

R&S®EPL EMI Test Receiver Getting Started

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dataTec AG

E-Mail: info@datatec.eu

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Version 04

ROHDE & SCHWARZ

Make ideas real



This manual applies to the following R&S®EPL models with firmware version 1.30 and higher:

- R&S®EPL1000 (1350.4444K10)
- R&S®EPL1001 (1350.4444K11)
- R&S®EPL1007 (1350.4444K17)



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E-Mail: info@datatec.eu

>>> www.datatec.eu

© 2025 Rohde & Schwarz

Muehldorfstr. 15, 81671 Muenchen, Germany

Phone: +49 89 41 29 - 0

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®EPL is indicated as R&S EPL, R&S® EPL1-Bxx/-Kxx is indicated as R&S EPL1-Bxx/-Kxx.

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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 product is intended for the development, production and verification of electronic components and devices in industrial, administrative, and laboratory environments. Use the product only for its designated purpose. Observe the operating conditions and performance limits stated in the specifications document.

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 [Section 1.1, "Safety instructions"](#), on page 5. The same information is provided in many languages in printed format. The printed "Safety Instructions" for "Mains-Powered Products, Not Heavy" (document number 1171.1771.99) 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 skilled persons 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>.

Lifting and carrying the product

The maximum weight of the product is provided in the specifications document. You can lift or carry the product by yourself, if you can manage the weight on your own. Alternatively, you can use lifting or transporting equipment. Follow the instructions provided by the equipment manufacturer.

Choosing the operating site

Only use the product indoors. The product casing is not waterproof. Water that enters can electrically connect the casing with live parts, which can lead to electric shock, serious personal injury or death if you touch the casing.

If Rohde & Schwarz provides accessories designed for outdoor use of your product, e.g. a protective cover, you can use the product outdoors.

You can operate the product up to an altitude of 2000 m above sea level. If a higher altitude is permissible, the value is provided in the specifications document. The product is suitable for pollution degree 2 environments where nonconductive contamination can occur. For more information on environmental conditions such as ambient temperature and humidity, see the specifications document.

Setting up the product

Always place the product on a stable, flat and level surface with the bottom of the product facing down. If the product is designed for different positions, secure the product so that it cannot fall over.

If the product has foldable feet, always fold the feet completely in or out to ensure stability. The feet can collapse if they are not folded out completely or if the prod-

uct is moved without lifting it. The foldable feet are designed to carry the weight of the product, but not an extra load.

If stacking is possible, keep in mind that a stack of products can fall over and cause injury.

If you mount products in a rack, ensure that the rack has sufficient load capacity and stability. Observe the specifications of the rack manufacturer. Always install the products from the bottom shelf to the top shelf so that the rack stands securely. Secure the product so that it cannot fall off the rack.

Connecting the product

Before connecting the interfaces or 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.

Connecting to power

The product is an overvoltage category II product. Connect the product to a fixed installation used to supply energy-consuming equipment such as household appliances and similar loads. Keep in mind that electrically powered products have risks, such as electric shock, fire, personal injury or even death. Replace parts that are relevant to safety only by original parts, e.g. power cables or fuses.

Take the following measures for your safety:

- Before switching on the product, ensure that the voltage and frequency indicated on the product match the available power source. If the power adapter does not adjust automatically, set the correct value and check the rating of the fuse.
- If a product has an exchangeable fuse, its type and characteristics are indicated next to the fuse holder. Before changing the fuse, switch off the product and disconnect it from the power source. How to change the fuse is described in the product documentation.
- Only use the power cable delivered with the product. It complies with country-specific safety requirements. Only insert the plug into an outlet with protective conductor terminal.

Safety instructions

- Only use intact cables and route them carefully so that they cannot be damaged. Check the power cables regularly to ensure that they are undamaged. Also ensure that nobody can trip over loose cables.
- Only connect the product to a power source with a fuse protection of maximum 20 A.
- Ensure that you can disconnect the product from the power source at any time. Pull the power plug to disconnect the product. The power plug must be easily accessible. If the product is integrated into a system that does not meet these requirements, provide an easily accessible circuit breaker at the system level.

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.
- 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.

Safety instructions

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 support. 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.

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.

Cleaning the product

Use a dry, lint-free cloth to clean the product. When cleaning, keep in mind that the casing is not waterproof. Do not use liquid cleaning agents.

Meaning of safety labels

Safety labels on the product and its accessories warn against potential hazards.

	Potential hazard Read the product documentation to avoid personal injury or product damage.
	Electrical hazard Indicates live parts. Risk of electric shock, fire, personal injury or even death.
	Hot surface Do not touch. Risk of skin burns. Risk of fire.
	Protective conductor terminal Connect this terminal to a grounded external conductor or to protective ground. This connection protects you against electric shock if an electric problem occurs.

1.2 Labels on R&S EPL

Labels on the casing inform about:

- Personal safety, see ["Meaning of safety labels"](#) on page 9
- Product and environment safety, see [Table 1-1](#)
- Identification of the product, see [Section 5.2.15, "Device ID"](#), on page 50

Table 1-1: Labels regarding R&S EPL 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 product user manual, section "Disposal".
	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, section "Disposal".

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.

1.4 Korea certification class A



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 EPL user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/EPL

2.1 Getting started manual

Introduces the R&S EPL and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc.

A printed version is delivered with the instrument. A PDF version is available for download on the Internet.

2.2 User manuals and help

Separate user manuals are provided for the base unit and the firmware applications:

- **Base unit manual**
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.
- **Firmware application manual**
Contains the description of the specific functions of a firmware application, including remote control commands. Basic information on operating the R&S EPL is not included.

The contents of the user manuals are available as help in the R&S EPL. The help offers quick, context-sensitive access to the complete information for the base unit and the firmware applications.

All user manuals are also available for download or for immediate display on the Internet.

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):

<https://gloris.rohde-schwarz.com>

2.4 Instrument security procedures

Deals with security issues when working with the R&S EPL in secure areas. It is available for download on the internet.

2.5 Printed safety instructions

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

2.6 Specifications and brochures

The specifications document, also known as the data sheet, contains the technical specifications of the R&S EPL. 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/EPL

2.7 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/EPL

2.8 Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/EPL

2.9 Video tutorials

Video tutorials that show you how to get started and perform basic tasks with the R&S EPL are available on the Rohde & Schwarz internet site:

https://www.rohde-schwarz.com/manual/r-s-fpl1000-trying-out-basic-measurement-tasks-manuals_78701-567115.html

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

2.10 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 EPL sets standards in RF performance and usability. Outstanding key features are:

One instrument for multiple applications

- Receiver measurements (CISPR compliant)
- Spectrum analysis

Solid RF performance

- Low spurious response
- Low displayed average noise level (DANL)
- 12.8 MHz signal analysis bandwidth
- Low level measurement uncertainty
- Precise spectral measurements due to low phase noise

Intuitive user interface

- High-resolution display
- Multipoint touchscreen
- Flexible arrangement of results and MultiView
- Toolbar
- Quiet operation

Fully portable

- Battery pack and 12 V/24 V power supply
- Carrying bag and shoulder harness
- Low power consumption

4 Preparing for use

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

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4.1 Lifting and carrying

The carrying handles are designed to lift or carry the instrument. Do not apply excessive external force to the handles.

See "[Lifting and carrying the product](#)" on page 6.

4.2 Unpacking and checking

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

4. Check the equipment for damage.

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

4.3 Choosing the operating site

Specific operating conditions ensure proper operation and avoid damage to the product and connected devices. For information on environmental conditions such as ambient temperature and humidity, see the specifications document.

For safety information, see ["Choosing the operating site"](#) on page 6.

Electromagnetic compatibility classes

The electromagnetic compatibility (EMC) class indicates where you can operate the product. The EMC class of the product is given in the specifications document.

- Class B equipment is suitable for use in:
 - Residential environments
 - Environments that are directly connected to a low-voltage supply network that supplies residential buildings
- Class A equipment is intended for use in industrial environments. It can cause radio disturbances in residential environments due to possible conducted and radiated disturbances. It is therefore not suitable for class B environments. If class A equipment causes radio disturbances, take appropriate measures to eliminate them.

4.4 Setting up the R&S EPL

The R&S EPL is designed for use either on a bench top or in a rack, or as a portable instrument (with optional battery operation) in a transport bag in the field.

See also:

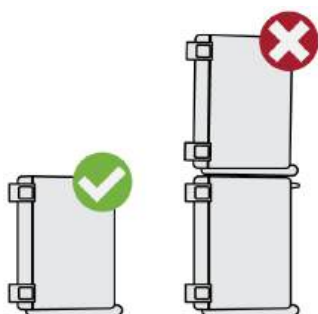
- ["Setting up the product"](#) on page 6
- ["Intended use"](#) on page 5

4.4.1 Placing the R&S EPL on a bench top

To place the product 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.



3. **CAUTION!** Foldable feet can collapse. For safety information, see "[Setting up the product](#)" on page 6.

Always fold the feet completely in or out. With folded-out feet, do not place anything on top or underneath.

4. **NOTICE!** Overheating can damage the product.

Prevent overheating as follows:

- Keep a minimum distance of 10 cm between the fan openings of the product and any object in the vicinity to provide sufficient airflow and ventilation.
- Do not place the product next to heat-generating equipment such as radiators or other products.

4.4.2 Mounting the R&S EPL in a rack

To prepare the rack

1. Observe the requirements and instructions in "[Setting up the product](#)" on page 6.
2. **NOTICE!** Insufficient airflow can cause overheating and damage the product.

Setting up the R&S EPL

Design and implement an efficient ventilation concept for the rack.

To mount the R&S EPL in a rack

1. Use an adapter kit to prepare the R&S EPL for rack mounting.
 - a) Order the rack adapter kit designed for the R&S EPL. For the order number, see the specifications document.
 - b) Mount the adapter kit. Follow the assembly instructions provided with the adapter kit.
2. Lift the R&S EPL to shelf height.
3. Grab the handles and push the R&S EPL onto the shelf until the rack brackets fit closely to the rack.
4. Tighten all screws in the rack brackets with a tightening torque of 1.2 Nm to secure the R&S EPL in the rack.

To unmount the R&S EPL from a rack

1. Loosen the screws at the rack brackets.
2. Remove the R&S EPL from the rack.
3. If placing the R&S EPL on a bench top again, unmount the adapter kit from the R&S EPL. Follow the instructions provided with the adapter kit.

4.4.3 Portable operation

An optional carrying bag designed specifically for the R&S EPL allows you to protect the instrument while working in the field. The bag includes ventilation areas at the position of the ventilation outlets in the casing to ensure air circulation. The transparent cover allows you to operate the instrument without removing it from the bag. With the help of the optional vest holster, you can carry the R&S EPL in its bag and keep your hands free. Together with the optional battery pack (see [Section 4.5.3, "Optional battery pack"](#), on page 22), and packed in the dedicated carrying bag, the R&S EPL is ideally suited for operation directly in the field, even in rough environments.



- Inspect the carrying bag for wear and tear before placing the instrument in it.

For details on optional accessories, see the R&S EPL data sheet.

4.5 Connecting to power

There are various options to supply power to the R&S EPL.

- The R&S EPL is equipped with an AC power supply connector.
- The R&S EPL can also be equipped with an optional (internal) DC power supply connector
The optional DC power supply is available with R&S FPL1-B30.
- The R&S EPL allows for battery operation if option R&S FPL1-B31 is installed.

4.5.1 Connecting the AC power

The R&S EPL can be used with different AC power voltages and adapts itself automatically to it. Refer to the datasheet for the requirements of voltage and frequency.

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

To connect the AC power

1. Plug the AC power cable into the AC power connector on the rear panel of the instrument. Only use the AC power cable delivered with the R&S EPL.



2. Plug the AC power cable into a power outlet with ground contact.

The required ratings are listed next to the AC power connector and in the data sheet.

For details on the connector, refer to [Section 5.2.1, "AC power supply connection and main power switch"](#), on page 45.

4.5.2 Connecting an optional DC power supply

The DC power supply is available with option R&S FPL1-B30.

The R&S EPL can also be equipped with an optional DC power supply connector. If installed, the R&S EPL can be operated by a DC voltage of +12 V to +24 V. For details on the connector see [Section 5.2.2, "Li-Ion battery packs and DC power connector"](#), on page 45.

If you use an external power supply unit to supply 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. Use a cable no longer than 3 m.

Also see ["Connecting to power"](#) on page 7.



DC connection

- ▶ Connect the DC power connector on the rear panel of the R&S EPL to the DC power source using a cable as described above.

4.5.3 Optional battery pack

The optional battery pack is available with R&S FPL1-B31.

As an alternative to the fixed AC or DC power supply, the R&S EPL also allows for battery operation. The "Battery Pack" option comprises two Li-ion batteries and an internal charger. The internal charger charges the batteries whenever the instrument is connected to AC power. During operation, if neither DC nor AC power is supplied, the R&S EPL automatically switches to battery operation.

The battery pack can be retrofitted by Rohde & Schwarz service.

For safety information, see ["Handling batteries safely"](#) on page 8.



Charging batteries

Charge the batteries before using battery operation for the first time. Following a long storage period, it can be necessary to charge and discharge the batteries several times to reach full capacity.

For batteries from third parties, follow the instructions provided by the manufacturer. For batteries manufactured by Rohde & Schwarz, observe the following:

- If inserted in the R&S EPL, batteries are charged via the common AC or DC power supply.
- You can also use the external battery charger R&S FSV-B34 to charge up to 4 batteries.
- Charge only in the temperature range specified in the data sheet. If the temperature exceeds those values, or the temperature varies strongly, charging is interrupted. If the battery temperature rises above +53 °C, charging is stopped.

- Try not to overcharge the battery too often because overcharging reduces the service life of the battery.



When the battery is being charged in standby mode, the [Power] LED blinks. During operation, the status bar indicates that the battery is being charged.

Spare battery pack

The spare battery pack is available with R&S FPL1-Z4.

In addition to the optional internal battery pack, spare batteries are available for the R&S EPL. The spare battery pack comprises two additional Li-ion batteries.

Outside the R&S EPL, batteries can be charged using the external battery charger R&S FSV-B34. Even during battery operation, you can exchange the internal batteries while the R&S EPL is running, as long as one battery remains in the instrument. However, it is not recommended to operate the R&S EPL with only one battery for a longer period.

4.6 Switching on or off

Table 4-1: Overview of power states

Status	LED on Power key	Position of main power switch
Off	● gray	[0]
Standby	● orange	[I]
Ready	● green	[I]

To switch on the R&S EPL

The R&S EPL is off but connected to power.

1. Set the switch on the power supply to position [I].
See [Section 5.2.1, "AC power supply connection and main power switch"](#), on page 45.

The LED of the Power key is orange.

See [Section 5.1.2, "Power key"](#), on page 39.

Note: If the R&S EPL was disconnected from power before it was switched off regularly, it automatically switches back on when the power is reconnected.

Connecting to RF coaxial connectors

Using a LAN-controlled power switch, you can take advantage of this behavior to switch the device on and off remotely.

2. Press the Power key.

The LED changes to green.

The instrument operates on battery, DC, or AC power, whichever is supplied. The R&S EPL boots.

After booting, the instrument is ready for operation.

To shut down the product

The product is in the ready state.

- Press the [Power] key.

The operating system shuts down. The LED changes to orange. The product changes to standby state.

To disconnect from power

The R&S EPL is in the standby state.

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.

Set the switch on the power supply to position [0].

See [Section 5.2.1, "AC power supply connection and main power switch"](#), on page 45.

The LED of the standby key is switched off.

2. Disconnect the R&S EPL from the power source.

4.7 Connecting to RF coaxial connectors

The most common interface used to provide signal input to the R&S EPL is the RF input 50 ohm connector.

The RF input can be coupled to the DUT by alternating current (AC) or direct current (DC). AC coupling blocks any DC voltage from the input signal. This is the default setting to prevent damage to the instrument. However, some specifications require DC coupling.

Connecting to RF coaxial connectors

In this case, protect the instrument from damaging DC input voltages manually, e.g. by inserting a DC blocker or using a bias tee to bias your DUT and supply the DC input to the instrument. For details, refer to the specifications document.

For details on coupling, see the section on radio frequency input in the R&S EPL user manual.

To prepare for connecting

1. **NOTICE!** Damaged or not clean connections can lead to RF insertion loss and mismatch, and even premature wear of the connectors.
Before connecting to the port, inspect the RF connector visually. Check that it is clean, undamaged and mechanically compatible.
2. Use a high-quality RF cable that matches the RF connector type. See also ["Cable selection to minimize electromagnetic interference \(EMI\)"](#) on page 35.

You can connect to two kinds of connectors:

- ["To connect to screwable connectors"](#) on page 25
- ["To connect to pluggable connectors"](#) on page 25

To connect to screwable connectors

To connect the cable with the connector, proceed as follows:

1. Carefully align the connector of the cable and the connector along a common axis.
2. Mate the connectors along the common axis until the male pin of the inner connector engages with the female socket of the outer connector.
3. Turn the nut of the outer connector until the connectors are firmly coupled.
4. **NOTICE!** Excessive tightening can damage the connectors.
Using a calibrated torque wrench, torque the nut to the limit. Hold the opposite connector part stationary with a spanner.

To connect to pluggable connectors

The R&S EPL provides pluggable Bayonet Neill-Concelman (BNC) connectors.

To connect the RF cable with the BNC connector, proceed as follows:

1. Carefully align the connector of the cable and the BNC connector along a common axis.

2. Mate the connectors along the common axis until the male pin of the connector of the cable engages with the female socket of the BNC connector.

4.8 Connecting to LAN

You can connect the instrument to a LAN for remote operation via a PC.

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

- To transfer data between a controlling device and the test device, e.g. to run a remote control program
- To access or control the measurement from a remote computer using the "Remote Desktop" application (or a similar tool)
- To connect external network devices (e.g. printers)
- To transfer data from a remote computer and back, e.g. using network folders

Network environment

Before connecting the product to a local area network (LAN), consider the following:

- Install the latest firmware to reduce security risks.
- For internet or remote access, use secured connections, if applicable.
- Ensure that the network settings comply with the security policies of your company. Contact your local system administrator or IT department before connecting your product to your company LAN.
- When connected to the LAN, the product may potentially be accessed from the internet, which may be a security risk. For example, attackers might misuse or damage the product. For more information about IT security and how to operate the product in a secure LAN environment, see the Rohde & Schwarz white paper [1EF96: Malware Protection Windows 10](#).

► **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.

Connect the R&S EPL to the LAN via the LAN interface on the rear panel of the instrument.

Windows automatically detects the network connection and activates the required drivers.

By default, the R&S EPL is configured to use DHCP and no static IP address is configured.



The default instrument name is <Type><variant>-<serial_number>, for example, EPL1000-123456. For information on determining the serial number, see [Section 5.2.15, "Device ID"](#), on page 50.

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

4.9 Connecting a keyboard

The keyboard is detected automatically when it is connected. The default input language is English – US.

However, you can also connect foreign language keyboards; currently the following languages are supported for the R&S EPL:

- German
- Swiss
- French
- Russian

To configure the keyboard language

1. To access the Windows operating system, press the Windows key on the external keyboard.
2. Select "Start > Settings > Time & language > Region & language > Add a language" .

4.10 Connecting an external monitor

You can connect an external monitor (or projector) to the "DisplayPort" connector on the rear panel of the R&S EPL (see also [Section 5.2.14, "DisplayPort"](#), on page 50).



Screen resolution and format

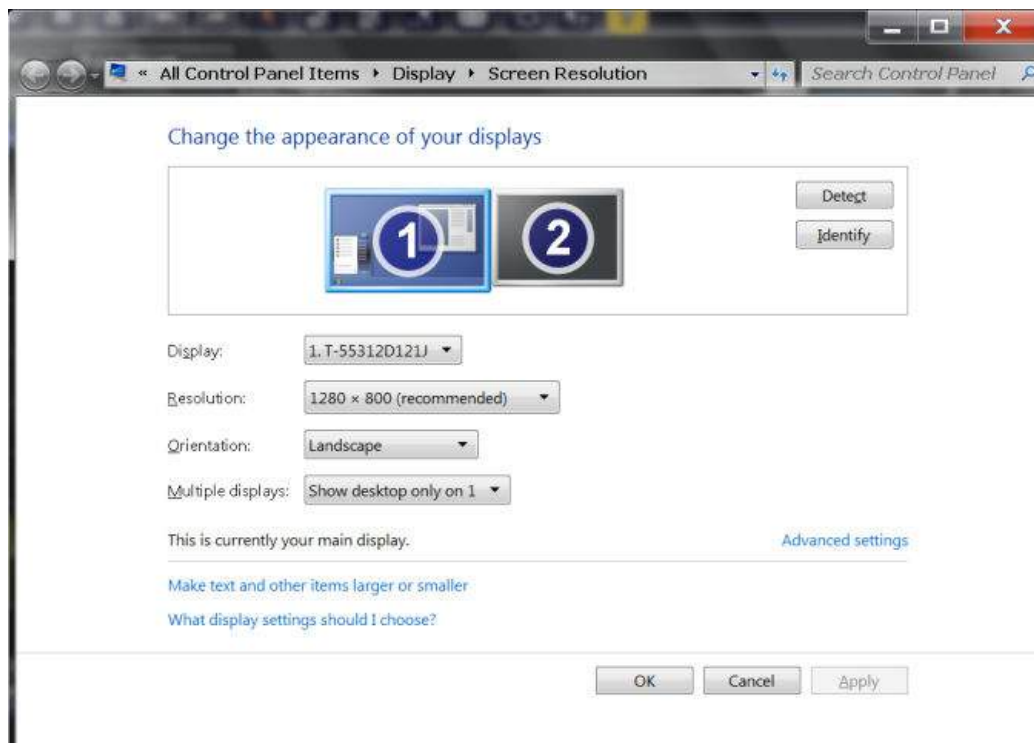
The touchscreen of the R&S EPL is calibrated for a 16:10 format. If you connect a monitor or projector using a different format (e.g. 4:3), the calibration is not correct and the screen does not react to your touch actions properly.

The touchscreen has a screen resolution of 1280x800 pixels. Usually, the display of the external monitor is a duplicate of the instrument's monitor.

If you configure the external monitor to be used as the *only* display in the Windows configuration dialog box ("Show only on 2"), the maximum screen resolution of the monitor is used. In this case, you can maximize the R&S EPL application window and see even more details. You cannot change the monitor's screen resolution via the standard Windows configuration dialog box.

The R&S EPL supports a minimum resolution of 1280x768 pixels.

1. Connect the external monitor to the R&S EPL.
2. Press the [Setup] key.
3. Press the "Display" softkey.
4. Select the "Configure Monitor" tab in the "Display" dialog box.
The standard Windows "Screen Resolution" dialog box is displayed.



5. If necessary, change the screen resolution. Consider the information in the note above.
6. Select the instrument for display:
 - "Display 1" : internal monitor only
 - "Display 2" : external monitor only
 - "Duplicate" : both internal and external monitor
7. Tap "Apply" to try out the settings before they are accepted permanently, then you can easily return to the previous settings, if necessary.
8. Select "OK" if the settings are suitable.

4.11 Windows operating system

The instrument contains the Windows operating system which has been configured according to the instrument's features and needs. Changes in the system setup are only required when peripherals like a keyboard or a printer are installed or if the network configuration does not comply with the default settings. After the R&S EPL is started, the operating system boots and the instrument firmware is started automatically.

Tested software

The drivers and programs used on the instrument under Windows are adapted to the instrument. Only install update software released by Rohde & Schwarz to modify existing instrument software.

You can install additional software on the instrument; however, additional software can impair instrument function. Thus, run only programs that Rohde & Schwarz has tested for compatibility with the instrument software.

The following program packages have been tested:

- Symantec Endpoint Security – virus-protection software
- FileShredder - for reliable deletion of files on the hard disk

Service packs and updates

Microsoft regularly creates security updates and other patches to protect Windows-based operating systems. They are released through the Microsoft Update website and associated update server. Update instruments using Windows regularly, especially instruments that connect to a network.

Firewall settings

A firewall protects an instrument by preventing unauthorized users from gaining access to it through a network. Rohde & Schwarz highly recommends using the firewall on your instrument. Rohde & Schwarz instruments are shipped with the Windows firewall enabled. All ports and connections for remote control are enabled.

Note that changing firewall settings requires administrator rights.

Virus protection

Take appropriate steps to protect your instruments from infection. Use strong firewall settings and scan any removable storage device used with a Rohde & Schwarz instrument regularly. It is also recommended that you install anti-virus software on the instrument. Rohde & Schwarz does NOT recommend running anti-virus software in the background ("on-access" mode) on Windows-based instruments, due to potentially degrading instrument performance. However, Rohde & Schwarz does recommend running it during non-critical hours.

For details and recommendations, see the following Rohde & Schwarz white paper:

- [1EF96: Malware Protection Windows 10](#)

To access the "Start" menu

The Windows "Start" menu provides access to the Windows functionality and installed programs.

- Press the "Windows" key on the front panel, or press the "Windows" key or the [CTRL + ESC] key combination on the (external) keyboard.

The "Start" menu and the Windows taskbar are displayed.

All necessary system settings can be defined in the "Start > Settings" menu.

For required settings, refer to the Windows documentation and to the hardware description.

4.12 Logging on

Windows requires that users identify themselves by entering a user name and password in a login window. By default, the R&S EPL provides two user accounts:

- **"Instrument"**: a standard user account with limited access
- **"Admin"** (depends on firmware image): an administrator account with unrestricted access to the computer/domain

Some administrative tasks require administrator rights (e.g. adapting the auto-login function or configuring a LAN network). Refer to the description of the basic instrument Setup ([Setup] menu) to find out which functions are affected.

Passwords

For all default user accounts, the initial password is 894129. Note that this password is very weak, and we strongly recommend that you change the password for both users after initial login. An administrator can change the password in Windows for any user at any time via "Start > Settings > Account > SignIn Options > Password > Change".

Auto-login

When shipped, the instrument automatically logs on the default "Instrument" user to Windows using the default password. This function is active until an administrator explicitly deactivates it or changes the password.



Changing the password and use of auto-login function

Note that when you change the default password, the default auto-login function no longer works!

In this case, you must enter the new password manually to log on.

Adapting the auto-login function to a new password

If you change the password that is used during auto-login, this function no longer works. Adapt the settings for the auto-login function first.



Changing the password for auto-login requires administrator rights.

1. Select the "Windows" icon in the toolbar to access the operating system of the R&S EPL (see also ["To access the "Start" menu"](#) on page 31).



2. Open the
`C:\Users\Public\Documents\Rohde-Schwarz\Analyzer\user\AUTOLOGIN.REG` file in any text editor (e.g. Notepad).
3. In the line `"DefaultPassword"="894129"`, replace the default password (894129) by the new password for automatic login.
4. Save the changes to the file.
5. In the Windows "Start" menu, select "Run".
The "Run" dialog box is displayed.
6. Enter the command
`C:\Users\Public\Documents\Rohde-Schwarz\Analyzer\user\AUTOLOGIN.REG`.
7. Press [ENTER] to confirm.
The auto-login function is reactivated with the changed password. It is applied the next time you switch on the instrument.

Checking the supplied options

Switching users when using the auto-login function

Which user account is used is defined during login. If auto-login is active, the login window is not displayed. However, you can switch the user account to be used even when the auto-login function is active.

1. Select the "Windows" icon in the toolbar to access the operating system of the R&S EPL (see also ["To access the "Start" menu"](#) on page 31).



2. Press [CTRL] + [ALT] + [DEL], then select "Sign out".

The "Login" dialog box is displayed, in which you can enter the different user account name and password.

For information on deactivating and reactivating the auto-login function, see the R&S EPL user manual.

4.13 Checking the supplied options

The instrument can be equipped with both hardware and firmware options. To check whether the installed options correspond to the options indicated on the delivery note, proceed as follows.

1. Press [SETUP].
2. Press "System Config".
3. Switch to the "Versions + Options" tab in the "System Configuration" dialog box.
A list with hardware and firmware information is displayed.
4. Check the availability of the hardware options as indicated in the delivery note.

4.14 Performing a self-alignment

When temperature changes occur in the environment of the R&S EPL, or after updating the firmware, you have to perform a self-alignment to align the data to a reference source.

During self-alignment, do not connect a signal to the RF input connector. Running a self-alignment with a signal connected to the RF input can lead to false measurement results.

Performing a self-alignment

Before performing this alignment, make sure that the instrument has reached its operating temperature (for details, refer to the specifications document).

A message in the status bar ("Instrument warming up...") indicates that the operating temperature has not yet been reached.

Depending on the installation settings, an automatic self-alignment is performed after installation. A dialog box is displayed indicating how much warm-up time is still required before self-alignment can be performed.

1. Press [Setup].
2. Press "Alignment" .
3. Select "Start Self Alignment" in the "Alignment" dialog box.

Once the system correction values have been calculated successfully, a message is displayed.



To display the alignment results again later

- Press [SETUP].
- Press "Alignment".

4.15 Considerations for test setup

An unsuitable test setup can damage the instrument and connected devices.

Cable selection to minimize electromagnetic interference (EMI)

Electromagnetic interference (EMI) can affect the measurement results.

To suppress electromagnetic radiation during operation:

- Use high-quality shielded cables, for example, double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Ensure that connected external devices comply with EMC regulations.

Preventing electrostatic discharge (ESD)

Electrostatic discharge is most likely to occur when you connect or disconnect a DUT.

- **NOTICE!** Electrostatic discharge can damage the electronic components of the product and the device under test (DUT).

Ground yourself to prevent electrostatic discharge damage:

- a) Use a wrist strap and cord to connect yourself to ground.
- b) Use a conductive floor mat and heel strap combination.

Electrostatically discharge the DUT with a short or match before connecting it to the instrument. Even residual charges on cables can cause damage when discharged by the instrument.

- **NOTICE!** Risk of instrument damage. Electrostatic discharge can cause an RF overload.

If the level at the input mixer is too high, a protection mechanism automatically turns off the connection between the RF input and the input mixer.

To avoid an RF overload in general, select an appropriate attenuation (at least 10 dB) to protect the input mixer.

Refer to the instructions in the user manual ("Protecting the input mixer") for more information about avoiding an RF overload.

Signal input and output levels

Information on signal levels is provided in the specifications document and on the instrument, next to the connector. Keep the signal levels within the specified ranges to avoid damage to the R&S EPL and connected devices.

Considerations for test setup

When measuring unknown signals, attenuate the signal input by at least 10 dB. Using a 0 dB attenuation when measuring unknown signals can damage or destroy the input mixer.

5 Instrument tour

5.1 Front panel view

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



Figure 5-1: Front panel view of R&S EPL

- 1 = Power key
- 2 = USB (2.0) connectors
- 3 = System keys
- 4 = Touchscreen
- 5 = Function keys
- 6 = RF input 50 Ω connector
- 7 = Keypad + navigation controls
- 8 = Internal generator output 50 Ω connector (requires option R&S EPL1-B9 or R&S EPL1-B91)

5.1.1 Touchscreen

All measurement results are displayed on the screen on the front panel. Also, the screen display provides status and setting information and allows you to switch between various measurement tasks. The screen is touch-sensitive, offering an

alternative means of user interaction for quick and easy handling of the instrument.



Figure 5-2: Touchscreen elements

- 1 = Toolbar with standard application functions, e.g. print, save/open file etc.
- 2 = Tabs for individual channel setups
- 3 = Channel setup bar for firmware and measurement settings
- 4 = Measurement results area
- 5 = Window title bar with diagram-specific (trace) information
- 6 = Softkeys for function access
- 7 = Diagram footer with diagram-specific information, depending on application
- 8 = Instrument status bar with error messages and date/time display

Any user interface elements that react to a click by a mouse pointer also react to a tap on the screen, and vice versa. Using touchscreen gestures, you can perform the following tasks (among others).

- Changing a setting
- Changing the display
- Changing the displayed result range in a diagram
- Moving a marker

- Zooming into a diagram
- Selecting a new evaluation method
- Scrolling through a result list or table
- Saving or printing results and settings

To imitate a right-click by mouse using the touchscreen, for example to open a context-sensitive menu for a specific item, press the screen for about 1 second.

For details on touchscreen gestures, see [Section 6.4, "Touchscreen gestures"](#), on page 65.

5.1.2 Power key

The [Power] key is located on the lower left corner of the front panel. It starts up and shuts down the instrument.

See also ["Connecting to power"](#) on page 7 and [Section 4.5, "Connecting to power"](#), on page 20.

5.1.3 USB

The front panel provides two female USB connectors (USB-A, 2.0 standard) to connect devices like a keyboard or a mouse. A memory stick can be connected to store and reload instrument settings and measurement data.

The rear panel provides further USB connectors (standard 3.0), see [Section 5.2.11, "USB"](#), on page 49.

5.1.4 System keys

System keys set the instrument to a predefined state, change basic settings, and provide print and display functions.

A detailed description of the corresponding functions is provided in the R&S EPL user manual.

Table 5-1: System keys

System key	Assigned functions
[Preset]	Resets the instrument to the default state.
[Setup]	Provides basic instrument configuration functions, e.g.: • Reference frequency (external/internal) • Date, time, display configuration • LAN interface • Firmware update and enabling of options • Information about instrument configuration incl. firmware version and system error messages • Service support functions (self-test etc.) • Self-alignment (with spectrum analysis option)
[Mode]	Manages channel setups
[Print]	Provides configuration settings for the print function
[FILE]	Provides save/recall functions for instrument settings and measurement results
	Switches between the on-screen keyboard display: • At the top of the screen • At the bottom of the screen • Off

5.1.5 Function keys

Function keys provide access to the most common measurement settings and functions.

A detailed description of the corresponding functions is provided in the R&S EPL user manual.

Table 5-2: Function keys

Function key	Assigned functions
[Freq]	Sets the center frequency and the start and stop frequencies for the frequency range under consideration. This key is also used to set the frequency offset and the signal track function.
[Span]	Sets the frequency span to be analyzed
[Ampt]	Sets the reference level, the displayed dynamic range, the RF attenuation and the unit for the level display Sets the level offset and the input impedance Activates the (optional) preamplifier
[BW]	Sets the resolution bandwidth and the video bandwidth.

Function key	Assigned functions
[Sweep]	Provides functionality to configure the measurement, for example: - the measurement mode (single or continuous measurements) - the measurement time
[Trace]	Configures the graphical analysis of the measurement data.
[Meas]	Provides the measurement functions and data input and output.
[Meas Config]	Used to configure measurements.
[Lines]	Configures display lines and limit lines.
[Mkr]	Sets and positions the absolute and relative measurement markers (markers and delta markers).
[Mkr->]	Used for search functions of the measurement markers (maximum/minimum of the trace). Assigns the marker frequency to the center frequency, and the marker level to the reference level. Restricts the search area (Search Limits) and characterizes the maximum points and minimum points (Peak Excursion).
[Trig]	Sets the trigger mode, the trigger threshold, the trigger delay, and the gate configuration for gated sweep.
[Peak]	Performs a peak search for active marker. If no marker is active, normal marker 1 is activated and the peak search is performed for it.
[Run Single]	Starts and stops a single new measurement (Single Sweep Mode).
[Run Cont]	Starts and stops a continuous measurement (Continuous Sweep Mode).

5.1.6 Keypad

The keypad is used to enter numeric parameters, including the corresponding units. It contains the following keys:

Table 5-3: Keys on the keypad

Type of key	Description
Decimal point	Inserts a decimal point "." at the cursor position.
Sign key	Changes the sign of a numeric parameter. For alphanumeric parameters, inserts a "-" at the cursor position.

Type of key	Description
Unit keys (GHz/-dBm MHz/dBm, kHz/dB, Hz/dB etc.)	Adds the selected unit to the entered numeric value and complete the entry. For level entries (e.g. in dB) or dimensionless values, all units have the value "1" as multiplying factor. Thus, they have the same function as an [ENTER] key.
[ESC]	Closes all kinds of dialog boxes, if the edit mode is not active. Quits the edit mode, if the edit mode is active. In dialog boxes that contain a "Cancel" button it activates that button. For "Edit" dialog boxes the following mechanism is used: • If data entry has been started, it retains the original value and closes the dialog box. • If data entry has not been started or has been completed, it closes the dialog box.
 (BACKSPACE)	If an alphanumeric entry has already been started, this key deletes the character to the left of the cursor.
[ENTER]	• Concludes the entry of dimensionless entries. The new value is accepted. • With other entries, this key can be used instead of the "Hz/dB" unit key. • In a dialog box, selects the default or focused element.

5.1.7 Navigation controls

The navigation controls include a rotary knob and navigation keys. They allow you to navigate within the display or within dialog boxes.



Navigating in tables

The easiest way to navigate within tables (both in result tables and configuration tables) is to scroll through the entries with your finger on the touch-screen.

5.1.7.1 Rotary knob



The rotary knob has several functions:

- For numeric entries: increments (clockwise direction) or decrements (counter-clockwise direction) the instrument parameter at a defined step width

- In lists: toggles between entries
- For markers, limit lines, and other graphical elements on the screen: moves their position
- For active scroll bars: moves the scroll bar vertically
- For dialog boxes: Same effect as the Enter key when pressed

5.1.7.2 Navigation keys

You can use the navigation keys as an alternative to the rotary knob to navigate through dialog boxes, diagrams or tables.

Arrow Up/Arrow Down Keys

The <arrow up> or <arrow down> keys do the following:

- For numeric entries: increments (Arrow Up) or decrements (Arrow Down) the instrument parameter at a defined step width
- In a list: scrolls forward and backward through the list entries
- In a table: moves the selection bar vertically
- In windows or dialog boxes with a vertical scroll bar: moves the scroll bar

Arrow Left/Arrow Right Keys

The <arrow left> or <arrow right> keys do the following:

- In an alphanumeric edit dialog box, move the cursor.
- In a list, scroll forward and backward through the list entries.
- In a table, move the selection bar horizontally.
- In windows or dialog boxes with horizontal scroll bar, move the scroll bar.

5.1.8 RF INPUT 50 Ohm

Provides RF input from a connected device under test (DUT) to the R&S EPL, which is then analyzed in an RF measurement. Connect the DUT to the "RF Input" on the R&S EPL via a cable equipped with an appropriate connector. Do not overload the input. For maximum allowed values, see the data sheet.

See also [Section 4.15, "Considerations for test setup"](#), on page 34.

5.1.9 GEN output 50 Ohm

Provides signal output from the (optional) internal generator (requires Internal Generator option R&S EPL1-B9 or option R&S EPL1-B91). Output levels range from -60 dBm to +10 dBm, with a resolution of 0.1 dB. For details, see the data sheet.

5.2 Rear panel view

This figure shows the rear panel view of the R&S EPL. The individual elements are described in more detail in the subsequent sections.

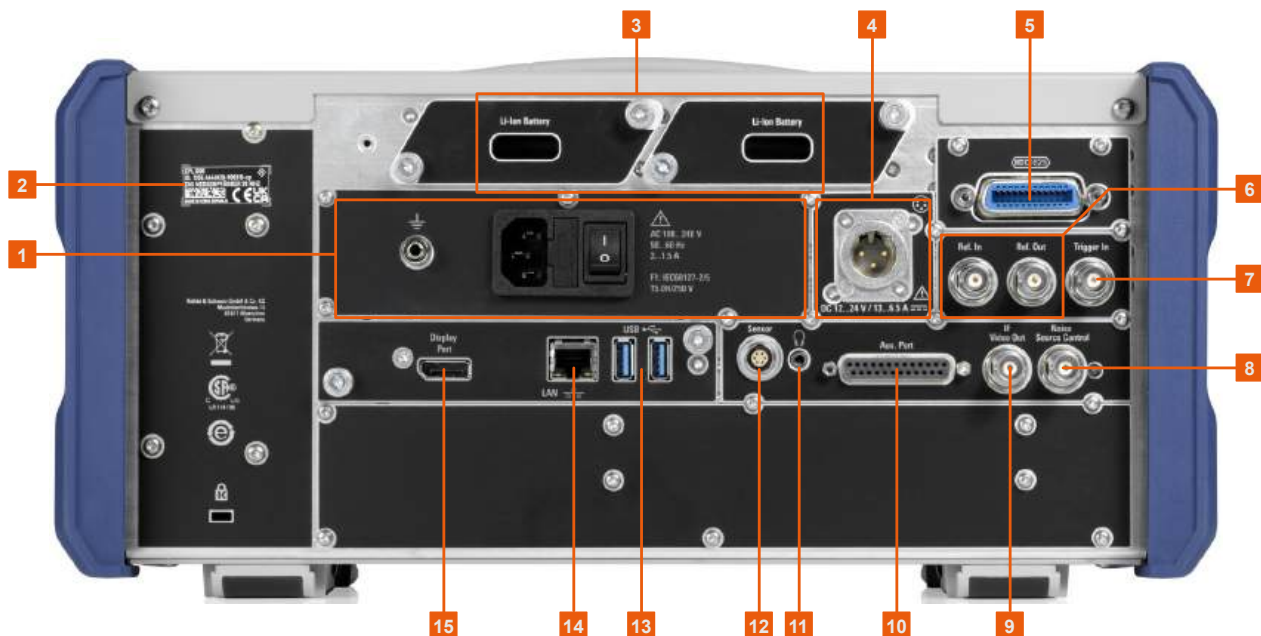


Figure 5-3: Rear panel view

- 1 = AC power supply, incl. main power switch with fuse and ground terminal
- 2 = Device ID with serial number and other labels
- 3 = Removable, rechargeable Li-Ion batteries
- 4 = DC power connector
- 5 = GPIB (IEC 625) interface
- 6 = Reference clock connectors
- 7 = Trigger input connector
- 8 = Noise source control
- 9 = "IF/Video out" connector
- 10 = Aux. Port
- 11 = Headphones connector
- 12 = Power sensor connector

13 = "USB" (3.0) connectors

14 = "LAN" connector

15 = "DisplayPort" connector for external display

 The meanings of the labels on the R&S EPL are described in [Section 1.2, "Labels on R&S EPL"](#), on page 10.

5.2.1 AC power supply connection and main power switch

An AC power supply connector and main power switch are located in a unit on the rear panel of the instrument.

Main power switch function:

Position 1: The instrument is in operation.

Position O: The entire instrument is disconnected from the AC power supply.

For details, refer to ["Connecting to power"](#) on page 7 and [Section 4.5, "Connecting to power"](#), on page 20.

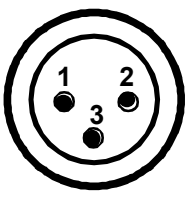
5.2.2 Li-Ion battery packs and DC power connector

The Li-Ion battery pack and DC power connector are available as an optional accessory (R&S FPL1-B31 and R&S FPL1-B30).

With the Li-ion battery pack, the R&S EPL can be operated independently of an AC or DC power supply. The instrument can house 2 Li-ion batteries which can be charged both via AC or DC power supply.

For safety information concerning batteries, see ["Handling batteries safely"](#) on page 8.

As an alternative, a DC power supply connector is available. DC power supplies from +12 V to +24 V and from 13 A to 6.5 A can be used. Connect the connector according to the following diagram:

	Pin	Description
	1	Plus
	2	Ground
	3	Not used

If you use an external power supply unit to supply 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.

Also see ["Connecting to power"](#) on page 7.

5.2.3 GPIB interface

The GPIB interface is available as an optional feature (R&S FPL1-B10).

The optional GPIB interface is in compliance with IEEE488 and SCPI. A computer for remote control can be connected via this interface. To set up the connection, a shielded cable is recommended.

For more details, refer to "Setting Up Remote Control" in the user manual.

5.2.4 Ref. In / Ref. Out

The Ref. In connectors are used to provide an external reference signal to the R&S EPL.

The Ref. Out connectors can be used to provide a reference signal from the R&S EPL to other devices that are connected to this instrument.

Various connectors are provided for different reference signals:

Connector	Reference signal	Usage
Ref. In	10 MHz 10 dBm	To provide an external reference signal on the R&S EPL.
Ref. Out	10 MHz 10 dBm	To provide the internal reference signal from the R&S EPL to another device continuously. For the R&S EPL, this is also used to provide the optional OCXO reference signal to another device.

5.2.5 Trigger In

Use the female Trigger In connector to input an external trigger or gate data. Thus, you can control the measurement using an external signal. The voltage level is 1.4 V. The typical input impedance is 10 kΩ.

5.2.6 Noise Source Control

The Noise Source Control female connector is used to provide the supply voltage for an external noise source. For example, use it to measure the noise figure and gain of amplifiers and frequency converting devices.

Conventional noise sources require a voltage of +28 V to be switched on and 0 V to be switched off. The output supports a maximum load of 100 mA.

5.2.7 IF/Video Output

The female BNC connector can be used for various outputs in the Spectrum application:

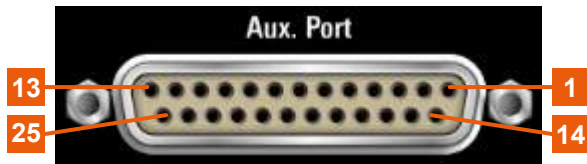
- Intermediate frequency (IF) output of approximately 20 MHz
- Video output (1V)

Which output is provided is defined in the software ("Overview" > "Output").

For details, see the R&S EPL Spectrum Mode user manual.

5.2.8 Aux. Port

A 25-pole SUB-D male connector used as an input and output for low-voltage TTL control signals (max. 5 V).



NOTICE

Short-circuit hazard

Always observe the designated pin assignment. A short-circuit can damage the port.

Table 5-4: Pin assignment for AUX port

Pin	Signal	Description
1	GND	Ground
2		not used for spectrum analysis
3	GND	Ground
4		not used for spectrum analysis
5	GND	Ground
6		not used for spectrum analysis
7	GND	Ground
8 to 11		not used for spectrum analysis
12	GND	Ground
13	+5 V / max. 250 mA	Supply voltage for external circuits
14 to 19	I/O_<no.>	Control lines for user ports (see user manual)
20	GND	Ground
21	READY FOR TRIGGER	Signal indicating that the instrument is ready to receive a trigger signal. The signal polarity is configurable. (See the R&S EPL user manual.)
22 to 25		not used for spectrum analysis

Pin	Signal	Description
23	GND	Ground
24 to 25		not used for spectrum analysis

5.2.9 Headphones connector

The R&S EPL provides demodulators for AM and FM signals, which can be routed to the headphone connector. With headphones or an external loudspeaker connected to the 3.5 mm headphone socket, the displayed signal can be identified acoustically.

Note the safety information provided in ["Using headphones"](#) on page 9.

For details, see the R&S EPL Spectrum mode user manual.

5.2.10 Sensor connector

The LEMOSA female connector is used to connect power sensors of the R&S NRP-Zxy family. For a detailed list of supported sensors, see the data sheet.

5.2.11 USB

The rear panel provides two additional female USB (3.0 standard) connectors to connect external devices (see also [Section 5.1.3, "USB"](#), on page 39).

5.2.12 LAN

The R&S EPL is equipped with a 1 GBit Ethernet IEEE 802.3u network interface with Auto-MDI(X) functionality. The assignment of the RJ-45 connector supports twisted-pair category 5 UTP/STP cables in a star configuration (UTP stands for *unshielded twisted pair*, and STP for *shielded twisted pair*).

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

5.2.13 DVI

You can connect an external monitor or other display device to the R&S EPL via the DVI (Digital visual interface) connector to provide an enlarged display.

For details, see [Section 4.15, "Considerations for test setup"](#), on page 34.

5.2.14 DisplayPort

You can connect an external monitor or other display device to the R&S EPL via the DisplayPort connector to provide an enlarged display.

For details, see [Section 4.15, "Considerations for test setup"](#), on page 34.

5.2.15 Device ID

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

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, EPL1000-123456.

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

6 Operating the instrument

This section provides an overview on how to work with the R&S EPL.



Remote control

In addition to working with the R&S EPL interactively, located directly at the instrument, it is also possible to operate and control it from a remote PC.

Various methods for remote control are supported:

- Connecting the instrument to a (LAN) network
- Using the web browser interface in a LAN network
- Using the Windows Remote Desktop application in a LAN network
- Connecting a PC via the GPIB interface

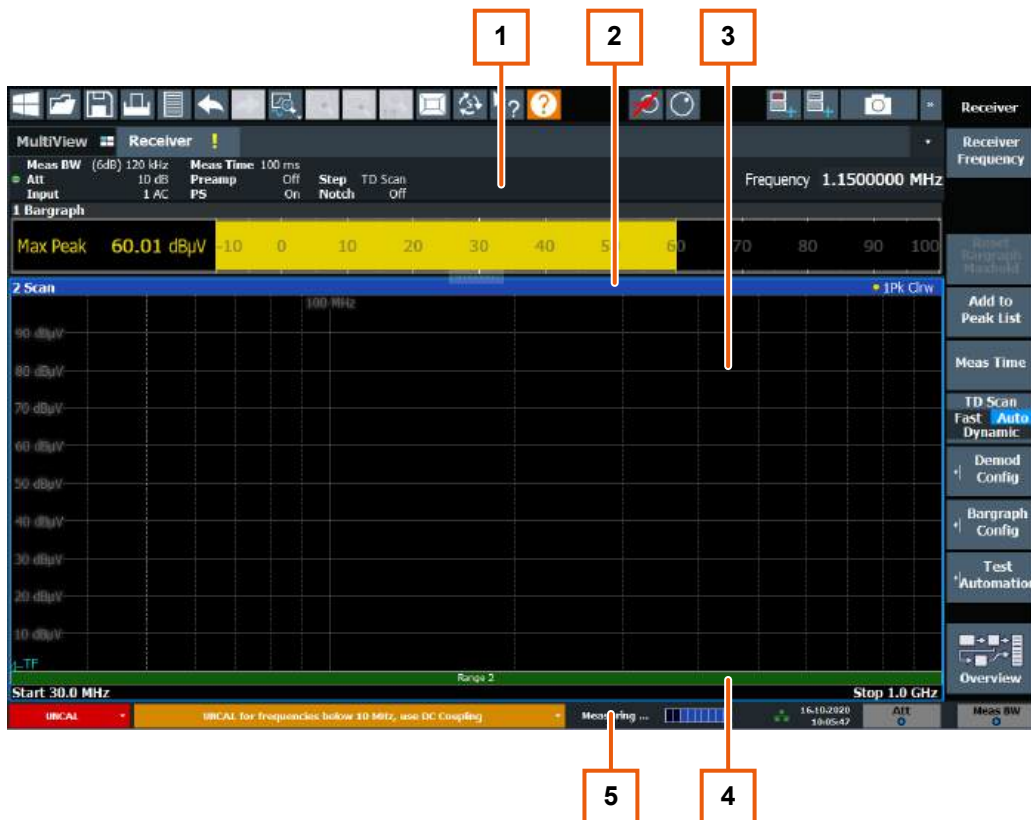
How to configure the remote control interfaces is described in the R&S EPL user manual.

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6.1 Understanding the display information

The following image shows the default display layout in the receiver application. All different information areas are labeled. They are explained in more detail in the following sections.

Understanding the display information



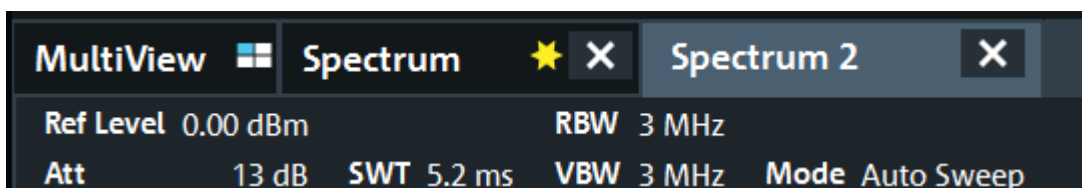
- 1 = Channel bar: shows firmware and measurement settings
- 2 = Window title bar: shows diagram-specific (trace) information
- 3 = Diagram area: contains the measurement results and other information related to the measurement (marker etc.)
- 4 = Diagram footer: shows diagram-specific information, depending on measurement application
- 5 = Instrument status bar: shows error messages, measurement progress, date/time etc.

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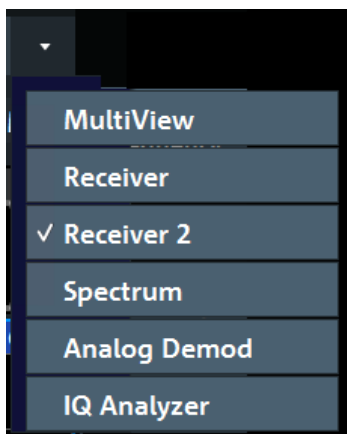
6.1.1 Channel bar

Using the R&S EPL you can handle several different measurement tasks (channels) at the same time (although they can only be performed asynchronously). For each channel, a separate tab is displayed on the screen. To switch from one channel display to another, simply select the corresponding tab.

Understanding the display information

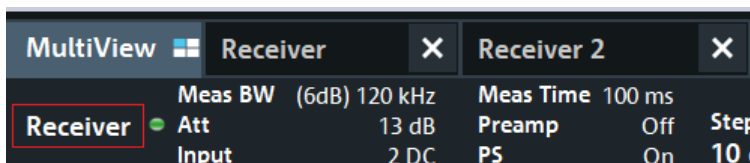


If many tabs are open, you can also select the tab selection list icon at the right end of the channel bar and select the channel you want to see.



MultiView tab

An additional tab labeled "MultiView" provides an overview of all active channels at a glance. In the "MultiView" tab, each individual window contains its own channel bar with an additional button. Tap this button to switch to the corresponding channel display quickly.



Icons in the channel bar

The star icon (★) on the tab label indicates that the displayed trace no longer matches the current instrument settings. This can be the case, for example, if a trace is frozen and the instrument settings are changed. When a new measurement is performed, the icon disappears.

The exclamation mark icon (!) indicates that an error or warning is available for that measurement channel. This is particularly useful if the MultiView tab is displayed.

Understanding the display information

The  icon indicates the currently active channel during an automatic measurement sequence (**sequencer** functionality).

Beneath the channel name, information about channel-specific settings for the measurement is displayed in the **channel bar**. Channel information varies depending on the active application.

The channel bar above the diagram also contains information about instrument settings.

Table 6-1: Contents of the channel bar (receiver application)

Label	Information
"Meas BW"	Type and bandwidth of the currently selected resolution filter. The filter type label either reads "6 dB" or "MIL". For 3 dB filters, the label is not displayed.
"Att(enuation)"	Currently defined RF attenuation.
"Input"	Currently used RF input (1 or 2), including the input coupling (AC or DC).
"Meas Time"	Currently defined measurement time. For a scan count > 1, the measurement time is the sum of all single measurements.
"Preamp(lifier)"	Currently selected preamplifier state.
"PS"	Current state of the preselector.
"Out"	Currently selected output type. If phones output is on, a corresponding icon is displayed.
"LISN"	Currently selected LISN and LISN phase. For R&S ENV216, it also shows the state of the highpass filter. Only displayed when a LISN is included in the measurement.
"SGL"	Indicates the progress of single measurements. The first number is the current measurement. The second number is the total number of measurements. Only displayed for single measurements and if the scan count is greater than 1.
"Frequency"	Current receiver frequency.
"TRG"	Currently selected trigger source.

Understanding the display information

Label	Information
GAT	The frequency sweep is controlled via the "TRIGGER INPUT" connector.
TDF	The specified transducer factor is activated.
75 Ω	The input impedance of the instrument is set to 75 Ω .
FRQ	A frequency offset $\neq$ 0 Hz is set.
CWSource: <level>	Internal generator in operation as independent CW source with specified level (requires option R&S EPL1-B9 or R&S EPL1-B91).
<"NOR" "APX"> /Trk.Gen	Internal generator in operation as tracking generator (requires option R&S EPL1-B9 or R&S EPL1-B91). NOR: the measurements are normalized with the results of the internal generator calibration APX (approximation): the measurements are normalized with the results of the internal generator calibration; however, the measurement settings have been changed since calibration If neither label is displayed, no calibration has been performed yet or normalization is not active. For details, see the "Internal Generator" section in the R&S EPL User Manual.

Icons for individual settings

In the **receiver application**, a bullet next to the setting indicates that automatic settings are used, not user-defined settings.

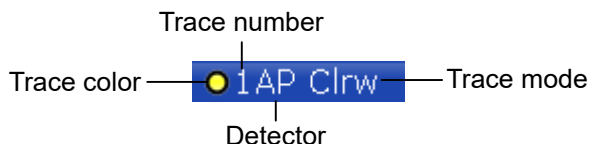
In **other applications**, a bullet next to the setting indicates that user-defined settings are used, not automatic settings. A green bullet indicates that this setting is valid and the measurement is correct. A red bullet indicates an invalid setting that does not provide useful results.

6.1.2 Window title bar

Each channel in the R&S EPL display can contain several windows. Each window can display either a graph or a table as a result of the channel measurement. The window's title bar indicates which type of evaluation is displayed.

Trace information in window title bar

Information on the displayed traces is indicated in the window title bar.



Trace color	Color of trace display in diagram
Trace no.	Number of the trace (1 to 6)
Detector	Abbreviation of the detector assigned to the trace.
Trace Mode	Abbreviation of the trace mode.
Norm/NCor	Correction data is not used.

6.1.3 Marker information

Marker information is provided either in the diagram grid or in a separate marker table, depending on the configuration.

Marker information in diagram grid

Within the diagram grid, the x-axis and y-axis positions of the last 2 markers or delta markers that were set are displayed, if available, as well as their index. The value in the square brackets after the index indicates the trace to which the marker is assigned. (Example: M2[1] defines marker 2 on trace 1.) For more than 2 markers, a separate marker table is displayed beneath the diagram by default.

Marker information in marker table

In addition to the marker information displayed within the diagram grid, a separate marker table can be displayed beneath the diagram. This table provides the following information for all active markers:

Label	Information
"Wnd"	Window type the marker is positioned in.
"Type"	Marker type: N (normal), D (delta), T (temporary, internal)
"Ref"	Reference (for delta markers)
"Trc"	Trace to which the marker is assigned

Label	Information
"X-value"	x-value of the marker
"Y-value"	y-value of the marker

6.1.4 Frequency and span information in diagram footer

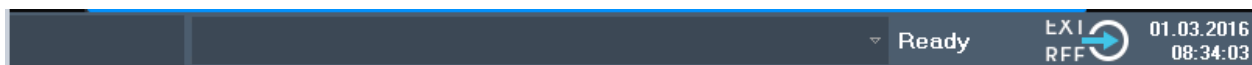
The information in the diagram footer (beneath the diagram) depends on the current application.

The contents depend on the application and the result display.

Label	Information
CF	Center frequency
Span	Frequency span (frequency domain display)
ms/	Time per division (time domain display)
Pts	Number of measurement points or (rounded) number of currently displayed points in zoom mode
Start	Start frequency of the scan
Stop	Stop frequency of the scan

6.1.5 Instrument and status information

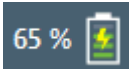
Global instrument settings and functions, the instrument status and any irregularities are indicated in the status bar beneath the diagram.



In the MultiView tab, the status bar always displays the information for the currently selected measurement.

The following information is displayed:

Instrument status

	The instrument is configured for operation with an external reference.
	Battery loading status

Date and time

The date and time settings of the instrument are displayed in the status bar.



6.1.6 Error information

If errors or irregularities are detected, a keyword and an error message, if available, are displayed in the status bar.



Depending on the type of message, the status message is indicated in varying colors.

Table 6-2: Status bar information - color coding

Color	Type	Description
Red	Error	An error occurred at the start or during a measurement, e.g. due to missing data or wrong settings, so that the measurement cannot be started or completed correctly.
Orange	Warning	An irregular situation occurred during measurement, e.g. the settings no longer match the displayed results, or the connection to an external device was interrupted temporarily.
Gray	Information	Information on the status of individual processing steps.
No color	No errors	No message displayed - normal operation.
Green	Measurement successful	Some applications visualize that the measurement was successful by showing a message.

 If any error information is available for a channel setup, an exclamation mark is displayed next to the channel setup name (❗). This is particularly useful when the MultiView tab is displayed, as the status bar in the MultiView tab always displays the information for the currently selected channel setup only.

6.2 Accessing the functionality

All tasks necessary to operate the instrument can be performed using this user interface. Apart from instrument specific keys, all other keys that correspond to an

external keyboard (e.g. arrow keys, ENTER key) operate as specified by Microsoft.

For most tasks, there are at least 2 alternative methods to perform them:

- Using the touchscreen
- Using other elements provided by the front panel, e.g. the keypad, rotary knob, or arrow and position keys.

The measurement and instrument functions and settings can be accessed by selecting one of the following elements:

- System and function keys on the front panel of the instrument
- Softkeys on the touchscreen
- Context menus for specific elements on the touchscreen
- Icons on the tool bar in the touchscreen
- Displayed setting on the touchscreen

6.2.1 Toolbar functions

Standard functions can be performed via the icons in the toolbar.



You can hide the toolbar display, e.g. when using remote control, to enlarge the display area for the measurement results ("Setup" > "Display" > "Displayed Items").

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**Print immediately**

Prints the current display (screenshot) as configured.

**Open**

Opens a file from the instrument ("Save/Recall" menu).

**Save**

Stores data on the instrument ("Save/Recall" menu).

**Report Generator**

Displays the "Report" menu to configure a report.

**Undo**

Reverts last operation, i.e. the status before the previous action is retrieved.

The undo function is useful, for example, if you are performing a zero span measurement with several markers and a limit line defined and accidentally select a different measurement. In this case, many settings would be lost. However, if you press [UNDO] immediately afterwards, the previous status is retrieved, i.e. the zero span measurement and all settings.

Note: The [UNDO] function is not available after a [PRESET] or "Recall" operation. When these functions are used, the history of previous actions is deleted.

**Redo**

Repeats previously reverted operation

**Zoom mode**

Displays a dotted rectangle in the diagram that can be expanded to define the zoom area.

**Multiple zoom mode**

Multiple zoom areas can be defined for the same diagram.

**Zoom off**

Displays the diagram in its original size.

**SmartGrid**

Activates "SmartGrid" mode to configure the screen layout.

**Sequencer**

Opens the "Sequencer" menu to perform consecutive measurements.

**Gen On/Off**

Enables/disables the internal generator.

**Gen Config**

Opens the dialog box to configure the internal generator.

**Help (+ Select)**

Allows you to select an object for which context-specific help is displayed

See [Section 6.5, "Getting help"](#), on page 68

**Help**

Displays context-sensitive help topic for the most recently selected element

See [Section 6.5, "Getting help"](#), on page 68

**Disconnect RF2**

RF2 input off: Signal applied to the RF2 input is not measured (instead the signal path of the calibration signal is used).

**Frequency lock**

Frequency does not change when you turn the rotary knob.

Only applies to the frequency. You can still change other parameters with the rotary knob.

**Windows**

Displays the Windows "Start" menu and task bar.

See ["To access the "Start" menu"](#) on page 31.

6.2.2 Softkeys

Softkeys are virtual keys provided by the software. Thus, more functions can be provided than those that can be accessed directly via the function keys on the instrument. Softkeys are dynamic, i.e. depending on the selected function key, a different list of softkeys is displayed on the right side of the screen.

A list of softkeys for a certain function key is also called a menu. Softkeys can either perform a specific function or open a dialog box.

The "More" softkey indicates that the menu contains more softkeys than can be displayed at once on the screen. When pressed, it displays the next set of softkeys.

Recognizing the softkey status by color

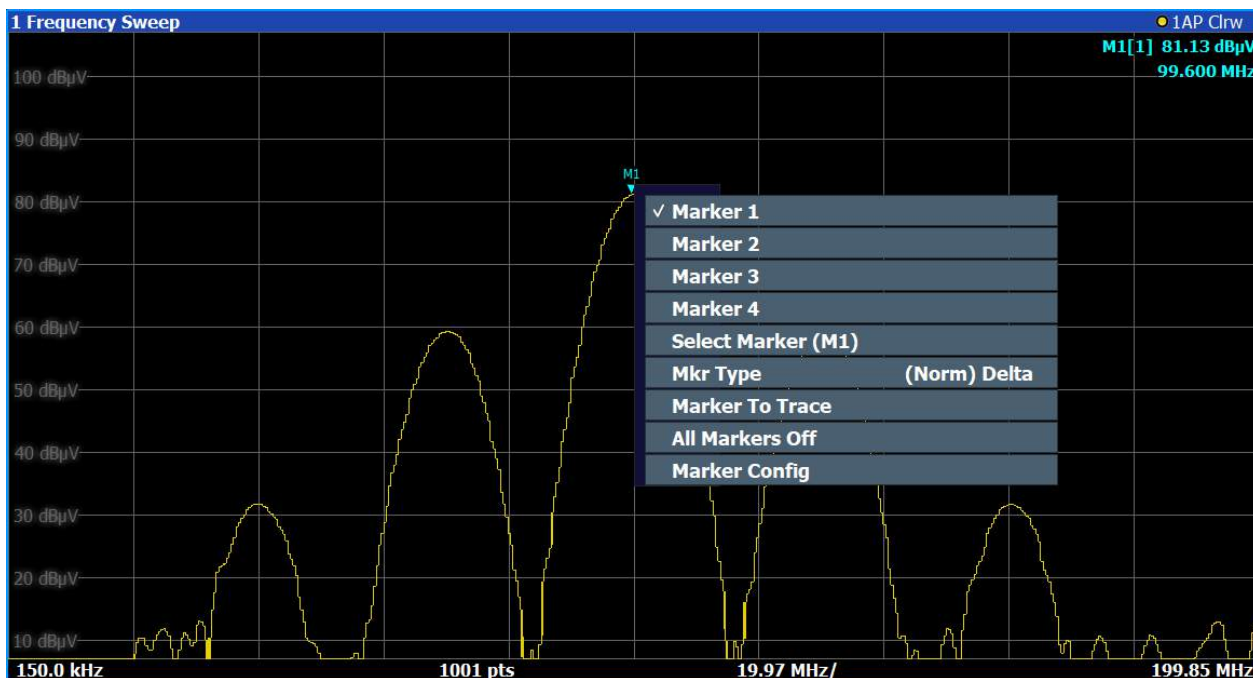
Color	Meaning
Orange	Associated dialog box is open
Blue	Associated function is active; for toggle keys: currently active state
Gray	Instrument function is temporarily not available due to a specific setting or missing option



You can hide the softkey display, e.g. when using remote control, to enlarge the display area for the measurement results ("Setup" > "Display" > "Displayed Items"). See the User Manual for details.

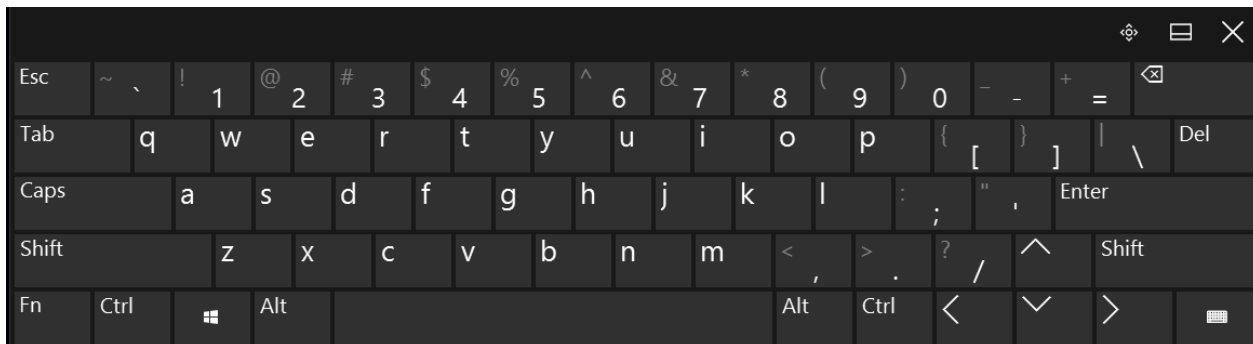
6.2.3 Context menus

Several items in the diagram area have context menus (for example markers, traces or the channel bar). If you right-click on one of these items (or tap it for about 1 second), a menu is displayed which contains the same functions as the corresponding softkey. This is useful, for example, when the softkey display is hidden.



6.2.4 On-screen keyboard

The on-screen keyboard is an additional means of interacting with the instrument without having to connect an external keyboard.



The on-screen keyboard display can be switched on and off as desired using the "On-Screen Keyboard" function key beneath the screen.



You can use the TAB key on the on-screen keyboard to move the focus from one field to another in dialog boxes.

6.3 Entering data

Data can be entered in dialog boxes using one of the following methods:

- Using the touchscreen, via the online keyboard
- Using other elements provided by the front panel, e.g. the keypad, rotary knob, or navigation keys
The rotary knob acts like the [ENTER] key when it is pressed.
- Using a connected external keyboard



Transparent dialog boxes

You can change the transparency of the dialog boxes to see the results in the windows behind the dialog box. Thus, you can see the effects that the changes you make to the settings have on the results immediately.

To change the transparency, select the transparency icon at the top of the dialog box. A slider is displayed. To hide the slider, select the transparency icon again.



(The title bar of the dialog box is always slightly transparent and is not affected by the slider.)



Particularities in windows dialog boxes

In some cases, e.g. if you want to install a printer, original Windows dialog boxes are used. In these dialog boxes, the rotary knob and function keys do not work. Use the touchscreen instead.

Entering numeric parameters

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

1. Enter the parameter value using the keypad, or change the currently used parameter value by using the rotary knob (small steps) or the [UP] or [DOWN] keys (large steps).
2. After entering the numeric value via keypad, 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 the [ENTER] key or any of the unit keys.

The editing line is highlighted to confirm the entry.

Entering Alphanumeric Parameters

If a field requires alphanumeric input, you can use the on-screen keyboard to enter numbers and (special) characters (see [Section 6.2.4, "On-screen keyboard"](#), on page 63).

Correcting an entry

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

Completing the entry

- Press the [ENTER] key or the rotary knob.

Aborting the entry

- Press the [ESC] key.
The dialog box is closed without changing the settings.

6.4 Touchscreen gestures

A touchscreen allows you to interact with the software using various finger gestures on the screen. The basic gestures supported by the software and most applications are described here. Further actions using the same gestures may be possible.



Tapping

Touch the screen quickly, usually on a specific element.

You can tap most elements on the screen; in particular, any elements you can also click on with a mouse pointer.

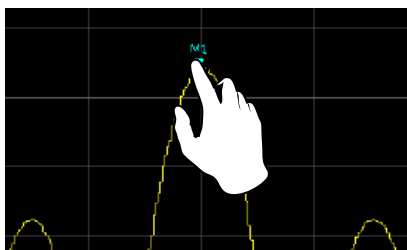


Figure 6-1: Tapping

Double-tapping

Tap the screen twice, in quick succession.

Double-tap a diagram or the window title bar to maximize a window in the display, or to restore the original size.



Dragging

Move your finger from one position to another on the display, keeping your finger on the display the whole time.

By dragging your finger over a table or diagram you can pan the displayed area of the table or diagram to show results that were previously out of view.

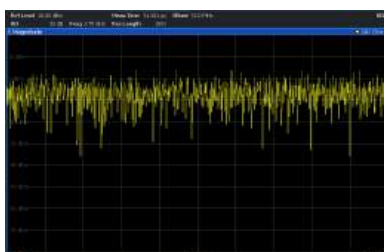
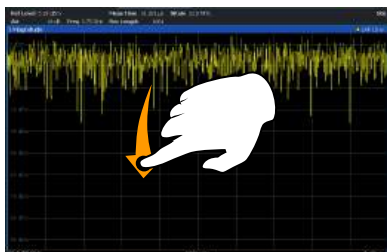


Figure 6-2: Dragging



Pinching and spreading two fingers

Move two fingers together on the display (pinch) or move two fingers apart on the display (spread).

When you pinch two fingers in the display, you decrease the size of the currently displayed area, showing the surrounding areas previously out of view.

When you spread two fingers in the display, you increase the size of the currently displayed area, showing more details.

Touchscreen gestures

You can pinch or spread your fingers vertically, horizontally, or diagonally. The direction in which you move your fingers determines which dimension of the display is changed.

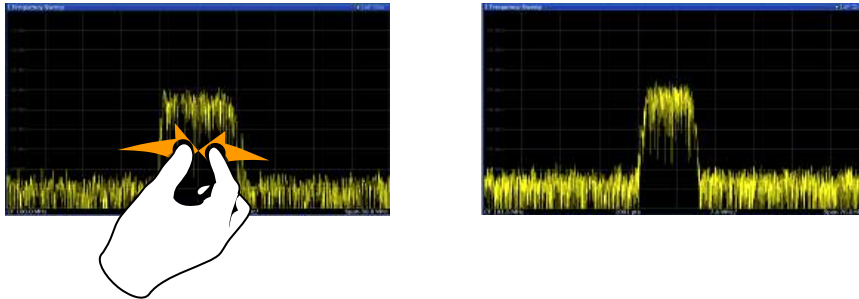


Figure 6-3: Pinching

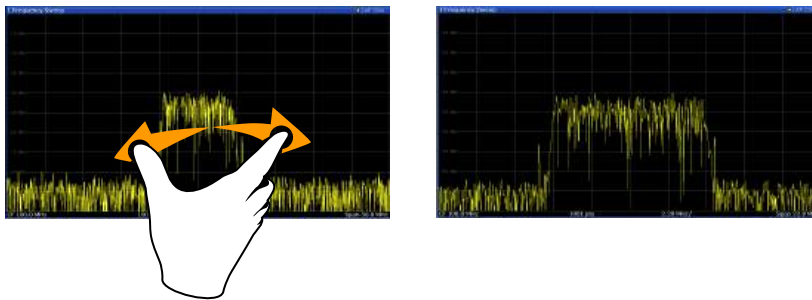


Figure 6-4: Spreading

**Touch gestures in diagrams change measurement settings**

When you change the display using touch gestures, the corresponding measurement settings are adapted. This is different to selecting an area on the screen in zoom mode, where merely the resolution of the displayed trace points is changed temporarily (graphical zoom).

Mouse vs. touch actions

Any user interface elements that react to actions by a mouse pointer also react to finger gestures on the screen, and vice versa. The following touch actions correspond to mouse actions:

Table 6-3: Correlation of mouse and touch actions

Mouse operation	Touch operation
Click	Tap
Double-click	Double-tap
Click and hold	Touch and hold
Right-click	Touch, hold for 1 second and release
Drag-&-drop (= click and hold, then drag and release)	Touch, then drag and release
n.a. (Change hardware settings)	Spread and pinch two fingers
Mouse wheel to scroll up or down	Swipe
Dragging scrollbars to scroll up or down, left or right	Swipe
In (graphical) Zoom mode only: dragging the borders of the displayed rectangle to change its size	Touch, then drag and release

Example:

You can scroll through a long table in conventional mouse operation by clicking in the table's scrollbar repeatedly. In touch operation, you would scroll through the table by dragging the table up and down with your finger.

6.5 Getting help

If any questions or problems concerning the R&S EPL arise, an extensive online help system is provided on the instrument and can be consulted at any time. The help system is context-sensitive and provides information specifically for the current operation or setting to be performed. In addition, general topics provide an overview on complete tasks or function groups as well as background information.

The online help can be opened at any time by selecting one of the "Help" icons on the toolbar or by pressing [F1] on an external or the on-screen keyboard.

To call context-sensitive help

- ▶ To display the "Help" dialog box for the currently focused screen element, e.g. a softkey or a setting in an opened dialog box, select the "Help" icon on the toolbar.



The "Help" dialog box "View" tab is displayed. A topic containing information about the focused screen element is displayed.

If no context-specific help topic is available, a more general topic or the "Content" tab is displayed.



For standard Windows dialog boxes (e.g. File Properties, Print dialog etc.), no context-sensitive help is available.

To display a help topic for a screen element not currently focused

1. Select the "Help pointer" icon on the toolbar.



The pointer changes its shape to a "?" and an arrow.

2. Select the screen element to change the focus.

A topic containing information about the selected (now focused) screen element is displayed.

7 Customer support

7.1 Collecting information for support

If problems occur, the instrument generates error messages which in most cases will be sufficient for you to detect the cause of an error and find a remedy.

Error messages are described in the "Troubleshooting" section of the user manuals.

In addition, our customer support centers are there to assist you in solving any problems that you may encounter with your R&S EPL. We will find solutions more quickly and efficiently if you provide us with the information listed below.

- **Windows Event Log Files**

Windows records important actions of applications and the operating system in event logs. You can create event log files to summarize and save the existing event logs (see ["To create windows event log files"](#) on page 71).

- **System Configuration:** The "System Configuration" dialog box (in the "Setup" menu) provides information on:

- **Hardware Info:** hardware assemblies
- **Versions and Options:** the status of all software and hardware options installed on your instrument
- **System Messages:** messages on any errors that may have occurred

An .xml file with information on the system configuration ("Device Footprint") can be created automatically (using the `DIAGnostic:SERvice:SINFo` command or as described in ["To collect the support information"](#) on page 71).

- **Error Log:** The `RSError.log` file (in the

`C:\ProgramData\Rohde-Schwarz\ZNL-FPL\log` directory) contains a chronological record of errors.

- **Support file:** a *.zip file with important support information can be created automatically (in the `C:\ProgramData\Rohde-Schwarz\ZNL-FPL\user` directory). The *.zip file contains the system configuration information ("Device Footprint"), the current eeprom data and a screenshot of the screen display.

To collect the support information

1. Press [Setup].
2. Select "Service" > "R&S Support" and then "Create R&S Support Information" .

The file is stored as

C:\Users\Public\Documents\Rohde-Schwarz\Analyzer\user\
<inst_model>_<serial-no>_<date_and_time>.zip

For example

C:\ProgramData\Rohde-Schwarz\ZNL-FPL\user\EPL1000__20220103_145113

To create windows event log files

1. Select the "Windows Start Button" in the bottom left corner.



2. Enter *Event Viewer* and select "Enter".
3. Select and expand "Windows Logs" in the "Console Tree".
4. Right-click on each subsection and select "Save All Events As...".

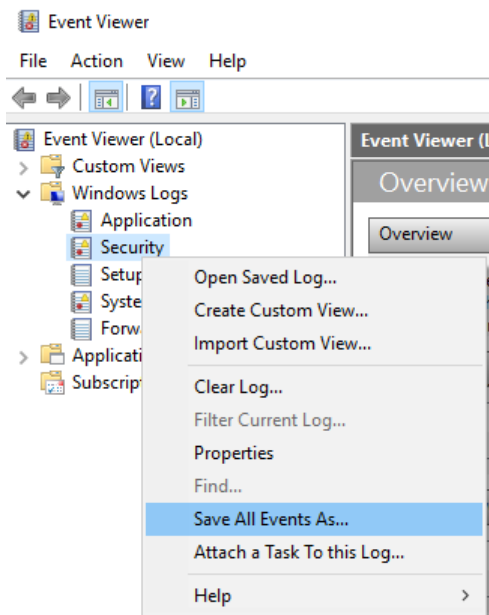


Figure 7-1: Event Viewer

5. Enter a file name and select "Save"

Contacting customer support

Collect the error information and log files and attach them to an email in which you describe the problem. Send the email to the customer support address for your region as described in [Section 7.2, "Contacting customer support"](#), on page 72.

7.2 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 7-2: QR code to the Rohde & Schwarz support page

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