

R&S® EVSD1000 VHF/UHF Nav/Drone Analyzer Getting Started



1179561802

Version 03

ROHDE & SCHWARZ

Make ideas real



This document describes the following R&S EVSD1000 models with firmware version 1.50 or later:

- R&S EVSD1000 VHF/UHF nav/drone analyzer (1330.0350K02)

Furthermore, it covers the following options:

- R&S EVSD1-Z1 Battery pack (1330.0366.02)
- R&S EVSD1-Z2 Battery charger (1330.0372.02)
- R&S EVSD1-Z3 V/UHF antenna (1330.0395.02)
- R&S EVSD1-Z5 Data-link-module (Wi-Fi) (1330.0520.02)
- R&S EVSD1-Z6 GNSS RTK device (rover) (1330.0472.02)
- R&S EVSD1-Z6 GNSS RTK device (base) (1330.0472.03)
- R&S EVSD1-Z7 GNSS antenna (1330.0437.02)
- R&S EVSG1-Z8 Power supply (1330.0289.02)
- R&S EVSD1-Z9 Transport case (1330.0508.02)
- R&S EVSG1-Z11 Verification test software (1329.8921.02)
- R&S EVSD1-Z20 Drone adapter DJI M300 RTK (1330.0443.02)

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1179.5618.02 | Version 03 | R&S®EVSD1000

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®EVSD1000 is indicated as R&S EVSD1000.

Contents

| | |
|---|-----------|
| 1 Safety and regulatory information..... | 5 |
| 2 Documentation overview..... | 10 |
| 3 Key features..... | 13 |
| 4 Preparing for use..... | 14 |
| 5 Instrument tour..... | 47 |
| 6 Operating basics..... | 58 |
| 7 Contacting customer support..... | 67 |
| Annex..... | 68 |
| A Reference: Dimensions..... | 68 |

1 Safety and regulatory information

The product documentation helps you use the product safely and efficiently. Follow the instructions provided here and in the following sections.

Intended use

The R&S EVSD1000 is a signal level and modulation analyzer to be used aboard medium-sized drones. It performs measurements on instrument landing systems (ILS), ground-based augmentation systems (GBAS) and very high frequency omnidirectional range (VOR) ground stations. It analyzes air traffic control communications (ATC COM) signals measured during startup, maintenance and servicing. The instrument's mechanical and electrical design is optimized for drone-based measurements on terrestrial navigation systems.

Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

Target audience

The R&S EVSD1000 and its documentation is targeted at air navigation service providers (ANSP), ground inspection service providers, national authorities for air traffic control, and manufacturers and airport technicians for ILS, GBAS and VOR ground equipment. Users require basic knowledge of ILS, GBAS and VOR ground equipment, as well as the International Civil Aviation Organization (ICAO) specifications in document 8071, annex 10.

Where do I find safety information?

Safety information is part of the product documentation. It warns you of potential dangers and gives instructions on how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In [Chapter 1.1, "Safety instructions"](#), on page 6. The same information is provided in many languages in printed format. The printed "Safety Instructions" for "DC-Powered Products with Internal Lithium Battery for Mobile Use" (document number 1171.1994.99) are delivered with the product.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation.

1.1 Safety instructions

Products from the Rohde & Schwarz group of companies are manufactured according to the highest technical standards. To use the products safely, follow the instructions provided here and in the product documentation. Keep the product documentation nearby and offer it to other users.

Use the product only for its intended use and within its performance limits. Intended use and limits are described in the product documentation such as the specifications document, manuals and the printed "Safety Instructions" document. If you are unsure about the appropriate use, contact Rohde & Schwarz customer support.

Using the product requires specialists or specially trained personnel. These users also need sound knowledge of at least one of the languages in which the user interfaces and the product documentation are available.

Reconfigure or adjust the product only as described in the product documentation or the specifications document. Any other modifications can affect safety and are not permitted.

Never open the casing of the product. Only service personnel authorized by Rohde & Schwarz are allowed to repair the product. If any part of the product is damaged or broken, stop using the product. Contact Rohde & Schwarz customer support at <https://www.rohde-schwarz.com/support>.

Connecting the product

Before connecting the interfaces and measuring inputs of the product to other products or electrical circuits, make sure that the other products or electrical circuits provide special protection against electric shock. This protection principle is referred to as SELV (safety extra-low voltage) and is based on a low voltage level and increased insulation. Exceptions are indicated by a measurement category on the product and given in the specifications document.

Operating the product

The product is intended for mobile use. The maximum weight of the product is provided in the specifications document. If the product casing is not waterproof, use an adequate weather protection to carry the product outdoors with you.

When operating the product on a mobile platform, such as a vehicle, aircraft or drone, make sure that the product is properly secured. Refer to the instructions

provided by the manufacturer of the mobile platform. If stacking is possible, secure the whole stack of products so that they cannot fall over and cause injury.

Observe the ambient conditions such as altitude, operating temperature and climatic loads; see the specifications document.

Due to their exposed location, mobile communications systems are at risk of damage from lightning. This also poses a risk to persons nearby. When the risk of lightning is present, remove antennas from exposed locations, e.g. vehicle roofs. Do not operate the product until the lightning risk has passed.

Connecting to power

The product runs on DC voltage. For the specifications of the supply voltage for the product, refer to the specifications document. Only connect the product to a power source that provides a protection against electric shock.

Take the following measures for your safety:

- If you connect the product to an external power supply, use one recommended in the product documentation.
- Before switching on the product, ensure that the voltage and polarity indicated on the product matches the available power source.
- Only use intact cables and route them carefully so that they cannot be damaged. Also ensure that nobody can trip over loose cables.

Handling batteries safely

The product contains exchangeable or built-in lithium polymer or lithium ion cells or batteries. The use of the word battery in the following always means all types. Only the battery contents are potentially hazardous. As long as a battery is undamaged and the seals remain intact, there is no danger.

Impact, shock or heat can cause damage such as dents, punctures and other deformations. A damaged battery poses a risk of personal injury. Handle a damaged or leaking battery with extreme care. Immediately ventilate the area since the battery releases harmful gases. If you come into contact with the battery fluid, immediately remove all contaminated clothing. Irritation can occur if the battery fluid comes in contact with your skin or eyes. Immediately and thoroughly rinse your skin or eyes with water and seek medical aid.

For safe handling, follow these rules:

- Do not short-circuit the battery.

Safety instructions


- Do not mechanically damage the battery. Do not open or disassemble the battery.
- Do not expose the battery to high temperatures such as open flames, hot surfaces and sunlight.
- Only use the battery with the designated Rohde & Schwarz product.
- Only use the appropriate Rohde & Schwarz charger to charge the batteries. If the batteries are improperly charged, there is a risk of explosion. For charging and discharging temperature ranges, see the product documentation.
- Replace exchangeable batteries only with the same battery type.
- Store the battery in the product or use the product packaging.
- Dispose of exchangeable batteries separately from normal household waste as specified by the local waste disposal agency.


If you disregard these rules, you risk serious personal injury or even death due to explosion, fire or hazardous chemical substances. The product documentation provides further details.

If exchangeable batteries or products with built-in batteries are defective, contact the Rohde & Schwarz customer service. Rohde & Schwarz classifies the severity of the defect. When returning batteries or Rohde & Schwarz products containing batteries, use a carrier qualified to transport dangerous goods and notify the carrier of this classification. Follow the carrier's transport stipulations in line with IATA-DGR, IMDG-Code, ADR or RID.

Meaning of safety labels

Safety labels on the product warn against potential hazards.

| | |
|---|--|
|  | <p>Potential hazard Read the product documentation to avoid personal injury or product damage.</p> |
|---|--|



| | |
|---|---|
|  | <p>DC - direct current Connect to a DC power supply of the specified voltage range.</p> |
|---|---|

1.2 Labels on the product

Labels on the casing inform about:

- Personal safety, see "[Meaning of safety labels](#)" on page 8
- Product and environment safety, see [Table 1-1](#)

Table 1-1: Labels regarding product and environment safety

| | |
|---|--|
|  | <p>Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see the R&S EVSD1000 user manual, chapter "Disposal".</p> |
|  | <p>Labeling in line with directive 2006/66/EC for disposal of batteries after they have come to the end of their service life. For more information, see the product user manual, chapter "Disposal".</p> |

1.3 Warning messages in the documentation

A warning message points out a risk or danger that you need to be aware of. The signal word indicates the severity of the safety hazard and how likely it will occur if you do not follow the safety precautions.

NOTICE

Potential risks of damage. Could result in damage to the supported product or to other property.

1.4 Korea certification class A



이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

2 Documentation overview

This section provides an overview of the R&S EVSD1000 user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/EVSD1000

Further documents are available at:

www.rohde-schwarz.com/product/EVSD1000

2.1 Getting started manual

Introduces the R&S EVSD1000 and describes how to set up and start working with the product. A printed version is delivered with the instrument.

2.2 User manuals and help

Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.

The contents of the user manual are also available as online help on the R&S EVSD1000.

2.3 Service manual

Describes the performance test for checking compliance with rated specifications, firmware update, troubleshooting, adjustments, installing options and maintenance.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

2.4 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

2.5 Specifications and brochures

The specifications document, also known as the data sheet, contains the technical specifications of the R&S EVSD1000. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/EVSD1000/

2.6 Release notes and open-source acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current software version, and describe the software installation.

The software uses several valuable open source software packages. An open source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/EVSD1000.

2.7 Calibration certificate

The document is available on <https://gloris.rohde-schwarz.com/calcert>. You need the device ID of your instrument, which you can find on a label on the rear panel.

2.8 Videos

Find various videos on Rohde & Schwarz products and test and measurement topics on YouTube: <https://www.youtube.com/@RohdeundSchwarz>

3 Key features

The R&S EVSD1000 offers the following key features:

- Precise, reproducible analysis of ILS, VOR and GBAS ground measurements (in line with ICAO Doc. 8071 and ICAO Annex 10)
- Extremely compact, with integrable battery and data-link-module (Wi-Fi)
- High measurement rate for dynamic measurements, at 100 data records per second
- Simultaneous analysis of course and clearance signals on dual-frequency (2F) ILS systems
- Detailed analysis options in the frequency and time domain

4 Preparing for use

Here, you can find basic information about setting up the product for the first time.

- [Unpacking and checking](#)..... 14
- [Selecting and preparing the system components](#)..... 15
- [Setting up the R&S EVSD1000](#)..... 16
- [Opening and closing the front and rear covers](#)..... 19
- [Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK](#)..... 20
- [Connecting to LAN](#)..... 30
- [Setting up a data link \(Wi-Fi\) connection](#)..... 31
- [Connecting to power](#)..... 34
- [Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000](#)..... 37
- [Connecting to GNSS](#)..... 40
- [Switching on or off](#)..... 45
- [Performing an autocalibration](#)..... 45

4.1 Unpacking and checking

1. Unpack the R&S EVSD1000 carefully.
2. Retain the original packing material. Use it when transporting or shipping the product later.
3. Using the delivery notes, check the equipment for completeness.

The instrument comes with the following accessories:

- DC power supply connector with cable (0.5 m long)
- LAN cable (1 m long)
- GNSS cable with an open end (2 m long)
- R&S EVSD1000 bottom antenna adapter
- Printed Getting Started manual (English)

4. Check the equipment for damage.

If the delivery is incomplete or equipment is damaged, contact Rohde & Schwarz.

4.2 Selecting and preparing the system components

The mechanical and electrical design of the R&S EVSD1000 is optimized for use with a drone. For the DJI M300, Rohde & Schwarz offers a corresponding adapter set (R&S EVSD1-Z20 Drone adapter DJI M300 RTK). Adapters for other drone types can be provided on request.

You can connect the R&S EVSD1-Z3 V/UHF antenna mechanically to the top of the DJI M300 (requires R&S EVSD1-Z20 Drone adapter DJI M300 RTK). The adapter set provides a quick-release system to fasten and unfasten the antenna and the drone from the R&S EVSD1000 quickly. The illustrations and mounting procedures in this manual are based on this setup. Use the quick-release system to connect only components with a maximum weight of 2 kilograms.

You can mount the R&S EVSD1000 to other drone types or mount the antenna to other positions using customized adapters. When selecting and designing the components, consider the following information to ensure a safe and suitable system setup.

Selecting the drone

When selecting the drone, make sure that the drone is suitable to carry the weight of the R&S EVSD1000 and all optional components.

Drones are commonly equipped with propellers made out of carbon fiber. Carbon fiber or other conductive materials can cause unwanted reflections of RF signals. Such reflections can distort the measurement results provided by the R&S EVSD1000 and make them useless. Therefore, take precautions to avoid reflections. For example, mount the R&S EVSD1000 to a drone with wooden propellers. Ensure that the drone still flies safely after the adaptations.

Wooden propellers are usually not foldable. To keep the system transportable, propeller quick-release systems are a good solution.

For the DJI M300, for example, the following third-party accessories are available:

- XOAR - PJP-N IIDJ, IIDJ-P - IIDJ21X10J: pre-drilled wooden propellers to fit onto a DJI M300
- XOAR - Quick Release for PJP-N21X10 - A-INS3-Z: pre-drilled propeller quick-release to fit onto a DJI M300

Designing the adapters

When designing the adapter, consider the R&S EVSD1000 dimensions and the center of gravity, see [Chapter A, "Reference: Dimensions"](#), on page 68. Most drone manufacturers provide information on the optimal position of the center of gravity. After setup, recalibrate the drone to the new center of gravity, if necessary.

Make sure none of the optional components and connecting cables disturb the flight of the drone, e.g. by blocking the propellers or the drone sensors.

Always use secured screws to prevent the screws from falling out due to vibrations or unsteady flight maneuvers. If components are not fastened to the R&S EVSD1000 or the drone securely, they can fall down and cause damage or injury.

4.3 Setting up the R&S EVSD1000

The R&S EVSD1000 was designed to be mounted on a drone. With the provided cover attached, the instrument is waterproof as specified in the data sheet. You can also set up the R&S EVSD1000 on a benchtop, for example to prepare the R&S EVSD1000 for mobile use.

See also:

- ["Intended use"](#) on page 5

4.3.1 Mounting the R&S EVSD1000 on a drone

You mount the R&S EVSD1000 on a drone via the adapter on the top panel. Currently, an adapter set is available for the DJI M300 (R&S EVSD1-Z20 Drone adapter DJI M300 RTK). You can design a customized drone adapter for other drone types or to mount the R&S EVSD1000 to the drone from a different position.



Figure 4-1: Example of a R&S EVSD1000 mounted to a DJI M300 drone

To mount the R&S EVSD1000 to a drone

Prerequisite: The customized drone adapter is drilled according to the drilling template in [Figure A-4](#).

i Mounting the R&S EVSD1000 to a DJI M300 using the R&S EVSD1-Z20 Drone adapter DJI M300 RTK is described in [Chapter 4.5, "Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK"](#), on page 20.

1. Screw the customized drone adapter to the top panel of the R&S EVSD1000 using secured screws.

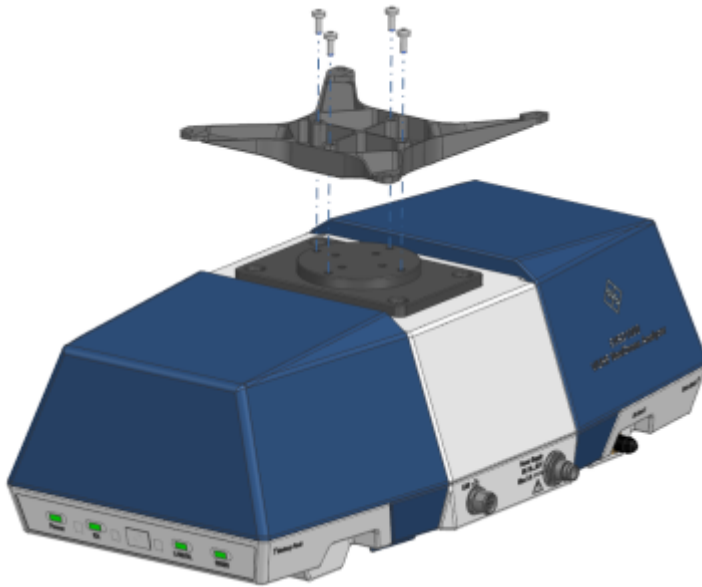


Figure 4-2: R&S EVSD1000 with a sample adapter

2. Fasten the drone adapter to the drone as designed.

4.3.2 Placing the R&S EVSD1000 on a benchtop

To place the R&S EVSD1000 on a bench top

1. **NOTICE!** Risk of damaging a connected antenna. If an antenna is connected to the bottom of the R&S EVSD1000, remove the antenna before you attempt to place the instrument on a bench top. Otherwise you can damage the antenna.

Place the R&S EVSD1000 on a stable, flat and level surface. Ensure that the surface can support the weight of the R&S EVSD1000. For information on the weight, see the data sheet.

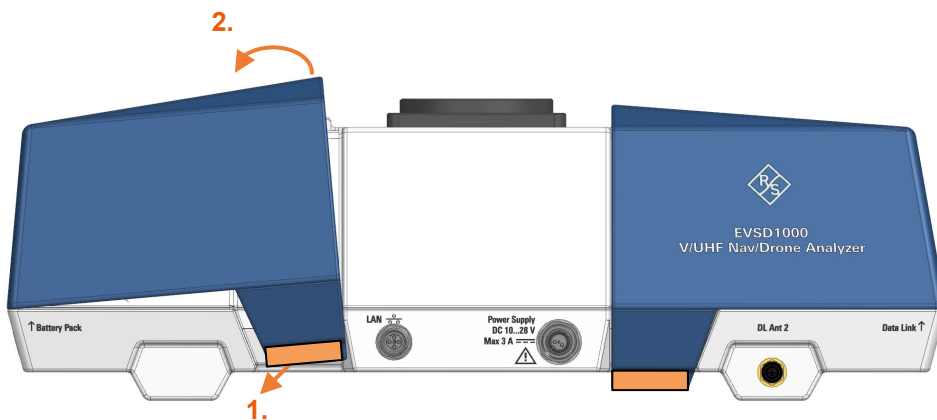
2. The top surface is not designed for stacking. If you want to stack the R&S EVSD1000 together with other products:
 - a) Follow the instructions given for the other products.
 - b) Place the R&S EVSD1000 on top.

4.4 Opening and closing the front and rear covers

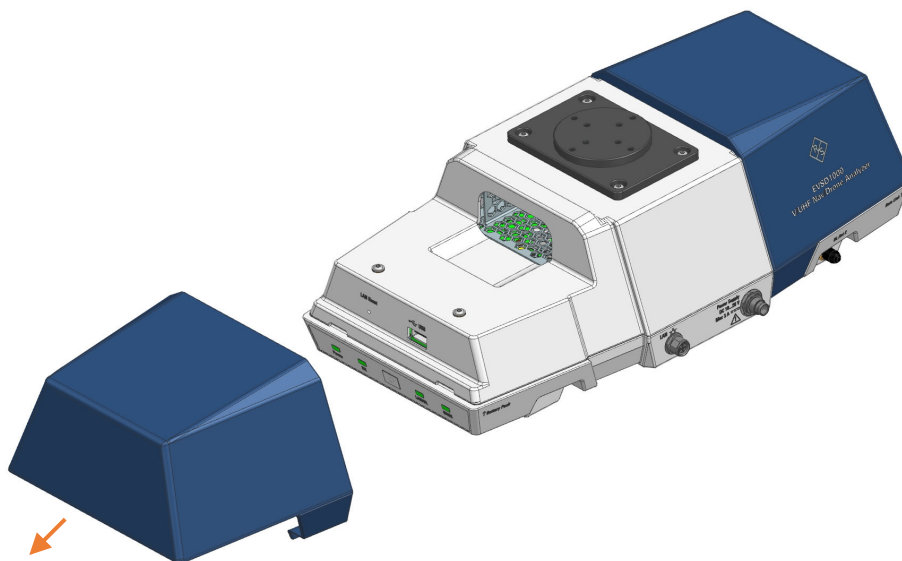
The front and rear sides of the R&S EVSD1000 are protected by two covers. Beneath the covers, you find additional connectors, the battery slot and the data link connectors. To connect devices to these connectors, you have to open the covers. Close the covers again before operation to ensure that the connectors and modules remain protected.

To open the front and rear covers

1. Pull the tabs at the bottom of the cover outwards.



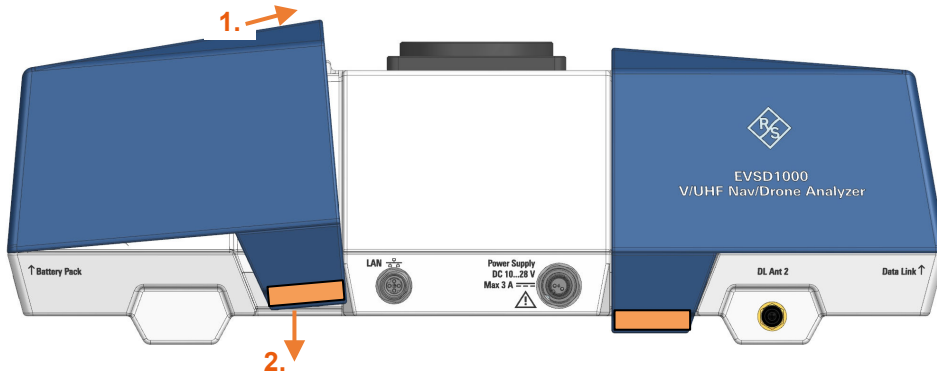
2. Lift the cover by the tabs.
3. Slide off the cover.



Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

To close the front and rear covers

1. Slide the cover onto the R&S EVSD1000 from the side.



2. Press the cover down onto the casing until the tabs lock into place.

4.5 Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

The optional R&S EVSD1-Z20 Drone adapter DJI M300 RTK allows you to connect and disconnect the R&S EVSD1000 to and from a DJI M300 drone and an ILS/VOR antenna using a quick-release system.

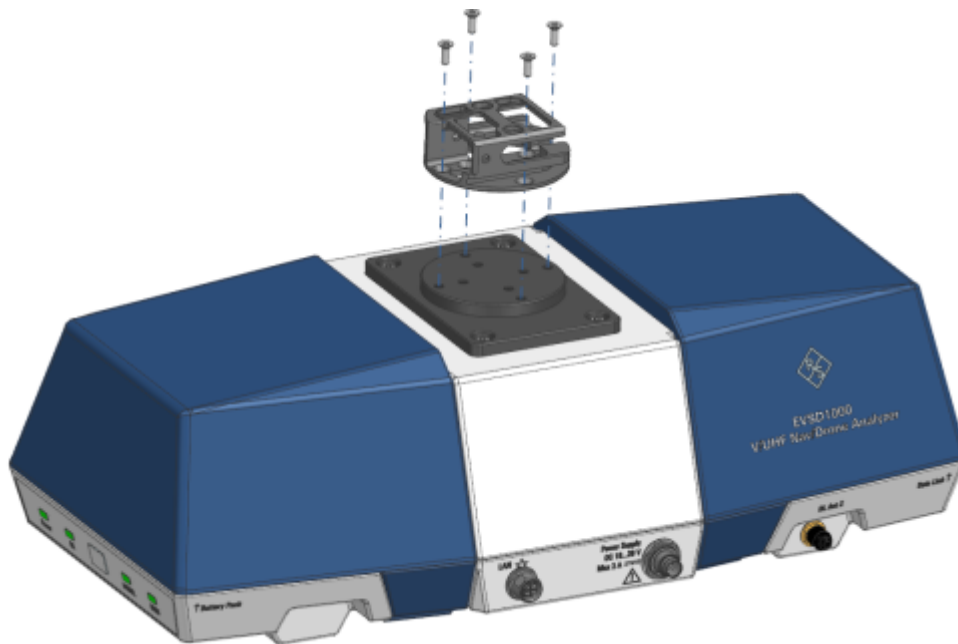
To mount the R&S EVSD1000 to a drone using the adapter set

Prerequisite:

R&S EVSD1-Z20 Drone adapter DJI M300 RTK

1. Insert 4 of the provided countersunk threadlocked screws through the top of the inner quick-release fastener.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

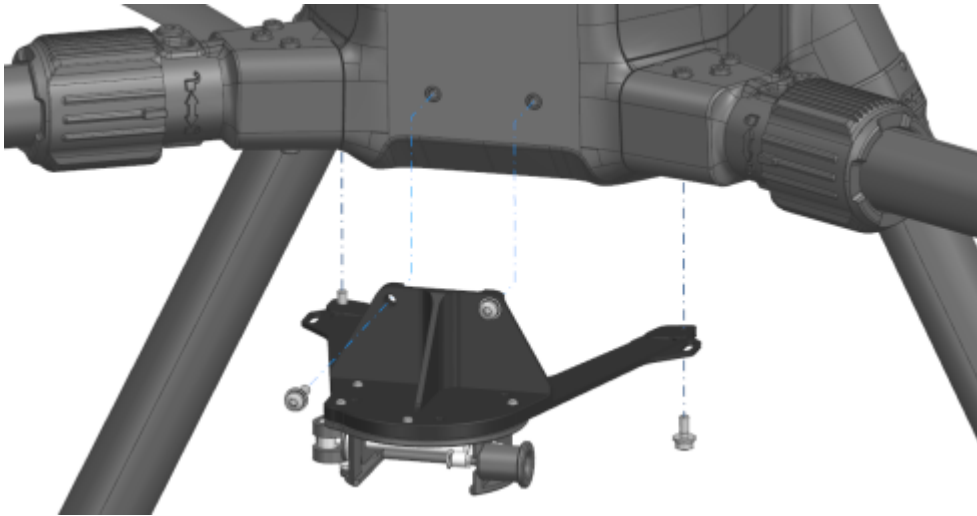


2. Screw the quick-release fastener to the outer bolt circle on the top panel of the R&S EVSD1000.
3. Insert 5 of the provided countersunk threadlocked screws through the bottom of the outer quick-release fastener.

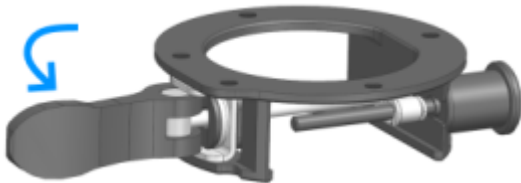


4. Screw the quick-release fastener to the drone adapter.
5. Mount the drone adapter with the quick-release fastener to the drone:

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

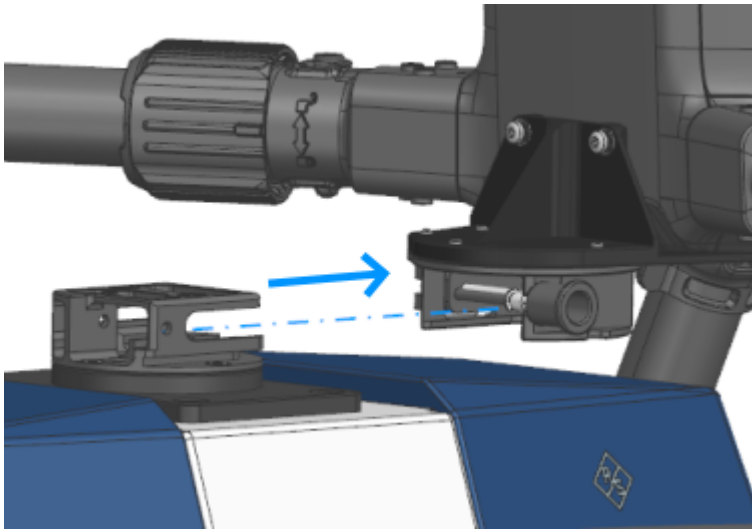


- a) Insert 2 of the provided M3x12 secured screws through the front of the drone adapter.
 - b) Screw the adapter to the front of the drone.
 - c) Insert 2 of the provided M3x8 secured screws through the bottom of the drone adapter.
 - d) Screw the adapter to the bottom of the drone.
6. Unfasten the quick-release clasp.

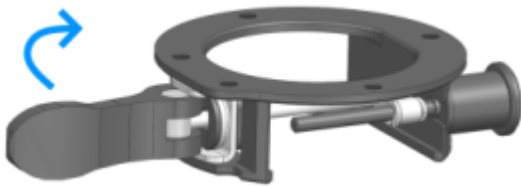


7. Insert the quick-release fastener on the R&S EVSD1000 in the quick-release counterpart on the drone until the locking pin catches.

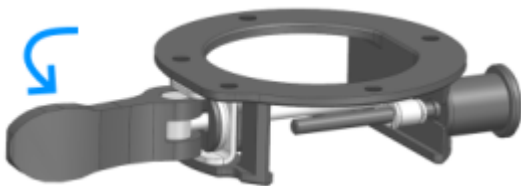
Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK



8. Make sure that the two components are connected securely.
9. Fasten the quick-release clasp.

**To remove the R&S EVSD1000 from the drone**

1. Unfasten the quick-release clasp.

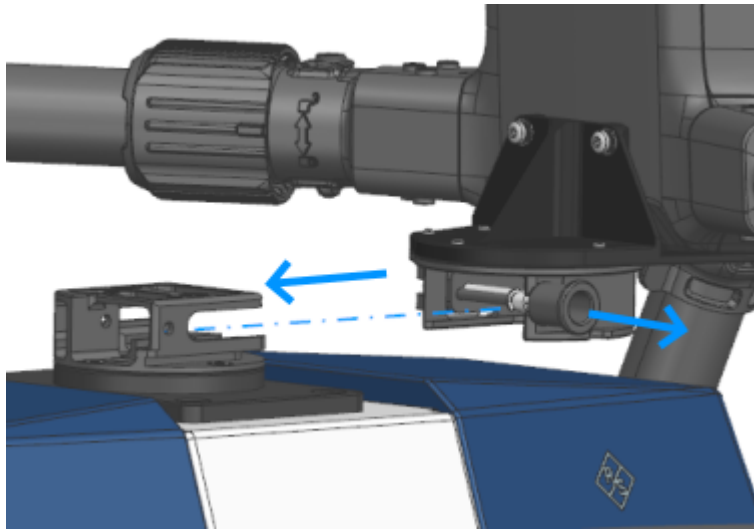


2. Pull the locking pin on the quick-release fastener.

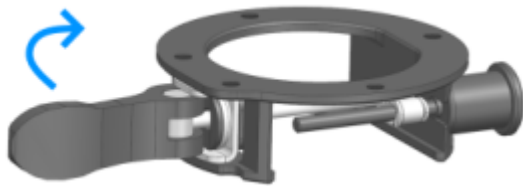


3. While holding the locking pin, carefully pull the R&S EVSD1000 out of the quick-release fastener.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK



4. Release the locking-pin.
5. Fasten the quick-release clasp.

**To connect the R&S EVSD1-Z3 V/UHF antenna to the drone adapter kit**

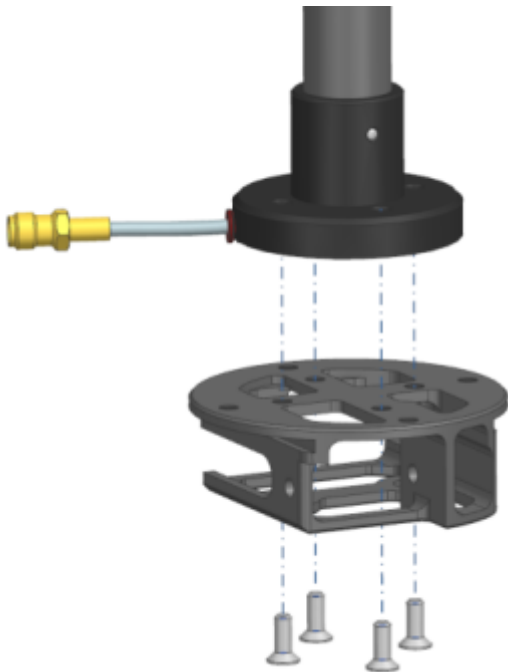
Prerequisites:

R&S EVSD1-Z20 Drone adapter DJI M300 RTK

R&S EVSD1-Z3 V/UHF antenna

1. Insert 4 of the provided countersunk threadlocked screws through the bottom of the inner quick-release fastener.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

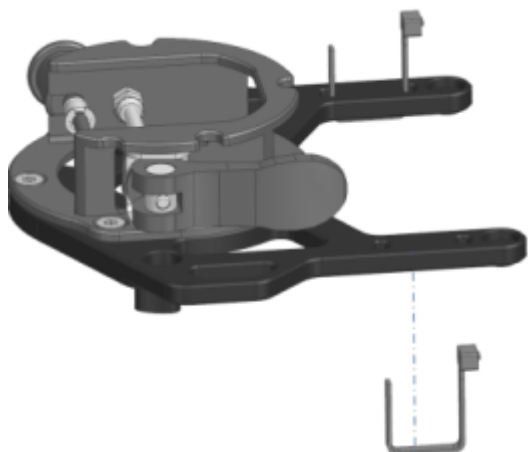


2. Place the flange of the antenna with the cable fitted in the inlet of the flange on the quick-release fastener.
3. Screw the quick-release fastener to the flange of the antenna.
4. Insert 5 of the provided countersunk threadlocked screws through the top of the outer quick-release fastener.



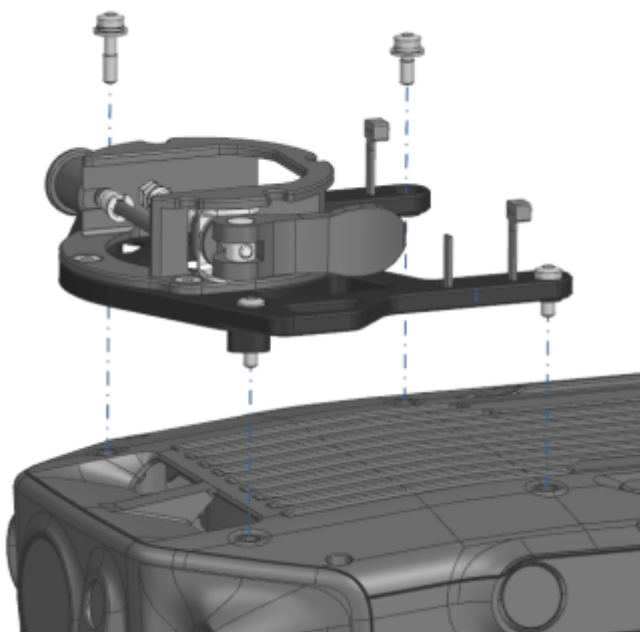
5. Screw the quick-release fastener to the antenna adapter.
6. Insert 2 cable ties in the holes of the antenna adapter. The ties are required to fasten the OSDK cable to the adapter later.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK



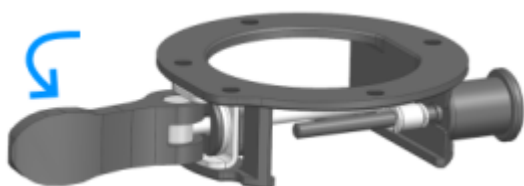
7. Insert 4 of the provided secured screws through the top of the antenna adapter:

- 2 M3x12 screws at the front
- 2 M3x8 screws at the back



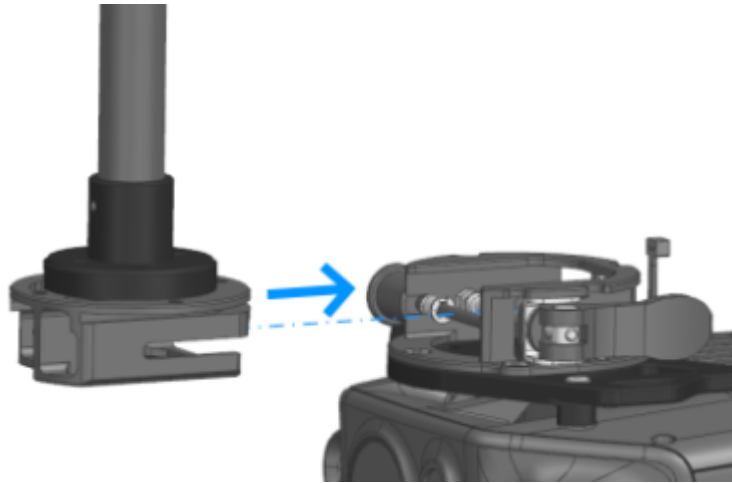
8. Screw the adapter and quick-release fastener to the top of the drone.

9. Unfasten the quick-release clasp.

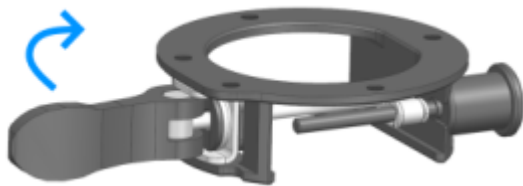


Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

10. Insert the quick-release fastener on the antenna in the quick-release counterpart on the drone until the locking pin catches.

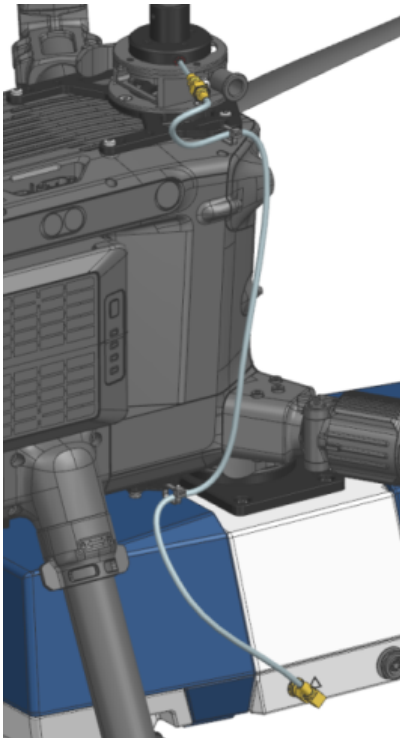


11. Make sure that the two components are connected securely.
12. Fasten the quick-release clasp.



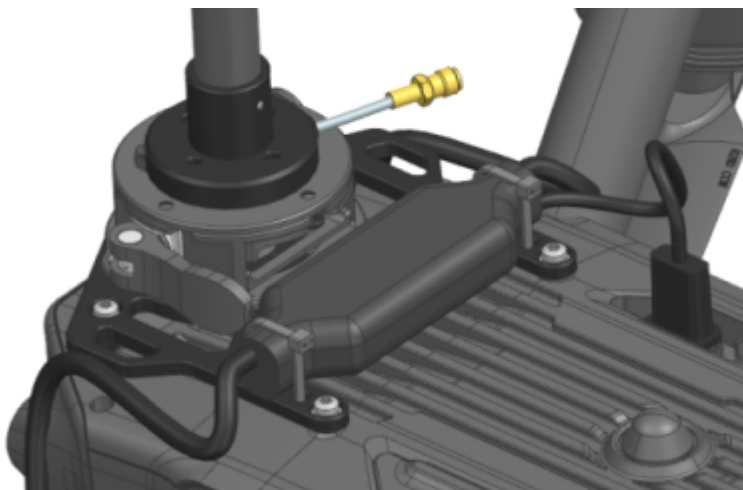
13. Connect the RF output cable ("pigtail") of the antenna to the straight end of the provided RF extension cable.
14. Connect the 90° connector of the RF extension cable to the "RX In" connector on the left panel of the R&S EVSD1000.
15. **NOTICE!** Risk of blocking the drone. Make sure that the connecting cables do not block the drone propellers or the sensors required for flight.
Secure all cables to the provided loops on both adapters using cable ties.
Make sure that the cables are fastened to the side of the drone securely.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

**To connect the OSDK cable**

The OSDK cable provides the electrical connections between the drone and the R&S EVSD1000.

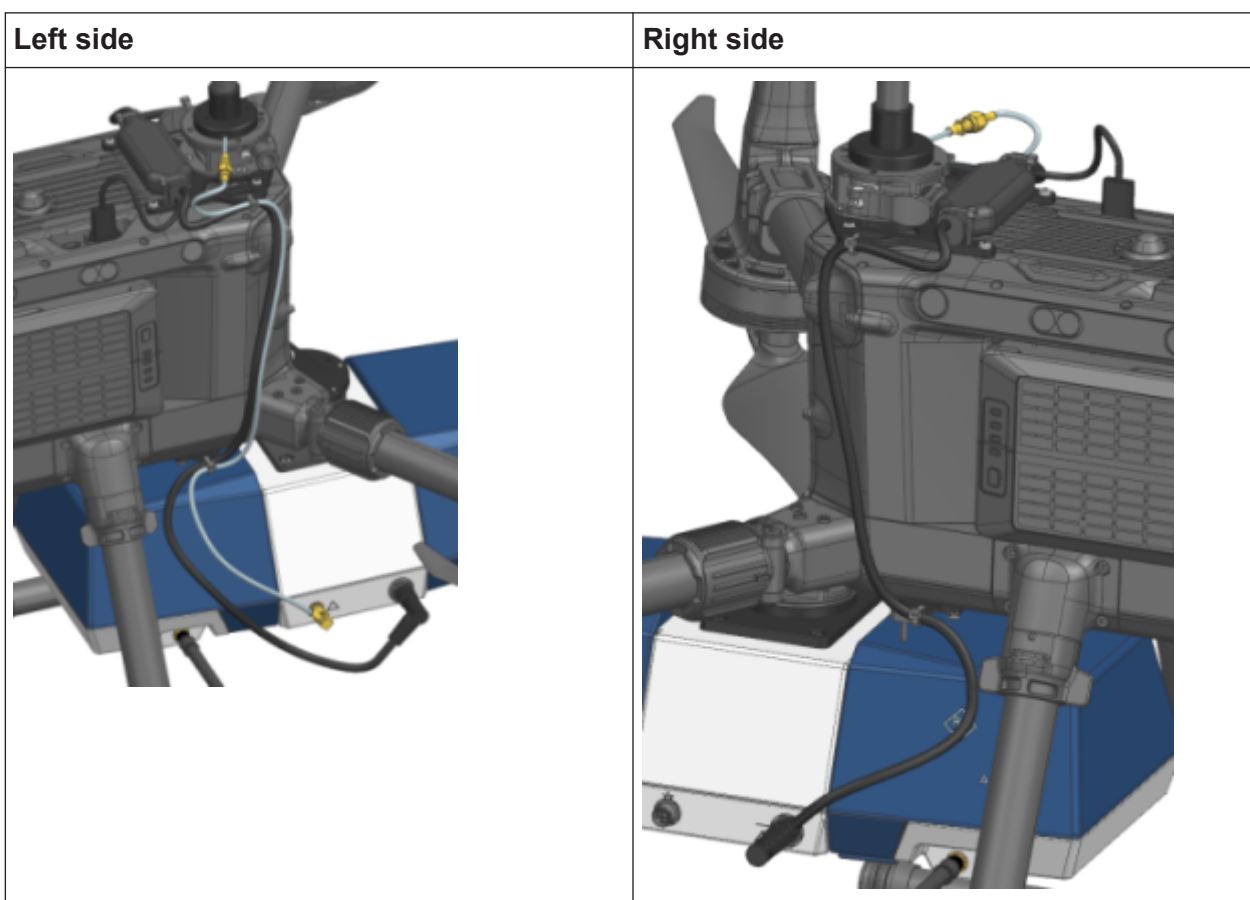
1. Place the encased part of the OSDK cable over the adapter, with the double cables facing the USB connector of the drone.



2. Fasten the OSDK cable to the adapter using the prepared cable ties.
3. Insert the USB connector of the OSDK cable in the USB connector of the drone.

Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK

4. Connect the single DC connector cable of the OSDK cable to the "Power supply" connector on the right panel of the R&S EVSD1000.
5. Connect the remaining GNSS connector cable of the OSDK cable to the "GNSS" connector on the left panel of the R&S EVSD1000.
6. **NOTICE!** Risk of blocking the drone. Make sure that the connecting cables do not block the drone propellers or the sensors required for flight.
Secure all cables to the provided loops on both adapters using cable ties.
Make sure that the cables are fastened to the side of the drone securely.



To configure GNSS reception from the drone, see [Chapter 4.10.1, "Receiving GNSS data from the DJI M300"](#), on page 40.

4.6 Connecting to LAN

You can connect the instrument to a LAN for remote operation via a remote device. For details on the connector, see [Chapter 5.3.1, "LAN \(ethernet\)"](#), on page 52.

Provided the network administrator has assigned you the appropriate rights and adapted the Windows firewall configuration, you can use the interface, for example:

- To stream measurement data from the R&S EVSD1000 to a connected device
- To access or control the measurement from a remote device using a VNC client
- To connect external network devices (e.g. printers)

NOTICE

Risk of network failure


Consult your network administrator before performing the following tasks:

- Connecting the instrument to the network
- Configuring the network
- Changing IP addresses
- Exchanging hardware

Errors can affect the entire network.

1. Connect the R&S EVSD1000 to the LAN via the LAN interface on the right panel of the instrument.
2. Start a VNC client on the connected remote device.
3. Enter the IP address of the R&S EVSD1000. The default address is the static IP address 10.255.255.98. Note that without a DHCP server, the network adapter on the remote device must use an IP address within the same TCP/IP subnet as the instrument. (Usually, that means only the last number of the IP address differs.)

Setting up a data link (Wi-Fi) connection

 When using DHCP, the IP address is assigned to the devices dynamically. In this case, if a dynamic name server (DNS) is available, you can use the permanent instrument name to access the R&S EVSD1000. The default instrument name is `EVSD<serial_number>`, for example, `EVSD123456`. For information on determining the serial number, see [Chapter 5.5.2, "Device ID"](#), on page 56.

 **Resetting the IP address**

If you do not know which IP address the instrument is currently set to, you can always reset the network settings of the instrument to their default values (LAN IP address: `10.255.255.98`, Wi-Fi access point IP address: `192.168.1.1`).

Insert a pointed tool, such as the tip of a pencil, in the [LAN reset button](#) on the front panel of the instrument, see [Chapter 5.1, "Front panel"](#), on page 47. Press the "LAN Reset" button for about 3 seconds to reset the IP address of the LAN connector and the optional data-link-module (Wi-Fi). Press the "LAN Reset" button shortly to re-establish the LAN or Wi-Fi connection without changing the settings.

For more information on LAN configuration, see the R&S EVSD1000 user manual.

4.7 Setting up a data link (Wi-Fi) connection

The R&S EVSD1000 can be equipped with an optional R&S EVSD1-Z5 Data-link-module (Wi-Fi). Thus, you can configure the R&S EVSD1000 as a Wi-Fi access point for wireless communication from a remote device. The data-link-module (Wi-Fi) is connected using the connectors in the data link slot on the rear of the R&S EVSD1000 (see [Chapter 5.4, "Rear panel"](#), on page 54).

Setting up a data link (Wi-Fi) connection

To connect the optional R&S EVSD1-Z5 Data-link-module (Wi-Fi)

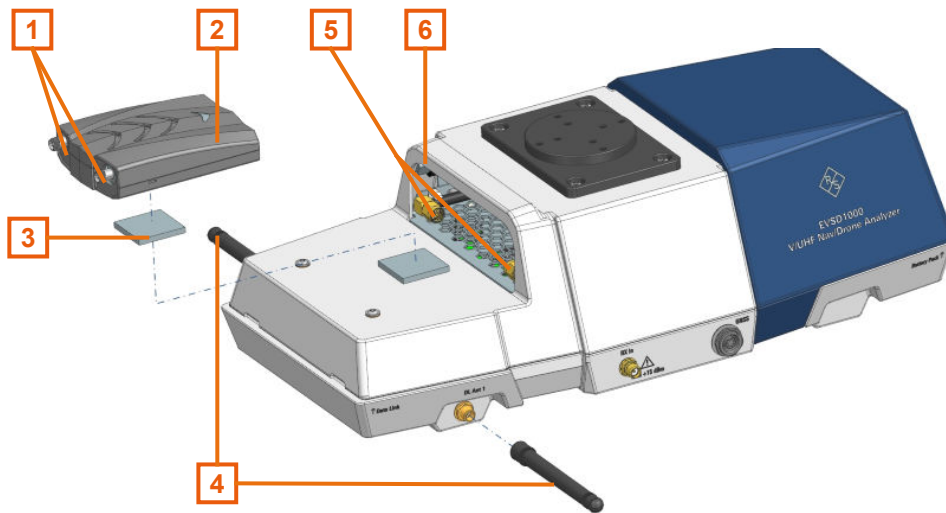


Figure 4-3: Connecting the R&S EVSD1-Z5 Data-link-module (Wi-Fi)

- 1 = RP-SMA connectors data-link-module (Wi-Fi)
- 2 = USB-C connector data-link-module (Wi-Fi)
- 3 = Hook-and-loop fastener
- 4 = Data link antennas with RP-SMA connectors
- 5 = RP-SMA cables data link slot
- 6 = USB-C cable data link slot

1. Open the rear cover of the R&S EVSD1000 as described in [Chapter 4.4, "Opening and closing the front and rear covers"](#), on page 19.
2. A hook-and-loop fastener is taped to the R&S EVSD1000, in front of the data link slot. Tape the upper part of the fastener to the data-link-module (Wi-Fi) as shown in [Figure 4-3](#).
3. Plug the USB-C cable from the R&S EVSD1000 data link slot in the USB-C connector on the data-link-module (Wi-Fi).
4. Screw both RP-SMA cables from the R&S EVSD1000 data link slot to the data-link-module (Wi-Fi) RP-SMA connectors.
5. Insert the data-link-module (Wi-Fi) in the data link slot of the R&S EVSD1000 until the hook-and-loop fasteners are connected.
6. **NOTICE!** Risk of blocking the drone. Make sure that the antennas and connecting cables do not block the drone propellers or the sensors required for flight.

Connect the short, non-bendable data-link antennas provided with the R&S EVSD1-Z5 Data-link-module (Wi-Fi) to the "DL Ant 1"/ "DL Ant 2" con-

Setting up a data link (Wi-Fi) connection

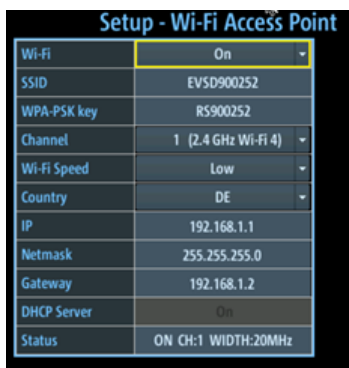
nectors on the left and right panel of the R&S EVSD1000 (see [Chapter 5.2.1, "Data link antenna connector"](#), on page 51).

To set up a data link (Wi-Fi) connection

Before you start the R&S EVSD1000, connect the data-link-module (Wi-Fi) to the R&S EVSD1000. Otherwise, the R&S EVSD1000 does not determine the IP information automatically.

1. Switch on the R&S EVSD1000.

The R&S EVSD1000 is configured as a Wi-Fi access point using a DHCP server. By default, the following settings are defined.



| Setup - Wi-Fi Access Point | |
|----------------------------|---------------------|
| Wi-Fi | On |
| SSID | EVSD900252 |
| WPA-PSK key | RS900252 |
| Channel | 1 [2.4 GHz Wi-Fi 4] |
| Wi-Fi Speed | Low |
| Country | DE |
| IP | 192.168.1.1 |
| Netmask | 255.255.255.0 |
| Gateway | 192.168.1.2 |
| DHCP Server | On |
| Status | ON CH:1 WIDTH:20MHz |

2. Usually, you can access the R&S EVSD1000 using the default IP address and Wi-Fi password without further configuration. The default IP address is 192.168.1.1. The default Wi-Fi password is RS<serial_number>, e.g. RS123456. For information on determining the serial number, see [Chapter 5.5.2, "Device ID"](#), on page 56.

If necessary, configure the data link information for your network.

For details, see the R&S EVSD1000 user manual.

Resetting the IP address

If you do not know which IP address the instrument is currently set to, you can always reset the network settings of the instrument to their default values (LAN IP address: 10.255.255.98, Wi-Fi access point IP address: 192.168.1.1).

Insert a pointed tool, such as the tip of a pencil, in the [LAN reset button](#) on the front panel of the instrument, see [Chapter 5.1, "Front panel"](#), on page 47. Press the "LAN Reset" button for about 3 seconds to reset the IP address of the LAN connector and the optional data-link-module (Wi-Fi). Press the "LAN Reset" button shortly to re-establish the LAN or Wi-Fi connection without changing the settings.

4.8 Connecting to power

The R&S EVSD1000 is equipped with a DC power supply connector that can be connected to the board power of a drone. Optionally, you can operate the R&S EVSD1000 by a battery (R&S EVSD1-Z1 Battery pack).


For use without a drone, you can use an optional external AC/DC power supply unit (R&S EVSG1-Z8 Power supply) or a battery.

For safety information, see "[Connecting to power](#)" on page 7.

- [Connecting the R&S EVSD1000 to an external DC power source](#)..... 34
- [Using an optional battery pack](#)..... 35
- [Connecting the R&S EVSD1000 to AC power](#)..... 37

4.8.1 Connecting the R&S EVSD1000 to an external DC power source

You can connect the R&S EVSD1000 to an external DC power source, such as the board power of the drone. The power supply must provide a voltage of 10 V DC to 28 V DC.

-  If you use the optional R&S EVSD1-Z20 Drone adapter DJI M300 RTK, power supply is provided by the OSDK cable. See [Chapter 4.5, "Mounting the R&S EVSD1-Z20 Drone adapter DJI M300 RTK"](#), on page 20.

If the external power supply unit supplies safety extra-low DC voltage (SELV) to the instrument, be sure to meet the requirements for reinforced/double insulation in accordance with DIN/EN/IEC 61010 (UL 3111, CSA C22.2 No. 1010.1) or DIN/EN/IEC 60950 (UL 1950, CSA C22.2 No. 950). Provide current limitation in accordance with DIN EN 61010-1 appendix F2.1.

Connect the R&S EVSD1000 to an external DC power source as follows:

1. Connect the XLR connection cable provided with the instrument to the Power supply connector on the left panel of the R&S EVSD1000.
2. **NOTICE!** Risk of instrument damage. Excess current from the external DC power source to the instrument can cause a short-circuit, which can damage the instrument or power supply unit.

Always insert a 3 AT H fuse in the power supply connection to protect the instrument.

3. Connect the XLR connection cable to the DC power supply.
If you have to extend the cable, ensure that the entire cable has a cross section of at least 1.5 mm².

The "Power" LED on the front panel of the R&S EVSD1000 lights up (see [Table 5-1](#)).

4.8.2 Using an optional battery pack

As an alternative to the fixed DC power supply, you can operate the R&S EVSD1000 by a battery pack. Use only the original battery pack R&S EVSD1-Z1 Battery pack.

If the battery option was ordered together with the instrument, the R&S EVSD1000 comes with the battery management and battery pack already installed. Otherwise these options must be installed by Rohde & Schwarz service personnel.

For safety information, see "[Handling batteries safely](#)" on page 7.

If the battery pack is installed and no DC power is supplied, the R&S EVSD1000 automatically switches to battery operation. The power mode and charge condition of the battery are indicated by the "Power" LED on the front panel of the R&S EVSD1000 (see [Table 5-1](#)).

Charging batteries

Charge the battery before using it for the first time. Following a long storage period, it can be necessary to charge and discharge the battery several times to reach full capacity. The battery can only be charged outside the R&S EVSD1000 using the R&S EVSD1-Z2 Battery charger.

Look up the following details in the data sheet:

- Charging conditions
- Recharging interval to avoid deep discharge

For information on storing and disposal of a battery pack, see the R&S EVSD1000 user manual, chapter "Maintenance".

Replacing batteries

To replace the battery

1. **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first. Proceed as described in [Chapter 4.11, "Switching on or off"](#), on page 45.
2. Disconnect the power supply.
3. Open the front cover from the R&S EVSD1000 as described in [Chapter 4.4, "Opening and closing the front and rear covers"](#), on page 19.
4. Pull the strap on the battery pack horizontally to remove the empty battery from the R&S EVSD1000.

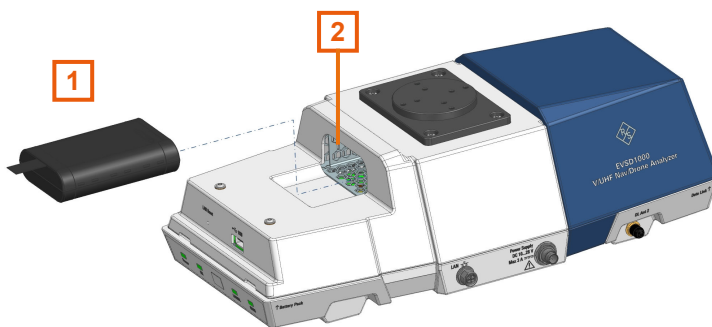


Figure 4-4: Replacing a battery pack

- 1 = Battery pack with strap
2 = Battery slot at front of the R&S EVSD1000


5. Charge the battery pack using the R&S EVSD1-Z2 Battery charger.

Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000

6. Insert the charged battery pack into the slot at the front of the R&S EVSD1000 with the charge state indicator LED facing upwards.
7. Push the battery pack onto the connector in the R&S EVSD1000.
8. Close the instrument cover as described in ["To close the front and rear covers"](#) on page 20.

4.8.3 Connecting the R&S EVSD1000 to AC power

If you need to operate the R&S EVSD1000 without a drone, you can use an AC/DC power supply unit, available as an accessory. When connecting to an AC power supply, only use the R&S EVSG1-Z8 Power supply.

 Only operate the external power supply R&S EVSG1-Z8 Power supply up to an altitude of 2000 m. See also the R&S EVSG1-Z8 Power supply data sheet.

Connect the R&S EVSD1000 to AC power as follows:

1. Connect the DC connector on the AC/DC power supply unit to the Power Supply connector on the left side of the R&S EVSD1000 (see [Chapter 5.3.2, "DC power supply"](#), on page 53).
2. Plug the AC power cable into the AC/DC power supply connector. Only use the AC power cable delivered with the power supply unit.
The required ratings are indicated next to the AC power connector and in the power supply unit's data sheet.
3. Plug the AC power cable into a two-pin power outlet with ground contact.
The green operating LED of the AC/DC power supply connector lights up.
The green Power LED on the front panel of the R&S EVSD1000 lights up.

4.9 Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000

If you do not have the optional R&S EVSD1-Z20 Drone adapter DJI M300 RTK, you can connect a receiving antenna to the bottom of the R&S EVSD1000.

Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000

To connect a receiving antenna to the bottom of the R&S EVSD1000

Prerequisites:

R&S EVSD1-Z3 V/UHF antenna

R&S EVSD1000 bottom antenna adapter (accessory to the R&S EVSD1000)

1. On the bottom panel of the R&S EVSD1000, unscrew the protection cover.

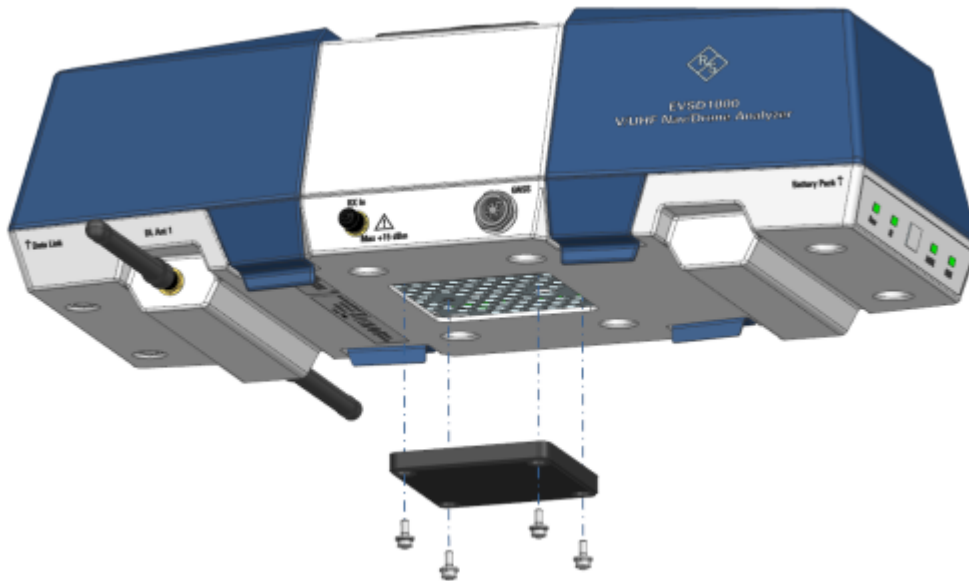
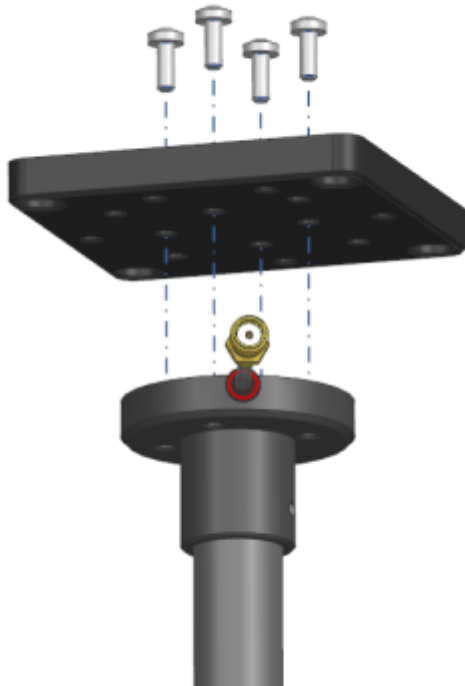


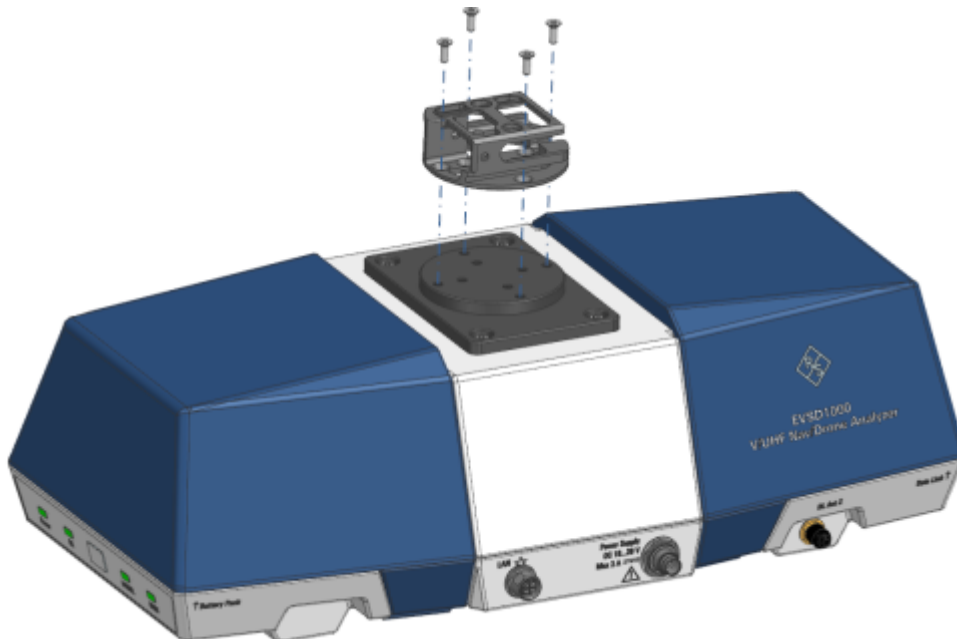
Figure 4-5: Removing the protection cover from the bottom panel

2. Insert four secured screws through the top of the antenna adapter.
3. Place the adapter on the flange of the antenna with the cable fitted in the inlet of the flange.

Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000



4. Screw the adapter to the flange of the antenna.
5. Insert four protected screws from below the antenna adapter.
6. Screw the adapter and antenna to the bottom panel of the R&S EVSD1000 with the antenna facing the flight direction.



7. Connect the RF output cable ("pig tail") of the receiving antenna to the provided RF extension cable.
8. Connect the RF extension cable to the "RX In" connector on the left panel of the R&S EVSD1000.

4.10 Connecting to GNSS

A GNSS receiver provides synchronization data for time and positioning results.

There are three ways to provide GNSS data to the R&S EVSD1000:

- Using the GNSS information from the drone
- Using the R&S EVSD1-Z6 GNSS RTK device (rover) and R&S EVSD1-Z7 GNSS antenna options
- Using a customer-specific GNSS receiver and antenna

You configure the used GNSS source on the R&S EVSD1000.

- [Receiving GNSS data from the DJI M300](#)..... 40
- [Using an optional GNSS antenna and receiver](#)..... 42
- [Using a customer-specific GNSS antenna and receiver](#)..... 44

4.10.1 Receiving GNSS data from the DJI M300

You can connect the R&S EVSD1000 to a DJI M300 and use the drone as a source for position and time data. Thus, the R&S EVSD1000 does not require an additional GNSS receiver.

To obtain the DJI M300 information

Prerequisites:

DJI Assistant 2 (Enterprise series) software (see <https://www.dji.com/>)

DJI developer account (see <https://developer.dji.com>)

1. In the DJI developer portal, register an Onboard SDK (OSDK) application for your DJI M300. For details on registration, see the developer documentation provided by the drone manufacturer.
2. In the DJI Assistant software, enable the OSDK API control. Optionally, change the baud rate. The default value is 230400.

You do not have to define other settings, as the R&S EVSD1000 automatically enables the required data sets.

- In the DJI developer portal, find the application ID and key for your drone.

APP INFORMATION

| | |
|-------------|--|
| SDK Type | Onboard SDK |
| APP Name | M300DataLink |
| APP ID | 1128261 |
| App Key | 888862a219181a44d25472b6b4e990248779a2128a571013113a414885 |
| App License | <small>The license details are provided in the DJI Developer Portal. For more information, please refer to the DJI Developer Portal. The license is provided for the DJI M300 Data Link application. The license is provided for the DJI M300 Data Link application. The license is provided for the DJI M300 Data Link application.</small> |
| Category | Telemetry |
| Description | M300 Data Link |

Figure 4-6: Example of application information shown in the DJI developer portal (2022)

To enable DJI M300 support on the R&S EVSD1000

Prerequisites:

The application ID and key for the registered drone application

LAN access to the R&S EVSD1000 for remote control (see [Chapter 4.6, "Connecting to LAN"](#), on page 30)

The OSDK connection cable is connected to the "GNSS" connector on the left panel of the R&S EVSD1000 (see [Chapter 5.2.3, "GNSS connector"](#), on page 51).

- Connect a terminal client, e.g. "putty" (<https://www.putty.org>) to the R&S EVSD1000 using the TCP port 8000. The required commands are simple text commands, not SCPI-conform. Use any line-based command tool, such as telnet, to send commands to the R&S EVSD1000. For more information on the commands described here, see the R&S EVSD1000 user manual.
- Specify the application ID on the R&S EVSD1000 by sending the remote command `DJI : APPID.`

For example:

```
DJI:APPID 1120702
```

3. Specify the application key on the R&S EVSD1000 by sending the remote command `DJI:KEY`.

For example:

```
DJI:KEY 87df76162e58ab5438453e03e493b7b5c15488d3e301a...
```

4. To use a data rate (baud rate) other than the default 230400, define the rate on the R&S EVSD1000 by sending the remote command `DJI:BAUDRATE`.

For example:

```
DJI:BAUDRATE 230400
```

The R&S EVSD1000 is ready to communicate with the DJI M300 drone.

To configure the GNSS source on the R&S EVSD1000

Prerequisite:

LAN or Wi-Fi connection between the R&S EVSD1000 and a PC (see [Chapter 4.6, "Connecting to LAN"](#), on page 30 and [Chapter 4.7, "Setting up a data link \(Wi-Fi\) connection"](#), on page 31).

1. On the R&S EVSD1000, in the "Setup - GPS / GNSS" settings, select the "Interface": "DJI_M300".

Note that it can take up to 30 seconds after switching on or connecting to the drone before the R&S EVSD1000 receives GNSS data. See the GNSS status indicator LED on the front panel of the R&S EVSD1000.

2. Define which part of the signal is used for synchronization: "PPS-Sync": "GNSS rising".

For details, see the R&S EVSD1000 user manual.

4.10.2 Using an optional GNSS antenna and receiver

An optional GNSS antenna and receiver are available for the R&S EVSD1000.

- R&S EVSD1-Z6 GNSS RTK device (rover) with GNSS interface (includes USB,RS-232, PPS)
- R&S EVSD1-Z7 GNSS antenna
For enhanced precision using RTK correction data, a dual-band GNSS antenna is required (order no. 3657.0756.00).

The R&S EVSD1-Z6 GNSS RTK device is based on the μ Blox F9P GNSS receiver module. The receiver is preconfigured at the factory for use with the R&S EVSD1000.

For a description of the required configuration and recommended settings for use with the R&S EVSD1000, see the R&S EVSD1000 user manual.

For more information, see the μ Blox documentation (<https://www.u-blox.com>).

To connect the R&S EVSD1-Z6 GNSS RTK device (rover) and R&S EVSD1-Z7 GNSS antenna

1. Connect the GNSS antenna to the SMA connector on the GNSS receiver. Make sure that the antenna has a clear view to the sky.
2. Using the provided GNSS cable, connect the GNSS receiver to the "GNSS" connector on the left panel of the R&S EVSD1000 (see [Figure 5-2](#)).

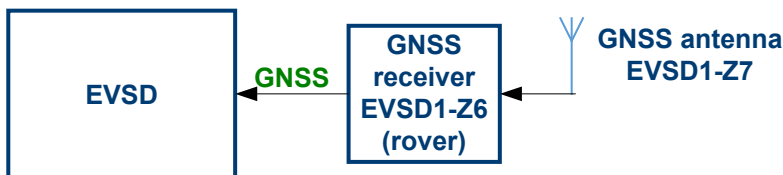


Figure 4-7: Connection of the R&S EVSD1-Z6 GNSS RTK device (rover)

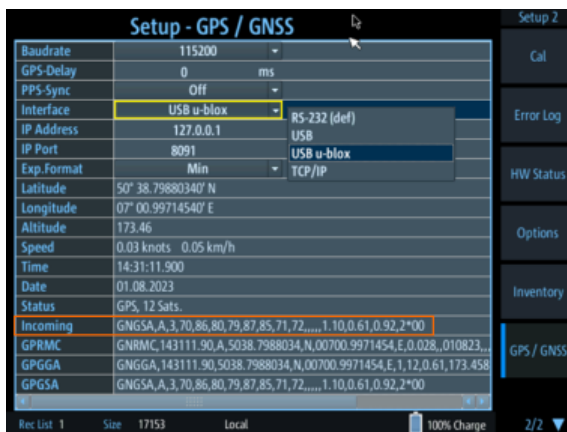
To configure the GNSS source on the R&S EVSD1000

Prerequisite:

LAN or Wi-Fi connection between the R&S EVSD1000 and a PC (see [Chapter 4.6, "Connecting to LAN"](#), on page 30 and [Chapter 4.7, "Setting up a data link \(Wi-Fi\) connection"](#), on page 31).

1. On the R&S EVSD1000, in the "Setup - GPS / GNSS" settings, select the "Interface": "USB u-blox".
As an alternative, you can use a serial "RS-232" interface connection. In this case, also define the correct "Baudrate".
2. Define which part of the signal is used for synchronization: "PPS-Sync": "PPS In Falling".
For details, see the R&S EVSD1000 user manual.

If the GNSS receiver is connected correctly, the "Setup - GPS / GNSS" window shows the incoming GNSS information ("Incoming").



If no PPS information is available, a red warning is displayed in the status bar of the R&S EVSD1000.

4.10.3 Using a customer-specific GNSS antenna and receiver

To obtain GNSS data using a GNSS antenna and receiver

1. Connect the GNSS antenna to the GNSS receiver.
2. Adapt the provided open-ended GNSS cable as required (see [Chapter 5.2.3, "GNSS connector"](#), on page 51).
3. Using the provided GNSS cable, connect the GNSS receiver to the "GNSS" connector on the left panel of the R&S EVSD1000 (see [Figure 5-2](#)).
4. Set up a LAN or Wi-Fi connection between the R&S EVSD1000 and a PC (see [Chapter 4.6, "Connecting to LAN"](#), on page 30 and [Chapter 4.7, "Setting up a data link \(Wi-Fi\) connection"](#), on page 31).
5. On the R&S EVSD1000, in the "Setup - GPS / GNSS" settings, select the interface that provides the GNSS data, e.g. RS-232 or TTL.

4.11 Switching on or off

To switch on the product

The product is off but connected to power.

- ▶ Press the power on/off switch. See [Chapter 5.1.3, "Power on/off switch"](#), on page 48.

The "Power" LED on the front panel of the R&S EVSD1000 lights up (see [Table 5-1](#)). The product boots.

To shut down the product

The R&S EVSD1000 is in the ready state.

- ▶ Press the power on/off switch. See [Table 5-1](#).

The operating system shuts down. The "Power" LED turns off (see [Chapter 5.1.1, "Power LED"](#), on page 48). While shutting down, the last settings are stored on the instrument.

To disconnect from power

- ▶ **NOTICE!** Risk of data loss. If you disconnect the product from power when it is in the ready state, you can lose settings and data. Shut it down first.

Disconnect the product from the power source.

4.12 Performing an autocalibration

After setting up the R&S EVSD1000, perform an autocalibration to ensure the accuracy of the measurements. After initial setup, we recommend that you perform an autocalibration every 2 months or if the difference of the environment temperature changes by more than 10 °C.

If valid data for automatic calibration is not available, the message "UNCAL" is displayed in the status line of the R&S EVSD1000 display.



R&S EVSG1-Z11 Verification test software

To maintain and prove the outstanding performance of the R&S EVSD1000, regular verification is mandatory, as is common for high accuracy instruments. The R&S EVSG1-Z11 Verification test software enables the customer to verify the R&S EVSD1000 on site. The main task of the R&S EVSG1-Z11 Verification test software is to provide nav aids signals that are more accurate than the R&S EVSD1000 itself. By reading the measurement results of the R&S EVSD1000 and comparing the values with the generated signal, the correct operation of the R&S EVSD1000 is proven.

For details, see the R&S EVSG1-Z11 Verification test software manual.

To perform an autocalibration

Prerequisites:

To perform an autocalibration, you require remote access to the instrument via LAN. For details see [Chapter 6.3, "Remote control"](#), on page 66.

Make sure that the instrument has reached its operating temperature (after about 15 minutes of operation; for details, refer to the data sheet). A message in the status bar ("Instrument warming up...") indicates that the operating temperature has not yet been reached.

During the autocalibration procedure, do not apply any input signal to the R&S EVSD1000.

1. Using the VNC viewer, select [n] > [F8] > [F1]
2. Select "Start Autocal".
3. Press [Enter].

The "Setup - CAL" display shows the status for each calibration step. When completed, after a few minutes, all entries must have the status "OK".

For more information on autocalibration, see the R&S EVSD1000 user manual.

5 Instrument tour

5.1 Front panel

This chapter describes the front panel, including all function keys and connectors. Note that some of the connectors are behind a protective cover, see [Chapter 4.4, "Opening and closing the front and rear covers"](#), on page 19.

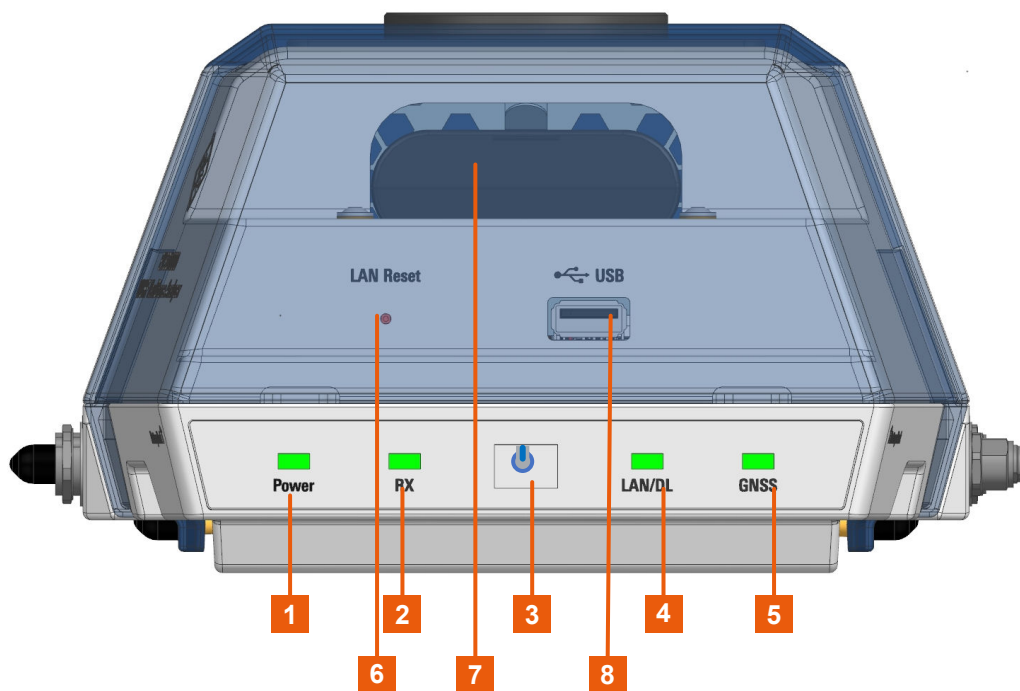


Figure 5-1: R&S EVSD1000 - Front panel view (with semi-transparent cover)

- 1 = [Chapter 5.1.1, "Power LED"](#), on page 48
- 2 = [Chapter 5.1.2, "RX input LED"](#), on page 48
- 3 = [Chapter 5.1.3, "Power on/off switch"](#), on page 48
- 4 = [Chapter 5.1.4, "LAN/ data link LED"](#), on page 49
- 5 = [Chapter 5.1.5, "GNSS LED"](#), on page 49
- 6 = [Chapter 5.1.6, "LAN reset button"](#), on page 49
- 7 = [Optional Li-Ion battery](#), see [Chapter 5.3.2, "DC power supply"](#), on page 53
- 8 = [Chapter 5.1.7, "USB-A connector"](#), on page 50

5.1.1 Power LED

Indicates whether the power is supplied by an external DC power supply or the optional R&S EVSD1-Z1 Battery pack. In battery mode, the charge condition is indicated.

Table 5-1: Overview of Power LED states

| LED | Power supply | Status instrument |
|------------------------|------------------------------------|-------------------|
| Off | No power supply | Off |
| green, flashing | External DC power supply | Off |
| green, blinking slowly | | Booting |
| green | | Ready |
| blue, flashing | Internal battery | Off |
| blue, blinking slowly | | Booting |
| blue | Charge condition > 50 % | Ready |
| orange | Charge condition > 20 % and < 50 % | |
| red | Charge condition < 20 % | |
| red (blinking) | Charge condition < 10 % | |

5.1.2 RX input LED

Indicates the state of the RX input from the R&S EVSD1-Z3 V/UHF antenna.

Table 5-2: Overview of input states

| LED | Status |
|--------|-------------------------|
| Off | Instrument off |
| green | Valid signal |
| yellow | Invalid signal detected |
| red | No signal detected |

5.1.3 Power on/off switch

Switches the R&S EVSD1000 on and off. When the instrument is ready for operation, the **Power LED** lights green.

See also [Chapter 4.11, "Switching on or off"](#), on page 45.

5.1.4 LAN/ data link LED

Indicates the state of the LAN or data link connection. See [Chapter 5.3.1, "LAN \(ethernet\)"](#), on page 52 and [Chapter 5.2.1, "Data link antenna connector"](#), on page 51.

Table 5-3: Overview of connection states

| LED | Status |
|------------------|---|
| Off | Instrument off |
| orange | Active WLAN connection |
| blue | TCP/IP connection on port 8000 (remote) |
| green (blinking) | Data transfer via LAN |

5.1.5 GNSS LED

Indicates whether a valid GNSS signal, and which type, is received from the R&S EVSD1-Z7 GNSS antenna.

Table 5-4: Overview of connection states

| LED | Status |
|--------|--------------------------|
| red | No GNSS signal available |
| yellow | GNSS signal |
| green | DGNSS signal |
| blue | RTK signal |

5.1.6 LAN reset button

The "LAN Reset" SMD button resets the network settings of the optional data-link-module (Wi-Fi) and the LAN connector. The button is only accessible via a pointed tool to avoid accidental resets.

Press the "LAN Reset" button shortly to re-establish the LAN or Wi-Fi connection without changing the settings.

Press the "LAN Reset" button longer (approximately 3 seconds) to reset the network settings of the instrument to their default values (LAN IP address: 10.255.255.98, Wi-Fi access point IP address: 192.168.1.1).

See also [Chapter 4.6, "Connecting to LAN"](#), on page 30.

5.1.7 USB-A connector

The front panel provides a female USB connector (USB-A, 2.0 standard) to connect storage devices like a memory stick.

The memory stick is used to store and reload instrument settings, to perform software updates and to export measurement data.

5.2 Left panel

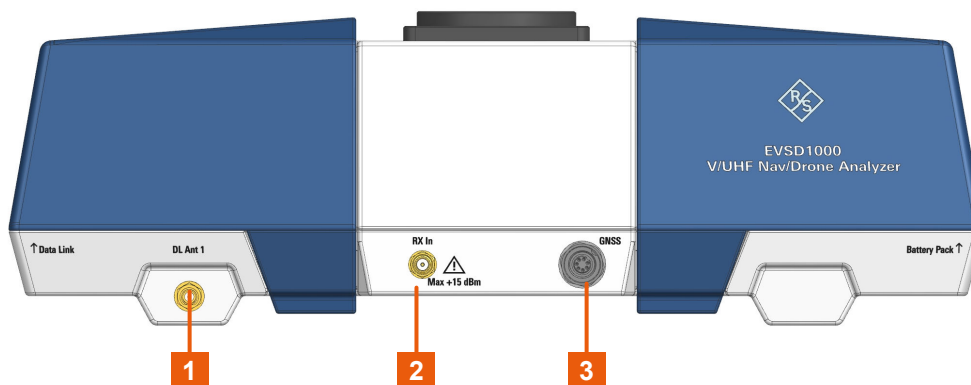


Figure 5-2: R&S EVSD1000 - Left panel view

1 = Data link antenna 1, see [Chapter 5.2.1, "Data link antenna connector"](#), on page 51

2 = [Chapter 5.2.2, "RX In connector"](#), on page 51

3 = [Chapter 5.2.3, "GNSS connector"](#), on page 51

For the specification of the following interfaces, see the R&S EVSD1000 data sheet.

- [Data link antenna connector](#)..... 51
- [RX In connector](#)..... 51
- [GNSS connector](#)..... 51

5.2.1 Data link antenna connector

SMA connector for a data link antenna if an internal R&S EVSD1-Z5 Data-link-module (Wi-Fi) is installed.

Another data link antenna connector is provided on the right panel of the R&S EVSD1000, see [Figure 5-3](#).

5.2.2 RX In connector

The RX input connector is a 50 Ω SMA connector. Use the RX input connector to provide signal input (max. +13 dBm) from a R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000.

The antenna itself is connected to the bottom panel of the R&S EVSD1000, see [Chapter 5.5, "Bottom panel"](#), on page 55.

5.2.3 GNSS connector

M9 IP67 connector with 7 contacts for a GNSS receiver, for various types of geo-positioning data, including PPS input. The connector supports USB, RS232 and TTL (Uart) signals. The used standard is configured in the software.

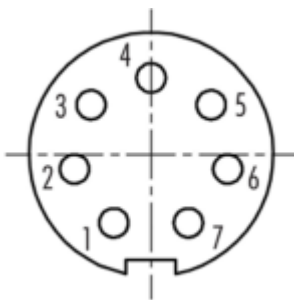


Table 5-5: Pin assignment of the GNSS connector

| Pin | Signal name | Usage |
|-----|-------------|---------------------|
| 1 | PPS | PPS input |
| 2 | RXD | RS232 receive data |
| 3 | TXD | RS232 transmit data |
| 4 | GND | 0 V ground |
| 5 | D+ | USB data positive |
| 6 | D- | USB data negative |

| Pin | Signal name | Usage |
|--------|-------------|-------------------|
| 7 | 5V | power supply +5 V |
| Shield | Shield | Shield |

5.3 Right panel

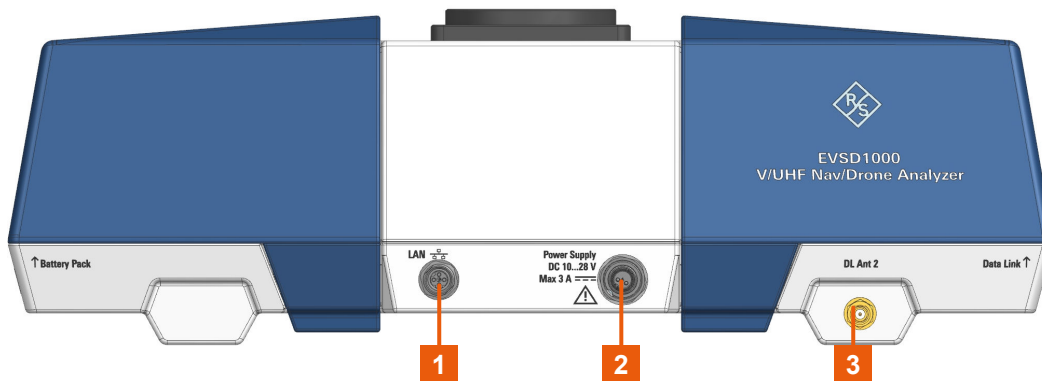


Figure 5-3: R&S EVSD1000 - Right panel view

1 = [Chapter 5.3.1, "LAN \(ethernet\)"](#), on page 52

2 = [Chapter 5.3.2, "DC power supply"](#), on page 53

3 = Data link antenna 2 connector, see [Chapter 5.2.1, "Data link antenna connector"](#), on page 51

5.3.1 LAN (ethernet)

M8-D IP67 connector with 4 contacts providing a FastEthernet LAN connection. The pins are assigned according to IEC 61076-2-114.

Operate the R&S EVSD1000 remotely using the LAN connection (Fast Ethernet). The LAN connection can also be used to stream measurement data (TCP port 8000; for I/Q data: 8001). The data transfer rate is 100 Mbit/s.

Using a VNC viewer, you can perform hardkey and softkey tasks on the R&S EVSD1000 in a LAN via shortcuts on a remote keyboard.

For details about remote control, see the "Remote Control" chapter in the R&S EVSD1000 user manual.

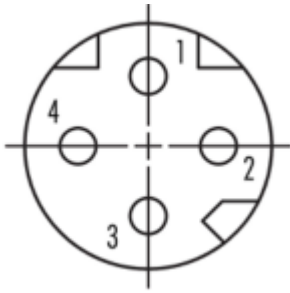


Table 5-6: Pin assignment of the LAN M8-D IP67 connector

| Pin | Signal name | Usage |
|--------|-------------|------------------------|
| 1 | TXP | Transmit data positive |
| 2 | RXP | Receive data positive |
| 3 | TXN | Transmit data negative |
| 4 | RXN | Receive data negative |
| Shield | Shield | Shield |

5.3.2 DC power supply

M9 IP67 connector with 2 contacts for an external DC power source (10 V DC to 28 V DC, max. 3 A).

The external DC power supply allows you to connect the R&S EVSD1000 to the drone board supply, for example.

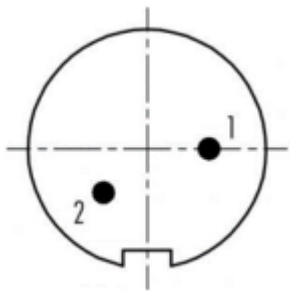


Table 5-7: Pin assignment of the DC M9 IP67 connector

| Pin | Signal name | Usage |
|-----|-------------|--------------------|
| 1 | DC-IN (+) | 10 V DC to 28 V DC |
| 2 | DC-IN (-) | 0 V ground |

For details, refer to ["Connecting to power"](#) on page 7 and [Chapter 4.8, "Connecting to power"](#), on page 34.

5.4 Rear panel

The rear panel of the R&S EVSD1000 provides a data link slot with connectors. In the R&S EVSD1000 data link slot, you can connect an optional R&S EVSD1-Z5 Data-link-module (Wi-Fi). Thus, you can configure the R&S EVSD1000 as a Wi-Fi access point for wireless communication from a remote device.

Note that the slot is located behind a protective cover, see [Chapter 4.4, "Opening and closing the front and rear covers"](#), on page 19.

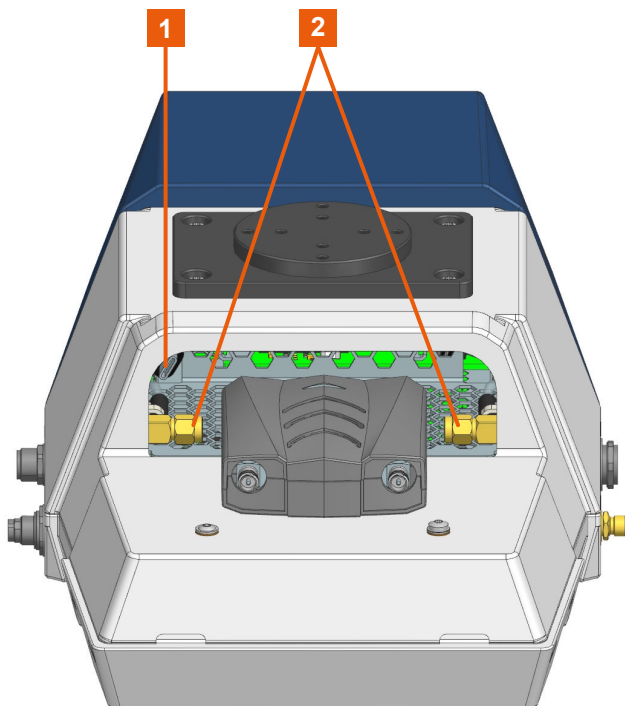


Figure 5-4: R&S EVSD1000 - Rear panel view (with installed optional R&S EVSD1-Z5 Data-link-module (Wi-Fi))

1 = USB-C connector
2 = SMA connectors

The R&S EVSD1000 data link slot provides the following connectors:

- Two 50-Ω SMA connectors for the signal input from the data link antennas (via the R&S EVSD1-Z5 Data-link-module (Wi-Fi)).

- USB-C 2.0 connector for signal input from the R&S EVSD1-Z5 Data-link-module (Wi-Fi).

The R&S EVSD1-Z5 Data-link-module (Wi-Fi) comes with two data link antennas with RP-SMA connectors.

For details, see [Chapter 4.7, "Setting up a data link \(Wi-Fi\) connection"](#), on page 31.

5.5 Bottom panel

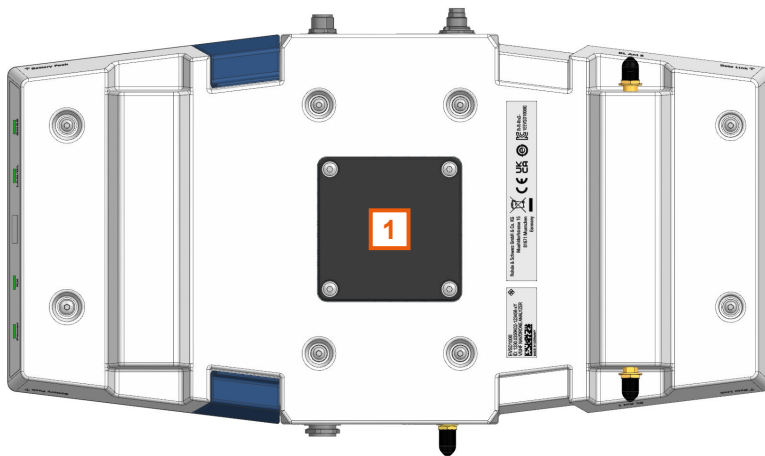


Figure 5-5: R&S EVSD1000 - Bottom panel view

1 = Designated position for ILS (LOC/GS) and VOR antenna

5.5.1 Mounting position for ILS (LOC/GS) and VOR receiver antenna

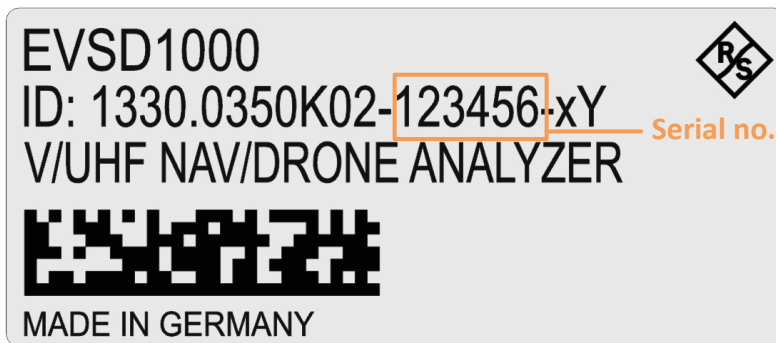
You can connect the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000 via an adapter on the bottom panel.

See also [Chapter 4.9, "Connecting the R&S EVSD1-Z3 V/UHF antenna to the R&S EVSD1000"](#), on page 37.

5.5.2 Device ID

The unique device identifier is provided as a barcode sticker on the bottom panel of the R&S EVSD1000.

It consists of the device order number and a serial number.



The serial number is used to define the **default instrument name**, which is:
<Type><variant>-<serial_number>

For example, EVSD123456.

The instrument name is required to establish a connection to the instrument in a LAN.

5.6 Top panel

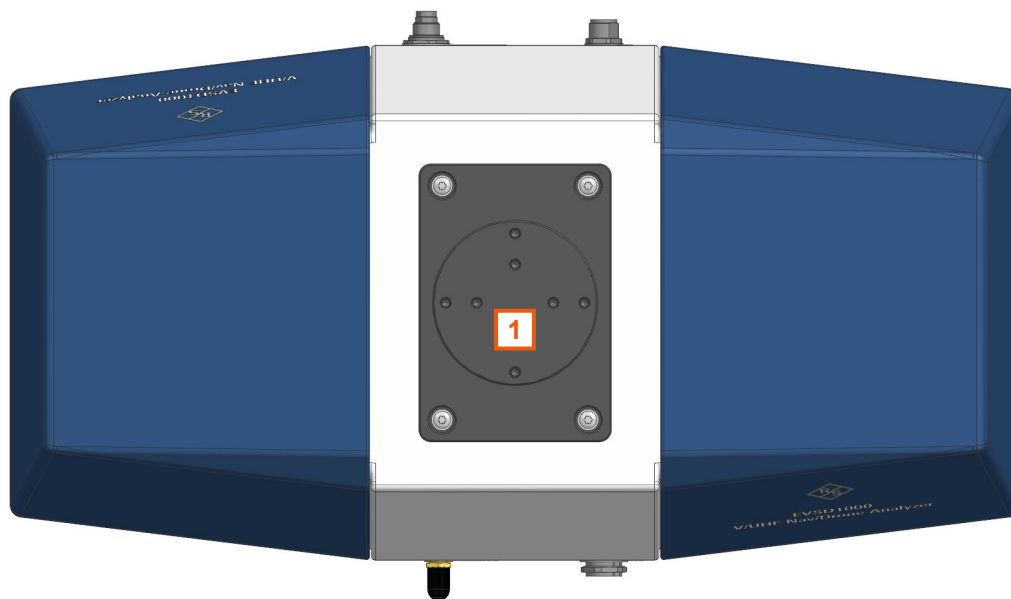


Figure 5-6: R&S EVSD1000 - Top panel view

1 = Drone adapter

The R&S EVSD1000 is equipped with a mechanical adapter on its top panel to mount it to a drone.

Adapter sets are available for the following drone types:

- DJI M300

To mount the R&S EVSD1000 on any other type of drone, create a customized adapter (see [Chapter 4.2, "Selecting and preparing the system components"](#), on page 15).

See also [Chapter 4.3.1, "Mounting the R&S EVSD1000 on a drone"](#), on page 16.

6 Operating basics

The R&S EVSD1000 is designed for operation on a drone, and is thus completely remote-controlled, via predefined commands. It does not have a graphical user interface for manual interaction.

Nevertheless, the instrument can also be controlled manually, by simulating a user interface on a remotely connected device, and using a connected keyboard. As a prerequisite, the R&S EVSD1000 must be connected to a remote device via LAN or Wi-Fi. See [Chapter 4.6, "Connecting to LAN"](#), on page 30 and [Chapter 4.7, "Setting up a data link \(Wi-Fi\) connection"](#), on page 31.

6.1 Basic connection settings

To operate the R&S EVSD1000 from a remote device, you require connection information.

By default, the R&S EVSD1000 is set to use the static IP address 10.255.255.98.

Resetting the IP address

If you do not know which IP address the instrument is currently set to, you can always reset the network settings of the instrument to their default values (LAN IP address: 10.255.255.98, Wi-Fi access point IP address: 192.168.1.1).

Insert a pointed tool, such as the tip of a pencil, in the [LAN reset button](#) on the front panel of the instrument, see [Chapter 5.1, "Front panel"](#), on page 47. Press the "LAN Reset" button for about 3 seconds to reset the IP address of the LAN connector and the optional data-link-module (Wi-Fi). Press the "LAN Reset" button shortly to re-establish the LAN or Wi-Fi connection without changing the settings.

Use this IP address for the initial connection from a remote device to the R&S EVSD1000.

When using DHCP, the IP address is assigned to the devices dynamically. In this case, if a dynamic name server (DNS) is available, you can use the permanent


instrument name to access the R&S EVSD1000. The default instrument name is EVSD<serial_number>, for example, EVSD123456. For information on determining the serial number, see [Chapter 5.5.2, "Device ID"](#), on page 56.

6.2 Manual operation from a VNC viewer

You can operate the R&S EVSD1000 manually from a connected PC using a keyboard.

You merely require a VNC viewer application, of which a variety is available on the Internet free of charge.

Using a VNC viewer application, you simply connect to the instrument, defined by its IP address. A graphical interface for the R&S EVSD1000 is shown on the control PC. The keys and other graphical user interface elements are operated using associated keyboard shortcuts on the connected keyboard.

 Operation via VNC is not possible during remote control (indicated by "Remote" in the status bar). To switch from remote control to manual operation, press [ESC].

Access to the R&S EVSD1000 via VNC can be protected by a password. In this case, enter *instrument* as the password in the login window.

6.2.1 Understanding the display information

The following figure shows a typical screen display for the R&S EVSD1000. All different screen elements are labeled. They are explained in more detail in the following sections.



Figure 6-1: R&S EVSD1000 - GUI overview

- 1 = Measurement settings area (numeric modes only)
- 2 = Measurement result area
- 3 = Softkeys to edit settings and activate functions
- 4 = Status bar

Measurement settings and results area

During a measurement, the available settings are displayed at the top of the screen; the measurement results at the bottom. If a general instrument setting or data management function is selected, the settings and information are displayed in the main part of the screen.

Softkeys

Softkeys are virtual function keys whose actual function is defined by the software, depending on the currently selected measurement mode or key, or both.

1/2 ▼ Sometimes, more functions are available than softkeys can be displayed at the same time. In this case, a second menu of functions is available, indicated by "1/2" and "2/2" beneath the softkeys in the display.

To switch between the two menus of softkey functions, press [F8].

Status bar

The status bar at the bottom of the screen contains information on the operating status of the instrument.

- Current list of data recording and size of this list
- Local or remote operation (see [Chapter 6.3, "Remote control"](#), on page 66)
- Battery status and charge status (in %)

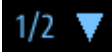
6.2.2 Keyboard commands for operation via a VNC viewer

[Table 6-1](#) shows the mapping between the keyboard shortcuts and the interface elements on the R&S EVSD1000.

Table 6-1: Keyboard commands (VNC viewer)

| Keyboard | Usage |
|-----------|-------------|
| y | Preset |
| c | Audio |
| v | Display |
| b | Help |
| n | Setup |
| m | Mode |
| z | Undo |
| r | Redo |
| PAGE UP | Field right |
| PAGE DOWN | Field left |
| | |
| x | Screenshot |

Manual operation from a VNC viewer

| Keyboard | Usage |
|-----------|---|
| a | Meas |
| s | Config |
| F1 | Softkey 1 |
| F2 | Softkey 2 |
| F3 | Softkey 3 |
| F4 | Softkey 4 |
| F5 | Softkey 5 |
| F6 | Softkey 6 |
| F7 | Softkey 7 |
| F8 |  Show additional softkeys |
| k | Trigger |
| l | Single |
| ESC | ESC |
| 0 | 0 |
| 1 | 1 |
| 4 | 4 |
| 7 | 7 |
| q | CH/FREQ |
| d | MTime |
| BACKSPACE | Back |
| ENTER | Enter |
| . | . |
| 2 | 2 |
| 5 | 5 |
| 8 | 8 |
| w | Ampt |
| | |
| | |
| F9 | Hz |

| Keyboard | Usage |
|----------|----------------|
| 3 | 3 |
| 6 | 6 |
| 9 | 9 |
| e | BW (Bandwidth) |
| | |
| F10 | kHz |
| F11 | MHz |
| F12 | GHz |
| p | Record |
| i | Marker |

6.2.3 Changing settings and activating functions

All functions available on the R&S EVSD1000 can be accessed using the keys on the external keyboard. Some keys provide a softkey menu on the display with further functions and settings.

1. Select a key as described in [Table 6-1](#) to activate a function directly, or to display a softkey menu.
2. Select the key for the setting or function as required.



If necessary, select [F8] to switch to the second softkey menu.

The function is activated, or a new window is displayed to view or change specific settings.

3. To set the focus on a specific setting in the displayed window, scroll through the individual settings by pressing the Up and Down arrow keys.
4. Enter a numeric or alphanumeric value as described in [Chapter 6.2.4, "Entering data"](#), on page 64.
5. Press [ENTER] to confirm the new setting and remove the focus.

6.2.4 Entering data

You enter data in input fields using the external keyboard, as described in [Table 6-1](#).

Entering numeric parameters

If a field requires numeric input, the keypad provides only numbers.

1. Define the parameter value by doing one of the following:
 - Change the currently used parameter value by pressing the Up or Down arrow keys.
 - Enter the parameter value using the keypad.
2. To define the unit, press the corresponding unit key.
The unit is added to the entry.
3. If the parameter does not require a unit, confirm the entered value by pressing [ENTER] or any of the unit keys.

Entering numbers and (special) characters via the keypad

If a field requires alphanumeric input, use the keypad on the external keyboard. Every alphanumeric key represents several characters and one number. The decimal point key (.) represents special characters, and the sign key (-) toggles between capital and small letters. The assignment of keys to characters is provided in [Table 6-2](#).

1. Press the key once to enter the first possible value.
All characters available via this key are displayed.
2. To choose another value provided by this key, press the key again, until your desired value is displayed.
3. With every key stroke, the next possible value of this key is displayed. If all possible values have been displayed, the series starts with the first value again. For information on the series, refer to [Table 6-2](#).
4. To change from capital to small letters and vice versa, press the sign key (-).
5. After entering a value, wait for 2 seconds to use the same key again.

Entering a blank

- ▶ Press the "0" key for 2 seconds.

Correcting an entry

1. Using the arrow keys, move the cursor to the right of the entry you want to delete.
2. Press the [BACK] key.
The entry to the left of the cursor is deleted.
3. Enter your correction.

Completing the entry

- ▶ Press [ENTER].
For numeric values, the default unit is appended to the numeric input.
To enter a value using a different unit, select the corresponding key.

Aborting the entry

- ▶ Press the [ESC] key.
The previous entry is restored.

Table 6-2: Keys for alphanumeric parameters

| Key name (upper inscription) | Series of (special) characters and number provided |
|---------------------------------|--|
| 7 | 7 μ Ω ° € ¥ \$ ¢ |
| 8 | A B C 8 Ä Å Ç |
| 9 | D E F 9 É |
| 4 | G H I 4 |
| 5 | J K L 5 |
| 6 | M N O 6 Ñ Ö |
| 1 | P Q R S 1 |
| 2 | T U V 2 Ü |
| 3 | W X Y Z 3 |
| 0 | <blank> 0 – @ + / \ < > = % & |
| . | . * : _ , ; " ' ? () # |
| – | <toggles between capital and small letters> |

6.3 Remote control

You can control the R&S EVSD1000, including data transfer, remotely from another device using the LAN connection (Fast Ethernet).

You define the IP address and subnet mask in the "Setup" menu.

See [Chapter 6.1, "Basic connection settings"](#), on page 58.

Remote control is performed using predefined remote commands which are sent from the control device to the R&S EVSD1000. The R&S EVSD1000 can also return queried data to the control device.

While in remote control, the R&S EVSD1000 display indicates "Remote" in the status bar. During remote control, the instrument is locked for manual operation via VNC. To return to manual operation, press [ESC].

7 Contacting customer support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:



Figure 7-1: QR code to the Rohde & Schwarz support page

Annex

A Reference: Dimensions

A.1 Instrument dimensions

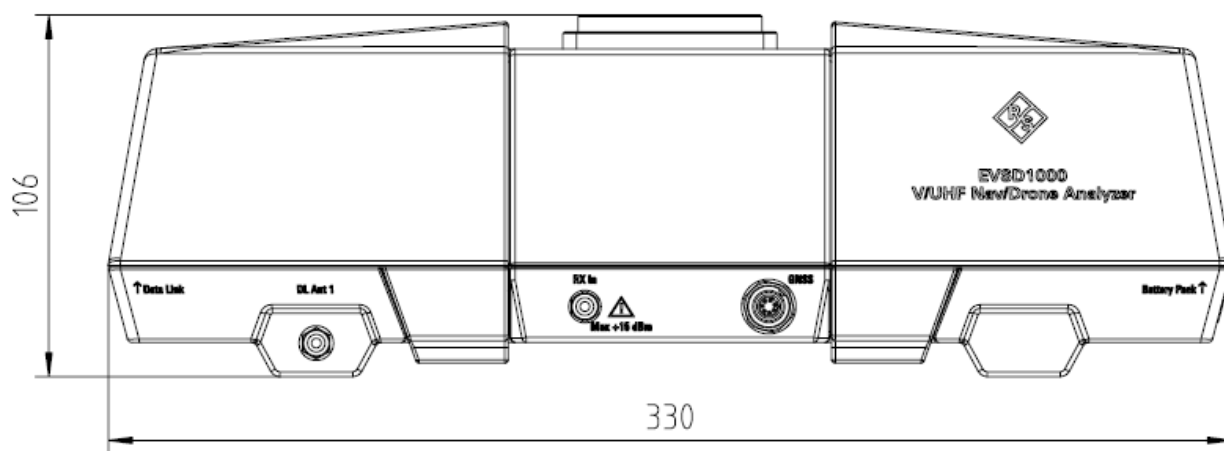


Figure A-1: Instrument dimensions (side view)

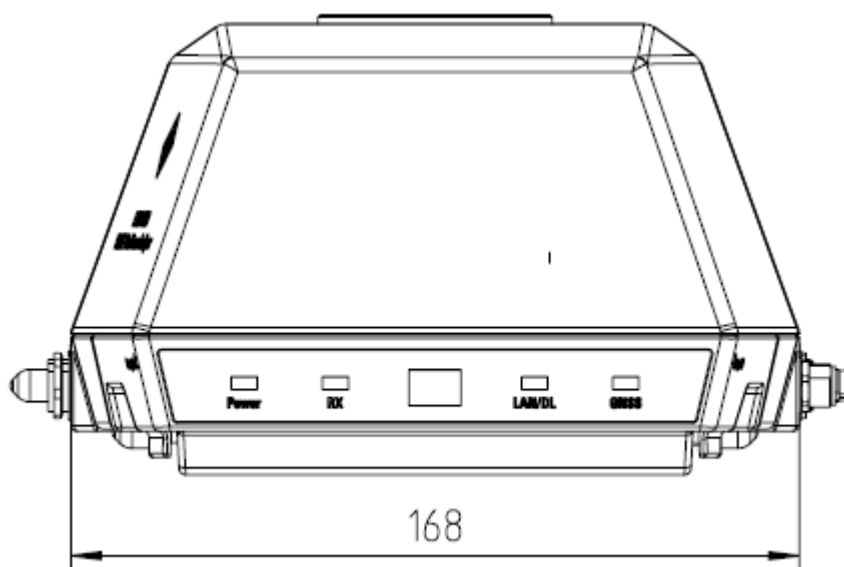


Figure A-2: Instrument dimensions (front view)

A.2 Dimensions for drone adapter

The R&S EVSD1000 is equipped with a mechanical adapter on its top panel to mount it to a drone.

To mount the R&S EVSD1000 on a customer-specific drone, create a customized adapter according to the following dimensions.

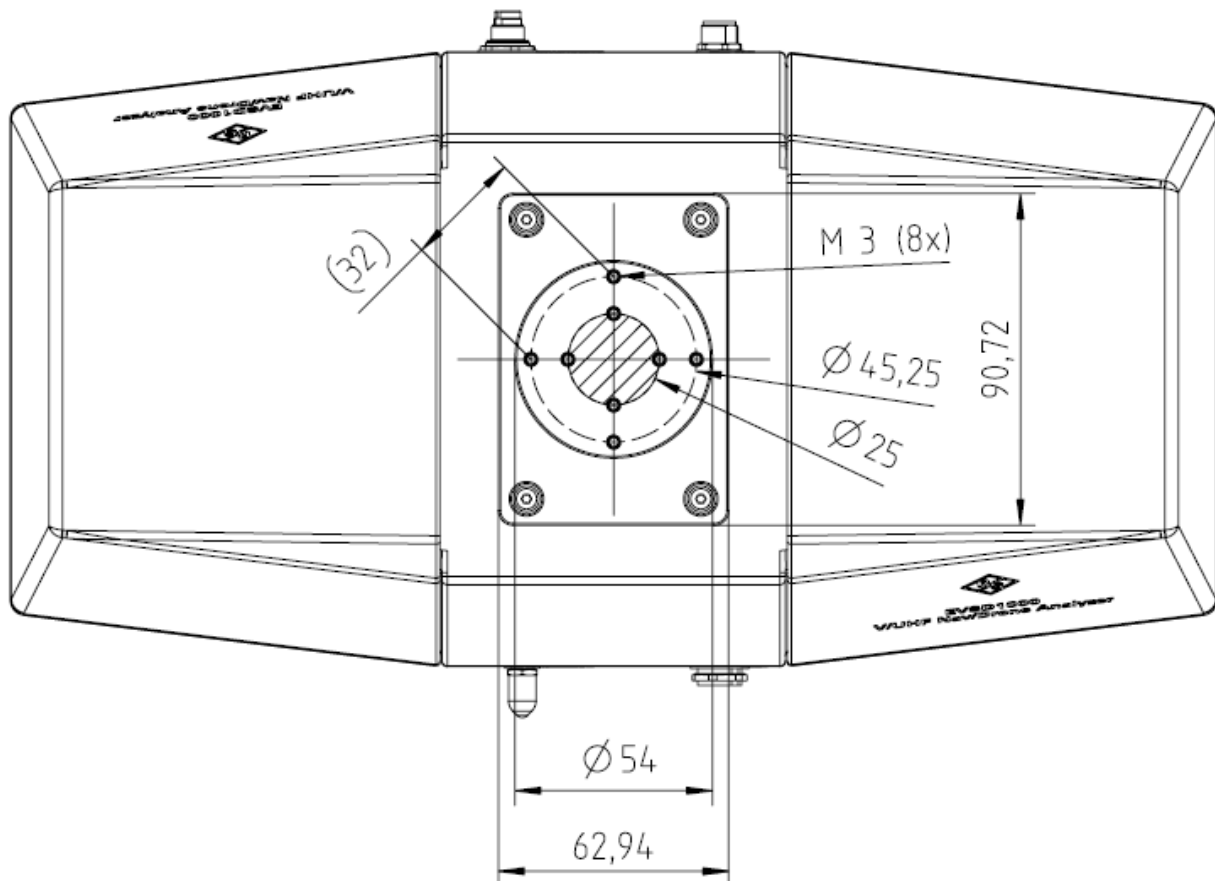


Figure A-3: Drone dimensions for adapter (top view)

Center of gravity

The center of gravity of the R&S EVSD1000 lies within the area indicated by $\varnothing 25$ in [Figure A-3](#). It remains within that area even if the optional components R&S EVSD1-Z1 Battery pack or R&S EVSD1-Z5 Data-link-module (Wi-Fi) are installed.

When creating a customized drone or antenna adapter, use the following drilling template to design the required holes for the fixed adapter of the

Dimensions for drone adapter

R&S EVSD1000. Make sure to align the vertical or horizontal lines with the direction of flight.

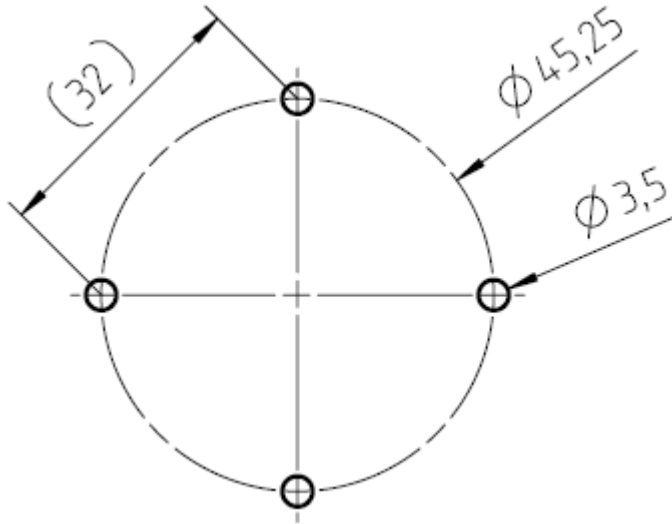


Figure A-4: Drilling template for antenna and drone adapter

A.3 R&S EVSD1-Z3 V/UHF antenna dimensions

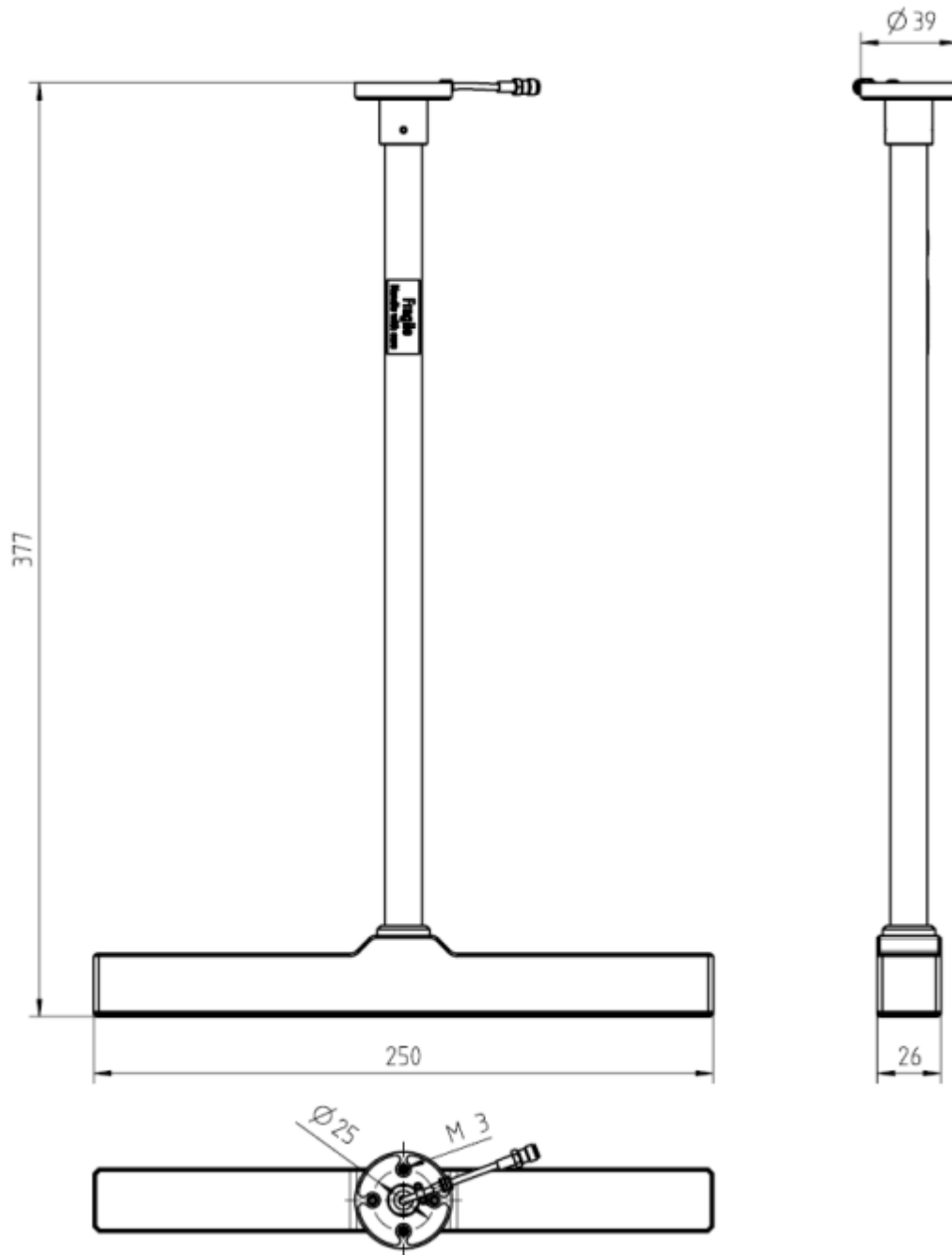


Figure A-5: R&S EVSD1-Z3 V/UHF antenna dimensions and fixing points

A.4 R&S EVSD1-Z6 GNSS RTK device dimensions

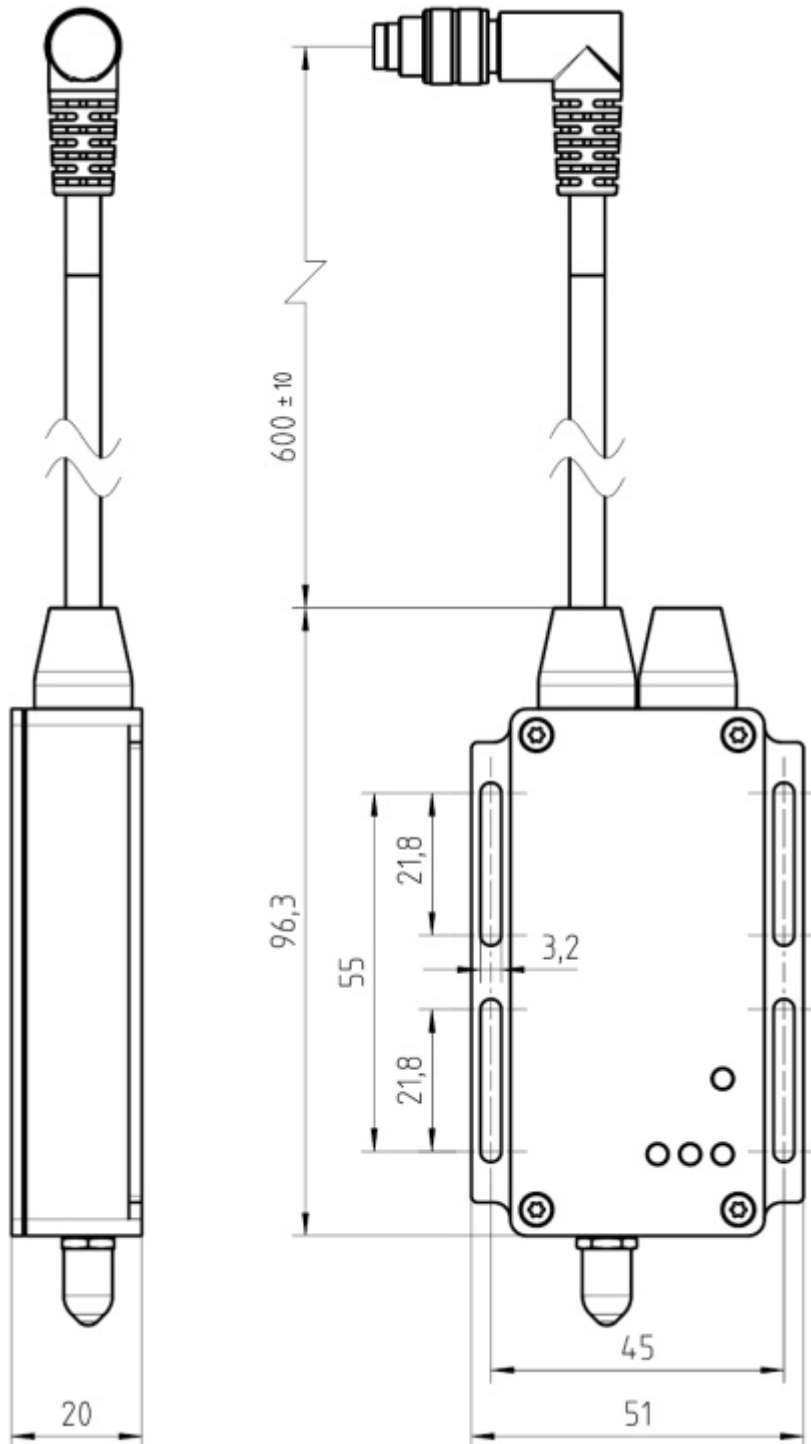


Figure A-6: R&S EVSD1-Z6 GNSS RTK device (rover)

R&S EVSD1-Z6 GNSS RTK device dimensions

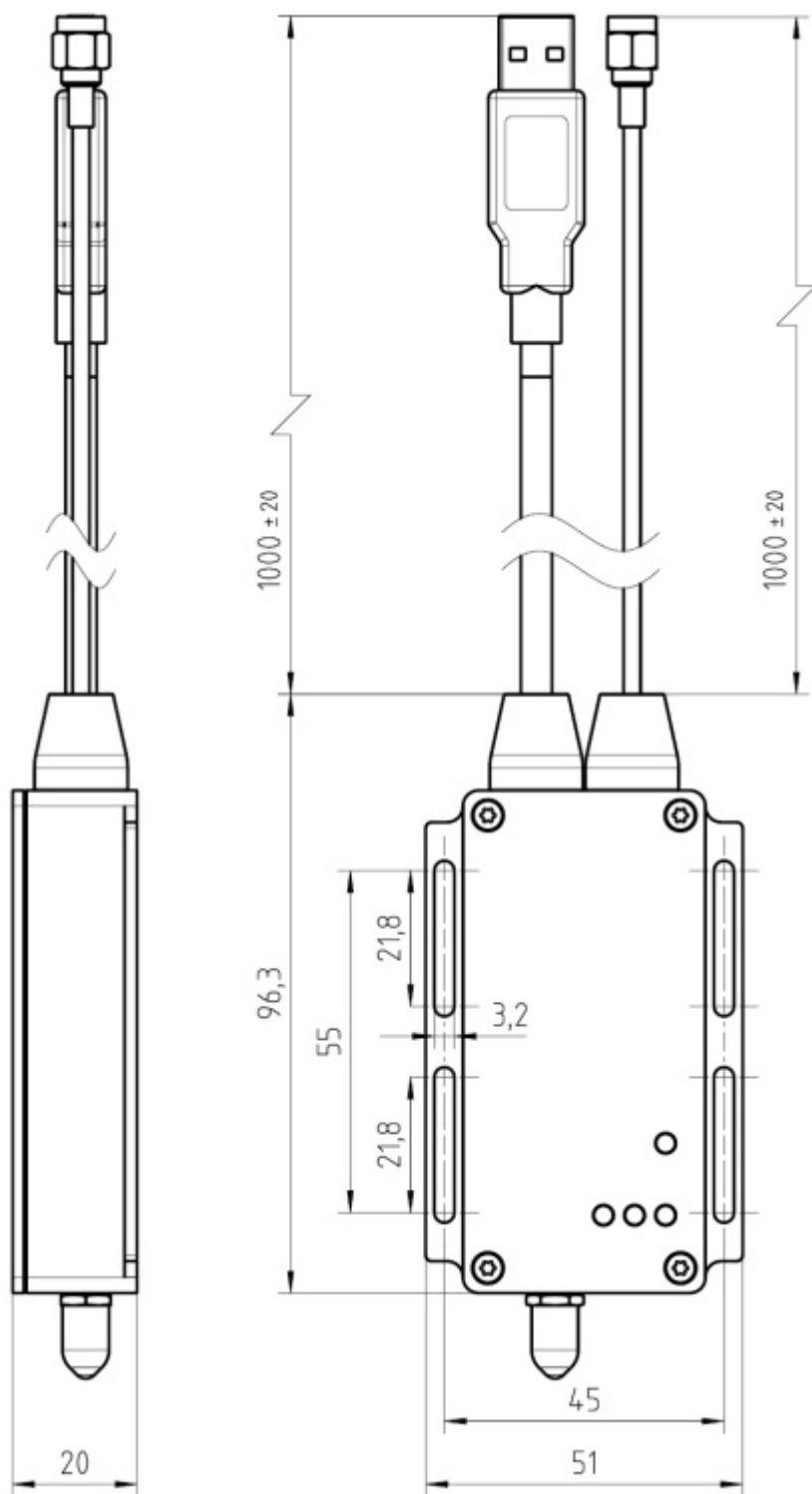


Figure A-7: R&S EVSD1-Z6 GNSS RTK device (base)