

R&S® FPC Spectrum Analyzer Getting Started



1328740902

Version 05

ROHDE & SCHWARZ

Make ideas real



This document describes the following products:

- R&S®FPC1000 (1328.6660K02)
- R&S®FPC1500 (1328.6660K03)

© 2021 Rohde & Schwarz GmbH & Co. KG

Mühldorfstr. 15, 81671 München, Germany

Phone: +49 89 41 29 - 0

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

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1328.7409.02 | Version 05 | R&S®FPC

Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol and without the model designation, e.g. R&S®FPC1000 is indicated as R&S FPC.

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 chapters.

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 data sheet.

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 3. 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.

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 <http://www.customersupport.rohde-schwarz.com>.

Lifting and carrying the product

The maximum weight of the product is provided in the data sheet. To move the product safely, you can use lifting or transporting equipment such as lift trucks and forklifts. 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 your product, e.g. a carrying bag, you can use the product outdoors.

Unless otherwise specified, you can operate the product up to an altitude of 2000 m above sea level. 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 data sheet.

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 product 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 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.

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.
- 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.
- 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.
- If the product needs an external power supply, use the power supply that is delivered with the product or that is recommended in the product documentation or a power supply that conforms to the country-specific regulations.
- 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.

Connecting 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 warn against potential hazards.


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

1.2 Labels on R&S FPC

Labels on the casing inform about:

- Personal safety, see "[Meaning of safety labels](#)" on page 6
- Product and environment safety, see [Table 1-1](#)
- Identification of the product, see "[Device ID](#)" on page 19

Table 1-1: Labels regarding R&S FPC and environment safety

	<p>Labeling in line with EN 50419 for disposal of electrical and electronic equipment after the product has come to the end of its service life. For more information, see the product user manual, chapter "Disposal".</p>
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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.

1.4 Regulatory information

Instruments with a serial number < 200000 have an internal Wi-Fi module. You can access the regulatory information for this module in the firmware of the R&S FPC.

1. Press the "Setup" key.
The R&S FPC opens the "Instrument Setup" menu.
2. Select the "Regulatory Information" menu item in the "WiFi" category with the "Enter" key.
The R&S FPC shows the regulations it complies with.

1.5 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 FPC user documentation. You can find it on the product page at:

www.rohde-schwarz.com/manual/fpc

Getting started manual

Introduces the R&S FPC and describes how to set up and start working with the product. A printed version is included in the delivery.

User manual

The user 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.

In addition to the R&S FPC user manual, there is a separate user manual for the R&S InstrumentView software package. This manual contains a description of all features of the R&S InstrumentView software package.

The online version (html format) of the user manual provides the complete contents for immediate display on the internet.

The user manual is also integrated into the firmware (.chm format). You can export the file to a memory stick ("Setup" > "User Preferences" > "Export Documentation"). After the export, you can connect the memory stick to a PC and read the .chm file.

Service manual

Describes the performance test for checking the rated specifications, module replacement and repair, firmware update, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS, <https://gloris.rohde-schwarz.com>).

Basic safety instructions

Contains safety instructions, operating conditions and further important information. The printed document is included in the delivery.

Data sheet and brochure

The data sheet contains the technical specifications of the R&S FPC. It also lists the options and their order numbers as well as optional accessories.

The brochure provides an overview of the R&S FPC and shows its specific characteristics.

Release notes and open source acknowledgment

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

The open source acknowledgment document provides verbatim license texts of the used open source software.

www.rohde-schwarz.com/manual/fpc

The open source acknowledgement is also integrated into the firmware (.chm format). You can export the file to a memory stick ("Setup" > "User Preferences" > "Export Documentation". After the export, you can connect the memory stick to a PC and read the .chm file.

Application notes, application cards, white papers, etc.

These documents contain information about possible applications and background information on various topics, see www.rohde-schwarz.com/appnotes.

Calibration certificates

The calibration certificates of your device are available online. Visit the R&S FPC product page and select the item to download the calibration certificate. You will be forwarded to a Gloris page.

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

Enter the device ID of your R&S FPC and download the certificate. You can find the device ID either in the "Setup" menu or on the label on the rear panel.

3 Preparing for use

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

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3.1 Lifting and carrying

See "[Lifting and carrying the product](#)" on page 4.

3.2 Unpacking and checking the instrument

1. Unpack the R&S FPC carefully.
2. Retain the original packing materials. Use it when transporting or shipping the R&S FPC later.
3. Using the delivery notes, check the equipment for completeness.
4. Check the R&S FPC for any damage.

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

3.3 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 data sheet.

See also "[Choosing the operating site](#)" on page 4.

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 data sheet under "General data".

- 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.

3.4 Setting up the R&S FPC

The R&S FPC is designed for use on a bench top or in a rack.

See also:

- "[Setting up the product](#)" on page 4
- "[Intended use](#)" on page 3

3.4.1 Placing the R&S FPC on a bench top

To place the product on a bench top

1. Place the product on a stable, flat and level surface. Ensure that the surface can support the weight of the product. For information on the weight, see the data sheet.
2. **CAUTION!** Foldable feet can collapse. See "[Setting up the product](#)" on page 4.
Always fold the feet completely in or out. With folded-out feet, do not place anything on top or underneath.
3. Alternatively, you can mount several products in a rack.

3.4.2 Mounting the R&S FPC in a rack

To prepare the rack

1. Observe the requirements and instructions in "[Setting up the product](#)" on page 4.
2. **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 FPC in a rack

1. Use an adapter kit to prepare the R&S FPC for mounting.
 - a) Order the rack adapter kit designed for the R&S FPC (19" rack mount kit R&S ZZA-FPC1 order no. 1328.7080.02).
 - b) Mount the adapter kit. Follow the installation instructions provided with the adapter kit.
2. Lift the R&S FPC to shelf height.
3. Push the R&S FPC 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 1.2Nm to secure the R&S FPC in the rack.

To unmount the R&S FPC from a rack

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

3.5 Considerations for test setup

Signal input and output

An unsuitable test setup can damage the instrument and connected devices. Before you switch on the instrument, check that all inputs and outputs are correctly connected and that the signal levels are within the specified ranges defined in the data sheet.

In particular, pay attention to the following limits to avoid damage to the R&S FPC:

- Do not overload the [RF input](#) and keep within the maximum allowed signal level defined in the data sheet.
- Never exceed a DC input voltage of 50 V at the [RF input](#).
- Never exceed a reverse power of 23 dBm at the [signal source output](#).

Cable selection and 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.

3.6 Connecting AC power

The AC power connector on the rear panel of the R&S FPC allows you to connect it to the primary power supply.

Included in the delivery of the R&S FPC are several common power plug types.

1. Select the cable with the plug type you need and firmly connect it to the R&S FPC.
2. Connect the AC plug to the power outlet to supply the R&S FPC with power. The R&S FPC is assembled in line with the specifications for safety class EN61010. Therefore, it may only be connected to an outlet that has a ground contact.

The AC power supply has the following characteristics.



- Line voltage: 100 V AC to 240 V AC
- Line frequency: 50 Hz to 60 Hz; 400 Hz
- Current: 0.6 A to 0.4 A

See also "[Connecting to power](#)" on page 5.

3.7 Turning the R&S FPC on and off

After you have established a connection to the power supply, you can turn on the R&S FPC.

Table 3-1: Overview of power states

Status	LED	Position of power switch
Off	Off	[0]
Standby	 orange	[I]
Ready	 green	[I]

Turning on the R&S FPC

- ▶ Turn on the main AC power switch on the rear panel of the R&S FPC (position "I").
The instrument is now supplied with AC power.

Turning the R&S FPC on and off

- "Power" key is highlighted orange: R&S FPC is in standby mode (main AC power switch is in position "I").
- "Power" key is highlighted green: R&S FPC is running and ready for operation.

Turning off the R&S FPC

- ▶ Turn off the main AC power switch on the rear panel of the R&S FPC (position "O").
The instrument is no longer supplied with AC power.

To disconnect from power

The product 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].
The LED of the Power key is switched off.
2. Disconnect the product from the power source.

4 Instrument tour

The R&S FPC has various connectors on the front and rear panel.

4.1 Front panel

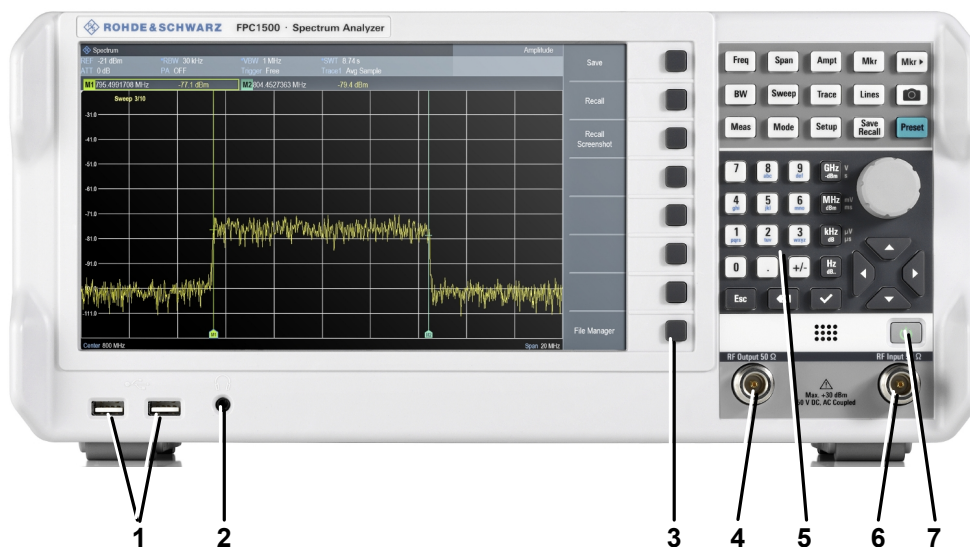


Figure 4-1: Front panel of the R&S FPC

- 1 = USB ports (type A)
- 2 = Headphone jack
- 3 = Softkeys
- 4 = Signal source output
- 5 = Function keys and alphanumeric keypad
- 6 = RF Input
- 7 = Power switch

Power switch

The power switch turns the R&S FPC on and off when it is supplied with power.

For more information, see [Chapter 3.7, "Turning the R&S FPC on and off"](#), on page 14.

Signal source output

Available on the R&S FPC1500.

The "Signal Source" output allows you to generate a signal that can be fed into the DUT or other external accessories like frequency dividers or amplifiers. You can connect the DUT or accessories with a cable that has a male N connector.

Headphone jack

The female headphone jack allows you to connect headphones (or external speakers) with a miniature jack plug.

You can control the output voltage with the volume control integrated into the firmware. Refer to the user manual for details.

If you connect headphones or external speakers, the R&S FPC automatically turns off the internal speaker.

Note the safety information provided in "[Connecting headphones](#)" on page 5.

USB ports (type A)

The two USB 2.0 ports on the front panel (type A) allow you to connect devices like memory sticks.

Function keys and alphanumeric keypad

The function keys provide access to the measurement settings and functions. The alphanumeric keypad allows you to enter alphanumeric data if necessary.

Refer to the user manual for a comprehensive description of the function keys.

Softkeys

The softkeys allow you to access measurement settings and functions.

Softkeys are dynamic. A different list of softkeys is displayed depending on the selected function key. 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.

Refer to the user manual for a comprehensive description of the function keys.

RF Input

The RF input with an impedance of 50 Ω allows you to connect a DUT to the R&S FPC. Typically, you connect the DUT with a cable and an appropriate connector (for example a male N connector).

The frequency range of the RF input is specified in the datasheet.

The attenuation range is between 0 dB and 40 dB.

4.2 Rear panel



Figure 4-2: Rear panel of the R&S FPC

- 1 = Trigger input / external reference
- 2 = LAN
- 3 = USB port (type B)
- 4 = Power supply

Power supply

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

The main power switch has the following states.

- Position "1": The instrument is supplied with power.
- Position "0": The instrument is disconnected from the power supply.

Trigger input / external reference

This female BNC connector allows you to connect an external trigger signal or an external reference signal.

When you are using the connector as a trigger input, you can trigger measurements with an external trigger. For more information about triggered measurements, refer to the user manual.

Alternatively, you can use the connector to connect a 10 MHz reference signal to synchronize the frequency with the external reference. Note that the reference signal must be stronger than 0 dBm.

LAN

The LAN interface allows you to connect the R&S FPC to a local network for remote control, printouts or data transfer. 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*).

USB port (type B)

The USB port (type B) allows you to connect the R&S FPC to a computer and establish a remote control connection.

Device ID

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

It consists of the serial number and a 2-character checksum.



The device ID is defined as the following example:

1310.3004.02-123456-ab

1310.3004.02 = Order number

123456 = Serial number

ab = Checksum

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