

# R&S® EVSF1000

## VHF/UHF Nav/Flight Analyzer

### Getting Started



This document describes the following R&S EVSF1000 models with firmware version 1.50 or later:

- R&S EVSF1000 VHF/UHF nav/drone analyzer (1330.0350K02)
- R&S EVSF1000 (1330.0008.02)

Furthermore, it covers the following options:

- R&S EVSF1-B4 (1330.1404.02)
- R&S EVSF1-Z1 (1330.1410.02)
- R&S EVSF1-Z2 (1330.1427.02)
- R&S EVSG1-K7 LF-Analysis (1329.9163.02)

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®EVSF1000 is indicated as R&S EVSF1000.

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# 1 Safety information

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

## Intended use

The R&S EVSF1000 is a level and modulation analyzer intended for installation in flight inspection aircraft. It performs measurements on instrument landing systems (ILS), ground-based augmentation systems (GBAS), very high frequency omnidirectional range (VOR) and marker beacon ground stations. It analyzes air traffic control communications (ATC COM) signals measured during startup, maintenance and servicing. The instrument's mechanical and electrical design and high sensitivity make it ideal for state-of-the-art flight inspection.

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 EVSF1000 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 as printed "Safety Instructions". The printed "Safety Instructions" 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 data sheet, manuals and the printed "Safety Instructions". If you are unsure about the appropriate use, contact Rohde & Schwarz customer service.

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 data sheet. 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 service at <https://www.rohde-schwarz.com/support>.

### Operating the product

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

When using the product in a vehicle or aircraft, make sure that the product is properly secured. 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 data sheet.

Due to their exposed location, mobile communications systems are at risk of damage from lightning. This also poses a risk to persons nearby. Vehicles carrying mobile communications systems require an electrically conductive body, a grounded antenna and also equipotential bonding that includes the cables routed into the vehicle.

## Connecting to power

The product runs on DC voltage. For the specifications of the supply voltage for the product, refer to the data sheet. Under normal conditions, contact with DC voltage in this range poses a low risk of 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.
- If you connect the product to a battery, observe the safety information delivered with the battery.
- Before switching on the product, ensure that the voltage and frequency indicated on the product match 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.

## Using headphones

Take the following measures to prevent hearing damage. Before using headphones, check the volume and reduce it if necessary. If you monitor varying signal levels, take off the headphones and wait until the signal has settled. Then adjust the volume.

## Meaning of safety labels

Safety labels on the product warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.
	DC - direct current Connect to a DC power supply of the specified voltage range.


## 1.2 Labels on the product

Labels on the casing inform about:

- Personal safety, see ["Meaning of safety labels"](#) on page 7
- Product and environment safety, see [Table 1-1](#)

## Warning messages in the documentation

**Table 1-1: Labels regarding product and environment safety**

	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 EVSF1000 user manual, chapter "Disposal".
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## 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.

### CAUTION

Potentially hazardous situation. Could result in minor or moderate injury if not avoided.

### NOTICE

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



## 2 Documentation overview

This section provides an overview of the R&S EVSF1000 user documentation. Unless specified otherwise, you find the documents at:

[www.rohde-schwarz.com/manual/EVSF1000](http://www.rohde-schwarz.com/manual/EVSF1000)

Further documents are available at:

[www.rohde-schwarz.com/product/EVSF1000](http://www.rohde-schwarz.com/product/EVSF1000)

### 2.1 Getting started manual

Introduces the R&S EVSF1000 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 EVSF1000.

### 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 Data sheets and brochures

The data sheet contains the technical specifications of the R&S EVSF1000. 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/EVSF1000/](http://www.rohde-schwarz.com/brochure-datasheet/EVSF1000/)

## 2.6 Release notes and open-source acknowledgment (OSA)

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

The software makes use of 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/EVSF1000](http://www.rohde-schwarz.com/firmware/EVSF1000).

## 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.

### 3 Key features

The R&S EVSF1000 offers the following key features:

- Detailed analysis of ILS, VOR and Marker Beacon ground measurements (based on ICAO Doc. 8071 and ICAO Annex 10)
- Analysis of air traffic control (ATC) communications signals
- High measurement rate, at 100 data records/s
- Two identical signal processing units for parallel measurement of Localizer and Glidepath
- Compact, robust design (ARINC 404)
- Simple remote operation via standard interfaces
- Software options for specific use cases
- Integrated data recording

## 4 Preparing for use

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

• <a href="#">Unpacking and checking</a> .....	12
• <a href="#">Lifting and carrying</a> .....	12
• <a href="#">Setting up the product</a> .....	13
• <a href="#">Connecting to power</a> .....	16
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### 4.1 Unpacking and checking

1. Unpack the R&S EVSF1000 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:
  - Printed Getting Started manual
4. Check the equipment for damage.

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

### 4.2 Lifting and carrying

The handle on the front of the R&S EVSF1000 is designed to move, lift or carry the instrument. Do not apply excessive external force to the handle.

## 4.3 Setting up the product

The R&S EVSF1000 was designed for installation in flight inspection aircraft. Even the movement caused by transportation or mobile use does not impair its functioning. You can also set up the R&S EVSF1000 on a benchtop, for example to prepare the R&S EVSF1000 for mobile use.

See also:

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

### 4.3.1 Mounting the R&S EVSF1000 in a rack

The R&S EVSF1000 is meant for use in a flight inspection plane. Make sure that the product is properly secured. For a stable setup, you can connect the R&S EVSF1000 to an optional installation tray that you insert in the flight inspection rack.

Using the connector plate, you can remove and replace the R&S EVSF1000 quickly and easily. While the tray remains connected to the aircraft permanently, you can remove the R&S EVSF1000 quickly and easily, without having to disconnect all cables from the instrument individually.

This setup requires an R&S EVSF1000 with the following options:

- Slide-in hardware (R&S EVSF1-B4)
- Installation tray with connector (R&S EVSF1-Z1)



The 60 mm perforations allow you to mount external fans to the tray.

#### To prepare the rack

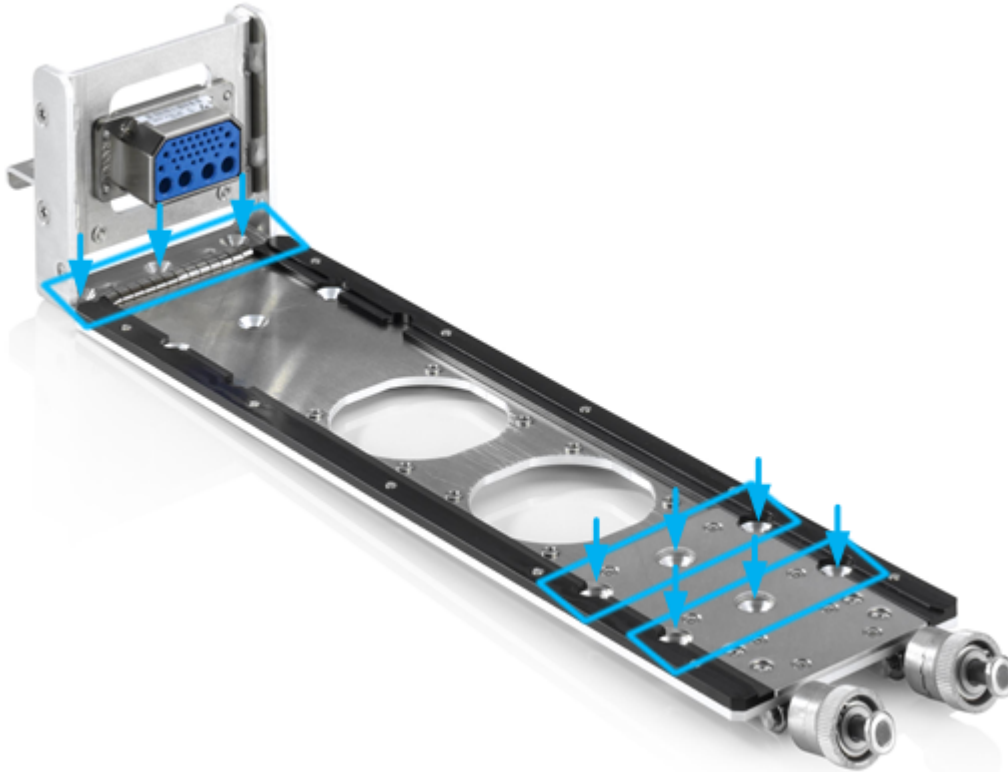
- **NOTICE!** Insufficient airflow can cause overheating and damage the product. Design and implement an efficient ventilation concept for the rack.

#### To mount the R&S EVSF1000 on an installation tray

1. Insert the installation tray into the flight inspection rack. Make sure it lies in the rack straight and securely.

## Setting up the product

2. Fasten the tray in the rack by inserting 5 mm flat-head screws from the top of the tray through the rack. Use only the indicated perforations for rack-mounting to ensure the mechanical strength of the tray.



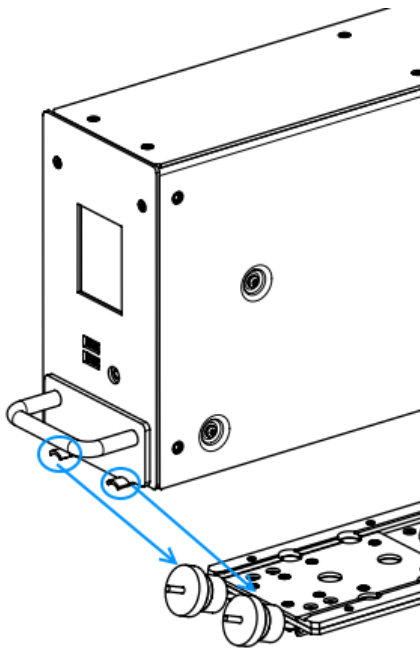
**Figure 4-1: Perforations for installation in the rack**

- a) Fasten 3 screws through the perforations on the left as shown in [Figure 4-1](#).
  - b) Fasten 3 screws through one of the two rows on the right.
  - c) Tighten all screws with a tightening torque of 1.2 Nm to secure the tray in the rack.
3. Connect the ARINC connector of the tray to the board power supply and any other devices required for signal input or output, such as the receiving antenna, the GPS receiver, or the PPS signal.  
For a description of the pin assignment, see [Table 5-1](#).
  4. Place the bottom of the R&S EVSF1000 on top of the installation tray.
  5. Insert the ARINC connector of the tray to the female connector on the R&S EVSF1000.



**Note:** The R&S EVSF1000 does not have a power (On/Off) switch. When you apply voltage to the ARINC connector, the R&S EVSF1000 starts immediately.

6. Make sure the curved offsets of the metal plate on the instrument lay securely on the knobs at the front of the tray.



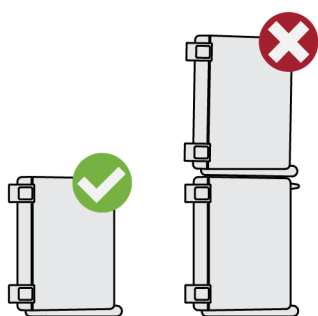
7. Fasten the knobs on the tray manually by twisting them clock-wise.  
The instrument is ready for operation.

### 4.3.2 Placing the R&S EVSF1000 on a bench top

#### To place the R&S EVSF1000 on a bench top

1. Place the product on a stable, flat and level surface.
2. **CAUTION!** The top surface of the product is too small for stacking. If you stack another product on top of the product, the stack can fall over and cause injury.

If you want to save space, mount several products in a rack.



## 4.4 Connecting to power

The R&S EVSF1000 is equipped with a DC power supply connector on the rear panel of the instrument that can be connected to the board power of an aircraft.

For use outside an aircraft, you can use an optional AC/DC power supply unit.

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

- [Connecting the R&S EVSF1000 to an external DC power source](#)..... 16
- [Connecting the R&S EVSF1000 to AC power](#)..... 17

### 4.4.1 Connecting the R&S EVSF1000 to an external DC power source

You can connect the R&S EVSF1000 to an external DC power source, such as the board power of the flight inspection plane or the drone. The power supply must provide a voltage of 11 V DC to 32 V DC.



## Connecting to power

The R&S EVSF1000 is inline with DO-160G, section 16, category A. For a minimum input of 20 V DC, the R&S EVSF1000 sustains a 200 ms DC power interruption without rebooting.

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 EVSF1000 to an external DC power source as follows:

1. Connect a 3-pin XLR connection cable to the Power supply connector on the back of the instrument (see [Chapter 5.2.1, "Power supply"](#), on page 27).
2. Insert a 3 AT fuse to protect the connection between the instrument and the external DC power source against excessive current. A short-circuit can damage the instrument or power supply unit.
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 mm<sup>2</sup>.

The R&S EVSF1000 does not have a power (On/Off) switch. When you apply board power, the R&S EVSF1000 starts immediately.

### Disconnecting from power

When you interrupt the supply voltage from a level of 20 V or more, the R&S EVSF1000 continues to work for approximately 300 ms. It is powered by internal backup capacitors, intended to bridge short power failures in an aircraft installation. During this time, the current measurement settings and the latest error log data are saved to the internal flash memory.

- To disconnect the R&S EVSF1000 from power, disconnect the XLR connection cable from the DC power supply.

## 4.4.2 Connecting the R&S EVSF1000 to AC power

If you need to operate the R&S EVSF1000 outside an aircraft, 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.

Connect the R&S EVSF1000 to AC power as follows:

1. Connect the DC connector on the AC/DC power supply unit to the Power Supply connector on the back of the R&S EVSF1000 (see [Chapter 5.2.1, "Power supply"](#), on page 27).
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 R&S EVSF1000 does not have a power (On/Off) switch. When you apply voltage to the Power Supply connector, the R&S EVSF1000 starts immediately. The green Power LED on the front panel of the R&S EVSF1000 lights up.

### Disconnecting from power

When you interrupt the supply voltage from a level of 20 V or more, the R&S EVSF1000 continues to work for approximately 300 ms. It is powered by internal backup capacitors, intended to bridge short power failures in an aircraft installation. During this time, the current measurement settings and the latest error log data are saved to the internal flash memory.

---

#### **NOTICE**

##### **Risk of losing settings**

If the power interruption occurs at a power level under 20 V, the R&S EVSF1000 does not save the settings.

In particular, if you operate the R&S EVSF1000 using an AC/DC power supply and the AC power supply is interrupted, the DC power decreases slowly. In this case, the R&S EVSF1000 detects the power failure too late and cannot save the settings.

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To ensure a controlled shutdown:

1. Disconnect the R&S EVSF1000 from the DC power supply.
2. Disconnect the AC power supply.

## 4.5 Starting and shutting down the R&S EVSF1000

The R&S EVSF1000 does not have a power (On/Off) switch. When you apply voltage to the power supply connector, the R&S EVSF1000 starts immediately.

To shut down the R&S EVSF1000, disconnect it from the power supply. Note the information concerning power interruption provided in [Chapter 4.4, "Connecting to power"](#), on page 16.

## 4.6 Connecting devices for signal input and output

1. Connect the RF input connector (RX1 IN/RX2 IN) with the receiving antenna (see [Chapter 5.2.2, "RX1 in / RX2 in"](#), on page 27).
2. Connect any other required connectors for input or output, such as GPS or PPS signals (see [Chapter 5.2.4, "RS-232 GPS"](#), on page 27 and [Chapter 5.2.5, "PPS in"](#), on page 28).

## 4.7 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 5.2.3, "LAN \(ethernet\)"](#), on page 27.

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 EVSF1000 to a connected device
- To access or control the measurement from a remote computer 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 EVSF1000 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 EVSF1000. 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 netmask. (Usually, that means only the last number of the IP address differs.)

The used IP address is indicated in the "Setup" menu on the R&S EVSF1000 display.



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 EVSF1000. The default instrument name is EVSF<serial\_number>, for example, EVSF1000-123456. For information on determining the serial number, see [Chapter 5.2.12, "Device ID"](#), on page 31.

For more information on LAN configuration, see the R&S EVSF1000 user manual.

## 4.8 Setting up a data link (Wi-Fi) connection

The R&S EVSF1000 can be equipped with an optional data-link-module (Wi-Fi, R&S EVSD1-Z5 Data-link-module (Wi-Fi)). Thus, you can configure the

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

R&S EVSF1000 as a Wi-Fi access point for wireless communication from a remote device.

**To connect the optional data-link-module (Wi-Fi)**

1. Plug the provided USB-A to USB-C adapter cable in one of the USB-A connectors on the R&S EVSF1000.
2. Connect the other end of the adapter cable in the USB-C connector on the data-link-module (Wi-Fi).
3. Connect the provided data-link antennas to the RP-SMA connectors on the data-link-module (Wi-Fi).

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

Before you start the R&S EVSF1000, connect the data-link-module (Wi-Fi) to the R&S EVSF1000. Otherwise, the R&S EVSF1000 does not determine the IP information automatically.

1. Switch on the R&S EVSF1000.

The R&S EVSF1000 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 EVSF1000 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 5.2.12, "Device ID"](#), on page 31.  
If necessary, configure the data link information for your network.  
For details, see the R&S EVSF1000 user manual.

## 4.9 Performing an autocalibration

After setting up the R&S EVSF1000, perform an autocalibration to ensure the accuracy of the measurements. After initial setup, it is recommended 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 EVSF1000 display.

To perform an autocalibration, you require remote access to the instrument via LAN. For details see [Chapter 6, "Operating basics"](#), on page 33.

### To perform an autocalibration

Before performing an autocalibration, 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 EVSF1000.

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 EVSF1000 user manual.

## 5 Instrument tour

### 5.1 Front panel

This chapter describes the front panel, including all function keys and connectors.

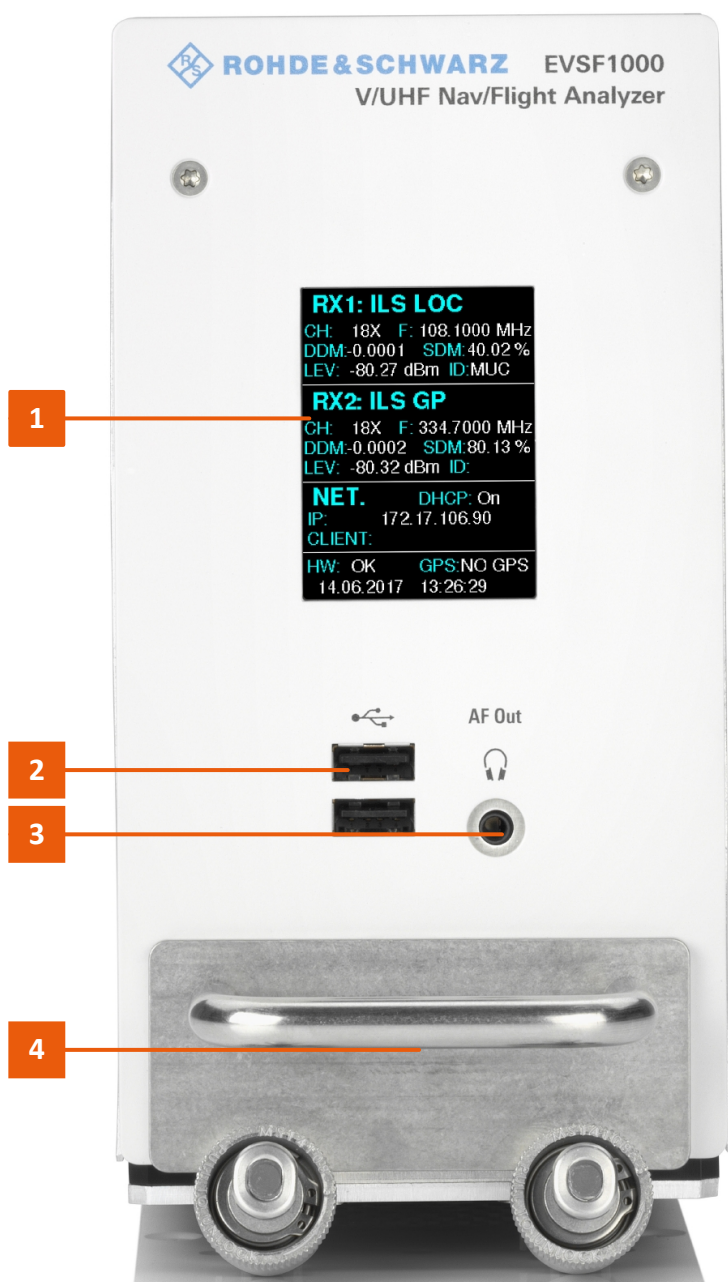


Figure 5-1: R&S EVSF1000 - Front panel view



- 1 = Display
- 2 = USB connectors
- 3 = AF Out
- 4 = Carrying handle

### 5.1.1 Display

The display shows a basic set of measurement and configuration settings, including the currently used IP address for remote access.

### 5.1.2 USB connectors

The front panel provides two female USB connectors (USB-A, 2.0 standard) to connect devices like a memory stick or a USB keyboard.

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

A standard USB keyboard can be used to configure the basic TCP/IP parameters.

For details, see [Chapter 6.1, "Basic configuration and status display"](#), on page 33.

### 5.1.3 AF out

Connector for a headset with a 3.5 mm jack plug.

### 5.1.4 Carrying handle

The carrying handle is used to insert and remove the R&S EVSF1000 from the flight inspection rack. You can also lift and carry the instrument by the handle.



## 5.2 Rear panel



**Figure 5-2: R&S EVSF1000 - Rear panel view (basic model, without R&S EVSF1-B4 option)**

- 1 = Power Supply
- 2 = RX2 In
- 3 = LAN
- 4 = RS-232 GPS
- 5 = Device ID with serial number and other labels
- 6 = PPS In
- 7 = RX 1 In

- i** If the R&S EVSF1000 is provided with the optional slide-in hardware R&S EVSF1-B4 installed, the rear panel has an ARINC connector instead of the individual connectors. See [Chapter 5.2.6, "Optional ARINC connector"](#), on page 28.



**Figure 5-3: R&S EVSF1000 - Rear panel view with ARINC connector (slide-in option R&S EVSF1-B4)**

For the specification of the following interfaces, see the R&S EVSF1000 data sheet.

• <a href="#">Power supply</a> .....	27
• <a href="#">RX1 in / RX2 in</a> .....	27
• <a href="#">LAN (ethernet)</a> .....	27
• <a href="#">RS-232 GPS</a> .....	27
• <a href="#">PPS in</a> .....	28
• <a href="#">Optional ARINC connector</a> .....	28
• <a href="#">LF in (baseband/low frequency input)</a> .....	30
• <a href="#">Demod out (baseband output)</a> .....	30
• <a href="#">AF out</a> .....	31

## Rear panel

• Trigger in.....	31
• IP-Address select.....	31
• Device ID.....	31

### 5.2.1 Power supply

XLR connector for an external DC power source (11 V DC to 32 V DC).

For details, refer to ["Connecting to power"](#) on page 7 and [Chapter 4.4, "Connecting to power"](#), on page 16.

### 5.2.2 RX1 in / RX2 in

The RX input connectors are 50  $\Omega$  N connectors. Use the RX inputs to connect a receiving antenna (max. +13 dBm) to the R&S EVSF1000 for RF signal input.

### 5.2.3 LAN (ethernet)

Operate the R&S EVSF1000 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 (RX1) or 8002 (RX2)). The data transfer rate is 100 Mbit/s.

Using a VNC viewer, you can perform hardkey and softkey tasks on the R&S EVSF1000 in a LAN via shortcuts on a remote keyboard.

For details about remote control, see the "Remote Control" chapter in the R&S EVSF1000 user manual.

### 5.2.4 RS-232 GPS

2-port RS232, 9-pin D-Sub connector for a GPS receiver providing NMEA protocol data. The NMEA protocol data is displayed and stored with the recorded data.

If R&S EVSF1-B4 is installed, the RS-232 GPS interface is integrated in the ARINC connector (see [Chapter 5.2.6, "Optional ARINC connector"](#), on page 28).

### 5.2.5 PPS in

SMA connector with 1 M $\Omega$  impedance. Provides a PPS signal from an external GPS device for precise synchronization during data logging.

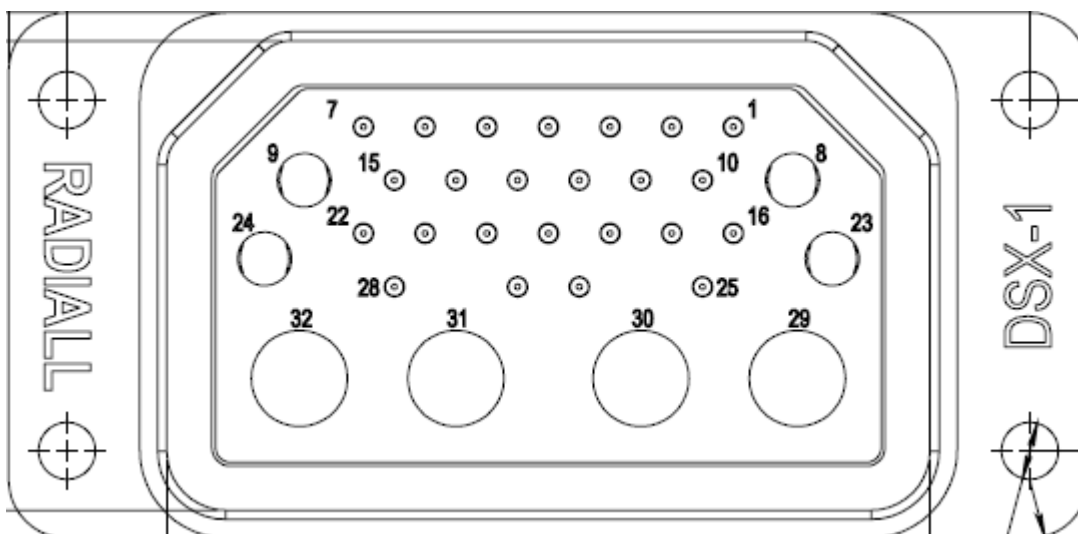
If R&S EVSF1-B4 is installed, the PPS In interface is integrated in the ARINC connector (see [Chapter 5.2.6, "Optional ARINC connector"](#), on page 28).

### 5.2.6 Optional ARINC connector

This connector is available with option R&S EVSF1-B4 only.

Optionally, the R&S EVSF1000 can be provided with an ARINC connector on the rear panel instead of the individual connectors in the standard model (see [Figure 5-3](#)). This connector allows you to slide the R&S EVSF1000 out of a flight inspection rack easily without having to disconnect all cables from the instrument individually.

The ARINC connector provides connections to all input and output provided by connectors on the standard R&S EVSF1000, and some additional signals.



**Figure 5-4: Pin assignment of ARINC connector**

**Table 5-1: Pin assignment of ARINC connector**

Pin	Signal	Description	Cable type
1	SPEAKER+/AUDIO	Speaker/Audio out (AF Out)	single, AWG 20-24
2	SPEAKER-/AUDIO_GND	Speaker/Audio GND (AF Out)	single, AWG 20-24
3	ADR_SEL_IN	IP-Address-Select	single, AWG 20-24
4	ETH_DO-	LAN (Ethernet)	4x2 twisted paired, AWG 20-24
5	ETH_DI-	LAN (Ethernet)	4x2 twisted paired, AWG 20-24
6	USB_VBUS	USB 5V	2x2 twisted paired, AWG 20-24
7	USB_D+	USB Data+	2x2 twisted paired, AWG 20-24
8	V_DCIN_GND	Power	single, AWG 16-20
9	V_DCIN_+28V	Power	single, AWG 16-20
10	GND	Signal GND	single, AWG 20-24
11	TRIGGER_IN	Trigger-Input	single, AWG 20-24
12	ETH_DO+	LAN (Ethernet)	4x2 twisted paired, AWG 20-24
13	ETH_DI+	LAN (Ethernet)	4x2 twisted paired, AWG 20-24
14	USB_GND	USB GND	2x2 twisted paired, AWG 20-24
15	USB_D-	USB Data-	2x2 twisted paired, AWG 20-24
16	BB-OUT	Baseband-Output (Demod Out)	RG 316, AWG 20-24
17	GND	Signal GND	single, AWG 20-24
18	PPS_IN	PPS-IN	RG 316, AWG 20-24
19	GPS_5V_SUPPLY	GPS RX/ANT-Supply	single, AWG 20-24
20	GPS_CTS	RS232-GPS	single, AWG 20-24
21	GPS_RTS	RS232-GPS	single, AWG 20-24
22	GPS_TXD	RS232-GPS	single, AWG 20-24
23	V_DCIN_GND	Power	single AWG 16-20

Pin	Signal	Description	Cable type
24	V_DCIN_+28V	Power	single AWG 16-20
25	BB-IN	Baseband-Input (LF-IN)	single, AWG 20-24
26	GPS_GND	RS232-GPS	single, AWG 20-24
27	GPS_PPS_IN	RS232-GPS PPS-IN	single, AWG 20-24
28	GPS_RXD	RS232-GPS	single, AWG 20-24
29	RX1 (coaxial inlay)	RX1 Antenna	RG 223/ RG 142/ RG 400, AWG 20-24
30	spare	spare	RG 223/ RG 142/ RG 400, AWG 20-24
31	spare	spare	RG 223/ RG 142/ RG 400, AWG 20-24
32	RX2 (coaxial inlay)	RX2 Antenna	RG 223/ RG 142/ RG 400, AWG 20-24

### 5.2.7 LF in (baseband/low frequency input)

This connector is available with option R&S EVSF1-B4 only.

Provides an AF signal or signals with a very low IF (<25 kHz) to the R&S EVSF1000 for further analysis of typical AF parameters. Furthermore, LF input allows for analysis of non-directional beacon (NDB) signals from 190 kHz to 1750 kHz.

When using the R&S EVSF1-Z2, use the BNC connector, 50  $\Omega$ /20k $\Omega$ .

Analyzing LF input requires option R&S EVSG1-K7 LF-Analysis.

### 5.2.8 Demod out (baseband output)

This connector is available with option R&S EVSF1-B4 only.

Outputs a demodulated (baseband) signal for connected devices, for example an oscilloscope.

When using the R&S EVSF1-Z2, use the BNC connector, 50  $\Omega$ /20k $\Omega$ .

### 5.2.9 AF out

This connector is available with option R&S EVSF1-B4 only.

Provides AF output to connected headphones or a loudspeaker (optimized for 8  $\Omega$ ). When using the R&S EVSF1-Z2, audio output is sent to the speaker.

### 5.2.10 Trigger in

This connector is available with option R&S EVSF1-B4 only.

Provides an external trigger for data recording. The voltage level is 3.3 V to 12 V. The typical input impedance is 1 M $\Omega$ .

When using the R&S EVSF1-Z2, use the BNC connector, 50  $\Omega$ /20k $\Omega$ .

### 5.2.11 IP-Address select

This connector is available with option R&S EVSF1-B4 only.

Determines which of two possible IP addresses is used, to distinguish between two instruments in a single rack.

If this pin is not connected, the address configured as "TCP/IP Address 1" is used.

If this pin is connected to ground, the address configured as "TCP/IP Address 2" is used.

### 5.2.12 Device ID

The unique device identifier is provided as a barcode sticker on the rear panel of the R&S EVSF1000.

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, EVSF1000-123456.

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

## 5.3 Accessories

Following accessories are available for rack installation:

- Slide-in option (R&S EVSF1-B4)  
Provides an ARINC connector on the rear panel of the R&S EVSF1000 which can be connected to the rack tray (R&S EVSF1-Z1 with connector). While the tray remains connected to the aircraft permanently, you can remove the R&S EVSF1000 quickly and easily, without having to connect and disconnect the instrument from the power supply and other devices.
- Installation tray with connector plate (R&S EVSF1-Z1)  
Allows you to mount the instrument in a flight inspection rack securely. Using the connector plate, you can remove and replace the R&S EVSF1000 quickly and easily.
- Service adapter (R&S EVSF1-Z2)  
The service adapter combines an ARINC connector with the common connectors provided on the rear panel of a conventional R&S EVSF1000. It allows you to connect a power supply and any other signal input and output devices to a R&S EVSF1000 with the slide-in hardware outside an aircraft.



## 6 Operating basics

The R&S EVSF1000 is designed for flight inspection and is thus optimized for remote operation, 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. Basic operation and status information is also available on a mini display directly on the R&S EVSF1000.

### 6.1 Basic configuration and status display

To connect to the R&S EVSF1000 from a remote device, you require connection information, such as the IP address. It is also helpful to obtain the operating status of the instrument before connecting to it. This basic information is displayed in the mini display directly on the R&S EVSF1000.

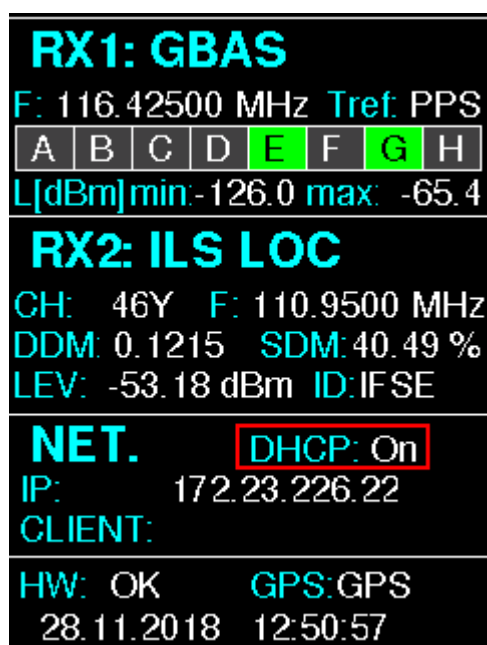


Figure 6-1: R&S EVSF1000 mini display

The following information is displayed in the mini display.

**Measurement information for each receiver board (RX1/RX2)**

In addition to the current measurement mode, measurement-specific information is provided.

For example, for "ILS LOC" mode:

- **"CH"** : Receiver channel
- **"F"** : Receiver frequency
- **"DDM"** : ILS DDM
- **"SDM"** : ILS SDM
- **"LEV"** : Currently measured power level
- **"ID"** : Decoded ID of transmitter

**Network settings (NET)**

- **"DHCP"** : DHCP usage
- **"IP"** : IP address of the R&S EVSF1000
- **"CLIENT"** : IP address of connected client

**Operating status of the R&S EVSF1000**

- **"HW"** : Hardware status("OK"/"ERROR")
- **"GPS"** : Availability of GPS signal

**Current date and time**

## 6.2 Basic connection settings

To operate the R&S EVSF1000 from a remote device, you require connection information.

By default, the R&S EVSF1000 is set to use the static IP address 10.255.255.98. The assigned IP address and DHCP state of the R&S EVSF1000 is provided in the mini display on the front panel.

Use this IP address for the initial connection from a remote device to the R&S EVSF1000.

## Manual operation from a VNC viewer


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 EVSF1000. The default instrument name is EVSF<serial\_number>, for example, EVSF1000-123456. For information on determining the serial number, see [Chapter 5.2.12, "Device ID"](#), on page 31.

## 6.3 Manual operation from a VNC viewer

You can operate the R&S EVSF1000 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. The display of the R&S EVSF1000 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 EVSF1000 via VNC can be protected by a password. In this case, enter *instrument* as the password in the login window.

### 6.3.1 Understanding the display information

The following figure shows a typical screen display for the R&S EVSF1000. All different screen elements are labeled. They are explained in more detail in the following sections.



Figure 6-2: R&S EVSF1000 - 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 the "More softkeys" key beneath the softkeys on the front panel of the R&S EVSF1000.

Softkeys can perform a function directly, or open a dialog or submenu with further settings and functions. Some softkeys are directly associated with an input field in the measurement settings area of the window. If the softkey shows a vertical blue line at the edge, you can edit the value of the corresponding setting directly in the measurement settings area of the window. If the blue line is not shown, the setting is read-only. To toggle between the edit mode and read-only mode, select the softkey again.



**Figure 6-3: Softkey with an associated input field**

## 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 6.4, "Remote control"](#), on page 42)


## 6.3.2 Keyboard commands for operation via a VNC viewer

[Keyboard commands \(VNC viewer\)](#) shows the mapping between the keyboard shortcuts and the interface elements on the R&S EVSF1000.

**Table 6-1: Keyboard commands (VNC viewer)**

Keyboard	Usage
y	Preset
c	Audio

## Manual operation from a VNC viewer

Keyboard	Usage
v	Display
b	Help
n	Setup
m	Mode
z	Undo
r	Redo
PAGE UP	Field right
PAGE DOWN	Field left
x	Screenshot
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

Keyboard	Usage
BACKSPACE	Back
ENTER	Enter
.	.
2	2
5	5
8	8
w	Ampt
F9	Hz
3	3
6	6
9	9
e	BW (Bandwidth)
F10	kHz
F11	MHz
F12	GHz
p	Record
i	Marker

### 6.3.3 Changing settings and activating functions

All functions available on the R&S EVSF1000 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 6.3.4, "Entering data"](#), on page 40.
5. Confirm the new setting and remove the focus by pressing [ENTER].

### 6.3.4 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.



## Manual operation from a VNC viewer

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 Æ Ç
9	D E F 9 É

Key name (upper inscription)	Series of (special) characters and number provided
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>

## 6.4 Remote control

You can control the R&S EVSF1000, including data transfer, remotely from another device using the LAN connection (Fast Ethernet).

See [Chapter 6.2, "Basic connection settings"](#), on page 34.

Remote control is performed using predefined remote commands which are sent from the control device to the R&S EVSF1000. The R&S EVSF1000 can also return queried data to the control device.

While in remote control, the R&S EVSF1000 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](http://www.rohde-schwarz.com/support), or follow this QR code:



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

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