

onway Router on3900



User Manual

2026-07-09

onway ag, Switzerland



1 Safety Instructions

Please carefully observe all safety instructions in the manual.

Compliance Information

The onway routers must be used in compliance with any and all applicable national and international laws and with any special restrictions regulating the utilization of the communication module in prescribed applications and environments.

Information about the accessories / changes to the device

- Please only use original accessories to prevent injuries and health risks.
- Changes made to the device or the use of non-authorized accessories will render the warranty null and void and potentially invalidate the operating license.
- onway routers must not be opened (SIM cards may be used according to the instructions).

Information about the device interfaces

- All systems that are connected to the onway router interfaces must meet the requirements for SELV (Safety Extra Low Voltage) systems.
- Interconnections must not leave the building nor penetrate the body shell of a vehicle.
- Connections for antennas may only exit the building or the vehicle hull if transient overvoltages (according to IEC 62368-1) are limited by external protection circuits down to 1500 V_{peak}. All other connections must remain within the building or the vehicle hull.
- Always keep a distance of more than 40 cm from the antenna in order to reduce exposure to electromagnetic fields below the legal limits.
- Devices with a WLAN interface may be operated only with the applicable regulatory domain configured. Special attention must be paid to country, number of antennas and the antenna gain. The maximum allowed gain is 3 dBi in the relevant frequency range. To use WLAN antennas with a higher gain, contact onway about custom radio configurations. The antenna gain and cable attenuation need to be correctly configured by certified specialized personnel. A misconfiguration will lead to loss of the approval.
- Cellular antennas attached to the router must have an antenna gain of no more than 2.5 dBi. The user is responsible for the compliance with the legal regulations.
- Only CE-compliant power supplies with a current-limited SELV output voltage range may be used with onway routers.

General safety instructions

- Observe the usage limitations of radio units at filling stations, in chemical plants, in systems with explosives or potentially explosive locations.
- The devices may not be used in airplanes.
- Exercise particular caution near personal medical aids, such as pacemakers and hearing aids.
- onway routers may also cause interference in the nearer distance of TV sets, radio receivers and personal computers.
- Never perform work on the antenna system during a thunderstorm.
- The devices are generally designed for normal indoor use. Do not expose the devices to extraordinary environmental conditions worse than IP40.
- Protect them against aggressive chemical atmospheres and humidity or temperatures outside specifications.

2 Specifications and Features

Interfaces

- 3× 2.5 Gbit/s Ethernet (10/100/1000/2500 Mbit/s) with auto-MDIX, push-pull compatible M12 X-coded connector.
- 1× USB-C Host port for mass storage
- 1× USB-C Device port with USB-to-UART serial console and network interface
- 1× Power input, M12 K-coded male connector

Options

- Up to 4 Cellular / WiFi Modules with 4×4 MIMO, e.g.
 - 4× 5G-NR / LTE-A
 - 2× 5G-NR / LTE-A and 2× WiFi 7
- Telit FN920 or FN990 with 5G Release 16 support
- WLE700x Wi-Fi7 supporting Access Point, Client and Mesh modes with concurrent dual band operation.
- Up to two SIM-cassettes with 4× Nano-SIM each (total of 8× Nano-SIM)
- Internal M.2 NVMe mass storage for content (sizes up to M.2 2280)
- GNSS receiver, optionally with dead reckoning and 3D accelerometer/gyroscope

Dimensions

- Size of mounting base, excluding connectors: 260 mm × 175 mm
- Height: 66 mm
- Weight: Approx. 2900 g, depending on options

Environmental Conditions

- Input voltage: 24 V to 110 V (DC, ±30 %)
- Operating temperature range: −40 °C to 70 °C
- Storage temperature range: −40 °C to 85 °C
- Humidity: 0 % to 95 % (non-condensing)
- Altitude: 2000 m and up to 4000 m with temperature derating
- Ingress protection rating: IP40
- Compliance level: EN 50155, EN 45545, EBA EMV 06.

3 Connectors and Indicators



ON3900 Router Front View. The STAT LED is on the upper lefthand side and the Ethernet LEDs are above each port on the left.

System status indicator

A single multi-color LED indicator STAT on the upper lefthand side of the front panel provides status information about the router. The following table summarizes these LED states:

Color	Description
	System in regular mode, all modems have IP connectivity, VPN tunnel established, and GPS fix available <i>Additional status information may be shown with a short blink after 5s of solid green</i>
	No VPN tunnel established
	No GPS fix available
	System in regular mode, some modems don't have IP connectivity
	System in regular mode, no modems have IP connectivity
	System in regular mode, no modems have network connectivity
	System in recovery mode, at least one modem has IP connectivity
	System in recovery mode, no modems have network connectivity
 — 	First-boot system initialization

Ethernet Status Indicators

On the upper lefthand side of each Ethernet port a multi-color LED provides information about the link status and data transfers. The following table summarizes these LED states:

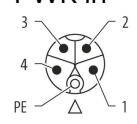
Name	Color	Description
LAN 0-2	 / 	Link / Activity with a link speed of 2500 Mbit/s
	 / 	Link / Activity, 1000 Mbit/s
	 / 	Link / Activity, 100 Mbit/s
	 / 	Link / Activity, 10 Mbit/s
		No link

Interface Connectors

Front Panel Connectors



ON3900 Router Front View

Interface Name	Connector	Function
LAN0–2	M12 X-coded	2.5 Gbit/s Ethernet ports 0–2
GNSS	QLS receptacle	Satellite navigation antenna
<i>up to four modems, named mbm0–3</i>		
A1 — A4	QLS receptacle	5G cellular modem 0 4×4 MIMO RX/TX antennas
B1 — B4	QLS receptacle	5G cellular modem 1 4×4 MIMO RX/TX antennas
C1 — C4	QLS receptacle	5G cellular modem 2 4×4 MIMO RX/TX antennas
D1 — D4	QLS receptacle	5G cellular modem 3 4×4 MIMO RX/TX antennas
<i>up to four WiFi modules, named wfi0–3</i>		
A1 — A4	QLS receptacle	WLAN module 0 MIMO RX/TX antennas
B1 — B4	QLS receptacle	WLAN module 1 MIMO RX/TX antennas
C1 — C4	QLS receptacle	WLAN module 2 MIMO RX/TX antennas
D1 — D4	QLS receptacle	WLAN module 3 MIMO RX/TX antennas
<i>SIM cassettes</i>		
SIM 1–4	SIM Cassette	Nano-SIM 1–4
SIM 5–8	SIM Cassette	Nano-SIM 5–8
<i>USB-C ports</i>		
Host	USB-C receptacle	Host port, see Host Port
Device	USB-C receptacle	USB 2.0/3.0 device port, see Device Port
<i>Extension ports</i>		
EXT1	10p terminal block	Extension port 1, see Extension Connectors
EXT2	10p terminal block	Extension port 2, see Extension Connectors
	M12 K-coded male	Power input
	Pin 1	24 V to 110 V DC nominal
	Pin 2	Not connected
	Pin 3	0 V
	Pin 4	Not connected
	PE	Shield
	Screw connector	Earth protection screw terminal

USB-C connectors

Host Port

The USB-C *Host* port on the router supports USB 2.0/3.0 mass storage devices. If enabled in the configuration or if the device has a signed partition, the device will be mounted automatically upon insertion and named USB. Connecting mass storage devices through USB hubs is not supported.

Warning

To avoid damaging the router, **do not connect a laptop or a computer** to this port. This port is only intended for connecting mass storage devices, such as USB flash drives. Connecting other devices may cause damage to the router or the connected device.

Device Port

The USB-C *Device* port on the router supports a USB-to-UART serial console and a USB network interface.

Extension Connectors

The router has two extension connectors which have different purposes depending on the chosen options. The following options are available:

- Digital Input/Output (DIO)
- RS-232 serial port
- RS-485 serial port
- CAN-FD port

Note

As a mating connector, a 10-pin spring cage terminal block with a pitch of 3.5 mm can be used e.g. Phoenix Contact DFMC 1.5/5-STF-3.5 (article number 1790328), or Weidmüller B2CF 3.50/10/180FZE SN BK BX (article number 2467360000).

Antenna Options

Depending on the installed router options, some connectors may be missing.

The installed cellular modems and WLAN modules have multiple antenna ports. For optimal performance, these antennas should all be connected and use different polarizations and/or directions when using individual antennas.

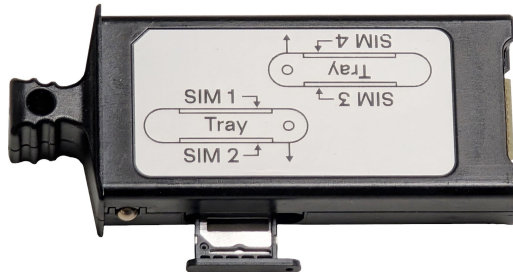
Modems and WLAN modules mapping

In case of a mix of modems and WLAN modules, the modems are always installed first starting on the left. The interfaces are installed next to each other without gaps. The interface index is linked with the antenna ports, so the device connected to antenna connectors A1–A4 will be named mbm0 or wfi0.

On a router with two modems and one WLAN module, the interfaces will be named: mbm0 (antennas A1–A4), mbm1 (antennas B1–B4), and wfi2 (antennas C1–C4).

SIM Cassettes

Up to two SIM cassettes with four nano SIM each are available. Each cassette has two trays for two SIM cards that can be opened using a SIM extractor tool. The position index of each SIM card is shown on the cassette label.



View of an ON3900 SIM cassette. The tray with SIM 1 and 2 is opened.

Once the cassette has been populated, it can be inserted in the router in either orientation. The SIM card numbering in software is shown in the following table:

Cassette position	Cassette SIM tray position	Software SIM number
Left	1	1
	2	2
	3	3
	4	4
Right	1	5
	2	6
	3	7
	4	8

SIM slots mapping

The default SIM to modem connections are SIM 1 to modem 0, SIM 2 to modem 1, and so on. This mapping can be reconfigured and any SIM can be connected to any modem, if desired.

Supply Voltage

To power the router, a supply voltage of 24V to 110V DC must be provided on the PWR connector. The router's earthing screw terminal **must** be connected to an earth protection. Consider the different operating temperature ranges depending on the model and the number of radio modules installed.

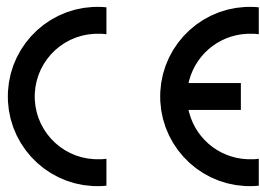
The required power supply rating depends on the installed options, but must be at least able to provide 50 W.

Factory Reset

On the upper lefthand side of the front of the router, between the USB-C ports, there is a small hole to access the Factory Reset Button. A short press of the Factory Reset Button triggers a system reboot. A long press, greater than 5 seconds, triggers a system reset. A reset deletes all configuration data as well as all credential data stored on the router. A reset will flash all LEDs three times in red. After the reset is complete, a reboot will follow.

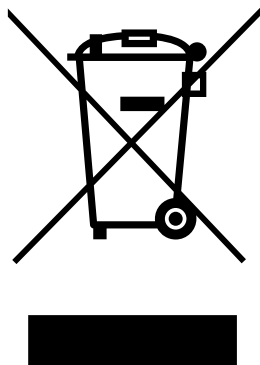
4 Conformity and Waste Disposal

Declaration of Conformity



onway routers comply with the relevant standards following the provisions of the RED Directive 2014/53/EU. To obtain a signed version of the Declaration of Conformity please contact the onway support.

Waste Disposal



This product is subject to the WEEE directive 2012/19/EU and compliant with the marking requirements. The WEEE symbol on this product indicates that it must not be disposed of with normal household waste at its end of life. Instead, it must be separated and returned to a designated collection point for waste electric and electronic equipment for proper recycling. Doing so helps to conserve natural resources and to protect the environment from unnecessary pollution.

5 Open Source Software Notice

This product does in part build on open source software. We are distributing such open source software to you under its respective license, and the licenses can be obtained here:

<https://support.onway.ch/onway-router/licenses/on3900/>

To obtain the corresponding open source codes covered by these licenses, please contact us at support@onway.ch.

Specific Acknowledgements

- This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)

6 Contact Information

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