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MTX-StarEnergy-E

Hardware User Guide

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Important Information

This technical description contains important information for the start up and use of the MTX-StarEnergy-E. Read it carefully before you start working with the device. The warranty will be void should damage occur due to non-compliance with these instructions for use. We cannot accept any responsibility for consequential loss.

Warranty

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Revision Information

REVISION	DATE	CHANGES
1.00	2021/06	First release
1.01	2021/08	Added safety instructions and AC/DC connection details
1.02	2021/10	Added packaging details
1.03	2022/06	Added Hole Plugs and modified RS232/RS485 Cable

Installation guide

1. About this Guide

This guide is intended to be used by qualified installers, testers and technical engineers in order to:

- Install the modem properly and safely.
- Understand the equipment operation.
- Verify proper operation.

Safety Requirements and Protection Regulations

Please read the information in this section before starting your integration work!

1. Safety Instructions

PLEASE READ THESE SAFETY INSTRUCTIONS AND KEEP A COPY OF THEM.

- MTX-StarEnergy-E, for any type of operation, is only accessible for instructed and skilled installers, testers and technical engineers.
- Before any type of handling of MTX-StarEnergy-E LTE modem, it must be ensured that it has been de-energized to allow for electrical work to be carried out and it cannot be inadvertently re-energized. Refer to INSTALLATION. chapter for more details.
- Always ensure that use of the modem is permitted. The modem may present a hazard if used in proximity to personal electronic medical devices. As a rule, the modem must not be used in hospitals, airports or planes.
- This equipment is not suitable for use in locations where children are likely to be present.
- Never use the device at a gas station, refuelling point, blasting area or in any other environment where explosives may be present.
- Operating the device close to other electronic devices, such as antennas, television sets, and radios may cause electromagnetic interference.
- This product is intended to be used with the antenna or other radiating element at least 20cm away from any part of the human body. In applications where this rule cannot be applied, the application designer is responsible for providing the SAR measurement test report and declaration.
- You are responsible for observing your country's safety standards, and where applicable, the relevant wiring rules.

2. General Precautions

The MTX-StarEnergy-E modem as a standalone item is designed for indoor use only. For outdoor use it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in General Information Chapter.

- Avoid exposing the device to lighted cigarettes, naked flames or to extreme hot or cold temperatures.
- Never try to dismantle the device yourself. There are no components inside the modem that can be serviced by the user. If you attempt to dismantle the device, you may invalidate the warranty.
- The MTX-StarEnergy-E terminal must not be neither installed nor located in areas where the surface temperature of the plastic case could exceed 85°C.
- Check that voltage and power available at installation is within range specified for modem. It can be found on this guide and labeled on modem.
- Do not install any modem that is obviously damaged or suspected of having been damaged.

In order to provide strain relief and to avoid transmitting excessive vibration to the device during installation, all cables connected to the MTX-StarEnergy-E modem must be secured or clamped immediately adjacent to the device's connectors.

- To protect the power supply cables, and in order to comply with the fire safety requirements, when the unit is powered from a battery or a high current supply, a fast 1.25A fuse should be connected in line with the positive supply.
- No compatible component or product must be connected to the MTX-StarEnergy-E terminal.

NOTE: MTX-StarEnergy-E distributors and sales offices may refuse warranty claims where evidence of product misuse is found.

3. SIM Card Precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- When the SIM card hatch is opened, the SIM card connectors lie exposed under the SIM card holder.

CAUTION: Do not touch these connectors! If you do, you may release an electrical discharge that could damage the modem or the SIM card.

- When designing your application, the SIM card's accessibility should be taken into account. We always recommend that you have the SIM card protected by a PIN code. This will ensure that the SIM card cannot be used by an unauthorized person.

4. Antenna Precautions

If the antenna is to be mounted outside the device, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one modem to a single antenna. The modem can be damaged by radio frequency energy from the transmitter of another modem.
- Like any mobile station, the antenna of the modem emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signal cable.
- The modem and antenna may be damaged if either of them come into contact with ground potentials other than the one in your application. Beware: ground potentials are not always what they appear to be.

5. Radio Frequency (RF) Exposure and SAR

Your wireless modem device is a low-power radio transmitter and receiver (transceiver). When it is turned on, it emits low levels of radio frequency energy (also known as radio waves or radio frequency fields).

Governments around the world have adopted comprehensive international safety guidelines, developed by scientific organizations such as ICNIRP (International Commission on Non-Ionizing Radiation Protection) and IEEE (The Institute of Electrical and Electronics Engineers Inc.), through periodic and thorough evaluation of scientific studies. These guidelines establish permitted levels of radio wave exposure for the general population. The levels include a safety margin designed to assure the safety of all persons, regardless of age and health, and to account for any variations in measurements.

Specific Absorption Rate (SAR) is the unit of measurement for the amount of radio frequency energy absorbed by the body when using a transceiver. The SAR value is determined at the highest certified power level in laboratory conditions, but the actual SAR level of the transceiver while operating can be well below this value. This is because the transceiver is designed to use the minimum power required to reach the network.

The MTX-StarEnergy-E wireless modem device has been approved for applications where the antenna is located more than 20cm from the body of the user. In all other configurations the user is responsible for meeting the local SAR regulations.

Users of the MTX-StarEnergy-E wireless modem device are responsible for ensuring that they meet the SAR regulatory requirements of the countries in which they intend to operate the device and that their documentation contains the relevant SAR declaration, certification information and user guidance as appropriate.

6. Personal Medical Devices

Wireless modem devices may affect the operation of cardiac pacemakers, hearing aids and certain other implanted equipment. If a minimum distance of 15 cm (6 inches) is maintained between the MTXGTW II-S modem radiating antenna and a pacemaker, the risk of interference is limited. If the user's application is likely to be situated in the vicinity of personnel, a suitable warning should be contained in the equipment manual to this effect.

Regulatory and Type Approval Information

1. Directives and Standards

The MTX-StarEnergy-E modem has been designed to comply with the directives and standards listed below.

It is the responsibility of the application manufacturer to ensure compliance of the final product with all provisions of the applicable directives and standards, as well as with the technical specifications provided in this document.

DIRECTIVES	
2014/53/UE	Directive of the European Parliament and of the Council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment.
2004/107/EC	Directive of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
2011/65/EU	Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment Text with EEA relevance.
2012/19/EU	Directive of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) Text with EEA relevance.
RD 110/2015	Real Decreto, de 20 de febrero, sobre residuos de aparatos eléctricos y electrónicos.

STANDARDS OF EUROPEAN TYPE APPROVA	
EN 301 489-1 V2.2.3	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements: Harmonized Standard covering the essential requirements of article 3.1(b) of the Directive 2014/53/EU and Harmonized Standard covering the essential requirements of article 6 of the Directive 2014/30/EU.
EN 301 489-52 V1.1.2	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

CISPR 32	Radio-frequency radiated emissions (30 - 6000MHz) - Class: B Continuous conducted emissions (0.15 - 30MHz) - Class: B
UNE-EN 61000-6-5:2016/ AC:2018-01	Immunity for equipment used in power station and substation environment
EN 62368-1:2014 + AC:2015 + A11:2017 + AC:2017	Audio/video, information and communication technology equipment - Part 1: Safety requirements
UNE-EN 60255-27:2014	Measuring relays and protection equipment - Part 27: Product safety requirements. Clause 10.6.4.2 Impulse voltage test 5kV and 20kV (150J) Clause 10.6.4.3 AC or DC Dielectric voltage test 2kV and 10kV Clause 10.6.4.4 Insulation resistance over 100M Ω
UNE-EN 60529:2018 + A1:2018 + A2:2018	Degrees of protection provided by enclosures (IP Code).
UNE-EN 60695-2-11:2015	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products. Test limits 650 ºC ± 10 ºC @ 30 s ± 1 s
IEC 60068-2-1:2007	Test Ad: Cold Test 24h+24h+24h (no controlled humidity) Specified operating range: -25 ± 3 Limit range of operation: -40 ± 3
IEC 60068-2-2:2008	Test Bd: Dry heat 72h + 72h (50% humidity) Specified operating range: +70 ± 2 Limit range of operation: +85 ± 2
IEC 60068-2-14:2009	Test Nb: Change of temperature, 5 cycles (no controlled humidity) High temperature: +70 ± 3 Low temperature: -25 ± 3
IEC 60068-2-78:2012	Test Cab: Damp heat, steady state 96h (93 ± 3% humidity) Temperature +55 ± 2

2. SAR Requirements Specific to Portable Mobiles

Mobile phones, PDAs or other portable transmitters and receivers incorporating a GSM module must be in accordance with the guidelines for human exposure to radio frequency energy. This requires the Specific Absorption Rate (SAR) of portable EHS6 based applications to be evaluated and approved for compliance with national and/or international regulations.

Since the SAR value varies significantly with the individual product design, manufacturers are advised to submit their product for approval if designed for portable use. For European markets the relevant directives are mentioned below. It is the responsibility of the manufacturer of the final product to verify whether or not further standards, recommendations or directives are in force outside these areas.

Products intended for sale in US markets

EN 59005/ANSI C95.1: Considerations for evaluation of human exposure to Electromagnetic Fields (EMFs) from Mobile Telecommunication Equipment (MTE) in the frequency range 30MHz – 6GHz.

Products intended for sale in European markets

EN 50360: Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300MHz - 3GHz)

Please note that SAR requirements are specific only for portable devices and not for mobile devices as defined below:

- Portable device: A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the user´s body.
- Mobile device: A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the user's body or that of nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and cannot be easily moved to another location.

3. RoHS Statement

The MTX-StarEnergy-E modem is compliant with the 2011/65/EU Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment Text with EEA relevance (RoHS).

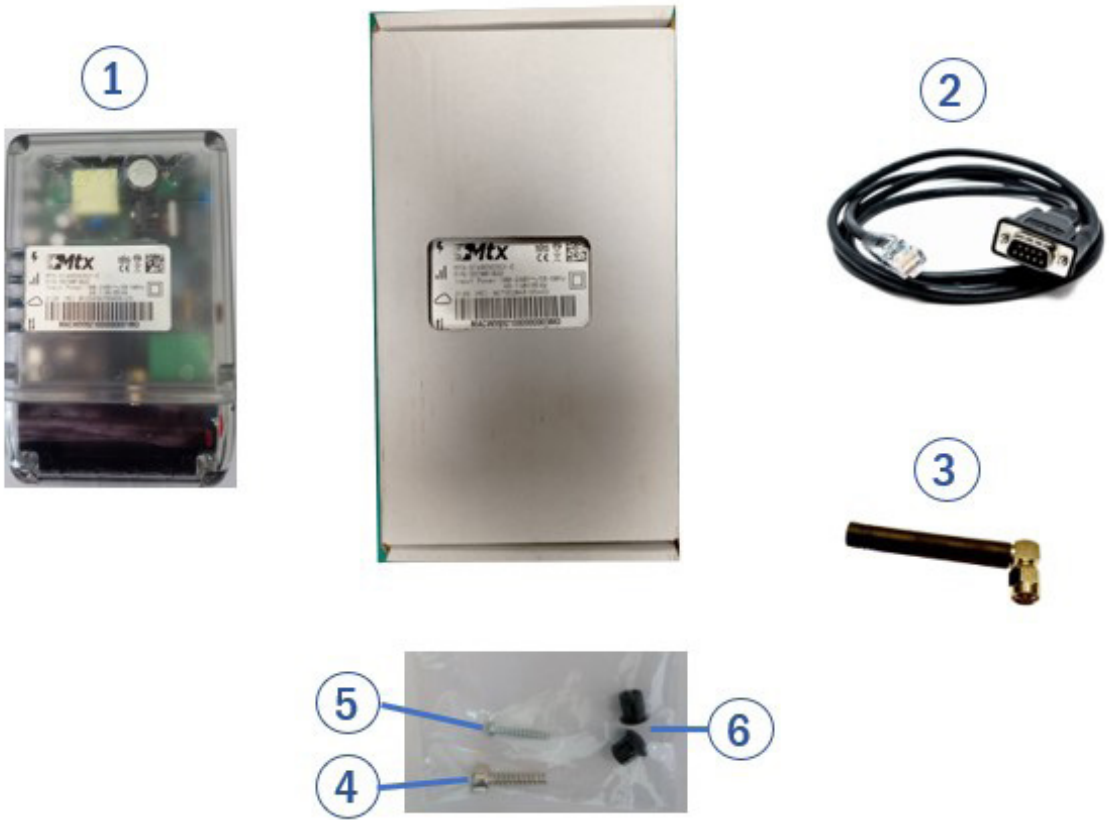
4. Disposal of Old Electrical and Electronic Equipment

This symbol, applied on our products and/or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, household waste disposal service or the retail store where you purchased this product.

5. General Information

5.1 Package Contents

MTX-StarEnergy-E is supplied with required accessories, all of them enclosed on a package as appear in the following picture with product label externally readable.



ITEM	REFERENCE	DESCRIPTION
1	199810130	MTX-StarEnergy-E Modem
2	230001103	RS232/RS485 Cable
3	118009286	MTX-Antenna STUBBY GSM5+LTE700/2700 SMA M R/A
4	000427082	Cable Cover Sealed Screw DIN404 (into plastic bag)
5	199801110	Cable Cover DIN7981 Plastic Thread (into plastic bag)
6	140001710	Hole Plugs for void cable entries (into plastic bag)

5.2 Features

MTX-StarEnergy-E is an innovative industrial modem that comprises a set of features specially focused for the electric market to provide remote wireless connectivity to electric meters on customer facilities.

It is equipped with a rich set of interfaces and Led indicators to show operating status of the modem.

Modem includes the following features:

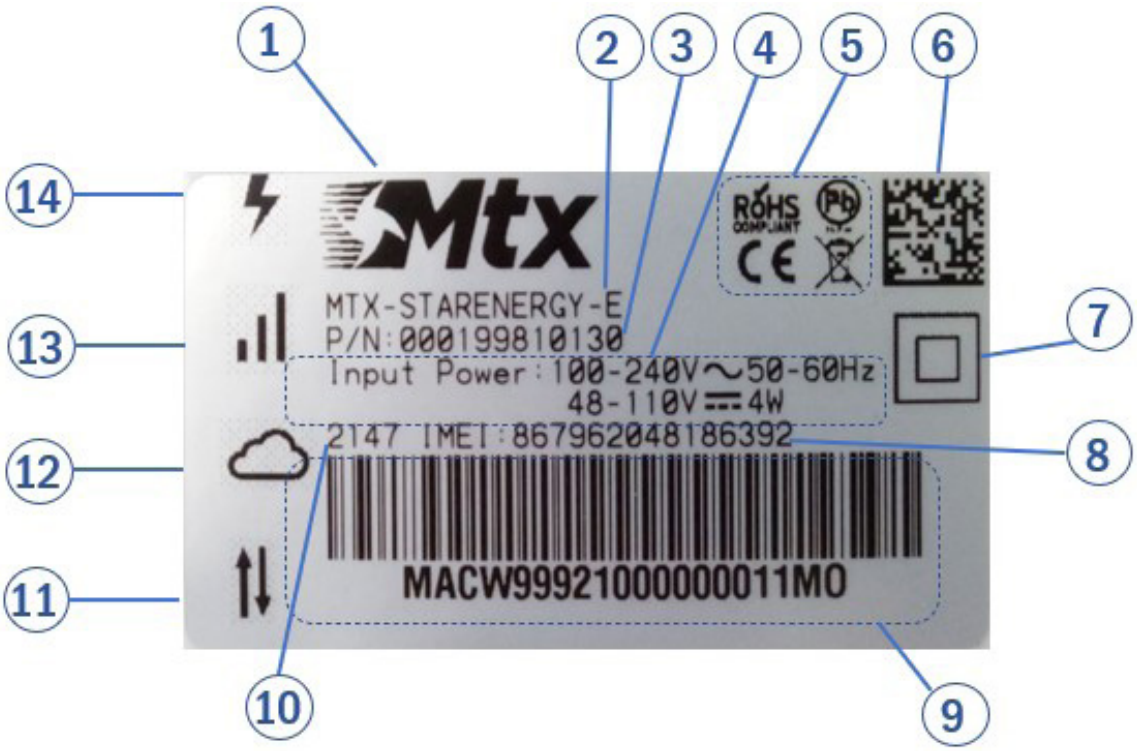
- 4G LTE Cat 1 module.
- Antenna connection on SMA Female type connector.
- SIM card socket.
- RS232 on RJ45 connector.
- RS485 full duplex on RJ45 connector.
- RTC with Super-Capacitor based backup energy.
- Reset button.
- USB interface only for factory configuration and testing purposes.
- 5mm pitch screwed terminal blocks for power supply input connection.
- Status Leds to show power, coverage, WAN connection and data transference status.
- Super-Capacitor for power supply backup, provides enough energy to send warning trap remotely when external power supply is lost.

5.3 Specification Ratings

Power supply voltage	100 – 240VAC ±10% on AC power supply input connector – Class II 48 – 110VDC ±10%on DC power supply input connector (no polarity)
Frequency for AC input power	50 – 60 Hz
Power consumption	4W
Power Supply Backup	Internal Supercapacitor
Real Time Clock backup	Internal Supercapacitor
Enclosure fixing	Wall mounting plate and DIN mounting compliant
Enclosure protection	IP51

Operating temperature	-25°C to +70°C
Storage temperature	-40°C to +85°C
Relative humidity	Maximum 98% RH at 50°C non-condensing.
Dimensions without plate	160mm x 100mm x 45mm
Dimensions with mounting plate	175mm x 100mm x 45mm
Weight	400g

5.4 Product Label Marking



Label fixed on front side of LTE Modem comprises the following information:

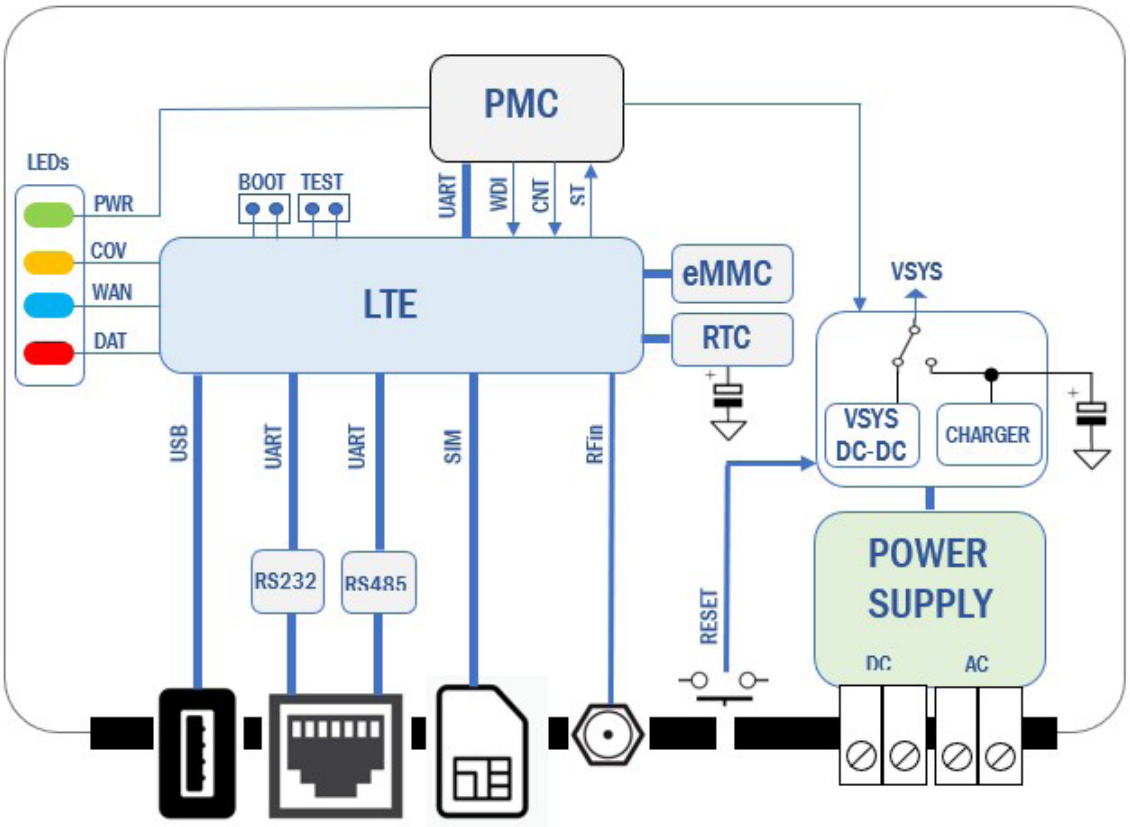
- 1. MTX logo.
- 2. Product name.
- 3. Part number.
- 4. Power supply operating specifications.

- 5. RoHS, Pb-Free, CE and WEEE symbols.
- 6. IMEI data matrix code.
- 7. Class II insulation.
- 8. IMEI.
- 9. UNE 207010 identification code and barcode.
- 10. Manufacturing date YYMM (Year/Month).
- 11. Data transference status Led Indicator.
- 12. WAN connection status Led Indicator.
- 13. Coverage status Led Indicator.
- 14. Power Supply status Led Indicator.

6. Functional Description

LTE Modem MTX-StarEnergy-E is based on a commercial LTE module with a rich set of interfaces and a companion power management controller, all of them assembled on a main board as appear on following diagram.

Connectors for external interfaces are grouped to be accessible at a common front panel.

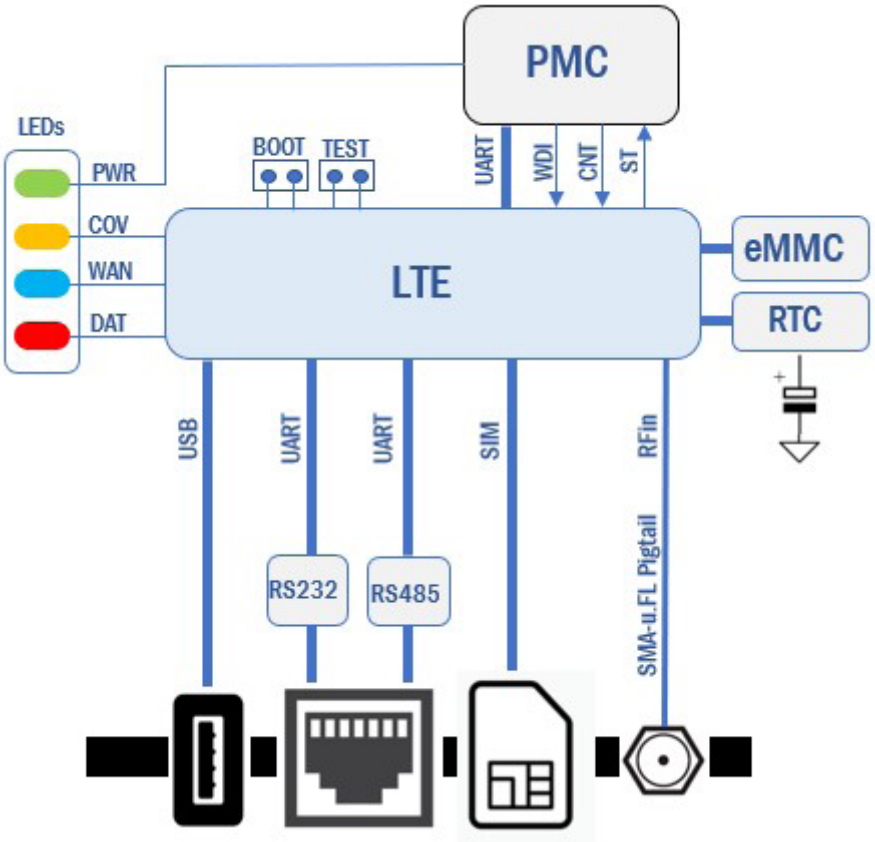


6.1 LTE Functionality

LTE interface covers EMEA region and is CE certified with following frequency bands and data rates:

NETWORK	BANDS	TECHNOLOGY	MAX. DATA RATE	
			DL	UL
4G	B1/B3/B5/ B7/B8/B20	LTE-FDD	10 Mbps	5 Mbps
3G	B1/B5/B8	DC-HSPA+	42 Mbps	5.76 Mbps
		WCDMA	384 kbps	384 kbps
2G	B3/B8	EDGE	296 kbps	236.8 kbps
		GPRS	107 kbps	85.6 kbps

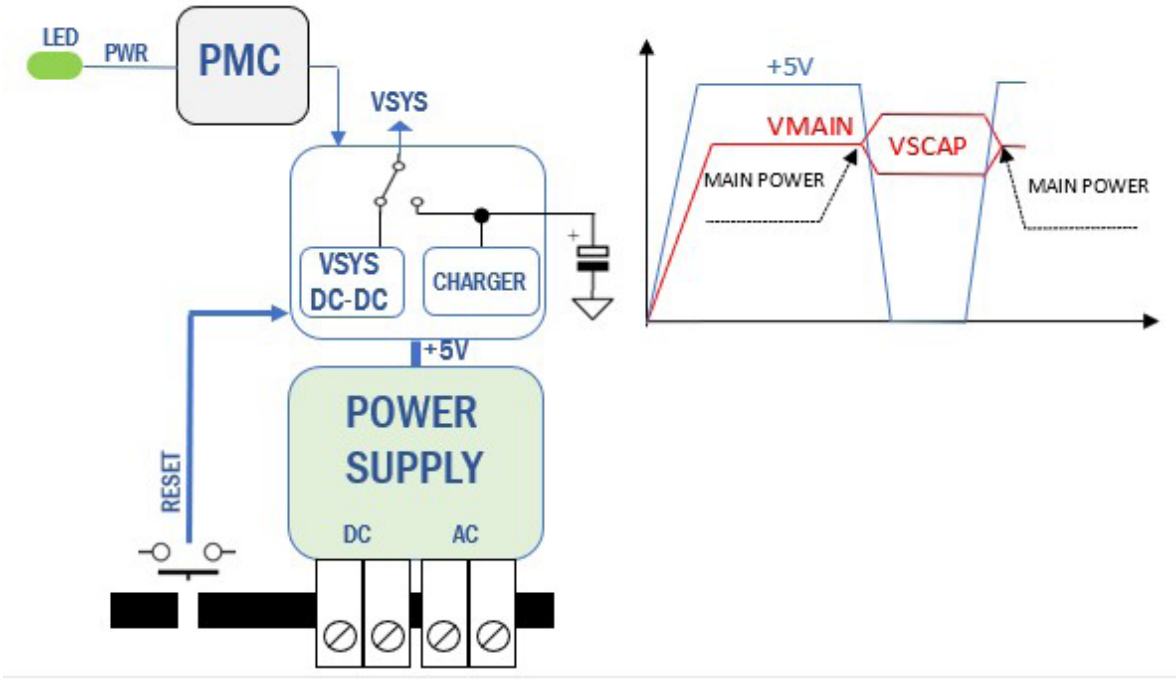
Following block diagram details internal connection of LTE module.



Besides all resources embedded on LTE module, main board includes additionally the following items:

- eMMC memory for system software needs.
- RTC to provide current date and time for system logs. In case of power supply is lost, a Super-Capacitor acts as energy backup to keep RTC running.
- USB connector with required filtering and protection elements. This interface is intended to be used for factory test and system configuration purposes.
- RS232 transceiver with required filtering and protection elements.
- RS485 transceiver with required filtering and protection elements. Termination resistor (120ohm) is connected on receive differential pair as well as true fail-safe biasing resistors, referenced to 3.3V.
- RJ45 connector as external interface for RS232 and RS485 signals.
- SIM card socket.
- U.FL type RF connector to attach u.FL-SMA pigtail. SMA connector is fixed to connectors panel.
- BOOT jumper. Used only for Factory programming purposes.
- TEST jumper. Used only for Factory testing purposes.
- LEDs. Four Leds are included to inform about system operating status.
- PMC. Power Management Controller based on a microcontroller with following tasks:
    - Manages power-on power-off sequence of LTE module as required.
    - Act as a hardware watchdog system supervisor to guaranty proper operation.
    - Communicates to LTE module to set / get data for system operation and maintenance.
    - Reset switch causes PMC power-off, hence, full system power-off. After Reset switch is released, PMC is powered on again and starts power-up sequence of whole system.

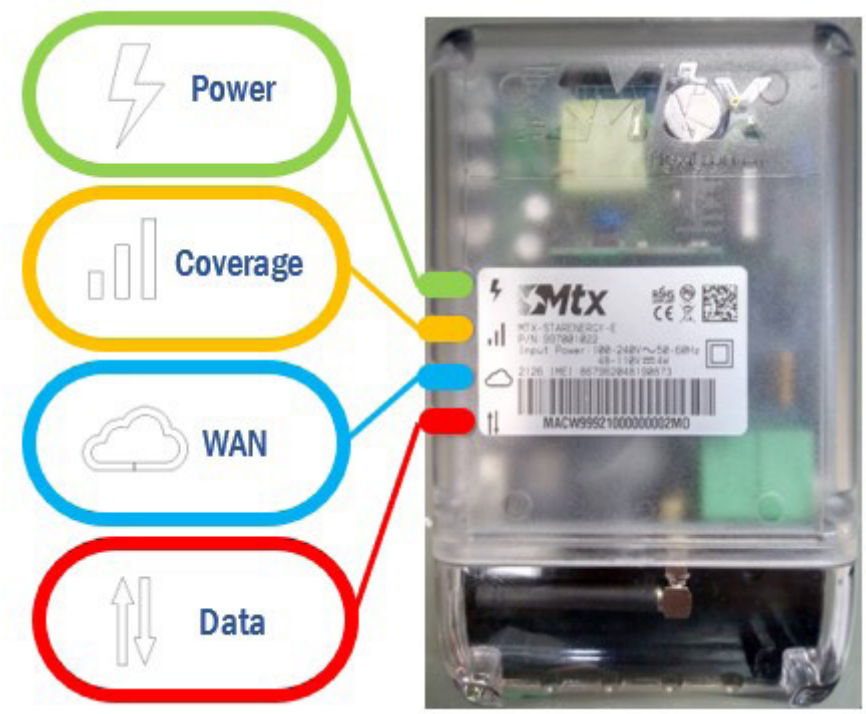
Regarding power supply operation, internal AC-DC module sources main +5V power supply when external power supply is available. A Super-Capacitor is included as backup source energy when external power supply disappears to provide required energy to system, in order to send a trap remotely to inform that main power energy is lost. Super-Capacitor requires a charger to control charging, as long as mains power input is available.



	BACKUP TIME
Super-Capacitor charging time, on normal operation	15sec
Super-Capacitor charging time, 1st time after it has been installed	4min 15sec
Backup mode discharging time (depending in network connection)	20sec – 30sec

6.2 LED Status Indicators

Bellow picture shows LED status color function.



Following table shows relationship between operation status and Led operation.

- Fast refers to fast blinking On-Off every 1 second.
- Slow refers to slow blinking On-Off every 2 seconds.

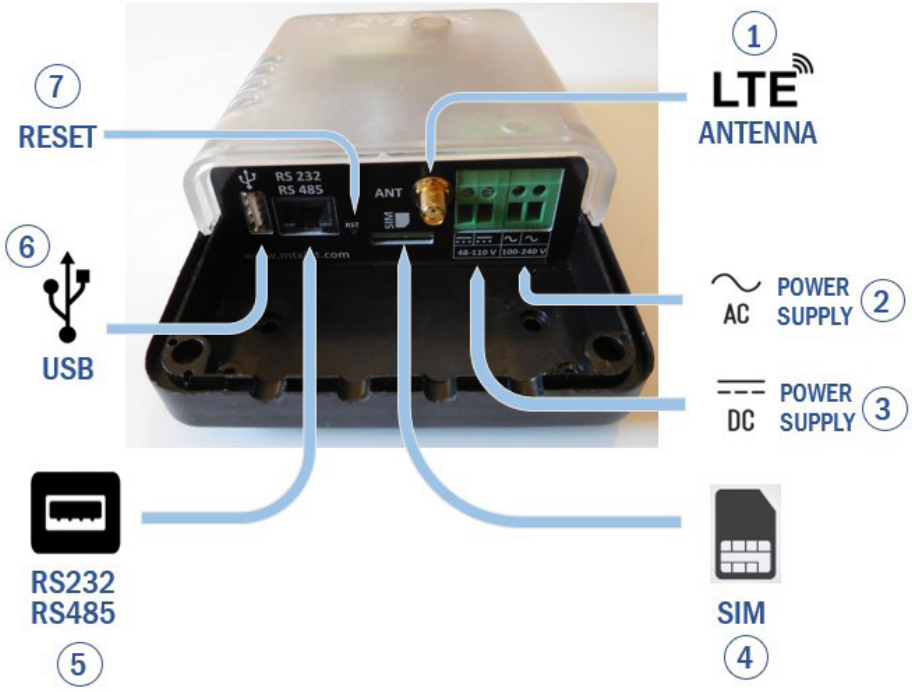
OPERATING STATES	POWER	COVERAGE	WAN	DATA
Power off	OFF			
Power on	ON			
Boot failure	Fast			
Power failure – Operation with backup super-capacitor	Slow			
Starting router		3 blinks		
Sim detected and ready		Slow/Fast/ON		

SIM undetected or incorrect PIN	OFF		
Not enough / critical coverage	Slow		
Low coverage	Fast		
Good coverage	ON		
No connection to APN		OFF	
APN connection ON (2G)		Slow	
APN connection ON (3G)		Fast	
APN connection ON (4G)		ON	
TCP port in listening state with TCP encapsulation disabled			OFF
TCP port in listening state with TCP encapsulation enabled			ON
Ongoing data transfer			Slow

6.3 External Interfaces

Cabling, SIM card insertion and antenna connection is located on bottom side of modem. It is individually protected with a separated cover and fixed to main enclosure with a sealable screw.

Bellow picture shows available interfaces offered by modem.

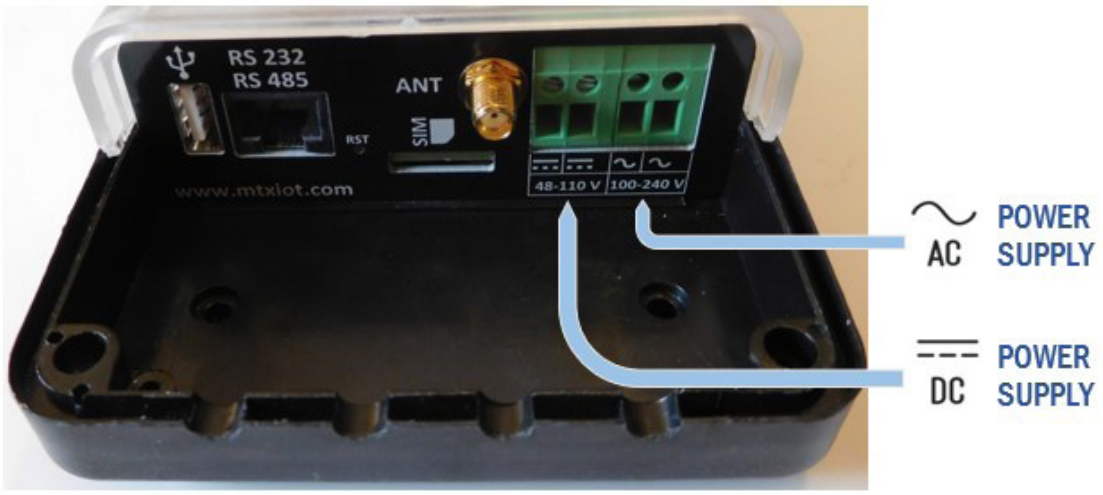


External interfaces available on connectors panel are:

- 1. SMA female connector for LTE Antenna.
- 2. 5mm pitch screwed terminal blocks for AC power supply input.
- 3. 5mm pitch screwed terminal blocks for DC power supply input.
- 4. SIM card socket.
- 5. RJ45 connector for RS232 / RS485 Full Duplex signals.
- 6. USB type A connector only for factory configuration and testing purposes.
- 7. Reset button.

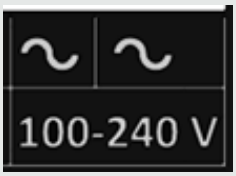
6.4 Mains Power Supply Connection

LTE Modem can be powered from AC or DC power sources according to ratings specified on this document.



Be aware to connect AC or DC input power on the right connector as described on this chapter.

Only DC or AC input power is allowed at a time. Both cannot be simultaneously connected at a time as damage can be caused to LTE Modem.

AC powered		AC mains power input, line and neutral wires, have to be connected on terminal block labeled with AC symbols. As Modem is a Class II device, no earth connection is available. Accepted wires section 22 - 12 AWG ≡ 0.5mm2 – 2.5mm2. If Modem is AC powered, it cannot be simultaneously DC powered.
DC powered		DC input power, positive and negative wires, have to be connected on terminal block labeled with DC symbols with no polarity (can be connected with both polarities). Accepted wires section 22 - 12 AWG ≡ 0.5mm2 – 2.5mm2. If Modem is DC powered, it cannot be simultaneously AC powered.

6.5 Antenna Connection

LTE Modem provides SMA connector to attach external antenna.

SMA connector is internally connected to main board though a 1.37mm, 50 ohms impedance and 100mm length pigtail, ended with u.FL connector.

Up-side position of SMA connector allows a small Stub antenna to be attached directly to SMA connector and protected with low end cover for cable connections.

SMA INTERFACE SPECIFICATIONS	
Impedance	50R
Type	SMA Female
ESD Protection	15kV air / 8kV contact

6.6 SIM Card

Internal main board provides a Push-Push type SIM Card socket.

SIM Card insertion and removal on LTE Modem is done through a card slot at connectors panel.

To insert SIM card, look at bellow picture for proper orientation.

To remove SIM card, push card slightly to release socket locking mechanism and let it be ejected.

SMA INTERFACE SPECIFICATIONS	
Impedance	50R
Type	SMA Female

ESD Protection	15kV air / 8kV contact

6.7 Reset Button

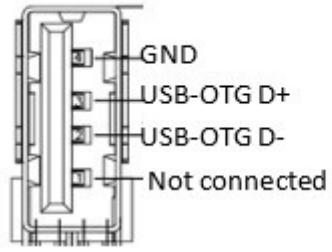
LTE Modem can be reset by pushing a small button on main board through a small hole on connectors panel identified by RST label. Reset is asserted as long as button is being pushed.

This reset assertion involves full controlled power-off and power-on sequence of internal devices.

6.8 USB

LTE Modem provides USB 2.0 interface on USB-A type connector only for factory configuration and test purposes.

As no use is foreseen for this interface on regular operation at customer facilities, it has to be covered with a USB Cap, in order to avoid unexpected connection of external devices.



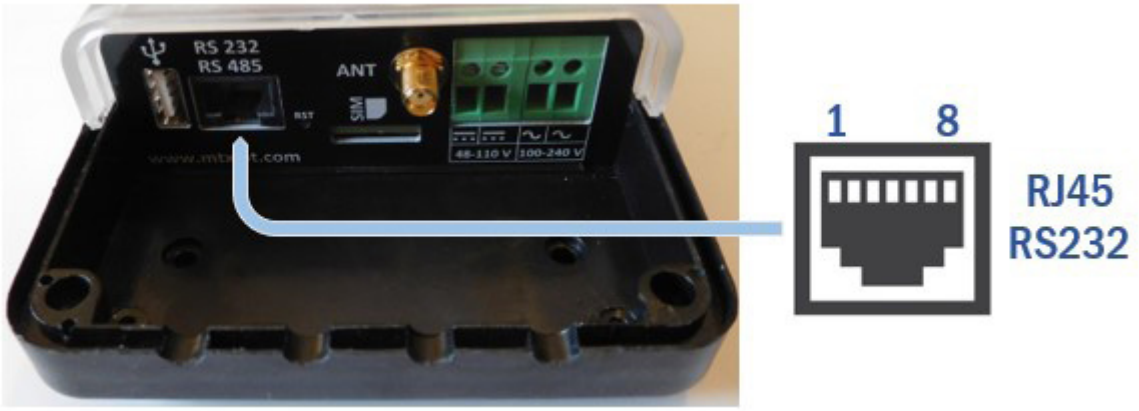
USB PORT SPECIFICATIONS	
Form Factor	USB-2.0 Type A
ESD Protection	15kV air/15kV contact
Voltage Output	No internal power supply output is sourced at USB connector

6.9 RS232 DCE Connection

RS232 DCE type interface on RJ45 connector provides RX, TX and GND signals, with no modem hardware flow-control signals. This communication port is intended to be connected to external meter through an additional cable ended with proper type connector and signal distribution. Maximum length for this cable is 1.5m.

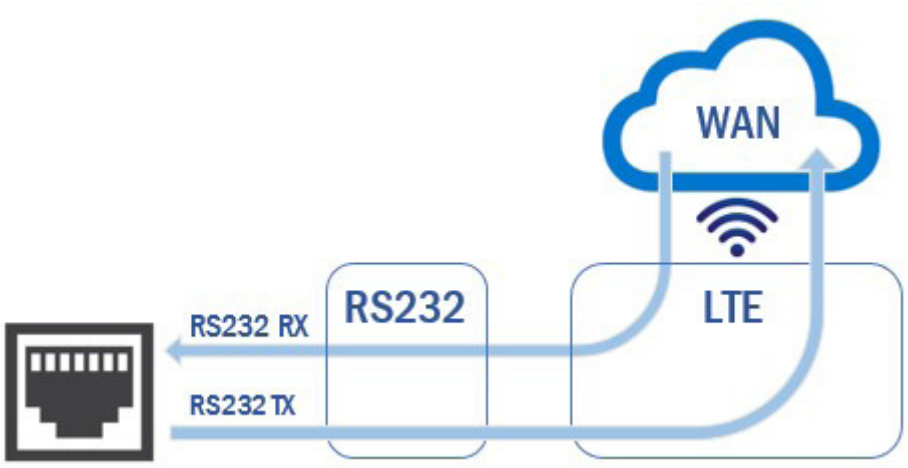
If RS232 cable required length is longer than 3m, it is recommended to use a shielded cable.

No hardware related configuration action is needed to enable RS232 port communication.



TERMINAL	RS232 DCE	DESCRIPTION
1		
2		
3	RS232 RX	Output - WAN received data is transmitted on this output
4		
5		
6	GND	Reference common signal

7		
8	RS232 TX	Input - Data received on this Input is transmitted to WAN



	RS232 SPECIFICATIONS
Baud Rate	Max. 115200 bps
ESD Protection	15kV air / 15kV contact
Cable length	Max. 1.5m

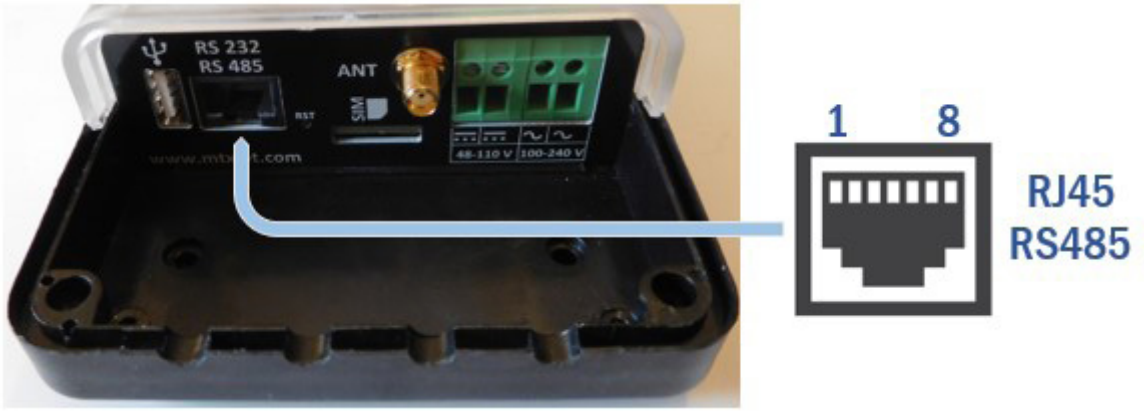
6.10 RS485 Connection

RS485 full-duplex interface on RJ45 connector provides RX+, RX-, TX+, TX- signals without direction control signal.

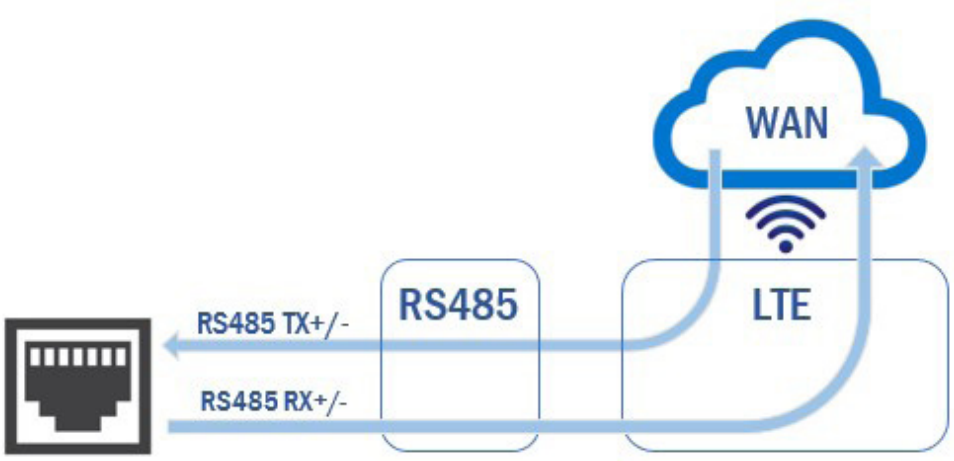
This communication port is intended to be connected to external meter through an additional cable ended with proper type connector and signal distribution. Maximum length for this cable is 1.5m.

If RS485 cable required length is longer than 3m, it is recommended to use a shielded cable.

No hardware related configuration action is needed to enable RS485 port communication.



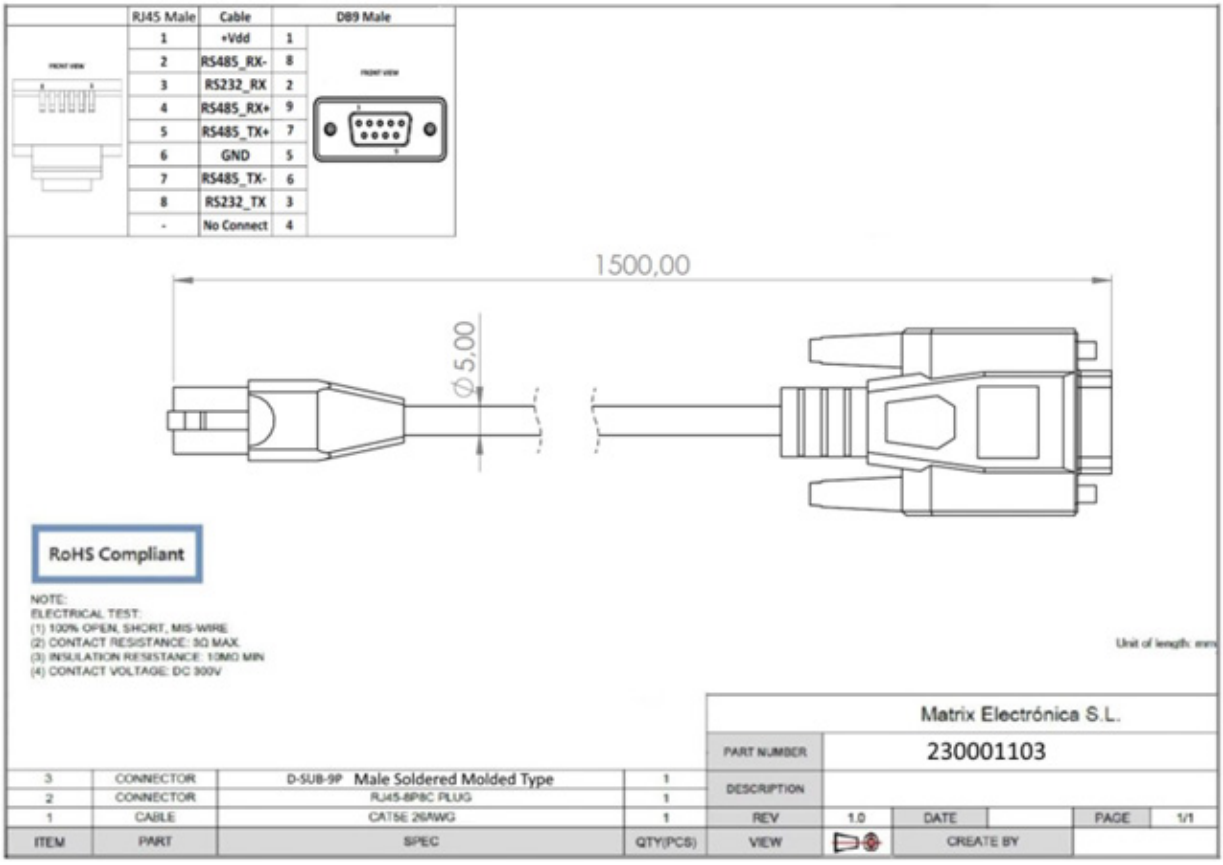
TERMINAL	RS485	DESCRIPTION
1		
2	RS485_TX-	Output - WAN received data is RS485 transmitted on this output, '-' signal.
3		
4	RS485_TX+	Output - WAN received data is RS485 transmitted on this output, '+' signal.
5	RS485_RX+	Input – RS485 data received on this Input is WAN transmitted, '+' signal.
6		
7	RS485_RX-	Input – RS485 data received on this Input is WAN transmitted, '-' signal.
8		



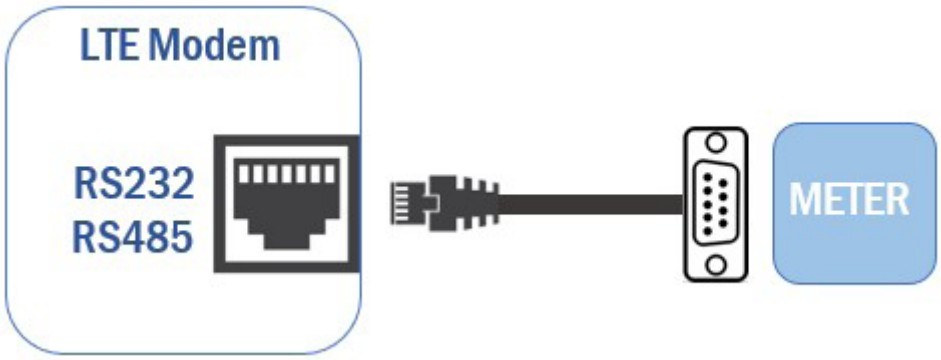
	RS485 SPECIFICATIONS
Baud Rate	Max. 115200 bps
Termination	Internal 120R on RS485_TX+/- pair with True Fail-Safe Bias
ESD Protection	15kV air / 15kV contact
Cable length	Max. 1.5m

6.11 Cable Adapter to DB9 Male

DB9 male connector ended cable adapter is offered to connect to RJ45 connector on LTE Modem according to bellow diagram.



	RJ45 Male	Cable	DB9 Male
	1	+Vdd	1
	2	RS485_RX-	8
	3	RS232_RX	2
	4	RS485_RX+	9
	5	RS485_TX+	7
	6	GND	5
	7	RS485_TX-	6
	8	RS232_TX	3
	-	No Connect	4



7. Installation

DANGER OF ELECTRIC SHOCK

Before installation/uninstallation, please read carefully and completely this installation guide and observe advice detailed on chapter SAFETY REQUIREMENTS AND PROTECTION REGULATIONS and remind:

- LTE Modem must only be installed / uninstalled by qualified installers.
- AC Mains or DC power cord has to be directly hardwired to an automatic breaker located on an electrical distribution panel in order to allow power circuit to be de-energized for safety when any type of handling is required.
- Circuit breaker has to be a bipolar type to open both AC line and neutral or DC positive and negative circuits with ratings according power supply voltage and a recommended opening current value of 1 Amps for 0.5mm2 up to 2mm2 connection wires or 5 Amps for 2.5mm2 connection wires.
- It must be ensured that electrical equipment that has been de-energized to allow for electrical work to be carried out, cannot be inadvertently re-energized. A good principle to adopt is that the point of isolation should be under the control of the person who is carrying out the work on the isolated circuit.
- Once LTE Modem is installed, before connecting mains energy, ensure that wall mounting is stable, all mechanical parts are properly fitted and cabling connection is in accordance with all rules defined within this guide.

As a brief guide to carry out installation, follow these steps and review detailed description on referred chapters:

7.1 Installation Location

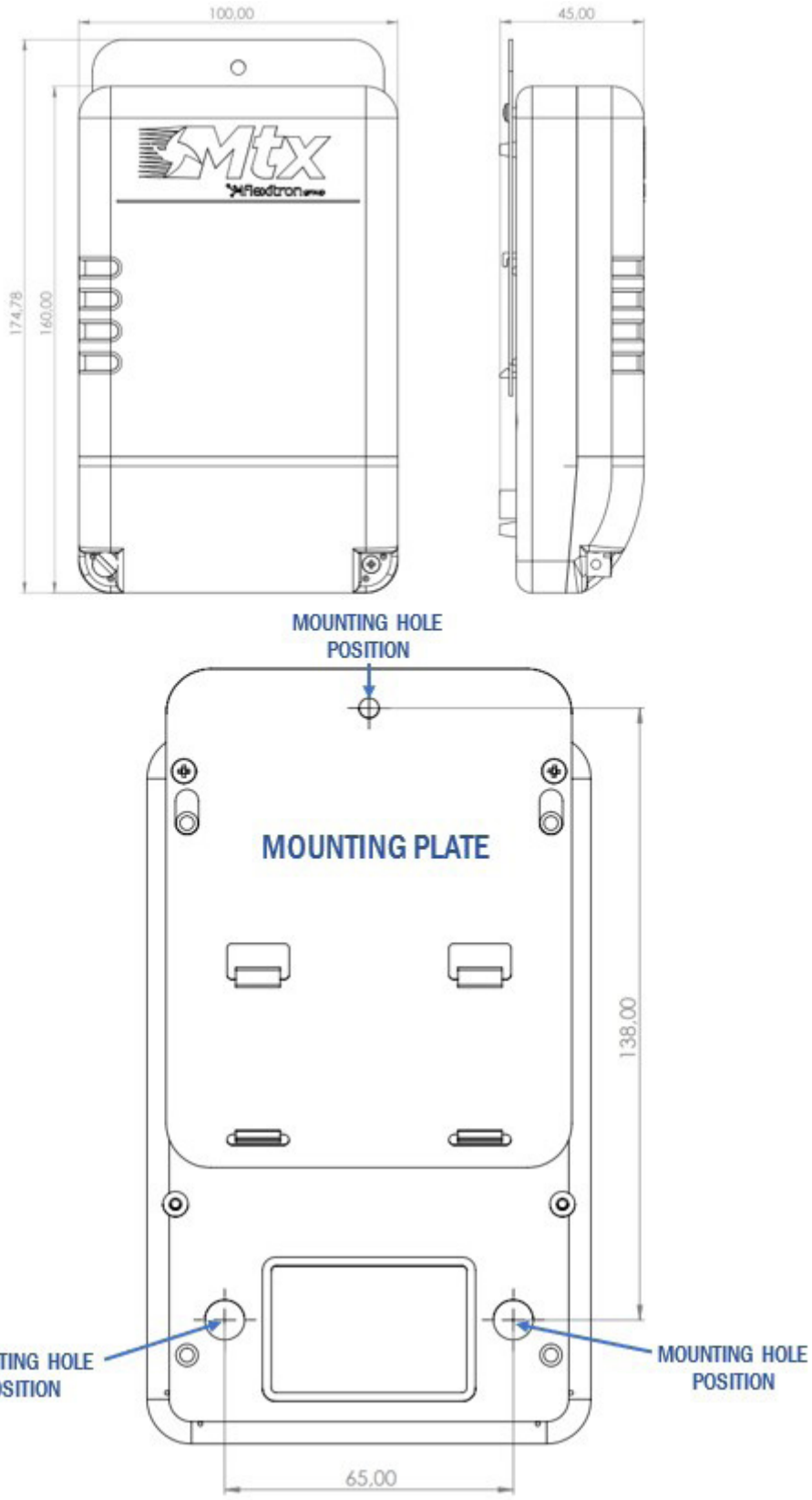
- LTE Modem can only be installed indoor in a restricted access area.
- For outdoor use it must be integrated into a weatherproof enclosure.
- Avoid direct sunlight incidence to the LTE Modem.
- Keep in mind environmental specifications as bellow table.

Enclosure protection	IP51
Operating temperature	-25°C to +70°C
Relative humidity	Maximum 98% RH at 50°C non-condensing

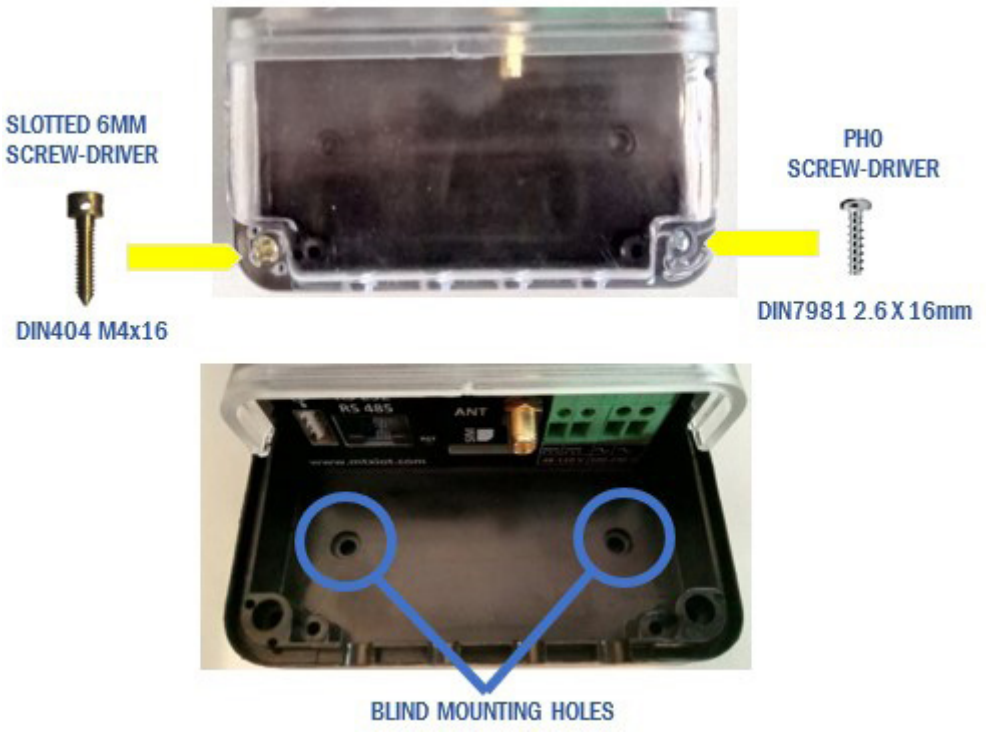
7.2 Modem Wall Mounting

- LTE Modem is intended to be installed on a vertical flat surface using supplied wall mounting plate or DIN mounting clips.
- It is recommended to leave a clear distance of at least 10cm around the Modem for proper air flowing.
- Installation height referred to floor must guarantee proper visibility of status Led and connection of wires, SIM card insertion and Antenna attachment.
- Drill 3 holes on the wall according to mounting hole positions as appear on bellow diagram. Recommended hole is 4mm diameter. Use required wall plastic plugs for proper fixing.
- Wall mounting screws and wall plastic plugs are not provided with LTE Modem.

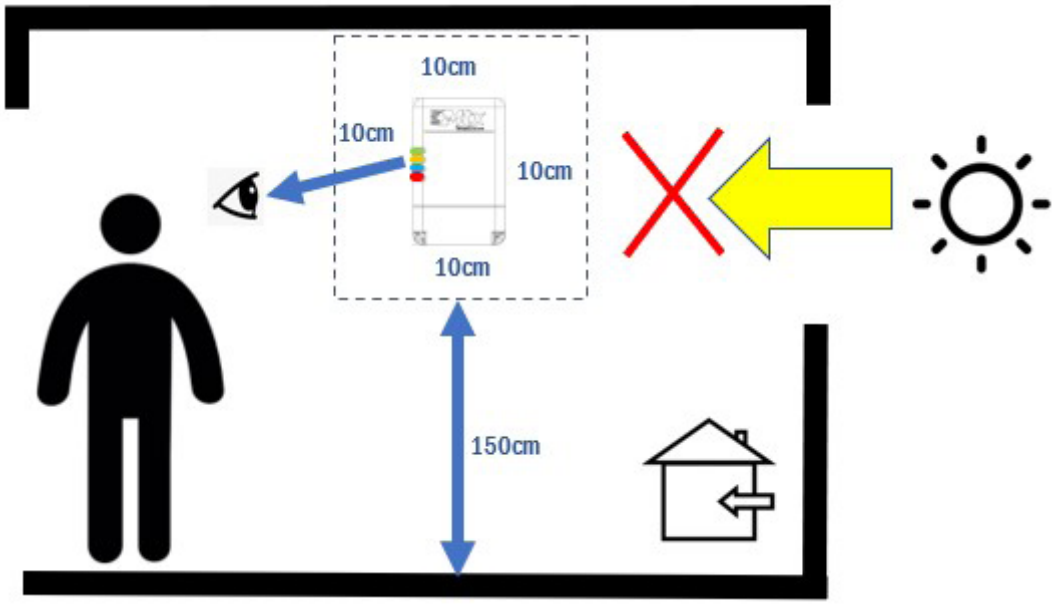
Enclosure fixing	Wall mounting plate and DIN mounting compliant
Dimensions without plate	160mm x 100mm x 45mm
Dimensions with mounting plate	175mm x 100mm x 45mm
Weight	400g


100,00
45,00
174,78
160,00
MOUNTING HOLE
POSITION
MOUNTING PLATE
138,00
MOUNTING HOLE
POSITION
MOUNTING HOLE
POSITION
65,00

- Remove LTE Modem cabling space plastic cover by removing screws with proper screw-driver to get access to low side mounting holes and drill them carefully with a 4mm diameter drill tool as both are blind holes.



- Fix LTE Modem to the wall being aware to follow bellow recommendations.

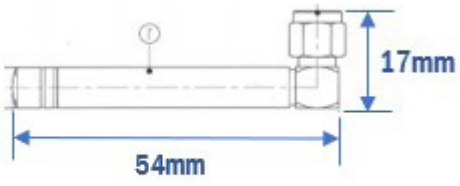


7.3 SIM Card Installation

- Refer to SIM Card chapter for more details.
- SIM Card has to be inserted before LTE Modem is powered on.
- If LTE Modem is powered on without SIM Card inserted, it is recommended to power off the modem, insert SIM Card and power on again.

7.4 Antenna Installation

- Refer to Antenna connection chapter for more details.
- Stub antenna can be connected directly to SMA connector on interface panel.
- Maximum dimensions of Stub Antenna to fit within cabling space is indicated bellow.



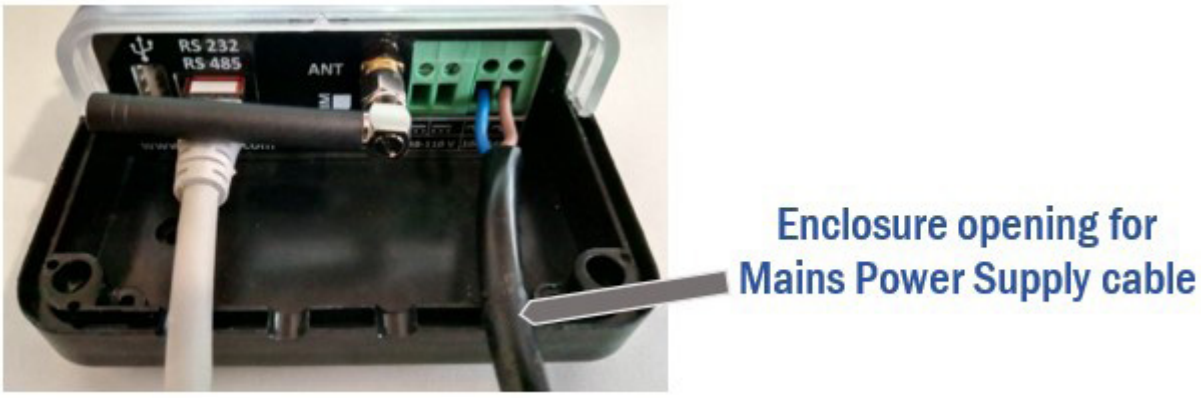
- External antenna can also be installed. Round opening on enclosure is available for cabling installation. RG174 and RG58 cable sizes can be used. Enclosure opening is a 6.5mm diameter hole.

7.5 RS232/RS485 Cable Installation

- Refer to RS232, RS485 and Cable Adapter chapters for more details.
- Matrix Electronica can provide a 1.5m length, RJ45 to DB9 conversion cable with Ref. 230001103.
- Enclosure opening is a 6.5mm diameter hole.

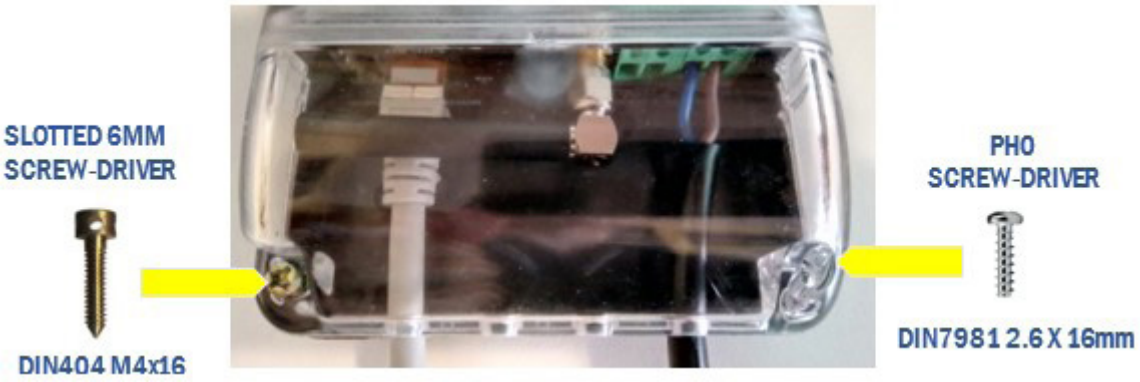
7.6 AC Mains and DC Power Input Cable Installation

- Refer to Mains Power Supply connection chapter for more details.
- Enclosure opening is a 6.5mm diameter hole.

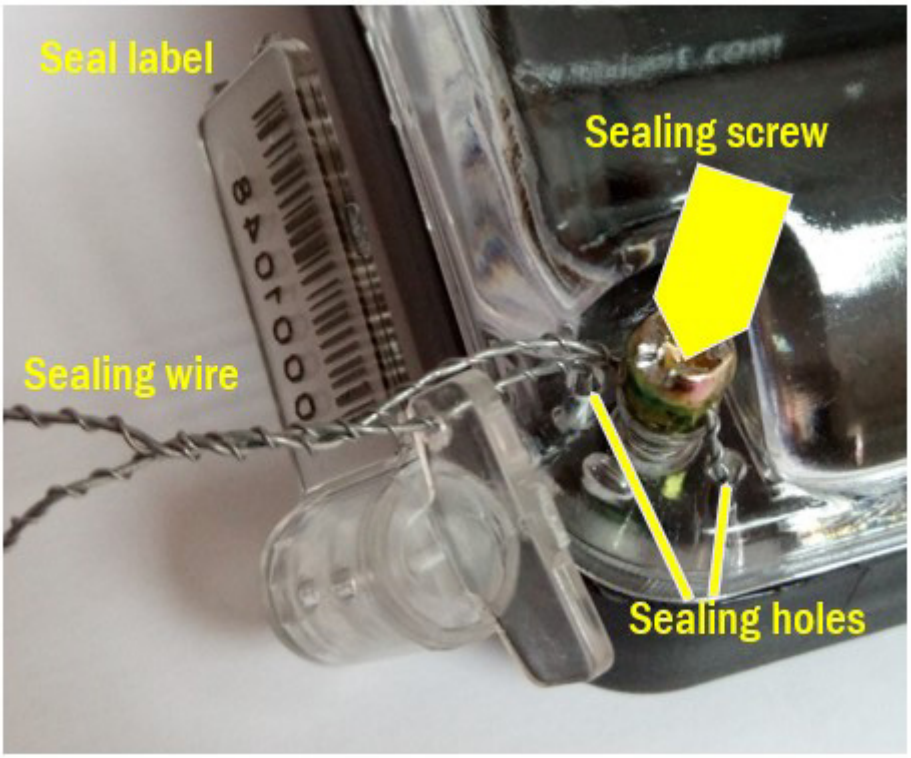


7.7 Cover Cabling Space and Seal

- Once LTE Modem is wall fixed with cables, antenna and SIM card installed, next step is to cover the cabling space.
- Fix cover to main enclosure base with supplied screw as detailed in the following picture.



- Install seal label with appropriate, maximum 1mm diameter sealing wire, joining sealing screw and both cabling cover and main enclosure base.
- Pay attention to the 1mm diameter crossing holes. Both holes cross completely both cabling cover and main enclosure base.



7.8 Power on LTE Modem and Check Operation

- Once LTE Modem is completely installed (fixed, wired and closed) it can be powered up.
- Apply energy source at Mains Power Supply.
- After power on, check system check Status Leds to verify Modem is working properly.

	POWER STATUS LED
ON	Power is properly connected and according required specifications
Fast	Boot failure: contact technical Support. LTE Modem is not operating properly
Slow	MAINS Power energy is lost: operation with backup super-capacitor; will send power lost trap and go into power-down mode
OFF	System is not properly powered on: check mains power supply energy is available and within required specifications; check cabling is properly installed

	COVERAGE STATUS LED
3 blinks	Starting router after system reset.
ON	Good coverage
Slow/Fast/ON	Sim detected and ready
Fast	Low coverage: verify Antenna is properly installed; check LTE Modem location coverage is enough with auxiliary coverage meter
Slow	Not enough/critical coverage: verify Antenna is properly installed; check LTE Modem location coverage is enough with auxiliary coverage meter
OFF	SIM undetected or incorrect PIN: verify SIM Card is properly installed; SIM Card cannot be installed with Modem LTE powered-on

	WAN STATUS LED
ON	4G Network - APN connection ON
Fast	3G Network - APN connection ON

Slow	2G Network - APN connection ON
OFF	No connection to APN: verify LTE Modem is properly setup

	**DATA STATUS LED**
ON	TCP port in listening state with TCP encapsulation enabled
Slow	Ongoing data transfer
OFF	TCP port in listening state with TCP encapsulation disabled

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