
# Teldat H2 RAIL

## Installation Manual

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# Chapter 1 About this Manual

This is the installation manual for the **Teldat H2 RAIL** router and contains information on how to correctly install this device in a working environment.

## 1.1 Supported devices

The information provided in this installation manual only applies to the **Teldat H2 RAIL** router.

## 1.2 Who should read this manual?

This manual should be read by the support personnel who need to install, 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 manual contains the following information:

- A description of the features that are available in the **Teldat H2 RAIL** router.
- Technical specifications.
- Power supply requirements.
- Connector and LED descriptions.
- Information about anticorrosion measures to protect the metal parts of the device during transportation, storing or at its final location
- Troubleshooting.

## 1.5 What is not in this manual?

This manual does not contain information about the device software or its configuration. For information on how to configure this device, please see the relevant protocol manuals found at 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. offers a technical support service. 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

## 1.8 Related documentation

Teldat Dm748-I Software Updating.

Teldat-Dm771-I Wireless LAN Interface.

Teldat Dm781-I Cellular Interface.

Teldat Dm812-I GPS.

**Note**

The manufacturer reserves the right to make changes and/or improvements to any and all parts of the software and hardware of this product, and to modify the specifications of this manual without prior notice.

The images showing the front and rear panels of the device are included for information purposes only. The actual device may differ slightly from what is shown.

# Chapter 2 Teldat H2 Rail

## 2.1 Description

The **Teldat H2 RAIL** router is a multi-service communications platform specifically designed for railway environments. It provides reliable 4G/LTE-Advanced broadband and, depending on the model, 802.11 a/b/g/n or backwards-compatible 802.11ac Wi-Fi communications with redundancy options, bandwidth aggregation, and advanced network security mechanisms.

The hardware design complies with railway regulations applicable to lightweight and high-speed train or tram installations, is EN 50155 certified (meeting vibration and emission requirements), and offers a wide range of operating temperatures.

The **Teldat H2 RAIL** router also provides extremely reliable communications using dynamic configurations (based on location/communications quality data).

This manual shows you how to install and connect the **Teldat H2 RAIL** router.

## 2.2 Characteristics

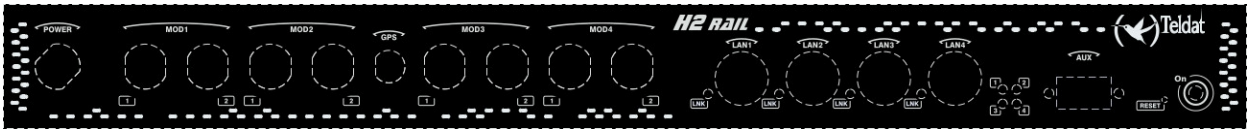



*Fig. 1:* **Teldat H2 RAIL: Outer features**

### 2.2.1 Power supply

For further information on the **Teldat H2 RAIL** power supply, please see *Connecting the power supply* on page 7.

### 2.2.2 Hardware monitoring

The **Teldat H2 RAIL** hardware can be monitored through the LEDs on the front panel. The LEDs provide visual status information about the hardware components, indicating whether there is connectivity, data flow, etc.

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

# Chapter 3 Components and Power Supply

This chapter describes the **Teldat H2 RAIL** chassis and its main components. The following sections are included:

- Components.
- Assembly instructions.
- Power supply.
- RESET button.
- Data connection.
- SIM card installation.

## 3.1 Components

### 3.1.1 Front panel

The following image shows the device's front panel.

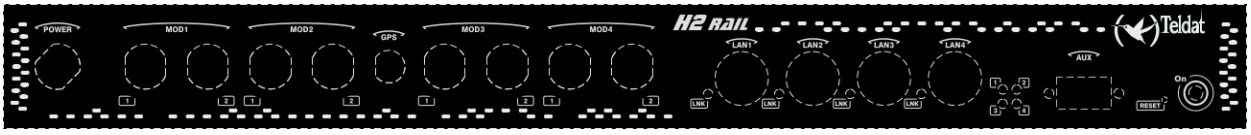



*Fig. 2:* **Front panel**

The front panel components are as follows:

**Table 1: Front panel components**

| Item | Description |
|---|---|
| POWER | Power connection. For further information on the power connection, please see *Power source* on page 7 |
| MOD1, MOD2 | WWAN/WLAN antenna connectors.<br>The created interface is cellular1/x or wlan1/0 for MOD 1, and cellular2/x or wlan2/0 for MOD2.<br>The type of device installed for each position depends on the commercial configuration. |
| GPS | GPS antenna connector. |
| MOD3, MOD4 | WWAN/WLAN antenna connectors.<br>The created interface is cellular3/x or wlan3/0 for MOD 3, and cellular4/x or wlan4/0 for MOD4.<br>The type of device installed for each position depends on the commercial configuration. |
| LAN1..LAN4 | LAN connectors for 4-port Gigabit Ethernet switch. |
| AUX | DB9 connector, which provides access to the device's local console for configuration and monitoring purposes. |
| RESET | Reset button. For further information on how the reset button works, please see *RESET button* on page 9 |

In addition to the connectors, the front panel also contains a set of LEDs that indicate router status.

#### 3.1.1.1 LEDs

The LEDs are located on the front panel of the router, as shown in the following image:

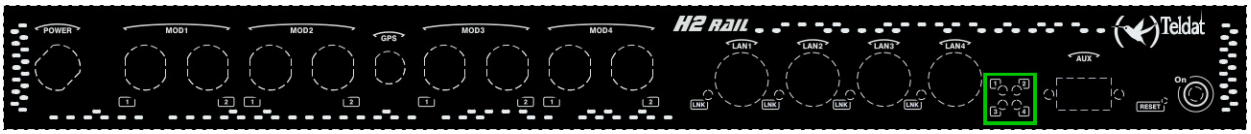



*Fig. 3:* **Teldat H2 RAIL***: Front panel*

The meaning of each LED depends on the modules installed. Each LED belongs to one of four possible modules.

See the table below to learn the meaning of each LED:

**Table 2: LEDs**

| | |
|---|---|
| **WWAN module** | Off -> system stopped.<br>Red -> interface is unavailable because it's not installed, not enabled (shutdown) or there was an auto-test failure.<br>Amber -> idle.<br>• Rapid flashing. The device has not registered with the network or there is insufficient quality for it to do so.<br>• Slow blinking. GSM connection (GPRS).<br>• Steady. WCDMA (UMTS / HSDPA) connection.<br>Green -> connected. Flashing: Data is being transferred. |
| **WLAN module** | Red -> interface down.<br>Green -> interface up.<br>Blinking (green/red) -> activity/maintenance. |

### 3.1.2 Rear panel

The following image shows the rear panel of the **Teldat H2 RAIL**. Here you will find the remaining connectors.

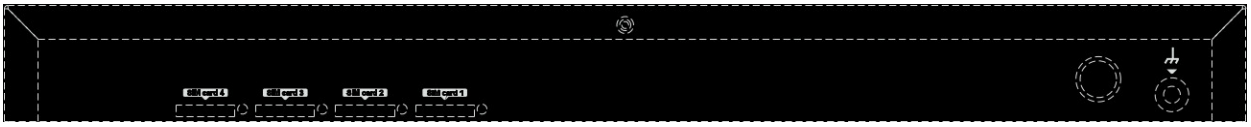


*Fig. 4:* **Rear panel**

The rear panel components are as follows:

**Table 3: Rear panel components**

| Item | Description |
|---|---|
| SIM card 1..4 | SIM trays (1 to 4). For more information on how to install the SIM cards and assign them to each module, see *SIM card installation* on page 14 |

## 3.2 Mounting options

The **Teldat H2 RAIL** is designed to be installed in a 19-inch rack.

**Note**

The device should be handled and installed by qualified service personnel, otherwise it could be damaged or malfunction.

The device is held firmly in place via the two brackets with slots that are attached to either side of the front panel.

### 3.2.1 Assembly: Recommendations

Insert the router into a 19-inch rack and align the brackets in the rack.

We recommend securing the unit to the rack using the screws and nuts provided. This will ensure the device is securely mounted.

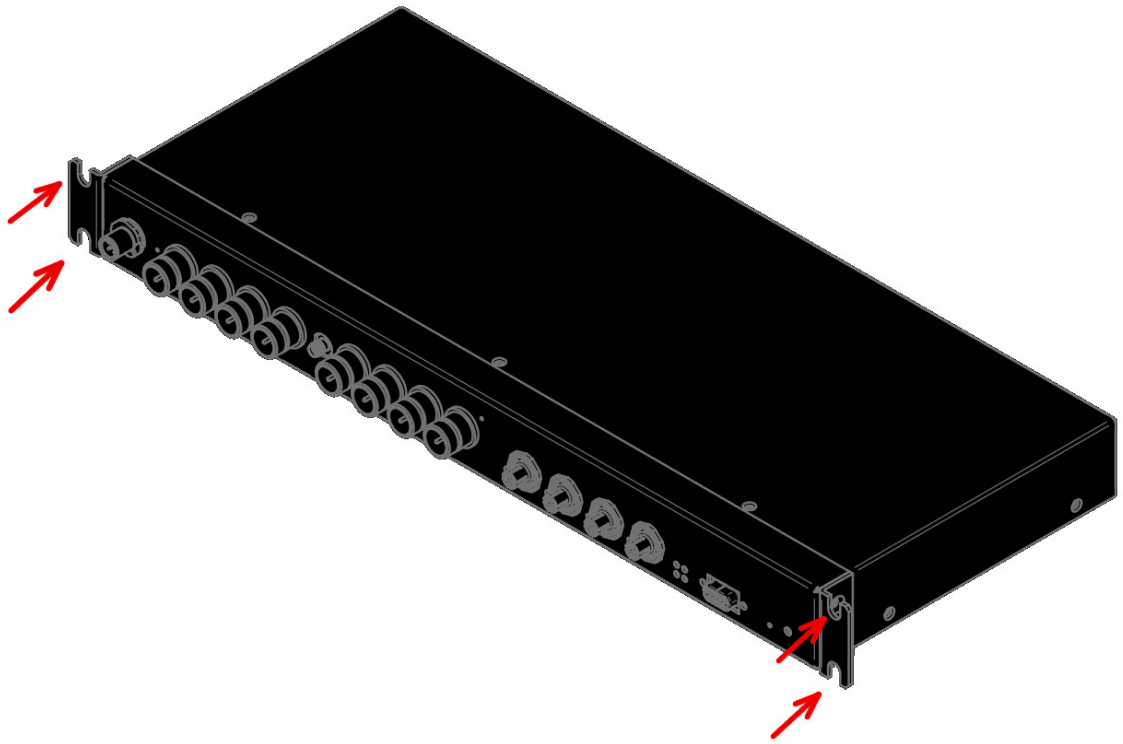


*Fig. 5: Mounting screws*

### 3.2.2 Outline drawing

The following outline drawing provides installation instructions:

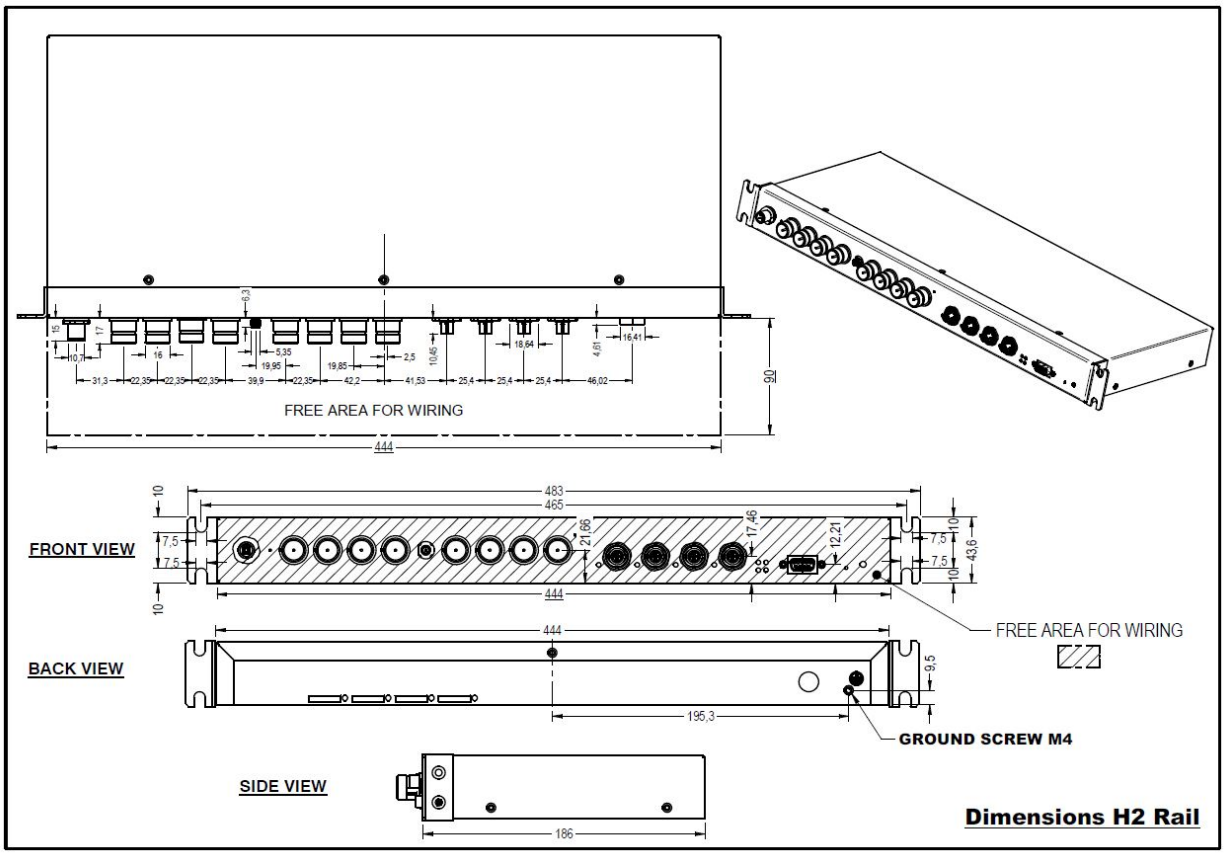



*Fig. 6:* **Outline drawing**

## 3.3 Power source

**Note**

Please read the following instructions carefully before connecting the router!

### 3.3.1 Connecting the power supply

Depending on the model, the **Teldat H2 RAIL** can be powered by a 110 V or 24 V nominal DC power source.

**Note**

Please check that the device's power input is compatible with your power supply.

There is no on/off switch or fuse. The power supply information is printed on a label found at the rear of the device.

| | |
|---|---|
| | This equipment requires an external overcurrent protection device. To comply with safety regulations, a 5.0 A time-lag fuse, or a previously approved 1-amp thermo-magnetic circuit breaker (ABB-S281-UC-K-1 or equivalent), must be installed in the power line. |
| | The H2 Rail has one earth terminal (on the rear panel). It must be grounded through a cable with a section measuring, at least, 2 $mm^2$ (AWG14).<br><br>This equipment must be grounded. Never deactivate the ground conductor or operate the equipment in the absence of a properly installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you don't know whether suitable grounding is available. When installing or replacing the unit, the ground connection must always be established first and disconnected last. |

The following image shows the location of the power connector.

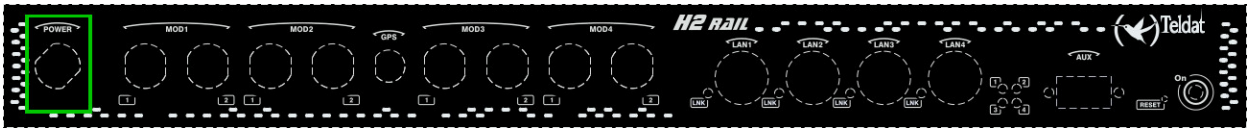
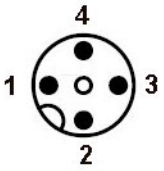



*Fig. 7:* **Power supply connection**

### 3.3.1.1 Power connector pins

The power connector on this router is an M12 4-pole code **A** male connector or equivalent.

| PIN | Signal | M12 4P Code A male |
|---|---|---|
| 1 | + V DC |  |
| 2 | + V DC | |
| 3 | 0 V | |
| 4 | 0 V | |



**Note**

Connections 1-2 and 3-4 are redundant. We recommend keeping this redundancy to guarantee device availability.

**Note**

To install the power cable using the M12 cable connector, the maximum tightening torque allowed is 0,4Nm. Higher values may damage the router connector. After its initial connection, frequent checkups must be carried out to ensure its correct fitting.

### 3.3.1.2 Power cable

The power cable is not supplied with the router. The estimated maximum consumption for this equipment is 150 mA (operating at 110 VDC) or 830mA (operating at 24 VDC). Any cable with four conductors and a gauge greater than, or equal to, 0.75 mm2 (AWG18) is acceptable. The type of cable and its gauge, however, will be determined by the characteristics of the female connector used.

You don't need a shielded cable. However, if you intend to use one, we recommend attaching the cable to the grounding point on the other side of the router, to the ground point on the power supply or to both.

The cable must be certified in terms of flammability. A CE or UL marking is necessary to ensure this.

Electric current in power cables, telephone lines and communication cables is dangerous. To prevent electric shocks, connect and disconnect the cables as shown in the following table before installing, handling or opening the equipment covers:

| To connect | To disconnect |
|---|---|
| Make sure that the power supply cable is not connected to the device. | Disconnect the power supply cable from the power supply. |

| | |
|---|---|
| Connect all data cables. | Disconnect the power supply cable from the device. |
| Connect the power supply cable to the device. | Disconnect the data cables. |
| Connect the power supply cable to the power supply. | |

## 3.4 RESET button

The following sections describe the functions of the RESET button.

### 3.4.1 Restarting the device

Press the RESET button while the device is running to restart the device.

### 3.4.2 Restoring the factory default configuration

Complete the following steps to reset the device with its factory default configuration:

- With the device switched off, press and hold down the RESET button while you turn the router on using the ON/OFF switch (1).
- The green PSU LED will light up and the amber Slot LED begins to blink. It continues to blink for 10 seconds.
- To reboot the device with the default settings, let go of the RESET button while the Slot LED is still blinking (i.e., before the 10-second blinking period expires).

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

- IP address: 192.168.1.1
- IP mask: 255.255.255.0

**Note**

Some devices come with customized settings. As a result, your device's default configuration may be different to the one shown above.

## 3.5 Connecting the data

The **Teldat H2 RAIL** has the following data connections.

### 3.5.1 Data connection

The **Teldat H2 RAIL** has the following data connectors:

#### 3.5.1.1 LAN SWITCH

The **Teldat H2 RAIL** incorporates a 4-port 10/100/1000BaseT switch with automatic MDI/MDIX support to connect to a local area network (LAN).

The router has a LINK LED that indicates connection status.

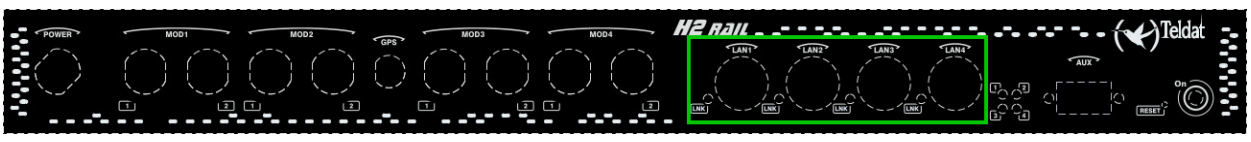
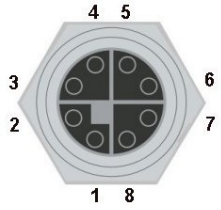



*Fig. 8:* **LAN switch ports (4)**

#### 3.5.1.1.1 LAN connector pins

The LAN connector installed in the router is an M12 8P X-Code female connector or equivalent.

| **PIN** | **GE Signal** -> Signal | **M12 8P X-Code female connector** |
|---|---|---|
| 1 | BI-DA+ ->Tx+ (1) |   |
| 2 | BI-DA- -> Tx- (2) | |
| 3 | BI-DB+ -> Rx+ (3) | |
| 4 | BI-DB- -> Rx- (6) | |
| 5 | BI-DD+ (4) | |
| 6 | BI-DD-(5) | |
| 7 | BI-DC-(7) | |
| 8 | BI-DC+(8) | |

**Note**

The switch's automatic MDIX feature means you can use a pin-to-pin cable to connect to another device without having to cross the Tx-Rx pairs.

**Note**

To install the LAN cable using the M12 Male cable connector, the maximum tightening torque allowed is 0,4Nm. Higher values may damage the M12 router connector. After its initial connection, frequent checkups must be carried out to ensure its correct fitting.

### 3.5.1.2 AUX

The front panel of the **Teldat H2 RAIL** contains a DB9 female connector marked **AUX**, which can be used as a router configuration port or as a V.24 asynchronous serial port (via a configuration command). The interface's behavior or functionality must be pre-configured. By default, it is configured as a configuration port. This section explains how to get the connector to work in asynchronous port mode.

The interface allows you to connect asynchronous serial devices that are able to operate without hardware control signals. This makes it possible, for example, to connect external modems or an asynchronous PPP WAN.

The interface is a V.24-compliant interface. It can't control hardware flow as it only has data signals and not control signals. However, it does allow for software flow control (XON/XOFF).

Parity cannot be configured in MARK and SPACE modes.

To set parity, you need to connect the **AUX** port to an asynchronous terminal (or to a PC with terminal emulation).

For information on how to use the port as a router configuration port, please see the section on *LAN connector pins* on page 10

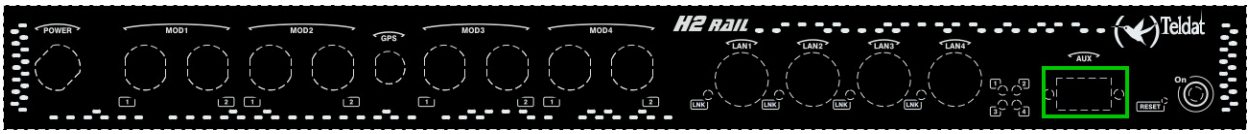



*Fig. 9:* **AUX port**

## 3.5.2 Connecting to a WWAN antenna

The **Teldat H2 RAIL** has up to eight type N connectors for connecting WWAN antennas.

| Name | WWAN Module | Antenna Function |
|---|---|---|
| MOD1 1 | MD1 | Main |
| MOD1 2 | MD1 | Aux. / diversity |
| MOD2 1 | MD2 | Main |
| MOD2 2 | MD2 | Aux. / diversity |
| MOD3 1 | MD3 | Main |
| MOD3 2 | MD3 | Aux. / diversity |
| MOD4 1 | MD4 | Main |
| MOD4 2 | MD4 | Aux. / diversity |

The router does not have any internal antennas. Antennas must be installed in the **Teldat H2 RAIL** to improve the quality of the signal received and transmitted by the WWAN module (GPRS, UMTS, HSDPA, HSUPA, HSPA+, LTE, etc.).

The cable used to connect the antennas must be valid for radio frequency (RF) signal communications of up to 2.6 GHz frequencies and impedances of 50 Ohm. Please note that the quality and length (loss) of an antenna cable can affect the quality of the RF signals transmitted and received. This, in turn, will affect the device coverage and data exchange rates.

**Note**

An appropriate software license must be installed for the WWAN interface to work.

Each router module has two WWAN antenna connectors (**1** and **2**).

Depending on the technology used, you can either use one antenna (e.g., for GPRS connection) or both (e.g., for LTE).

Installing an antenna in the **Main (1)** connector is mandatory. The second connector (**2, Ext.Diversity)** may not be needed. If you don't need the second one, disable the antenna (through the configuration settings) for optimum performance.

If you install both the Main and Ext Diversity antennas, they *must* be separated by a minimum of 7 cm. The maximum recommended distance is 25 cm.

For optimum performance, please use the radio frequency accessories (antennas and cables) recommended by Teldat.

The following image shows the location of the WWAN antenna connectors.

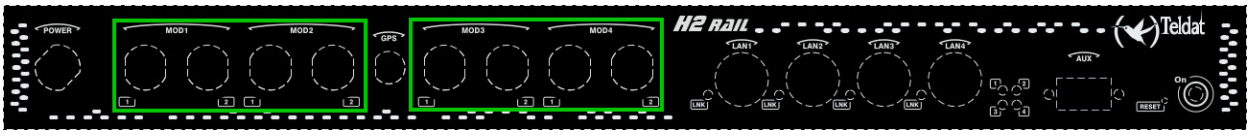



*Fig. 10:* **WWAN antenna connectors**

For further information on WWAN interfaces, please see the Teldat Dm781-I Cellular Interface manual.

#### 3.5.2.1 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) interferences.

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 those used for heating, 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 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 the face and eyes).
- Do not install the device in areas where the atmosphere is potentially explosive.
- Wireless devices can cause interference in other devices. Do not use them in areas where medical equipment is installed.

### 3.5.3 Connecting the WLAN antenna

The **Teldat H2 RAIL** is fitted with type N connectors to connect up to two WLAN (Wi-Fi) antennas (on models equipped with this interface).

Since the router doesn't have any internal antennas, external antennas must be installed on the **Teldat H2 RAIL** to improve WLAN signal quality.

The cable used to connect the antennas must be valid for RF signal communications of up to 2.4 GHz (5.7 GHz for 802.11a) frequencies and impedances of 50 Ohm. Please note, the quality and length of an antenna cable can affect the quality of RF signals transmitted and received. This, in turn, will affect the device coverage and data exchange rates.

Please note, an appropriate software license must be installed for the WLAN interface to work.

The following image shows the location of the WLAN antenna connectors (MOD3 and MOD4).


*Fig. 11:* **WLAN antenna connectors**

For further information on WLAN interfaces, please see the Teldat-Dm771-I Wireless LAN Interface manual.

## 3.5.4 Connecting the GPS antenna

The **Teldat H2 RAIL** has an FME connector to connect an active GPS antenna (on models equipped with this interface).

Since the router doesn't have any internal antennas, an active 3.3V external antenna must be installed on the **Teldat H2 RAIL** to optimize the GPS signal quality.

The cable used to connect the antennas must be valid for radio frequency (RF) signal communications of up to 1.5 GHz frequencies and impedances of 50 Ohm. Please note the quality and length of an antenna cable can affect the quality of the RF signals transmitted and received. This, in turn, will affect the device coverage and data exchange rates.

The following image shows the location of the GPS antenna connector.

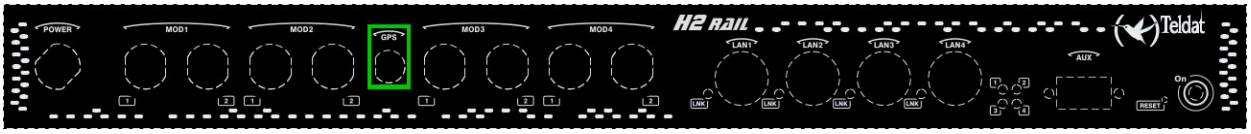



*Fig. 12:* **GPS antenna connector**

**Note**

The GPS will not work properly unless you install a valid SIM card.

For further information on GPS configuration, please see the Teldat Dm812-I GPS manual.

## 3.5.5 Configuration connection

### 3.5.5.1 Configuration using the local console (AUX connector)

The **Teldat H2 RAIL** has a DB9 female connector on the front panel known as **AUX**. This provides access to the router's local console and can operate as an asynchronous serial port. The interface behavior or function must be pre-configured. By default, it is configured in local console mode. This section focuses on the connection for local console mode.

To configure local console mode, connect the **AUX** port to an asynchronous terminal (or to a PC with terminal emulation).

**Note**

The terminal must be configured as follows:

- Speed: 9600 bps.
- Eight data bits.
- One stop bit.
- No parity bit.
- No flow control.

Connection to the configuration port is carried out using a DB9 male and a DB9 female connector. If the terminal has DB25 connectors, you will need an additional adapter.

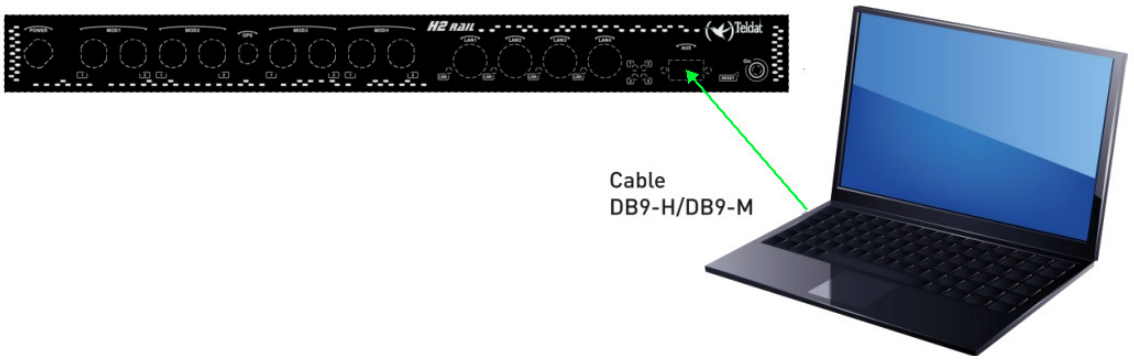



*Fig. 13:* **Connection for configuration**

### 3.5.5.2 Configuration using the IP terminal (LAN1..4 connectors)

The **Teldat H2 RAIL** includes a default configuration, which activates if the device has not been pre-configured.

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

- IP Address: 192.168.1.1
- IP Mask: 255.255.255.0

**Note**

Some devices leave the factory with customized settings. This personalization may mean that your router's default configuration is different to the one shown above.

This initial configuration lets you access the router's configuration console through the Telnet IP protocol. To do this, follow these steps:

- Configure the Ethernet interface on the IP terminal (usually a PC) using an IP address within the following range [192.168.1.2, 192.168.1.254] and mask 255.255.255.0. For example, 192.168.1.2, 255.255.255.0.
- Connect the IP terminal Ethernet interface to any of the Ethernet switch ports on the **Teldat H2 RAIL** (LAN1..4 connectors) using an appropriate Ethernet cable (M12 to RJ45).
- Start a Telnet session from the IP terminal to IP address 192.168.1.1 ( **Teldat H2 RAIL** default address).
- The default configuration does not ask for login credentials (user/password) to access the console.

For further information on how to configure the device, please refer to the user manuals provided by Teldat on the documentation CD or on the web.

## 3.6 SIM card installation

The **Teldat H2 RAIL** is equipped with up to four WWAN interfaces that require SIM cards to operate.

Some carriers in certain countries provide services (CDMA) that do not require SIM cards. However, in routers where a SIM card is required, at least one must be inserted.

The **Teldat H2 RAIL** has four SIM trays located on the rear of the device.

SIM allocation depends on the WWAN modules installed and their configuration. For further information about SIM configuration and assignment, please see the Teldat Dm781-I Cellular Interface manual.

| Installed Modules | SIM allocation |
|---|---|
| MOD1 | SIM1 and/or SIM3 (DualSIM option). |

| | |
|---|---|
| | For old hardware revisions (0,1,2): SIM1 and/or SIM2. |
| MOD1, MOD2 | SIM1 and/or SIM3 can be assigned to MOD1; SIM2 and/or SIM4 can be assigned to MOD2.<br><br>For old hardware revisions (0,1,2): SIM1 to MOD1, SIM2 to MOD2. |
| MOD1, MOD2, MOD3 and MOD4 | One SIM is automatically assigned to each module: SIMx to MODx. |

**Warning**

This router is compatible with 1.8 V and 3 V SIM cards. Do not install SIMs that do not support these voltages.

Never install a SIM card when the device is switched on.

Always disconnect the router from the main power supply before installing a SIM card.

Always disconnect the device before removing the casing to access the trays.

Protect yourself against electrostatic discharges (ESD) when inserting a SIM card.

Do not touch the SIM card connectors.

### 3.6.1 Installing the SIM

To insert a SIM card into a SIM tray, first place the router on a stable surface with the rear panel facing towards you (as shown in the following figure) and then follow the instructions given below:

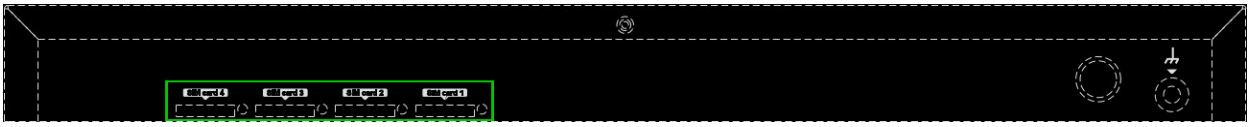


*Fig. 14:* **SIM trays**

(1) Press the button until the SIM tray slides out of the slot.

(2) Place the SIM card on the tray.

(3) Return the tray to the slot by pushing it in.

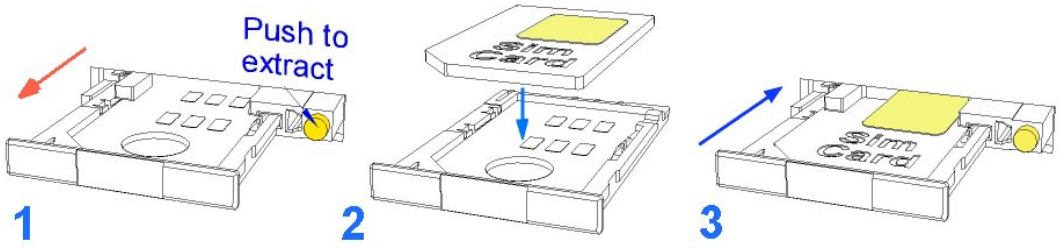



*Fig. 15:* **Inserting the SIMs**

# Chapter 4 Compliance

## 4.1 Manufacturer information

| | |
|---|---|
| *Brand* | Teldat |
| *Manufacturer* | Teldat S.A. |
| *Country* | Spain |
| *Postal Address* | Isaac Newton, 10<br>Parque Tecnológico de Madrid, 28760<br>Tres Cantos, Madrid, Spain |
| *International Phone* | +34 91 807 65 65 |

## 4.2 Risk identification

| | |
|---|---|
|  | WARNING: Signal word used to designate a potentially dangerous situation that may cause severe injuries or death if not avoided. |

## 4.3 Safety warnings

| | |
|---|---|
|  | Hazardous voltage. Danger to life! Do not open this equipment when it is switched on. |
| | |
| | Voltaje peligroso. ¡Peligro de muerte!<br>No abra este equipo cuando esté conectado a la corriente. |
| | |
|  | This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain about whether suitable grounding is available. When installing or replacing the unit, the ground connection must always be made first and disconnected last. |
| | |
| | Este equipo debe ser conectado a tierra. Nunca abandone la toma de tierra u opere el equipo en ausencia de una toma de tierra adecuada. Contacte con la autoridad eléctrica apropiada o con un electricista si tiene dudas sobre la situación de su toma de tierra. Cuando instale o reemplace el equipo, se debe conectar la conexión de tierra primero y desconectarla la última. |
| | |
|  | This equipment has been designed to work with an extended ambient temperature range of up to 70 °C (158 °F) and under these conditions the metallic surface could reach dangerous temperatures that may cause injuries. |
| | |
| | Este equipo ha sido diseñado para funcionar con una temperatura ambiente de |

| | |
|---|---|
| | rango extendido de hasta 70 ºC (158 ºF) y bajo estas condiciones la superficie metálica puede alcanzar temperaturas que pueden causar daños. |
| | |
|  | The equipment is intended to be installed by service personnel and only handled by qualified personnel. If not, the device may be damaged and malfunction. |
| | |
| | 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. |
| | |
|  | This device contains elements that are sensitive to electrostatic surges and shocks. Therefore, it is essential when handling the equipment that an antistatic wriststrap is connected to the device chassis and that this is placed on an antistatic mat. Furthermore, the device's components must not come into contact with necklaces, bracelets, rings, ties, etc. |
| | |
| | Este equipo contiene componentes sensibles a las sobrecargas y descargas electroestáticas. Por eso, durante la manipulación del equipo, utilice una pulsera antiestática conectada al chasis del equipo y colóquelo sobre una esterilla antiestática. Evite también el contacto de colgantes, pulseras, anillos, corbatas, etc. con cualquier componente del equipo. |
| | |
|  | This equipment requires an external overcurrent protection device. To comply with safety regulations, a 5.0 A time-lag fuse or a previously approved 1-amp thermomagnetic circuit breaker (ABB-S281-UC-K-1 or equivalent) must be installed in the power line. |
| | |
| | Este equipo depende de un dispositivo externo para la protección frente a sobrecorrientes. La normativa de seguridad requiere instalar en la línea de alimentación o bien un fusible retardado de 5 A o bien un interruptor magnetotérmico homologado de 1 A (ABB-S281-UC-K-1 o equivalente). |
| | |
|  | The electric current in power cables, telephone lines and communication cables is dangerous. To prevent electric shocks, before installing, handling or opening the equipment covers, connect and disconnect the cables following the steps set forth in *Connecting the data* on page 9. |
| | |
| | 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”. |
| | |
|  | This device is compatible with 1.8 V and 3 V SIM cards. Do not install SIM cards that do not support these voltages. |
| | |
| | Este equipo es compatible con SIM de 1.8V y 3V. No instale SIM que no soporten estas tensiones. |
| | |

| | |
|---|---|
|  | Never install SIM cards when the device is switched on.<br><br>Always disconnect the device from the main power supply before installing a SIM card.<br><br>Always disconnect the device before removing the casing to access the trays.<br><br>When inserting a SIM card, please protect yourself against electrostatic discharge (ESD).<br><br>Do not touch the SIM card connectors. |
| | |
| | No instale nunca las tarjetas SIM con el equipo encendido.<br><br>Desconecte siempre el equipo de la red antes de instalar las tarjetas SIM.<br><br>Desconecte siempre el equipo antes de desmontar la carcasa para acceder a las bandejas.<br><br>Al insertar las tarjetas SIM, protéjase contra descargas electroestáticas (ESD).<br><br>No toque los conectores de las tarjetas SIM. |
| | |

## 4.4 WEEE information

| | |
|---|---|
|  | The crossed-out wheelie bin symbol indicates that when the device comes to the end of its useful service life, it must be disposed of separately from normal domestic waste at an appropriate waste disposal facility.<br><br>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. |

## 4.5 REACH

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

## 4.6 EC declaration of conformity

| | |
|---|---|
| English (EN) | Hereby, Teldat S.A. declares the radio equipment type **Teldat H2 RAIL** is in compliance with:<br>Directive 2014/53/EU (RED)<br>Directive 2011/65/EU (RoHS)<br>as given by the European Parliament. |
| Spanish (ES) Español | Por la presente, Teldat S.A. declara que el tipo de equipo radioeléctrico **Teldat H2 RAIL** es conforme con:<br>Directiva 2014/53/UE (RED)<br>Directiva 2011/65/CE (RoHS)<br>del Parlamento Europeo. |
| German (DE) Deutsch | Hiermit erklärt Teldat S.A., dass der Funkanlagentyp **Teldat H2 RAIL** der Richtlinie:<br>Richtlinie 2014/53/EU (RED)<br>Richtlinie 2011/65/EU (RoHS)<br>des Europäischen Parlaments. |

The EC declaration of conformity can be found at http://www.teldat.com/conformity.

In addition to this conformity, Harmonized Standards have been applied to the TLDPH00H1.A hardware and CIT 11.01 software version, in order to meet the essential requirements of the Directives.

## 4.7 National restrictions

In accordance with Article 10 of 2014/53/EU, we inform you that national restrictions and requirements may apply when it comes to authorization. Not all EU countries have implemented the harmonized use of 5 GHz for the implementation of WAS/RLANs. There are restrictions in:

Albania, Andorra, Azerbaijan, Moldova, Monaco, San Marino and Vatican City

The requirements for any country may evolve. Teldat S.A. recommends that you check with local authorities for any requirements or restrictions that may apply.

This product is supplied without antennas. Choosing antennas is at the discretion of the operator, but said party is responsible for ensuring they comply with local regulations.

Make sure the characteristics of the antennas used match the regulations applicable to the installation location.

## 4.8 Operating frequency

### 4.8.1 WWAN antenna

The antenna(s) used for the WWAN transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. In order to meet RF exposure requirements, only those antennas tested with the device or similar antennas with equal or lesser gain may be used with this transmitter: 6 dBi at 700-900 MHz and 7.5dBi at 1700-1900 MHz and 2300-2600 MHz bands.

### 4.8.2 WLAN antenna

The antenna(s) used for the WLAN transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. In order to meet RF exposure requirements, only those antennas tested with the device or similar antennas with equal or lesser gain may be used with this transmitter: 4dBi at 2.4 GHz and 6 dBi at 5 GHz. Operations in the 5150-5350 MHz band are restricted to indoor usage only.

## 4.9 Labeling

The following table shows the symbols that appear on the label affixed to the rear of the device.

Caution, risk of electric shock

Direct current

CE Marking. Manufacturer's declaration that the product meets all the legal requirements for CE marking and can be sold throughout the EEA (European Economic Area).

Separate collection for electrical and electronic equipment.

Refer to the manual.

Indoor use only.

# 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.

| Problem | Solution |
|---|---|
| None of the LEDs on the router light up. | Check the power supply to the router (power supply cable, main power outlet). |
| LED 1, 2, 3 or 4 (WWAN modules) remains OFF. | Check the SIM card has been inserted correctly,<br>or<br>Check you have entered the correct SIM PIN,<br>or<br>Check the antenna is properly installed (make sure it is screwed in correctly),<br>or<br>Check the SIM tray configuration is correct. |

## A.2 Maintenance

**Teldat H2 RAIL** routers are designed to be highly available and durable, and for this reason have no moving parts. *This design makes any maintenance unnecessary.*

### A.2.1 Anticorrosion measures to protect the device's metal parts during transportation, storing or at its final location

As far as the metal housing is concerned, the **Teldat H2 RAIL** router was designed to be placed in an enclosed space, protected from bad weather and never to be exposed to extreme environmental conditions.

The device housing is made of galvanized iron sheet with an epoxy and polyester resin-based powder paint coating, added for aesthetic and anti-corrosion purposes. These characteristics give the housing the ability to withstand the effects of external corrosive agents (oxidation) to which the device might be exposed during transportation, storage or at its final location. As previously mentioned, these locations must always be indoors, sheltered, and never exposed to extreme environmental or meteorological conditions.

External paint's resistance to corrosion.

| | | |
|---|---|---|
| Humidity cabinet | DIN 50017 | No change after 500 hours |
| Salt fog chamber | ASTM B117-97 | 500 hours |

However, there are various considerations and measures that need to be taken into account during the transportation, storage and final deployment of devices to prevent the metal parts of the device from rusting.

- Devices should be stored indoors or in places that are dry, clean and away from chemicals.
- Do not subject the device to sudden rapid changes in temperature that could lead to condensation (which, in turn, will cause the metal parts in the devices to rust). Try to maintain the device at as constant a temperature as possible.

- During transportation and storage, place the device on a wooden or plastic pallet in order to avoid direct contact with the ground.

Never store the device outdoors. If this is unavoidable, take the following steps and make sure this situation lasts as little as possible.

- Protect the devices with a waterproof cover (made out of plastic, canvas or a similar material).
- Try to leave some space between the devices and the waterproof cover to allow some air circulation.
- Keep the devices on wooden or plastic pallets and never in direct contact with the ground. Try to set the pallet at a slight angle to allow any water that might occasionally collect on the waterproof cover to drain off.
- Check the storage area regularly to make sure there is no moisture or condensation build-up on or around the stored devices.

As mentioned above, keep the device outdoors for as short a period as possible, especially in seasons with extreme temperatures that can accelerate the oxidization of metal parts.

### A.2.2 Software updates

**Teldat H2 RAIL** router software can be updated to newer versions. Please contact your dealer for information about new versions.

There are several ways to update one of our routers. Please see the “Teldat Dm748-I Software Updating” manual for further information.

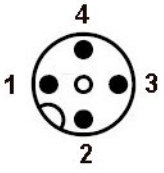
The software required to update one of our routers is supplied in a format known as **distribution**. This consists of a single file containing all the files needed to update your device, as well as in-depth information on the contents of the files.

The **Teldat H2 RAIL** incorporates independent modules for the WWAN interface. The firmware for the modules is usually independent of the router software. There is an UPGRADE file for each Wireless LAN module. Please ask your dealer for the appropriate UPGRADE file (according to the module in your device). The “Teldat Dm 781-I Cellular Interface” manual shows you how to UPGRADE the module.

## A.3 Connectors

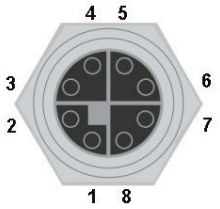
### A.3.1 POWER connector

The power connector installed in the device is an M12 4-pole code A connector.

| PIN | Signal | M12 4P A Code male |
|---|---|---|
| 1 | + V DC |   |
| 2 | + V DC | |
| 3 | 0 V | |
| 4 | 0 V | |

### A.3.2 LAN connector

The LAN connector installed in the device is an M12 8P X-Code female connector.

| **PIN** | **GE Signal** -> Signal | M12 8P X-Code female connector |
|---|---|---|
| 1 | BI-DA+ -> Tx+ (1) |  |
| 2 | BI-DA- -> Tx- (2) | |
| 3 | BI-DB+ -> Rx+ (3) | |
| 4 | BI-DB- -> Rx-(6) | |
| 5 | BI-DD+(4) | |
| 6 | BI-DD-(5) | |
| 7 | BI-DC-(7) | |
| 8 | BI-DC+(8) | |

### A.3.3 WWAN connectors

The WWAN connector installed is an N female coaxial connector.

| **PIN** | **Signal** | **N-Type connector (female jack)** |
|---|---|---|
| Internal | RF In/Out |  |
| External | Gnd | |

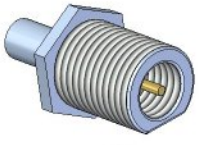
### A.3.4 WLAN connectors

The WLAN connector installed (on devices equipped with this interface) is an N female coaxial connector.

| **PIN** | **Signal** | **N-Type connector (female jack)** |
|---|---|---|
| Internal | RF In/Out |  |
| External | Gnd | |

### A.3.5 GPS connector

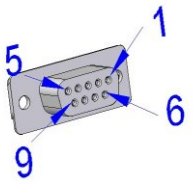
The GPS connector installed (on devices equipped with this interface) is an FME male connector.

| **PIN** | **Signal** | **RF FME male connector** |
|---|---|---|
| Internal | RF In |  |

| | | |
|---|---|---|
| External | Gnd | |

### A.3.6 Configuration connector

The configuration connector installed is a DB9 female connector.

| PIN | Signal | DB 9 female |
|---|---|---|
| 2 | TxD (Output) |   |
| 3 | RxD (Input) | |
| 5 | GND | |

## A.4 Technical specifications

### A.4.1 Hardware architecture

| | |
|---|---|
| PROCESSORS | Freescale QorIQ processor. |
| MEMORY | 256 MB in DDR3. |
| STORAGE UNIT | FLASH Memory (32 Mbytes). |

### A.4.2 LAN interface

| | |
|---|---|
| PROTOCOLS | Ethernet (802.3). |
| PORTS | 4-port switch managed through MDI/MDX autodetection. |
| SPEED | 10/100/100 Mbps (BaseT). |
| CONNECTOR | M12 8P X-Code female connector. |

### A.4.3 Wireless WAN interface

| | |
|---|---|
| WWAN Standard/Bands | MC7455:<br>• LTE:<br>  • FDD. B1-B5, B7, B12, B13, B17, B20, B25, B26, B29, B30<br>  • TDD: B41<br>• WCDMA: B1, B2, B3, B4, B5, B8<br>MC7430:<br>• LTE:<br>  • FDD. B1, B3, B5, B7, B8, B18, B19, B21, B28<br>  • TDD: B38-B41<br>• WCDMA: B1, B5, B6, B8, B9, B19<br>• TD-SCDMA: B39 |
| Speed (DL/UL) | MC7455:<br>• LTE Cat 6.<br>  • FDD. 300Mbps/50Mbps<br>  • TDD: 222Mbps/26Mbps<br>• HSPA+ Cat 24/6: 42Mbps/5.76Mbps<br>MC7430:<br>• LTE Cat 6.<br>  • FDD. 300Mbps/50Mbps<br>  • TDD: 222Mbps/26Mbps<br>• HSPA+ Cat 24/6: 42Mbps/5.76Mbps |
| CONNECTOR | Up to eight N coaxial connectors. |
| SIM Slots | 4 Mini-SIM (2FF) ISO/IEC 7810:2003, ID-000 (1.8V / 3V) |
| ANTENNA | The antennas are supplied separately from the device. |

### A.4.4 Wireless LAN interface

Note: 802.11ac features only available on 802.11ac capable devices.

| | |
|---|---|
| WLAN standards | 802.11b; 802.11g; 802.11n (Mimo 2x2); 802.11a and 802.11ac (Mimo 2x2). |
| Frequency bands 2.4 GHz in-door/outdoor (EU) | 2.4 GHz Indoor/Outdoor (2412-2484 MHz) max. 100 mW EiRP. |
| Frequency bands 5 GHz indoor (EU) | 5 GHz indoor (5150-5350 MHz) max. 200 mW EiRP allowed. |
| Frequency bands 5 GHz out-door (EU) | 5 GHz outdoor (5470-5725 MHz). |
| WLAN modes<br><br>2.4 GHz Operation | 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 |
| WLAN modes | 801.1a only; 802.11a/n; 802.11n only; 802.11ac with up to 867 Mbit/s. |

| | |
|---|---|
| 5 GHz Operation | |
| Automatic Rate Selection (ARS) | Available. |
| Transmission rate | Automatic. |
| Data rates for 802.11b,g (2.4 GHz) | 11, 5.5, 2 and 1 Mbps (DSSS modulation);<br>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. |
| Data rates for 802.11ac, Long Guard (800ns), 20 MHz with two spatial streams | MSC0 13 Mbps; MSC1 26 Mbps; MCS2 39 Mbps; MCS3 52 Mbps; MCS4 78 Mbps; MSC5 104 Mbps; MCS6 117 Mbps; MCS7 130 Mbps; MCS8 156 Mbps |
| Data rates for 802.11ac, Short Guard (400ns), 20 MHz with two spatial streams | MSC0 14,4 Mbps; MSC1 28,9 Mbps; MCS2 43,3 Mbps; MCS3 57,8 Mbps; MCS4 86,7 Mbps; MSC5 115,6 Mbps; MCS6 130,3 Mbps; MCS7 144,4 Mbps; MCS8 173,3 Mbps |
| Data rates for 802.11ac, Long Guard (800ns), 40 MHz with two spatial streams | MSC0 27 Mbps; MSC1 54 Mbps; MCS2 81 Mbps; MCS3 108 Mbps; MCS4 162 Mbps; MSC5 216 Mbps; MCS6 243 Mbps; MCS7 270 Mbps; MCS8 324 Mbps; MCS9 360 Mbps |
| Data rates for 802.11ac, Short Guard (400ns), 40 MHz with two spatial streams | MSC0 30 Mbps; MSC1 60 Mbps; MCS2 90 Mbps; MCS3120 Mbps; MCS4 180 Mbps; MSC5 240 Mbps; MCS6 270 Mbps; MCS7 300 Mbps; MCS8 360 Mbps;MCS9 400 Mbps |
| Data rates for 802.11ac, Long Guard (800ns), 80 MHz with two spatial streams | MSC0 58,5 Mbps; MSC1 117 Mbps; MCS2 175,5 Mbps; MCS3 234 Mbps; MCS4 351 Mbps; MSC5 468 Mbps; MCS6 526,5 Mbps; MCS7 585 Mbps; MCS8 702 Mbps; MCS9 780 Mbps |
| Data rates for 802.11ac, Short Guard (400ns), 80 MHz with two spatial streams | MSC0 65 Mbps; MSC1 130 Mbps; MCS2 195 Mbps; MCS3 260 Mbps; MCS4 390 Mbps; MSC5 520 Mbps; MCS6 585 Mbps; MCS7 650 Mbps; MCS8 780 Mbps; MCS9 866,7 Mbps |
| Output power limitation (without antenna gain) | Adjustable in the following steps: 5, 8,11,14,16 dBm and maximum. Maximal power varies depending on data rate, frequency band and country setting. |

| | |
|---|---|
| Bandwidth (802.11n) | 20/40 MHz (bundling two adjoining 20 MHz channels into one 40 MHz channel). |
| Bandwidth (802.11ac) | 20 MHz; 40 MHz (bundling two adjoining 20 MHz channels into one 40 MHz channel); 80 MHz (bundling four adjoining 20 MHz channels into one 80 MHz channel) |

### A.4.5 GPS interface

| | |
|---|---|
| STANDARDS | NMEA. |
| SATELLITE CHANNELS | Maximum 30 channels (16 GPS, 14 GLONASS) simultaneous tracking. |
| CONNECTOR | RF FME male. |
| ANTENNA | 3.3 V Active.<br>Passive. |

### A.4.6 Configuration interface

| | |
|---|---|
| INTERFACES | This can be configured in two modes:<br>*Asynchronous Port*:<br>24 DCE. Hardware flow control is not permitted.<br>*Local Console:*<br>V.24 DCE only 8-N-1, without flow control. |
| PROTOCOLS | *Asynchronous Port:*<br>AT, PPP, GPS-DATA. |
| SPEED | *Asynchronous Port:*<br>300 at 115,200 bps.<br>Local console:<br>9,600 bps (configurable up to 115,200). |
| CONNECTOR | DB9 female located on the device front panel of the device. |

### A.4.7 Power

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|---|---|
| INPUT VOLTAGE | Depending on the model:<br>+110 VDC.<br>+24 VDC. |
| INPUT CURRENT | Depending on the model:<br>180 mA @110 VDC or<br>830 mA @24 VDC. |
| MAXIMUM POWER | 30 W. |

### A.4.8 Housing: Material, dimensions and weight

| | |
|---|---|
| TYPE | Ruggedized casing for 19” rack. |
| MATERIAL | Paint coated galvanized iron sheet. |
| LENGTH x WIDTH x HEIGHT | 240 x 483 x 45 mm. |
| WEIGHT | 3.8 kg. |

### A.4.9 Environmental specifications

| | |
|---|---|
| AMBIENT TEMPERATURE | OPERATION: -25 °C to 70 °C.<br>STORAGE: -30 °C to 85 °C. |
| RELATIVE HUMIDITY | Annual average < 75 %.<br>During 30 consecutive days per year < 95 %. |

# Appendix B CE Radio Information

This section contains information on some of the European radio frequencies that are currently in force in various parts of Europe. Country-specific bands are available upon request.

## B.1 RF WAN specifications

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

This product is supplied without antennas. The choice of antennas is left to the discretion of the operator, who is responsible for ensuring they comply with local regulations.

Technology LTE. MC7455 specifications.

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

Technology: LTE. MC7430 specifications.

| Bands | Frequencies | Conducted Transmit Power |
|---|---|---|
| Band 1 | Tx: 1920-1980 MHz<br>Rx: 2110-2170 MHz | +23 dBm ± 1 dB |
| Band 3 | Tx: 1710–1785 MHz<br>Rx: 1805–1880 MHz | +23 dBm ± 1 dB |
| Band 7 | Tx: 2500–2570 MHz<br>Rx: 2620–2690 MHz | +22 dBm ± 1 dB |

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

| Bands | Frequencies | Conducted Transmit Power |
|---|---|---|
| Band 1 | Tx: 1920-1980 MHz<br>Rx: 2110-2170 MHz | +23 dBm ± 1 dB |
| Band 3 | Tx: 170–1785 MHz<br>Rx: 1805–1880 MHz | +23 dBm ± 1 dB |

| | | |
|---|---|---|
| Band 8 | Tx: 880–915 MHz<br>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<br>Rx: 2110–2170 MHz | +23 dBm ± 1 dB |
| Band 8 | Tx: 880–915 MHz<br>Rx: 925–960 MHz | +23 dBm ± 1 dB |

## B.2 WLAN specifications

WLAN modules provide WLAN connectivity.

This product is supplied without antennas. The choice of antennas is left to the discretion of the operator, who is responsible for ensuring they comply with local regulations.

Technology WLAN 802.11a/b/g/n/ac. WLE600VX specifications.

| | |
|---|---|
| Frequency Range | 802.11b/g/n-HT20: 2412 ~ 2472MHz;<br>802.11n-HT40: 2422 ~ 2462MHz;<br>802.11a /n-HT20/ac-VHT20: 5180~5240 MHz, 5260~5320 MHz, 5500~5700 MHz;<br>802.11n-HT40/ac-VHT40: 5190~5230 MHz, 5270~5310 MHz, 5510~5670 MHz;<br>802.11ac-VHT80: 5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz. |
| Channel Number | 802.11a/n-HT20/ac-VHT20: 19<br>802.11n-HT40/ac-VHT40: 9<br>802.11ac-VHT80: 4 |
| Type of Modulation | **2.4 GHz:**<br>802.11b: DSSS<br>802.11g/n: OFDM.<br>**5.0 GHz:**<br>802.11a/n/ac: OFDM. |
| Conducted Output Power per chain, 1T.<br>(tolerance ± 2 dB) | *Note: The maximum RF power setting will vary according to individual country regulations.*<br>802.11a: +17dBm @54Mbps.<br>802.11bg: +18dBm @54Mbps.<br>2.4GHz, 802.11gn HT20: +16dBm @MCS7.<br>2.4GHz, 802.11gn HT40: +16dBm @MCS7.<br>5 GHz, 802.11an/ac HT20: +15dBm @MCS9.<br>5GHZ, 802.11n/ac HT40: +14dBm @MCS9. |

| | |
|---|---|
| | 5GHZ, 802.11ac HT80: +14dBm @MCS9. |
| Receive Sensitivity, 1R.<br>(tolerance ± 2 dB) | 802.11a: -80dBm @54Mbps.<br>802.11bg: -80dBm @54Mbps.<br>2.4GHz, 802.11gn HT20: -77dBm @MCS7.<br>2.4GHz, 802.11gn HT40: -75dBm @MCS7.<br>5 GHz, 802.11an/ac HT20: -71dBm @MCS9.<br>5GHZ, 802.11n/ac HT40: -71dBm @MCS9.<br>5GHZ, 802.11ac HT80: -68dBm @MCS9. |

Technology WLAN 802.11a/b/g/n. WPEA-25NI specifications.

| | |
|---|---|
| Frequency Range | a/n ISM Band: 5.150 ~ 5.725 GHz.<br>b/g/n ISM Band: 2.400 ~ 2.4835 GHz. |
| Channel Number | **2.4 GHz:**<br>802.11b, 802.11g, 802.11n (20MHz): 13.<br>802.11n (40MHz): 9.<br>**5.0 GHz:**<br>*5.18 ~ 5.32 GHz*.<br>802.11a, 802.11n (20MHz): 8.<br>802.11n (40MHz): 4.<br>*5.50 ~ 5.70 GHz*<br>802.11a, 802.11n (20MHz): 8.<br>802.11n (40MHz): 3. |
| Type of Modulation | **2.4 GHz:**<br>802.11b: DSSS<br>802.11g/n: OFDM.<br>**5.0 GHz:**<br>802.11a/n: OFDM. |
| Conducted Output Power per chain, 1T.<br>(tolerance ± 2 dB) | *Note: The maximum RF power setting will vary according to individual country regulations.*<br>802.11a: +14dBm @54Mbps.<br>802.11b: +19dBm @11Mbps.<br>802.11g: +16dBm @54Mbps.<br>802.11gn HT20: +15dBm @MCS7.<br>802.11gn HT40: +14dBm @MCS7.<br>802.11an HT20: +12dBm @MCS7.<br>802.11an HT40: +11dBm @MCS7. |

| | |
|---|---|
| Receive Sensitivity, 1R.<br>(tolerance ± 2 dB) | 802.11a: -77dBm@54Mbps<br>802.11b: -85dBm@11Mbps.<br>802.11g: -77dBm@54Mbps.<br>802.11gn HT20: -74dBm@MCS7.<br>802.11gn HT40: -71dBm@MCS7.<br>802.11an HT20: -73dBm@MCS7<br>802.11an HT40: -70dBm@MCS7 |