSUB-25 (RS232) connector and 2 digital inputs
(black and white wires)**

In case of using the RS485 data connector

Step 1: Connect the RS485 cable's (3) four wire (from left to right: white, brown, yellow, green) of the modem device to the meter's data connection – signed with A on the next photo.

Note that, some meters has DSUB-25 type RS232 connector which can be attached in the same way. You can order the modem with that kind of connector for the proper connection.

Step 2: Then connect the 2-pins plastic mains connector (1) of the modem device to the meter's 2-pin plastic mains connector (signed with „B").

Step 3: After this, you connect the other side of the wires to the meter's left connection positions (from left to right: black and red wires) – signed with „C".
Now the modem will gets its power from the meter source.

Step 4: Then put the LTE antenna to the SMA-M connector (4) – signed with „D".
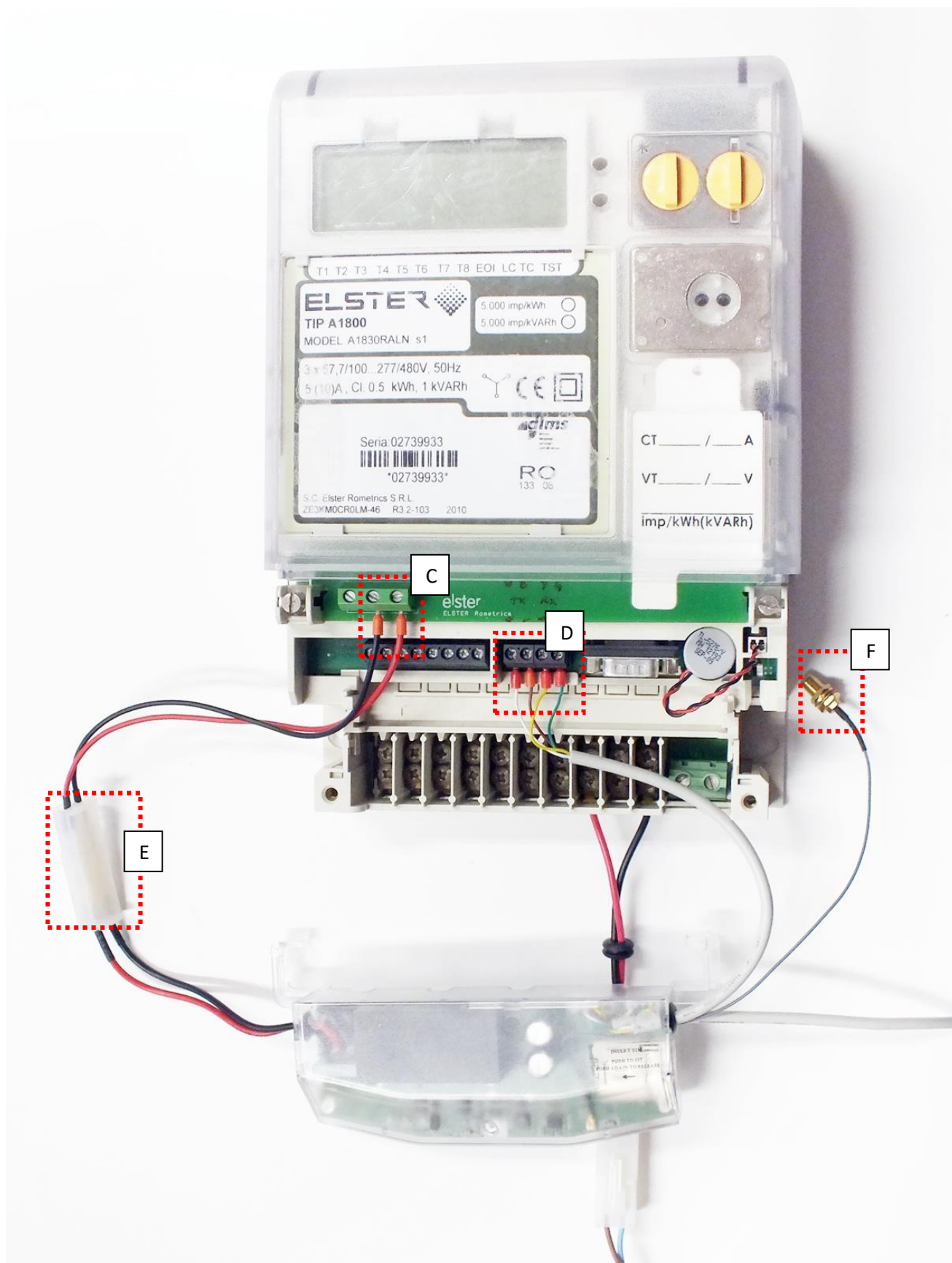
Elster®/Honeywell® Alpha A1800 meter connection

Step 5: Now snap the modem unit PCB (signed with „E") into the meter communication module's place by sliding it through the 2 plastic fixation hooks

(signed with „F") of the modem case to the meter case's two holders upon to the hooks until this fixes and you hear a click sound.

Always be careful to the wires and cable connections below the modem case against wire cut or other unwanted situations, when put and fixate the modem unit. Always use quality and longer wires to the proper connection.
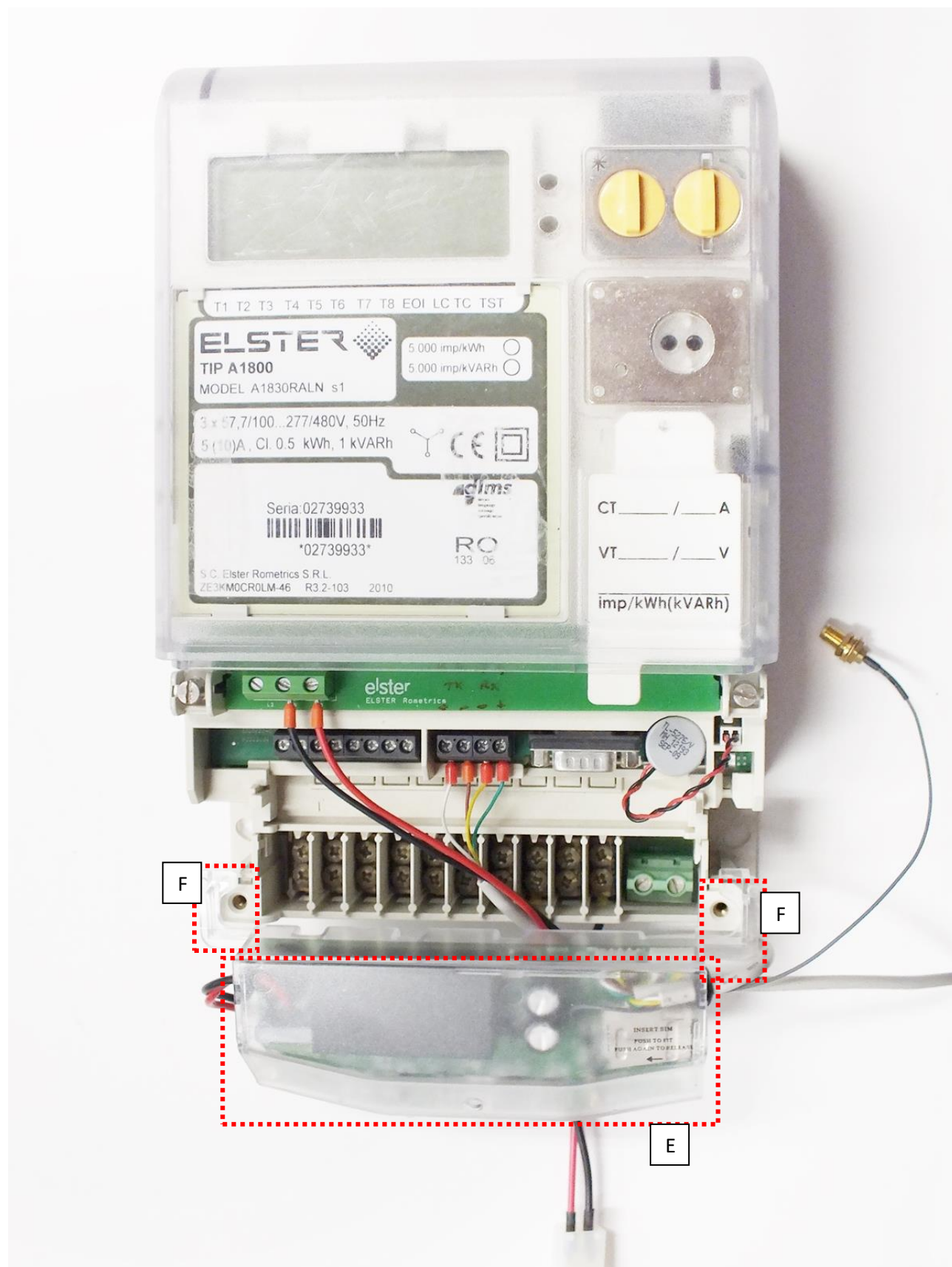
The modem is now under power connection and uses wired data (RS485) connection. If you want to connect RS232 (labeled 2 or 2a), connect it to the RS232 socket marked "G" on the meter. For A1500/A1800 type meter use the DSUB-9 connector, for A1700 type meter connect the DSUB-25 connector of the modem to the connection „G".

Wiring to the Elster®/Honeywell® Alpha A1800 meter

In case of using RS232 connection (DSUB9 connector) only – as you can see in the next photo – you don't need the RS485 4-wire connection – signed with „C" – but you have to use the RS232 connection of the modem – signed with „G2" – to connect it to the right data RS232 serial connection position – signed with „G" - of the meter system. (For A1500/A1800 type meter use the DSUB-9 connector, for A1700 meter connect the DSUB-25 connector of the modem to connect to the „G" connector of meter.)
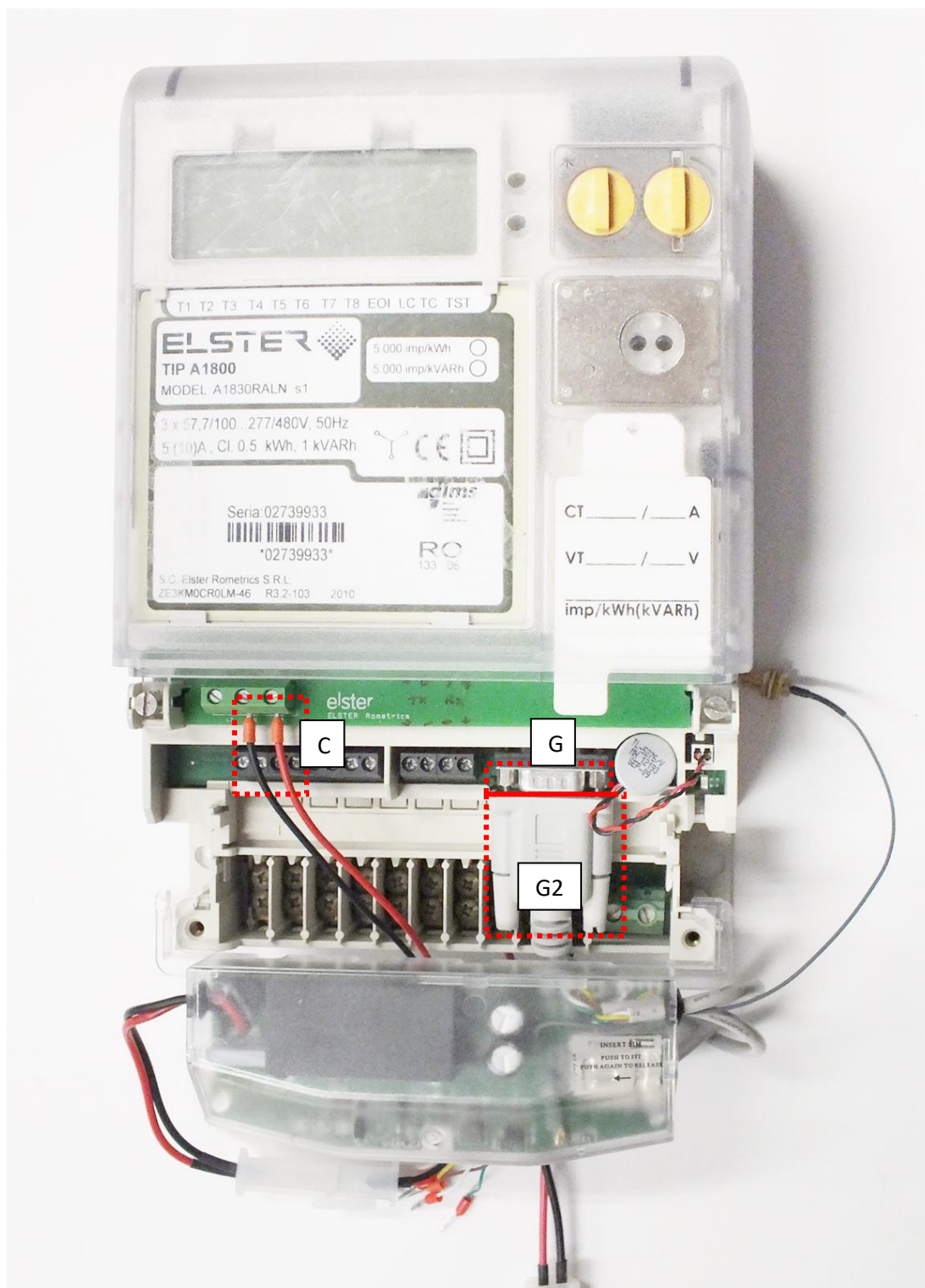
The modem is now under power connection and uses wired serial data (RS232) connection.

In case of using the RS485 and the RS232 (DSUB9) serial connection together – as you can see in the next photo – you have to apply all described connection ways to the proper data connection (the RS485 4-wire connection (signed with A) and the RS232 serial data connector („G" + „G2") then the power supply connection (signed with „C").
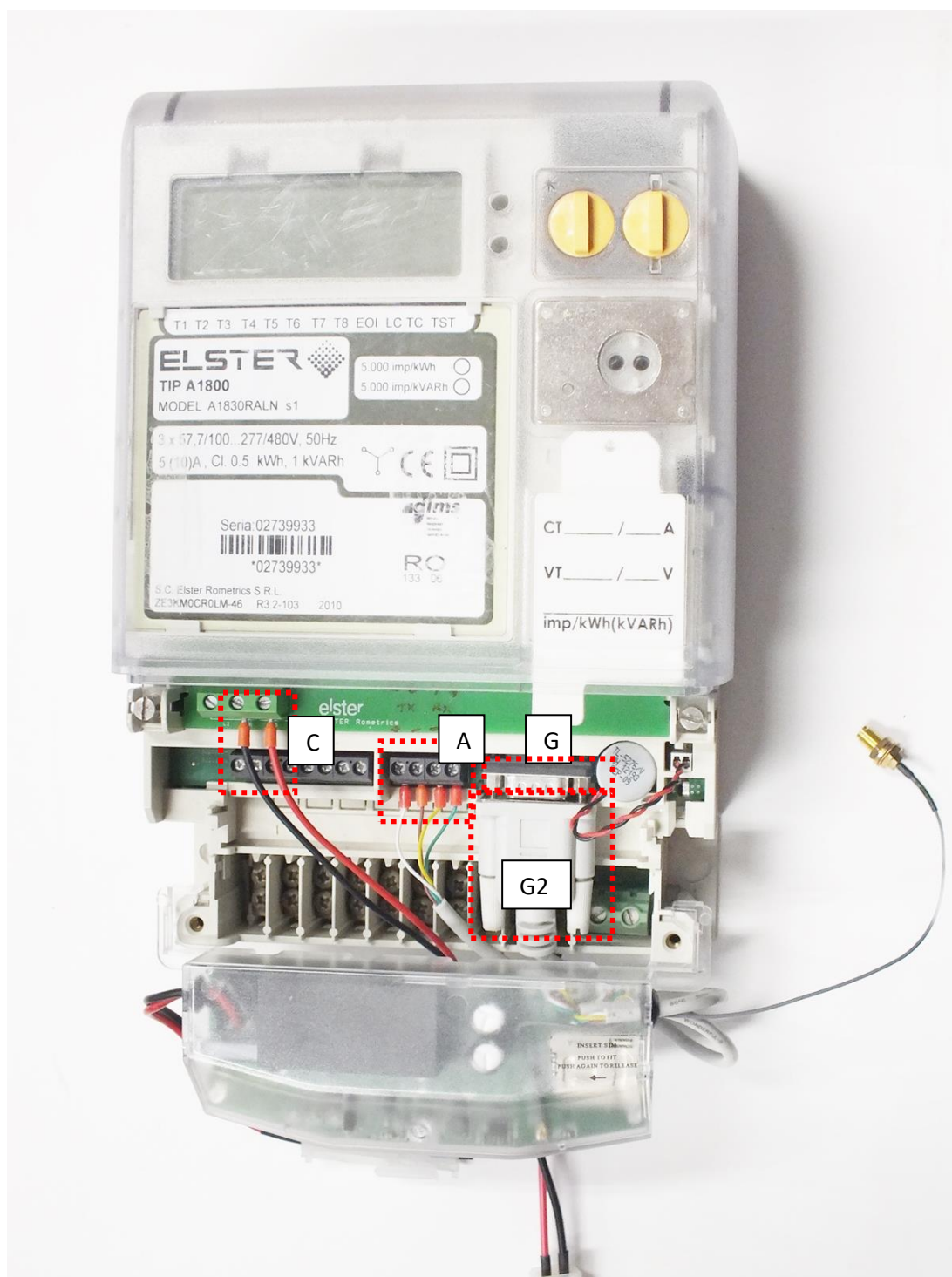
The modem is now under power connection and uses RS232 / RS485 connection. Now you can put back the removed communication module's coverage upon to the modem device to the meter box by sliding the meter housing back to its place. Fixate the meter case with the 2 screws.

2.10 Connecting the modem to Landis+Gyr® meter

If the meter has RJ12 port (2), then connect the modem's RJ12 connector to the meter's "G" marked RS232 socket plug. Connect the modem's AC power – sleeve – connector to the meter's power output connector.
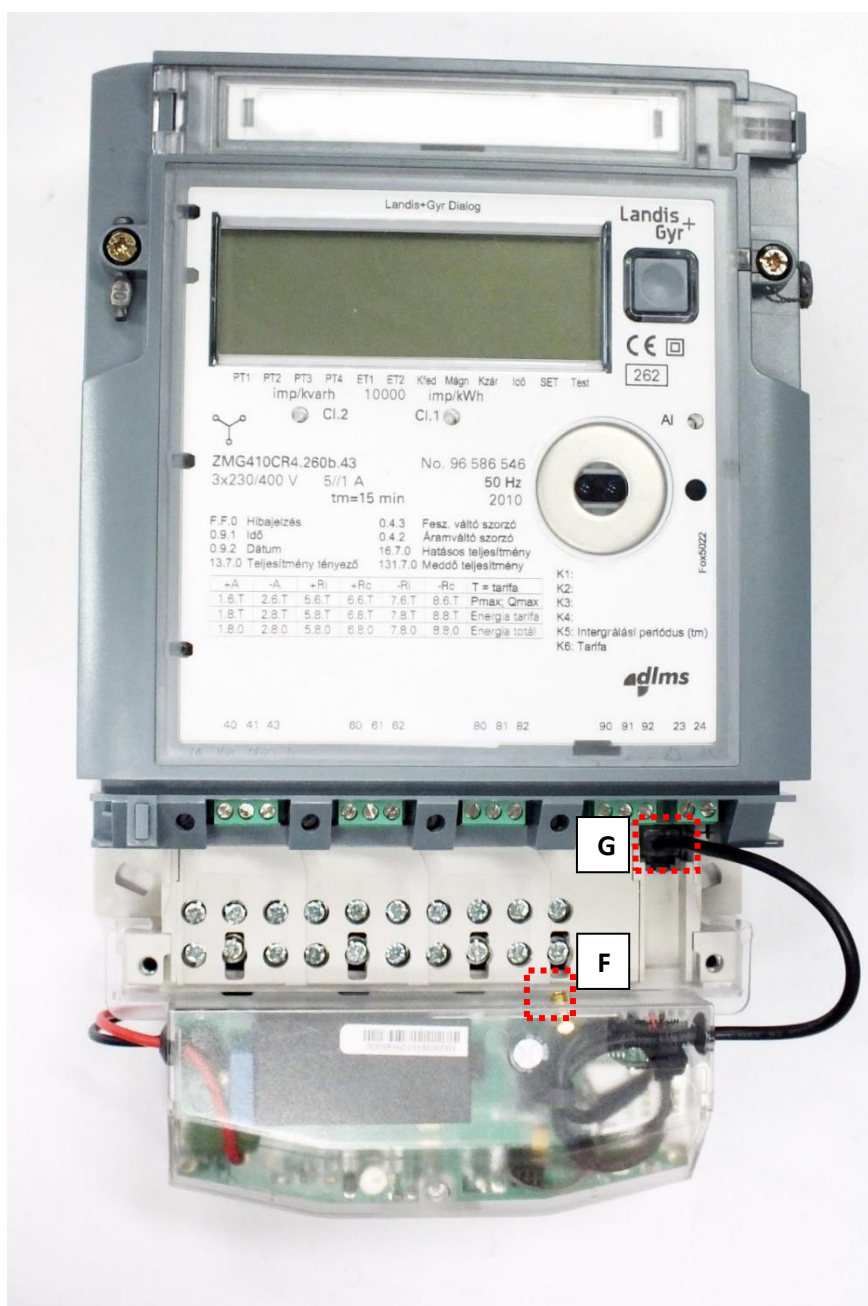
Connection to Landis+Gyr® ZMG/ZMD meter

2.11 Connecting the modem to Itron® ACE6000, ACE8000 meter

This meter has two RJ45 ports (2a, 2b) or has only one RJ45 port (RS232 or RS485). Connect the modem's RS232 (RJ45) connector (2a) to the meter's "G" marked RS232 socket plug. If the meter is RS485 version, then connect opposite side of the modem's RJ45 connector (2b) to the meter's RJ45 socket.

Connect the modem's "E" marked AC power plug to the meter's power output ("B").
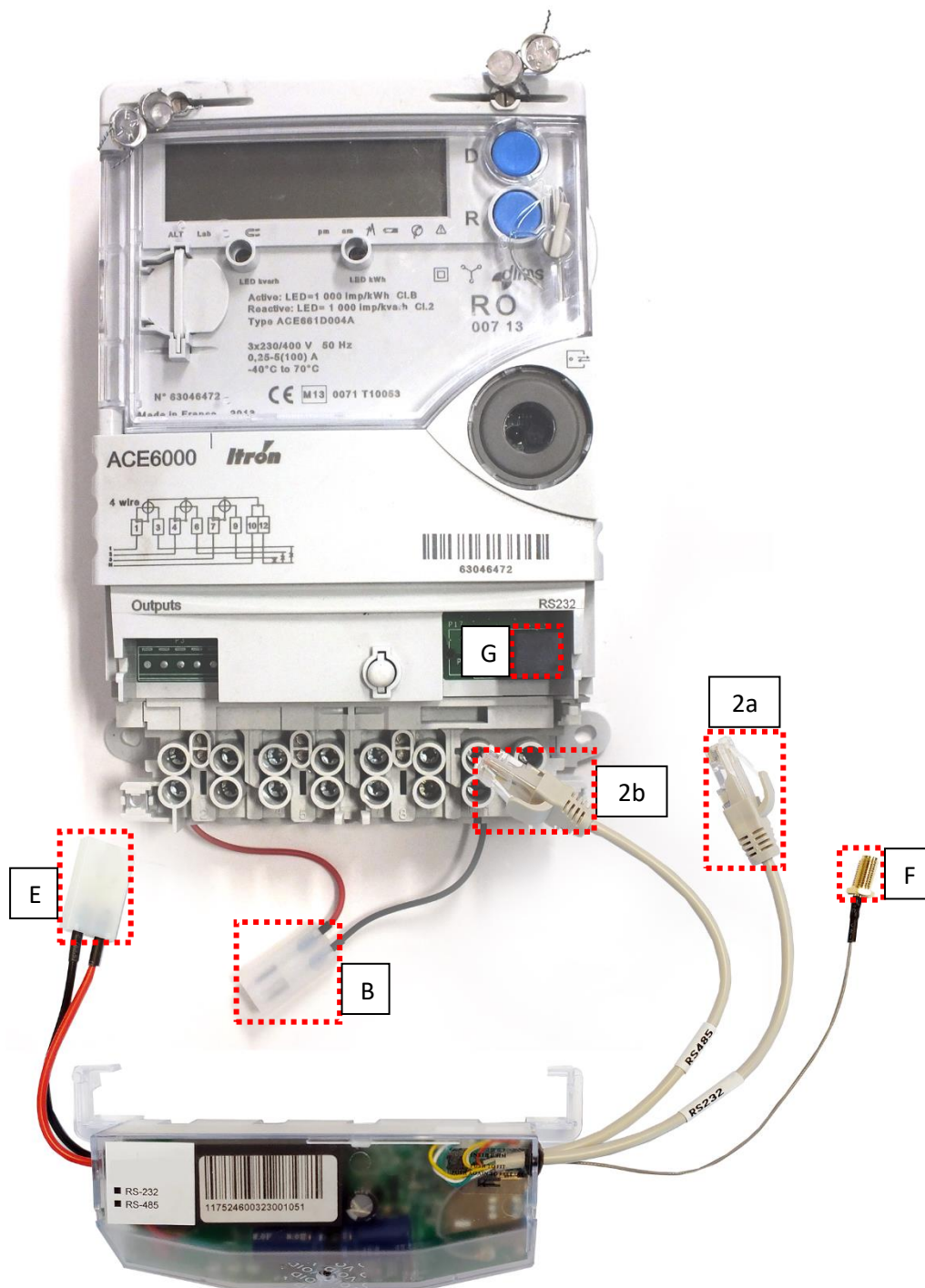
Connection to Itron® ACE6000 / ACE8000 meter

2.12 Connecting the modem to Itron® E620 meter

This meter has two RJ45 ports (2a, 2b) – an RS232 and an RS485.

Connect the modem's RS232 (RJ45) cable connector (2a) to the meter's "G" marked RS232 socket plug.

Then connect the RS485 cable connector (2b) to the meter's "D" marked RJ45 socket plug.

Connect the modem's "E" marked AC pigtail power plug to the meter's power output ("B").
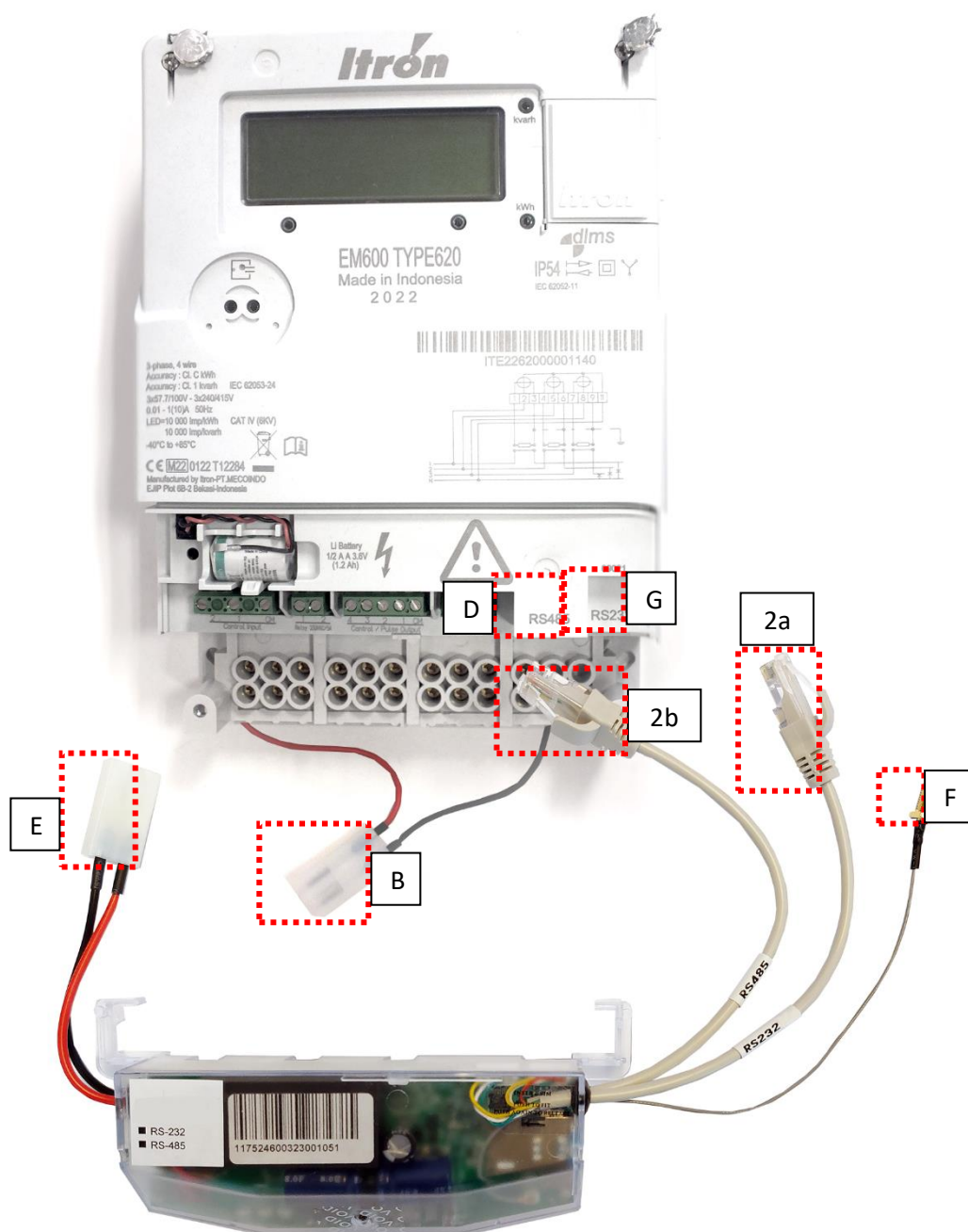

Connection to Itron® EM600 (E620) meter

2.13 Antenna connection

The modem requires enough signal strength of the cellular network and LTE or similar antenna for the proper operation and good communication. Where the signal strength of the cellular network is sufficienty, there an internal antenna may be enough to use. However, in places where the signal strength is low or poor, you should use an external antenna (50 Ohm, SMA connector), which can be mounted to the modem – you can place it even inside of the top cover of the meter.

2.14 Operation LEDs

The LED numbering is the same as the LED labels on the modem panel: from left to right in order: LED1 (blue, left), LED3 (green, center), LED2 (red, right).
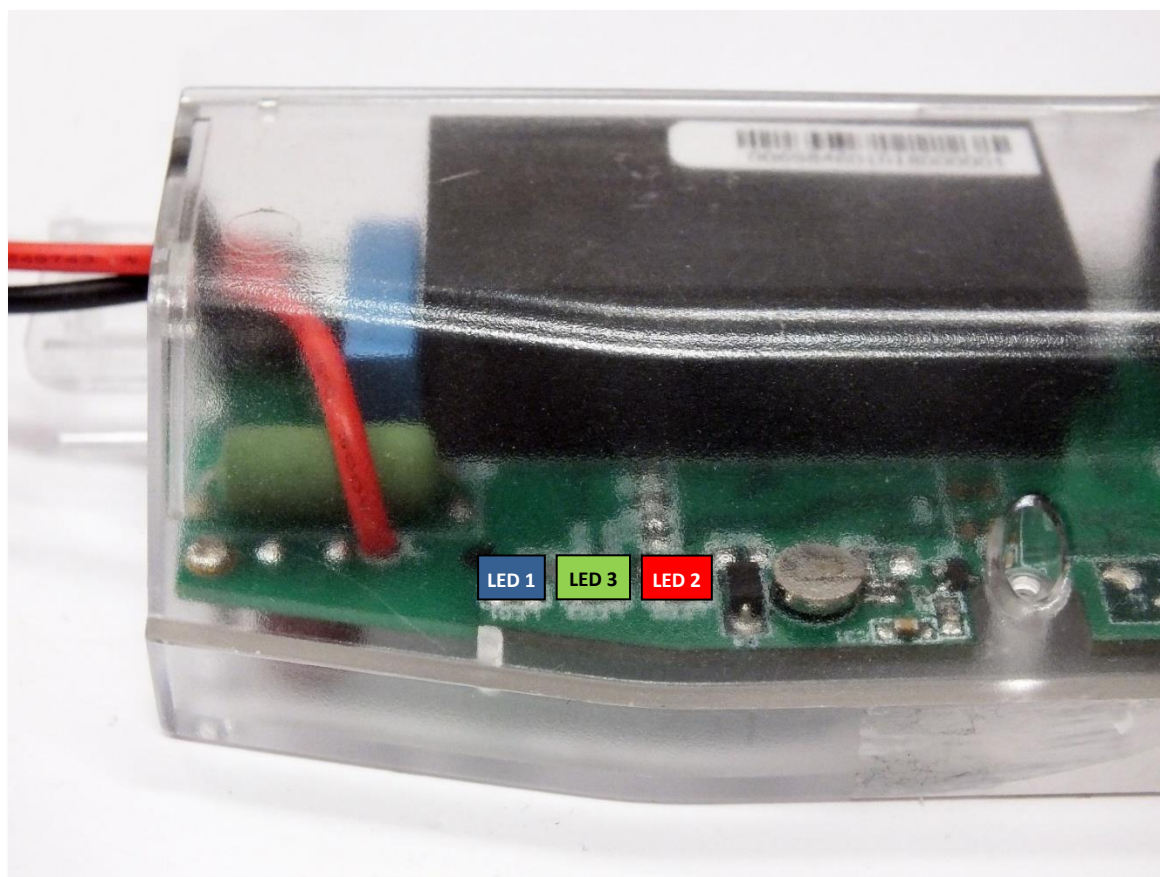
Factory default LED signals:

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 3 **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) - 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 2 **E-meter status**	- During the **transparent 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*** or ***blank***.

Over the factory defaults, the operation and the sequence of the LED signals can be changed by the **WM-E Term®** *configuration tool, at the* **Standard Meter Interface** *parameter group, where you can define one of the following functions of the leds (LED1..LED3) according the next list:*

Selectable LED status (in WM-E Term)
Not used
GSM / GPRS status *(see above)*
SIM status *(see above)*
E-meter status *(see above)*
E-meter relay status – in case of WM-E3S CIR version (E-meter relay output status)
M-Bus status
Firmware status
Network status and access technology – Network status and accessible technology information
Meter status with IEC polling – Meter status in case of IEC communication
AMM (IEC) client state

Further status LED signals (can be configured as well):

LED identifier	Events
E-meter relay status - E-meter relay* output status (in case of WM-E3S CIR only)	• Default status**: "Ready"** - LED flashes 1x per second • **"Active"** mode - the *relay switched**, which **turns on the LED** when it is switched on. • "**Normal**" mode - the *relay released**, which **turns off the leds** released.
M-Bus status	• Not used
Firmware status	• When the modem **firmware starts**, the **LED turns on** • When the **connection between the meter ←→ modem** is established, the LED **flashes in every 2 seconds.**
Network status and access technology	• During **network search**: **flashes once per second** • When **connected to the cellular network** and the IP connection is OK: **Blinks twice per second** • If mobile network access has changed: flashes quickly: ◦ *2G → 2 flashes / sec* ◦ *3G → 3 flashes / sec* ◦ *4G → 4 flashes / sec* • If **no network** is available: the LED is **not active**
Meter status with IEC polling	• When the modem ←→ meter starts communicating, the LED flashes 1x per second. • If the meter responds to the modem during communication, it turns on the LED. • If the modem ←→ meter cannot communicate with each other for a while, the LED will turned off.
AMM (IEC) client state	• By default, or when the modem ←→ EI client communication is closed, the LED is off • · modem ←→ EI client** flashes briefly once per second when connecting (then pause for approx. 1 second) • If the EI client** flashes once per second when logging in • The communication connection between the EI client** ←→ modem is established - the led is active

The power supply of the e-meter can be controlled with the relay listed here. Cannot be used for tariff change!
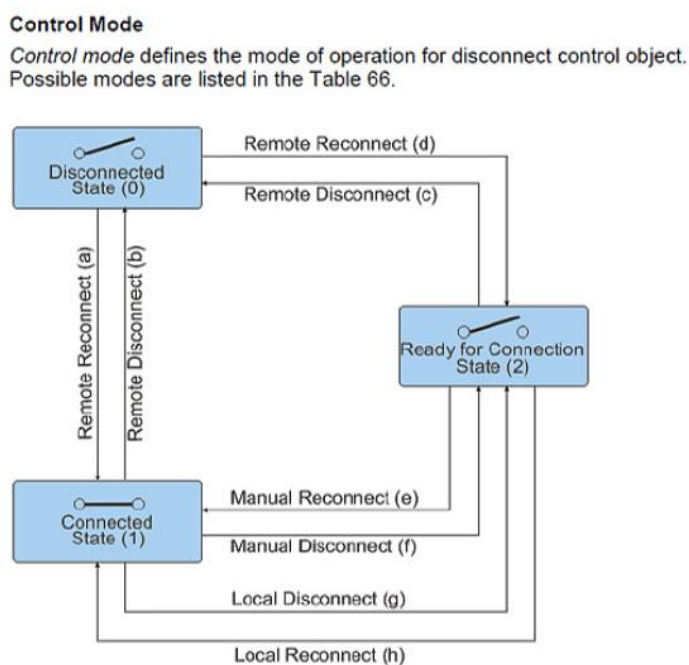
** The EI client is a transparent TCP channel outgoing from the modem to the EI server

At the relay status, as it is shown in the next figure it is „*Disconnected*", which is the "active" mode (relay retracted, in which case the **LED is turned on**).

The "*Connected*" is in "normal" mode (relay released), the **LED is turned off.**

In case of "*Ready for Connection*", it is in "ready", when the **LED flashes once in every second.**

During firmware upload, the LEDs indicate normal operation - there is no distinct indication during the FW update. After installing the FW, the three LEDs light up for 5 seconds and then all three light up. The modem will then restart and use the new firmware. Then each LED will continue to flash according to the listed states.

Control Mode
Control mode defines the mode of operation for disconnect control object.
Possible modes are listed in the Table 66.

2.15 Input status detection

If the 2 digital input cable is presented on the modem, the device can be used to monitor the status of two inputs. Furthermore, it can be used for sabotage detection. In case of input status change the device generates and transmits SMS alert notification – according the settings. This SMS messages can be configured by the WM-E Term® application – in the **AMM (IEC)** parameter group part.

2.16 Internal connectors
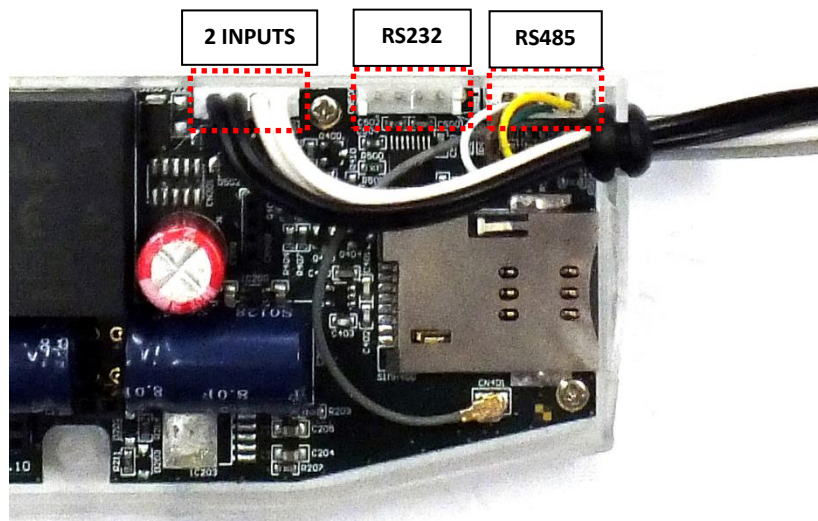
RS232 – 4-pin internal connector, connected to the CN500. Serial cable outfit to DSUB-9 type connector (by order, alternatively it can be ordered with an RJ12, RJ45 or DSUB-25 type connector outfit).

RS485 – 4-pin internal connector, connected to the CN501. The RS485 cable outfit leads to 2- or 4-wire connector (alternatively it can be ordered with RJ12 or RJ45 type connector outfit).

2 INPUTS – 4-pin connector, connected to the CN502. The cable outfit leads to a 4-wire connector to connect to the external devices. Pinout: **black** wires are related for input nr. #1, **white** wires are related for input nr. #2.

2.17 RS232 connector pinout (internal CS5 connector)

Color	Alternative color	Mark	Meaning	Meter RS232 port connector side
White	Black	GND	Ground	Meter_GND
Brown	Red	RX	Receiving data	Meter_TX
Green	Green	TX	Sending data	Meter_RX
Yellow	Yellow	DCD	DCD (in case of compatible meter)	Meter_DCD

On **CS5** connector - marked by **red circle** on the photo – the pin nr. "**1**" is the **GND** connector.

2.18 RS485 connector pinout (internal CS7 connector)

Color	Alternative colour	Mark	Meaning	Meter RS485 port connector side
White	Black	RX+	Receiving data	Meter_TX+
Brown	Red	RX-	Receiving data	Meter_TX-
Yellow	Yellow	TX-	Sending data	Meter_RX-
Green	Green	TX+	Sending data	Meter_RX+
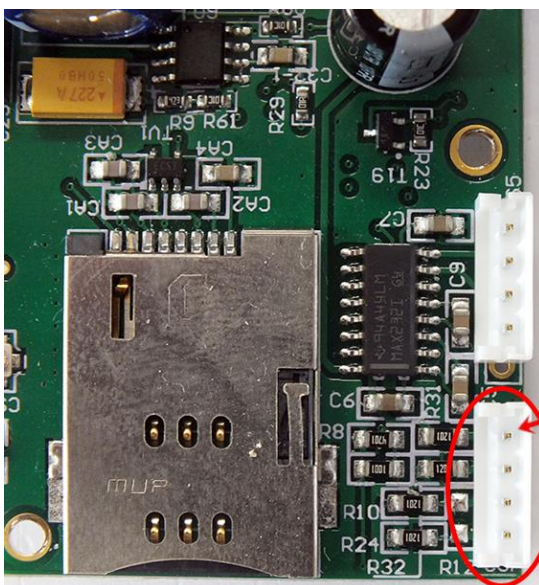
On **CS7** connector - marked by **red circle** on the photo – the pin nr. "**1**" is the **RX+** connector.

2.19 Power outage management

Some firmware versions of the modem support 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.

2.20 Push operation method

The complete readout and data sending mechanism to the centre and the other direction for the configuration and maintenance tasks can be realized on the defined paths.
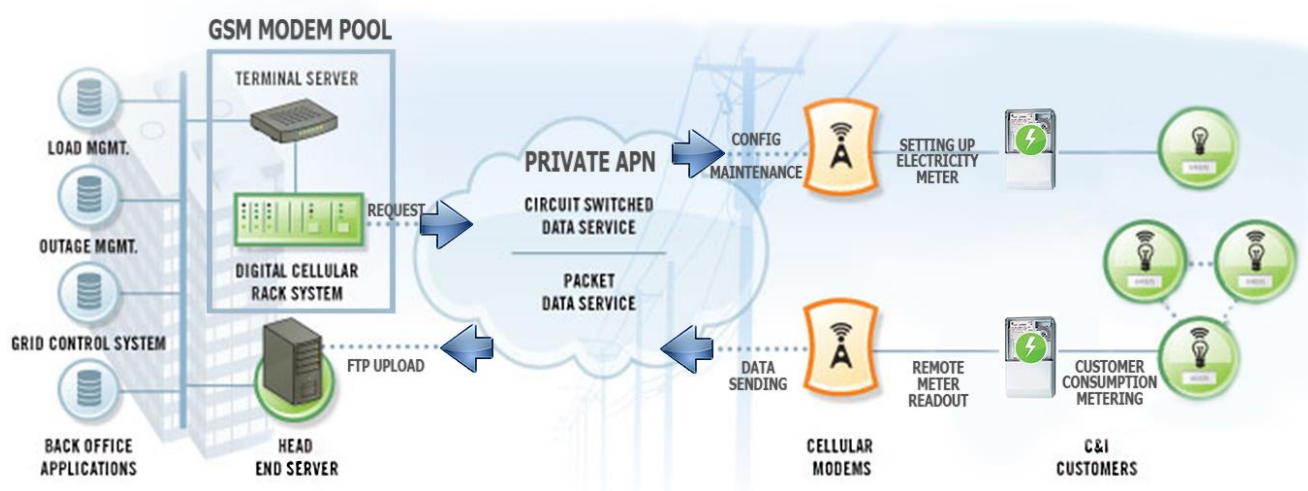
The modem does not operate continously on the network.

Therefore, there is an another option and meter data sending mode to initiate a remote readout automatically in the pre-defined intervals. Anyway, 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 devices needs to be connected to GSM network and ready to connect to GPRS, but without active IP connection.

- Data Push - starting at predefined times

- The Data Push method triggers FTP file upload, plain text or encrypted.
- The unique filename and the file is generated automatically.
- The ftp function also requires an ftp server to receive data that is accessible from the currently used mobile network.
- The ftp must be set to passive mode.
- Unique file names are generated automatically.
- The file always consists of two parts, first a standard register read and then an event log (containing the events of the last 31 days).
- The readings shown as standard IEC format, including some ASCII control characters
  like STX ETX, etc. also.

- Alarm Push (sending alarms) - starting when new event can be read from meter

- Alarm Push method triggers TCP sending of a DLMS WPDU contains the IP address,
- listening port number for transparent service, and the meter ID.

- Triggering with SMS

- GPRS connection can be activated remotely with a defined SMS from any call number.
- The SMS text must be left empty.
- After the SMS received, the modem will connect to IP network, and will be accessible as a IP server for a time period defined in the config file.
- Example config file will be provided with a 30 minute setting.

2.21 LED operation during the CSD call

The CSD call consists of two parts:

a.) We want to read / configure a meter in transparent mode

b.) We want to perform a modem configuration / firmware update

<u>To read / configure a meter in transparent mode:</u>

- The LED configured for GSM / GPRS status will be lit continuously during the CSD call.

- The LED that is configured for e-meter status will flash according to the CSD call status:

• It will flash every half second from the beginning of the connection to the end of the connection / If the measuring interface is not configured for a baud rate of 9600, the LED will be lit continuously from the beginning to the end of the connection

• After closing the connection, the LED will turn off

<u>If you want a modem configuration / firmware update:</u>

- The LED configured for GSM / GPRS status will be lit continuously during the CSD call.

- In this case, the other LEDs do not change due to the CSD mode.

2.22 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*.

2.23 Data control direction (DCD) feature

In case of using the WM-E1S® modem with Itrón® SL7000 or other meters or the WM-E1SL® meter through RS232 connection, there you can use the **DCD** feature - due to the RS232 data connection – there you can declare the direction of the data control according the following parameter settings as options.

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)

Important! *This feature needs of using the 2.49B or later firmware version for the modem.*

2.24 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 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.) <u>Passive mode - If you don't use the ping - set the connection retry:</u>

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 log on to the network in a given time).

Chapter 3. Modem Configuration

3.1 Configuration

The modem must be configured by the WM-E Term® software by configuring its parameters which must be performed before the normal operation and usage.

Over the parameter settings of meter, modem and communication, etc., you can also test the modem communication by the configuration program.

Important! The modem can be configured through RS232 connection only!

During the configuration, you have to remove the meter-modem data connection (2/2a) and you have to connect the modem to your computer by the following hints.

Important!
Note that until the configuration the modem is not connected to the meter, therefore it cannot readout the parameter values through the RJ12 / RS232 interface. Another configuration port should be selected for that – e.g. Optical or TCP/IP port.

The modem can be connected with the RS232 cable (2a) - or in case of version C by the RJ12 cable (2) and by using the RJ12/USB DONGLE adapter by directly to your computer.

Attention!
During the configuration, the power supply of the modem must be assured by its AC plug from an externa power source (from 100-230V AC or by the meter 57-100V AC).

Use the WM-E Term program for the configuration – use the WM-E Term User manual.

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 configured by using the WM-E Term® software through the serial link connection.

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

In places where the signal strength is strong it is possible to use internal antenna, for areas with poor reception mount an external antenna (50 Ohm SMA connection) to the antenna connector (3) of the device, which you can place inside even inside the meter enclosure (under the plastic housing).

If you want to readout the meter parameter values during the PC-modem connection, after the RJ12-configuration you made, then you should select a different configuration port to the meter as TCP/IP or Optical, etc.

3.2 Configuring the modem by WM-E Term®

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

Download WM-E Term® to your computer from the following location using a browser:
https://www.m2mserver.com/m2m-downloads/WM_ETerm_v1_3_80.zip

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

The configuration software supports user account management and password change. You can log in to the program with a password! Follow the WM-E Term® configuration software's User's Guide!

After the firmware update, the modem will restart and work according to the new settings.

The LEDs on the device always inform you about the current status of the modem.

Factory configuration file sample (for WM-E Term):
https://www.m2mserver.com/m2m-downloads/WM-E1S_STD_v5210_default.zip

For the operation of the modem cellular network communication and SIM card settings (such as APN, password, and account) are required.

In addition, be sure to review and save the transparent mode data speed functions in the WM-E Term program for the RS232, RS485 settings. In addition, you must send the configured configuration to the modem using the program - according to the configuration software's User Manual document.

WM-E Term User Manual:

https://www.m2mserver.com/m2m-downloads/WM-E-TERM_User_Manual_V1_94.pdf

3.3 Sending an SMS from the meter

Depending on the meter configuration, by using the modem, the meter can send SMS message corresponding to standard AT commands to the phone number which was configured at the meter side.

It is worth configuring this primarily for alarms and special events, according to the capabilities of the meter.

No other settings are required in WM-E Term®.

3.4 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).

Device information

RSSI: -73 dBm			
Access technology: 2G			

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		

RS_232

3.5 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.

3.6 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.

Chapter 4. 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

4.1 Support

The product has an 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/

4.2 Product Support

The documents and information related on the product are available here.
https://www.m2mserver.com/en/product/wm-e1s/

Chapter 5. 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.