



Teldat H2 Automotive Router

Installation Manual

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Table of Contents

Chapter 1	About this Guide	1
1.1	Supported devices	1
1.2	Who should read this manual?	1
1.3	When should I read this manual?	1
1.4	What is in this manual?	1
1.5	What is not in this manual?	1
1.6	How is the information organized?	1
1.7	Technical support.	1
1.8	Related documentation	2
Chapter 2	Teldat H2 Automotive Router	3
2.1	Features.	3
2.1.1	Power supply	3
2.1.2	Hardware monitoring	3
Chapter 3	Components and Power Supply	4
3.1	Components	4
3.1.1	Front panel	4
3.1.2	Rear panel.	5
3.2	Mounting options	7
3.2.1	Assembly: Recommendations	7
3.2.2	Outline drawing.	8
3.3	Power source	8
3.3.1	Connecting the power cable to the vehicle	8
3.3.2	Connecting the power cable to the device	9
3.3.3	Cable features	10
3.3.4	Configuring power management	10
3.3.5	Deactivating power management	10
3.3.6	Activating power management	10
3.3.7	Deactivating On/Off switch.	11
3.4	Protection fuse	12
3.5	RESET button	13
3.5.1	Rebooting the device	13
3.5.2	Default configuration	13
3.6	Connecting the data.	14
3.6.1	4-port Ethernet switch	14
3.6.2	WAN connection	14

3.6.3	Wireless LAN antenna connection (Wi-Fi connectors)	15
3.6.4	Connecting a 3G USB device (USB connector)	15
3.6.5	Connecting for configuration	15
3.6.6	Connecting to a WWAN antenna (cell connectors)	16
3.6.7	Connecting the GPS antenna	18
Chapter 4	Installing the SIM card	19
4.1	Identifying the SIM trays	19
4.2	Installing the SIM	20
Chapter 5	Teldat H2 Automotive module options.	22
5.1	Interface assignment	23
Chapter 6	Compliance	25
6.1	Manufacturer information	25
6.2	Safety warnings	28
6.3	WEEE information	28
6.4	REACH	29
6.5	EC declaration of conformity	29
6.6	CE marking	29
6.7	National restrictions	30
6.8	Operating frequency	30
6.9	FCC statement	30
6.9.1	Federal Communications Commission Interference	30
6.10	IC statement	30
6.10.1	CAN ICES-3 (A)/NMB(A)	30
Appendix A	Technical Information.	31
A.1	Troubleshooting	31
A.2	Updating the software	31
A.3	Connecting to the device	31
A.3.1	Connecting through the local console (AUX connector)	31
A.3.2	Connecting through IP terminal (LAN 1..4 connectors)	32
A.4	Connectors	33
A.4.1	LAN connector	33
A.4.2	WWAN connectors	33
A.4.3	WLAN connectors	33
A.4.4	GPS connector	33

A.4.5	AUX connector	34
A.4.6	POWER supply connector	34
A.5	Technical specifications	34
A.5.1	Architecture hardware	34
A.5.2	LAN interface	35
A.5.3	Wireless WAN interface	35
A.5.4	GPS interface	35
A.5.5	Wireless LAN interface	35
A.5.6	Configuration interface	36
A.5.7	Power supply	36
A.5.8	Dimensions and weight	36
A.5.9	Environmental specifications	37
Appendix B	Radio Information	38
B.1	RF LTE specifications	38
B.2	RF GSM/WCDMA specifications	39
B.3	WIFI specifications	40

Chapter 1 About this Guide

Welcome to the **Teldat H2 Automotive** router family installation manual, which describes how to correctly install this device in a working environment.

1.1 Supported devices

All the information contained herein applies to the **Teldat H2 Automotive** router family.

1.2 Who should read this manual?

This manual should be read by personnel who already have aftermarket installation experience and are familiar with the general practices needed to install electronic devices in vehicles.

1.3 When should I read this manual?

This manual should be read when you wish to familiarize yourself with the device and its components.

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

1.4 What is in this manual?

This installation guide contains information on:

- The features available on **Teldat H2 Automotive** routers.
- Technical specifications.
- Power supply requirements.
- The LEDs and connectors on the device.
- Troubleshooting.

1.5 What is not in this manual?

This manual does not contain any information relative to the software or configuration of the device. For configuration instructions, please consult the relevant manuals for the different protocols, which can be found at the following web-site:

<http://www.teldat.com>

1.6 How is the information organized?

Each chapter focuses on a specific part of the hardware and its components. All descriptions, technical specifications and information on a component can be found in the relevant chapter.

1.7 Technical support

Teldat S.A. offers a technical support service. Regular software updates are available for maintenance purpose and 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 Dm704-I *Configuration Monitoring*.

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 for information purposes only. The actual device may differ slightly from what is shown..

Chapter 2 Teldat H2 Automotive Router

2.1 Features

2.1.1 Power supply

For further information about the different power supplies for the **Teldat H2 Automotive** router family, please refer to the section headed *Power source* on page 8 in the chapter on *Components and Power Supply* on page 4.

2.1.2 Hardware monitoring

The **Teldat H2 Automotive** router hardware is monitored through the LEDs on the rear panel, which provide visual information on what is happening in the device (status of hardware components, connection, data flow, etc.).

For further information on the LED panel, please see the section on *Components* on page 4 in the following chapter.

Chapter 3 Components and Power Supply

The following chapter provides detailed information on the chassis of the **Teldat H2 Automotive** and its components. This information includes:

- Components.
- Information on assembly.
- Power supply.
- RESET button.
- Data connection.
- SIM card installation.

3.1 Components

3.1.1 Front panel

The following figure shows the front panel.

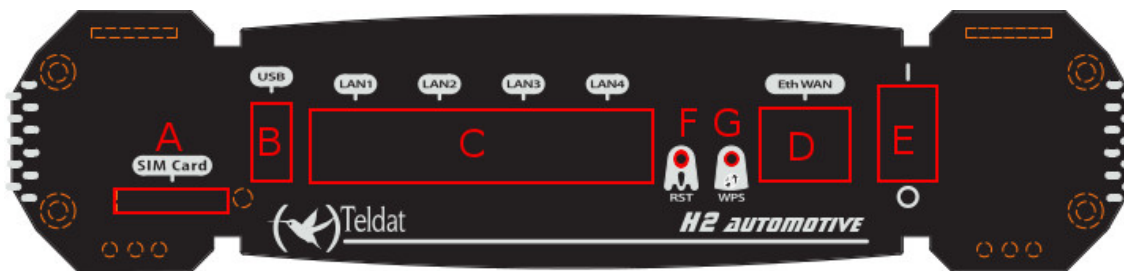


Fig. 1: Front panel

The front panel components are as follows:

Front panel components

Item	Description
A	SIM Card. Slot where you can insert the SIM card for the secondary cellular module.
B	USB. Slot where you can insert an external USB modem.
C	LAN 1..4. 4-port Gigabit Ethernet Switch.
D	Eth WAN. WAN Gigabit Ethernet.
E	On/Off switch.
F	Rst. Reset button. For further information on how the reset button works, please read the relevant chapter.
G	WPS (Wireless Protected Setup). This allows for easy and secure configuration of the Wi-Fi network parameters. For further information, please see the "Teldat-Dm771-I Wireless LAN Interface" manual.

In addition to the connections, you can see a set of luminous indicators, or LEDs, on the front panel that provide information on what is happening in the router.

The Ethernet WAN port and the Switch LAN ports each have two LEDs (one yellow and one green) that reflect the status of the connection according to the following table:

Switch and Ethernet WAN LED indicators

LED	Associated Interface	Description
Yellow	LAN 1..4 and Eth WAN	<p>OFF -> Interface is unavailable, not installed or not registered.</p> <p>ON -> Connected to 10 M:</p> <ul style="list-style-type: none"> - Steady: Is not transferring data. - Blinking: Transferring data.
Yellow + Green	LAN 1..4 and Eth WAN	<p>OFF -> Interface is unavailable, not installed or not registered.</p> <p>ON -> Connected to 100 M:</p> <ul style="list-style-type: none"> - Steady: Is not transferring data. - Blinking: Transferring data.
Green	LAN 1..4 and Eth WAN	<p>OFF -> Interface is unavailable, not installed or not registered.</p> <p>ON -> Connected to 1000 M:</p> <ul style="list-style-type: none"> - Steady: Is not transferring data. - Blinking: Transferring data.

3.1.2 Rear panel

The following figure shows the rear panel.

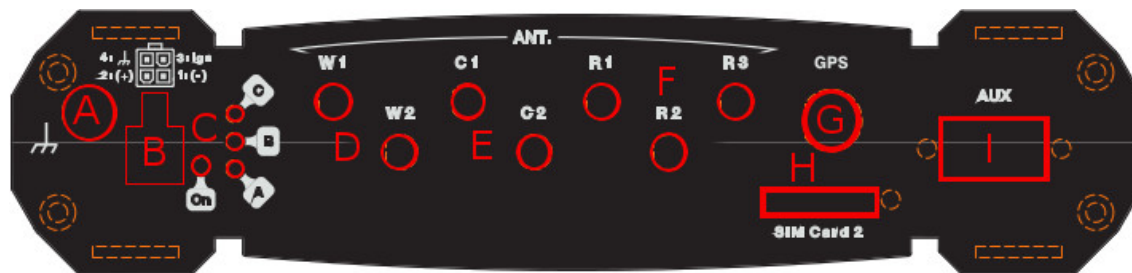


Fig. 2: Rear panel

The rear panel components are as follows:

Rear panel components

Item	Description
A	Functional earthing. Usually not connected.
B	12-24 DC. Power source connection.
C	<p>LEDs:</p> <ul style="list-style-type: none"> • On: Illuminated indicator showing whether the device is switched on or not. • A, B and C: explained in rear panel LEDs table.
D	W1, W2. WiFi antennas for the Wireless LAN module. This module is optional (your device may not have any antennas).
E	C1, C2. Antennas for the Teldat H2 Automotive cellular module. This module is

	optional (your device may not have any antennas).
F	R1, R2, R3. Antennas for the Wireless LAN or cellular Main module.
G	GPS. External GPS antenna.
H	SIM card 2. Slot where you can insert a SIM card for the Main cellular module.
I	AUX. DB9 connector that provides access to the device's local console for configuration and monitoring.

In addition to the connections, you can see a set of luminous indicators, or LEDs, on the rear panel that provide information on what is happening in the router.

The LEDs on the rear panel of the router are shown in the following figure:

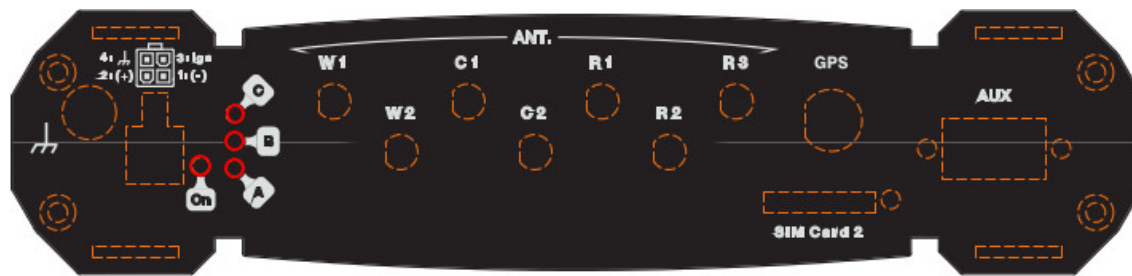


Fig. 3: Rear panel LEDs

Rear panel LEDs

LED	Associated Interface	Status	Description
A	Wireless WAN channel 0 (cellular1/1).	Monochrome green	<p>OFF -> Interface is unavailable, not installed or not registered.</p> <p>ON -> Registering or registered and connected to the SIM carrier network:</p> <ul style="list-style-type: none"> - Steady: Is not transferring data. - Blinking: Transferring data.
B	Wireless WAN channel 1 (cellular2/1).	Monochrome green	<p>OFF -> Interface is unavailable, not installed or not registered.</p> <p>ON -> Registering or registered and connected to the SIM carrier network:</p> <ul style="list-style-type: none"> - Steady: Is not transferring data. - Blinking: Transferring data.
C	The device has a MINI-PCI slot where a Wireless LAN daughter can be installed.	Monochrome green	<p>OFF -> Interface is unavailable, not installed or not established.</p> <p>ON -> Connecting or connected and communications</p>

			established: - Steady: Is not transferring data. - Blinking: Transferring data.
--	--	--	---

3.2 Mounting options

The **Teldat H2 Automotive** device can be mounted in various vehicles on the wall, ceiling or on a horizontal surface.

The front and rear panels have two openings where you can add a bracket with slots to firmly hold the device in place.

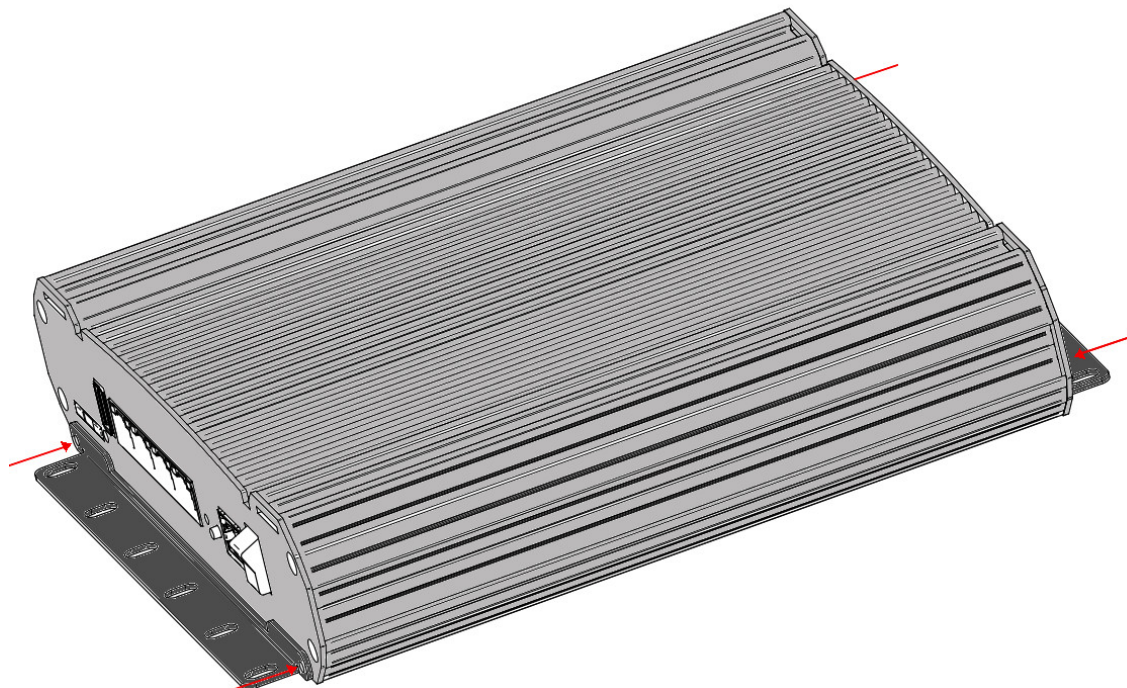


Fig. 4: Front panel bracket mounting

3.2.1 Assembly: Recommendations

We recommend that the device is mounted on a horizontal surface and that it is screwed to this surface using the bracket slots.

For the mounting to be secure, we recommend using the following screws:

- For sheet metal installation, use #8 self-drilling screws.
- For tapped holes, use M4 machine screws.



Warning

If the screws are not properly anchored, the strain of the cables connected to the router could pull the router out.



Note

The assembly screws are not provided with the router and must be purchased separately.

3.2.2 Outline drawing

An outline drawing is provided for proper installation.

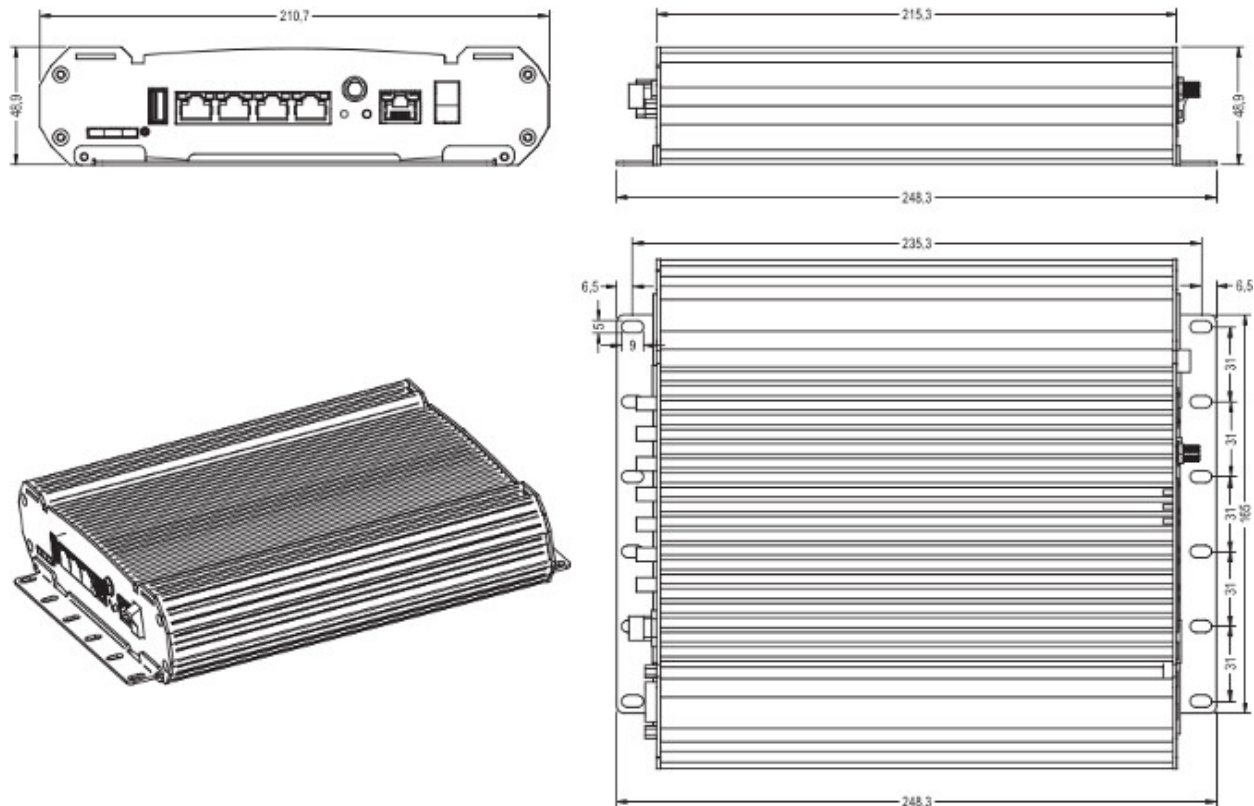


Fig. 5: Outline drawing

3.3 Power source

The **Teldat H2 Automotive** router family is powered through direct current (DC).

Workplace Conditions. Main Characteristics

- Avoid humid and/or dusty locations.
- Avoid direct exposure to sunlight and any other heat sources. Do not place the device between papers, magazines or other items that could hinder natural air circulation.
- Do not place the device near strong electromagnetic fields such as those produced by speakers, motors, etc.
- The device should not be placed too close to the driver or in areas where it might distract him/her.
- Avoid knocks and/or strong vibrations during operation, storage and transport.
- The device should be mounted in accordance with accepted aftermarket practices and materials.



Warning

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](#) on page 9 and [Disconnecting](#) on page 9.

3.3.1 Connecting the power cable to the vehicle

The device power supply cable must be connected to the vehicle's fuse box. Always follow the recommendations of the vehicle manufacturer on the connection of electrical accessories.

The following are some general tips:

- Disconnect the positive battery cable from the vehicle's battery post.
- Find an empty fuse slot with 5 A - 10 A fuse ratings.
- Terminate the cable conductors with suitable crimp connectors, fuse tap or bare wires (depending on the fuse box connectors).
- Connect the BATTERY conductor to the fuse connector.
- Connect the GND conductor to a battery ground connector.
- Alternatively, the IGNITION conductor can be connected to the vehicle's ignition switch (if available).
- We recommended installing an approved vehicle circuit breaker.
- Insert the new fuse into the fuse slot.
- Connect the positive battery cable to the vehicle's battery post.

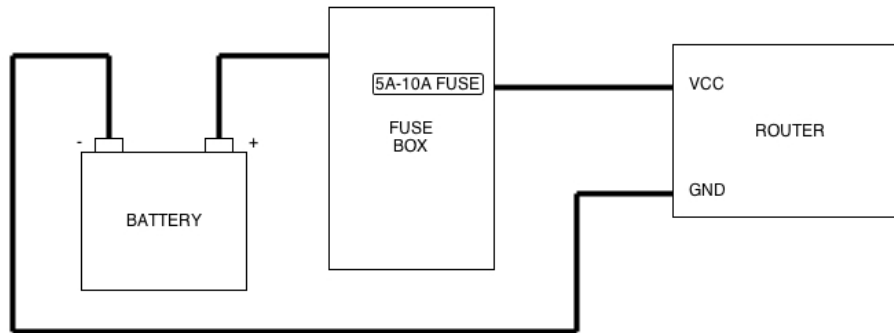


Fig. 6: Cable Connection to vehicle power source

All components used in the connection to the vehicle should be UL Listed and comply with the regulations of the country where the installation takes place.

The cabling should be separated from other vehicle wiring and should be routed away from sharp edges.

The power supply cable goes from the fuse panel to the router along the vehicle wall (ALWAYS inside the vehicle cabin and NOT crossing the vehicle's firewall protection).

3.3.2 Connecting the power cable to the device

3.3.2.1 Connecting

- Make sure that the power supply cable is not connected to the device.
- Connect the data cables.
- Locate the 12 - 24 V DC connector, which is found on the rear part of the device.
- Insert the power cable connector.

3.3.2.2 Disconnecting

- Disconnect the power supply cable from the device.
- Disconnect the data cables.

3.3.2.3 Power connector pinout

PIN	Signal
1	-
2	+
3	ACC / IGNITION
4	Functional Earth

3.3.3 Cable features

In the United States and Canada, the cable should be UL Listed, SAE type GPT Cable, min 18AWG.



Note

The cable features may depend on the recommendations of the country where the equipment is installed. The cable must always be 18 A WG or greater.

3.3.4 Configuring power management

The power management system of the **Teldat H2 Automotive** :

- stops the device from switching on until the vehicle has started.
- when installed, the device switches off a short time after the vehicle turns off. The purpose of this slight delay is to keep the device from disconnecting during short stops.

This feature is configured using the internal micro-switches (**SW1**). However, the duration of the delay has to be set using the configuration command.

The micro-switches are located in the device, as shown in following figure.

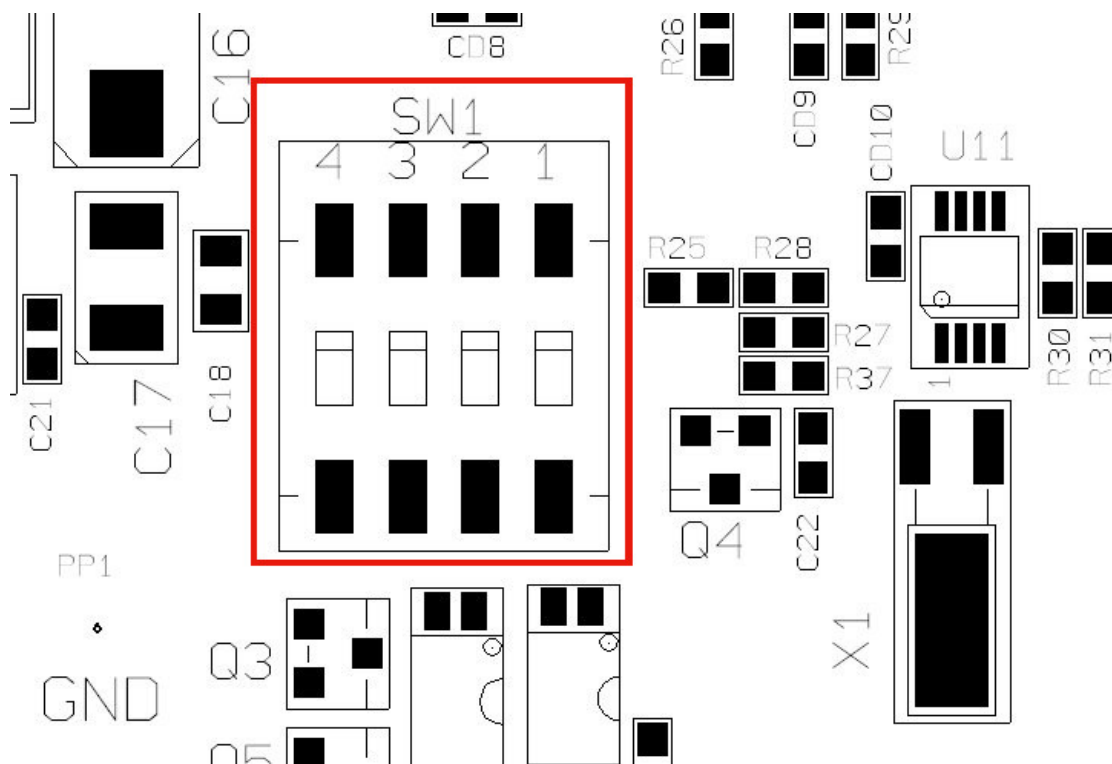


Fig. 7: Power management switch

3.3.5 Deactivating power management

Micro-switches SW1 2 and 3, labeled IGNITION, must be OFF.

3.3.6 Activating power management

Micro-switches SW1 2 and 3, labeled IGNITION, must be ON.



Caution

This is a factory setting i.e. the devices are already configured like this by default.

In this operating mode, the device expects to be constantly powered and the ACC / IGNITION signal operates as a switch. When power is applied to the device (BATTERY /VCC) the device remains switched off. It will only switch on when the ignition pin (ACC / IGNITION) sends a signal (+12 V or +24 V).

Similarly, if the ignition signal deactivates once the device has switched on, the device remains switched on for the period of time configured through the **set ignition-off-powerdown-timer <value>** command.

```
*
*p 4

Config>set ?
  application-active      Permits you to select the code used to boot the router
  console                 Set console configuration
  contact-person          Assign a name or identification to the contact-person
  data-link               Type of data link for a WAN line
  default-conf            Restores the default configuration
  file-cfg                Configure a configuration file as active
  ftp                    Permits you to access the FTP configuration menu
  host-location           Physical location of the router
  hostname                Assign a name to a device
  ignition-off-powerdown-timer  Configure the time to router power down after car
                           ignition off
  inactivity-timer       Configure the maximum inactivity time
  login                  Configure login options
  password                Configure the device access password
  pool                    Number of bytes assigned to each memory pool
  schedule-restart       Allows to configure router reset schedule
  telnet                  Access the TELNET protocol configuration
  web-probe               Access the Web probe configuration
Config>set ignition-off-powerdown-timer ?
  <1..1440>               Power down timeout in minutes
  disabled                Disable ignition off power down timer
Config>set ignition-off-powerdown-timer 10
Config>
```

For further information on this command, please see manual Teldat- Dm704-I Configuration and Monitoring.

3.3.7 Deactivating On/Off switch

Deactivating the On/Off Switch from the **Teldat H2 Automotive** is possible.

When the On/Off Switch is enabled, the schema looks like the following figure, with the JP5 connector connected:

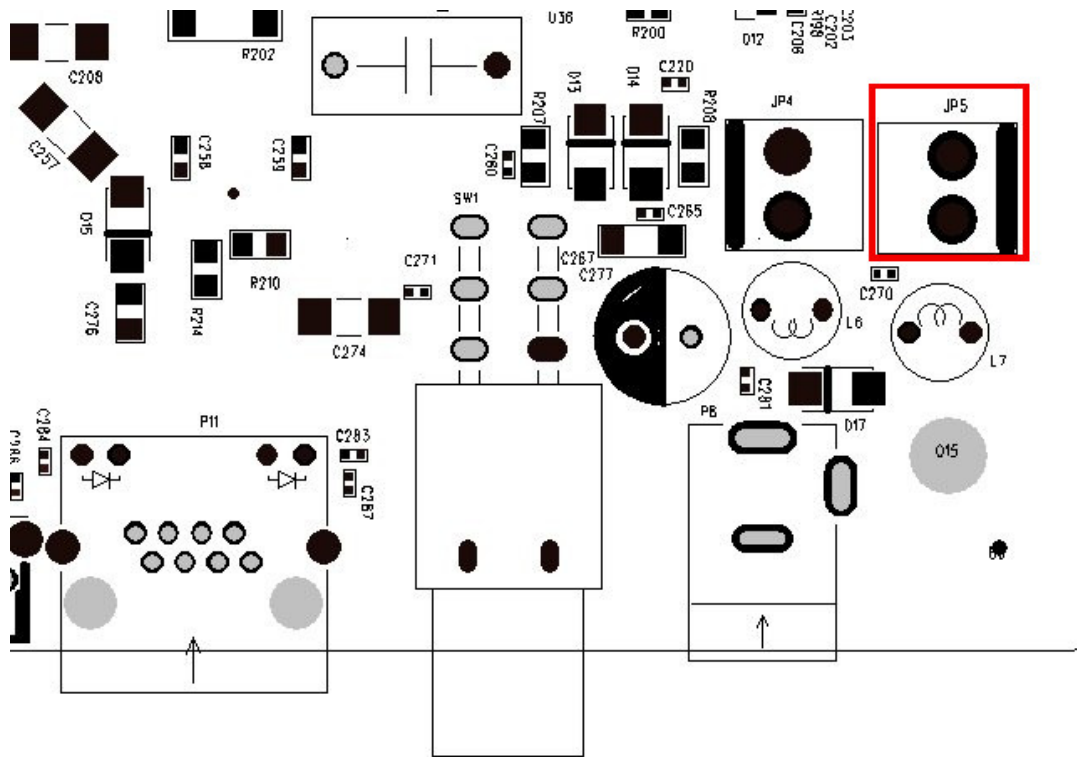


Fig. 8: On/Off Switch enabled

If you want to disable the On/Off Switch, then the JP4 connector is connected:

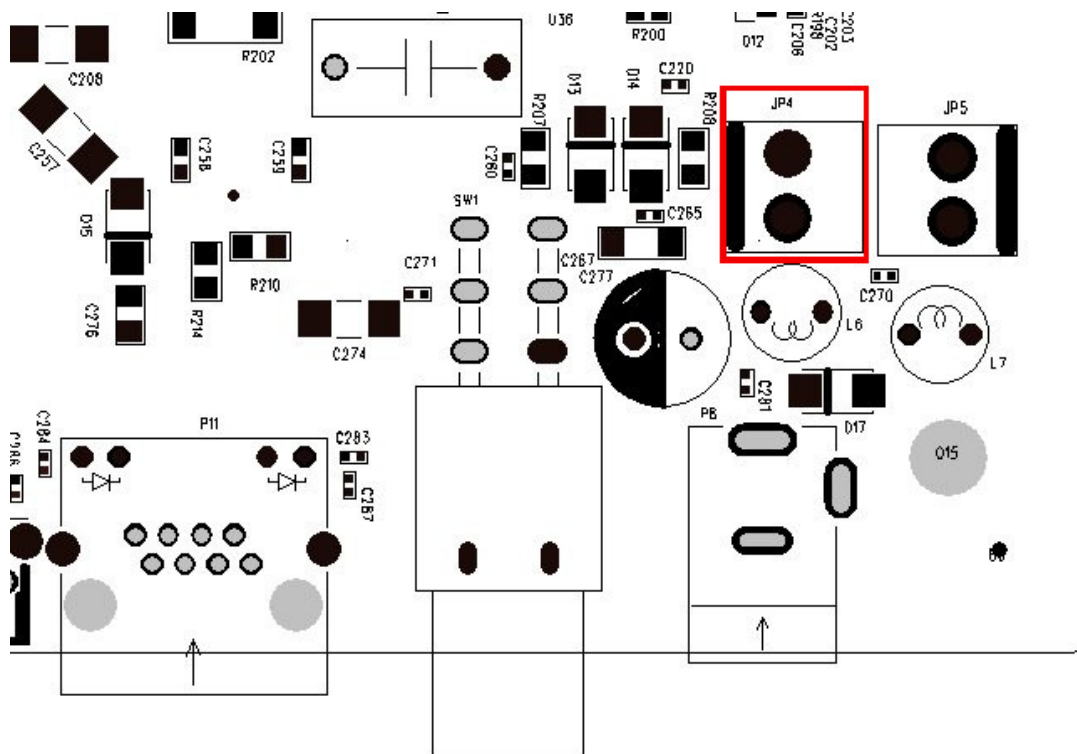


Fig. 9: On/Off Switch disabled

3.4 Protection fuse

The **Teldat H2 Automotive** router family has an internal protection fuse incorporated with the aim of preventing damage to the device and the surrounding area.

The following image shows where the protection fuse is located (F1).

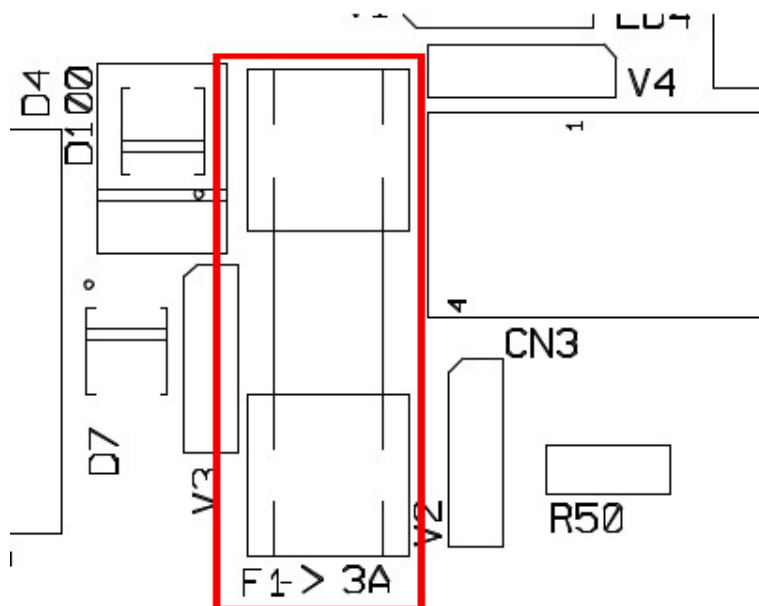



Fig. 10: Protection Fuse

If the device is not operating, please check that the fuse is correctly installed and has not blown.

Protection fuse: Characteristics	
Normal current value	3,15A
Voltage	250V
Type	FSF



Warning
The fuse must have the characteristics indicated by Teldat S.A..

3.5 RESET button

The **Teldat H2 Automotive** has a button labeled RESET on the rear panel of the device. This button is physically protected to stop it from being accidentally pressed. To activate it, please use a sharp pointed object.

The features of the reset button are described below.

3.5.1 Rebooting the device

If you press the RST button once the device is running normally, it will restart.

3.5.2 Default configuration

The RST button allows you to reboot the device to its factory default settings by following these steps:

- With the device switched off, press and hold down the RST button and switch on the router using the ON/OFF switch (1).
- Stop pressing the RST button after 5 seconds.

The router's default configuration establishes the following IP 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 can mean that the default configuration is different from the one shown above.

3.6 Connecting the data

The **Teldat H2 Automotive** has the following data connections:

3.6.1 4-port Ethernet switch

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

Please pay careful attention to the labeling to avoid mistaking this switch for other types of ports.

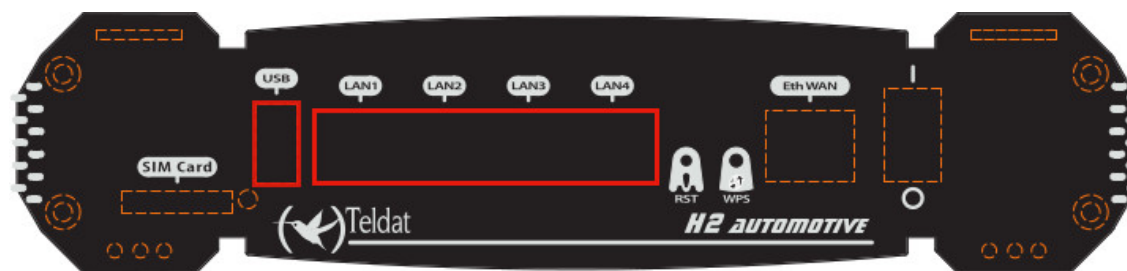


Fig. 11: LAN switch ports (4)



Note

During booting and BIOS mode, only the LAN 1 connector is available.



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.

3.6.2 WAN connection

The **Teldat H2 Automotive** incorporates an Ethernet WAN 10/100/1000 BaseT port with automatic MDI/MDIX.

The WAN port is independent of the switch and is operated just like any other interface.

Please pay careful attention to the labeling to avoid mistaking this switch for other types of ports:

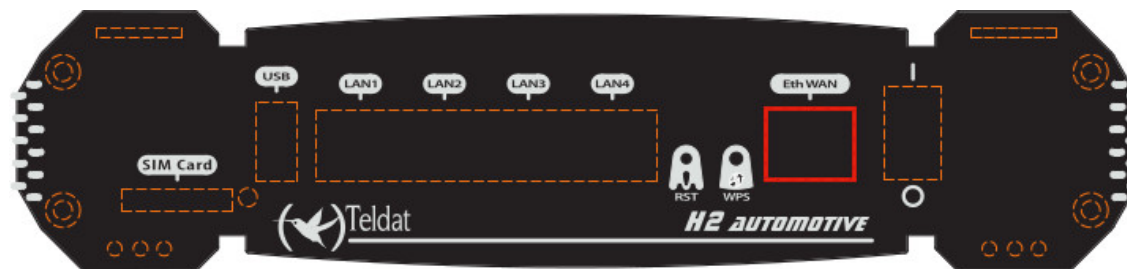


Fig. 12: WAN PORT

**Note**

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

3.6.3 Wireless LAN antenna connection (Wi-Fi connectors)

The **Teldat H2 Automotive** router family has three connectors for RF antennas, used to improve the quality of the signal received and transmitted by the Wireless LAN Module 2, R1, R2 and R3 (future use). If the router has two Wireless LAN modules, the connectors for Module 0 are W1 and W2.

These modules are internal and can be activated through the purchase of the corresponding software license. To assemble and remove the antennas, simply screw/unscrew them into/from the connectors labeled *W*, on the router's rear panel.

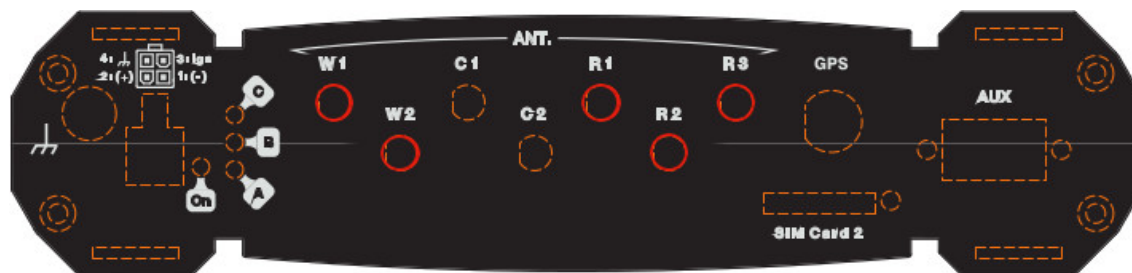


Fig. 13: Wi-Fi Antennas

**Note**

Antennas must not be directly connected to the **Teldat H2 Automotive**, but at least 50 cm away.

3.6.4 Connecting a 3G USB device (USB connector)

The **Teldat H2 Automotive** has a USB HOST 2.0 Type A connector interface, compatible with 3G USB modems. The interface can be activated by purchasing the appropriate software license.

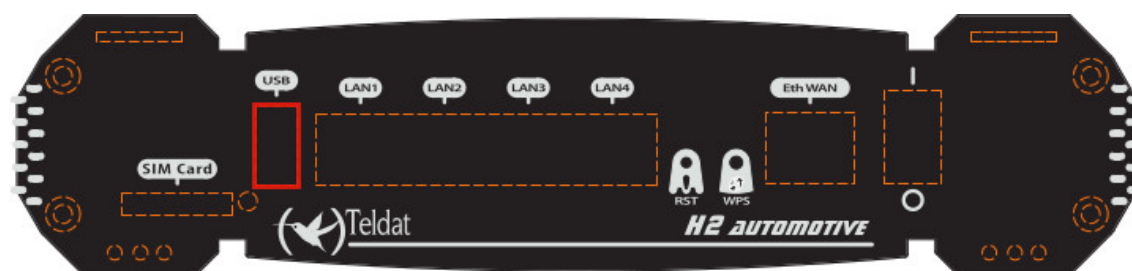


Fig. 14: 3G USB Connector

**Note**

To see the list of compatible external USB modems, please visit:

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

3.6.5 Connecting for configuration

The **Teldat H2 Automotive** router has a DB9 female connector on the front panel labeled **AUX**. that can be used as a router configuration port or as a V.24 asynchronous serial port (through a configuration command). The behavior or functionality of this interface must be preconfigured. By default, this interface is configured as a configuration port. Therefore, this section focuses on how to make the connector operate in asynchronous port mode.

This interface allows you to connect asynchronous serial devices that do not need hardware control signals, i.e. en-

abling 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 accordance with the V24 norm. Since it only has data signals (not control signals), it 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 this, connect the **AUX** port to an asynchronous terminal (or to a PC with terminal emulation).

To use the port as a router configuration port, please see Section [Connecting to the device](#) on page 31

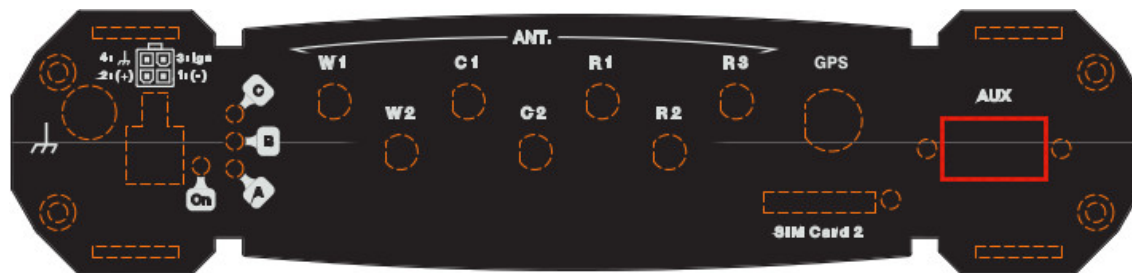


Fig. 15: **AUX** connector

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

3.6.6 Connecting to a WWAN antenna (cell connectors)

The **Teldat H2 Automotive** routers can have three or five connectors in order to connect the WWAN antennas, depending on the number of WWAN modules installed in the device.

To assemble and remove the antennas, simply screw/unscrew them into/from the connectors labeled R1, R2 and R3 (future use) for Module 2, or C1 and C2 for Module 1.

Installing antennas in the **Teldat H2 Automotive** is essential to improve the quality of the signal received and transmitted by the Wireless WAN module (GPRS, UMTS, HSDPA, HSUPA, HSPA+, LTE, etc.).



Note

- For optimum performance, always install the WWAN antennas.
- The *Wireless WAN* interface is only operative if you have installed the corresponding software license.

Some cellular telephony technologies use antenna diversity to improve the quality of the received signal (HSUPA, HSPA+, LTE, CDMA EV-DO, etc.). Therefore, the **Teldat H2 Automotive** incorporates five connectors for each module installed.

- The MAIN antenna for each module (R1, C1) is installed in the ANT connector.
- The auxiliary or DIVERSITY antenna for each module (R2 and C2) is installed in the ANT connector too.

Module 2	Module 1
R1 -> MAIN Antenna.	C1 -> MAIN Antenna.
R2 -> DIVERSITY Antenna.	C2 -> DIVERSITY Antenna.
R3 -> Reserved for future use.	

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

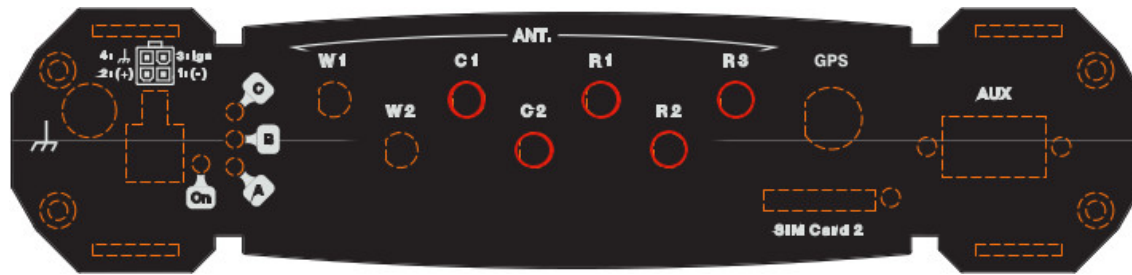


Fig. 16: **Antenna connectors for WWAN (with diversity)**

Depending on the connecting technology, you will need to use one (e.g. GPRS) or two antennas (e.g. LTE).

You must always install the antenna for the **R1, C1 (Main)** connectors (mandatory). The **R2, C2 (Ext.Diversity)** antenna connectors are optional.

In some models, if you are not going to install the Diversity antenna you need to configure the router accordingly (disabling this antenna for optimum performance).

When you install both the Main and the Ext.Diversity antennas, the minimum distance between the two must be 7 cm. Maximum recommended distance is 25 cm.

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

Teldat has a range of accessories that allow **Teldat H2 Automotive** routers to be installed in different locations.



Note

Antennas must not be directly connected to the **Teldat H2 Automotive** router, but at least 50 cm away.

3.6.6.1 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.
- The 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 canalization, 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 router 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 router in areas where the atmosphere is potentially explosive.
- Wireless devices can cause interferences with other devices. Do not use the router in areas where medical equipment is installed.

3.6.7 Connecting the GPS antenna

When the Wireless WAN module supports this functionality, **Teldat H2 Automotive** have an additional connector for GPS external antennas. To assemble the antenna, simply screw its cable connector into the connector labeled GPS (located on the front panel).

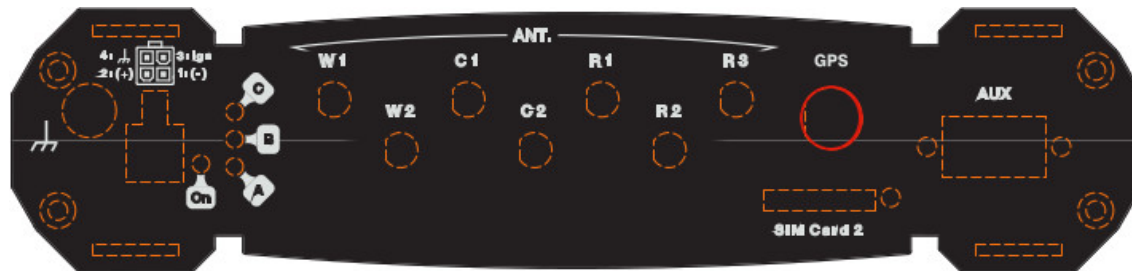


Fig. 17: GPS Antenna connector

The device supports active and passive GPS antennas (LTE models, labeled as -LE or -LA) and passive only antennas (HSPA+ models, labeled as -H+).



Note

For the GPS to operate correctly, the router must have a valid SIM card installed.

Chapter 4 Installing the SIM card

The **Teldat H2 Automotive** has a Wireless WAN interface that needs one, two or three SIM cards to operate.

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 Automotive** has one internal and two external SIM trays. The external trays are located on the front and rear panels.

The **Teldat H2 Automotive** can incorporate one or two Wireless WAN modules, or none at all.

- When it incorporates two modules, the SIM Card on the front panel is assigned to Module 1. The internal SIM card (SIM Card 2I) and the remaining external SIM card (SIM Card 2), on the rear panel, are assigned to Module 2 since it can manage dual-SIM.
- In devices where there is only one cellular module installed and only one SIM card used, the latter must be placed in one of the following trays: SIM Card 1 or SIM Card 2.

Having 2 SIM trays allows you to carry out some special configurations. For example, when installing two SIMs, one can act as backup to the other. To execute this type of configuration, and given that each SIM requires different configuration parameters, you must first define which tray is going to be associated to which SIM.



Warning

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



Warning

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

Always disconnect the device from the main power supply before inserting the internal SIM.

Always disconnect the device before removing the housing to get to the internal SIM.

When inserting the SIM card, please protect yourself against electrostatic discharges (ESD).

Do not touch the SIM card connectors.

4.1 Identifying the SIM trays

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

- Module 2 -> SIM Card 2I (internal) and SIM Card 2.
- Module 1 -> SIM Card.

The following figure shows the location of the modules and the SIM trays:



Fig. 18: SIM Card 21 and SIM Card 2 for Module 2, SIM Card for Module 1

4.2 Installing the SIM

Internal SIM

Insert a SIM card in the internal tray as follows: first 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.

- (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.

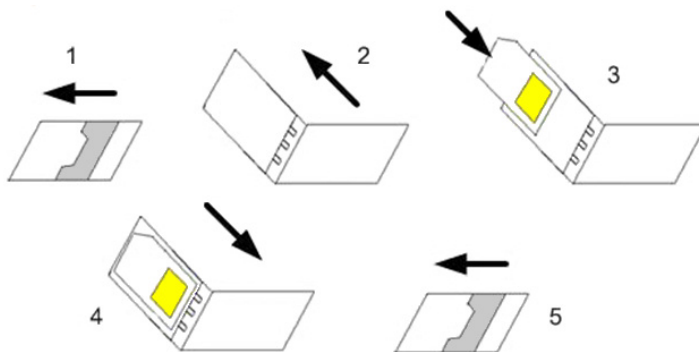


Fig. 19: Instructions on how to insert the SIM in the internal tray

External SIM

The procedure to insert the SIM card in the external SIM tray is as follows: first place the device so you can see the panel that contains the tray and then carry out the following steps:

- (1) Press on the button so the SIM tray comes out.
- (2) Place the SIM on the tray.
- (3) Insert the tray in the slot and return the tray to its original position.

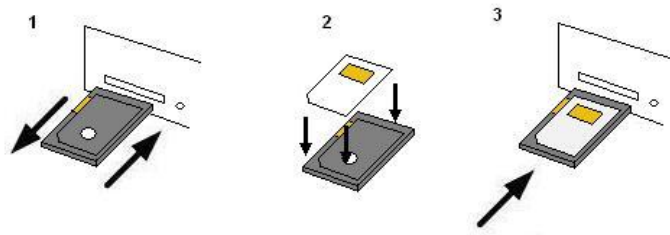


Fig. 20: Instructions on how to insert the SIM in the external tray

Chapter 5 Teldat H2 Automotive module options

The Teldat H2 Automotive offers two mounting module options:

- Two WiFi modules and only one or no cellular modules.



Fig. 21: Option 1, with two WiFi modules

- One, two or no cellular modules and one WiFi module or none. The first Cellular module is always in the main position.



Fig. 22: Option 2, with one, two or no cellular modules

5.1 Interface assignment

Interface assignment I

Label	Cellular Module 2 Interface, Antenna Connectors, Diversity	Cellular Module 1 Interface, Antenna Connectors, Diversity	GPS Interface
H2 AUTO-1LE	cellular2/0, R1&R2, Yes	n/a	cellular2/0
H2 AUTO-2LE	cellular2/0, R1&R2, Yes	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-1W-1LE	cellular2/0, R1&R2, Yes	n/a	cellular2/0
H2 AUTO-1W-2LE	cellular2/0, R1&R2, Yes	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-2W-1LE	n/a	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-1H+	cellular2/0, R1, No	n/a	cellular2/0
H2 AUTO-2H+	cellular2/0, R1&R2, Yes	cellular1/0, C1, No	cellular1/0
H2 AUTO-1W-1H+	cellular2/0, R1, No	n/a	cellular2/0
H2 AUTO-1W-2H+	cellular2/0, R1&R2, Yes	cellular1/0, C1, No	cellular1/0
H2 AUTO-2W-1H+	n/a	cellular1/0, C1, No	cellular1/0
H2 AUTO-1LA	cellular2/0, R1&R2, Yes	n/a	cellular2/0
H2 AUTO-2LA	cellular2/0, R1&R2, Yes	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-1W-1LA	cellular2/0, R1&R2, Yes	n/a	cellular2/0
H2 AUTO-1W-2LA	cellular2/0, R1&R2, Yes	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-2W-1LA	n/a	cellular1/0, C1&C2, Yes	cellular1/0
H2 AUTO-2W	n/a	n/a	n/a

Interface assignment II

Label	WiFi Module 0 Interface, Antenna Connectors	WiFi Module 2 Interface, Antenna Connectors	Description
H2 AUTO-1LE	n/a	n/a	LTE-EU: 1 LTE 1/3/7/8/20
H2 AUTO-2LE	n/a	n/a	LTE-EU: 2 LTE 1/3/7/8/20
H2 AUTO-1W-1LE	wlan0/0, W1&W2	n/a	LTE-EU: 1 LTE 1/3/7/8/20, 1 802.11n
H2 AUTO-1W-2LE	wlan0/0, W1&W2	n/a	LTE-EU: 2 LTE 1/3/7/8/20, 1 802.11n
H2 AUTO-2W-1LE	wlan0/0, W1&W2	wlan2/0, R1&R2	LTE-EU: 1 LTE 1/3/7/8/20, 2 802.11n
H2 AUTO-1H+	n/a	n/a	3G: 1 HSPA+ 850/900/1900/2100




H2 AUTO-2H+	n/a	n/a	3G: 2 HSPA+ 850/900/1900/2100
H2 AUTO-1W-1H+	wlan0/0, W1&W2	n/a	3G: 1 HSPA+ 850/900/1900/2100, 1 802.11n
H2 AUTO-1W-2H+	wlan0/0, W1&W2	n/a	3G: 2 HSPA+ 850/900/1900/2100, 1 802.11n
H2 AUTO-2W-1H+	wlan0/0, W1&W2	wlan2/0, R1&R2	3G: 1 HSPA+ 850/900/1900/2100, 2 802.11n
H2 AUTO-1LA	n/a	n/a	American-LTE: 1 LTE 2/4/5/13/17/25
H2 AUTO-2LA	n/a	n/a	American-LTE: 2 LTE 2/4/5/13/17/25
H2 AUTO-1W-1LA	wlan0/0, W1&W2	n/a	American-LTE: 1 LTE 2/4/5/13/17/25, 1 802.11n
H2 AUTO-1W-2LA	wlan0/0, W1&W2	n/a	American-LTE: 2 LTE 2/4/5/13/17/25, 1 802.11n
H2 AUTO-2W-1LA	wlan0/0, W1&W2	wlan2/0, R1&R2	American-LTE: 1 LTE 2/4/5/13/17/25, 2 802.11n
H2 AUTO-2W	wlan0/0, W1&W2	wlan2/0, R1&R2	WIFI: 2 802.11n



Chapter 6 Compliance



6.1 Manufacturer information

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


6.2 Safety warnings

	<p>If the screws are not properly anchored, the strain of the cables connected to the router could pull the router out.</p>
	<p>Если винты крепления закручены недостаточно плотно, маршрутизатор может упасть из-за натяжения подключенных к нему кабелей.</p>
	<p>Si les vis ne sont pas fixées correctement, la tension des câbles raccordés au routeur pourrait tirer le routeur.</p>
	<p>Si los tornillos no están bien anclados, la tensión de los cables del router podría hacer que el router se caiera.</p>
	<p>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 on page 9 and Disconnecting on page 9.</p>
	<p>Электрический ток в кабелях и проводах может быть опасен для жизни и здоровья. Чтобы предотвратить поражение током, перед установкой оборудования, его обслуживанием и снятием панелей необходимо отсоединять кабели в соответствии с правилами, изложенными в соответствующем разделе.</p>
	<p>Le courant électrique qui circule dans les câbles d'alimentation, les lignes téléphoniques et les câbles de communication est dangereux. Afin d'éviter tout choc électrique, brancher, puis débrancher les câbles en suivant les consignes préconisées dans chaque section avant d'installer, de manipuler ou d'ouvrir les caches de l'équipement.</p>
	<p>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".</p>
	<p>This device is compatible with 1.8 V and 3 V SIMs. Do not install SIMs that do not support these voltages.</p>
	<p>Данное устройство совместимо только с SIM-картами 1,8 и 3 В. Не устанавливайте карты, не поддерживающие такое напряжение.</p>
	<p>Cet appareil est compatible avec des cartes SIM 1,8 V et 3 V. Ne pas installer de cartes SIM qui ne supporte pas ces tensions.</p>
	<p>Este equipo es compatible con SIMs de 1,8 V y 3 V. No instale SIMs que no soporten estas tensiones.</p>

	<p>Never install the SIM card when the device is switched on.</p> <p>Always disconnect the device from the main power supply before inserting the internal SIM.</p> <p>Always disconnect the device before removing the casing to get to the internal SIM.</p> <p>When inserting the SIM card, please protect yourself against electrostatic discharges (ESD).</p> <p>Do not touch the SIM card connectors.</p>
	<p>Никогда не устанавливайте SIM-карты, когда устройство включено.</p> <p>Всегда отключайте устройство от сети электропитания перед установкой внутреннего SIM.</p> <p>Всегда отключайте устройство перед снятием обшивки, чтобы добраться до внутреннего SIM.</p> <p>При установке SIM-карты, пожалуйста, защитите себя от электростатических разрядов (ESD).</p> <p>Не прикасайтесь к контактам SIM-карты.</p>
	<p>N'installez jamais la carte SIM lorsque l'appareil est allumé.</p> <p>Débranchez toujours l'appareil de l'alimentation électrique principale avant d'insérer la carte SIM interne.</p> <p>Débranchez toujours l'appareil avant de retirer le boîtier pour accéder à la carte SIM interne.</p> <p>Lors de l'insertion de la carte SIM, protégez-vous contre les décharges électrostatiques (ESD).</p> <p>Ne touchez pas les connecteurs de la carte SIM.</p>
	<p>No instale nunca la tarjeta SIM con el equipo encendido.</p> <p>Desconecte siempre el equipo de la red antes de instalar el SIM interno.</p> <p>Desconecte siempre el equipo antes de desmontar la carcasa para acceder al SIM interno.</p> <p>Al insertar la tarjeta SIM, protéjase contra descargas electroestáticas (ESD).</p> <p>No toque los conectores de la tarjeta SIM.</p>
	<p>Consider Restricted Access Location the spaces and cavities in the vehicle secured through a lock, key, tool or by some other means of security, where only trained personnel can access. The vehicle trunk is a non-Restricted Access Location.</p> <p>If the equipment is going to be installed in a non-Restricted Access Location where untrained service personnel can access, the equipment must be mounted inside a separate compartment like a Security Lock Box.</p>
	<p>Зона ограниченного доступа может являться местом или углублением в транспортном средстве, защищенном с помощью замка, ключа, инструмента или других средств защиты, доступ к которым может иметь только специально подготовленный персонал. Багажник транспортного средства не является зоной ограниченного доступа.</p> <p>Если оборудование устанавливается в месте, которое не является зоной ограниченного доступа, к которому имеет доступ персонал без надлежащей подготовки, оборудование должно устанавливаться внутри отдельного отсека, к примеру, в сейфе с кодовым замком.</p>

	<p>Considérez Emplacement à Accès Restreint les espaces et les cavités dans le véhicule assurés par un verrou, une clef, un outil ou par d'autres moyens de sécurité, où seul le personnel qualifié peut accéder. Le coffre du véhicule est un Emplacement à Accès Sans Restriction.</p> <p>Si l'équipement va être installé dans un Emplacement à Accès Sans Restriction où personnel de service non qualifié peut accéder, l'équipement doit être monté dans un compartiment séparé comme une boîte de serrure de sécurité.</p>
	<p>Considere como lugar de acceso restringido a los espacios y cavidades en el vehículo cerrados con llave u otros sistemas de seguridad, donde sólo personal capacitado pueda acceder. El maletero no se considera como una zona de acceso restringido.</p> <p>Si el equipo va a ser instalado en una zona de acceso público donde personal no capacitado pueda acceder, ha de montarse dentro de un compartimento separado como una caja de seguridad.</p>
	<p>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.</p>
	<p>Оборудование должно эксплуатироваться квалифицированным персоналом; в противном случае устройство может быть повреждено и впоследствии работать неисправно.</p>
	<p>L'équipement est destiné à être installé par le Personnel de Service et seulement manipulé par du personnel qualifié. Sinon, l'appareil risque d'être endommagé et dysfonctionner.</p>
	<p>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.</p>
	<p>The fuse must have the characteristics indicated by Teldat S.A..</p>
	<p>Предохранитель должен иметь характеристики, указанные компанией Teldat S.A..</p>
	<p>Le fusible doit avoir les caractéristiques indiquées par Teldat S.A..</p>
	<p>El fusible deber tener las características indicadas por Teldat S.A..</p>

6.3 WEEE information

	<p>The waste container symbol with the >X< 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.</p> <p>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.</p>
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6.4 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.

6.5 EC declaration of conformity

English (EN)	<p>This equipment is in compliance with the essential requirements and other relevant provisions of:</p> <p>Directive 2014/53/EU (RED) or</p> <p>Directive 2014/30/EU (EMC)</p> <p>Directive 2014/35/EU (LVD)</p> <p>Directive 2009/125/EC (ErP)</p> <p>Directive 2011/65/EU (RoHS)</p> <p>of the European Parliament</p>
Spanish (ES) Español	<p>Este dispositivo cumple con los requisitos esenciales y con las normas correspondientes de las siguientes directivas:</p> <p>Directiva 2014/53/UE (RED) o</p> <p>Directiva 2014/30/UE (EMC)</p> <p>Directiva 2014/35/UE (LVD)</p> <p>Directiva 2009/125/CE (ErP)</p> <p>Directiva 2011/65/UE (RoHS)</p> <p>del parlamento Europeo</p>



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>

6.6 CE marking

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



6.7 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 with local authorities what the latest status of national regulations is.

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

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

6.8 Operating frequency

To find out more about the device's operating frequencies, see Appendix [RF LTE specifications](#) on page 38, [RF GSM/WCDMA specifications](#) on page 39 and [WIFI specifications](#) on page 40.

6.9 FCC statement

6.9.1 Federal Communications Commission Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will have to bear the expense of having it corrected.

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

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

6.10 IC statement

6.10.1 CAN ICES-3 (A)/NMB(A)

This device observes the Class A limits applicable to radio noise emissions coming from digital apparatus, as set out in the interference-causing equipment standard entitled "Digital Apparatus, ICES-003" issued by the Department of Communications .

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques," NMB-003 édictée par le ministère des Communications.

Appendix A Technical Information

A.1 Troubleshooting

The following table can help you solve problems when installing the router. If you cannot solve the issue, 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 LEDs do not light up in green.	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 (been screwed in correctly), or Get your technical service to verify that the device is in the optimum position.

A.2 Updating the software

The **Teldat H2 Automotive** router can be updated to new releases. Please contact your dealer for further details on new releases.

There are several ways to update one of our routers. For further information, please see manual “Teldat Dm748-I Software Updating”

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 Automotive** router incorporates independent modules for the Wireless WAN interface. Generally, the firmware for the modules is independent from the router software. There is an UPGRADE file for each Wireless LAN module. Please ask your distributor for the correct upgrade file (according to the module in your device). The Cellular Interface manual (Teldat Dm 781-I) explains how to upgrade the module.

A.3 Connecting to the device

There are two ways to access the CLI:

- Through the AUX connector.
- Through the Telnet protocol.

A.3.1 Connecting through the local console (AUX connector)

Teldat H2 Automotive has a DB9 female connector on the rear panel known as **AUX.**, which provides access to the device’s CLI or operates as an asynchronous serial port. The behavior of this interface must be pre-configured. By default, this interface is configured in local console mode. This section only focuses on the local console mode.

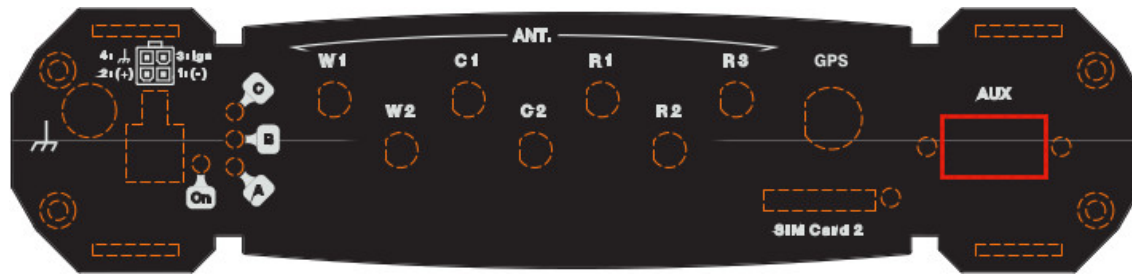


Fig. 31: **AUX** connector

In order 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 as follows:

- 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 by joining a DB9 male to a DB9 female connector. If the terminal has DB25 connectors, you will need to use an additional adapter.

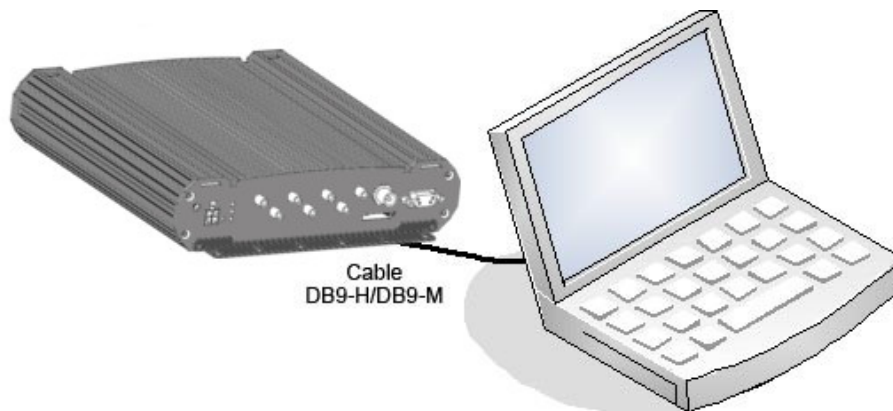


Fig. 32: **Connecting for configuration**

A.3.2 Connecting through IP terminal (LAN 1...4 connectors)

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

The router's default configuration establishes the following IP address and mask:

- IP Address: 192.168.1.1
- IP Mask: 255.255.255.0



Note

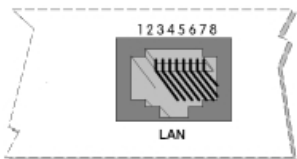
Some devices leave the factory with customized settings. This personalization can mean that the default configuration is different from the one shown above.

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. E.g. 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 Automotive** (the LAN1...4 connectors) through the Ethernet cable (RJ45) provided.
- Start a Telnet session from the IP terminal to IP address 192.168.1.1 (the **Teldat H2 Automotive** default address).
- The default configuration does not ask for login credentials (user/password) to access the console.

A.4 Connectors

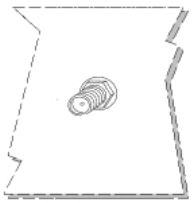
A.4.1 LAN connector

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


A.4.2 WWAN connectors

	PIN	ANT
	Internal	RF in/out
	External	GND

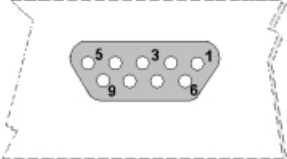
A.4.3 WLAN connectors

	PIN	ANT
	Internal	RF in/out
	External	GND

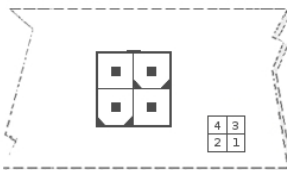
A.4.4 GPS connector

	PIN	ANT
	Internal External	RF in/out GND

A.4.5 AUX connector

DB9 CONFIGURATION	PIN	CONF
	1	--
	2	RxD
	3	TxD
	4	--
	5	GND
	6	--
	7	--
	8	--

A.4.6 POWER supply connector

	PIN	SIGNAL
	1	-
	2	+
	3	IGNITION
	4	Functional Earth, optional

A.5 Technical specifications

A.5.1 Architecture hardware

PROCESSORS	Freescle QorQ.
MEMORY	128 Mbytes in SDRAM.
STORAGE UNIT	FLASH Memory (32 Mbytes).

A.5.2 LAN interface

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

A.5.3 Wireless WAN interface

STANDARDS	GPRS, UMTS, HSDPA, HSUPA, HSPA+, LTE ... Depends on the version of Wireless WAN interface incorporated.
SPEED	Depends on the version of Wireless WAN interface incorporated. Please see the manual on the appropriate module.
CONNECTOR	2/3 RF SMA female per module.
ANTENNA	Depends on the type of Wireless WAN interface. Please see the antenna catalog for Cellular interfaces.

A.5.4 GPS interface

STANDARDS	NMEA.
FREQUENCY	1,575.42 MHz.
CONNECTOR	RF FME male.
ANTENNA	Active 3.3 V max 80 mA. Passive.

A.5.5 Wireless LAN interface

STANDARDS	802.11n a/b/g 2x2.
FREQUENCY	2.4 GHz / 5 GHz.
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	2/3 RF SMA RP female.

A.5.6 Configuration interface

INTERFACES	<p>This can be configured in two modes:</p> <p><i>Asynchronous Port:</i></p> <p>V24 DCE. Does not permit Hardware flow control.</p> <p><i>Local Console:</i></p> <p>V.24 DCE only 8-N-1, without flow control.</p>
PROTOCOLS	<p><i>Asynchronous Port:</i></p> <p>AT, PPP, GPS-DATA.</p>
SPEED	<p><i>Asynchronous Port:</i></p> <p>300 to 115.200 bps.</p> <p><i>Local Console:</i></p> <p>9.600 bps (configurable up to 115.200).</p>
CONNECTOR	DB9 female, on the front panel of the device.

A.5.7 Power supply

INPUT VOLTAGE	<p>Nominal: 12-24 V DC, Absolute minimum: 10.8 V DC.</p> <p>Absolute maximum: 36 V DC.</p>
INPUT CURRENT	2 A @ 12Vdc.
FUSE	3.15 A 250 V AC Type: FSF.
MAXIMUM POWER	<p>With a WWAN module installed: 12 W.</p> <p>With a WWAN+WIFI module installed: 15 W.</p> <p>With two WWAN+WIFI modules installed: 19 W.</p>
ACC/IGNITION	<p>Input voltage: +12 - 24 V DC.</p> <p>Current: 7 mA @ 12Vdc, 14mA @ 24Vdc.</p> <p>Control Levels:</p> <ul style="list-style-type: none"> - ON: the same level as the INPUT VOLTAGE (+12 or +24 V DC). - OFF: GND or not connected.
CONNECTOR	4 Pin polarized connector.

A.5.8 Dimensions and weight

TYPE	Ruggedized housing with multiple support positions.
LENGTH x WIDTH x HEIGHT	216 x 210 x 50 mm.
WEIGHT	2.0 kg.

A.5.9 Environmental specifications

TEMPERATURE	Operating: 0 °C to 50 °C.
RELATIVE HUMIDITY	ON: 8 % to 85 %. (non condensing). OFF: 5 % to 90 %. (non condensing).

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 any antennas. The operator must make sure that the antennas of his/her picking comply with the local regulations.

Technology: LTE

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz Rx: 2110-2170 MHz	+23 dBm \pm 1 dB
Band 3	Tx: 1710-1785 MHz Rx: 1805-1880 MHz	+23 dBm \pm 1 dB
Band 7	Tx: 2500-2570 MHz Rx: 2620-2690 MHz	+22 dBm \pm 1 dB
Band 8	Tx: 880-915 MHz Rx: 925-960 MHz	+23 dBm \pm 1 dB
Band 20	Tx: 832-862 MHz Rx: 791-821 MHz	+23 dBm \pm 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 \pm 1 dB
Band 2	Tx: 1850-1910 MHz Rx: 1930-1990 MHz	+23 dBm \pm 1 dB
Band 5	Tx: 824-849 MHz Rx: 869-894 MHz	+23 dBm \pm 1 dB
Band 8	Tx: 880-915 MHz Rx: 925-960 MHz	+23 dBm \pm 1 dB

Technology: GSM / GPRS / EDGE

Bands	Frequencies	Conducted Transmit Power
GSM 850 (850 MHz)	Tx: 824-849 MHz	+32 dBm \pm 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 RF GSM/WCDMA specifications

The GSM/WCDMA model with the MC8705 module provides WCDMA, GSM, GPRS and EDGE network connectivity over several radio frequency bands, in accordance with 3GPP standards.

This product is supplied without any antennas. The operator must make sure that the antennas of his/her picking comply with the local regulations.

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

Bands	Frequencies	Conducted Transmit Power
Band 1	Tx: 1920-1980 MHz	+23 dBm ± 1 dB
	Rx: 2110-2170 MHz	
Band 2	Tx: 1850–1910 MHz	+23 dBm ± 1 dB
	Rx: 1930–1990 MHz	
Band 5	Tx: 824–849 MHz	+23 dBm ± 1 dB
	Rx: 869–894 MHz	
Band 6	Tx: 830–840 MHz	+23 dBm ± 1 dB
	Rx: 875–885 MHz	
Band 8	Tx: 880–915 MHz	+23 dBm ± 1 dB
	Rx: 925–960 MHz	

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.3 WIFI specifications

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

This product is supplied without any antennas. The operator must make sure that the antennas of his/her picking comply with the local regulations.

Frequency Range	<p>802.11a, 802.11n @ 5 GHz</p> <ul style="list-style-type: none"> • 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 <p>802.11b</p> <ul style="list-style-type: none"> • •2400 ~2497 MHz <p>802.11g</p> <ul style="list-style-type: none"> • 2400 ~2497 MHz <p>802.11n @ 2.4 GHz</p> <ul style="list-style-type: none"> • 2.4 ~2.5 GHz
Operating	<p>802.11a/n:</p> <ul style="list-style-type: none"> • USA/Canada: 24 non-overlapping channels • Major Europe Countries: 19 non-overlapping channels • Japan: 19 non-overlapping channels • China: 5 non-overlapping channels <p>802.11b:</p> <ul style="list-style-type: none"> • USA: 11 channels • Europe Countries: 13 channels • Japan: 14 channels <p>802.11g/n:</p> <ul style="list-style-type: none"> • USA: 11 channels • Europe Countries: 13 channels • Japan: 13 channels
Output Power. (tolerance ± 2 dB)	<p><i>Note: The maximum RF power setting will vary according to specified country regulations.</i></p> <p>802.11a:</p> <p>5.150~5.350 GHz Band</p> <ul style="list-style-type: none"> • +16 dBm at 6~24 Mbps • +14 dBm at 48 Mbps • +13 dBm at 54 Mbps <p>5.470~5.725 GHz Band</p> <ul style="list-style-type: none"> • +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