Teldat Router M1/M1L

Installation Manual

Legal Notice

Warranty

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Table of Contents

I Related Documents

Teldat Dm748-I Software Updating

Chapter 1   About this manual

This installation manual for the **Teldat M1** router family contains information on how to correctly install the device in a working environment.

1.1   Supported devices

The information provided in this installation manual only applies to the **Teldat M1** router family.

1.2   Who should read this manual?

This manual should be read by support personnel who need to configure, maintain and monitor the device.

1.3   When should this manual be read?

Read this guide as soon as you are ready to familiarize yourself with the device and its components.

This manual will give you a greater understanding of your new device.

1.4   What is in this manual?

This installation guide contains the following information:

• A description of the features that are available in the **Teldat M1** router.
• Technical specifications.
• Power supply requirements.
• Elements that can be connected when the router is operating.
• How to install/uninstall modules and power sources.
• Connector and LED descriptions.
• Troubleshooting.

1.5   What is not in this manual?

This manual does not contain information about the device's software or configuration. For information on how to configure this device, please see the relevant protocol manuals on the Teldat website:

http://www.teldat.com

1.6   How is the information organized?

Each chapter focuses on a specific part of the hardware and its components. Technical descriptions and information about the components can be found in the relevant chapter.

1.7   Technical support

Teldat S.A. provides technical support. Firmware can be upgraded on a regular basis for maintenance purposes or to add new features.

Contact information:

> Web: http://www.teldat.com

Tel.: +34 918 076 565

Fax: +34 918 076 566

Email: support@teldat.com

Chapter 2 Teldat M1 / Teldat M1L Devices

2.1 Characteristics

2.1.1 Power supply

For further information on the different types of power supply for the **Teldat M1** router, please see *Power source* on page 12.

2.1.2 Hardware monitoring

The LEDs on the front panel help monitor the **Teldat M1** hardware. They provide visual information on the status of hardware components and indicate whether there is connectivity, data flow, etc.

For further information on the LED panel, please see *Components* on page 5.

Chapter 3 Components and power supply

This chapter describes the **Teldat M1** router family chassis and its main components. The following sections are included:

• Components
• Assembly instructions
• Installing and uninstalling modules
• Power supply
• RST button
• Data connection
• SIM card installation

3.1 Components

3.1.1 Front panel

The following image shows the device's front panel:
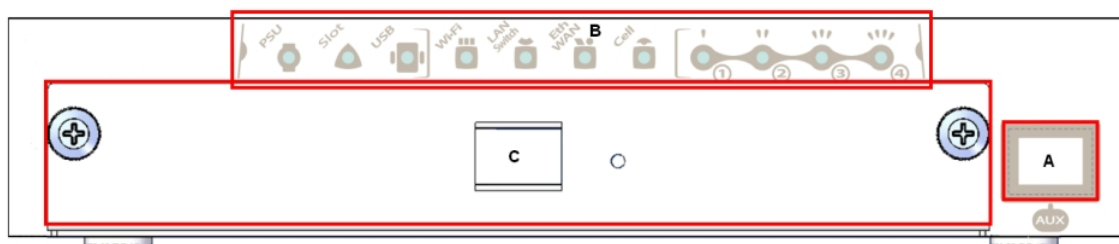
Fig. 1: **Front Panel**

The front panel elements are as follows:
FRONT PANEL ELEMENTS

Item	Description
A	Aux. RJ45 connector providing access to the device's local console for configuration and monitoring purposes.
B	LED panel.
C	Expansion card tray.

The LEDs show the status of the device's hardware components (indicating whether they are active or not) and display the current status of network activity.
LEDs

LED	Status	Description
PSU	Monochrome green	Off -> no power through PSU. On -> powered through PSU.
Slot	Tricolor	Off -> No card in the expansion slot. Red -> interface down. Amber -> auto test. Green -> interface up (blinking, in some cards, when

		data is being transferred).
USB	Tricolor	Off -> system stopped.
		Red -> The interface is unavailable because it is being installed, is disabled (shutdown), or has failed a self-test.
		Amber -> idle.
		• Rapid blinking. The device has not registered in the network or the quality is insufficient.
		• Slow blinking. GSM connection (GPRS).
		• Steady. WCDMA (UMTS / HSDPA) connection.
		Blinking (green/red) -> activity/maintenance.
Wi-Fi	Bicolor	Red -> interface down.
		Green -> interface up.
		Blinking (green/red) -> activity/maintenance.
LAN Switch	Tricolor	Green -> connected. Blinking: data is being transferred.
		Red -> disconnected.
Eth WAN	Tricolor	Green -> connected. Blinking: data is being transferred.
		Amber -> blinking: auto test.
		Red -> disconnected.
Cell	Tricolor	Off -> system stopped.
		Red -> The interface is unavailable because it is being installed, is disabled (shutdown), or has failed a self-test.
		Amber -> idle.
		• Rapid blinking. The device has not registered in the network or the quality is insufficient.
		• Slow blinking. GSM connection (GPRS).
		• Steady. WCDMA (UMTS / HSDPA) connection.
		Green -> connected. Blinking: data is being transferred.
Coverage (1, 2, 3, 4)	Monochrome Blue	Shows the coverage level for the internal 3G module, ranging from level 0 (all LEDs off) to level 4 (all lit up).

3.1.2 Rear panel

The following image shows the rear panel of the **Teldat M1** router, which contains the majority of connectors.
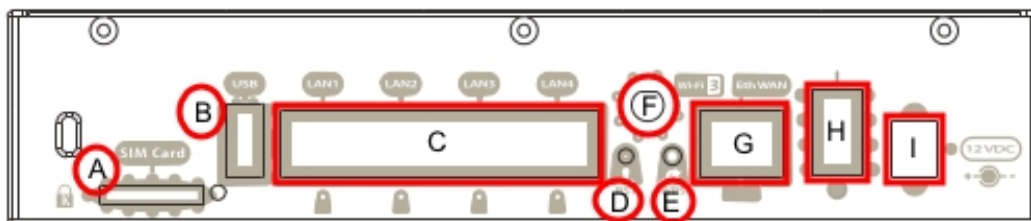
Fig. 2: **Rear panel**

The following table describes each connector:
Rear panel elements

Item	Description
A	SIM Card. Slot to insert a SIM card for the external 3G module.
B	USB. Slot to insert a 3G USB modem.
C	4-port Gigabit Ethernet switch.
D	RST. Reset button. For further information on how the reset button works, please see *RST button* on page 13.
E	WPS (Wireless Protected Setup). This allows for an easy and secure configuration of Wi-Fi network parameters.
F	Wi-Fi Antenna no. 3. The use of this connector depends on the router's Wi-Fi card.
G	Eth WAN. WAN Gigabit Ethernet.
H	On/Off switch.
I	Power source connection (PSU).

3.1.3 Side panels

Two Wi-Fi connectors and two 3G antenna connectors can be found on each side panel:
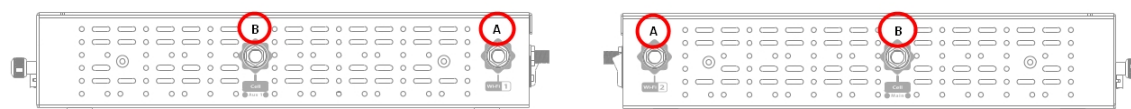
Fig. 3: **Fig. 4: Right and left-hand side panels**

The connectors are as follows:
Side panel connectors

Item	Description
A	Wi-Fi antenna connectors.
B	3G antenna connectors.

3.1.4 Underside panel

The following image shows the underside panel:
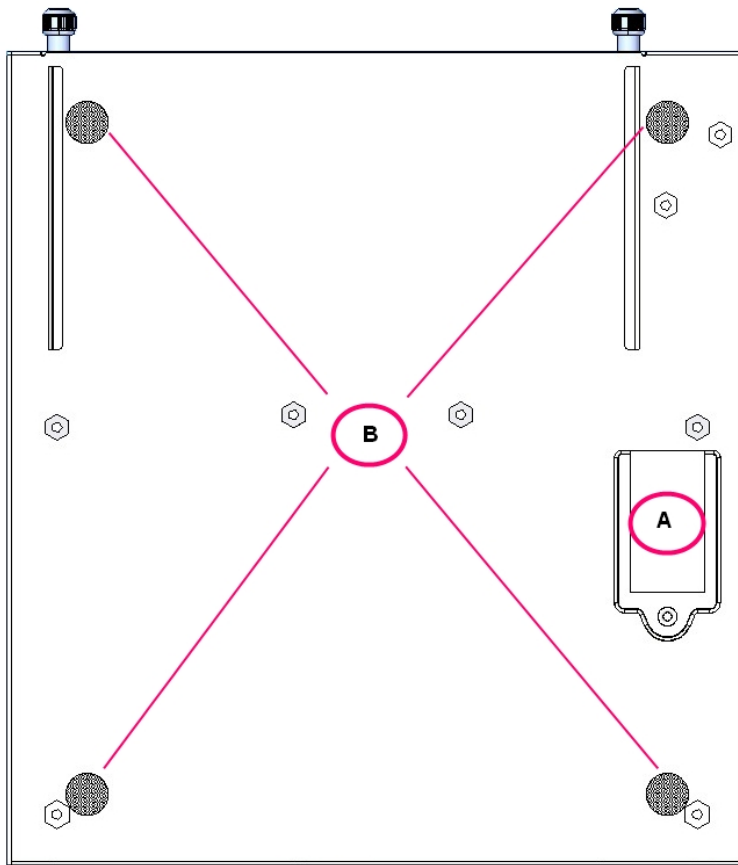
Fig. 4: **Underside panel**

The following elements can be found on the underside panel:
Underside PANEL ELEMENTS TABLE

Item	Description
A	Internal 3G module SIM tray. Accessed from the underside of the router.
B	Adhesive rubber feet (not required when the device is mounted on a rack).

3.2 Expansion slot

The **Teldat M1** router comes with an expansion slot that allows you to increase the number of features and interfaces the router has by inserting different cards or boards.

This slot is found on the router's front panel, as shown in the following figure:
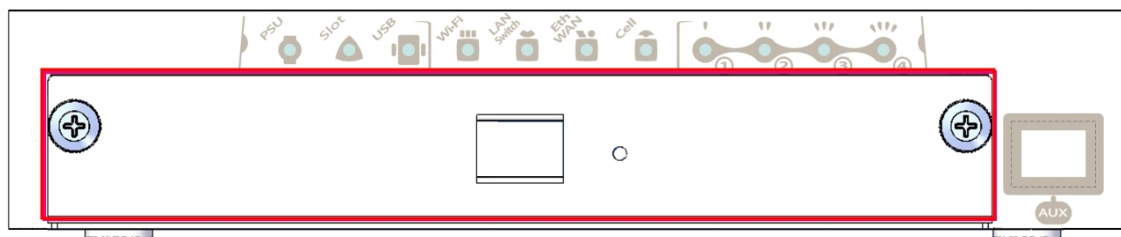
Fig. 5: **Expansion slot**

To insert cards, follow these steps:

(1) Switch the device off and remove the data cables as described in *Disconnecting* on page 13.

(2) Remove the device from the workplace and place it in a stable, safe location where it can be easily accessed and handled.

(3) Unscrew the screws on the front panel to remove the tray that gives access to the expansion cards. Please see

Fig. 6 on page 9.
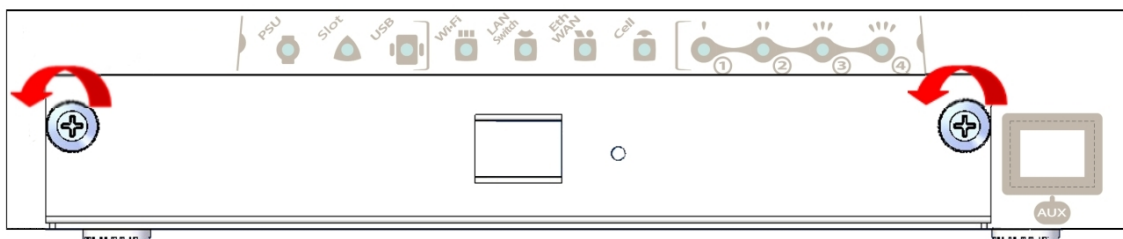
Fig. 6: **Removing the screws on the front panel**

(4)   Remove the screws and gently pull the tray out of the slot. Please see *Fig. 7* on page 9.
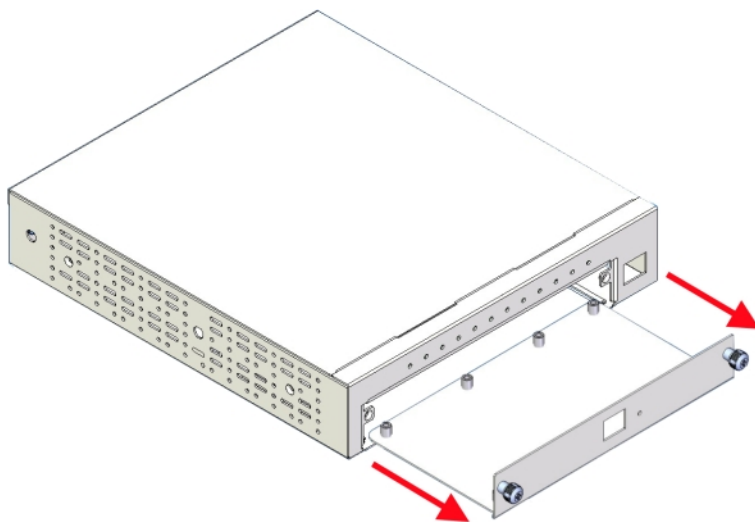
Fig. 7: **Removing the tray from the slot**

(5)   If you are using a fixed card, please proceed to the next step. If not, remove the tray from the device and place the card on the tray. Use appropriate screws to affix the card to the tray, being careful not to damage the card when tightening the screws. Please see *Fig. 8* on page 9.
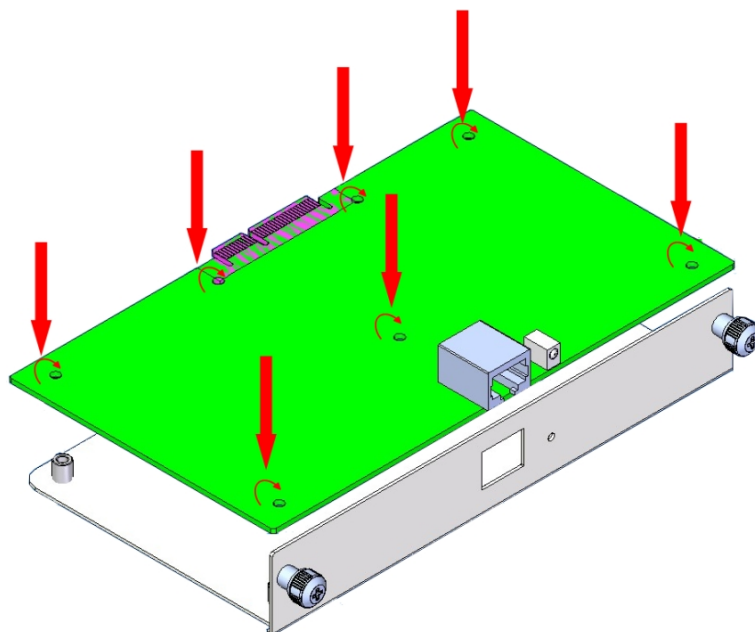
Fig. 8: **Installing the expansion card**

(6)   Finally, insert the tray into the device once again using the appropriate guides. See *Fig. 9* on page 10.
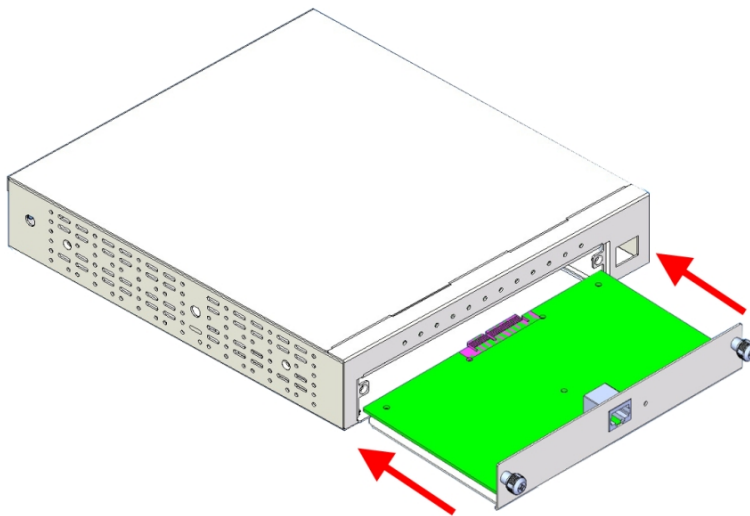
Fig. 9: **Inserting the expansion card**

(7)   Secure the tray to the device. See *Fig. 10* on page 10.
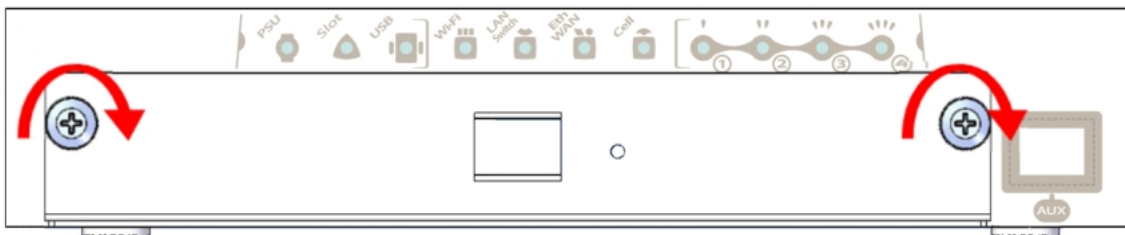
Fig. 10: **Secure the tray to the front panel using two screws.**

(8)   Connect a terminal to the console to ensure the device can detect the expansion card.

3.3 Installing in a rack

The **Teldat M1** router can be mounted in a 19-inch rack. Rack rails and screws are not provided and must be purchased separately.

Both rails are attached to the device by means of 4 screws, two on each side (see Figure 11).
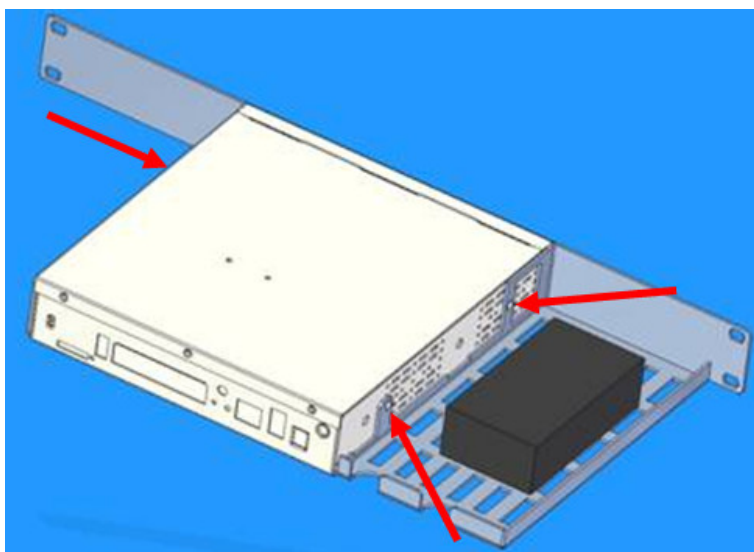
Fig. 11: **Anchor bolts for a rack**

3.3.1 Standalone

Teldat M1 routers can be placed as standalones on a flat, stable surface. The adhesive rubber feet must be stuck to the underside panel to prevent the router from sliding.

Make sure there is plenty of space around the router for ventilation and check that the electricity cables are not pulled too tight.

3.3.2 Mounting on a wall

An optional wall mount kit is available for the **Teldat M1**. The kit can be ordered separately or together with your **Teldat M1** router.

The anchors to mount the device on the wall must be installed as shown in the following figure, using the screws provided by the manufacturer.
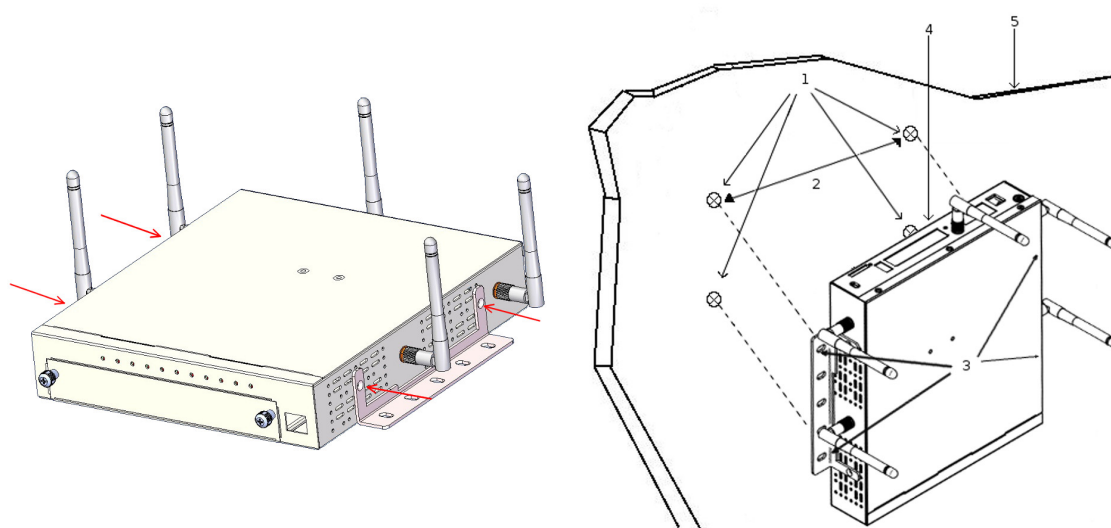
Fig. 12: **Wall mounting**

Once the anchors are in place, the device may be secured to the wall as shown in the figure on the right above.

> ⚠ **Warning**
>
> All screws must be screwed into wall studs (wood) or anchors. Choose a type of wall stud or anchor that is appropriate for the wall. Screws driven directly into drywall will not be strong enough to support the weight of the router.

The above figures show the wall-mounting features on the **Teldat M1** router.
Wall-mounting elements

Item	Description
1	Wall screws.
2	23.2 cm (9.13 inches).
3	Chassis mounting holes.
4	Router chassis.
5	Mounting surface.

(1)   Place the two (or four) wall studs on the wall or other vertical surface separated horizontally.

> ⚠ **Warning**
>
> If installing the router onto drywall, use hollow-wall anchors (8mm - 5/16 inch) to secure the screws. If the screws are not properly anchored, the strain of the cables connected to the back of the router could pull the router from the wall.

(2) Fix the router to the wall using the screws (3.5x30). The above figure indicates how to install it so that it is safe to use.

3.4 Plug-in modules

The only module that can be inserted in the device is a 3G USB modem. A list of supported 3G modems can be found on the following website: http://www.teldat.com.

3.4.1 Installation

Simply insert the USB in the appropriate slot on the rear panel, as shown in the following figure:
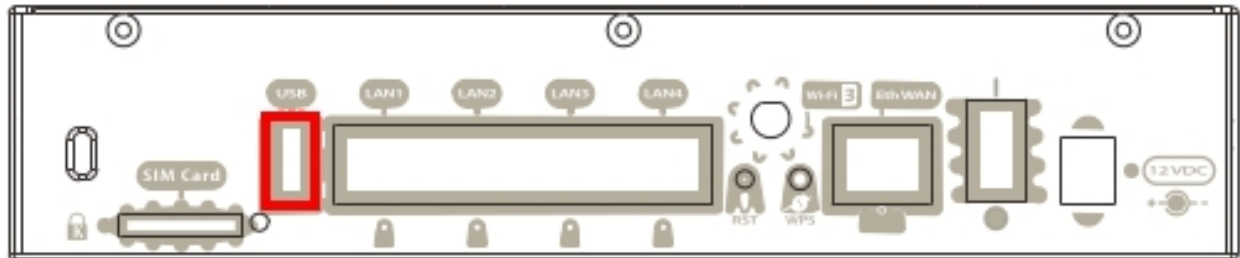
Fig. 13: **USB modem insertion slot**

3.4.2 Uninstall

To uninstall the device, simply remove it from the slot where it was inserted. See *Fig. 13* on page 12.

3.5 Power source

The **Teldat M1** router is powered by an external AC/DC source.

Workplace conditions. Main characteristics

• Do not expose the device to humid and/or dusty environments.

• Do not expose the device to direct sunlight or install near any heat sources. Do not place the device amongst papers, magazines or other elements that could hinder natural air circulation.

• Do not place the device close to strong electromagnetic fields (e.g., speakers, engines, etc.).

• Avoid knocks and/or strong vibrations during transport, operation and storage.

> ⚠️ **Warning**
>
> Electrical current from power, telephone and communication cables is hazardous. To prevent electric shock, you must connect and disconnect the cables according to the instructions set forth in *Connecting* on page 13 and *Disconnecting* on page 13 before attempting to install, move or open any of the device's covers.

3.5.1 Connecting the power supply

To connect the power supply to the device, please follow the steps outlined in the section entitled *Connecting* on page 13.

To prevent electric shocks, residual current circulation, and other unwanted effects that have an impact on communications, the following is recommended:

> ⚠️ **Warning**
>
> All interconnected communication devices should be plugged into THE SAME GROUNDED POWER OUTLET, which should also be of good quality (lower than 10 ohms).

> We recommend connecting all data devices to the same power source, regardless of whether the work-place has an uninterrupted power supply (UPS), a regulated supply or is independent of other power supplies (such as lighting, etc.). This will help to prevent malfunctions and premature aging of the drivers and other components.

3.5.2 Connecting

- Make sure the router's power supply switch is in the OFF position (0).
- Ensure the power supply is NOT connected to either the mains or the router.
- Connect all data cables.
- Connect the power supply cable to the device.
- Connect the power supply cable to the mains.
- Set the router's power supply switch to the ON position (1).

3.5.3 Disconnecting

- Make sure the router's power supply switch is in the OFF position (0).
- Disconnect the power supply from the mains.
- Disconnect the power supply from the router.
- Disconnect the data cables.

3.6 RST button

The RST button on the rear of the **Teldat M1** router has various functions (described below).

3.6.1 Rebooting the device

Once the device is operating normally, pressing the RST button will make it restart.

3.6.2 Default configuration

The RST button allows you to restore your router to its factory default configuration through the following steps:

- With the device switched off, keep the RST button pressed and switch the router on using the ON/OFF switch (1).
- The PSU LED lights up in green and the LED slot starts to blink in amber. This blinking will continue for 10 seconds.
- For the device to boot with the default configuration, stop pressing the RST button while the LED slot is blinking (i.e., before the 10-second period expires).

The router's default configuration sets up the router with the following IP address and mask:

- IP address: 192.168.1.1
- IP mask: 255.255.255.0

> **Note**
>
> Some devices come with customized settings. As a result, the default configuration may be different to the one shown above.

3.7 Connecting the data

The **Teldat M1** router has the following data connections.

3.7.1 4-port Ethernet switch

The **Teldat M1** router incorporates a 4-port 10/100/1000 BaseT Switch with automatic MDI/MDIX to connect to a local area network (LAN).

Please pay careful attention to the labeling so you do not mix this switch with other port types:
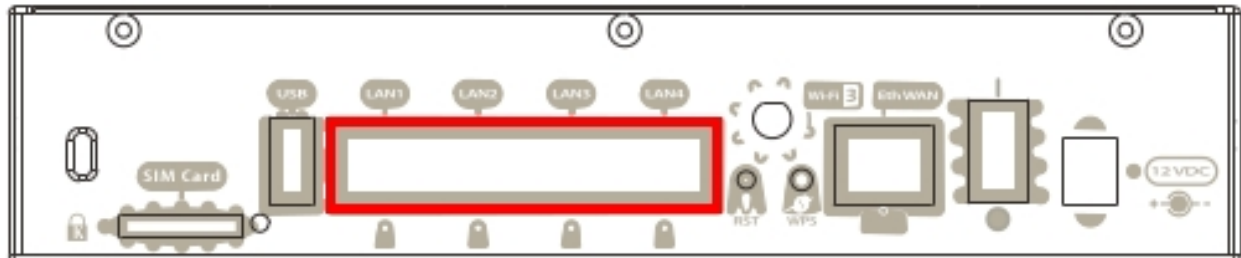
Fig. 14: **LAN switch ports**

> **Note**
>
> Only the LAN 1 connector is available during booting and in BIOS mode.

> ⚠ **Warning**
>
> The equipment must be used with the power supply provided by the manufacturer.

3.7.2 WAN connection

The **Teldat M1** incorporates an Ethernet WAN 10/100/1000 BaseT port with automatic MDI/MDIX.

The WAN port is independent from the switch and is handled like every other interface.

Please pay careful attention to the labeling so you do not mix this switch with other port types:
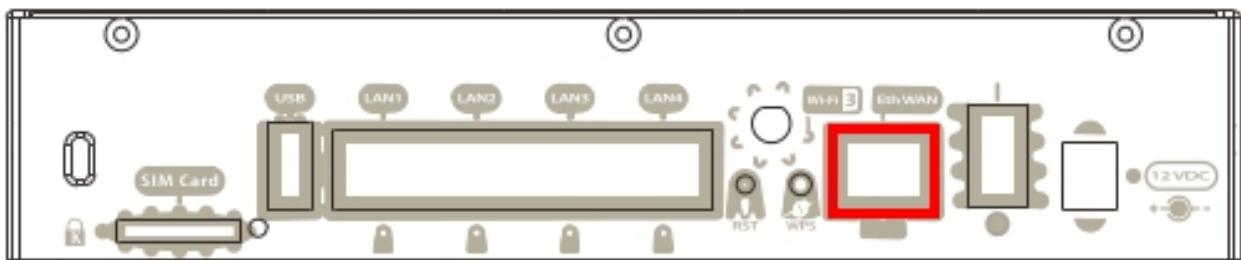
Fig. 15: **WAN PORT**

> **Note**
>
> The WAN connector is not operational during booting and in BIOS mode.

3.7.3 WWAN antenna connection (cell connector)

The **Teldat M1** has two 3G antenna connectors. The antennas are assembled and disassembled by screwing/unscrewing them into/from the *Cell* connectors on the router's side panels.

Using these antennas with the **Teldat M1** router improves the quality of the signal received and transmitted by the cellular model.

> **Note**
>
> The WWAN antennas should be connected to the router at all times in order to deliver high-quality performance.
>
> The corresponding software license must be installed in the router for the *cellular* interface to work.

Some cellular telephony technologies use the antenna diversity technique to improve the quality of the signal received (HSUPA, CDMA EV-DO, etc.). For this reason, the **Teldat M1** router family is equipped with several WWAN connectors:
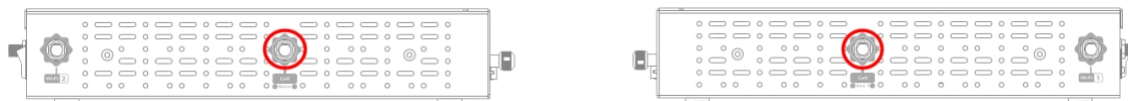
Fig. 16: **WWAN Main** *and* **WWAN Aux1 antennas**

If the Main and Aux 1 antennas are connected via extension cables rather than being directly screwed into the router, the minimum distance between them must be 7 cm. The maximum recommended distance between the two antennas is 25 cm.

To achieve optimum performance, any radio frequency accessories installed (antennas and cables) should meet our recommendations.

We offer a range of accessories (90-degree antenna mounts, exterior antenna mounts, ceiling mounts, extension cables, etc.) that allow you to install the devices in different locations.

3.7.3.1 Positioning the antenna

Device performance can be significantly influenced by antenna orientation and location with respect to other wireless devices and radiation sources (such as communication devices, personal computers, etc.).

Antennas transmit and receive radio signals. Performance is also affected by environmental factors (such as the distance between the device and base station), physical obstacles and radio-frequency (RF) interference.

In order to receive better coverage, follow the instructions given below:

- Whenever possible, place the antenna away from physical obstacles. Obstacles between the antenna and the base station degrade the wireless signal. Place the antenna above ground level and direct it towards the nearest base station.
- Antennas are affected by the density of materials so place them away from walls, metal screens, mirrors, etc.
- Do not place the antenna near columns; these might throw shadows and reduce the coverage area.
- Keep the antenna away from metal pipes such as canalization, air-conditioning etc.
- Bear in mind that other wireless devices such as telephones, microwaves, etc., can temporarily interfere with the quality of the wireless signal.
- Installing the antennas in racks alongside communication devices, computers, etc, is not recommended. Use an extension cable and place the antenna outside.

The following recommendations are applicable to all wireless devices:

- Do not touch or move the antenna while the device is transmitting or receiving.
- When the antenna is transmitting, do not touch equipment containing devices that radiate very close to, or touching, any exposed part of the body (particularly face and eyes).
- Do not install the device in areas where the atmosphere is potentially explosive.
- Wireless devices can cause interferences in other devices. Do not use the device in areas where medical equipment is installed.
- In order to comply with the R&TTE 1999/5/EC directive, the device must be at least 15 cm away from a person's body when operating.

3.7.4 Wireless LAN antenna connection (Wi-Fi connectors)

The **Teldat M1** has three RF antenna connectors. These can be used to connect an external antenna to improve the quality of the signal received and transmitted by the Wireless LAN module.

This module is internal and can be activated by purchasing the corresponding software license. The antennas are assembled and disassembled by screwing/unscrewing them into the connectors labeled *Wi-Fi* (located on the router's rear and side panels).

Fig. 17: **Wi-Fi 1** *and* **Wi-Fi 2 antennas**
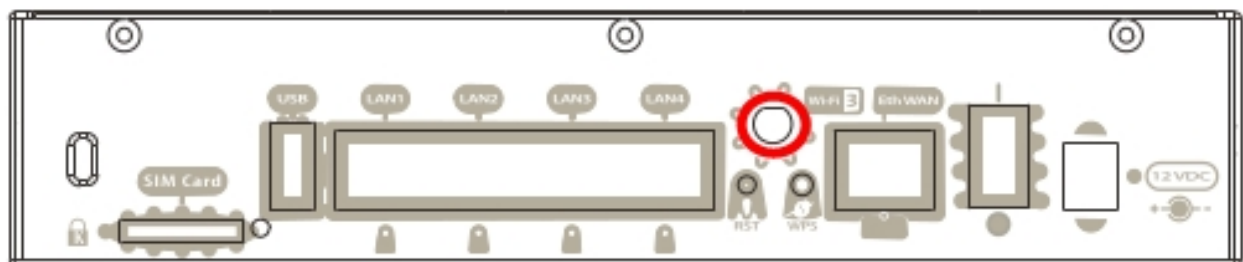
Fig. 18: **Wi-Fi 3 Antenna**

3.7.5 Connecting a 3G USB device (USB connector)

The **Teldat M1** has a USB HOST 2.0 Type A connector interface to connect 3G USB modems. The interface can be activated by purchasing the corresponding software license.
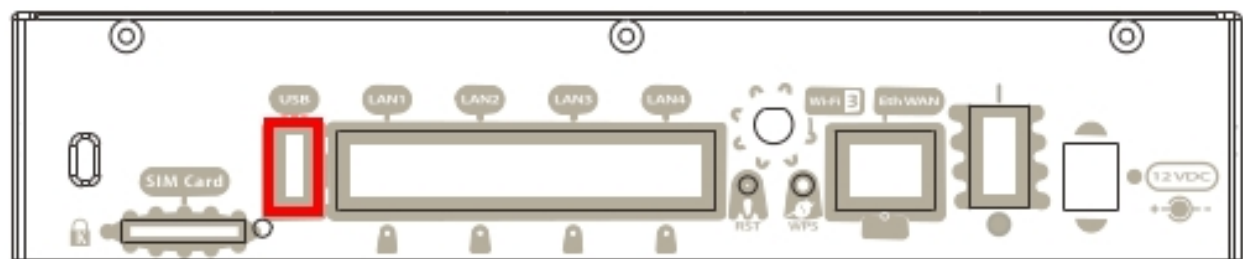
Fig. 19: **3G USB Connector**

3.7.6 Connecting for configuration

The front panel of the **Teldat M1** features an RJ45 female connector, labeled "**Aux**", that provides access to the router's local console.

For further information, please see *Connecting to the device* on page 27.
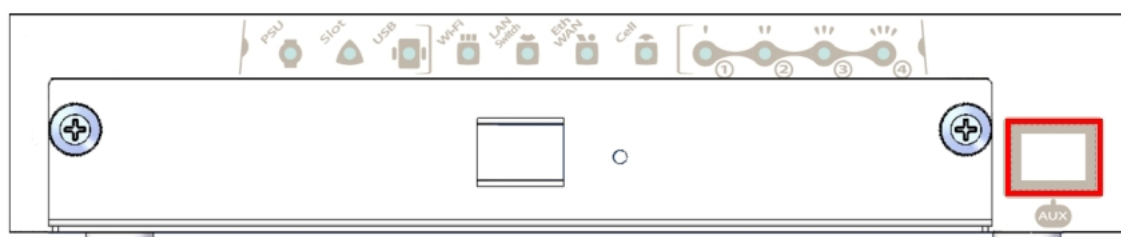
Fig. 20: **Aux. Connector**

3.8 SIM card installation

You may need to insert a SIM card in the **Teldat M1** before you can use the WWAN interface. Some countries have services (CDMA) that do not require SIM cards.

The **Teldat M1** has two SIM trays.

One is located on the rear panel of the router, as shown in the following figure:
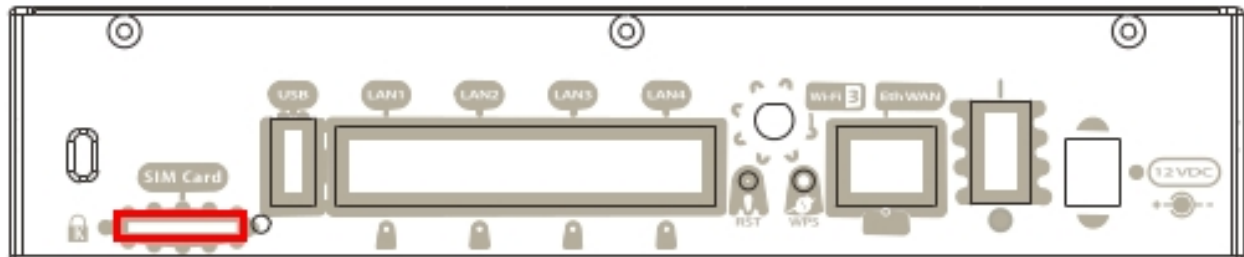
Fig. 21: **External module SIM tray**

To insert the SIM card in the external SIM tray, first turn the device so that you can see the rear panel (see figure 23), and then carry out the following steps:

(1)   Press the button until the SIM tray comes out.

(2)   Place the SIM on the tray.

(3)   Insert the tray in the slot and push it back in.
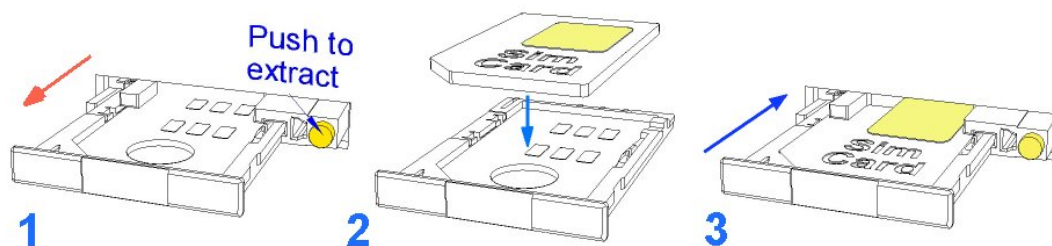
Fig. 22: **Inserting the SIM in the external module**

The other SIM tray is internal. To access it, you need to open the flap on the underside of the router (as shown in the following figure) and insert the SIM card.
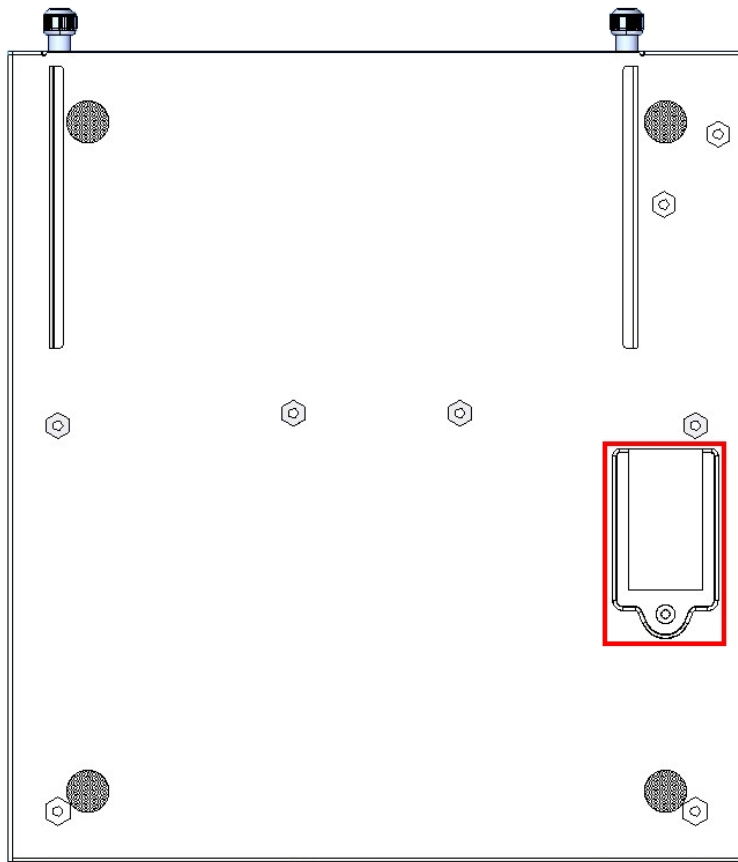
Fig. 23: **Internal module SIM tray**

In order to insert a SIM card, locate the slot and remove the flap. The SIM tray becomes visible. Now carry out the following steps:

(1)   Slide the SIM card case cover in the direction indicated by the arrow labeled *OPEN.*

(2)   Open the cover.

(3)   Fully insert the SIM card using the guides on the inner part of the case cover.

(4)   Close the case cover.

(5)   Hold the SIM card case cover down while you slide the cover to the side, as indicated by the arrow labeled *LOCK*, until it is firmly in place.
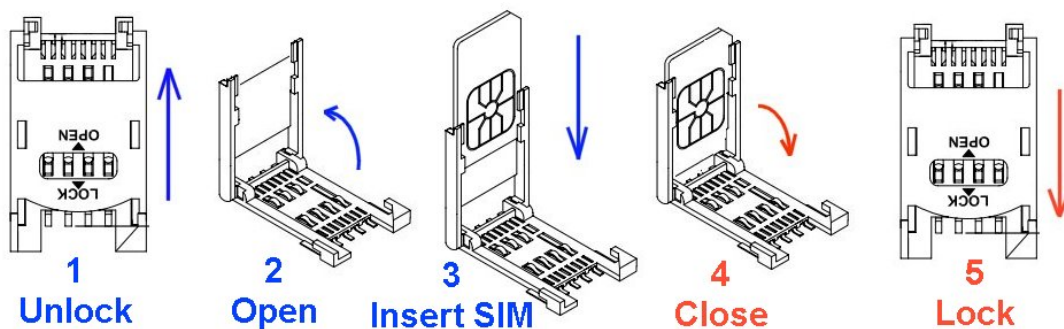
Fig. 24: **Inserting the SIM in the internal tray**

Chapter 4 Compliance

4.1 Manufacturer information

Brand	Teldat
Manufacturer	Teldat S.A.
Country	Spain
Postal Address	Isacc Newton, 10 Parque Tecnológico de Madrid, 28760 Tres Cantos, Madid, Spain
International Phone	+34 91 807 65 65

4.2 Safety warnings

⚠	The screws must be secured using wall studs (wood) or wall anchors that are appropriate for the wall. Screws driven directly into drywall will not be strong enough to support the weight of the router.
	Болты должны входить в стойки каркаса в стенах (деревянные) или стеновые анкеры соответствующего типа. Завинчивание болтов в гипсокартон не является достаточно надежным для монтажа маршрутизатора.
	Les vis doivent aller dans un poteau mural (bois) ou un ancrage murau du type approprié. Vis en plaques de plâtre ne sont pas assez forts pour monter le routeur.
	Die Schrauben müssen in einen Dübel oder Wandanker geschraubt werden, der für die jeweilige Art der Wand geeignet ist. Schrauben in einer Trockenbauwand sind nicht stabil genug, um den Router zu halten
	Los tornillos deben ir atornillados en un taco de pared (de madera) o del tipo adecuado según la clase de pared. Los tornillos que se montan directamente en los paneles de yeso no son lo bastante resistentes para soportar el router.
⚠	If you are installing the screws in drywall, use hollow wall anchors (8 mm – 5/16 inch) to secure the screws. If the screws are not properly anchored, the strain of the cables connected to the router's rear panel could pull the router from the wall.
	Если вы установите винты в гипсокартона , используйте полым дюбели (8мм - 5/16 дюйма) , чтобы обеспечить винты. Если винты крепления закручены недостаточно плотно, маршрутизатор может упасть со стены из-за натяжения подключенных к нему кабелей.
	Si vous installez les vis dans des cloisons sèches, utilisez des ancres creuses-murales (8 mm - 5/16 po) pour fixer les vis. Si les vis ne sont pas fixées correctement, la tension des câbles raccordés au panneau arrière du routeur pourrait tirer le routeur de la paroi.

Wenn Sie die Schrauben in eine Trockenbauwand schrauben wollen, verwenden Sie Hohlraumdübel (8 mm – 5/16 Zoll), um die Schrauben zu sichern. Wenn die Schrauben nicht angemessen verankert sind, kann Zug auf die Verkabelung an der Rückseite des Routers diesen aus der Wand reißen.

Si instala los tornillos en paneles de yeso, utilice tacos de pared hueca (8 mm - 5/16 pulga-das) para fijar los tornillos. Si los tornillos no están bien anclados, la tensión de los cables conectados al panel posterior del router podría hacer que el router se cayera de la pared.

Electrical current from power, telephone and communication cables is hazardous. To prevent electric shock, you must connect and disconnect the cables according to the instructions set forth in *Connecting* on page 13 and *Disconnecting* on page 13 before attempting to in-stall, move or open any of the device's covers.

Электрический ток в кабелях и проводах может быть опасен для жизни и здоровья. Чтобы предотвратить поражение током, перед установкой оборудования, его обслуживанием и снятием панелей необходимо отсоединять кабели в соответствии с правилами, изложенными в соответствующем разделе.

Le courant électrique qui circule dans les câbles d'alimentation, les lignes téléphoniques et les câbles de communication est dangereux. Afin d'éviter tout choc électrique, brancher, puis débrancher les câble en suivant les consignes préconisées dans chaque section avant d'installer, de manipuler ou d'ouvrir les caches de l'équipement.

Der elektrische Strom in Strom-, Telefon- und Datenkabeln ist gefährlich. Um Elektroschocks zu vermeiden, trennen Sie vor der Installation, der Bedienung oder dem Öffnen des Geräts die Kabel wie in den Abschnitten Verbinden und Trennen beschrieben.

La tensión eléctrica de los cables de alimentación, de los cables de la línea telefónica y de los cables de comunicación es peligrosa. Para evitar descargas, antes de instalar, mover o abrir las cubiertas de este equipo, conecte y desconecte los cables siguiendo el orden que se detalla en los apartados "Conectar" y "Desconectar".

All interconnected communication devices should be plugged into THE SAME GROUNDED POWER OUTLET, which should also be of good quality (lower than 10 ohms).

We recommend connecting all data devices to the same power source, regardless of wheth-er the workplace has an uninterrupted power supply (UPS), a regulated supply or is inde-pendent of other power supplies (such as lighting, etc.). This will help to prevent malfunc-tions and premature aging of the drivers and other components.

Убедитесь в том, что все связанные устройства связи подключены к ОДНОЙ И ТУ ЖЕ ЗАЗЕМЛЕННОЙ ШТЕПСЕЛЬНОЙ РОЗЕТКЕ высокого качества (сопротивление не превышает 10 Ом).

Проверьте, оборудовано ли рабочее место источником бесперебойного питания (ИБП), источником регулируемого питания, или оно является независимым от других систем (таким как освещение и т.п.); строго рекомендуется подключать все информационные устройства к одному источнику питания. Это поможет предотвратить эксплуатационные проблемы и преждевременное старение приводов и других деталей.

Tous les dispositifs de communications interconnectés doivent être branchés sur la même prise correctement mise à la terre, qui doit être de bonne qualité (moins de 10 ohms).

	Soit le lieu de travail équipé d'un système d'alimentation sans interruption (ASI), alimentation régulée ou indépendante du reste (comme l'éclairage, etc), il est fortement recommandé que tous les dispositifs de données soient reliés à la même source d'alimentation. Cela permettra d'éviter des problèmes de fonctionnement et de vieillissement prématuré de drivers et d'autres composants.
	Alle miteinander verbundenen Kommunikationsgeräte sollten mit der gleichen geerdeten Stromversorgung verbunden werden. Diese sollte von hoher Qualität sein (niedriger als 10 Ohm).
	Unabhängig davon, ob der Arbeitsplatz über eine unterbrechungsfreie Stromversorgung (UPS) oder eine geregelte Versorgung verfügt oder unabhängig von der weitere Installation (z. B. Licht) ist – es wird dringend empfohlen, alle Geräte an die gleiche Spannungsversor- gung anzuschließen. Dies beugt Problemen im Betrieb sowie Problemen der vorzeitigen Al- terung von Komponenten vor.
	Todos los equipos de comunicaciones interconectados deberán estar unidos a UNA MISMA TOMA DE TIERRA, a ser posible de buena calidad (inferior a 10 ohmios).
	Si la instalación está dotada de un Sistema de Alimentación Ininterrumpida (SAI), alimentación estabilizada, o bien es independiente del resto (alumbrado, etc.), conecte todos los equipos de comunicaciones a la misma fuente de alimentación. Así, se ahorrará prob- lemas de funcionamiento y envejecimiento prematuro de drivers y demás componentes.
⚠	Never install the SIM cards when the device is switched on.
	Always disconnect the device from the mains supply before installing the SIM cards.
	Always disconnect the device before removing the casing to access the trays.
	Please protect yourself against electrostatic discharge (ESD) when inserting the SIM cards.
	Do not touch the SIM card connectors.
	Никогда не устанавливайте SIM-карты, когда устройство включено.
	Перед установкой SIM-карт отключите устройство от источника питания.
	Всегда отключайте устройство перед тем, как снять корпус и извлечь лотки.
	При установке SIM-карты, пожалуйста, защитите себя от электростатических разрядов (ESD).
	Не прикасайтесь к контактам SIM-карты.
	N'installez jamais la carte SIM lorsque l'appareil est allumé.
	Débranchez toujours l'appareil de l'alimentation électrique principale avant d'insérer les cartes SIM.
	Débranchez toujours l'appareil avant de retirer le boîtier pour accéder aux baies.
	Lors de l'insertion de la carte SIM, protégez-vous contre les décharges électrostatiques (ESD).
	Ne touchez pas les connecteurs des cartes SIM.
	Installieren Sie keine SIM-Karten, solange das Gerät eingeschaltet ist.
	Trennen Sie das Gerät immer von der Stromversorgung, bevor Sie eine SIM-Karte installier- en.
	Trennen Sie das Gerät immer von der Stromversorgung, bevor Sie das Gehäuse für einen

Zugang zu den SIM-Halterungen öffnen.

Schützen Sie sich gegen elektrostatische Entladung (ESD), wenn Sie eine SIM-Karte installieren.

Berühren Sie die SIM-Karten-Kontakte nicht.

No instale nunca las tarjetas SIM con el equipo encendido.

Desconecte siempre el equipo de la red antes de instalar las tarjetas SIM.

Desconecte siempre el equipo antes de desmontar la carcasa para acceder a las bandejas.

Al insertar las tarjetas SIM, protéjase contra descargas electroestáticas (ESD).

No toque los conectores de las tarjetas SIM.

The equipment is intended to be installed and handled by qualified Service Personnel only. Improper handling may result in damage or failure of the device.

Оборудование должно эксплуатироваться квалифицированным персоналом; в противном случае устройство может быть повреждено и впоследствии работать неисправно.

L'équipement est destiné à être installé par le Personnel de Service et seulement manipulé par du personnel qualifié. Sinon, l'appareil risque d'être endommagé et dysfonctionner.

Das Gerät ist für eine Montage durch Servicepersonal ausgelegt und darf nur von qualifiziertem Personal gehandhabt werden. Andernfalls kann es zur Beschädigung des Geräts und zu Fehlfunktionen kommen.

El equipo está diseñado para ser instalado por personal del servicio técnico y su manejo debe realizarlo personal cualificado. De lo contrario, el equipo puede resultar dañado y quedar inservible.

Only use the power supply provided by the manufacturer.

Оборудование должно использоваться с источником питания поставляемым производителем.

L'équipement doit être utilisé avec la source d'alimentation fournie par le fabricant.

Das Gerät muss mit dem vom Hersteller gelieferten Netzteil betrieben werden.

El equipo debe ser usado con la fuente de alimentación proporcionada por el fabricante.

4.3 WEEE information

The crossed-out wheelie bin symbol indicates that the device must be disposed of separately from normal domestic waste at an appropriate waste disposal facility at the end of its useful service life.

Das auf dem Gerät befindliche Symbol mit dem durchgekreuzten Müllcontainer bedeutet, dass das Gerät am Ende der Nutzungsdauer bei den hierfür vorgese-henen Entsorgungsstellen getrennt vom normalen Hausmüll zu entsorgen ist.

El símbolo del contenedor con la cruz, que se encuentra en el aparato, significa que cuando el equipo haya llegado al final de su vida útil, deberá ser llevado a los centros de recogida previstos, y que su tratamiento debe estar separado del de los residuos urbanos.

4.4 REACH

In compliance with the REACH Candidate List, the delivered product and product packaging do not contain chemical substances above a 0.1% concentration weight by weight (w/w). This declaration will be updated whenever any changes occur or other chemical substances are added to the REACH Candidate List. Information is currently provided to consumers upon request.

4.5 PSU Energy Efficiency

According to Commission Regulation (EU) 2019/1782 laying down ecodesign requirements for external power sup-plies pursuant to Directive 2009/125/EC of the European Parliament and of the Council and repealing Commission Regulation (EC) No 278/2009, the instruction manuals for end-users shall include the following information:

Model	DA-60N12
Manufacturer Name	ASIAN POWER DEVICES INC. (APD)
Manufacturer Address	NO.5 LANE 83. LUNG-SOU ST, TAO-YUAN CITY, TAIWAN R.O.C.
Input Voltage	100-240 Vac
Input AC frequency	50-60 Hz
Output voltage	12.0 V
Output current	5.0 A
Output power	60,0 W
Average active efficiency	88.3%
Efficiency at low load (10%)	87.2%
No-load power consumption	0.12 W

4.6 EC declaration of conformity

English (EN)	This equipment complies with the essential requirements and other relevant provisions of:
	Directive 2014/53/EU (RED) or
	Directive 2014/30/EU (EMC)
	Directive 2014/35/EU (LVD)
	Directive 2009/125/EC (ErP)
	Directive 2011/65/EU (RoHS)
	of the European Parliament.
German (DE) Deutsch	Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie
	Richtlinie 2014/53/EU (RED) oder
	Richtlinie 2014/30/EU (EMC)
	Richtlinie 2014/35/EU (LVD)
	Richtlinie 2009/125/EG (ErP)
	Richtlinie 2011/65/EU (RoHS)
	des Europäischen Parlaments.
Spanish (ES) Español	Este dispositivo cumple con los requisitos esenciales y con las normas correspondientes de las siguientes directivas:
	Directiva 2014/53/UE (RED) o
	Directiva 2014/30/UE (EMC)
	Directiva 2014/35/UE (LVD)
	Directiva 2009/125/CE (ErP)
	Directiva 2011/65/UE (RoHS)
	del parlamento Europeo.

The EC declaration of conformity and additional product documentation can be found at:

http://www.teldat.com/conformity

4.7 CE marking

This equipment is in conformity with the CE procedures and marking.

4.8 National restrictions

In accordance with article 10 of 2014/53/EU, we hereby inform you that national usage restrictions and requirements may apply to the device. The requirements for any country might change. We recommend that you check with your local authorities for the latest status of national regulations.

This product is supplied with antennas to meet local regulations. Do not use other antennas with this product. To comply with power limits and RF exposure requirements, the antennas used with this transmitter must be installed to provide a separation distance of, at least, 25 cm from all persons.

4.9 Operating frequency

To find out more about operating frequencies, see Appendix *RF WAN specifications* on page 36 and *Radio WI-FI specifications* on page 38

4.10 Federal Communications Commission (FCC) statement

4.10.1 FCC interference

This equipment has been tested and complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

* Reorient or relocate the receiving antenna.

* Increase the distance between the equipment and the receiver.

* Connect the equipment to a different outlet so that the equipment and receiver are on different circuits.

* Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's Authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

4.10.2 FCC radiation exposure statement

This equipment complies with FCC radiation exposure limits for an uncontrolled environment. It should be installed and operated leaving a minimum distance of 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

4.10.3 Radio frequency interference requirements

High power radars are allocated as primary users of the 5.25 - 5.35 GHz and 5.65 - 5.85 GHz bands. These radar stations can cause interference with and/or damage this device.

4.11 IC statement

4.11.1 CAN ICES-3 (B)/NMB-3(B)

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This device and its antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with IC multi-transmitter product procedures.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

Appendix A Technical information

A.1 Troubleshooting

The following table can help you solve problems when installing the device. If you cannot solve the problem, contact your dealer for more information.

Symptom	Solution
None of the LEDs lights up on the router.	Check the power supply to the router (power source, ON/OFF switch, main power outlet).
You have forgotten the access password for the router.	Ignore the configuration through the RST button (as explained in the relevant section).
The *LAN Switch* LED never lights up in green.	Check the Ethernet cable and the connection to the network. Check the appropriate license is available for its use.
The *Eth WAN* LED never lights up in green.	Check the Ethernet cable and the connection to the network.
The *Wi-Fi* LED never lights up in green.	Check the router's configuration and that for the remote station(s). Check the appropriate license is available for its use.
The *USB* LED never lights up in green.	Check that the device inserted in the USB connector is supported by the router. Please check the Teldat website http://www.teldat.com to get the list of 3G USB modems that are supported. Check the appropriate license is available for its use.

A.2 Updating the software

The **Teldat M1** router family can be updated to new releases. Please contact your distributor for further details on new releases.

There are various ways to update a Teldat router. For further information, please see manual: "Teldat- *Dm 748-I Software Updating*".

The software required to update Teldat routers is supplied in a format known as **distribution**. This consists of a single file containing all the files needed to update your device, as well as in-depth information on their content.

A.3 Connecting to the device

A.3.1 Connecting using the local console (Aux connector)

An RJ45 female connector, labeled "**Aux**", on the front panel of the **Teldat M1** router provides access to the device's local console.
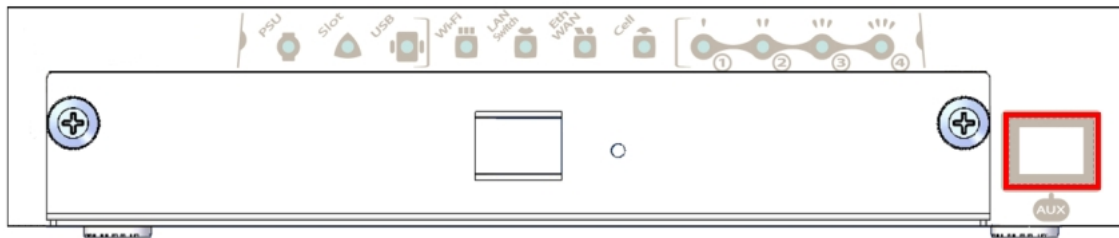
Fig. 26: **Aux Connector**

To configure this, you must connect the " **Aux**" port to an asynchronous terminal (or to a PC with terminal emulation).

> **Note**
>
> The configuration for the terminal must be:
>
> - Speed: 9600 bps.
>
> - Eight data bits.
>
> - One stop bit.
>
> - No parity bit.
>
> - No type of flow control.

You can connect to the configuration port by using the RJ45 cable (supplied with the device), together with the RJ45 Female-DB9 Female adapter (also provided).
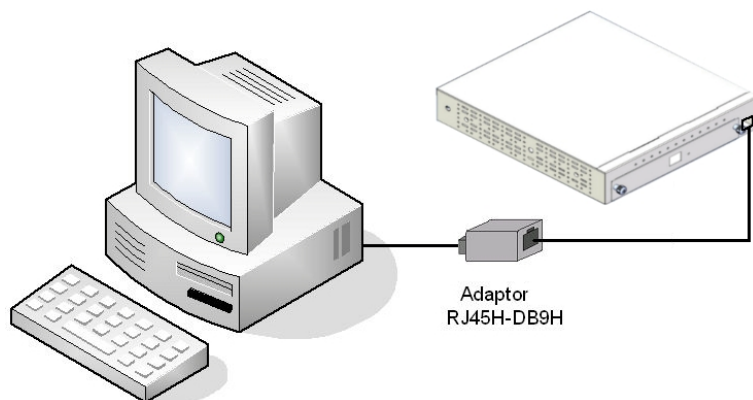
Fig. 27: **Connecting for Configuration**

A.4 Licenses

The **Teldat M1** router family offers a series of licenses. Among them, the following stand out:

WiFi: Activation license for the WLAN 802.11bgn.

USB: Activation license for the USB port to be used for the WWAN modems.
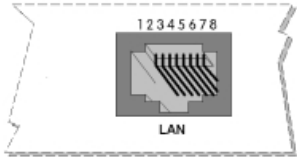
Hardware encryption: Activation license for the hardware encryption.

WAN Ethernet: Activation license for the WAN Gigabit Ethernet port.
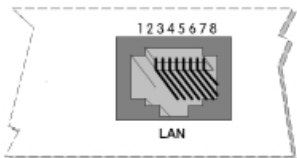
M1L to M1: **Teldat M1L** to **Teldat M1** conversion license.

A.5 Connectors
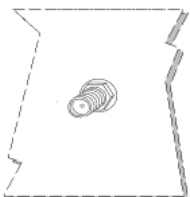
A.5.1 LAN connector

RJ45 LAN	RJ45 PIN	FE Signals	GE Signals
	1	BI-DA+	BI-DA+
	2	BI-DA-	BI-DA-
	3	BI-DB+	BI-DB+
	4	--	BI-DC+
	5	--	BI-DC-
	6	BI-DB-	BI-DB-
	7	--	BI-DD+
	8	--	BI-DD-
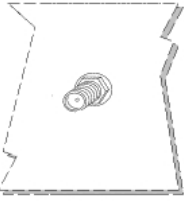
A.5.2 WAN connector

RJ45 WAN	RJ45 PIN	FE Signals	GE Signals
	1	BI-DA+	BI-DA+
	2	BI-DA-	BI-DA-
	3	BI-DB+	BI-DB+
	4	--	BI-DC+
	5	--	BI-DC-
	6	BI-DB-	BI-DB-
	7	--	BI-DD+
	8	--	BI-DD-
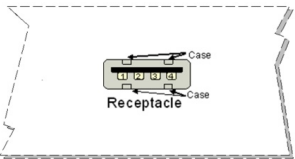
A.5.3 WWAN connector (female)

	PIN	ANT
	Internal	RF in/out
	External	GND
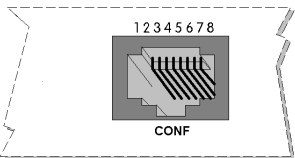
A.5.4 WLAN connector (male)

	PIN	ANT
	Internal	RF in/out
	External	GND

A.5.5 USB connector

USB Type A	PIN	USB
	1	VCC
	2	DATA-
	3	DATA+
	4	GND
	Shell	Shield

A.5.6 Configuration connector

RJ45 CONFIGURATION	RJ45 PIN	CONF
	1	--
	2	RxD
	3	GND
	4	--
	5	--
	6	GND
	7	TxD
	8	--

A.5.7 Power supply connector

PIN	ANT
Internal	POSITIVE
External	NEGATIVE

A.6 Technical specifications

A.6.1 Hardware architecture

PROCESSORS	Freescale QorIQ.
MEMORY	256 Mbytes in SDRAM.
STORAGE UNIT	FLASH Memory (32 Mbytes).

A.6.2 LAN interface

PROTOCOLS	Ethernet (802.3).
PORTS	4 port Switch managed with MDI/MDX autodetection.
SPEED	10/100/1000 Mbps (BaseT).
CONNECTOR	RJ45 female.

A.6.3 WAN interface

STANDARDS	Ethernet (802.3).
SPEED	10/100/1000 Mbps (BaseT).
CONNECTOR	RJ45 female.

A.6.4 Wireless WAN interface

WWAN Standard/Bands	MC7455:
	
	• LTE:
	  • FDD. B1-B5, B7, B12, B13, B17, B20, B25, B26, B29, B30
	  • TDD: B41
	• WCDMA: B1, B2, B3, B4, B5, B8
	
	MC7430:
	
	• LTE:
	  • FDD. B1, B3, B5, B7, B8, B18, B19, B21, B28
	  • TDD: B38-B41
	• WCDMA: B1, B5, B6, B8, B9, B19
	• TD-SCDMA: B39
	
	MC7304:
	
	• LTE:
	  • FDD. B1, B3, B7, B8, B20
	• WCDMA: B1, B2, B5, B8
	• GSM/GPRS/EDGE: Quad band
	
	MC7354:
	
	• LTE: B2, B4, B5, B13, B17, B25
	• WCDMA: B1, B2, B4, B5, B8
	• CDMA 1xRTT/EV-DO Rev A: BC0,BC1,BC10
	• GSM/GPRS/EDGE: Quad band
	
	EC25-E:
	
	• LTE:
	  • FDD. B1, B3, B5, B7, B8, B20
	  • TDD: B38, B40, B41
	• WCDMA: B1, B5, B8
	• GSM/GPRS/EDGE: 900/1800 MHz
	
	EC25-AU:
	
	• LTE:
	  • FDD. B1, B2, B3, B4, B5, B7, B8, B28
	  • TDD. B40
	• WCDMA: B1, B2, B5 , B8
	
	E362:
	
	• LTE: B13
	• WCDMA: B1, B2, B5, B8
	• CDMA 1xRTT/EV-DO Rev A: BC0, BC1
	• GSM/GPRS/EDGE: Quad band

Speed (DL/UL)	MC7455: • LTE Cat 6. • FDD. 300Mbps/50Mbps

- TDD: 222Mbps/26Mbps

- HSPA+ Cat 24/6: 42Mbps/5.76Mbps

MC7430:

- LTE Cat 6.
  - FDD. 300Mbps/50Mbps
  - TDD: 222Mbps/26Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps

MC7304:

- LTE Cat 3. 100Mbps/50Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps
- EDGE: 236Kbps

MC7354:

- LTE Cat 3. 100Mbps/50Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps
- CDMA 1xRTT: 153Kbps, EV-DO: 3.1Mbps/1.8Mbps
- EDGE: 236Kbps

EC25-E:

- LTE Cat 4.
  - FDD. 150Mbps/50Mbps
  - TDD: 130Mbps/35Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps
- EDGE: 236Kbps

EC25-AU:

- LTE Cat 4.
  - FDD. 150Mbps/50Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps

E362:

- LTE Cat 3. 100Mbps/50Mbps
- HSPA+ Cat 24/6: 42Mbps/5.76Mbps
- CDMA 1xRTT: 153Kbps, EV-DO: 3.1Mbps/1.8Mbps
- EDGE: 236Kbps

CONNECTOR	Two SMA female connectors.
SIM Slots	2 Mini-SIM (2FF) ISO/IEC 7810:2003, ID-000 (1.8V / 3V)

A.6.5 Wireless LAN interface

WLAN standards	802.11n (MIMO 2x2); 802.11b; 802.11g; 802.11a; 802.11h.
Frequency bands 2.4 GHz indoor and outdoor (EU)	2400–2483.5 MHz: 20 dBm max EIRP allowed.
Frequency bands 2.4 GHz indoor and outdoor (USA)	2400–2473 MHz: 20 dBm max EIRP allowed.
Frequency bands 5 GHz indoor (EU), indoor and outdoor (USA)	5170-5330 MHz: 23 dBm max EIRP allowed
Frequency bands 5 GHz indoor and outdoor (EU/USA)	5490-5710 MHz: 30 dBm max EIRP allowed
Frequency bands 5 GHz indoor and outdoor (USA)	5735-5835 MHz: 30 dBm max EIRP allowed
WLAN modes	2.4 GHz: 802.11b only; 802.11g only, 802.11b/g/n mixed; 802.11b/g/n mixed long; 802.11b/g/b mixed short; 802.11b/g/n; 802.11g/n; 802.11n only; 5 GHz Operation: 802.11a only; 802.11a/n; 802.11n only.
Automatic Rate Selection (ARS)	Automatic usage of the optimized data rate.
Data rates for 802.11b,g (2.4 GHz)	11, 5.5, 2 and 1 Mbps (DSSS modulation). 54, 48, 36, 24, 18, 12, 9 and 6 Mbps (OFDM modulation).
Data rates for 802.11a,h (5 GHz)	54, 48, 36, 24, 18, 12, 9 and 6 Mbps (OFDM modulation).
Data rates for 802.11n, Long Guard (800ns), 20 MHz	MSC0 6,5 Mbps; MSC1 13 Mbps; MCS2 19,5 Mbps; MCS3 26 Mbps; MCS4 39 Mbps; MSC5 52 Mbps; MCS6 58,5 Mbps; MCS7 65 Mbps; MCS8 13 Mbps; MCS9 26 Mbps; MCS10 39 Mbps; MCS11 52 Mbps; MCS12 78 Mbps; MCS13 104 Mbps; MCS14 117 Mbps; MCS15 130 Mbps.
Data rates for 802.11n, Short Guard (400ns), 20 MHz	MSC0 7,2 Mbps; MSC1 14,4 Mbps; MCS2 21,7 Mbps; MCS3 28,9 Mbps; MCS4 43,3 Mbps; MSC5 57,8 Mbps; MCS6 121,5 Mbps; MCS7 135 Mbps; MCS8 27 Mbps; MCS9 54 Mbps; MCS10 81 Mbps; MCS11 108 Mbps; MCS12 162 Mbps; MCS13 216 Mbps; MCS14 243 Mbps; MCS15 270 Mbps.
Data rates for 802.11n, Long Guard (800ns), 40 MHz	MSC0 13,5 Mbps; MSC1 27 Mbps; MCS2 40,5 Mbps; MCS3 54 Mbps; MCS4 81 Mbps; MSC5 108 Mbps; MCS6 121,5 Mbps; MCS7 135 Mbps; MCS8 27 Mbps; MCS9 54 Mbps; MCS10 81 Mbps; MCS11 108 Mbps; MCS12 162 Mbps; MCS13 216 Mbps; MCS14 243 Mbps; MCS15 270 Mbps.
Data rates for 802.11n, Short Guard (400ns), 40 MHz	MSC0 15 Mbps; MSC1 30 Mbps; MCS2 45 Mbps; MCS3 60 Mbps; MCS4 90 Mbps; MSC5 120 Mbps; MCS6 135 Mbps; MCS7 150 Mbps; MCS8 30 Mbps; MCS9 60 Mbps; MCS10 90 Mbps; MCS11 120 Mbps; MCS12 180 Mbps; MCS13 240 Mbps; MCS14 270 Mbps; MCS15 300 Mbps.
Output power limitation (without antenna gain)	Adjustable in the following steps: 5, 8,11,14,16 dBm and maximum. Maximum power varies depending on the data rate, frequency band and country setting.
Bandwidth (802.11n)	20/40 MHz (bundling two adjoining 20 MHz channels into one 40 MHz channel).
CONECTOR	Up to 3 RF RP-SMA female.

A.6.6 USB interface

3G USB MODEMS	Please see the Teldat website http://www.teldat.com to get a list of supported 3G USB modems.
SPEED	The interface complies with the USB 2.0 (480 Mbps) standard; the end speed depends on the 3G USB modem used.
CONNECTOR	USB Type A.

A.6.7 Configuration interface

LOCAL TERMINAL	V.24 9600-8-N-1 without flow control.
CONNECTOR	RJ45 female on the device's front panel.

A.6.8 Power supply

INPUT VOLTAGE	+12V DC
INPUT CURRENT	1600 mA
JACK	5.5 mm
INTERNAL PIN	2.5 mm

A.6.9 External power supply

INPUT VOLTAGE	100 - 240 V AC.
INPUT FREQUENCY	50-60 Hz.

A.6.10 Dimensions and weight

TYPE	Desktop / chassis for a 1 U high Rack mount enclosure.
LENGTH x WIDTH x HEIGHT	245 x 210 x 45 mm.
WEIGHT	1.4 kg.

A.6.11 Environmental specifications

TEMPERATURE	OPERATING NORMALLY: 0 ºC to 45 ºC STORED: -25 ºC to 70 ºC
RELATIVE HUMIDITY	On: 5 % to 90 %

Appendix B Radio information

In accordance with Article 10(8) of the Radio Equipment Directive 2014/53/EU, the following tables provide information on frequency bands and RF transit power levels.

B.1 RF WAN specifications

LTE/WCDMA/GSM connectivity is provided by different WWAN modules. The exact module installed will depend on your particular router model.

This product is supplied with YWX-6221SAX9-508 antennas. To comply with the regulations, do not choose other antennas.

Technology: LTE. MC7304 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB
Band 3	Tx: 1710–1785 MHz Rx: 1805–1880 MHz	+23 dBm ± 1 dB
Band 7	Tx: 2500–2570 MHz Rx: 2620–2690 MHz	+22 dBm ± 1 dB
Band 20	Tx: 832–862 MHz Rx: 791–821 MHz	+23 dBm ± 1 dB

Technology: LTE. MC7455 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB
Band 3	Tx: 1710–1785 MHz Rx: 1805–1880 MHz	+23 dBm ± 1 dB
Band 7	Tx: 2500–2570 MHz Rx: 2620–2690 MHz	+22 dBm ± 1 dB
Band 20	Tx: 832–862 MHz Rx: 791–821 MHz	+23 dBm ± 1 dB

Technology: LTE. MC7430 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB

| Band 3 | Tx: 1710–1785 MHz

Rx: 1805–1880 MHz | +23 dBm ± 1 dB |
| Band 7 | Tx: 2500–2570 MHz

Rx: 2620–2690 MHz | +22 dBm ± 1 dB |

Technology: LTE. EC25-E specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 2 dB
Band 3	Tx: 1710–1785 MHz Rx: 1805–1880 MHz	+23 dBm ± 2 dB
Band 7	Tx: 2500–2570 MHz Rx: 2620–2690 MHz	+23 dBm ± 2 dB
Band 20	Tx: 832–862 MHz Rx: 791–821 MHz	+23 dBm ± 1 dB

Technology: UMTS(WCDMA)/ HSDPA/ HSUPA/ HSPA+/ DC-HSPA+. MC7304 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB
Band 8	Tx: 880–915 MHz Rx: 925–960 MHz	+23 dBm ± 1 dB

Technology: UMTS(WCDMA)/ HSDPA/ HSUPA/ HSPA+/ DC-HSPA+. MC7455 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB
Band 3	Tx: 170–1785 MHz Rx: 1805–1880 MHz	+23 dBm ± 1 dB
Band 8	Tx: 880–915 MHz Rx: 925–960 MHz	+23 dBm ± 1 dB

Technology: UMTS(WCDMA)/ HSDPA/ HSUPA/ HSPA+/ DC-HSPA+. MC7430 specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920–1980 MHz Rx: 2110–2170 MHz	+23 dBm ± 1 dB

| Band 8 | Tx: 880–915 MHz

Rx: 925–960 MHz | +23 dBm ± 1 dB |

Technology: UMTS(WCDMA)/ HSDPA/ HSUPA/ HSPA+/ DC-HSPA+. EC25-E specifications.

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+24 dBm +1/-3 dB
Band 8	Tx: 880–915 MHz Rx: 925–960 MHz	+24 dBm +1/-3 dB

Technology: GSM / GPRS / EDGE. MC7304 specifications.

Bands	Frequencies	Conducted Transmit Power
EGSM 900 (900 MHz)	Tx: 880–915 MHz Rx: 925–960 MHz	+32 dBm ± 1 dB +27 dBm ± 1 dB
DCS 1800 (1800 MHz)	Tx: 1710–1785 MHz Rx: 1805–1880 MHz	+29 dBm ± 1 dB +26 dBm ± 1 dB

Technology: GSM / GPRS / EDGE. EC25-E specifications.

Bands	Frequencies	Conducted Transmit Power
EGSM 900 (900 MHz)	Tx: 880–915 MHz Rx: 925–960 MHz	+33 dBm ± 2 dB +27 dBm ± 3 dB
DCS 1800 (1800 MHz)	Tx: 1710–1785 MHz Rx: 1805–1880 MHz	+30 dBm ± 2 dB +26 dBm ± 3 dB

B.2 Radio WI-FI specifications

Wi-Fi radio communications comply with standards 802.11a/b/g/n.

This product is supplied with EDA-8709-25GR2-A9 antennas. To comply with the regulations, do not choose other-antennas.

Standard	IEEE 802.11-2016 including 802.11a, 802.11b, 802.11g, 802.11n, 802.11i, 802.11e
Frequency bands	2,4 GHz/5 GHz
Channels and frequencies	EU: 802.11b/g/n-HT20: 2412 ~ 2472MHz (channels 1 to 13); EU: 802.11n-HT40: 2422 ~ 2462MHz (channels 3 to 11); EU: 802.11a /n-HT20/ac-VHT20: 5180~5240 MHz (channels 36 to 48), 5260~5320 MHz (channels 52 to 64), 5500~5700 MHz (channels 100 to 140); EU: 802.11n-HT40: 5190~5230 MHz (channels 38 and 46), 5270~5310 MHz (channels 54 and 62), 5510~5670 MHz (channels 102 to 134) ; USA: 802.11b/g/n-HT20: 2412 ~ 2462MHz (channels 1 to 11);

	USA: 802.11n-HT40: 2422 ~ 2452MHz (channels 3 to 9);
	USA: 802.11a /n-HT20: 5180~5240 MHz (channels 36 to 48), 5260~5320 MHz (channels 52 to 64), 5500~5700 MHz (channels 100 to 140), 5745~5825 MHz (channels 149 to 165);
	USA: 802.11n-HT40: 5190~5230 MHz (channels 38 and 46), 5270~5310 MHz (channels 54 and 62), 5510~5670 MHz (channels 102 to 134), 5755~5795 (channels 151 and 159) ;
Carrier frequencies stability	+- 2 ppm
Number of Channels	EU: 802.11a/n-HT20: 19 EU: 802.11n-HT40: 9 USA: 802.11a/n-HT20: 24 USA: 802.11n-HT40: 11
Type of modulation	802.11b: PSK, DBPSK, DSSS, and CCK 802.11g: BPSK, QPSK, 16QAM, 64QAM with OFDM 802.11a: BPSK, QPSK, 16QAM, 64QAM with OFDM 802.11n: BPSK, QPSK, 16QAM, 64QAM with OFDM
Transmission technology	CSMA/CA (Carrier-sense multiple access with collision avoidance)
Unwanted Emissions in the Spurious Domain Limit	1 GHz to 12,75 GHz < -30 dBm according to EN 301 893 and EN 300 328
TX power @ 5 GHz 802.11a	5.150~5.350G Hz Band 16dBm 6~24Mbps; 14dBm 48Mbps; 13dBm 54Mbps 5.470~5.725G Hz Band 16dBm 6~24Mbps; 13dBm 48Mbps; 12 dBm 54Mbps 5.725~5.825G Hz Band 15dBm 6~24Mbps; 12 dBm 48Mbps; 11 dBm 54Mbps
Receiver Sensitivity @ 5 GHz 802.11a	–87dBm 6Mbps; –87dBm 9Mbps; –86dBm 12Mbps; –84dBm 18Mbps; –80dBm 24Mbps; –77dBm 36Mbps; –74dBm 48Mbps; –72dBm 54Mbps
TX power @ 2,4 GHz 801.11b	18dBm(+- 2dB) 1,2,5.5,11Mbps
Receiver Sensitivity @ 2.4 GHz 802.11b	–95dBm 1Mbps; 93dBm 2Mbps; –92dBm 5.5Mbps; –88dBm for 11Mbps
TX power @ 2,4 GHz 801.11g	19dBm 6~12 Mbps (18dBm); 19dBm 18 Mbps; 19dBm 24 Mbps; 18dBm 36 Mbps; 18dBm 48 Mbps; 16dBm 54 Mbps
Receiver Sensitivity @ 2.4 GHz 802.11g	–88dBm 6Mbps; –88dBm 9Mbps; –88dBm 12Mbps; –88dBm 18Mbps; –87dBm 24Mbps–83dBm 36Mbps; –76dBm 48Mbps; –74dBm 54Mbps
TX Power @ 2.4 GHz 801.11n (HT20)	18dBm MCS0/8; 18dBm MCS1/9; 18dBm MCS3/11; 18dBm MCS4; 18dBm MCS5; 16dBm MCS6; 16dBm MCS7
TX Power @ 2.4 GHz 801.11n (HT40)	18dBm MCS0/8; 18dBm MCS1/9; 18dBm MCS3/11; 18dBm MCS4; 17dBm MCS5; 16dBm MCS6; 15dBm MCS7

Receiver Sensitivity @ 2.4 GHz 802.11n (HT20)	–88dBm MCS0; –88dBm MCS1; –87dBm MCS2; –82dBm MCS3; –80dBm MCS4; –75dBm MCS5; –73dBm MCS6; –71dBm MCS7.
Receiver Sensitivity @ 2.4 GHz 802.11n (HT40)	–85dBm MCS0; –85dBm MCS1; –85dBm MCS2;–81dBm MCS3; –78dBm MCS4; –73dBm MCS5;–70dBm MCS6; –68dBm MCS7.
TX power @ 5 GHz 801.11n (HT20)	5.150~5.350G Hz Band 15dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 15dBm MCS6/14; 12dBm MCS7/15 5.470~5.725G Hz Band 15dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 15dBm MCS6/14; 11dBm MCS7/15 5.725~5.825G Hz Band 14dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 12dBm MCS6/14; 10dBm MCS7/15
TX power @ 5 GHz 801.11n (HT40)	5.150~5.350G Hz Band 13~15dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 13~15dBm MCS6/14; 11~13dBm MCS7/15; 5.470~5.725G Hz Band; 13~15dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 13~15dBm MCS6/14; 10~12dBm MCS7/15 5.725~5.825G Hz Band 12~15dBm MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13; 12~15dBm MCS6/14; 10~12dBm MCS7/15.
Receiver Sensitivity @ 5 GHz 802.11n (HT20)	–88dBm MCS0; –87dBm MCS1; –85dBm MCS2; –82dBm MCS3; –79dBm MCS4; –76dBm MCS5; –73dBm MCS6; –71dBm MCS7
Receiver Sensitivity @ 5 GHz 802.11n (HT40)	-85dBm MCS0; –85dBm MCS1; –81dBm MCS2; –78dBm MCS3; –74dBm MCS4; –71dBm MCS5; –68dBm MCS6; –66dBm MCS7.