



EasyRouter

Hardware manual

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General Notes

Product is deemed accepted by recipient and is provided without interface to recipient's products. The documentation and/or product are provided for testing, evaluation, integration, and information purposes. The documentation and/or product are provided on an "as is" basis only and may contain deficiencies or inadequacies. The documentation and/or product are provided without warranty of any kind, express or implied. To the maximum extent permitted by applicable law, Webdyn further disclaims all warranties, including without limitation any implied warranties of merchantability, completeness, fitness for a particular purpose and non-infringement of third-party rights. The entire risk arising out of the use or performance of the product and documentation remains with recipient. This product is not intended for use in life support appliances, devices, or systems where a malfunction of the product can reasonably be expected to result in personal injury. Applications incorporating the described product must be designed to be in accordance with the technical specifications provided in these guidelines. Failure to comply with any of the required procedures can result in malfunctions or serious discrepancies in results.

Furthermore, all safety instructions regarding the use of mobile technical systems, including GSM products, which also apply to cellular phones, must be followed. Webdyn or its suppliers shall, regardless of any legal theory upon which the claim is based, not be liable for any consequential, incidental, direct, indirect, punitive or other damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information or data, or other pecuniary loss) arising out the use of or inability to use the documentation and/or product, even if Webdyn has been advised of the possibility of such damages. The foregoing limitations of liability shall not apply in case of mandatory liability, e.g., under the Spanish Product Liability Act, in case of intent, gross negligence, injury of life, body or health, or breach of a condition which goes to the root of the contract. However, claims for damages arising from a breach of a condition, which goes to the root of the contract, shall be limited to the foreseeable damage, which is intrinsic to the contract, unless caused by intent or gross negligence or based on liability for injury of life, body or health. The above provision does not imply a change on the burden of proof to the detriment of the recipient. Subject to change without notice at any time. The interpretation of this general note shall be governed and construed according to Spanish law without reference to any other substantive law.

Important information

This technical description contains important information for the startup and use of the Webdyn EasyRouter gateway. Read it carefully before you start working with the EasyRouter 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.

Revision Information

| REVISION | DATE | AUTHOR | CHANGES |
|----------|---------|--------|----------------------------|
| 1.0 | 2022/10 | FJGG | First release |
| 1.1 | 2023/04 | JZM | Updated changes |
| 1.2 | 2023/07 | JZM | Review pictures and schema |
| 2.4 | 2023/10 | CPF | GNSS and Antenna Updates. |

Warranty

The information contained within this user guide, including but not limited to any product specification, is subject to change without notice. Webdyn provides no warranty with regard to this user guide, or any other information contained herein and hereby expressly disclaims any implied warranties of merchantability or fitness for any particular purpose with regard to any of the foregoing. Webdyn assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the uses guide. In no event shall Webdyn be liable for any incidental, consequential, special, or exemplary damages, whether based on tort, contract or otherwise, arising out of or in connection with this user guide or any other information contained herein or the use thereof

Rohs statement

EasyRouter gateway is compliant with the 2002/95/EC (RoHS 1) and 2011/65/EC (RoHS 2) directives of the European Parliament and of the Council of 27 January 2003 (and revised on 8 June 2011) on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS).



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.



Precautions

1.1 General Precautions



PLEASE READ THESE GENERAL PRECAUTIONS AND KEEP A COPY OF THEM.

- EasyRouter 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 Technical Data.
- 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 router that can be serviced by the user. If you attempt to dismantle the device, you may invalidate the warranty.
- The EasyRouter terminal must not be neither installed nor located in areas where the surface temperature of the metallic case could exceed 85°C.
- Check that voltage and power available at installation is within range specified for router. It can be

found on this guide and labelled on gateway.

- Do not install any gateway 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 EasyRouter 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 not be connected to EasyRouter.
- Note! EasyRouter distributors and sales offices may refuse warranty claims where evidence of product misuse is found.

Safety requirements and protection regulations



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

- EasyRouter, for any type of operation, is only accessible for instructed and skilled installers, testers and technical engineers.
- Before any type of handling of EasyRouter, 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.
- Always ensure that use of EasyRouter is permitted. The router may present a hazard if used in proximity to personal electronic medical devices. As a rule, the router 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.

1.2 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 router 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.

1.3 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 router to a single antenna. The router can be damaged by radio frequency energy from the transmitter of another router.

- Like any mobile station, the antenna of the gateway 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 gateway and antenna may be damaged if either of them comes into contact with ground potentials other than the one in your application. Beware: ground potentials are not always what they appear to be.

1.4 Radio Frequency (RF) Exposure and SAR

Your wireless 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.

EasyRouter 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 EasyRouter gateway 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.

1.5 SAR Information

Wireless Modules models: EC21 is marketed without a defined antenna.

The Maximum Antenna Gain when using indoor antennas depends on the distance from the antenna to any nearby persons when in normal operation. It should not exceed the values shown on the table below.

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

The maximum measured power output in the 900 MHz band is 1995.26 mW (33 dBm).

The maximum permissible exposure defined by 47 CFR 1.1310 is $f/1500 = 0.6 \text{ mW/cm}^2$.

The maximum measured power output in the 1800 MHz band is 1000 mW (30 dBm).

The maximum permissible exposure is defined as 47 CFR 1.1310 with 1 mW/cm^2 .

According to the limit in 47 CFR 1.1310, we get the value of the maximum antenna gain as follows:

$$S = P \cdot G / 4\pi R^2; G = 4\pi R^2 (S / P)$$

$$S = 0.6 \text{ mW/cm}^2 \text{ or } 1 \text{ mW/cm}^2$$

$$P = 1995.26 \text{ mW or } 1000 \text{ mW}$$

$$R = 20 \text{ cm or } 50\text{cm}$$

$$\pi = 3.1416$$

$$G(\text{dBi}) = 10 \cdot \log(G)$$

Solving for G; the maximum antenna gain is:

| BAND | P (mW/ dBm) | S (mW/ cm ²) | DISTANCIE | MAX. GAIN (dBi) |
|----------|--------------|---------------------------|-----------|-----------------|
| 900 MHz | 1995.26 / 33 | 0.6 | 20cm | 1.79 |
| 900 MHz | 1995.26 / 33 | 0.6 | 50cm | 9.75 |
| 1800 MHz | 1000 / 30 | 1 | 20cm | 4.79 |
| 1800 MHz | 1000 / 30 | 1 | 50cm | 14.97 |

1.6 Personal Medical Devices

Wireless 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 EasyRouter device 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.

1.7 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 EC21 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 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 20cm to 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 20cm 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.

Technical description

2.1 Overview

The EasyRouter is an innovative industrial gateway that comprises a set of features to provide remote wireless connectivity on customer facilities.

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

Router includes the following features:

- 4G LTE Cat 1 module.
- GNSS that supports GPS, GLONASS, BeiDou/Compass, Galileo and QZSS.
- 3x Antenna connection: 1x SMA Female for LTE, 1x SMA F for GNSS, 1x SMA F RP for WiFi
- Double Mini SIM card socket.
- RS232 on RJ45 connector.
- RS485 on Terminal block connector.
- Ethernet GIGABIT port.
- WiFi IEEE 802.11a/b/g/n/ac (2.4 GHz / 5 GHz).
- 1x Digital input.
- 1x Digital output.
- RTC with Super-Capacitor based backup energy.
- Factory reset button.
- 3.5mm pitch screwed terminal blocks for power supply input connection.
- Status Leds to show power, coverage, WAN connection and errors.



EasyRouter has an industrial temperature range (-40/+85°C) and is built in a metal casing that provides high impact resistance. It has a detachable accessory for DIN rail mounting and is equipped with two supports with removable tray for Mini Sim cards, gigabit Ethernet, Wifi, digital input and output and RS485 and RS232 interfaces to minimize the need for further hardware development. This device can be used as a powerful and flexible device that can be integrated into a wide range of applications that require 4G technology, in addition, it includes a RTC in cases where real time is needed.

A full list of antennas, cables and accessory supplies are available.

2.2 Operating Range

| Electrical specifications. | Min. | Typ. | Max. |
|---|------|------------------------------------|-----------------------|
| Power supply voltage | 7VDC | 12VDC | 30VDC |
| Current consumption (12VDC) | | | 175mA (Average value) |
| Power consumption | | | <3W |
| Digital Input voltage | 0V | | 28VDC |
| “Low” digital input voltage | 0V | | 0.8V |
| “High” digital input voltage | 3V | | 28VDC |
| Factory Default Input voltage | 0V | | 30VDC |
| Digital Output voltage | 0V | | VIN-0.4V |
| “Low” digital output voltage | 0V | | |
| “High” digital output voltage | | | 30VDC |
| RS485 baudrate | | | 500 kbps |
| RS485 D+, D- common mode | -7V | | 12V |
| RS485 short circuit current | | | ±250mA (HBM) |
| RS485 ESD protection | | | ±16kV (HBM) |
| RS232 baudrate | | | 250 kbps |
| RS232 ESD protection | | | ±15kV (HBM) |
| SIM card slot ESD protection | | | ±15kV (Contact) |
| LTE module | | Detailed parameters on chapter 2.6 | |
| LTE Main antenna | | 50 ohms | |
| GNSS antenna | | 50 ohms | |
| WiFi antenna | | 50 ohms | |
| Real Time Clock backup: Internal Supercapacitor | | | |

Mechanical and environmental specifications.

| | |
|-----------------------------------|-----------------------------|
| Enclosure fixing | DIN rail mounting compliant |
| Operating temperature (*) | -40°C to +85°C |
| Storage temperature | -40°C to +85°C |
| Dimensions with DIN Rail plate | 113.2 x 30.5 x 90.2 mm |
| Weight | 195g |
| (*) LTE module extended operation | |

2.3 Ordering Information

| Model name | Part Number |
|----------------------------|--------------|
| Webdyn EasyRouter EU | 000199811003 |
| Webdyn EasyRouter AU/LATAM | 000199811004 |

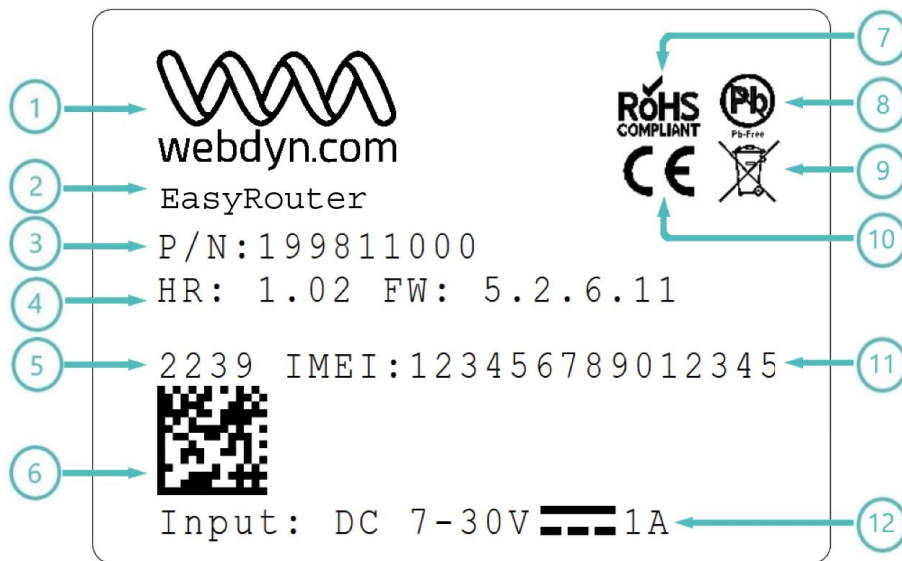
2.4 Packaging

EasyRouter gateway is packaged without any additional accessories and through an open window on the box it allows the product label to be read when closed.



2.5 Product Label

The label fixed to the top of a EasyRouter device comprises the following information:

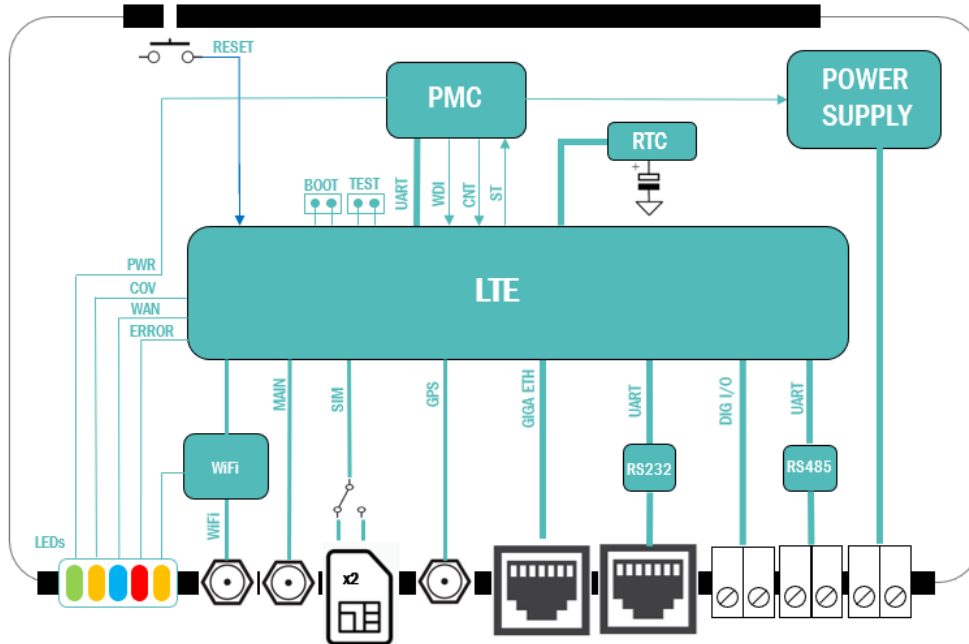


1. Webdyn logo
2. Product name (model)
3. Part number/ordering code
4. Manufacturing Year/week (YYMM)
5. Bar Code
6. RoHS symbol
7. Pb-Free logo
8. WEEE logo
9. CE logo
10. IMEI
11. Power supply operating specifications

2.6 System Architecture

EasyRouter gateway 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 and rear panel.



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

For 000199811003 Webdyn EasyRouter EU

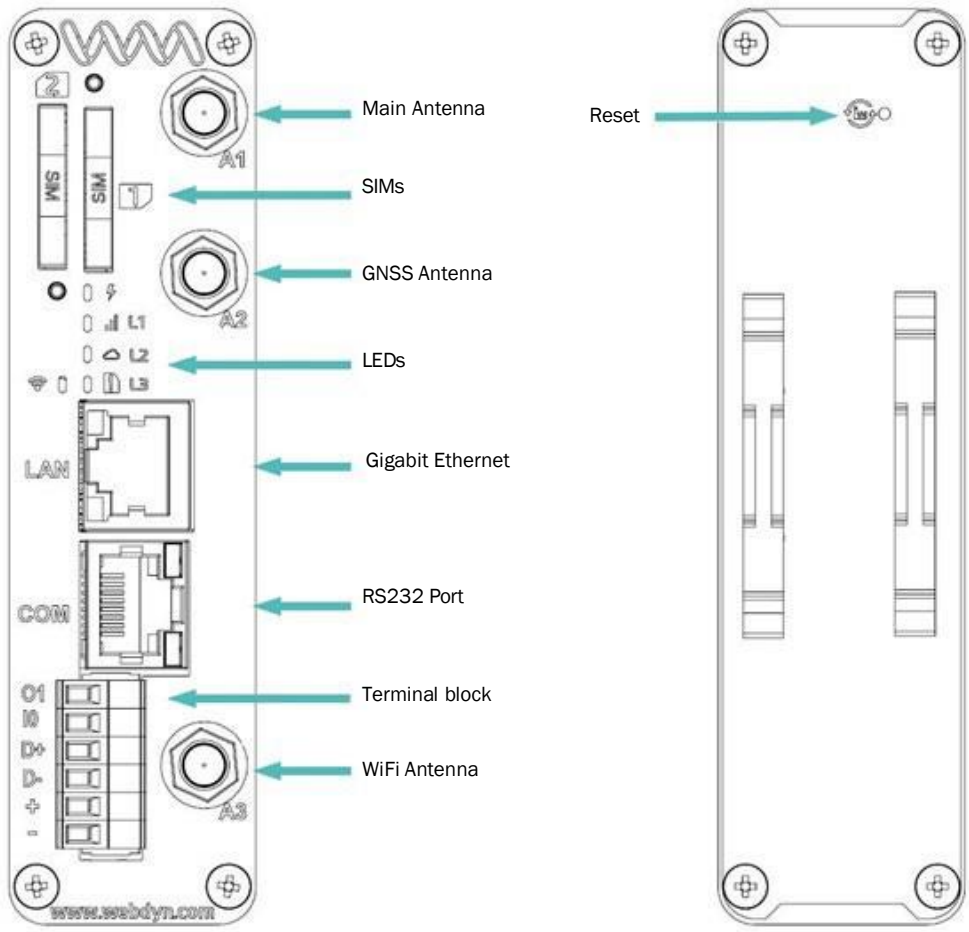
| NETWORK | BANDS | TECHNOLOGY | MAX. DATA RATE | |
|---------|--------------------------|------------|----------------|------------|
| | | | DL | UL |
| 4G | B1/B3/B7/B8/ B20/B28A | LTE-FDD | 10 Mbps | 5 Mbps |
| 3G | B1/B8 | DC-HSDPA+ | 42 Mbps | 5.76 Mbps |
| | | WCDMA | 384 kbps | 384 kbps |
| 2G | B3/B8 | EDGE | 296 kbps | 236.8 kbps |
| | | GPRS | 107 kbps | 85.6 kbps |

LTE interface covers Australia and Latin America region and is certified with following frequency bands and data rates:

For 000199811004 Webdyn EasyRouter AU/LATAM

| NETWORK | BANDS | TECHNOLOGY | MAX. DATA RATE | |
|---------|------------------------------|------------|----------------|------------------|
| | | | DL | UL |
| 4G | B1/B2/B3/B4/B5/ B7/B8/B28 | LTE-FDD | 10 Mbps | 5 Mbps |
| | B40 | LTE-TDD | 8.96 Mbps | 3.1 Mbps |
| 3G | B1/B2/B5/B8 | DC-HSPA+ | 42 Mbps | <u>5.76 Mbps</u> |
| | | WCDMA | 384 kbps | 384 kbps |
| 2G | B2/B3/B5/B8 | EDGE | 296 kbps | 236.8 kbps |
| | | GPRS | 107 kbps | 85.6 kbps |

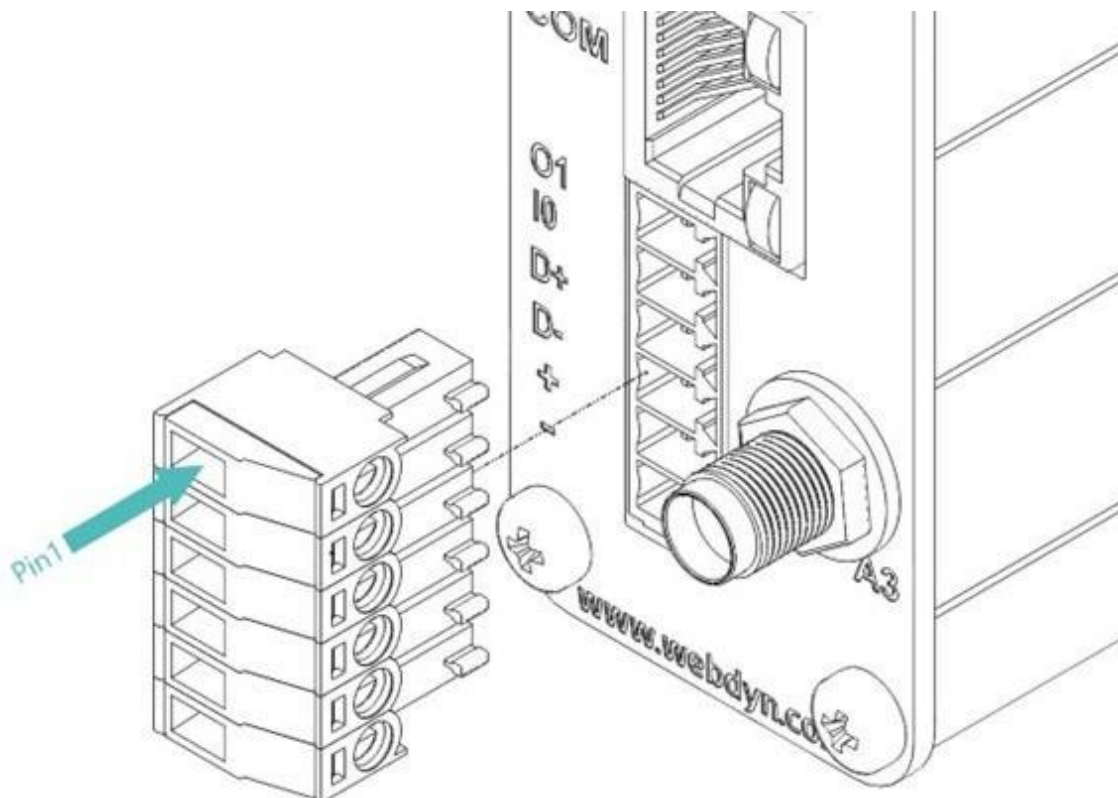
2.7 External Interfaces on Front and Rear Panel



- Antenna (A1) – SMA-F connector for 4G main antenna.
- Antenna (A2) – SMA-F connector for GNSS antenna.
- Antenna (A3) – SMA-F-RP connector for WiFi antenna
- Double SIMs – x2 SIM sockets for Mini-SIM form factor card with tray.
- LEDs – Five leds for operation status.
- Gigabit Ethernet port (RJ45)
- COM – Communication Port RS232 (RJ45)
- TERMINAL BLOCK – 6-way plug-in 3.5mm pitch terminal block for:
 - o Power supply input
 - o RS485 interface
 - o 1x General Purpose Digital Input
 - o 1x General Purpose Digital Output
- Factory Reset push button (rear panel)

2.8 Terminal Block Connection

EasyRouter device has a terminal block type connector for fastening to front panel for power supply input, RS485 port and inputs connection.



| PIN | SIGNAL | TYPE | FUNCTION |
|-----|--------|------|-----------------------------|
| 1 | O1 | DO | Digital output #1 |
| 2 | I0 | DI | Digital input #0 |
| 3 | D+ | IO | RS485 positive line |
| 4 | D- | IO | RS485 negative line |
| 5 | + | PWR | Positive power supply input |
| 6 | - | PWR | Negative power supply input |

Power supply input is externally connected on terminal block, positive signal at pin 5 and negative signal at pin 6. Operating range values are specified at (table 2.2).

EasyRouter gateway is equipped with a RS485 half-duplex interface with external connection on terminal block type connector. D+ signal has to be connected on pin 3 and D- signal on pin 4.

Formerly, TIA/EIA-RS485 specification identifies A signal as equivalent to D- and B signal as equivalent to D+, nonetheless, some semiconductor manufacturers adopted the opposite relationship, so it is recommended to follow D+ and D- signal identification.

RS485 interface features ESD protection with internal network termination resistor and fail-safe polarization network.

A general-purpose digital input is included within EasyRouter gateway, available on the terminal block type connector on pin 2.

To activate any input externally, it must be shorted to V- input on pin 6 of terminal block so it is recommended to use external dry-contact type devices, as relays or open-drain/collector transistors.

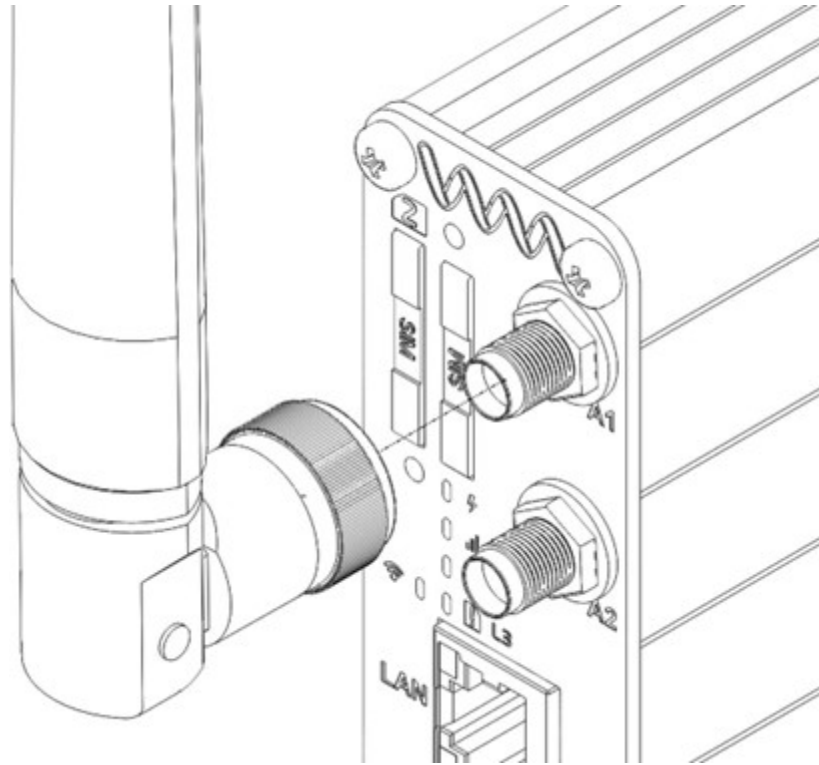
Finally, a general-purpose digital output is included within EasyRouter gateway in this terminal block. Operating range values are specified at (table 2.2).

2.9 Main Antenna Connection

EasyRouter device provides SMA Female connector to attach external antenna. This connector allows radio frequency (RF) transmission signals between the router and an external customer-supplied antenna. EasyRouter is fitted with a 50Ω SMA Female coaxial connector.

These external antennas must be matched properly to achieve the best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression.

| SMA INTERFACE SPECIFICATIONS | |
|------------------------------|--------------------------|
| Impedance | 50 Ω |
| Type | SMA Female |
| ESD Protection | 15 KV air / 8 KV contact |



Consider the following requirements:

- The antenna must be designed for one of the frequency bands in use; please ask your network provider for more information.
- Frequency according to band of chosen 4G module
- The impedance of the antenna and antenna cable must be 50Ω
- Antenna connector should be SMA Male type
- Antenna power should be at least 500mW as maximum power is 316.23mW.
- Maximum Output RF load mismatch ruggedness at antenna is 10:1 VSWR

The antenna should be placed away from electronic devices and other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If the signal strength is weak, it is useful to face a directional antenna towards the closest radio base station. This can increase the strength of the signal received by the router. The LoRa module's peak output power can reach 320mW.

RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential / commercial areas and the light industry can withstand a minimum of 3V/m.

Possible communication disturbances include the following:

- Noise can be caused by electronic devices and radio transmitters.
- Path-loss occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.

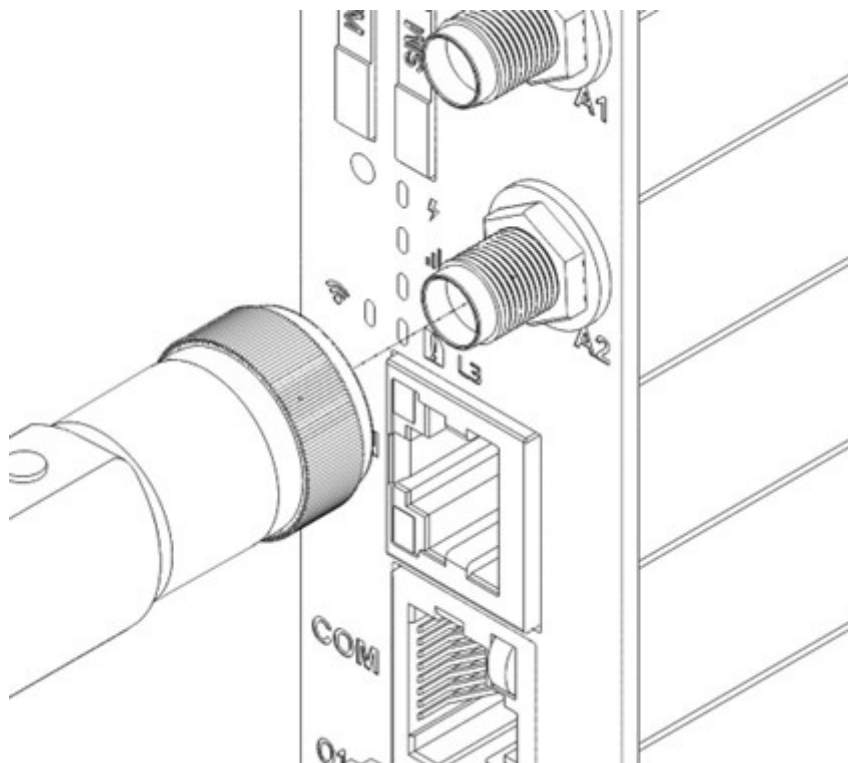
- Shadowing is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- Multi-path fading is a sudden decrease or increase in the signal strength. This is the result of interference which is caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.
- Hand-over occurs as you move from one cell to another in the GSM network. Your mobile application call is transferred from one cell to the next. Hand-over can briefly interfere with communication and may cause a delay, or at worst, disruption.

2.10 GNSS Antenna Connection

EasyRouter device provides SMA Female connector to attach external antenna. This connector allows radio frequency (RF) transmission signals between the router and an external customer-supplied antenna. EasyRouter is fitted with a 50Ω SMA Female coaxial connector.

These external antennas must be matched properly to achieve the best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression.

| SMA INTERFACE SPECIFICATIONS | |
|------------------------------|--------------------------|
| Impedance | 50 Ω |
| Type | SMA Female |
| ESD Protection | 15 KV air / 8 KV contact |
| Active Power Out | 3.3V |



Consider the following requirements:

- The antenna must be designed for one of the frequency bands in use.
- Frequency according to band of chosen the right GNSS solution.
- The impedance of the antenna and antenna cable must be 50Ω.
- Antenna connector should be SMA Male type.
- Active antenna could be used, for this instance, the router is able to supply 3.3V ±5% for this function.
- The maximum active antenna current consumption has to be less than 30mA.

The antenna should be placed away from electronic devices and other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If the signal strength is weak, it is useful to face a directional antenna towards the closest radio base station. This can increase the strength of the signal received by the router.

RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential / commercial areas and the light industry can withstand a minimum of 3V/m.

Possible communication disturbances include the following:

- Noise can be caused by electronic devices and radio transmitters.
- Path-loss occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.
- Shadowing is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- Multi-path fading is a sudden decrease or increase in the signal strength. This is the result of interference which is caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.

2.11 WiFi Antenna Connection

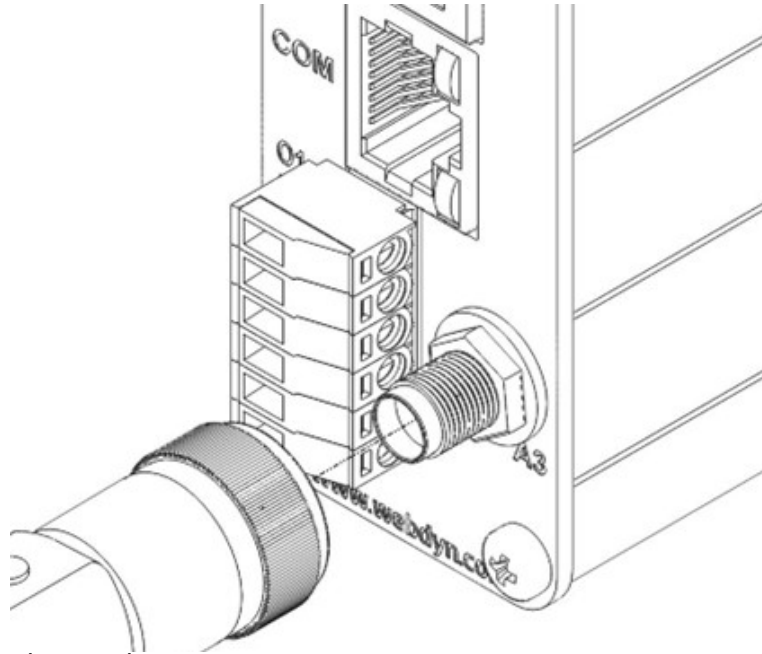
EasyRouter device provides SMA Female RP connector to attach external antenna. This connector allows radio frequency (RF) transmission signals between the router and an external customer-supplied antenna. EasyRouter is fitted with a 50Ω SMA Female RP coaxial connector, and maximum power of 17dB.

These external antennas must be matched properly to achieve the best performance regarding radiated power, DC-power consumption, modulation accuracy and harmonic suppression.

| SMA INTERFACE SPECIFICATIONS | |
|------------------------------|--------------------------|
| Impedance | 50 Ω |
| Type | SMA Female RP |
| ESD Protection | 15 KV air / 8 KV contact |

With the correct antennas and the appropriate conditions these are the maximum speeds that can be obtained in each mode.

| Data Rate (Max.) | |
|------------------|----------|
| 802.11a | 54 Mbps |
| 802.11b | 11 Mbps |
| 802.11g | 54 Mbps |
| 802.11n | 150 Mbps |
| 802.11ac | 433 Mbps |



Consider the following requirements:

- The antenna must be designed for one of the frequency bands in use (2.4 GHz / 5 GHz).
- Frequency according to band of chosen the right WiFi solution.
- The impedance of the antenna and antenna cable must be 50Ω.
- Antenna connector should be SMA Male RP type.
- Maximum Output RF load mismatch ruggedness at antenna is 10:1 VSWR.

The antenna should be placed away from electronic devices and other antennas. The recommended minimum distance between adjacent antennas, operating in a similar radio frequency band, is at least 50cm. If the signal strength is weak, it is useful to face a directional antenna towards the closest radio base station. This can increase the strength of the signal received by the router.

RF field strength varies with antenna type and distance. At 10cm from the antenna the field strength may be up to 70V/m and at 1m it will have reduced to 7V/m. In general, CE-marked products for residential / commercial areas and the light industry can withstand a minimum of 3V/m.

Possible communication disturbances include the following:

- Noise can be caused by electronic devices and radio transmitters.
- Path-loss occurs as the strength of the received signal steadily decreases in proportion to the distance from the transmitter.
- Shadowing is a form of environmental attenuation of radio signals caused by hills, buildings, trees or even vehicles. This can be a particular problem inside buildings, especially if the walls are thick and reinforced.
- Multi-path fading is a sudden decrease or increase in the signal strength. This is the result of interference which is caused when direct and reflected signals reach the antenna simultaneously. Surfaces such as buildings, streets, vehicles, etc., can reflect signals.

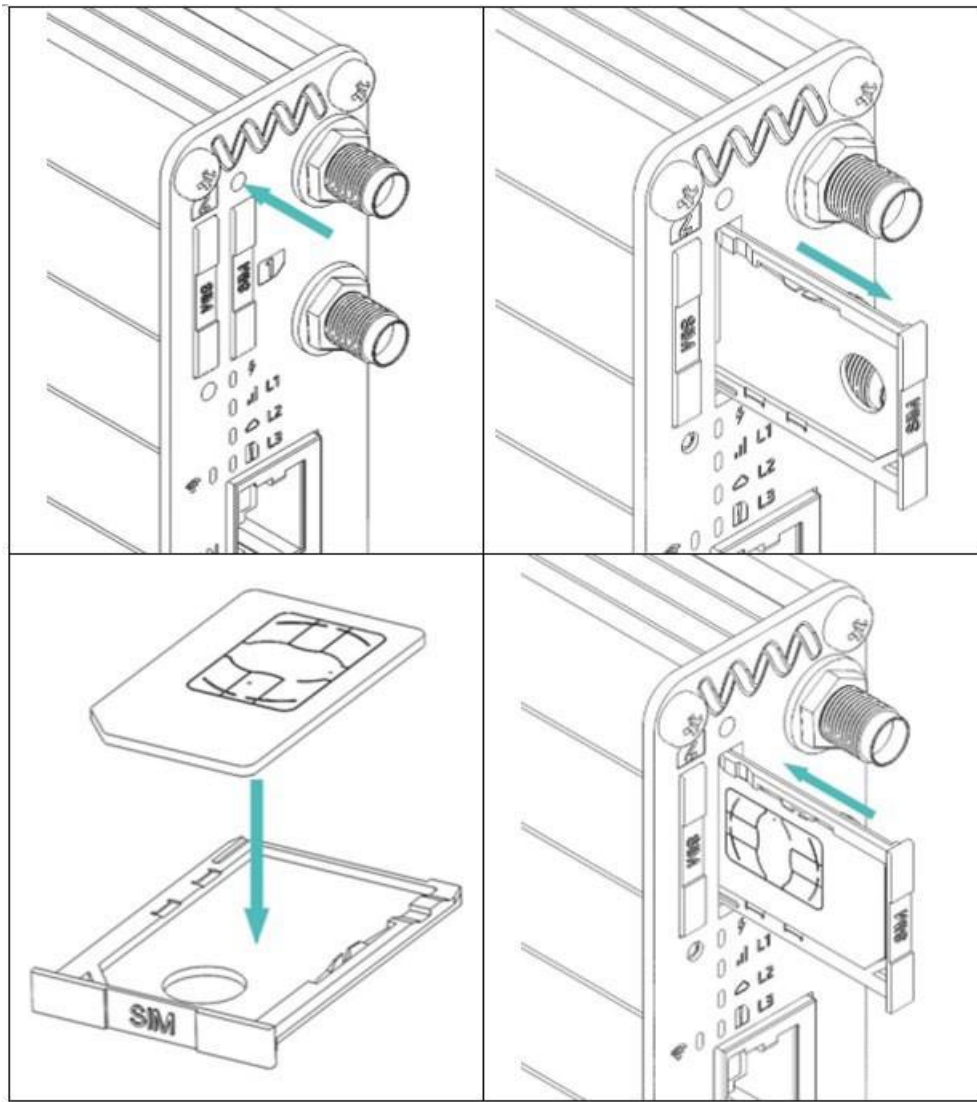
2.12 SIM Card Reader

EasyRouter device is fitted with two Mini SIM card readers designed for 1.8V and 3V Mini SIM cards. It is the bar push type with tray and can be accessed through the front panel.

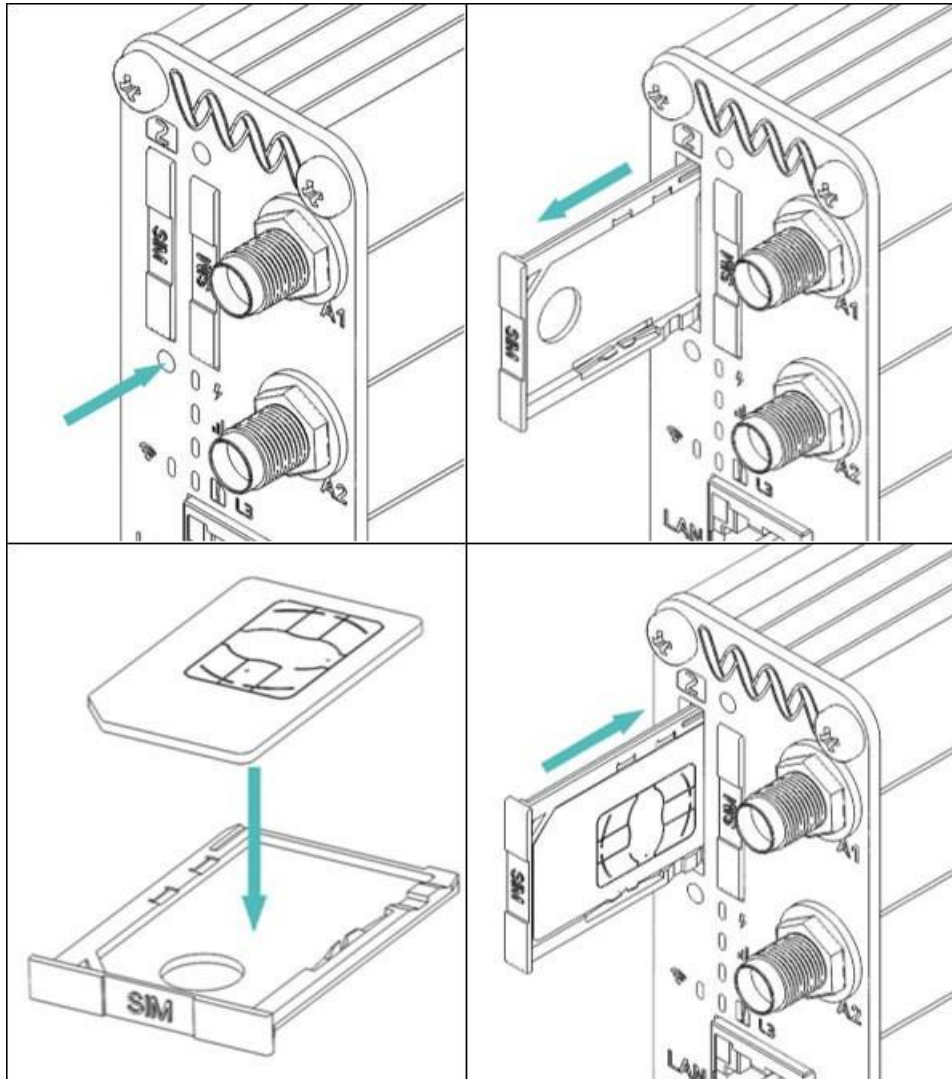
EasyRouter presents the possibility of mounting two cards, one as a backup. In the front panel is identified SIM card priority with the numbers 1 and 2.

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

- Mini Sim 1

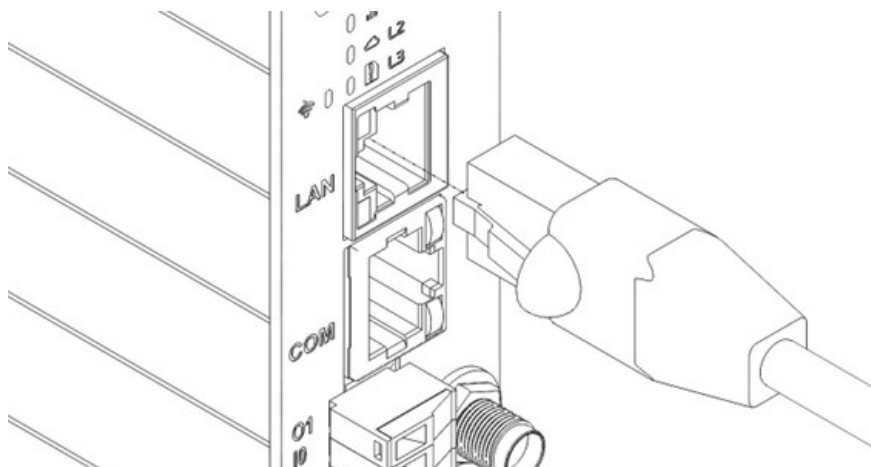


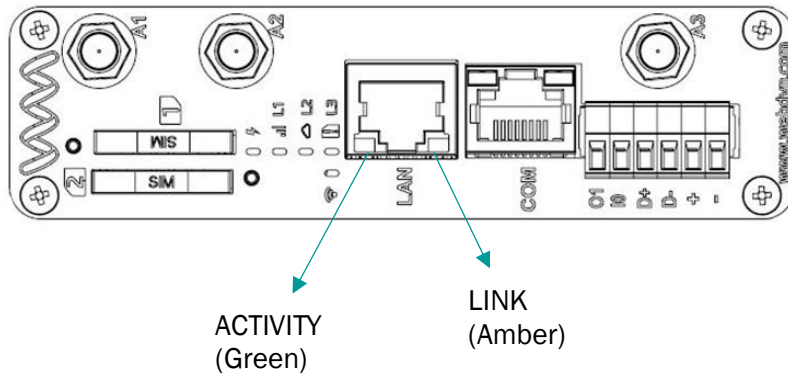
- Mini Sim 2



2.13 Ethernet Gigabit Port

EasyRouter gateway provides a full router functionality with ethernet connector (RJ45) available on a RJ45 connector at the front panel with this symbol





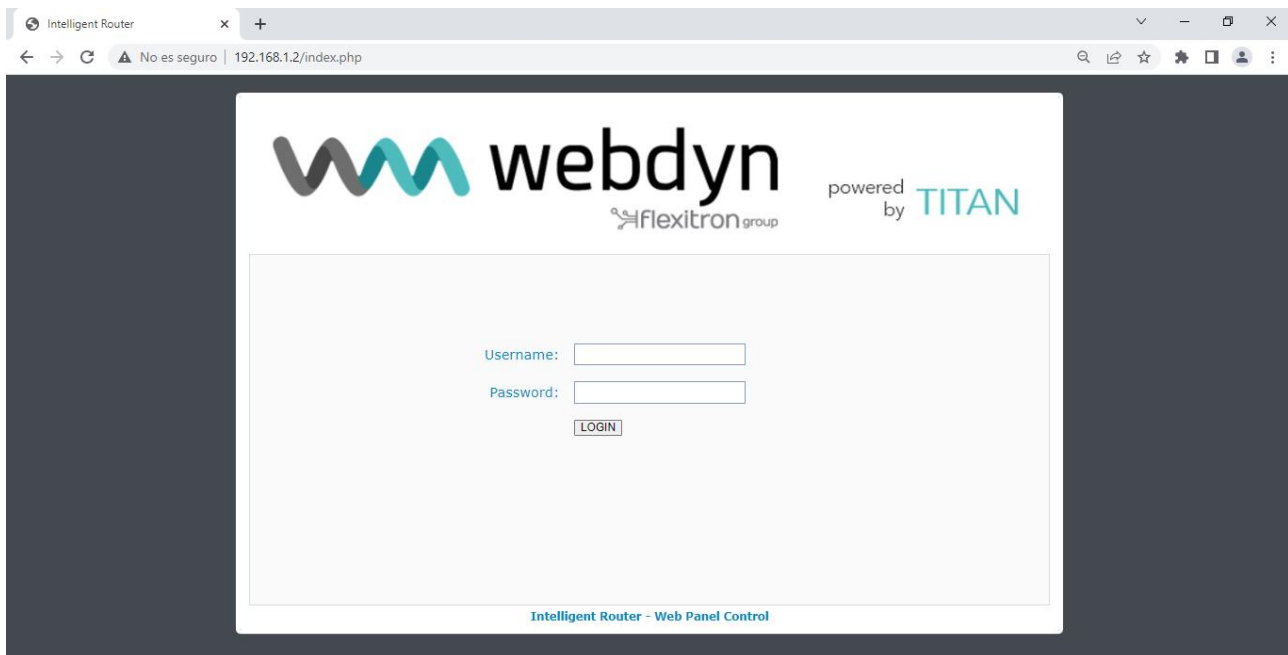
| RS485 SPECIFICATIONS | |
|----------------------|-------------------------|
| LINK (Amber) | 10Mb / 100Mb Led OFF |
| | 1000Mb Led ON |
| ACTIVITY (Green) | Blink Transmitting Data |

By connecting EasyRouter through an ethernet cable with our computer we will have access Titan Firmware

The PC must have a fixed IP, within the range: 192.168.1.x

EasyRouter has by factory default IP: 192.168.1.2 – Mask: 255.255.255.0

Open a browser, with the address "<http://192.168.1.2>" a window like the following should appear:



Use the default username and password: **admin** and **admin**

Through which we can configure WAN, Titan scripts, Sims, RTC, digital input and output, etc.

See Titan software manual for more information.

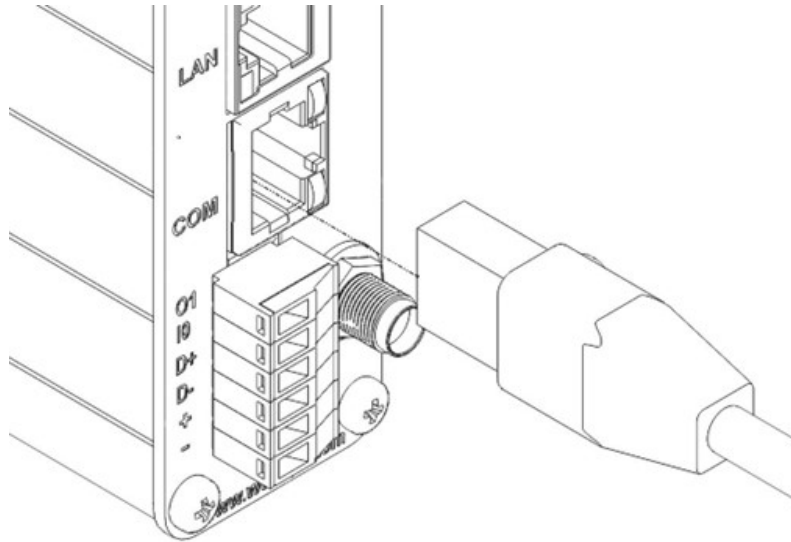
2.14 RS232 Connection

EasyRouter device have implemented RS232 interface in RJ45 (COM).

RS232 interface is implemented as a serial asynchronous transmitter and receiver conforming to ITU-T V.24 Interchange Circuits DCE. It is configured for 8 data bits, no parity and 1 stop bit and can be operated at fixed bit rates from 300bps to 460.8kbps.

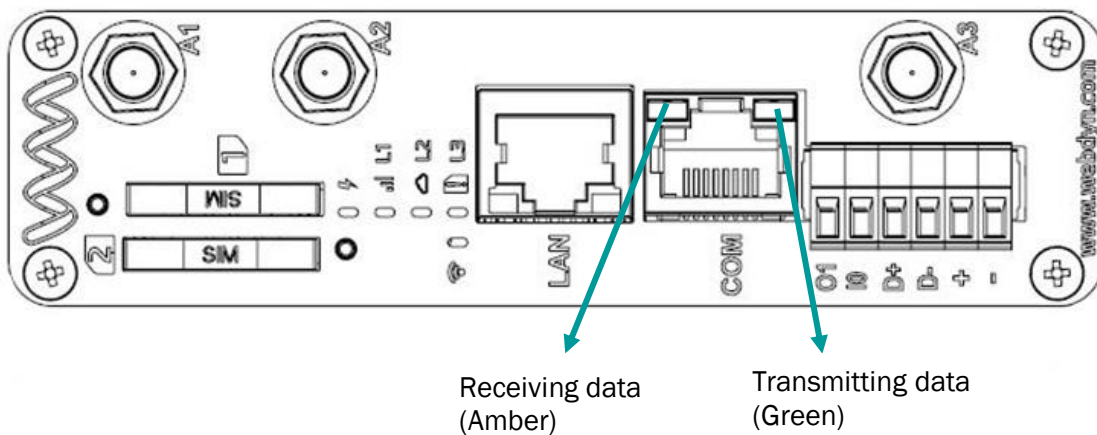
If RS232 cable required length is longer than 3m, it is recommended to use a shielded cable.

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



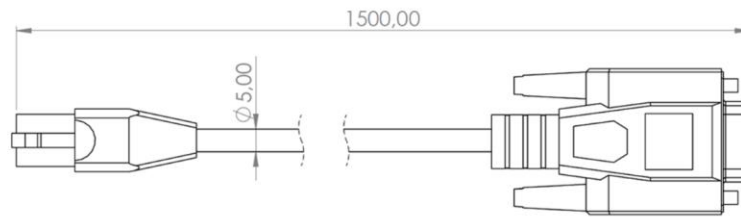
| Terminal | RS232 DCE | Type | Description |
|----------|-----------|------|---|
| 1 | +VIN | Pwr | Positive power supply input |
| 2 | RS232 CTS | Out | Clear to send |
| 3 | RS232 Rx | Out | WAN received data is transmitted on this output |
| 4 | NC | NC | Not Connected |
| 5 | RS232 RTS | In | Ready to send |
| 6 | GND | Pwr | Reference common signal |
| 7 | NC | NC | Not Connected |
| 8 | RS232 Tx | In | Data received on this Input is transmitted to WAN |


| RS232 LEDS | |
|------------|-------------------------|
| Green | Blink Transmitting Data |
| Amber | Blink Receiving Data |



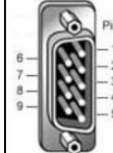
| RS232 SPECIFICATIONS | |
|----------------------|---------------------------|
| Baud Rate | Max. 250 Kbps |
| ESD Protection | 15 KV air / 15 KV contact |
| Cable length | Max. 3 m |

Optionally, a cable can be supplied to convert the RJ45 to DB9 Male (usually used in electricity meters). This is the pin-out of the cable:



| RS485-RJ45 Plug | Signal | Pin | Direction |
|--|--------|-----|-----------|
|  | NC | 1 | X |
| | CTS | 2 | OUT |
| | RxD | 3 | OUT |
| | NC | 4 | X |
| | RxD | 5 | IN |
| | GND | 6 | X |
| | NC | 7 | X |
| | TxD | 8 | IN |
| - | - | - | X |

| Webdyn Cod. 00230001103 | | |
|-------------------------|-------|----------|
| Signal | Cable | DB9 MALE |
| 1 | NC | 1 |
| 2 | CTS | 8 |
| 3 | RxD | 3 |
| 4 | NC | 4 |
| 5 | RTS | 7 |
| 6 | GND | 5 |
| 7 | NC | 6 |
| 8 | TxD | 2 |
| - | NC | 9 |

| DB9 MALE | Signal | Pin | Direction |
|--|--------|-----|-----------|
|  | NC | 1 | X |
| | TxD | 2 | IN |
| | RxD | 3 | OUT |
| | NC | 4 | X |
| | GND | 5 | - |
| | NC | 6 | X |
| | RTS | 7 | IN |
| | CTS | 8 | OUT |
| | NC | 9 | X |

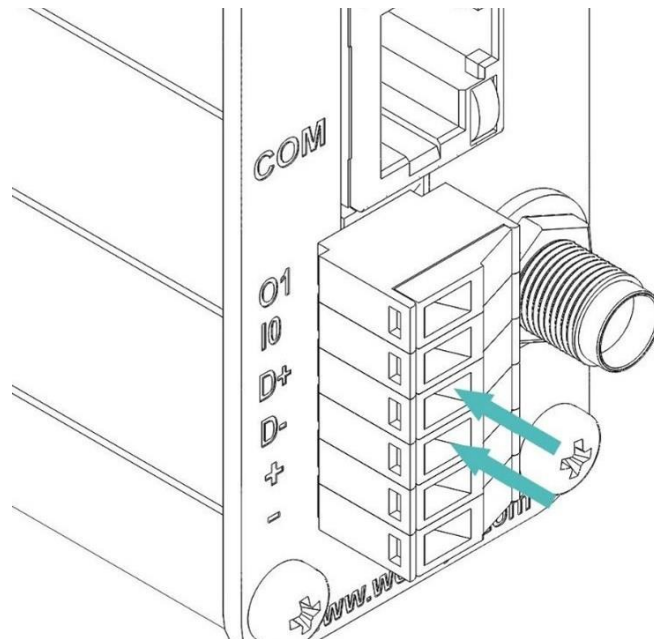
2.15 RS485 Connection

EasyRouter provides RS485 interface on terminal block connector D+ and D-.

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.

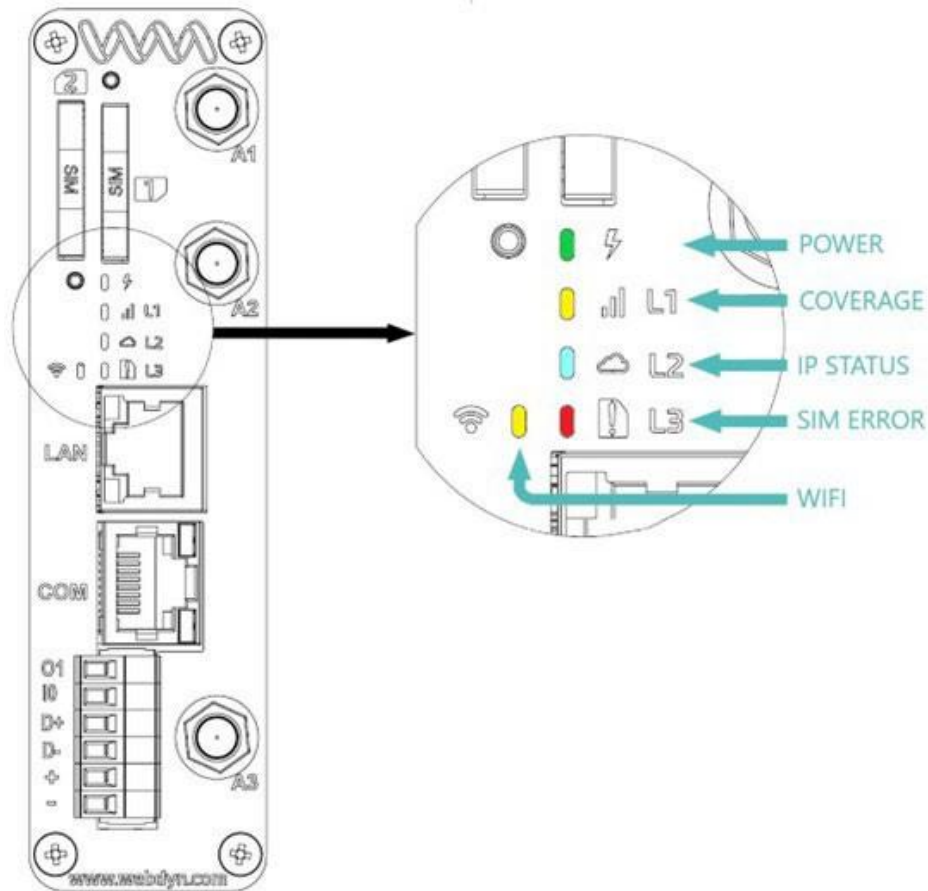


| PIN | RS485 | Type | Description |
|-----|-------|------|-----------------------------|
| 1 | O1 | DO | Digital output |
| 2 | IO | DI | Digital input |
| 3 | D+ | IO | RS485 positive line |
| 4 | D- | IO | RS485 negative line |
| 5 | + | PWR | Positive power supply input |
| 6 | - | PWR | Negative power supply input |

| RS485 SPECIFICATIONS | |
|----------------------|--|
| Baud Rate | Max. 500 Kbps |
| Termination | Internal Resistors on RS485 Fail-Safe Bias |
| ESD Protection | 16 KV air / 16 KV contact |
| Cable length | Max. 3 m with UTP cable Max. 20 m with SFTP cable |

2.16 Status LEDs

Four LEDs on front panel are included to inform about operation status of EasyRouter gateway.



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.

- Power LED:

| OPERATING STATES | STATE |
|--|--------|
| Power Off | OFF |
| Power On | ON |
| Fail turning router ON | Fast |
| Upgrade mode active | Medium |
| System will go to Bootloader or power down | Low |

- Coverage LED:

| OPERATING STATES | STATE |
|--------------------------------------|--------------|
| Starting Router | 3 blinks |
| Mini SIM detected and ready | Slow/Fast/ON |
| Mini SIM undetected or incorrect PIN | OFF |
| Not enough / critical coverage | Slow |
| Low Coverage | Fast |
| Good Coverage | ON |

- IP Status LED:

| OPERATING STATES | STATE |
|------------------|-------|
| IP Not Assigned | OFF |
| IP Assigned | ON |

- SIM Error LED:

| OPERATING STATES | STATE |
|------------------|-------|
| Mini SIM OK | OFF |
| Mini SIM Error | ON |

- WiFi LED:

| OPERATING STATES | STATE |
|------------------|-------|
| Wi-Fi Power on | ON |
| Wi-Fi Power off | OFF |

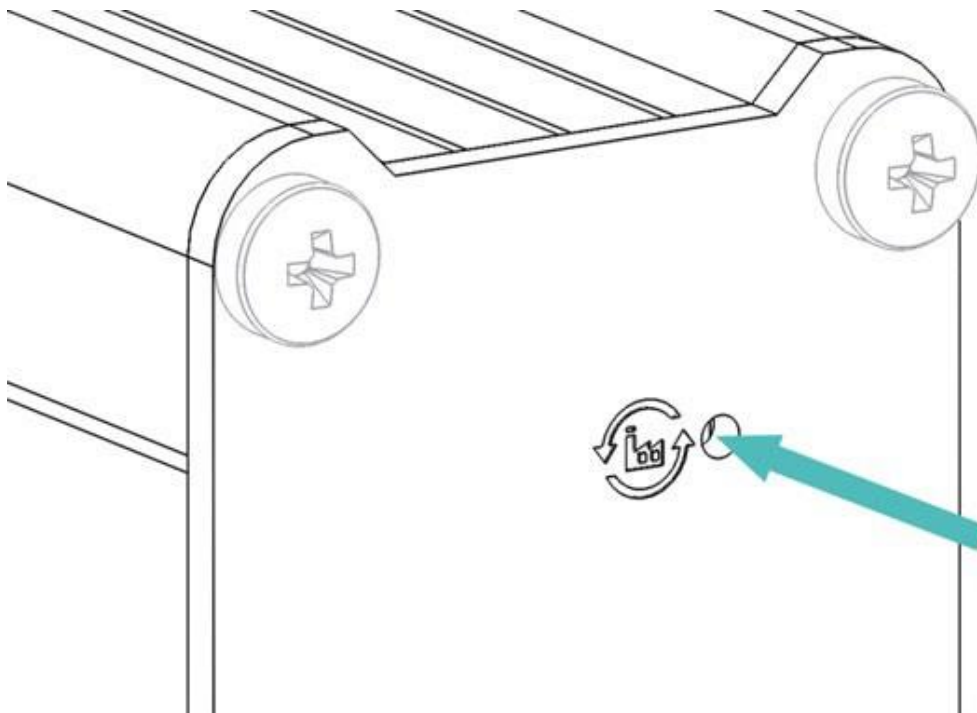
2.17 Real Time Clock (RTC)

EasyRouter device integrates Real Time Clock for timestamping purposes.

RTC power backup is based on a supercapacitor to allow the system to keep hour and date for a month at least when external power supply is removed.

2.18 Factory Default Reset

EasyRouter parameters can be restored to factory default values with an external input push button in rear panel. This input is labelled on rear panel with this symbol:

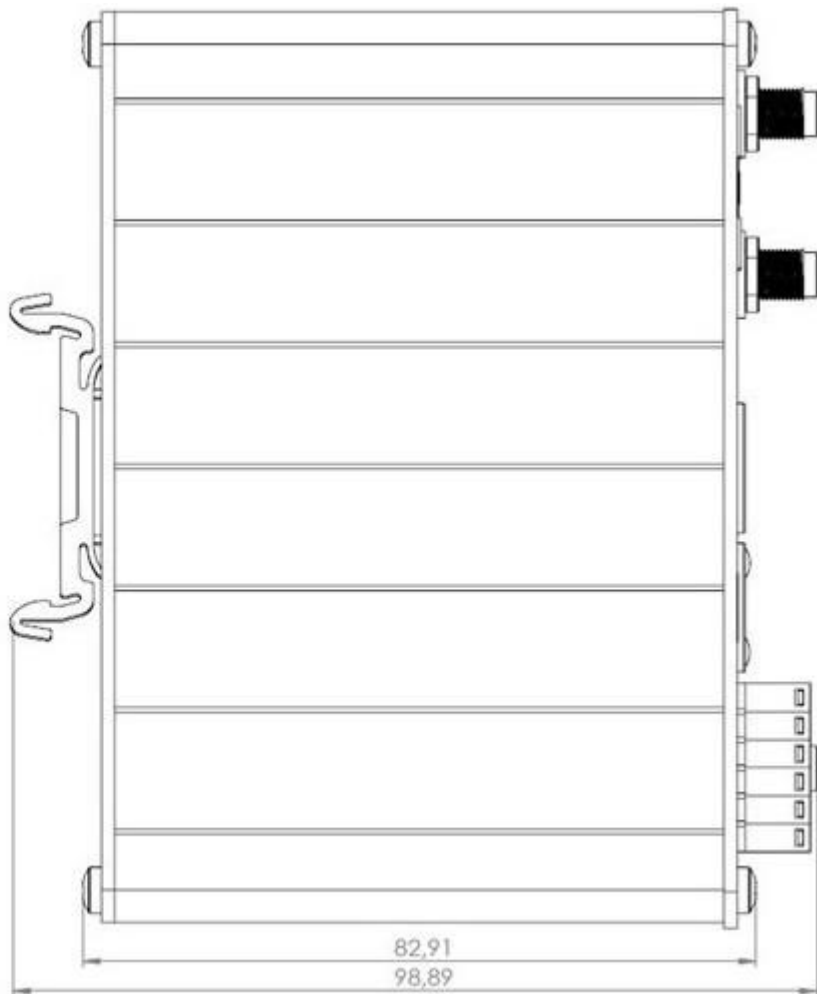
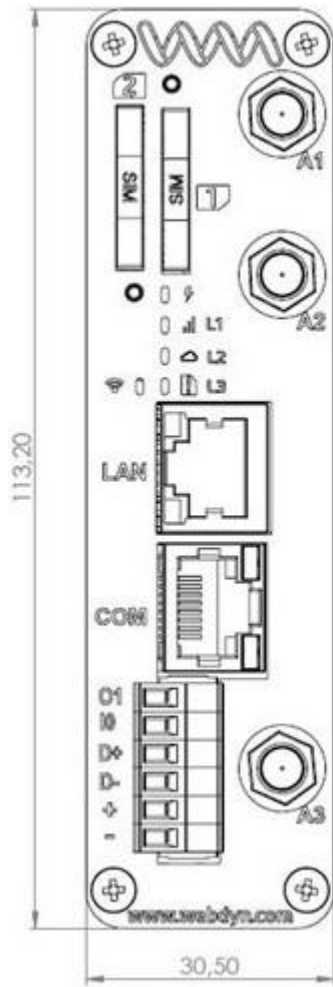


To proceed to restore parameters to factory default:

1. Power off the router.
2. Hold on Reset button and power on the router.
3. Wait for router to restart and ready for operation to check default parameters. Coverage LED start to blink (yellow LED).
4. Release Reset button.
5. Power off the gateway.
6. Power on again.

Mechanical description

3.1 Dimensions



Device Installation

This chapter gives you advices and helpful hints on how to install the EasyRouter device from a hardware perspective.

There are several conditions which need to be taken into consideration when designing your application as they might affect the router and its function.

Please, carefully read the complete hardware user guide as there are many details to be considered for installation.

4.1. Installation Location.

EasyRouter is intended to be installed indoor with environmental conditions as stated in the **¡Error! No se encuentra el origen de la referencia.** chapter.

Gateway is equipped with a DIN Rail holder on its rear-side plate lo let it be installed on a vertical flat surface, preferred into a cabinet.

Installation height referred to floor must guarantee proper visibility of status Leds and connection of wires, SIM card insertion and Antenna attachment.

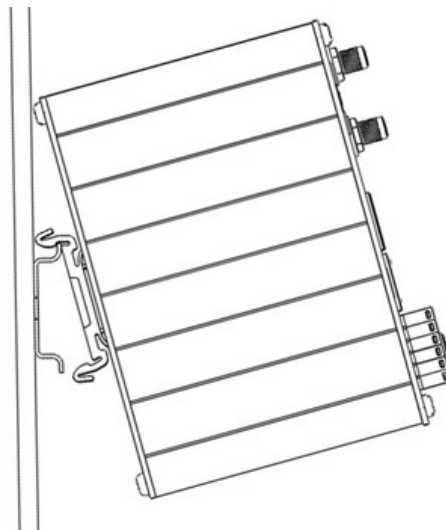
4.2. RF Signal Strength

The device must be placed in a way that ensures sufficient signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the gateway is to a radio base station. You must ensure that where you intend to use the router is within the network coverage area. Degradation in signal strength can be the result of disturbance from another source, i.e., an electronic device in the immediate vicinity. More information about possible communication disturbances can be found in section Operation 3.5 (Possible communications disturbances).

Tip! Before installing the router, use an ordinary mobile telephone to check a possible location for it. In determining the location for the router and antenna, you should consider signal strength as well as cable length.

4.3. DIN Rail Mounting

To install device on the DIN Rail, position the top groove of the rear module installation adapter on the top edge of the DIN rail. Push on the arrow direction on the adapter until the bottom groove of the installation adapter fits under the DIN rail.



4.4. Connections of EasyRouter

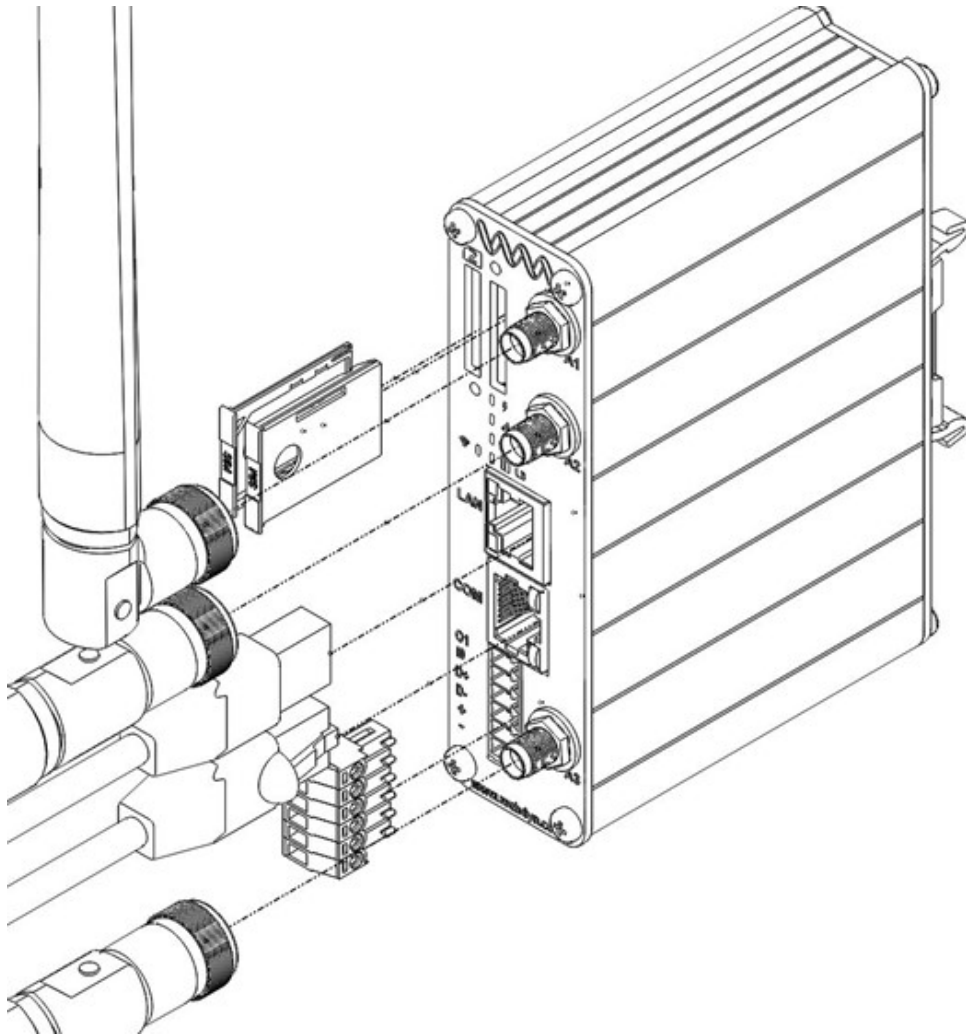
The user is responsible for the final integrated system. If not correctly designed or installed, external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the router.

For power supply connection, use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current.

It is encouraged to perform installation with no external power applied, unplug the terminal block from the gateway and screw all required wirings. Plug again terminal block, fixing both fastening screws, and finally apply external power to the system.

When the unit is powered from a battery or a high current supply, connect a fast 1.25A fuse in line with the positive supply. This protects the power cabling and gateway.

Bellow figure shows connection for all available interfaces, nonetheless, only those required for the end application are to be connected.



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