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Teldat H2 RAIL Lite

Installation Manual

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Legal Notice

Warranty

This publication is subject to change.

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I Important Information

> **Caution**
>
> 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.

> **Warning**
>
> 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.
>
> 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, it is crucial to avoid any kind of contact between the device components and necklaces, bracelets, rings, ties etc.

> **Note**
>
> Please note that when the device operates for prolonged periods of time under extreme conditions (including high temperature and humidity) the service life of the device falls significantly.

Chapter 1 Description

1.1 Introduction

The **Teldat H2 RAIL Lite** router is an IP router designed to work in hostile and extreme environments and to be installed in rolling stock. Thanks to its ruggedized mechanics and special characteristics, which allow it to bear extreme temperatures, this router is particularly suitable for: rolling stock, automotive applications, industrial environments, industrial telecontrol, distribution installations for electricity, gas, water, etc.

Moreover, it enables access to data networks through cellular or mobile telephony technologies. Thanks to its modular design, the device can quickly adapt to the latest technologies.

The **Teldat H2 RAIL Lite** family is compatible with GPRS, EDGE, UMTS, HSDPA, HSUPA, HSPA, HSPA+, LTE, CDMA 2000 1xRTT, CDMA Ev-Do, etc.

The router can incorporate one or two cellular technology modules. This way, the device can be simultaneously connected to different carrier networks in order to increase its capacity or to use them as backup when one of the networks is unavailable.

In addition, the latest technology in internal GPS (SiRF® Start IV) can be incorporated for positioning tasks in onboard environments.

The **Teldat H2 RAIL Lite** includes an integrated four-port Ethernet LAN Switch for local area networks.

Optionally, the **Teldat H2 RAIL Lite** may incorporate a Wireless LAN MINI-PCI module.

This manual will show you how to install and connect these devices.

Fig. 1: **Teldat H2 RAIL Lite: External appearance**

> **Note**
>
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>
> Other products, services and names used in this document may have been registered by their respective proprietors.

Chapter 2 Installation

2.1 Connections

> **Note**
>
> Before connecting the router, please read the following instructions carefully.

Workplace Conditions. Main Characteristics

This device is designed to be installed in a 19" Rack.

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 as shown in the following table:

To Connect	To Disconnect
Make sure the power cable is not connected to the device.	Disconnect the power supply from the power supply cable.
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.	

2.1.1 Connecting the power

The **Teldat H2 RAIL Lite** family is powered by an 110 V nominal DC power source. This device has no on/off switch or fuse.

To comply with electrical safety regulations, this equipment must be connected to the vehicle power network through a 1 amp approved thermo-magnetic circuit breaker (ABB-S281-UC-K-1 or equivalent).

As an additional EMC measure, the H1 Rail device has two functional earth terminals (on the front or back panel). One of the two must be grounded by means of a cable with a section not less than 2 mm ^{2} (AWG14).

The following image shows where the power connector is located. This is labeled "**Power / 110 V DC**" .
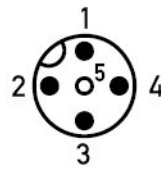

Fig. 2: **Power supply connection**

2.1.1.1 Power connector pins

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

PIN	Signal	M12 4P Code A male

1	110 V DC	
2	110 V DC	
3	0 V	
4	0 V	

> **Note**
>
> Connections 1-2 and 3-4 are redundant. However, for the device to remain available, we recommend that you keep this redundancy.

2.1.1.2 Power cable

The power cable is not supplied with the device. Maximum estimated consumption for the device operating at 110 V DC is approximately 150 mA. Therefore, any cable with a gauge greater than or equal to 0.2 mm ^{2} (AWG24) is acceptable. The type of cable and its gauge will be determined by the characteristics of the female connector used.

For example, for a female Phoenix Contact SACC-M12FS-4CON-PG7-M or equivalent, we would recommend a cable with an outer diameter of 4-6 mm with 4 AWG24-AWG18 conductors.

The cable does not have to be shielded. If you use a shielded cable, we recommend that you connect the cable shield to the ground at the other end of the device, in the power source or in both.

2.1.2 Data connection

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

2.1.2.1 LAN SWITCH

The **Teldat H2 RAIL Lite** incorporates a 4 port Switch, 10/100BaseT with automatic MDI/MDIX to connect to a local area network (LAN).

This device has a LINK LED that indicates the state of the connection.

Fig. 3: **LAN switch ports (4)**

2.1.2.1.1 LAN connector pins

The LAN connector installed in the device 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**
>
> Since the Switch integrated in the device has an automatic MDIX feature, you can use a PIN to PIN
> cable in order to connect to another device without having to cross the Tx-Rx pairs.

2.1.2.2 AUX

The **Teldat H2 RAIL Lite** has a DB9 female connector on the front panel labeled **AUX**. This can be used as a config-
uration port for the router or as a V.24 asynchronous serial port by means of a configuration command. The behavior
or functionality of this interface must be previously configured. By default, this interface is configured in the router's
configuration port mode. This section focuses on the connection necessary to operate in asynchronous port mode.

This interface allows you to connect asynchronous serial devices that do not need hardware control signals. For in-
stance, it allows the connection of external modems or an asynchronous PPP WAN.

Another interesting feature of this port is the possibility of using it as a GPS data source in NMEA sentences
(GPS-DATA).

This interface only operates in compliance with the V24 norm. It does not have control signals, only data signals.
Therefore, this interface cannot control hardware flow. It does, however allow for software flow control (XON/XOFF).

You cannot configure parity in MARK and SPACE modes.

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

For more information on how to use this as a configuration port for the router, please see section *Configuration con-
nection* on page 7 .

Fig. 4: **AUX Port**

2.1.3 Connecting to a WWAN antenna

The **Teldat H2 RAIL Lite** has up to 4 N connectors for WWAN antennas (3G).

Name	3G Module	Antenna Function
MOD.1 ANT.1	MD1	Main
MOD.1 ANT.2	MD1	Aux. / diversity
MOD.2 ANT.1	MD2	Main
MOD.2 ANT.2	MD2	Aux. / diversity

Since the device does not have internal antennas, installing them is essential to improve the quality of the signal re-
ceived and transmitted by the Wireless WAN module (GPRS, UMTS, HSDPA, HSUPA, HSPA+, LTE, etc.).

The cable used to connect the antennas must be valid for RF signal communications of up to 2.6 GHz frequencies

and a 50 Ohm impedance. Please note that the quality and the length of the antenna cable (loss) may have an impact on the quality of the RF signals transmitted and received and, consequently, on device coverage and the speed at which the data is exchanged.

> **Note**
>
> For the Wireless WAN interface to be operative, the device must have the corresponding software license incorporated.

For each module, the device has two WWAN antenna connectors incorporated (**ANT.1** and **ANT.2**).

Depending on the technology used for the connection, it will be necessary to use one (e.g., GPRS) or two antennas (e.g., LTE).

Installation of the antenna in the **ANT.1 (Main)** connector is mandatory. The antenna for the **ANT.2 (Ext.Diversity)** connector may not be necessary.

In some models, if you are not going to install the ANT.2 Ext Diversity antenna you must configure the router accordingly (disabling this antenna) to obtain optimum performance.

When you install both the ANT.1 Main and the ANT.2 Ext.Diversity antennas, the minimum distance between them must be 7 cms and the maximum recommended distance is 25 cms.

To achieve optimum features, the installed radio frequency accessories (antennas and cables) should be those recommended by Teldat.

The following image shows you where to find the antenna connectors for the WWAN modules.

Fig. 5: **Antenna connectors for WWAN**

2.1.3.1 Positioning the antenna

Antenna orientation and its location with respect to other wireless devices and radiation devices (such as communication devices, personal computers, etc.) can significantly influence device performance.

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

For optimum coverage, carry out the following instructions:

• Whenever possible, place the antenna where there are no physical obstacles. Obstacles between the antenna and the base station degrade the wireless signal. Place the antenna above ground level facing the nearest base station.

• Density of materials also affects the antennas. Place them away from any type of wall, metal screens, mirrors, etc.

• Do not place the antenna near columns, which may throw shadows and reduce the coverage area.

• Keep the antenna away from metal pipes such as those used for heating, air-conditioning, etc.

• Please bear in mind that other wireless devices such as telephones, microwaves, etc., can temporarily interfere with the quality of the wireless signal.

• We do not recommend installing antennas near, or between, racks containing communication devices, computers, etc. Use an extension cable and place the device 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 any equipment that contains 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 interference in other devices. Do not use the device in areas where medical equipment is installed.

2.1.4 Connecting the WLAN antenna

The **Teldat H2 RAIL Lite** has N connectors to connect up to 2 WLAN (Wi-Fi) antennas in the models that have this interface.

Since the device does not have internal antennas, installing them is essential to improve the quality of the signal received and transmitted by the Wireless LAN module.

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 a 50 Ohm impedance. Please note that the quality and length of the antenna cable (loss) may have an impact on the quality of the RF signals transmitted and received and, consequently, on device coverage and the speed at which data is exchanged.

For the Wireless WAN interface to be operative, the device must have the corresponding software license incorporated.

The following image shows you where to find the antenna connectors for the WLAN modules.

Fig. 6: **Antenna connectors for WLAN**

2.1.5 Connecting the GPS antenna

The **Teldat H2 RAIL Lite** has an FME connector to connect an active GPS antenna in the models equipped with this interface.

Since the device does not have internal antennas, installing an active 3.3V external antenna in **Teldat H2 RAIL Lite** routers is essential to improve the quality of the signal received by the GPS module.

The cable used to connect the antennas must be valid for RF signal communications of up to 1.5 GHz frequencies and a 50 Ohm impedance. Please note that the quality and length of the antenna cable (loss) may have an impact on the quality of the RF signals received and, consequently, on the accuracy and speed at which the position is obtained.

The following image shows you where to find the antenna connector for the GPS module.

Fig. 7: **Antenna connector for GPS**

2.1.6 Configuration connection

2.1.6.1 Configuring through the local console (AUX connector)

The **Teldat H2 RAIL Lite** has a DB9 female connector on the front panel labeled **AUX.**, which provides access to the device's local console or may operate as an asynchronous serial port. The behavior or functionality of this interface must be previously configured. By default, this interface is configured in local console mode. This section focuses on the connection for the local console mode.

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

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

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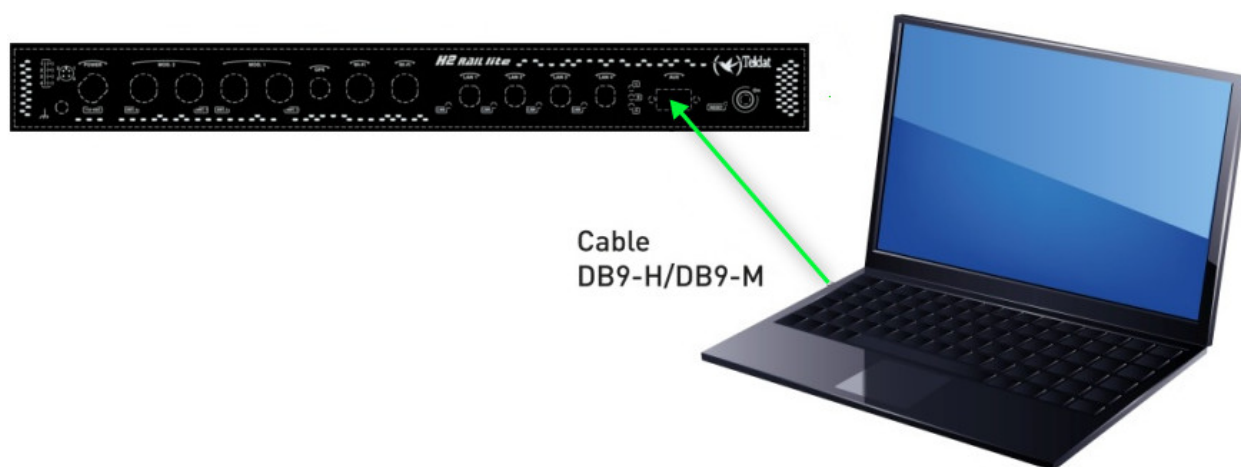

Fig. 8: **Connection for configuration**

2.1.6.2 Configuring through the IP terminal (LAN1..4 connectors)

The **Teldat H2 RAIL Lite** includes a default configuration that activates if the device has not been previously configured.

The router's default configuration sets 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 a customized configuration for a specific client. This personalization can mean that the default configuration is different from the one shown above.

This initial configuration means you can access the device's configuration console through the Telnet IP protocol. To do this, carry out the following steps:

- Configure the Ethernet interface on the IP terminal (normally a PC) using the IP address from 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's Ethernet interface to any of the Ethernet Switch ports on the **Teldat H2 RAIL Lite** router (the LAN1..4 connectors) through an appropriate Ethernet cable (M12 to RJ45).
- Start a Telnet session from the IP terminal to IP address 192.168.1.1 (the **Teldat H2 RAIL Lite** default address).
- The default configuration does not ask for login credentials (user/password) to access the console.

For further information on how to fully configure the device, please see the manuals provided by Teldat on the documentation CD or through the WEB page.

2.2 Installing the SIM card

The **Teldat H2 RAIL Lite** has one or two Wireless WAN interfaces. For them to operate, you may have to insert at least one SIM card in the device.

There are certain services (CDMA) provided by several carriers in some countries that do not require SIM cards. In installations where a SIM card is required, you must always insert at least one.

The **Teldat H2 RAIL Lite** has two SIM trays. Both are located inside the device.

In cases where it incorporates two modules, a SIM tray is automatically assigned to each module.

When only one SIM card is going to be used, it can be inserted into either of the two SIM trays. However, you must remember to configure the router correctly so it selects the appropriate tray.

Having 2 SIM trays allows you to carry out some special configurations. One example is installing two SIMs and using one as a backup to the other. To carry out this type of configuration, you must set the tray that has to be associated to each SIM (since each SIM requires different configuration parameters).

> ⚠️ **Warning**
>
> This device is compatible with 1.8V and 3V SIMs. Do not install SIMs that do not support these voltages.
>
> Never install the SIM cards when the device is switched on.
>
> Always disconnect the device from the main power supply before installing the SIM cards.
>
> Always disconnect the device before removing the housing to access the trays.
>
> When inserting the SIM cards, please protect yourself against electrostatic discharges (ESD).
>
> Do not touch the SIM cards connectors.

To access the SIM trays, open the upper housing of the device. To do this, undo the two screws located on the upper part of the front panel, the two located on each of the side panels and the screw on the upper part of the rear panel.

2.2.1 Identifying the SIM cards

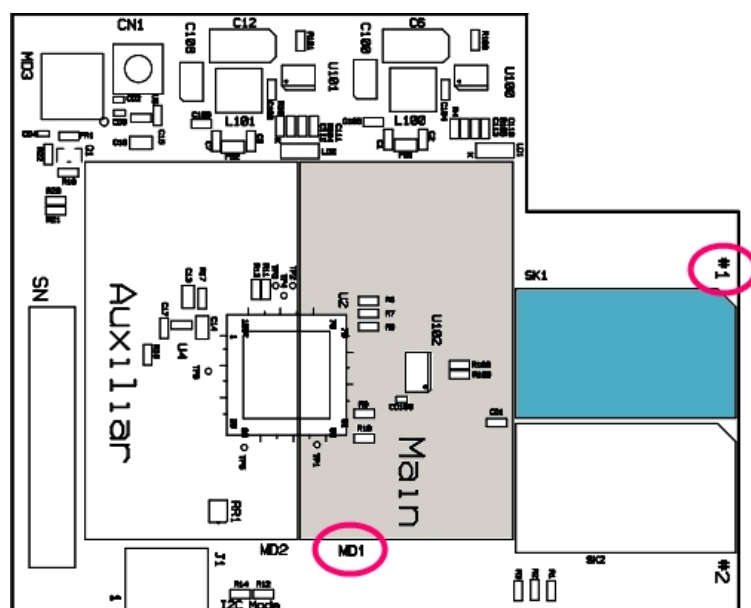The following figures show the location of the modules and the SIM trays:

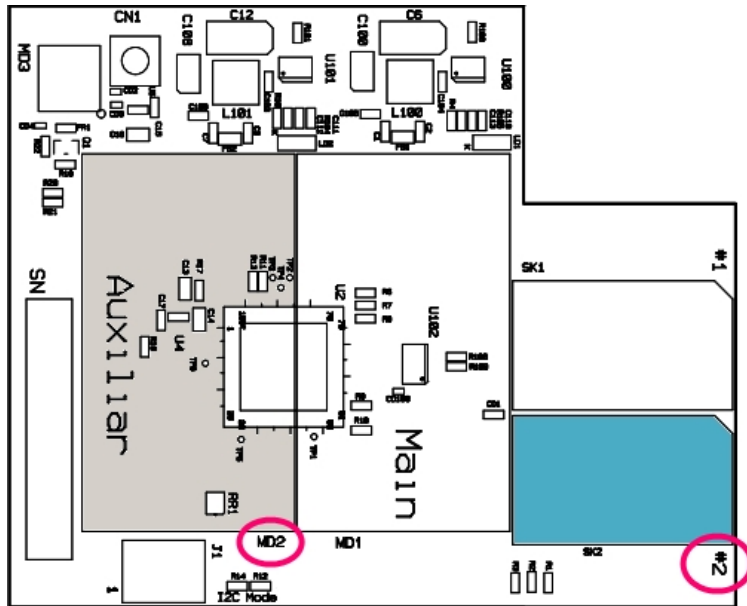*Fig. 9:* **SIM tray #1 for MD1 Module**

Fig. 10: **SIM tray #2 for MD2 Module**

When there are two modules, the SIM tray assignment is set and is as follows:

- Module MD1 for SIM #1
- Module MD2 for SIM #2

In devices where a single WWAN module is installed (MD1), if only one SIM card is going to be used, it can be inserted in either SIM tray (#1 or #2). However, you must remember to configure the router correctly so it selects the appropriate tray.

- Module MD1 # SIM #1 (default) or SIM #2

2.2.2 Installing the SIM

To insert a SIM card in the internal tray, locate the retaining clasp (metal fastening with OPEN and LOCK on it) so you can open the tray and place the SIM card on it. The steps are as follows:

(1)   Push the fastening toward the OPEN arrow.

(2)   Open the upper part of the tray.

(3)   Insert the SIM card so it's flush with the edges of the tray.

(4)   Return the tray to its original position.

(5)   While pressing on the tray, push the fastening toward the LOCK arrow so that the card is securely held.
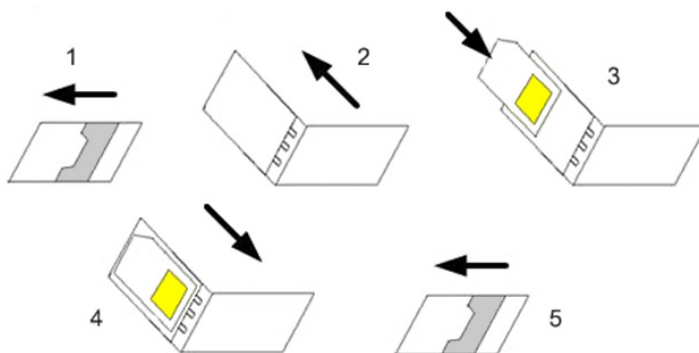

Fig. 11: **Instructions on how to insert the SIM in the internal tray**

2.2.3 Closing the device

After installing the SIM card, you can then close the device. To do this, carry out the steps used to open the device in reverse order paying special attention to the Thermal Pad for the communication modules.

This element must be placed over the communication modules to expel the heat from the module (through the device's metal housing). The module should be in contact with the housing.

This pad quite often sticks to the housing when you open up the device. This is due to its rubbery consistency, as no adhesive is used.

To assemble the device again, carry out the following steps:

(1) Check that the Thermal Pad is located on top of the module. If it isn't, check if it's stuck to the housing. If it is, remove it from the housing and place on top of the module.

(2) Refit the lid, first sliding it horizontally and then vertically so as not to 'drag' it over the pad.
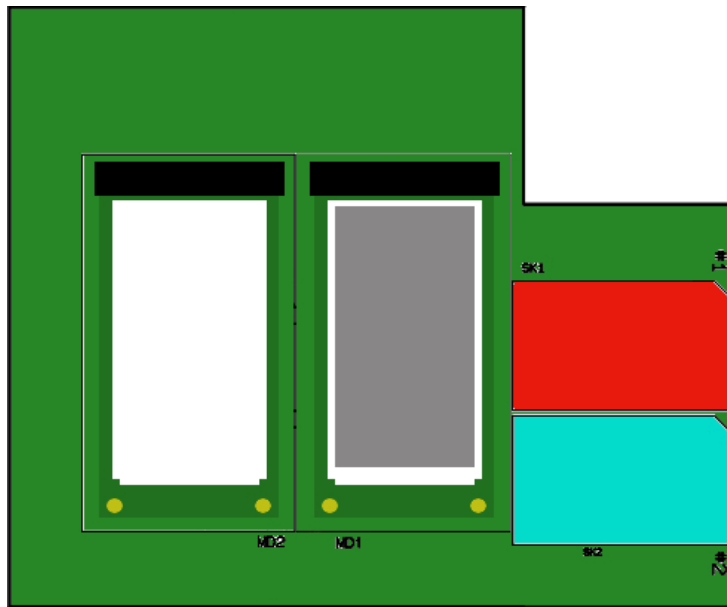
(3) Replace the seven screws holding the cover.

Fig. 12: **Example of a Thermal Pad assembled over the WWAN MD1. This must be assembled in both.**

Chapter 3 Meaning of the LEDs

The following figure shows the positions of the LEDs on the front panel of the device:

Fig. 13: **Teldat H2 RAIL Lite***: Front panel*

A	Wireless WAN interface channel 0 (cellular10/1).
	OFF: Interface not available, not installed or not registered.
	ON: Registered, or registered and connected in the SIM operator network.
	- STEADY: Not transferring data.
	- BLINKING: Transferring data.
B	Wireless WAN interface channel 1 (cellular11/1).
	OFF: Interface not available, not installed or not registered.
	ON: Registered, or registered and connected in the SIM operator network.
	- STEADY: Not transferring data.
	- BLINKING: Transferring data.
C	The device has a MINI-PCI slot where a Wireless LAN daughter card can be installed.
	OFF: Interface not available, not installed or not registered.
	ON: Connecting, or connected and communication established.
	- **STEADY:** Not transferring data.
	- BLINKING: Transferring data.
LNK(4)	Associated to each Ethernet switch connector (LAN1, LAN2, LAN3 and LAN4).
	ON: Ethernet link established.
	- STEADY: Not transferring data.
	- BLINKING: Transferring data.

> **Note**
>
> During device initialization and boot, LEDs A, B, C and Link can turn on, turn off and blink. Once the device has booted, the LEDs display functions described in the table above.

Chapter 4 Microswitches

The **Teldat H2 RAIL Lite** routers have a block of 8 available micro-switches used for maintenance and test tasks. In this case, they are only used to load the default configuration.

This block of micro-switches can be found inside **Teldat H2 RAIL Lite**. You need to remove the top housing in order to handle them, following the instructions set forth in section *Installing the SIM* on page 10.

These switches should not be handled by the user other than to establish the default configurations.

> **Note**
>
> For the device to operate correctly, all micro-switches must be in the OFF position.

4.1 Procedure to ignore the configuration

Follow the steps below if you have to discard the whole configuration of the device (for instance, if you cannot remember the password). When doing this, the device is generally connected to a terminal (PC) through the Console port (AUX).

• Turn off the device.

• Using a screwdriver, move micro-switch '5' to the ON position.

• Power up the device.

When the device is switched on, a message similar to the one shown below will appear on the configuration console (AUX port):

```
***************************************************
***************************************************
***************************************************


BOOT CODE VERSION: 03.02  Apr 28 2009 11:25:37
  gzip  Apr 28 2009 11:19:34
P.C.B.: C8  MASK:0C10  Microcode:00E1
START FROM FLASH
BIOS CODE DUMP....................
BIOS DATA DUMP....
End of BIOS dump



BIOS CODE VERSION: 03.02
CLK=262144 KHz   BUSCLK=65536 KHz   PCICLK=32768 KHz   L1
Date: 05/25/09, Monday         Time: 13:37:06


SDRAM size: 64 Megabytes
   BANK 0: 64 Megabytes (detected)
I_Cache: ON
D_Cache: ON    Write-Back
FLASH: 16 Mb.
NVRAM: 128 Kb.
EEPROM: 2048 Bytes.
DPRAM: 8192 Bytes.
SWITCH 10/100
SECURITY ENGINE
PCI device: Host bridge
  (Bus: 0, Device: 0, Function: 0)
  (Vendor: 0x1057, Device: 0x18C1)
  (Subs. Vendor: 0x0000, Subs. Device: 0x0000)
Slot 1 - PCI device: serial bus controller
  (Bus: 0, Device: 10, Function: 0)
  (Vendor: 0x1131, Device: 0x1561)
  (Subs. Vendor: 0x5444, Subs. Device: 0x2800)
```

```
Slot 1 - PCI device: serial bus controller
  (Bus: 0, Device: 10, Function: 2)
  (Vendor: 0x1131, Device: 0x1562)
  (Subs. Vendor: 0x5444, Subs. Device: 0x2800)
Slot 2 - PCI device: Ethernet controller
  (Bus: 0, Device: 29, Function: 0)
  (Vendor: 0x168C, Device: 0x0013)
  (Subs. Vendor: 0x185F, Subs. Device: 0x1012)
Current production date: 09 21
Current software license: 20 12
S/N: 682/00100
BIOS MAC Add: 00-a0-26-c8-00-64
>>
........
TRYING APP CODE DUMP
    (CONFIGURED) APPCODE1.BIN ver.: 0.10.7.32 0.0.0.0 ......
.........................................................
.........................................................
..................
APP DATA DUMP.......................................................
Running application
Default configuration used
Parsing text mode configuration ...
Configuration parsed
Initializing

Press any key to get started
```

On reaching this point, you can set micro-switch '5' in the OFF position (you don't have to power off the device). This way, the saved configuration will run next time you restart the device. Also, bear in mind that the device configuration is *ignored* on start up but it is *not deleted*.

Chapter 5 Compliance

5.1 Manufacturer information

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

5.2 Safety warnings

	Hazardous voltage. Danger to life! Do not open this equipment when it is switched on.
	Voltaje peligroso. ¡Peligro de muerte! 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 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 55 °C (131 °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 55 ºC (131 ºF) y bajo estas condiciones la superficie metálica puede alcanzar temperaturas que puden 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.
	To comply with electrical safety regulations, this equipment must be connected to the vehicle power network through a 1 amp approved thermo-magnetic circuit breaker (ABB-S281-UC-K-1 or equivalent).
	Para cumplir con la normativa de seguridad eléctrica, este equipo deberá ser conectado a la red de alimentación del vehí-culo mediante un interruptor magnetotérmico homologado de 1 amperio (ABB-S281-UC-K-1 o equivalente).
	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. Always disconnect the device from the main power supply before installing a SIM card. Always disconnect the device before removing the housing to access the trays. When inserting a SIM card, please protect yourself against electrostatic discharge (ESD). Do not touch the SIM card connectors.
	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.

5.3 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 life. 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.

5.4 REACH

In compliance with the REACH Candidate List, the delivered product and product packaging do not contain any chemical substances above a concentration limit of 0.1 % 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.

5.5 EC declaration of conformity

English (EN)	This equipment is in compliance 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
Spanish (ES) Español	Este dispositivo cumple con los requisitos esenciales y con las normas correspondientes de las siguientesdirectivas:
	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

Note

- Directive 2014/53/EU (RED) replaces Directive 1999/5/EC (R&TTE) on 13th June 2016

The EC declaration of conformity and additional product documentation can be accessed here:

http://www.teldat.com

5.6 CE marking

This equipment is in conformity with CE procedures and marking.

5.7 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. These can evolve with time. Teldat S.A. recommends that you check the latest status of national regulations with the local authorities.

This product is supplied without antennas. The coi is atthe discretion of the operator, but said party is responsible for complying with local regulations.

Make sure that the characteristics of the antennas usedmatch the regulations applicable to the installation location.

5.8 Operating frequency

To find out more about the device's operating frequencies, see appendix *RF LTE specifications* on page 25 and*WIFI specifications* on page 26 .

Appendix A Technical Information

A.1 Troubleshooting

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

Problem	Solution
None of the LEDs light up on the device.	Check the power supply to the device (power supply cable, main power outlet).
The LAN LED does not light up in green.	Check that the LINK LED is lit up. If it isn't, check the Ethernet cable and the network connection.
LED A remains OFF.	Check that the SIM card has been inserted correctly, or Check that the SIM PIN is correct, or Check that the antenna is properly installed (has been screwed in correctly), or Check that the SIM tray configuration is correct.

A.2 Maintenance

The **Teldat H2 RAIL Lite** routers are designed to be highly available and durable. Therefore, they do not have any moving parts. *This design makes any maintenance unnecessary.*

A.2.1 Upgrading the software

The **Teldat H2 RAIL Lite** router family can be upgraded to new software releases. Please contact your dealer for further details on the new releases.

There are several ways to update a Teldat router.

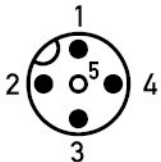The software required to update the Teldat routers is supplied in a format known as distribution. This consists of a single file that contains all the files needed to upgrade your device, as well as in-depth information on the contents of said upgrade.

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	110 V DC	
2	110 V DC	
3	0 V	
4	0 V	

A.3.2 LAN connector

The LAN connector type installed in this 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 type installed is N female coaxial.

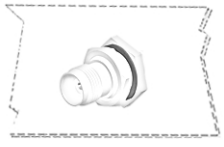| PIN	Signal	N-Type Connector (Jack female)
Internal	RF In/Out	
External	Gnd	

A.3.4 WLAN connectors

The WWAN connector type installed is N female coaxial on those devices equipped with this interface.

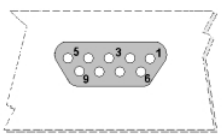| PIN	Signal	N-Type Connector (Jack female)
Internal	RF In/Out	
External	Gnd	

A.3.5 GPS connector

The GPS connector type installed is an FME female on those devices equipped with this interface.

PIN	Signal	RF FME male Connector
Internal	RF In	
External	Gnd	

A.3.6 Configuration connector

The configuration connector installed is a DB9 female.

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

A.4 Technical specifications

Hardware Architecture

PROCESSORS	Motorola PowerPC MPC82xx.
MEMORY	64 Mbytes in SDRAM.
STORAGE UNIT	FLASH Memory (16 Mbytes). EEPROM 2 Kbytes, NVRAM 128 Kbytes.

LAN Interface

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

Wireless WAN Interface

STANDARDS	GPRS, UMTS, HSDPA, HSUPA, HSPA+, LTE … Depending on the wireless WAN version running in the device.
SPEED	Depending on the wireless WAN version running in the device. Please refer to the manual on the relevant module.
CONNECTOR	Up to 4 coaxial connectors, type N.

| ANTENNA | Antennas are supplied separately from the device. |

Wireless LAN Interface

STANDARDS	802.11n a/b/g 2x2.
SPEED	802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps. 802.11b: 1, 2, 5.5, 6, 9, and 11 Mbps. 802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps. 802.11n: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54, and m0-m15.
CONNECTOR	Up to 2 coaxial connectors, type N.
ANTENNA	Antennas are supplied separately from the device.

GPS Interface

STANDARDS	SiRFstarIV.
CONNECTOR	RF FME male.
ANTENNA	3.3 V Active. These are supplied independently of the device.

Configuration Interface

INTERFACES	This can be configured in two modes: *Asynchronous Port*: V24 DCE. Does not permit Hardware flow control. *Local Console:* V.24 DCE only 8-N-1, without flow control.
PROTOCOLS	*Asynchronous Port:* AT, PPP, GPS-DATA.
SPEED	*Asynchronous Port:* 300 at 115,200 bps. Local console: 9,600 bps (configurable up to 115,200).
CONNECTOR	DB9 female located on the front panel of the device.

Power

INPUT VOLTAGE	+110 V DC
INPUT CURRENT	150 mA @ 110 V DC
MAXIMUM POWER	15 W

Dimensions and Weight

| TYPE | Ruggedized housing for 19" rack. |

LENGTH x WIDTH x HEIGHT	240 x 445 x 44 mm.
WEIGHT	3.8 kg.

Environmental Specifications

AMBIENT TEMPERATURE	ON: -25 °C to 70 °C. In storage: -30 °C to 85 °C.
RELATIVE HUMIDITY	Annual average < 75 %. During 30 consecutive days per year < 95 %.

Appendix B Radio Information

B.1 RF LTE specifications

The LTE equipment model with the MC7304 module provides LTE, DC-HSPA+, HSPA+, HSDPA, HSUPA, WCDMA, GSM, GPRS and EDGE network connectivity over several radio frequency bands, in accordance with 3GPP standards.

This product is supplied without antennas. The operator must make sure that the antennas chosen comply with local regulations.

Technology: LTE

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 8	Tx: 880–915 MHz Rx: 925–960 MHz	+23 dBm ± 1 dB
Band 20	Tx: 832–862 MHz Rx: 791–821 MHz	+23 dBm ± 1 dB

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

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm ± 1 dB
Band 2	Tx: 1850–1910 MHz Rx: 1930–1990 MHz	+23 dBm ± 1 dB
Band 5	Tx: 824–849 MHz Rx: 869–894 MHz	+23 dBm ± 1 dB
Band 8	Tx: 880–915 MHz Rx: 925–960 MHz	+23 dBm ± 1 dB

Technology: GSM / GPRS / EDGE

Bands	Frequencies	Conducted Transmit Power
GSM 850 (850 MHz)	Tx: 824–849 MHz	+32 dBm ± 1 dB

	Rx: 869–894 MHz	+27 dBm ± 1 dB
EGSM 900 (900 MHz)	Tx: 880–915 MHz	+32 dBm ± 1 dB
	Rx: 925–960 MHz	+27 dBm ± 1 dB
DCS 1800 (1800 MHz)	Tx: 1710–1785 MHz	+29 dBm ± 1 dB
	Rx: 1805–1880 MHz	+26 dBm ± 1 dB
PCS 1900 (1900 MHz)	Tx: 1850–1910 MHz	+29 dBm ± 1 dB
	Rx: 1930–1990 MHz	+26 dBm ± 1 dB

B.2 WIFI specifications

The WMCND03TD module provides Wifi Radio communications, in accordance with standards 802.11a/b/g/n.

This product is supplied without antennas. The operator must make sure that the antennas chosen comply with local regulations.

Frequency Range	**802.11a, 802.11n @ 5 GHz**
	• **USA & Canada:** 5.15 ~ 5.35GHz. , 5.47 ~ 5.725GHz and 5.725~5.850 GHz
	• **Europe:** 5.15 ~ 5.35GHz and 5.47 ~ 5.725GHz GHz
	• **Japan:** 5.15 ~ 5.35GHz and 5.47 ~ 5.725GHz GHz
	• **China:** 5.725 ~ 5.850GHz
	802.11b
	• •2400 ~2497 MHz
	802.11g
	• 2400 ~2497 MHz
	802.11n @ 2.4 GHz
	• 2.4 ~2.5 GHz
Operating	**802.11a/n:**
	• USA/Canada: 24 non-overlapping channels
	• Major Europe Countries: 19 non-overlapping channels
	• Japan: 19 non-overlapping channels
	• China: 5 non-overlapping channels
	802.11b:
	• USA: 11 channels
	• Europe Countries: 13 channels
	• Japan: 14 channels
	802.11g/n:
	• USA: 11 channels
	• Europe Countries: 13 channels
	• Japan: 13 channels
Output Power.	*Note: The maximum RF power setting will vary according to specified country regulations.*

(tolerance ± 2 dB)	802.11a:
	5.150~5.350 GHz Band
	• +16 dBm at 6~24 Mbps
	• +14 dBm at 48 Mbps
	• +13 dBm at 54 Mbps
	5.470~5.725 GHz Band
	• +16 dBm at 6~24 Mbps
	• +13 dBm at 48 Mbps
	• +12 dBm at 54 Mbps
	5.725~5.825 GHz Band
	• +15 dBm 6~24 Mbps
	• +12dBm at 48 Mbps
	• +11 dBm at 54 Mbps
	802.11b: 18 dBm at 1, 2, 5.5, 11Mbps
	802.11g:
	• +19 dBm at 6 ~12, 18, 24 Mbps
	• +18 dBm at 36, 48, 54 Mbps
	802.11n @2.4 GHz
	HT20
	• +18dBm at MCS0/8, MCS1/9, MCS3/11, MCS4, MCS5
	• +16dBm at MCS6, MCS7
	HT40
	• +18dBm at MCS0/8, MCS1/9, MCS3/11, MCS4
	• +17dBm at MCS5
	• +16dBm at MCS6
	• +15dBm at MCS7
	802.11n @ 5 GHz
	HT20
	5.150~5.350 GHz Band
	• +15dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13, MCS6/14
	• +12dBm at MCS7/15
	5.470~5.725 GHz Band
	• +15dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13, MCS6/14
	• +12dBm at MCS7/15
	5.725~5.825 GHz Band
	• +14dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13
	• +12dBm at MCS6/14
	• +10dBm at MCS7/15
	HT40
	5.150~5.350 GHz Band

- +13~15dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13, MCS6/14
- +11~13dBm at MCS7/15

5.470~5.725 GHz Band

- +13~15dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13, MCS6/14
- +10~12dBm at MCS7/15

5.725~5.825 GHz Band

- +12~15dBm at MCS0/8 , 1/9 , 2/10 , 3/11 , 4/12 , 5/13, MCS6/14
- +10~12dBm at MCS7/15