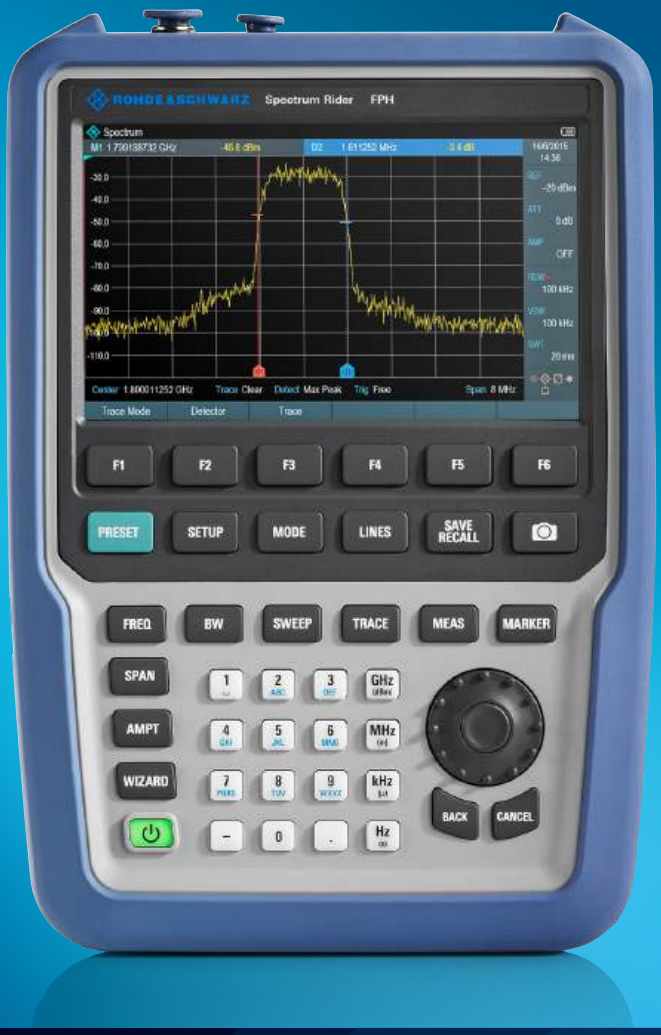
R&S®ESSENTIALS

R&S®SPECTRUM RIDER FPH HANDHELD SPECTRUM ANALYZER

Small form for big tasks



Product Brochure
Version 11.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®Spectrum Rider FPH is a versatile, user-friendly instrument with a rugged and appealing design. Most basic models have a unique keycode frequency extension concept. The analyzer supports a wide frequency range up to 44 GHz.

The R&S®Spectrum Rider FPH is designed for both indoor and outdoor field applications and use in labs. Large buttons and a multifunction rotary control allow operation even when wearing gloves. The backlit keypad makes the analyzer usable in the dark, and the bright nonreflecting display is readable in bright sunlight. The battery lasts an entire working day. The light weight, small form factor and ruggedness make the analyzer easy to carry. It is a reliable companion even in harsh and difficult-to-reach environments.

The fan-free design means the analyzer operates noise free, is clean and reliable since no dust or water can slip in through a vent guard.

The small form factor does not limit its performance or capabilities. The solid RF performance, short boot times and ease of use make the R&S®Spectrum Rider FPH ideal for spectrum measurements in the lab or in service applications.

The state-of-the-art touchscreen allows smartphone-like touch gestures. An on-screen keyboard and many other functions make the life of the user easier.

Key facts

- Frequency range from 5 kHz up to 44 GHz
- Tracking generator with frequency range from 30 kHz to 44 GHz (models .23/.36/.54)
- Frequency extensions via keycode
  - From 5 kHz down to 100 Hz (applicable to models .06/.13/.26/.23/.36/.44/.54, with R&S®FPH-B29 option installed)
  - From 2 GHz to 3 GHz or 4 GHz (model .02)
  - From 6 GHz to 8 GHz (model .06)
  - From 13.6 GHz to 20 GHz (models .13/.23)
  - From 26.5 GHz to 31 GHz (models .26/36)
- Spectrum analysis for e.g.
  - Mobile communications
  - Radar and satellite communications
  - Broadcasting
- Solid RF performance
  - DANL: typ. –163 dBm (10 MHz to 3 GHz, preamplifier on)
  - TOI measurement: +10 dBm (f = 2.4 GHz)
- Ideal for field use: > 6 hour battery life, ≥ 2.5 kg (5.5 lb.) weight, backlit keypad, fast boot time, nonreflective display, small footprint, ruggedized housing
- Large color display with touch and gesture operation
- Measurement wizard that supports measurement campaigns, speeds up measurements and avoids errors
- Features and options for various industries such as aerospace and defense, wireless communications, broadcasting, spectrum regulators and education
- Easy and cost-efficient upgrades of all options via software keycode
- 3 year warranty as standard (battery and accessories have 1 year warranty)

BENEFITS AND KEY FEATURES

Excellent in the field
- Lightweight, compact with long battery life
- Wide range of accessories
- Nonreflective display and backlit keypad for outdoor use
- Ruggedized in line with MIL-PRF-28800F class 2

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Excellent for lab diagnostics
- Solid RF performance for diagnostics in the lab
- EMI debugging with optional near-field probes
- Scalar frequency response measurements

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User-friendly
- User friendly with smartphone-like touchscreen
- Configuration overview menu
- Setting frequencies with channel tables

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Future-ready
- Software-upgradeable frequency ranges
- Multipurpose uses in industrial applications, R&D and education
- Easy upgrade of all options via software keycode
- Optional software applications
  - Power measurements with power sensors
  - Internal channel power meter
  - Pulse measurements with power sensors
  - AM/FM analysis

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Higher productivity with measurement wizard
- Simplified measurements
- Reproducible and fast measurements

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Postprocessing and remote control
- R&S®InstrumentView software for measurement postprocessing and documentation
- Remote control via LAN or USB
- R&S®MobileView app for remote control and file transfer

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EXCELLENT IN THE FIELD

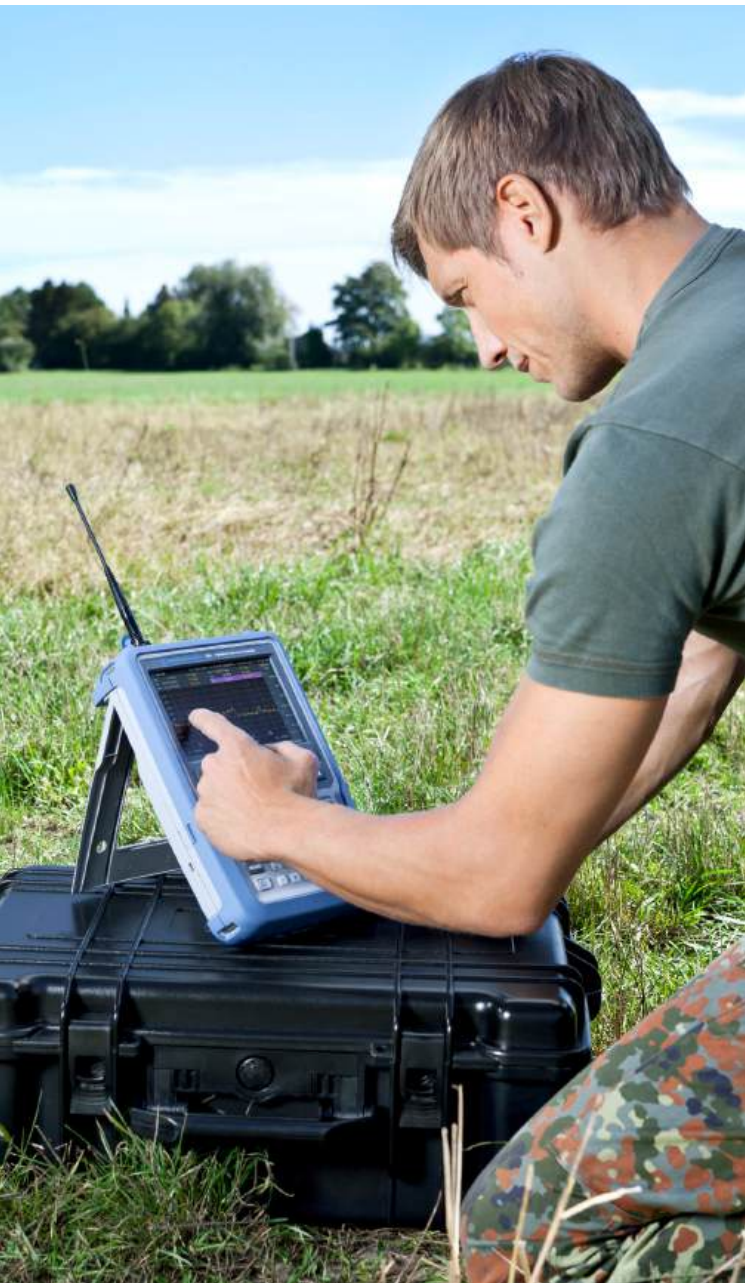
Lightweight, compact with long battery life

The low weight, small footprint, short boot time and longest battery life on the market make the R&S®Spectrum Rider FPH ideal for work in the field, even in remote, difficult-to-reach locations.

The R&S®Spectrum Rider FPH can operate an entire working day (over 6 hours) without recharging or replacing the battery. Depending on the model, the instrument plus battery weighs between 2.5 kg (5.5 lb) and 3.2 kg (7.1 lb).

Measurements in the field:

- Verify signal transmission (e.g. verifying 5G, broadcast, radar and satellite communications link)
- Spectrum checks, site surveys
- Interference hunting
- EMF measurements
- Microwave link alignments



Protected connectors and interfaces

Wide range of accessories

A soft carrying bag, battery charger, spare batteries and other accessories are available for work in the field.

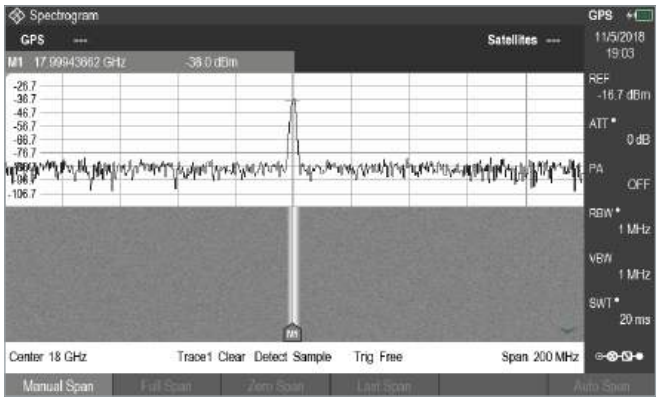
Nonreflective display and backlit keypad for outdoor use

The 18 cm (7") display is nonreflective and shows measurement results, not the operator's reflection. Adjusting the brightness makes the display easy to view in outdoor environments. The black-and-white mode is readable even in bright sunlight. The keypad can be illuminated for convenient work in dim environments. Large buttons and a rotary knob with enter function make the instrument easy to operate even when wearing gloves.

Ruggedized in line with MIL-PRF-28800F class 2

The R&S®Spectrum Rider FPH has no vents or fans where dirt or water can penetrate. All interfaces and connectors are protected. The instrument is tested in line with the MIL-PRF-28800F class 2 mechanical test specification for work in rough environments. It is protected against dust and dripping water in line with the IP51 specification.

High-contrast black and white display mode enhances screen readability



EXCELLENT FOR LAB DIAGNOSTICS

Solid RF performance for diagnostics in the lab

Phase noise of –105 dBc (1 Hz) at 100 kHz offset from the carrier, total measurement uncertainty of 0.5 dB and high sensitivity (displayed average noise level (DANL) of typ. < –163 dBm (10 MHz to 3 GHz with preamplifier on) make the R&S®Spectrum Rider FPH a powerful and easy-to-use spectrum analyzer for RF diagnostics in service and development labs.

Examples of measurements in the lab:

- Frequency and amplitude of any RF device
- Accurate frequency readings with the frequency counter (to align frequency references)
- Measurement of spurious emissions
- Measurement of harmonics and intermodulation products
- Measurement of pulsed signals in the time domain

EMI debugging with optional near-field probes

The R&S®HZ-15/R&S®HZ-17 near-field probes are used as diagnostic tools for EMI debugging (on circuit boards, integrated circuits, cables and shielding). The near-field probe set is ideal for measuring emissions from 30 MHz to 3 GHz. The R&S®HZ-16 preamplifier improves measurement sensitivity up to 3 GHz, with approx. 20 dB gain and a 4.5 dB noise figure. In combination with the R&S®Spectrum Rider FPH, the preamplifier and near-field probe can cost-effectively analyze and locate disturbance sources during development.

Scalar frequency response measurements

Models with tracking generators extend the analyzer capacity to include measurement of amplitude frequency characteristics for filters, amplifiers, attenuators and antennas. The tracking generator frequency ranges from 30 kHz to the relevant maximum frequency. Port output power can be adjusted in 1 dB steps.

There are three types of generator sources:

- Tracking: the output frequency is identical to the analyzed spectrum analyzer frequency
- CW (independent source): user-defined output frequency
- Coupled CW: the output frequency is coupled to the center frequency

The R&S®Spectrum Rider FPH with near-field probes and DUT

USER-FRIENDLY

User friendly with smartphone-like touchscreen

The R&S®Spectrum Rider FPH is flexible and straightforward. It can be operated either with the 7" capacitive touchscreen or keys.

The unique capacitive touchscreen can adjust to the most common settings, such as center frequency, span and reference level, and manage markers with intuitive smartphone-like gestures.

The large keys and the rotary knob with enter function let the R&S®Spectrum Rider FPH be easily operated outdoors and even while wearing winter gloves. Dedicated softkeys and hardkeys are available for the most important settings such as frequency, span, amplitude, markers and limit lines.

The screenshot button makes it possible to save and document a graphics file with a single keystroke. A USB flash drive or a microSD card can store large amounts of data.

The user interface is available in 11 languages: English, German, Korean, Japanese, Chinese, Russian, Italian, Spanish, Portuguese, French and Hungarian. All these languages are also supported by the convenient on-screen keyboard.

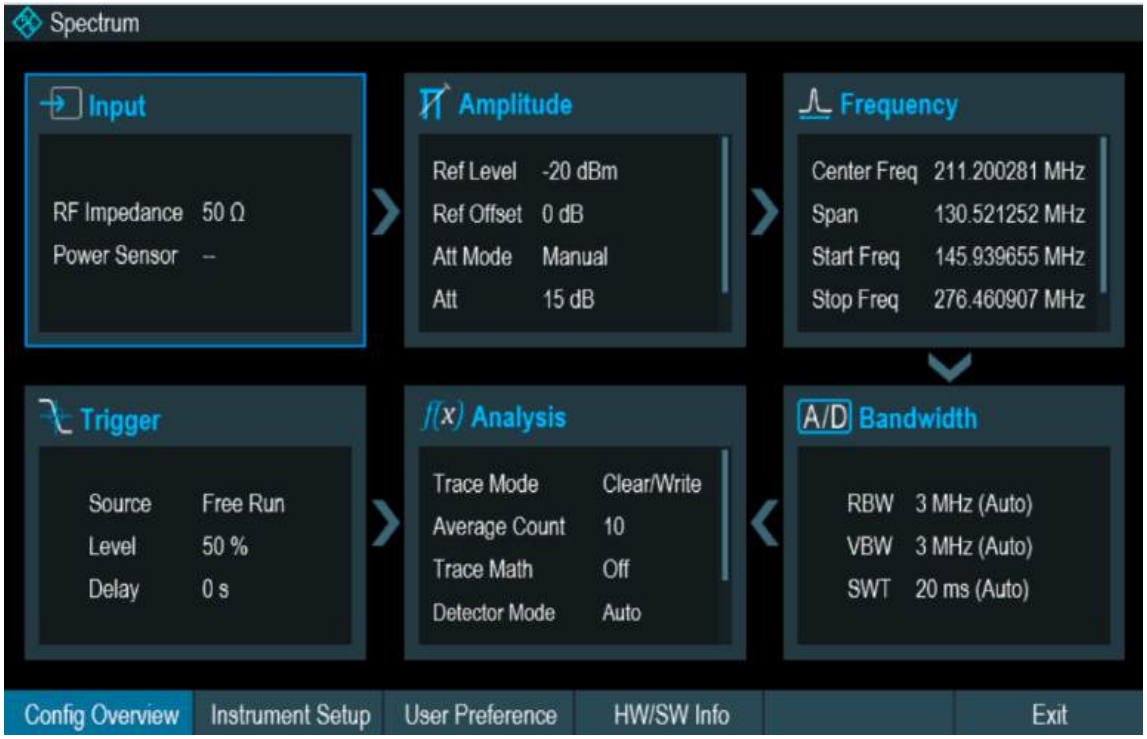
Configuration overview menu

The configuration overview menu makes it easy for the user to have an overview of the main measurement settings. The menu shows the flow of spectrum measurements at different receiver stages, along with the relevant parameters that impact the measurements at each stage.

Click on the configuration overview icon for quick access to the menu for checking and changing frequency, amplitude, bandwidth, etc.

Setting frequencies with channel tables

Users who prefer channel numbers to frequencies can use the predefined channel tables. The most common channel tables for wireless and broadcast systems come standard; users can also add their own channel tables.



Configuration overview menu

OPERATING ELEMENTS

BNC connector

RF input (N-type/PC 3.5 mm/PC 2.92 mm)

Touch-sensitive display area

Softkey labels (on display)

Softkeys

System keys

DC connector (protected)

Kensington lock

Function keys

Power key

Alphanumeric keypad

microSD card slot (behind battery)

Headphones

USB ports

Screenshot key

Function keys

Rotary knob with enter function

LAN and mini USB ports (protected)

Cancel key

Back key

Unit keys

FUTURE-READY

Software-upgradeable frequency ranges

The R&S®Spectrum Rider FPH is the first handheld analyzer with frequency range software upgrade. The units handle frequencies between 5 kHz to 31 GHz. No downtime is needed for the upgrade and no recalibration is required after the upgrade. The frequency range can be extended as needed. The 26.5 GHz base model can be easily upgraded to 31 GHz with the R&S®FPH-B31 keycode option.

Multipurpose uses in industrial applications, R&D and education

The excellent price/performance ratio make the R&S®Spectrum Rider FPH attractive to field engineering companies, repair centers and development labs. The analyzer is also great for RF teaching labs in schools and universities.

The R&S®Spectrum Rider FPH comes with a wide range of standard features for everyday spectrum analysis, such as four spectrum traces, AM/FM audio demodulation, remote control and frequency counter. Field engineers and repair labs in various industries will find optional measurement applications for peak and average power measurements.

Field strength measurements are also possible by connecting to a directional or isotropic antenna.

Easy upgrade of all options via software keycode

All options can be easily added with a software keycode. This eliminates extra installation costs and turnaround times because the instrument does not need to be sent to a service center for calibration or alignment.

The R&S®Spectrum Rider FPH with an R&S®NRP50P pulse power sensor

Software-upgradeable frequency ranges

R&S®Spectrum Rider FPH	Frequency range	Frequency range upgradable
Model .02	5 kHz to 2 GHz	up to 3 GHz (with R&S®FPH-B3 option), up to 4 GHz (with R&S®FPH-B3 and R&S®FPH-B4 options)
Model .06	5 kHz to 6 GHz	up to 8 GHz (with R&S®FPH-B8 option), from 5 kHz down to 100 Hz (with R&S®FPH-B29 option)
Models .13/.23 (with tracking generator)	5 kHz to 13.6 GHz	up to 20 GHz (with R&S®FPH-B20 option), from 5 kHz down to 100 Hz (with R&S®FPH-B29 option)
Models .26/.36 (with tracking generator)	5 kHz to 26.5 GHz	up to 31 GHz (with R&S®FPH-B31 option), from 5 kHz down to 100 Hz (with R&S®FPH-B29 option)
Models .44/.54 (with tracking generator)	5 kHz to 44 GHz	from 5 kHz down to 100 Hz (with R&S®FPH-B29 option)

Optional software applications

Power measurements with power sensors

Precision is needed when measuring and aligning transmitter levels and the R&S®FPH-K9 option lets the R&S®Spectrum Rider FPH be used for power measurements together with the R&S®NRP power sensor series. The setup has a measurement range of –70 dBm to +45 dBm and covers frequencies up to 110 GHz.

When combined with an R&S®HA-Z360/Z361 optical power sensor, the R&S®Spectrum Rider FPH power meter mode can display optical absolute power in dBm and relative power in dB.

Internal channel power meter

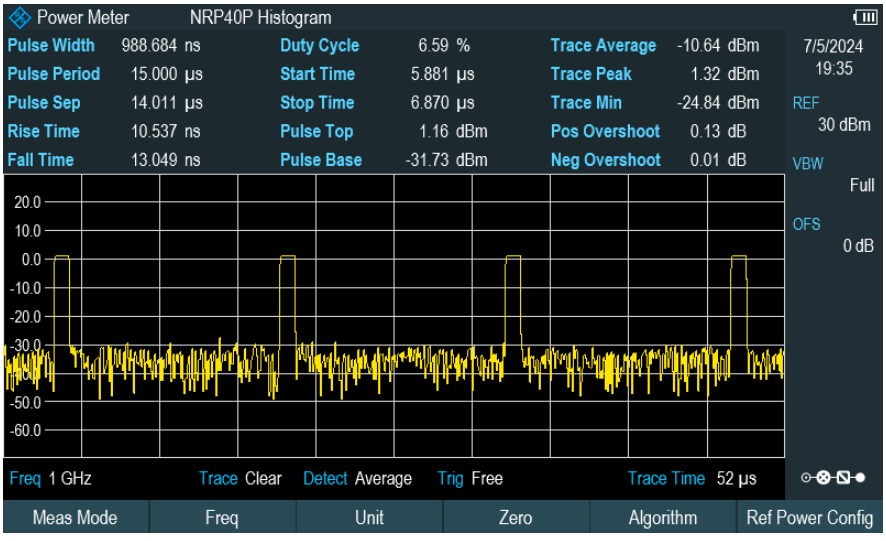
The R&S®FPH-K19 channel power meter option converts the R&S®Spectrum Rider FPH into a portable power meter with a level measurement accuracy of typ. 0.5 dB. The option enables quick and easy power measurements without adding a power sensor or switching to spectrum analyzer mode. The option helps check power levels along the signal path of field transmitters or verify power levels for devices under test (DUT) in a lab.

Pulse measurements with power sensors

The R&S®FPH-K29 option enables precise pulse and peak power measurements with the R&S®Spectrum Rider FPH and R&S®NRPxxP wideband power sensors, which measure pulses with a resolution of up to 50 ns and support from 18 GHz to 50 GHz.

The main pulse parameters such as pulse width, rise/fall time and duty cycle are displayed automatically. The trigger function and markers can to zoom in on pulses by reducing trace times, which is convenient when installing and maintaining radar systems.

Optical power measurement screen (R&S®FPH-K9)



Pulse analysis with the R&S®FPH-K29 option and R&S®NRPxxP wideband power sensors or new R&S®NRPxxP series pulse power sensor

AM/FM analysis

The R&S®FPH-K7 option makes the R&S®Spectrum Rider FPH an analog modulation analyzer that can measure the quality of amplitude or frequency-modulated signals. The analog modulation display shows waveforms and measurement parameters such as carrier power, carrier offset and modulation index (depth) for AM signals, frequency deviation for FM signals, SINAD and THD. The modulation summary has user-definable limits for each measurement.

Interference analysis and signal strength mapping

The R&S®FPH-K15 interference analysis and R&S®FPH-K16 signal strength mapping options help analyze and locate ambiguous signals or interferers. When analyzing, a long-time spectrogram recording can capture up to 999 hours of on-air activity; the recording time depends on the interval setting. The recorded data can be analyzed on the device or with R&S®InstrumentView. Signal strength mapping depicts signal power levels on an indoor or outdoor map. The color indicator provides a good estimation of signal coverage for a particular area or the most likely location of the interferer or intended signal.

Receiver mode

The R&S®FPH-K43 receiver mode option enables EMI diagnostics with weighted detectors such as the quasi-peak detector. Measurements are performed at predefined frequencies for adjustable measurement times.

Advanced gated trigger measurements

In spectrum analyzer mode (including channel power and spectrogram modes), the R&S®Spectrum Rider FPH has a gated trigger function. The gated trigger helps display weak uplink signals normally buried by strong downlink signals in TDD networks.

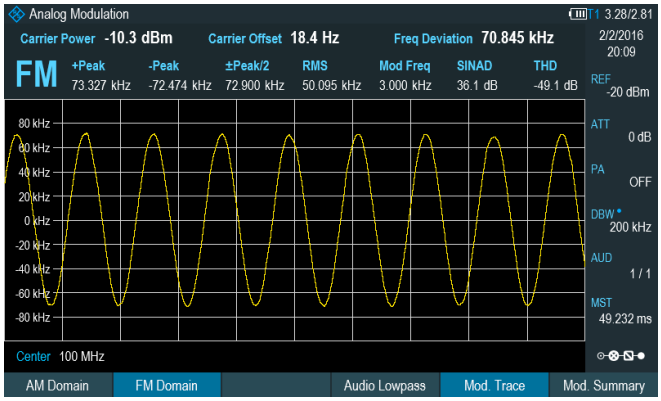
The R&S®FPH-K57 advanced gated trigger measurements option includes occupied bandwidth (OBW), adjacent channel leakage ratio (ACLR) and spectrum emission mask (SEM) measurement modes. The standard gated trigger and new advanced gated trigger measurement options help assess network quality and easily identify interferers.

EMF measurement application

The R&S®FPH-K105 option supports automated test sequences for frequency selective measurements. R&S®InstrumentView software conveniently configures such measurements. The configuration setup covers one or several sub-measurements on various frequencies or channels and can include EMF emission limits in line with national and international standards during configuration or after measurement for a quick overview of transmitter system compliance with safety exposure limits. Preconfiguration can be done in a lab to save time. All test sequences are executed automatically with just a few clicks. The results can be previewed on the analyzer or with R&S®InstrumentView to analyze and document them.

Locating a signal with the R&S®FPH-K15 interference analysis option

Analysis of a frequency-modulated signal with the R&S®FPH-K7 AM/FM analysis option



Standard features

- Two spectrum traces
- Six markers, absolute or relative
- Noise marker
- Frequency counter with 0.1 Hz resolution
- AM/FM audio demodulator (audio via built-in loudspeaker or headphones)
- Limit line monitoring (pass/fail function)
- Remote control via USB/LAN interface
- Predefined channel tables
- Measurement wizard

Optional features

- Preamplifier (R&S®FPH-B22/-B23/-B24/-B25/-B26)
- Frequency extension down to 100 Hz (R&S®FPH-B29)
- Analog modulation analysis AM/FM (R&S®FPH-K7)
- Power sensor support (R&S®FPH-K9)
- Interference analysis (R&S®FPH-K15)
- Signal strength mapping (R&S®FPH-K16)
- Channel power meter (R&S®FPH-K19)
- Pulse measurements with power sensors (R&S®FPH-K29)
- Receiver mode (R&S®FPH-K43)
- Advanced gated trigger measurements (R&S®FPH-K57)
- EMF measurement application (R&S®FPH-K105)

Frequency selective measurement with the R&S®FPH-K105 EMF measurement application option

Gated trigger in ACLR mode with the R&S®FPH-K57 advanced gated trigger measurements option

Measurement using quasi-peak detectors with the R&S®FPH-K43 receiver mode option

Display of the interferer signal strength on the map with the R&S®FPH-K16 signal strength mapping option

HIGHER PRODUCTIVITY WITH MEASUREMENT WIZARD

Site surveys or transmitter station installation and maintenance often require a standard set of spectrum measurements. The measurements must be done correctly to avoid additional costs and time on site.

Simplified measurements

The measurement wizard simplifies measurements by automating, standardizing and optimizing test sequences. A sequence of standardized and recurring measurements can be done quickly, easily and error-free.

A measurement expert creates test sequences with the R&S®Spectrum Rider FPH and R&S®InstrumentView on a PC. Pictures and written instructions can be added to each measurement step.

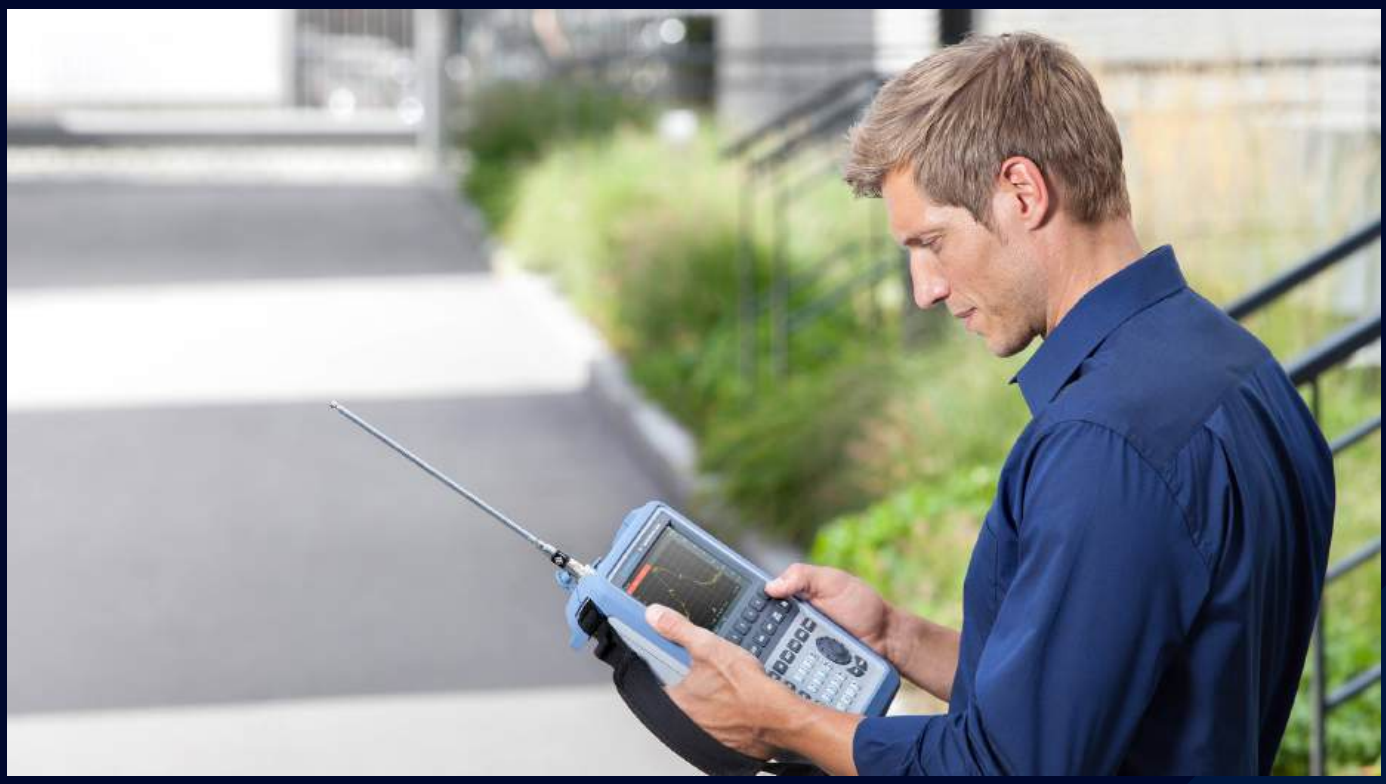
After the measurement sequence is configured, it is transferred to instruments in the field. The operator in the field just needs to start the wizard, select the measurement sequence and follow the predefined on-screen instructions. The instrument is correctly configured for each test step, so that the operator does not need to spend time configuring the instrument on site.

The results are automatically saved as soon as all the measurements are completed, when they can be transferred to a tablet or PC. Complete measurement reports can be generated in PDF, RTF or HTML formats with the report generator in R&S®InstrumentView.

Reproducible and fast measurements

The measurement wizard and the report generator ensure the following:

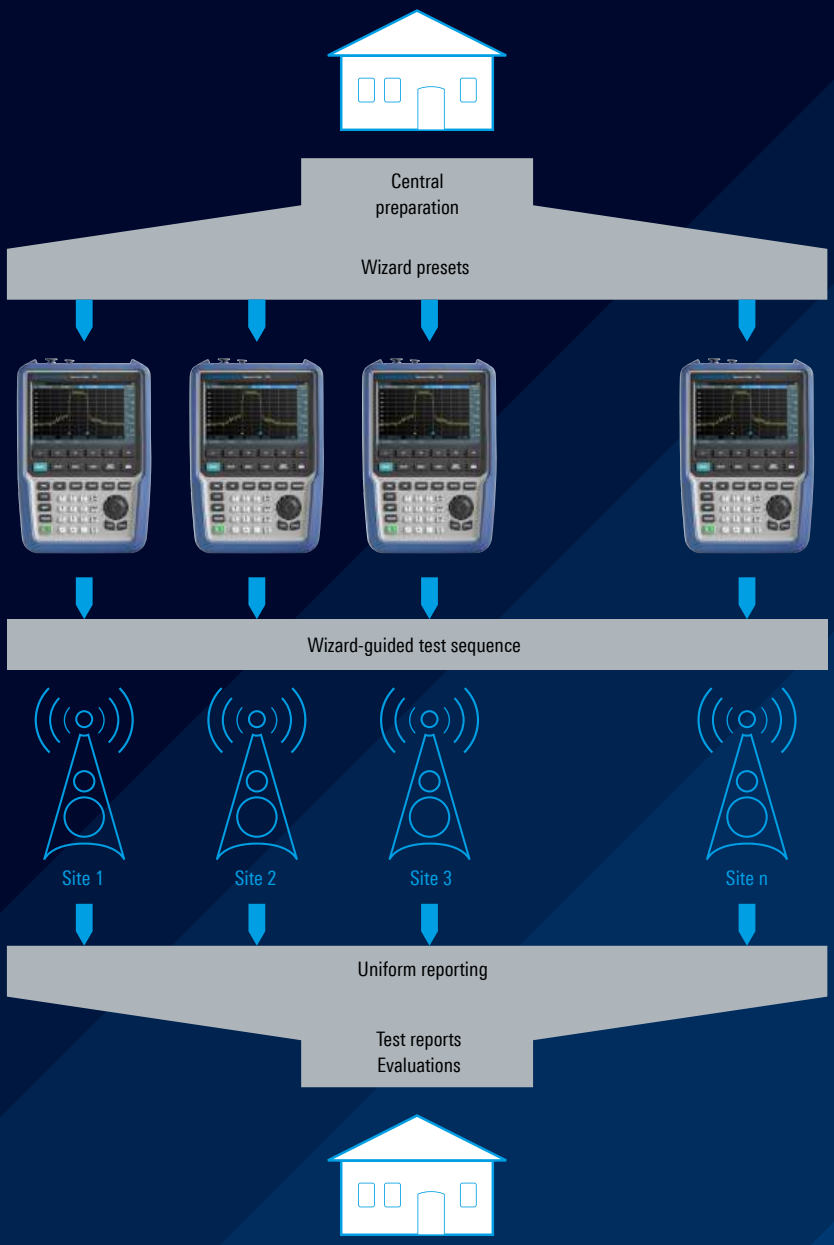
- The results are correct and reproducible; all measurements are performed correctly with the right settings and in the right order; no need to come back to the site due to incorrect measurement settings or setup.
- Measurement times are much shorter thanks to predefined settings; the instrument does not need to be set up on site.
- No training is required for new users; less experienced operators can reliably perform measurements with the on-screen instructions and preset measurement settings.
- All measurement results are documented in a complete, customizable measurement report, which can include additional data such as operator or site name, company name, location and instrument serial number.



Three simple steps needed to work with the measurement wizard

1. Project manager/expert creates the test sequences
2. Operator uses the wizard to execute the test sequences
3. Operator shows the measurement result to the project manager/expert and documents it

Typical deployment setup with measurement preparations and postprocessing



POSTPROCESSING AND REMOTE CONTROL

R&S®InstrumentView software for measurement postprocessing and documentation

R&S®InstrumentView software is included with the instrument. It makes it easy to postprocess and document measurement results and manage instrument settings.

Features

- Fast data exchange between the R&S®Spectrum Rider FPH and a PC via USB or LAN connection
- Easy processing of measurement results
- Easy creation of test reports in PDF, HTML and RTF format
- Printout of all relevant data via Windows tablet or PC
- Editing of measurement results by displaying/hiding and shifting markers or limit lines, etc.
- Editor for generating limit lines, antenna factors and transducer factors for external attenuators and amplifiers as well as channel lists
- Compatible with Windows 7 (32 bit/64 bit), Windows 8 (32 bit/64 bit) and Windows 10 (32 bit/64 bit)

Remote control via LAN or USB

The R&S®Spectrum Rider FPH can be remotely controlled via the USB or LAN interface and integrated into user-specific programs. SCPI-compatible remote control commands come standard.

R&S®MobileView app for remote control and file transfer

The R&S®MobileView app allows wireless remote control of the R&S®Spectrum Rider FPH within line of sight. Simply connect a third-party wireless router to the R&S®Spectrum Rider FPH LAN port. Download the R&S®MobileView app from an iOS or Android platform. The app offers seamless remote control of the R&S®Spectrum Rider FPH and conveniently transfers the screenshot and measured result from the device.

SPECIFICATIONS IN BRIEF

Specifications in brief		
Frequency range	model .02	5 kHz to 2 GHz
	with R&S®FPH-B3 option	5 kHz to 3 GHz
	with R&S®FPH-B3 and R&S®FPH-B4 options	5 kHz to 4 GHz
	model .06	5 kHz to 6 GHz
	with R&S®FPH-B8 option	5 kHz to 8 GHz
	model .13/.23 (with tracking generator)	5 kHz to 13.6 GHz
	with R&S®FPH-B20 option	5 kHz to 20 GHz
	model .26/.36 (with tracking generator)	5 kHz to 26.5 GHz
	with R&S®FPH-B31 option	5 kHz to 31 GHz
	models .44/.54 (with tracking generator)	5 kHz to 44 GHz
	models .06/.13/.23/.26/.36/.44/.54 with R&S®FPH-B29 option [1]	from 5 kHz down to 100 Hz
Frequency resolution		1 Hz
Resolution bandwidth		1 Hz to 3 MHz in 1/3 sequence
Spectral purity	frequency = 500 MHz	
SSB phase noise	models .02/.06/.13/.26	
	carrier offset = 30 kHz	< –88 dBc (1 Hz), typ. –95 dBc (1 Hz)
	carrier offset = 100 kHz	< –98 dBc (1 Hz), typ. –105 dBc (1 Hz)
	carrier offset = 1 MHz	< –118 dBc (1 Hz), typ. –125 dBc (1 Hz)
	models .23/.36/.44/.54	
	carrier offset = 30 kHz	< –88 dBc (1 Hz), typ. –94 dBc (1 Hz)
	carrier offset = 100 kHz	< –90 dBc (1 Hz), typ. –96 dBc (1 Hz)
	carrier offset = 1 MHz	< –115 dBc (1 Hz), typ. –120 dBc (1 Hz)
Displayed average noise level	0 dB RF attenuation, 50 Ω termination, RBW = 1 kHz, VBW = 10 Hz, sample detector, log scaling, normalized to 1 Hz	
Model .02	preamplifier = off	
	1 MHz to 10 MHz	< –135 dBm, typ. –142 dBm
	10 MHz to 1 GHz	< –142 dBm, typ. –146 dBm
	1 GHz to 4 GHz	< –140 dBm, typ. –144 dBm
	preamplifier = on	
	1 MHz to 10 MHz	< –150 dBm, typ. –160 dBm
	10 MHz to 3 GHz	< –158 dBm, typ. –163 dBm
	3 GHz to 4 GHz	< –156 dBm, typ. –161 dBm
Models .06/.13/.26	preamplifier = off	
	1 MHz to 10 MHz	< –122 dBm, typ. –130 dBm
	10 MHz to 25 MHz	< –130 dBm, typ. –135 dBm
	25 MHz to 1 GHz	< –140 dBm, typ. –145 dBm
	1 GHz to 4 GHz	< –135 dBm, typ. –140 dBm
	4 GHz to 8 GHz	< –135 dBm, typ. –140 dBm
	8 GHz to 19 GHz	< –135 dBm, typ. –138 dBm
	19 GHz to 20 GHz	< –130 dBm, typ. –138 dBm
	20 GHz to 27 GHz	< –130 dBm, typ. –138 dBm
	27 GHz to 29 GHz	< –125 dBm, typ. –130 dBm
	29 GHz to 31 GHz	< –120 dBm, typ. –123 dBm
	preamplifier = on	
	1 MHz to 20 MHz	< –147 dBm, typ. –152 dBm
	20 MHz to 1 GHz	< –158 dBm, typ. –162 dBm
	1 GHz to 3 GHz	< –158 dBm, typ. –162 dBm
	3 GHz to 4 GHz	< –155 dBm, typ. –158 dBm
	4 GHz to 4.5 GHz	< –155 dBm, typ. –158 dBm

[1] For serial number ≥ 103100.

Specifications in brief

	4.5 MHz to 8 GHz	< –150 dBm, typ. –155 dBm
	8 GHz to 20 GHz	< –150 dBm, typ. –155 dBm
	20 GHz to 27 GHz	< –150 dBm, typ. –155 dBm
	27 GHz to 29 GHz	< –140 dBm, typ. –145 dBm
	29 GHz to 31 GHz	< –130 dBm, typ. –133 dBm
Models .23/.36/.44/.54	preamplifier = off	
	1 MHz to 10 MHz	< –125 dBm, –130 dBm (typ.)
	10 MHz to 25 MHz	< –130 dBm, –135 dBm (typ.)
	25 MHz to 2.7 GHz	< –140 dBm, –145 dBm (typ.)
	2.7 GHz to 8 GHz	< –135 dBm, –140 dBm (typ.)
	8 GHz to 29 GHz	< –133 dBm, –138 dBm (typ.)
	29 GHz to 38 GHz	< –130 dBm, –135 dBm (typ.)
	38 GHz to 44 GHz	< –125 dBm, –130 dBm (typ.)
	preamplifier = on	
	1 MHz to 20 MHz	< –147 dBm, –152 dBm (typ.)
	20 MHz to 3 GHz	< –157 dBm, –162 dBm (typ.)
	3 GHz to 4.2 GHz	< –150 dBm, –155 dBm (typ.)
	4.2 GHz to 8 GHz	< –153 dBm, –158 dBm (typ.)
	8 GHz to 27.5 GHz	< –145 dBm, –150 dBm (typ.)
	27.5 GHz to 38 GHz	< –140 dBm, –145 dBm (typ.)
	38 GHz to 44 GHz	< –130 dBm, –135 dBm (typ.)
Third order intercept (IP3)	intermodulation-free dynamic range, signal level –20 dBm (both), RF attenuation = 0 dB, RF preamplifier = off	
Model .02	f = 1 GHz	+7 dBm (meas.)
	f = 2.4 GHz	+10 dBm (meas.)
Models .06/.13/.26	f = 1 GHz	+7 dBm (meas.)
	f = 4.5 GHz, 22 GHz	+8 dBm (meas.)
	f = 9.5 GHz, 26.5 GHz	+10 dBm (meas.)
	f = 12 GHz	+9 dBm (meas.)
Models .23/.36/.44/.54	f = 1 GHz	+10 dBm (meas.)
	f = 4.5 GHz, 9.5 GHz, 26.5 GHz, 32 GHz, 40 GHz	+11 dBm (meas.)
	f = 12 GHz	+8 dBm (meas.)
	f = 22 GHz	+9 dBm (meas.)
Total measurement uncertainty	95% confidence level, +20°C to +30°C, SNR > 16 dB, 0 dB to –50 dB below reference level, RF attenuation auto	
	10 MHz ≤ f ≤ 44 GHz	< 1.25 dB, typ. 0.5 dB
Display		
Resolution		WVGA, 800 × 480 pixel
R&S®HA-Z306 lithium-ion battery pack		
Capacity		72 Wh
Voltage		nom. 11.25 V
Operating time with new, fully charged battery	model .02	8 h
	model .06	7 h
	models .13/.26	6 h
	models .23/.36/.44/.54	4.5 h
Dimensions	W × H × D	202 mm × 294 mm × 76 mm (8.0 in × 11.6 in × 3 in)
Weight	models .02/.06/.13/.26	2.5 kg (5.5 lb)
	models .23/.36/.44/.54	3.2 kg (7.1 lb)

ORDERING INFORMATION

Designation	Type	Order No.
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 2 GHz	R&S®FPH	1321.1111.02
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 6 GHz	R&S®FPH	1321.1111.06
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 13.6 GHz	R&S®FPH	1321.1111.13
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 26.5 GHz	R&S®FPH	1321.1111.26
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 44 GHz	R&S®FPH	1321.1711.44
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 13.6 GHz with tracking generator	R&S®FPH	1321.1711.23
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 26.5 GHz with tracking generator	R&S®FPH	1321.1711.36
R&S®Spectrum Rider FPH handheld spectrum analyzer, 5 kHz to 44 GHz with tracking generator	R&S®FPH	1321.1711.54
Accessories supplied: Lithium-ion battery pack, USB cable, AC power supply with country-specific adapters for EU, GB, US, AUS, CH, CD-ROM with R&S®InstrumentView software and documentation, quick start guide, side strap		
Options		
Spectrum analyzer frequency upgrade, 2 GHz to 3 GHz [1]	R&S®FPH-B3	1321.0667.02
Spectrum analyzer frequency upgrade, 3 GHz to 4 GHz (requires R&S®FPH-B3) [1]	R&S®FPH-B4	1321.0673.02
Spectrum analyzer frequency upgrade, 6 GHz to 8 GHz [2]	R&S®FPH-B8	1321.0767.02
Spectrum analyzer frequency upgrade, 13.6 GHz to 20 GHz [3]	R&S®FPH-B20	1321.0773.02
Spectrum analyzer frequency upgrade, 26.5 GHz to 31 GHz [4, 5]	R&S®FPH-B31	1321.0780.02
N type RF input connector for model .26 (factory installed) [5]	R&S®FPH-B100	1321.0596.02
Spectrum analyzer preamplifier, 5 kHz to 4 GHz [1]	R&S®FPH-B22	1321.0680.02
Spectrum analyzer preamplifier, 5 kHz to 8 GHz [2]	R&S®FPH-B23	1321.0867.02
Spectrum analyzer preamplifier, 5 kHz to 20 GHz [3]	R&S®FPH-B24	1321.0850.02
Spectrum analyzer preamplifier, 5 kHz to 31 GHz [4]	R&S®FPH-B25	1321.0873.02
Spectrum analyzer preamplifier, 5 kHz to 44 GHz [6]	R&S®FPH-B26	1334.6600.02
Spectrum analyzer 100 Hz frequency extension, from 5 kHz to 100 Hz [7]	R&S®FPH-B29	1334.8532.02
Analog modulation analysis AM/FM	R&S®FPH-K7	1321.0696.02
Power sensor support	R&S®FPH-K9	1321.0709.02
Interference analysis	R&S®FPH-K15	1321.0715.02
Signal strength mapping	R&S®FPH-K16	1321.0615.02
Channel power meter	R&S®FPH-K19	1321.0721.02
Pulse measurements with power sensor	R&S®FPH-K29	1321.0738.02
Receiver mode	R&S®FPH-K43	1321.0621.02
Advanced gated trigger measurements	R&S®FPH-K57	1321.1586.02
EMF measurement application	R&S®FPH-K105	1334.6946.02
Accessories		
Battery charger for R&S®HA-Z306 [8, 9]	R&S®HA-Z303	1321.1328.02
Battery charger for R&S®HA-Z406 [8]	R&S®HA-Z406	1321.1486.02
Lithium-ion battery pack, 6.4 Ah	R&S®HA-Z306	1321.1334.02
Spare power supply, incl. mains plug for EU, GB, US, AUS, CH	R&S®HA-Z301	1321.1386.02
Car adapter	R&S®HA-Z302	1321.1340.02
Carrying holster	R&S®HA-Z322	1321.1370.02
Rainproof carrying holster	R&S®HA-Z322	1321.1370.03
Soft carrying bag	R&S®HA-Z220	1309.6175.00
Hardcase	R&S®HA-Z321	1321.1357.02
Hard shell protective carrying case	R&S®RTH-Z4	1326.2774.02
Headphones	R&S®FSH-Z36	1145.5838.02

[1] Applicable only to base unit with order no. 1321.1111.02.
[2] Applicable only to base unit with order no. 1321.1111.06.
[3] Applicable only to base unit with order no. 1321.1111.13 or 1321.1711.23.
[4] Applicable only to base unit with order no. 1321.1111.26 or 1321.1711.36.
[5] R&S®FPH-B31 option is not available in combination with R&S®FPH-B100 option.
[6] Applicable only to base unit with order no. 1321.1711.44 or 1321.1711.54.
[7] For serial number ≥ 103100. Not applicable to R&S®Spectrum Rider FPH model .02.
[8] The battery charger is to be used for charging an additional battery outside the instrument. The internal battery is charged by the instrument itself.
[9] Product to be discontinued and replaced by R&S®HA-Z403.

Designation	Type	Order No.
Spare USB cable	R&S®HA-Z211	1309.6169.00
Spare Ethernet cable	R&S®HA-Z210	1309.6152.00
Antennas and antenna accessories		
Yagi antenna, 1710 MHz to 1990 MHz	R&S®HA-Z1900	1328.6825.02
Yagi antenna, 824 MHz to 960 MHz	R&S®HA-Z900	1328.6283.02
Telescopic antenna	R&S®CS-ZANT	4500.7470.00
RF cable (length: 1 m), DC to 6 GHz, N (m) – N (m) connectors	R&S®HA-Z901	3626.2757.02
Carrying bag, for R&S®HA-Z900 or R&S®HA-Z1900 Yagi antenna	R&S®HA-Z902	1328.6883.02
Handheld directional antenna (antenna handle)	R&S®HE400BC	4104.6000.04
Cable set for R&S®HE400BC	R&S®HE400-KB	4104.7770.04
Handheld directional antenna (antenna handle)	R&S®HE400	4104.6000.02
Handheld directional microwave antenna (antenna handle)	R&S®HE400MW	4104.6000.03
Cable set for R&S®HE400 and R&S®HE400MW (requires R&S®HE300USB)	R&S®HE400-K	4104.7770.02
HF antenna module, 8.3 kHz to 30 MHz	R&S®HE400HF	4104.8002.02
VHF antenna module, 20 MHz to 200 MHz	R&S®HE400VHF	4104.8202.02
UWB antenna module, 30 MHz to 6 GHz	R&S®HE400UWB	4104.6900.02
Log-periodic antenna module, 450 MHz to 8 GHz	R&S®HE400LP	4104.8402.02
Cellular antenna module, 700 MHz to 2500 MHz	R&S®HE400CEL	4104.7306.02
S and C band antenna module, 1.7 GHz to 6 GHz	R&S®HE400SCB	4104.7606.02
SHF antenna module, 5 GHz to 20 GHz (with R&S®HE400BC and R&S®HE400MW antenna handle)	R&S®HE400SHF	4104.8602.02
USB adapter, for R&S®HE400 directional antenna	R&S®HE300USB	4080.9440.02
Handheld directional antenna, with preamplifier	R&S®HE800-PA	4115.6006.02
Transport case, for R&S®HE800-PA	R&S®HE800Z1	4115.7660.02
Log-periodic OEM antenna, 700 MHz to 4 GHz	R&S®HA-Z350	1321.1405.02
RF cable (length: 1 m), DC to 8 GHz, armored, N (m) – N (f) connectors	R&S®FSH-Z320	1309.6600.00
RF cable (length: 3 m), DC to 8 GHz, armored, N (m) – N (f) connectors	R&S®FSH-Z321	1309.6617.00
GPS receiver for R&S®Spectrum Rider FPH	R&S®HA-Z340	1321.1392.02
Portable EMF measurement system, hardcase	R&S®TS-EMF	1158.9295.05
Isotropic antenna, 30 MHz to 3 GHz for R&S®TS-EMF	R&S®TSEMF-B1	1074.5719.02
Isotropic antenna, 700 MHz to 6 GHz for R&S®TS-EMF	R&S®TSEMF-B2	1074.5702.02
Isotropic antenna, 9 kHz to 200 MHz for R&S®TS-EMF	R&S®TSEMF-B3	1074.5690.02
Converter cable	R&S®TSEMF-CV	1158.9250.02
Matching pad, 50/75 Ω, L section	R&S®RAM	0358.5414.02
Matching pad, 50/75 Ω, series resistor 25 Ω	R&S®RAZ	0358.5714.02
Matching pad, 50/75 Ω, L section, N to BNC	R&S®FSH-Z38	1300.7740.02
Adapter N (m) – BNC (f)		0118.2812.00
Adapter N (m) – N (m)		0092.6581.00
Adapter N (m) – SMA (f)		4012.5837.00
Adapter N (f) – SMA (f)		3692.7660.00
Adapter N (m) – 7/16 (f)		3530.6646.00
Adapter N (m) – 7/16 (m)		3530.6630.00
Adapter N (m) – FME (f)		4048.9790.00
Adapter BNC (m) – banana (f)		0017.6742.00
Attenuator, 50 W, 20 dB, 50 Ω, DC to 6 GHz, N (f) – N (m)	R&S®RDL50	1035.1700.52
Attenuator, 100 W, 20 dB, 50 Ω, DC to 2 GHz, N (f) – N (m)	R&S®RBU100	1073.8495.20
Attenuator, 100 W, 30 dB, 50 Ω, DC to 2 GHz, N (f) – N (m)	R&S®RBU100	1073.8495.30
Compact probe set for E and H near-field measurements, 30 MHz to 3 GHz	R&S®HZ-15	1147.2736.02
Near-field probe set H-field	R&S®HZ-17	1339.4141.02
Preamplifier (3 GHz, 20 dB), power adapter (100 V to 230 V), for R&S®HZ-15	R&S®HZ-16	1147.2720.02
Omnidirectional antenna for circular right-hand polarization, 18 GHz to 26.5 GHz	R&S®AC004R1	0749.3000.03
Omnidirectional antenna for circular left-hand polarization, 18 GHz to 26.5 GHz	R&S®AC004L1	4078.4000.02
Omnidirectional antenna for circular right-hand polarization, 26.5 GHz to 40 GHz	R&S®AC004R2	0749.3251.03
Omnidirectional antenna for circular left-hand polarization, 26.5 GHz to 40 GHz	R&S®AC004L2	4078.5006.02
Broadband omnidirectional antenna, 800 MHz to 26.5 GHz	R&S®HF907OM	4070.3279.02
Standard gain horn antenna, 26 GHz to 40 GHz, mid band gain 20 dB, WR-28	R&S®FH-SG-40	3629.2393.02
Standard gain horn antenna adapter	R&S®HA-Z370	1334.8432.02

Designation	Type	Order No.
Mast and tripod adapter	R&S®KM011Z8	4090.4006.02
Wooden tripod	R&S®HZ-1	0837.2310.02
Test port cable, 0 Hz to 26.5 GHz, 3.5 mm (f) – 3.5 mm (m), length: 635 mm (25 in)	R&S®ZV-Z93	1301.7595.25
Test port cable, 0 Hz to 26.5 GHz, 3.5 mm (f) – 3.5 mm (m), length: 965 mm (38 in)	R&S®ZV-Z93	1301.7595.38
Test port cable, 0 Hz to 26.5 GHz, 3.5 mm (f) – 3.5 mm (m), length: 610 mm (24 in)	R&S®ZV-Z193	1306.4520.24
Test port cable, 0 Hz to 26.5 GHz, 3.5 mm (f) – 3.5 mm (m), length: 914 mm (36 in)	R&S®ZV-Z193	1306.4520.36
Test port cable, 0 Hz to 26.5 GHz, 3.5 mm (f) – 3.5 mm (m), length: 1524 mm (60 in)	R&S®ZV-Z193	1306.4520.60
Test port cable, 0 Hz to 40 GHz, 2.92 mm (f) – 2.92 mm (m), length: 635 mm (25 in)	R&S®ZV-Z95	1301.7608.25
Test port cable, 0 Hz to 40 GHz, 2.92 mm (f) – 2.92 mm (m), length: 965 mm (38 in)	R&S®ZV-Z95	1301.7608.38
Test port cable, 0 Hz to 40 GHz, 2.92 mm (f) – 2.92 mm (m), length: 610 mm (24 in)	R&S®ZV-Z195	1306.4536.24
Test port cable, 0 Hz to 40 GHz, 2.92 mm (f) – 2.92 mm (m), length: 914 mm (36 in)	R&S®ZV-Z195	1306.4536.36
Power sensors supported by the R&S®Spectrum Rider FPH [10)]		
Directional power sensor, 25 MHz to 1 GHz	R&S®FSH-Z14	1444.0029.02
Directional power sensor, 200 MHz to 4 GHz	R&S®FSH-Z44	1444.0035.02
Universal power sensor, 10 MHz to 8 GHz, 100 mW, two-path	R&S®NRP-Z211	1417.0409.02
Universal power sensor, 10 MHz to 18 GHz, 100 mW, two-path	R&S®NRP-Z221	1417.0309.02
Pulse power sensor, 1 nW to 100 mW, 50 MHz to 18 GHz	R&S®NRP18P	1444.1190.02
Pulse power sensor, 1 nW to 100 mW, 50 MHz to 40 GHz (2.92 mm)	R&S®NRP40P	1444.1290.02
Pulse power sensor, 1 nW to 100 mW, 50 MHz to 50 GHz (2.40 mm)	R&S®NRP50P	1444.1390.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
Three-path diode power sensor, 100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
Three-path diode power sensor, 100 pW to 200 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
Three-path diode power sensor, 100 pW to 200 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
Thermal power sensor, 300 nW to 100 mW, DC to 18 GHz	R&S®NRP18T	1424.6115.02
Thermal power sensor, 300 nW to 100 mW, DC to 33 GHz	R&S®NRP33T	1424.6138.02
Thermal power sensor, 300 nW to 100 mW, DC to 40 GHz	R&S®NRP40T	1424.6150.02
Thermal power sensor, 300 nW to 100 mW, DC to 50 GHz	R&S®NRP50T	1424.6173.02
Thermal power sensor, 300 nW to 100 mW, DC to 67 GHz	R&S®NRP67T	1424.6196.02
Thermal power sensor, 300 nW to 100 mW, DC to 110 GHz	R&S®NRP110T	1424.6215.02
Average power sensor, 100 pW to 200 mW, 8 kHz to 6 GHz	R&S®NRP6A	1424.6796.02
Average power sensor, 100 pW to 200 mW, 8 kHz to 18 GHz	R&S®NRP18A	1424.6815.02
Optical power sensor and accessories		
OEM USB optical power meter (Germanium)	R&S®HA-Z360	1334.5162.00
OEM USB optical power meter (filtered InGaAs)	R&S®HA-Z361	1334.5179.00
SC adapter for optical power meter	R&S®HA-Z362	1334.5185.00
LC adapter for optical power meter	R&S®HA-Z363	1334.5191.00
2.5 mm universal adapter for optical power meter	R&S®HA-Z364	1334.5204.00
1.25 mm universal adapter for optical power meter	R&S®HA-Z365	1334.5210.00
Patch cord SC-LC SM, SX, length: 1 m	R&S®HA-Z366	1334.5227.00
Patch cord SC-SC SM, SX, length: 1 m	R&S®HA-Z367	1334.5233.00
The power sensors require the following adapter cable for operation with the R&S®Spectrum Rider FPH		
USB adapter cable for R&S®FSH-Z14/R&S®FSH-Z44 power sensors	R&S®FSH-Z144	1145.5909.02
USB adapter cable (passive), length: 2 m, to connect R&S®NRP-ZxxS/SN power sensors to the R&S®Spectrum Rider FPH	R&S®NRP-Z4	1146.8001.02
R&S®NRP power sensors require the following adapter cable for operation with the R&S®Spectrum Rider FPH		
USB interface cable, length: 1.5 m, to connect R&S®NRP sensors to the R&S®Spectrum Rider FPH	R&S®NRP-ZKU	1419.0658.03

[10)] For average power measurements only.

Warranty		
Base unit		3 years
All other items [10]		1 year
Service options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde&Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

[10] For options installed, the remaining base unit warranty applies if longer than 1 year. Exception: all batteries have a 1 year warranty.

The R&S®Spectrum Rider FPH with an R&S®HA-Z900 Yagi antenna

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