R&S®RTM3000 Oscilloscopes

Power of 10

▷ For more information, visit
www.rohde-schwarz.com/catalog/RTM3000

The perfect choice for

- R&D power integrity debugging
- R&D serial bus debugging
- Manufacturing testing and repair
- Education

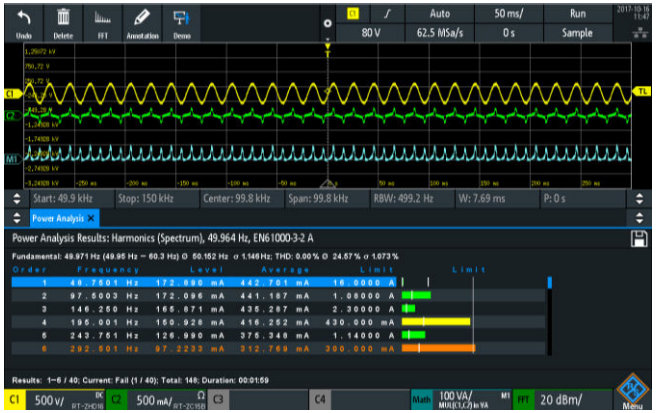
See more of your signal with the power of 10

What sets these scopes apart from all others in their class? New, advanced technology.

- Large 10.1" capacitive touchscreen
- Rohde & Schwarz designed 10-bit ADC
- 40 MSample (all channels) and 80 MSample (interleaved) acquisition memory depth
- 10 second boot time

Key specifications	
Bandwidth	100 MHz, 200 MHz, 350 MHz, 500 MHz, 1 GHz
Channels	2 or 4 analog channels + 16 digital channels (with MSO option)
ADC	10-bit
Max. sampling rate	5 Gsample/s (interleaved), 2.5 Gsample/s (all channels)
Memory depth	40 Msample, 80 Msample (interleaved), 400 Msample in history mode (with R&S®RTM-K15 option)
Display	10.1" capacitive touch, 1280 x 800 resolution
Boot time	10 seconds
Connectivity	LAN, USB host/device, fast display over Ethernet
Upgradable	bandwidth, protocol trigger and decode, MSO, pattern generator and arbitrary waveform generator
Probe interface	probe power and auto configuration
Warranty	standard 3-year

Your benefit	Features
Easier to see and collaborate. Faster to operate and interpret results	10.1" capacitive touchscreen with 1280 x 800 resolution, grid annotation, split window, SmartGrid
Capture more time at full bandwidth	5 Gsample/s max sample rate with up to 80 Msample memory, 12 horizontal divisions, 400 Msample in history mode
See small signal detail in the presence of large signals	10-bit ADC, 1280 x 800 pixel display resolution
Start working sooner	10 second boot time
Troubleshoot and solve a wide range of problems with one instrument	8 instruments in one: oscilloscope, logic analyzer, spectrum analyzer, protocol analyzer, arbitrary waveform generator, pattern generator, counter, digital voltmeter



Power highlights

- Analyze the input, output and transfer function of switched-mode power supplies
- Measurement wizard for fast results
- Simple and fast documentation
- Analyze harmonic current in line with conventional EN, MIL and RTCA standards

Ordering information

Step 1: Choose your oscilloscope model

Two-channel model: R&S®RTM3002
Four-channel model: R&S®RTM3004

Included: All models include R&S®RT-ZP05S passive probes for each channel, a power cord and a 3-year warranty.

Languages supported: English, German, French, Spanish, Italian, Portuguese Czech, Polish, Russian, simplified and traditional Chinese, Korean and Japanese.

Step 2: Choose your bandwidth option

100 MHz bandwidth	standard for two-channel and four-channel models
200 MHz bandwidth	R&S®RTM-B222 for R&S®RTM3002 R&S®RTM-B242 for R&S®RTM3004
350 MHz bandwidth	R&S®RTM-B223 for R&S®RTM3002 R&S®RTM-B243 for R&S®RTM3004
500 MHz bandwidth	R&S®RTM-B225 for R&S®RTM3002 R&S®RTM-B245 for R&S®RTM3004
1 GHz bandwidth	R&S®RTM-B2210 for R&S®RTM3002 R&S®RTM-B2410 for R&S®RTM3004

Step 3: Choose your options and accessories

Software options	
Triggering and decoding	R&S®RTM-K1 I²C/SPI R&S®RTM-K2 UART/RS-232/422/485 R&S®RTM-K3 CAN/LIN R&S®RTM-K5 I²S audio R&S®RTM-K6 MIL-STD-1553 R&S®RTM-K7 ARINC-429
History and segmented memory	R&S®RTM-K15 (400 Msample)
Spectrum analysis	R&S®RTM-K18
Power analysis	R&S®RTM-K31
Application bundle	R&S®RTM-PK1 (includes R&S®RTM-K1, -K2, -K3, -K5, -K6, -K7, -K15, -K18, -K31, -B6)
Hardware options	
R&S®RTM-B1 mixed signal upgrade for non-MSO models, 400 MHz	
R&S®RTM-B6 arbitrary waveform generator	
Accessories	
R&S®ZZA-RTM3K rackmount kit	

8 instruments in one

Oscilloscope	standard
Logic analyzer (16-channel MSO)	R&S®RTA-B1MSO option, includes cabling, lead sets and grabbers
Protocol analyzer	options for different serial buses
Spectrum analyzer	R&S®RTA-K18 option with DDC and spectrogram
Integrated digital voltmeter	standard
Trigger counter	standard
Waveform generator (25 MHz)	R&S®RTA-B6 option
Pattern generator (4-bit)	R&S®RTA-B6 option

Step 4: Choose your probes (more available)

Power rail probe	Type
2.0 GHz, 1:1, 50 kΩ, ±0.85 V, ±60 V offset, Rohde & Schwarz probe interface	R&S®RT-ZPR20
Active single-ended probes	
1.0 GHz, 1 MΩ, Rohde & Schwarz probe interface	R&S®RT-ZS10E
Active differential probes	
1.0 GHz, 1 MΩ, R&S®ProbeMeter, micro button, Rohde & Schwarz probe interface	R&S®RT-ZD10
Current probes	
100 MHz, AC/DC, 0.1 V/A, 30 A (RMS), Rohde & Schwarz probe interface	R&S®RT-ZC20B
High-Voltage differential probes	
100 MHz, 1000:1/100:1, 40 MΩ, 6000 V (pk), 1000 V CATIII, Rohde & Schwarz probe interface	R&S®RT-ZHD60

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R&S®FPC
Spectrum Analyzer
Getting Started

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ROHDE&SCHWARZ

Getting Started

This document describes the following products:

- R&S®FPC1000 (1328.6660.02)

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Email: info@rohde-schwarz.com
Internet: www.rohde-schwarz.com

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

1 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/fpc1000

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.

See www.rohde-schwarz.com/firmware/fpc1000

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.

Safety Instructions
Instrucciones de seguridad
Sicherheitshinweise
Consignes de sécurité

⚠ WARNING

Risk of injury and instrument damage

The instrument must be used in an appropriate manner to prevent electric shock, fire, personal injury or instrument damage.

- Do not open the instrument casing.
- Read and observe the "Basic Safety Instructions" delivered as printed brochure with the instrument.
- Read and observe the safety instructions in the following sections.
  Note that the data sheet may specify additional operating conditions.
- Keep the "Basic Safety Instructions" and the product documentation in a safe place and pass them on to the subsequent users.

⚠ ADVERTENCIA

Riesgo de lesiones y daños en el instrumento

El instrumento se debe usar de manera adecuada para prevenir descargas eléctricas, incendios, lesiones o daños materiales.

- No abrir la carcasa del instrumento.
- Lea y cumpla las "Instrucciones de seguridad elementales" suministradas con el instrumento como folleto impreso.
- Lea y cumpla las instrucciones de seguridad incluidas en las siguientes secciones. Se debe tener en cuenta que las especificaciones técnicas pueden contener condiciones adicionales para su uso.
- Guarde bien las instrucciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

⚠ WARNUNG

Gefahr von Verletzungen und Schäden am Gerät

Betreiben Sie das Gerät immer ordnungsgemäß, um elektrischen Schlag, Brand, Verletzungen von Personen oder Geräteschäden zu verhindern.

- Öffnen Sie das Gerätegehäuse nicht.
- Lesen und beachten Sie die "Grundlegenden Sicherheitshinweise", die als gedruckte Broschüre dem Gerät beiliegen.
- Lesen und beachten Sie die Sicherheitshinweise in den folgenden Abschnitten; möglicherweise enthält das Datenblatt weitere Hinweise zu speziellen Betriebsbedingungen.
- Bewahren Sie die "Grundlegenden Sicherheitshinweise" und die Produktdokumentation gut auf und geben Sie diese an weitere Benutzer des Produkts weiter.

⚠ AVERTISSEMENT

Risque de blessures et d'endommagement de l'appareil

L'appareil doit être utilisé conformément aux prescriptions afin d'éviter les électrocutions, incendies, dommages corporels et matériels.

- N'ouvrez pas le boîtier de l'appareil.
- Lisez et respectez les "consignes de sécurité fondamentales" fournies avec l’appareil sous forme de brochure imprimée.
- Lisez et respectez les instructions de sécurité dans les sections suivantes. Il ne faut pas oublier que la fiche technique peut indiquer des conditions d’exploitation supplémentaires.
- Gardez les consignes de sécurité fondamentales et la documentation produit dans un lieu sûr et transmettez ces documents aux autres utilisateurs.

Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

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2 Regulatory Information

You can access the regulatory information 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.

3 Preparing for Use

The R&S FPC is designated for use in industrial, administrative and laboratory environments. Use the R&S FPC only for its designated purpose. Observe the safety and usage instructions documented in the operating manual, as well as the operating conditions and performance limits stated in the data sheet.

Make sure to consider the following information before using the R&S FPC for the first time.

⚠ WARNING

Risk of injury and instrument damage

The instrument must be used in an appropriate manner to prevent electric shock, fire, personal injury, or damage.

- Do not open the instrument casing.
- Read and observe the "Basic Safety Instructions" delivered as a printed brochure with the instrument.
  In addition, read and observe the safety instructions in the following sections. Notice that the data sheet may specify additional operating conditions.

NOTICE

Risk of instrument damage due to inappropriate operating conditions

Specific operating conditions are required to ensure accurate measurements and to avoid damage to the instrument. Observe the information on appropriate operating conditions provided in the basic safety instructions and the instrument's data sheet.

NOTICE

Instrument damage caused by electrostatic discharge

Electrostatic discharge (ESD) can damage the electronic components of the instrument and the device under test (DUT). Electrostatic discharge is most likely to occur when you connect or disconnect a DUT or test fixture to the instrument's test ports. To prevent electrostatic discharge, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination.

NOTICE

Risk of instrument damage during operation

An unsuitable operating site or test setup can damage the instrument and connected devices. Ensure the following operating conditions before you switch on the instrument:

- The instrument is dry and shows no sign of condensation.
- The instrument is positioned as described in the following sections.
- The ambient temperature does not exceed the range specified in the data sheet.
- Signal levels at the input connectors are all within the specified ranges.
- Signal outputs are correctly connected and are not overloaded.

EMI impact on measurement results

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated electromagnetic interference (EMI):

- Use suitable shielded cables of high quality. For example, use double-shielded RF and LAN cables.
- Always terminate open cable ends.
- Note the EMC classification in the data sheet.

3.1 Unpacking and Checking the Instrument

Unpack the R&S FPC carefully and check the contents of the package.

- Check if all items listed on the delivery note, including the getting started manual, are included in the delivery.
- Check the R&S FPC for any damage.
  If the contents are damaged, immediately contact the carrier who delivered the package.
- Keep the box and packing material.

NOTICE

Risk of damage during transportation and shipment

Insufficient protection against mechanical and electrostatic effects during transportation and shipment can damage the instrument.

- Always make sure that sufficient mechanical and electrostatic protection is provided.
- When shipping an instrument, the original packaging should be used. If you do not have the original packaging, use sufficient padding to prevent the instrument from moving around inside the box. Pack the instrument in antistatic wrap to protect it from electrostatic charging.
- Secure the instrument to prevent any movement and other mechanical effects during transportation.

Packing material

Retain the original packing material. If the instrument needs to be transported or shipped later, you can use the material to protect the control elements and connectors.

3.2 Placing or Mounting the Instrument

The R&S FPC is designed for use under laboratory conditions, either on a bench top or in a rack.

Benchtop operation

If the R&S FPC is operated on a bench top, the surface should be flat. The instrument can be used in horizontal position, standing on its feet, or with the support feet on the bottom extended.

Mounting the R&S FPC in a rack

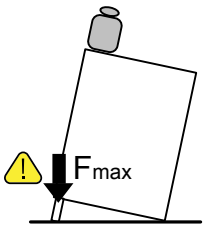
The R&S FPC can be installed in the 19" rack mount kit R&S ZZA-FPC1 (order no.1328.7080.02). The installation instructions are part of the adapter kit.

⚠ CAUTION

Risk of injury if feet are folded out

The feet can fold in if they are not folded out completely or if the instrument is shifted. This can cause damage or injury.

- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 200 N.



3.3 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

3.4 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.

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.
- "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.

Changing the AC supply fuse

Only fuses of the type 2A T IEC60127-2/V should be used.

1. Disconnect the power cable.

2. Open the flap covering the voltage selector using a small screwdriver (or similar).
3. Remove the cylinder labeled with the nominal voltages. Remove the fuse and install the new one. Reinsert the cylinder so that the value visible through the hole in the cover flap is the same nominal voltage as before.
4. Close the flap.

4 Instrument Tour

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

4.1 Front Panel

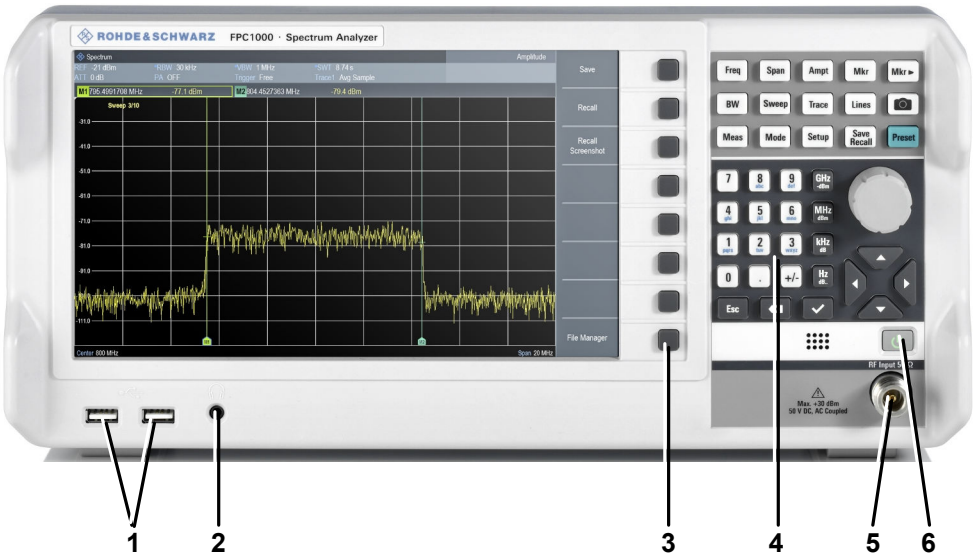


Figure 4-1: Front panel of the R&S FPC

1 = USB ports (type A)
2 = Headphone jack
3 = Softkeys
4 = Function keys and alphanumeric keypad
5 = RF input
6 = Power switch

NOTICE

Instrument damage caused by cleaning agents

Cleaning agents contain substances such as solvents (thinners, acetone, etc.), acids, bases, or other substances. Solvents can damage the front panel labeling, plastic parts, or screens, for example.

Never use cleaning agents to clean the outside of the instrument. Use a soft, dry, lint-free dust cloth instead.

Power switch

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

For more information, see Chapter 3.4, "Turning the R&S FPC on and off", on page 10.

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.

NOTICE

Risk of instrument damage

Make sure not to overload the RF input and keep within the maximum allowed signal levels. Refer to the datasheet for the maximum allowed signal levels.

A DC input voltage of 50 V must never be exceeded.

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.

⚠ CAUTION

Risk of hearing damage

Before putting on the headphones, make sure that the volume setting is not too high to protect your hearing.

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.

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.