WM-E3S 4G CI® modem
WM-E3S 4G CI R® modem

Installation Guide and

Modem Configuration
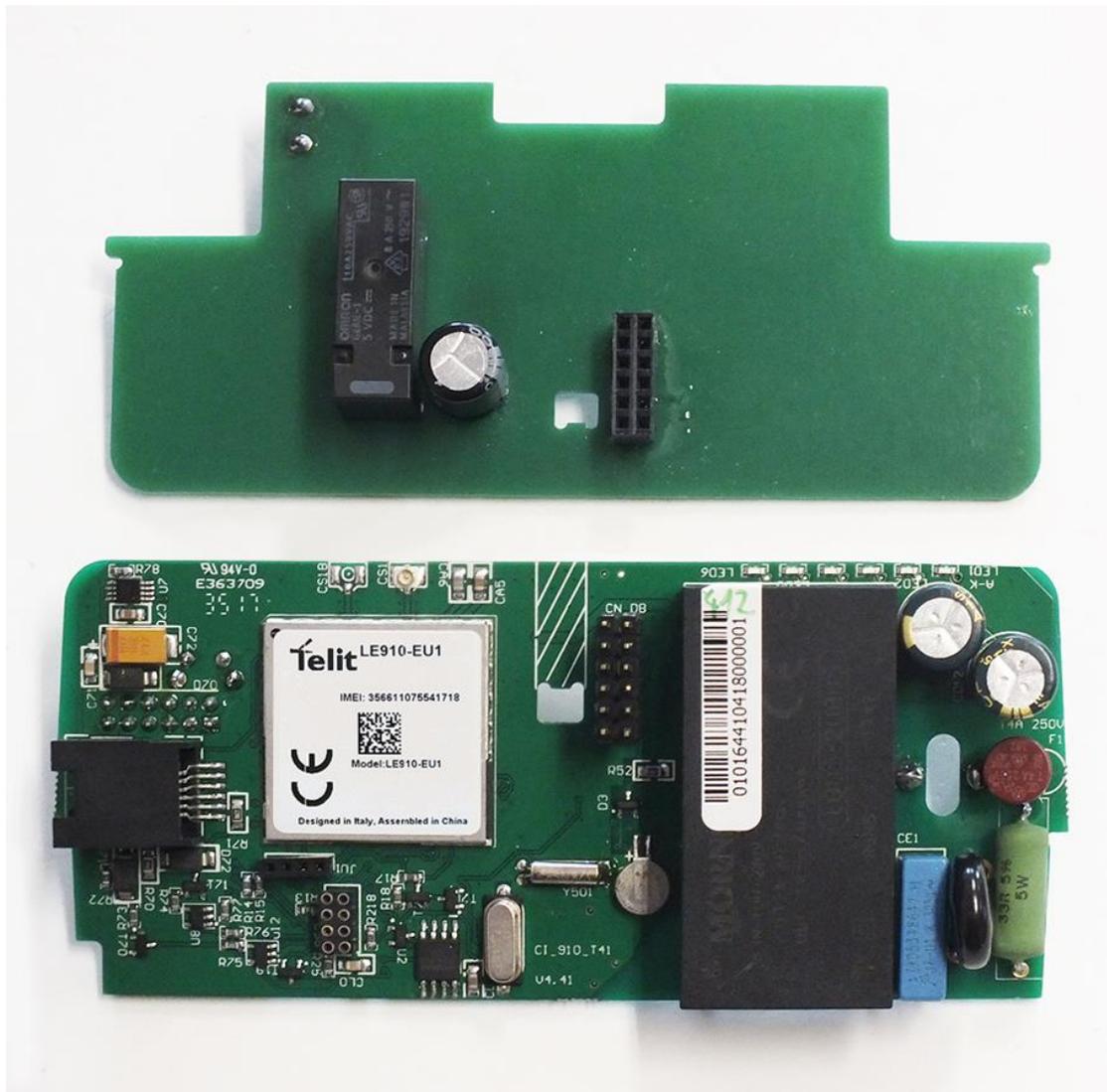
Document specifications

This documentation was made for the installation and configuration of the **WM-E3S 4G CI®** (Customer Interface version) modem and the **WM-E3S 4G CI R®** (Customer Interface and relay output version) modem.

Document Version:	REV 1.5.1
Hardware Type/Version:	WM-E3S 4G CI®, WM-E3S 4G CI R® modem for electricity metering
Hardware Version:	V 4.41 + CI board
Firmware Version:	V 2.3.10
WM-E Term® config. software version:	V 1.3.78
Pages:	24
Status:	Final
Created:	15-11-2016
Last Modified:	20-01-2022

Chapter 1. Introduction

The **WM-E3S 4G CI®** is an integrated modem, which is suitable for remote reading of electricity meters remotely, on the 4G LTE-based cellular network. The communication module is a part of the Smart Metering concept.

This modem was especially developed for **Elster® AS220, AS230, AS300, AS1440, AS3000, AS3500** electricity meters, and can be connected to the meter by sliding into the meters' communication module slot and can be sealed.

Thus, the modem presents a compact solution, the dimensions of the meter will not change if a modem if fitted or not. This solution offers the possibility of future upgrade of the electricity meter with a communication module and is ideal for installations where there is restricted assembling space. The modem is powered internally by 230V AC power through the meter's integrated mains connector.

The **WM-E3S 4G®** is 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 modem can be accessed remotely through the cellular network (by the **Telit®** module) and it is able to send data on the Internet by using an APN.
It has 2G fallback features, therefore in case of outage/inaccessibility of the 4G network it is communicating further on the 2G network.
You can save money by using our modem, because there is no further need of manual readout of the meter systems.

The Customer Interface (CI) version receives data from the meter in the scheduled intervals, therefore can readout the meter registers over the parameters.

All over these, the „**R**" version (**WM-E3S 4G CI R®** modem) has relay output, therefore the it can switch the meter to change the tarrif mode through its output - due to the 1-4 configures Tariff-mode settings.

The modem can be used with push data transmission method, thus the modem can initiate the communication with the AMR centre periodically at a pre-programmed time interval or triggered by an alarm (power outage, cover removal, reverse run, etc.)

The device can be configured through the serial port, but can be performed through TCP connection remotely.

Chapter 2. Connections

2.1 Interface connectors, internal connections (mainboard)
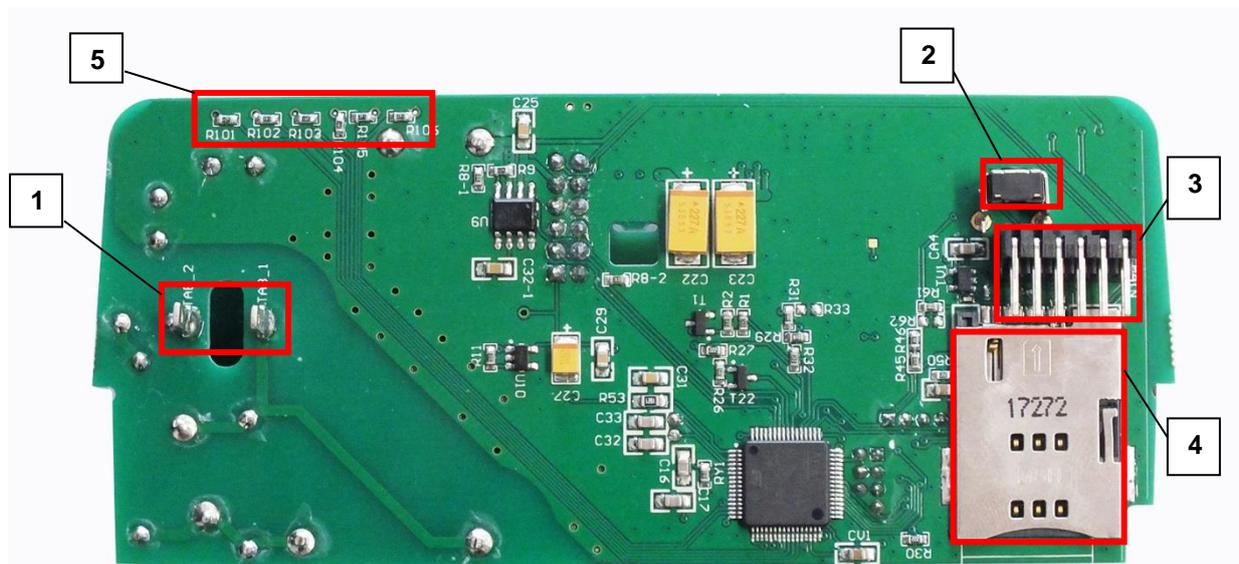
1 – Mains connector
2 – Push button
3 – Data connector (to the meter)
4 – SIM card socket (push-insert)
5 – Status LEDs
6 – SMA antenna connector
7 – U.FL antenna connector

8 – Telit LTE module
9 – Rechargeable battery (for spare purposes)
10 – Power adapter unit
11 – RJ12 interface connector (6P6C)
12 – Internal data connector (for relay board „R" version)
13 – Relay output (on expansion board) - optional
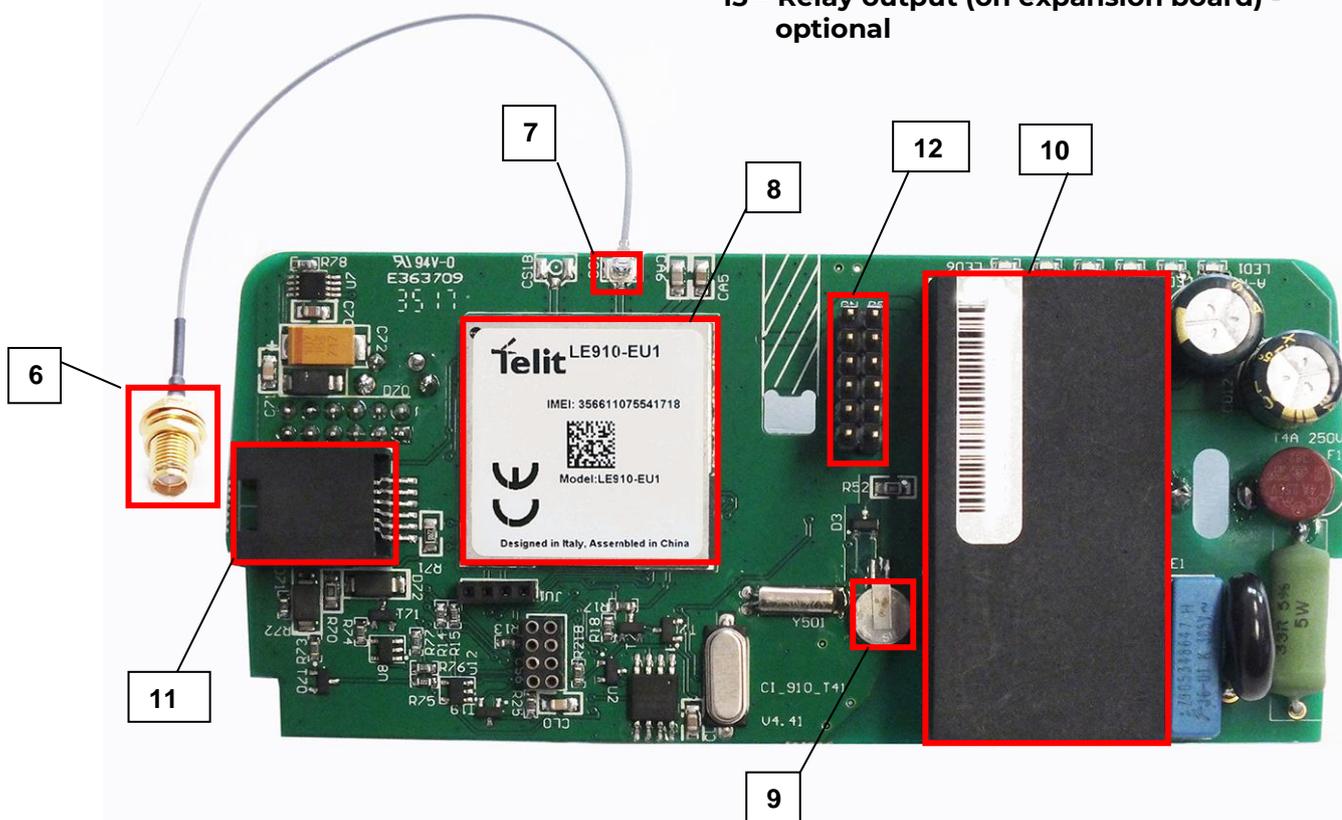
2.2 Interface connectors, internal connection (expansion board)
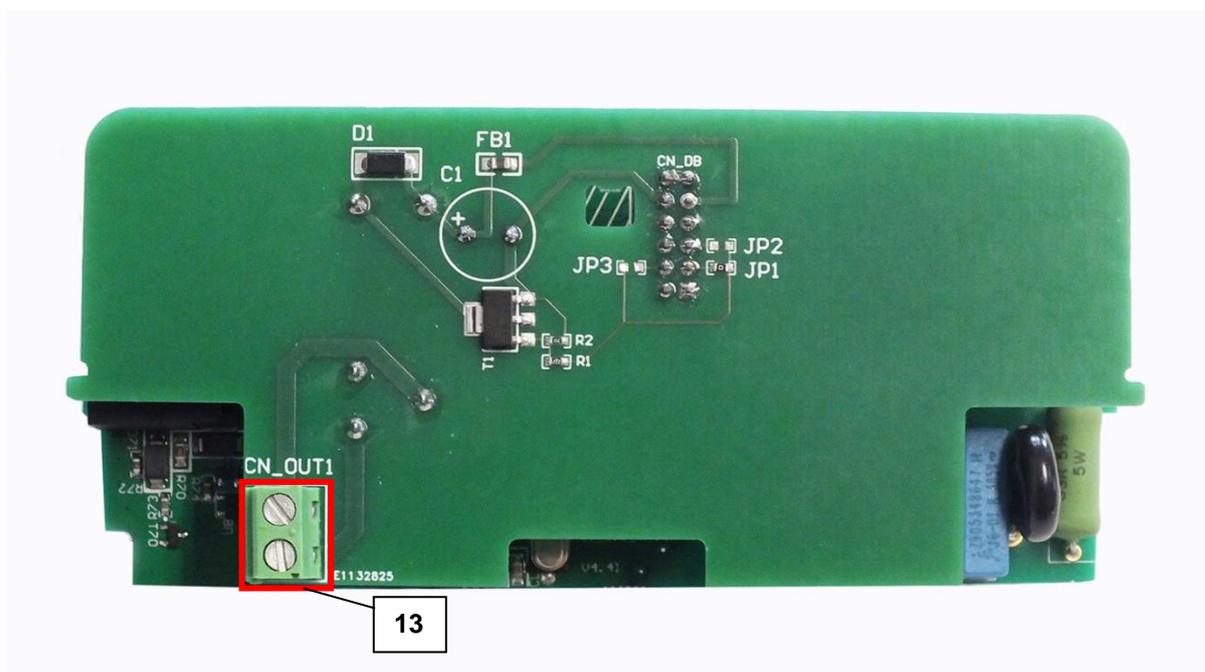
2.3 Assembled modem (mainboard + expansion board)
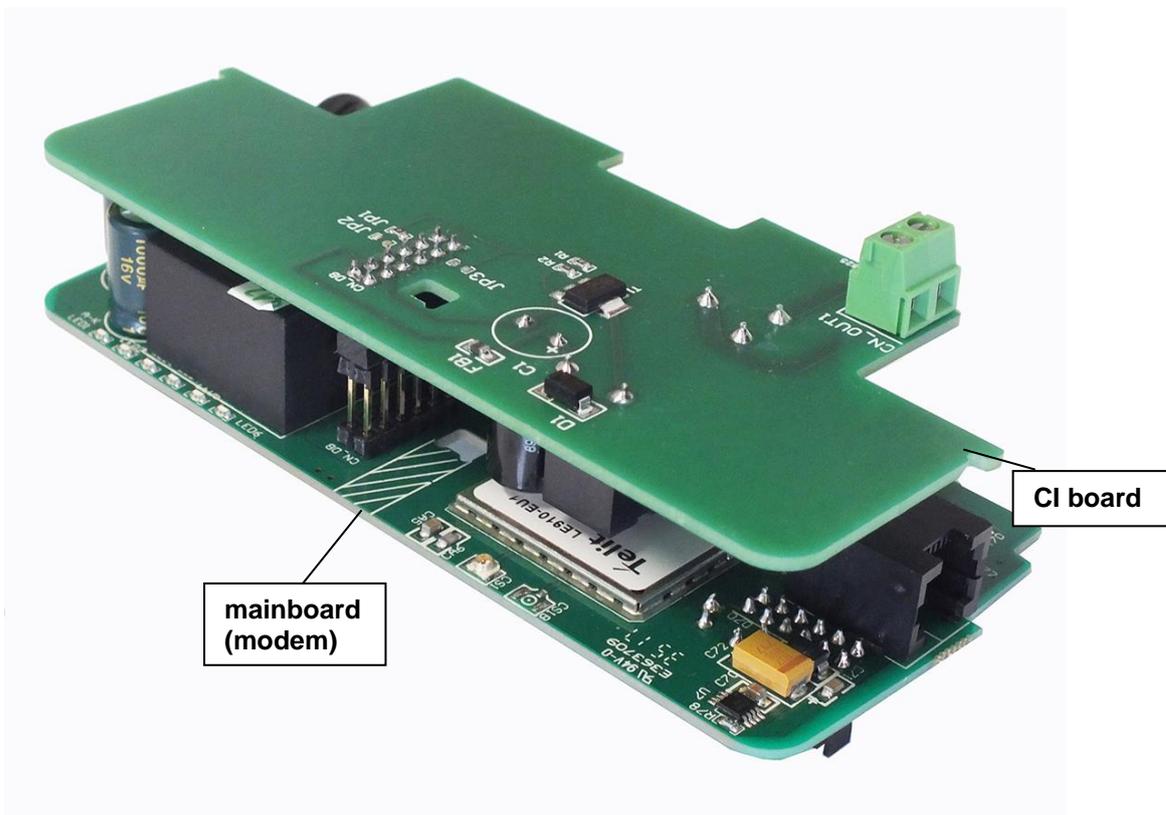
We deliver assembled product as it is show in the picture.

2.4 Inserting a SIM card

Insert an activated SIM card into the push-push SIM card slot (4). The SIM card is replaceable by pushing the inserted SIM card – if it is necessary.

2.5 Connecting the modem the AS3000, A3500 meter

Remove the Elster® AS3000, AS3500 meter's communication module plastic case by releasing the screw from the top middle part of the housing.
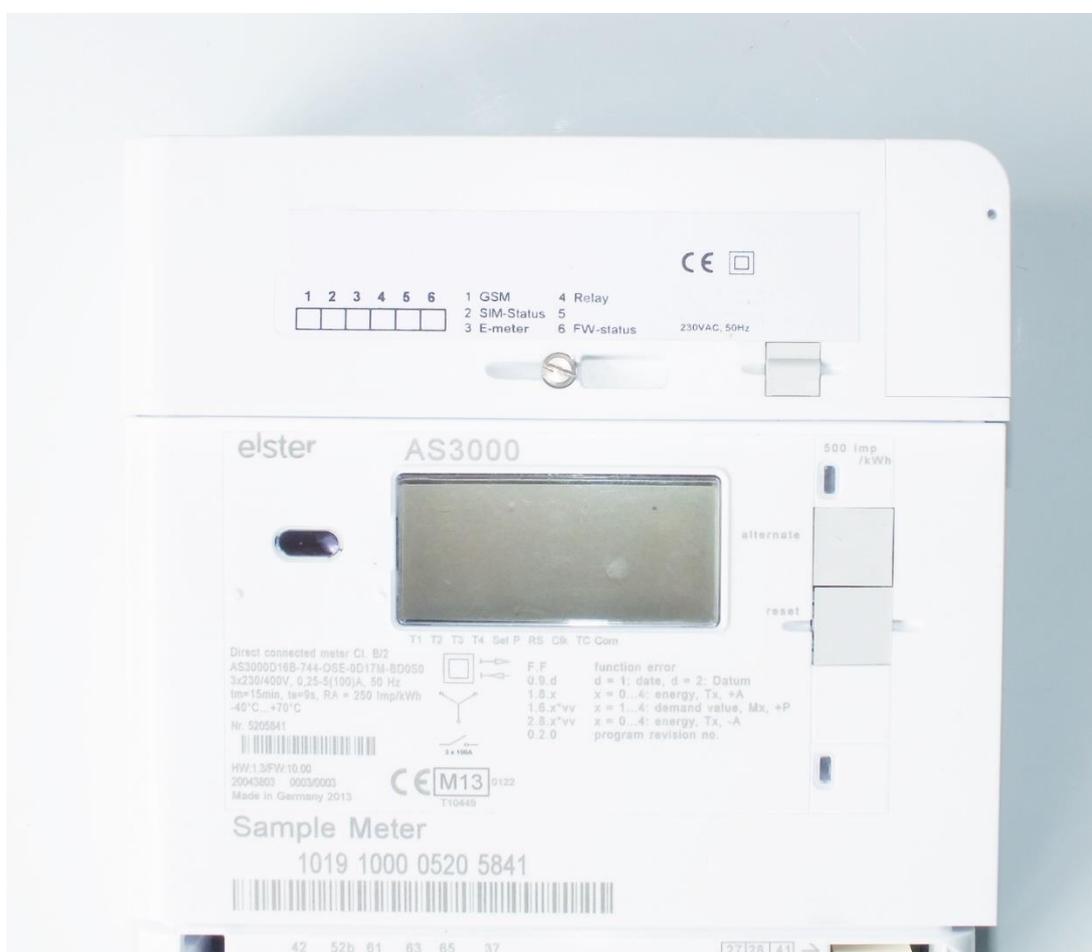

Inside the communication unit's case mount the SMA-M antenna interface connector (6) on the housing (fix it with the SMA connector's screw).
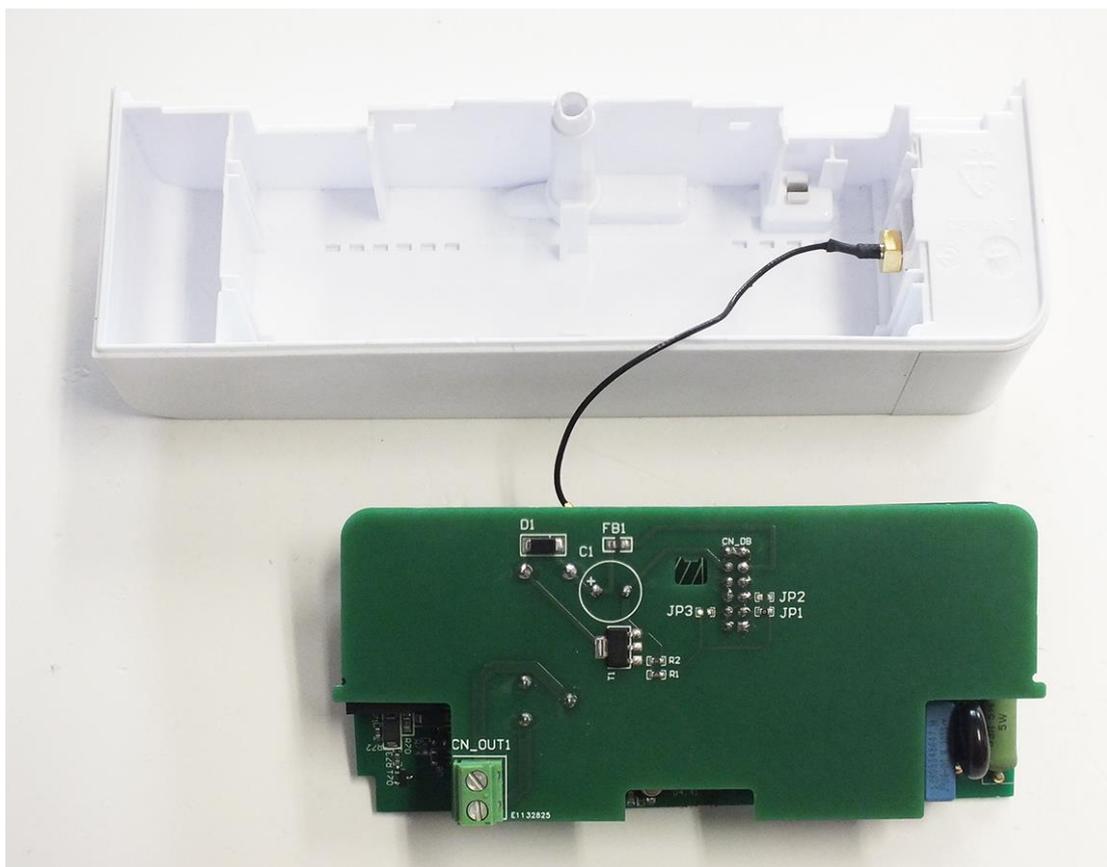
Snap the modem unit (mainboard + expansion board) into the communication module terminal's plastic enclosure by sliding into, through the guiding rails of the case. Insert the modem into the right orientation into the slot. Check the 12-pin data connector (3) position – according the next picture.

Push the modem into the terminal enclosure, until you'll hear a click sound.
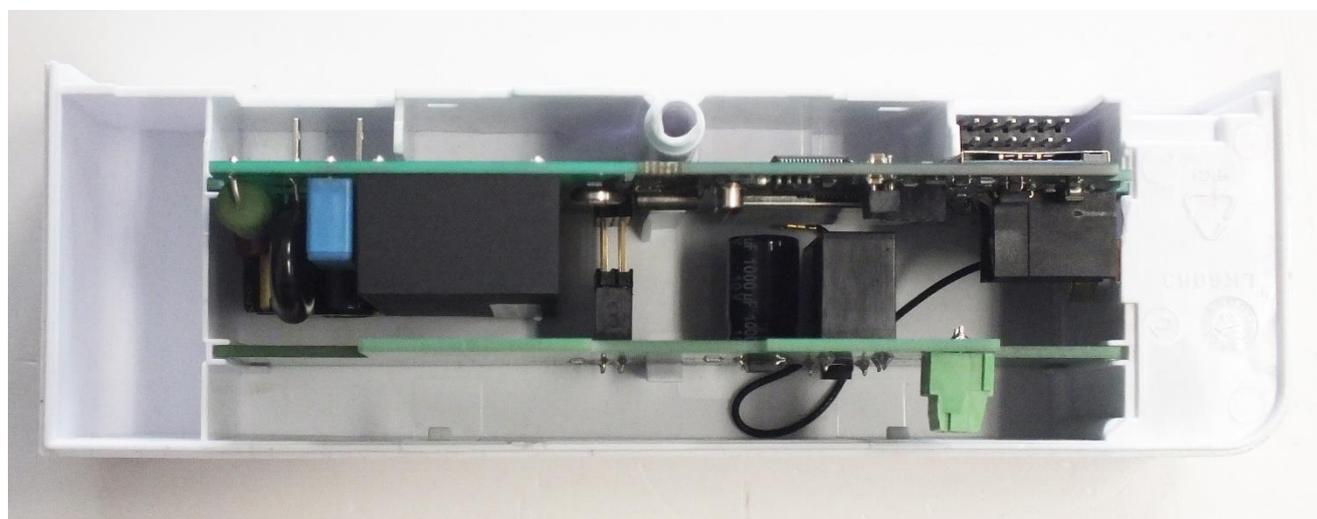
The interface connector (3) is close to the SMA antenna connector (6) (right top side on the picture).

At the center of the modem you will found two plastic hooks, which helps you at the fixation into the enclosure.

(If you want to remove the modem board, push these hooks carefully,

and you can free to remove the communication module from the terminal case.)

Now we can connect the communication module to the meter by sliding the modem into the meter enclosure.

The communication interface (3) and the mains connectors (1) must be connected to the connector pairs from the meter housing.

(Check the 12-pins data connector and the power connector (2-pins) position in the picture. You will find the same connectors' opposite part at the bottom meter side, which you have to connect.

The meter's terminal module housing upper right edge is a rounded as a sign of the perfect

slide fit the adaptation to the meter.
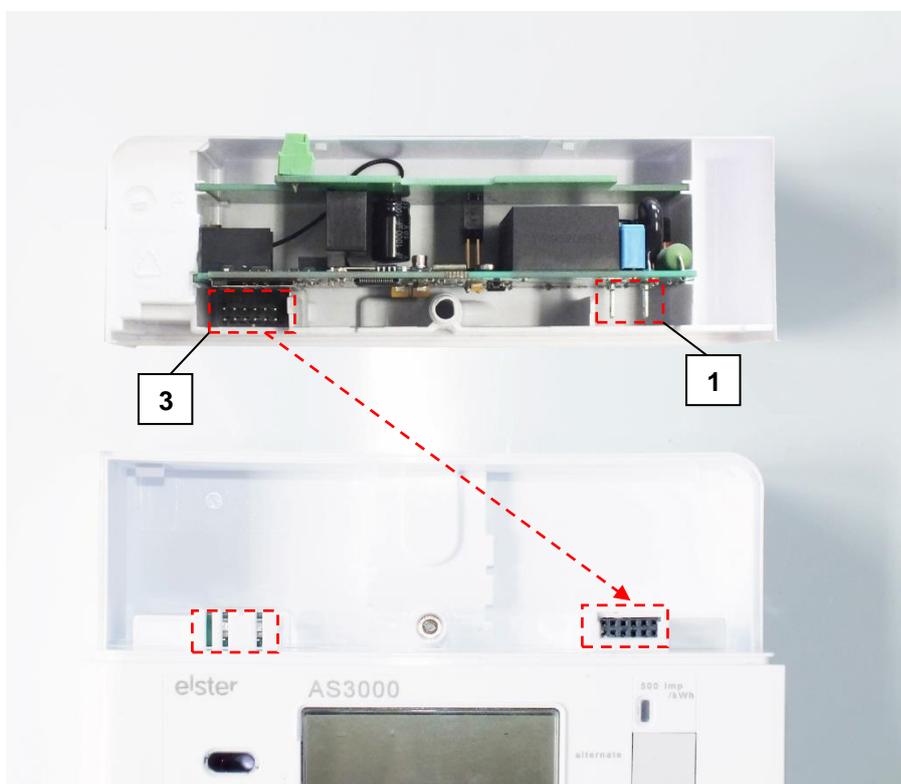
After assembling, attaching the modem terminal unit and turning on the meter, the modem will be immediately powered on, and its operation is confirmed by the LED signals.
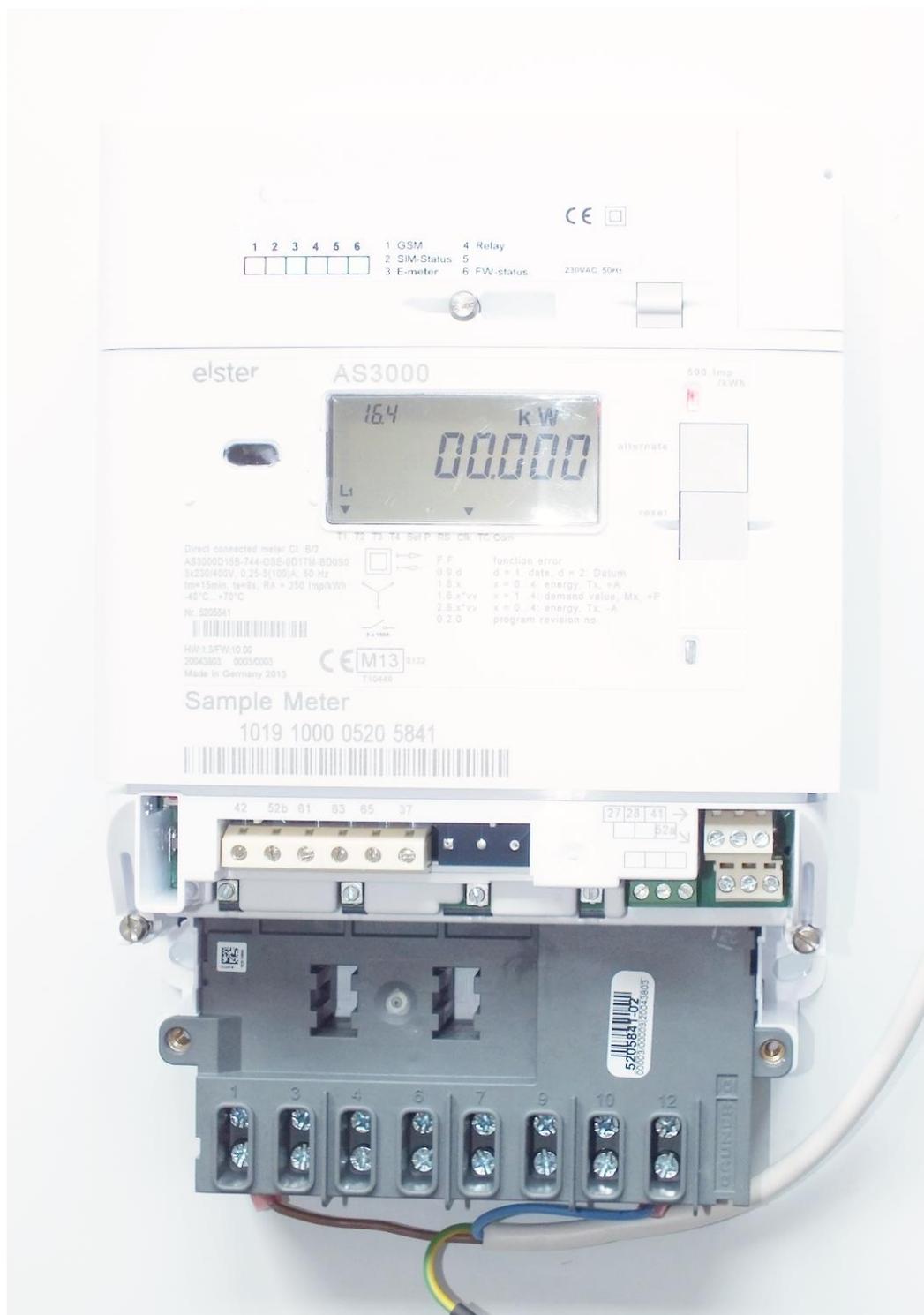
2.6 Connecting the modem to the AS220, AS230, AS300 meter

Disassemble the Elster® AS220, AS230, AS300 meter's communication module plastic case. Release the top screw at the middle and take off the upper modem unit case.

The modem can be inserted into the transparent plastic enclosure of the communication unit.
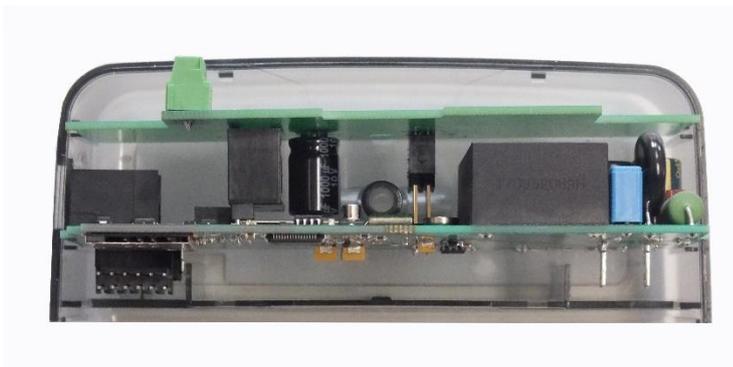
Inside the communication module's transparent plastic case, mount the SMA-M antenna to the antenna connector (6) on the housing (fix it with the SMA connector screw).
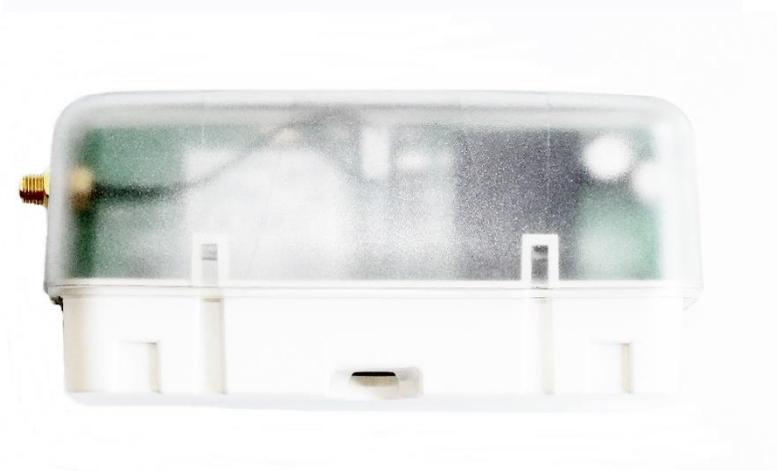
The communication unit now is ready to be attached to the meter by fixing it on the meter housing.

The 12 pins communication interface (3) and the mains connector (1) now plugs into the meter.

After assembly and turning the meter on the communication module is ready for operation. The LED signals will sign the operation status of the communication module.

2.7 Antenna connection

For proper 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-M connected) to the antenna connector (6) of the device, which you can place inside even inside the meter enclusre (under the plastic housing).

2.8 using the RJ12 connection

Connect the proper cable to the modem's RJ12 communication interface (11). The listed registers can be readout on the cable (see Chapter 4).

The data is always active on the P1 interface, furthermore you can readout other registers from the meters.

The RJ12 connection pinout can be seen in the following table.*

Pin # (RJ12)	Signal name	Description	Remark
1	+5V	+5V power supply	Power supply line
2	Data request	Data request; Rx	Input
3	Data GND	Data ground	
4	NC	-	
5	Data	Data line; Tx	Output; open collector
6	Power GND	Power ground	Power supply line

The Pin nr. 2 inactvice in case of the relay output version modem!

2.9 Relay connection

You can found the relay output (13)on the modem's optional expansion. Then, by using the Customer Interface, the client can receive data in cyclic intervals from the meter, which is switching the operation by the current tarrif settings – due to the modem's relay output switching.

Chapter 3. Modem Installation Guide

The *WM-E3S 4G CI*® communication module unit can be configured by the a **WM-E Term® v1.3.19T** or newer version or the **DM Set**® / **AlphaSet®** software which is also suitable for setup the electricity meter through a serial connection.

The **WM-E Term®** tool is suitable over the communication settings to readout the *P1 Customer interface* registers and to perform *Tariff* mode settings. You can found a document about the application tool's settings on our website.

Here we show the **DM-Set®** software settings, which is used by the utility companies. Follow the next steps for configuring the CM to the meter.

3.1 Connection

1. The **DM Set®** software must be installed to a *Microsoft Windows*® capable installed PC computer.

2. Connect properly the optical head to the meter and to the USB port of the computer.

3. Configure the modem through the optical head.

4. Start the **DM Set®** application for the configuration (version 2.14 or newer is necessary).

5. After launching the application, choose the **Extras** menu and **Set modem series** option.

6. Then choose **AMXXX** option then click on the **OK**.

7. Choose **Extras** menu and **Options**, then choose the proper **serial port** which is used for the connectivity of the optical head. Let's choose the **8N1** data format and **115 200 baud** speed rate for the data transfer.

8. When you are configuring the modem first time, you can read out the version information only.

    Load the sample config file provided (go to step 9.), or request it from your supplier.

    IF YOU HAVE ALREADY LOADED A VALID CONFIGURATION FILE TO THE MODEM, You can use the Read Settings for readout the parameters of the meter (then edit and save the parameter settings with the Modify / Modem settings).

9. Or it's also possible to open a pre-defined configuration file with the **Open File** menu (after opening the file you can edit the configuration)

10. Choose the **Modify** / **Modem Settings** option from the menu and give the **APN server name** to configure the access point name for the secure logon. (Then the modem will be communicating on the transparent data port number 9000, by default.)

11. **GPRS Always ON** must be checked on.

12. You have to fill the **password** regarding the SIM Card settings (get information from Your Mobile Operator)
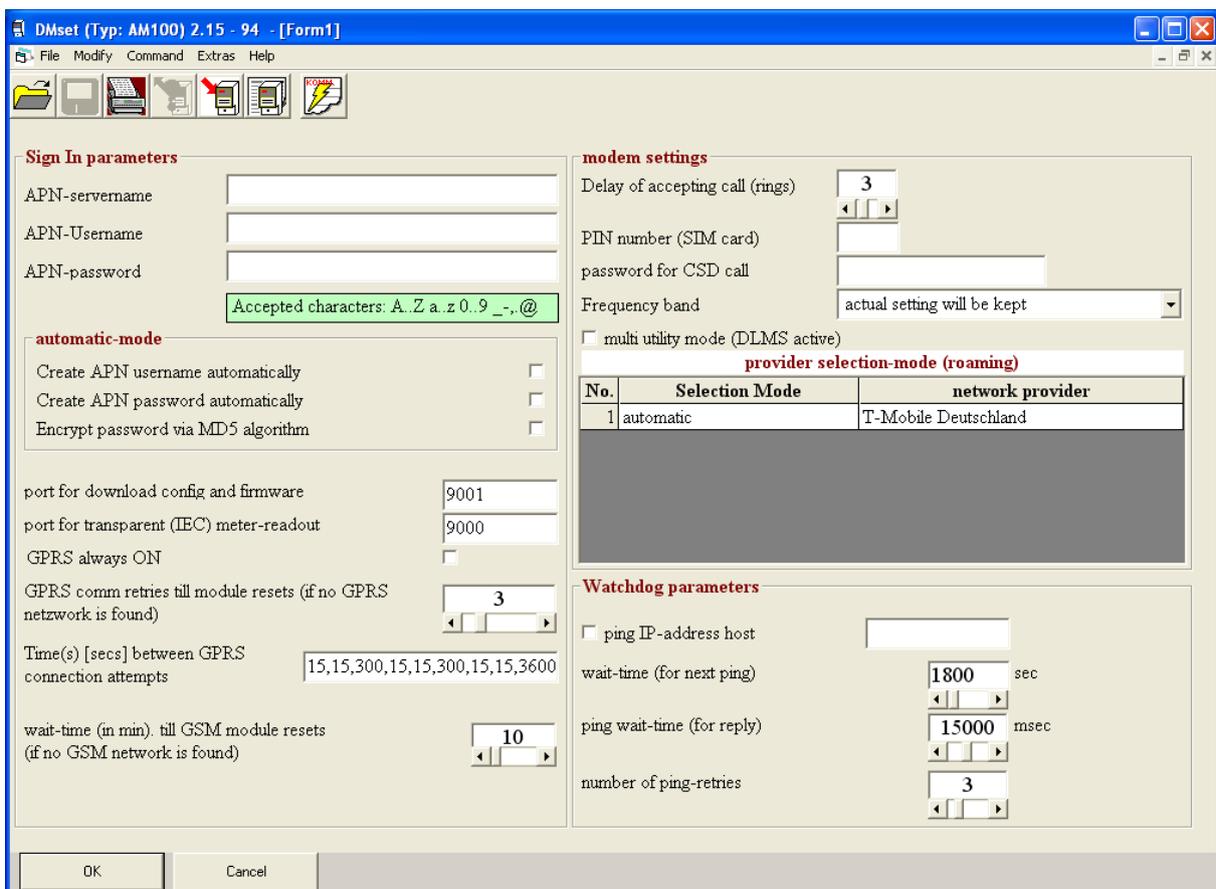
Settings of modem unit in the DM Set® application

13. In case of parameter modification after the changes. You have to save the changed parameter values into the configuration file by selecting the **File** / **Save** menu.

14. After the configuration the modem able to connect to the GPRS network.

15. The modem will be assessable through the meter.

3.2 Testing the readout of the meter

The readout and connection can be tested with **AlphaSet**® application. Let's *AlphaSet Reading and Configuration Tool Instruction Manual* documentation. *"alphaset_user_manual_GBR.doc"*)

3.3. Status LED signals

```
meaning of LED 1                          GSM/GPRS status
meaning of LED 2                          PIN status (ON=OK)
meaning of LED 3                          E-meter communication (DLMS active)
meaning of LED 4                          E-meter relay status
meaning of LED 5                          M-Bus status
meaning of LED 6                          Firmware status
```

* *LED 1 flashing faster if registered on the 3G wireless network*

** *Presence of LED 4, 5 is optional.*

3.4. 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.
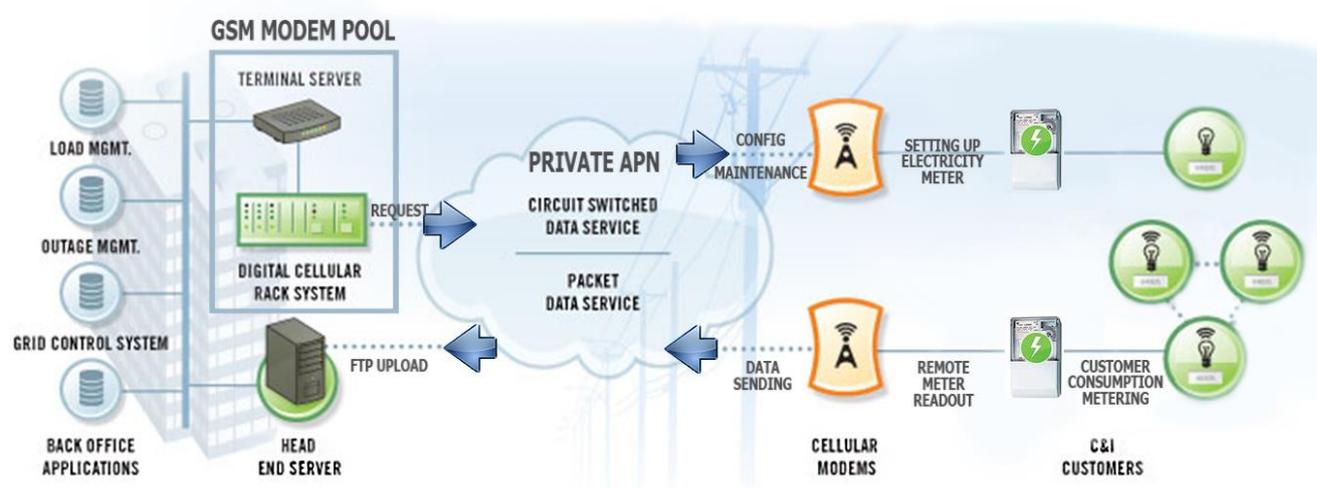
The modem is not operate continously on the GPRS network.

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.

Features:

- 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 file is always has two parts, first the standard register reading,
>
> then the event log from last 31 days. (the period may extended automatically
>
> if the date of the event is earlier)
>
> The readings shown as standard IEC format, including some ASCII control characters
>
> like STX ETX, etc. also.
>
> The ftp is set to passive mode.

- Alarm Push - 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.

3.5. Configuration of the push operation mode

Configuration can be loaded with **DM-Set**, but there is no dedicated menu item for these settings. The configuration file must be edited manually.

The following **DM-Set** configuration file items are necessary to configure this mode.

- Data Push setting (using DMSet):

- GPRS always ON: unchecked

- ping IP-address host: host, user, password:

  ftp://username:password@host/path using IRA(ITU T.50) character set

  Some parameters cannot be set ont he DMSet GUI, these must be defined by direct editing the config file in a text editor.

- Config file keywords:

- smp.always_on = 0

- smp.connect_on_timer = 1

- conn.ping_host = ftp://username:password@host/path

  Example: ftp://device001:pwd001@server.com/upload

  There can be defined a port number in the ftp upload URL. If the ftp port other than 21, eg. 1021 the port number must be defined.

  Example: ftp://username:password@host:1021/path
            ftp://device001:pwd001@server.com:1021/upload

- smp.connect_interval = 28800

  Connect interval counted in seconds.

- smp.connect_start = YYYYMMDDWWHHmmSS

Y = Years, M = Months, D = Days, W = Day of week, where 01 is Monday and 07 Sunday.

H = Hours, m = Minutes, S = Seconds, wildcards FF are allowed.

At the datetime (connet_start) the wildcard=FF, upcase only!
For example: *smp.connect_start = FFFFFFFFFFFF0000* which means send once in every hour.

When the time is between 01:00:00 AM to 02:00:00 AM UTC, the scheduling maybe skipped on the start of the daylight savings, and run twice at the end.

- csd.password = <max. 16 characters>

- conn.apn_name = wm2m

  Where apn name must be maximal 50 char long.

- conn.apn_user =

- conn.apn_pass =

  Where apn password must be maximal 30 char long.

- smp.connect_interval in seconds, max 0xFFFFFFFF

  Meter date format setting must be set in config file for proper operation:

  emeter.date_format = YYMMDD

  or

  emeter.date_format = DD-MM-YY

  for example.

- Encryption:

The file can be encripted with AES-128 CBC method.

The 128-bit key must be added to the config file.

If the parameter is empty or the length is wrong, no encryption will be used.

dlms.lls_secret = 00112233445566778899AABBCCDDEEFF

- Triggering with SMS:

- trigger: SMS triggered (Empty SMS)

The SMS length must be 0. The encoding can be 7-bit or 8-bit.

The device will be registered to IP network for a predefined time, if the GPRS always on setting is unchecked (smp.always_on = 0) Setting of time period:

- Config file keywords:

- smp.disconnect_delay = 1800

Above an example can be found, where the 1800 seconds value means that in 30 minutes online time.

- Event Push settings:

The smp.disconnect_delay setting also applies to Event trigger.

The device will remain online for this time after sending the event notification.

- Config file keywords:

ei_client.addr = <destination IPV4 address>

ei_client.port = <destination port number>

example:

ei_client.addr = 192.168.0.1

ei_client.port = 4000

In these examples, the IP address is 192.168.0.1 and the port number is 4000. You can change these values with the required values.

The APN name, user and password parameters are also required for push mode operation.

The device will connect to the defined TCP port.

Event Push data format: DLMS WPDU contains the IP address, listening port number for transparent service, and the meter ID.

TCP data, binary, 29-byte:

0001000100010015FF0203060ACAB60F1223280908303 5323035383431

Structure:

DLMS WPDU HEADER, 8-byte

Version = 1

srcPort = 1

dstPort = 1

Payload Length = 21

AXDR encoded data packet:

```
 <Data>
   <Structure Qty="0003" >
     <DoubleLongUnsigned Value="0ACAB60F" />    IP address
     <LongUnsigned Value="0FA0" />              port number, that the device listening
on
     <OctetString Value="3035323035383431" />   meter ID
   </Structure>
 </Data>
```

When You'll save the **DM-Set** configuration file, please consider that the filename must be used the following naming convention:

IMEINumber_MeterCode_SN<MeterSerialNumber>_Date_Time_<4-digit_counter>.TXT file format.

Example: 123456789012345_ELS5_SN12345678_20140101_010000_1234.TXT

All strings in parameters must be fit to the IRA character set.
Reference: http://en.wikipedia.org/wiki/ITU_T.50

If You're using a 3G capable version of modem hardware it is highly recommended to set the modem to 2G communication mode for reliable CSD connection.

When further information is necessary related on the implementation, this can be requested from our technical support.

Chapter 4. P1 registers

4.1 Always active data and registers on the P1 interface

#	Value	OBIS E-meter	OBIS P1-out	Value Format	Value Unit	Remark
1	Header information	/ELS5\@V10.03	/ELS5	Manufacturer specific		Optional: firmware version of e-meter
2	Version information for P1 output	-	1-3:0.2.8.255	S2, tag 9		Firmware version of module
3	Date of the P1 message	0.9.2	-			
4	Time stamp of the P1 message	0.9.1	0-0:1.0.0.255	TST	YYMMDD hhmmssX	see [2]
5	Equipment identifier	0.0.0	0-0:96.1.1.255	Sn (n=0,96), tag 9		e-meter serial-number
6	Meter Reading electricity delivered to client (Tariff 1) in 0,001 kWh	1.8.1	1-0:1.8.1.255	F9(3,3), tag 6	kWh	
7	Meter Reading electricity delivered to client (Tariff 2) in 0,001 kWh	1.8.2	1-0:1.8.2.255	F9(3,3), tag 6	kWh	
8	Meter Reading electricity delivered by client (Tariff 1) in 0,001 kWh	2.8.1	1-0:2.8.1.255	F9(3,3), tag 6	kWh	
9	Meter Reading electricity delivered by client (Tariff 2) in 0,001 kWh	1.8.2	1-0:2.8.2.255	F9(3,3), tag 6	kWh	
10	Actual electricity power delivered (+P) in 1 Watt resolution	1.7.0	1-0:1.7.0.255	F5(3,3), tag 18	kW	
11	Actual electricity power received (-P) in 1 Watt resolution	2.7.0	1-0:2.7.0.255	F5(3,3), tag 18	kW	

4.2 Choosable/selectable registers on the P1 interface

#	Value	OBIS E-meter	OBIS P1-out	Value Format	Value Unit	Remark
1	Number of power failures in any phase	C.7.0	0-0:96.7.21.255	F5(0,0), tag 18		
2	Power Failure Event Log (long power failures)	C.77*	1-0:99.97.0.255	TST, F10(0,0) - tag 6 Format applicable for the value within the log (OBIS code 0-0:96.7.19.255)	Timestamp (end of failure)	
3	Number of voltage sags in phase L1	32.32.0	1-0:32.32.0.255	F5(0,0), tag 18		
4	Number of voltage sags in phase L2	52.32.0	1-0:52.32.0.255	F5(0,0), tag 18		
5	Number of voltage sags in phase L3	72.32.0	1-0:72.32.0.255	F5(0,0), tag 18		
6	Number of voltage swells in phase L1	32.36.0	1-0:32.36.0.255	F5(0,0), tag 18		
7	Number of voltage swells in phase L2	52.36.0	1-0:52.36.0.255	F5(0,0), tag 18		
8	Number of voltage swells in phase L3	72.36.0	1-0:72.36.0.255	F5(0,0), tag 18		
9	Instantaneous voltage L1 in V resolution	32.7.0	1-0:32.7.0.255	F4(1,1), tag 18	V	
10	Instantaneous voltage L2 in V resolution	52.7.0	1-0:52.7.0.255	F4(1,1), tag 18	V	
11	Instantaneous voltage L3 in V resolution	72.7.0	1-0:72.7.0.255	F4(1,1), tag 18	V	
12	Instantaneous current L1 in A resolution	31.7.0	1-0:31.7.0.255	F3(0,0), tag 18	A	
13	Instantaneous current L2 in A resolution	51.7.0	1-0:51.7.0.255	F3(0,0), tag 18	A	
14	Instantaneous current L3 in A resolution	71.7.0	1-0:71.7.0.255	F3(0,0), tag 18	A	
#	Value	OBIS E-meter	OBIS P1-out	Value Format	Value Unit	Remark
15	Instantaneous active power L1 (+P) in W resolution	21.7.0	1-0:21.7.0.255	F5(3,3), tag 18	kW	
16	Instantaneous active power L2 (+P) in W resolution	41.7.0	1-0:41.7.0.255	F5(3,3), tag 18	kW	
17	Instantaneous active power L3 (+P) in W resolution	61.7.0	1-0:61.7.0.255	F5(3,3), tag 18	kW	
18	Instantaneous active power L1 (-P) in W resolution	22.7.0	1-0:22.7.0.255	F5(3,3), tag 18	kW	
19	Instantaneous active power L2 (-P) in W resolution	42.7.0	1-0:42.7.0.255	F5(3,3), tag 18	kW	
20	Instantaneous active power L3 (-P) in W resolution	62.7.0	1-0:62.7.0.255	F5(3,3), tag 18	kW	

Chapter 5. 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

5.1 Support

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

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

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

5.2 Product Support

The documents and information related on the product are available here.
https://www.m2mserver.com/en/product/wm-e3s/

Chapter 6. Legal notice

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