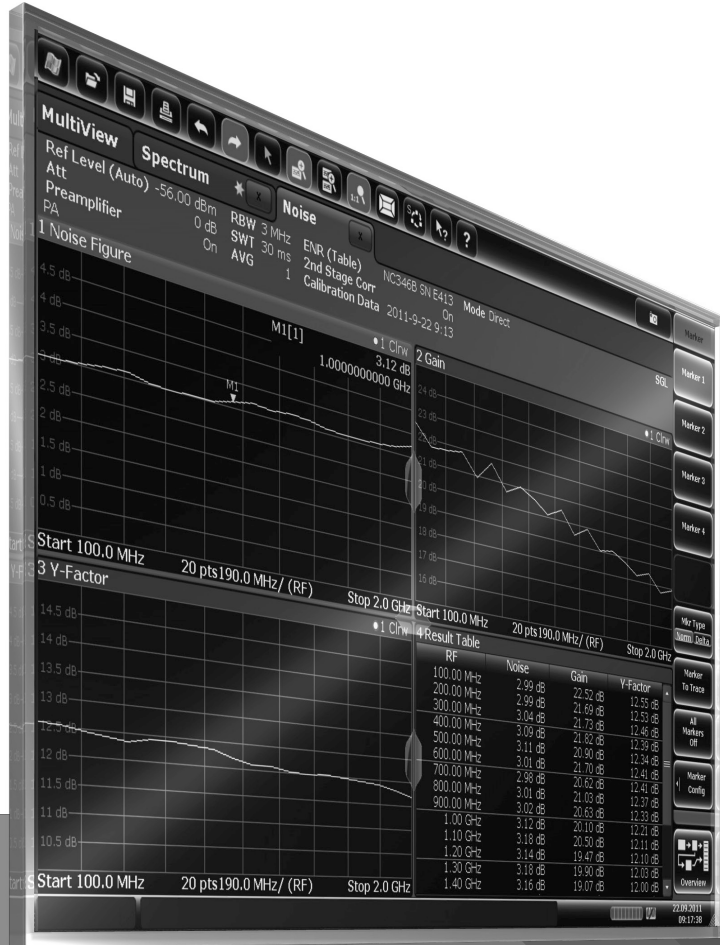


# NOISE FIGURE MEASUREMENT APPLICATION

## Specifications

R&S®FSW-K30  
R&S®FSWP-K30  
R&S®FSMR3-K30  
R&S®FSV3-K30  
R&S®FPS-K30  
R&S®FSV-K30  
R&S®FPL1-K30



Specifications  
Version 12.00

**ROHDE & SCHWARZ**  
Make ideas real



# CONTENTS

<b>Definitions .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
Frequency .....	4
Configuration .....	5
Results .....	6
Measurement uncertainty (nominal).....	7
Recommended hardware .....	8
<b>Ordering information .....</b>	<b>9</b>
Noise figure measurement application .....	9
R&S®FSW signal and spectrum analyzer.....	9
R&S®FSWP phase noise analyzer and VCO tester.....	9
R&S®FSMR3000 measuring receiver .....	10
R&S®FSVA3000 and R&S®FSV3000 signal and spectrum analyzers .....	10
R&S®FPS signal and spectrum analyzer.....	10
R&S®FSVA and R&S®FSV signal and spectrum analyzers .....	11
R&S®FPL1000 signal and spectrum analyzer .....	11
R&S®ZNL vector network analyzer .....	11

# Definitions

## General

Product data applies under the following conditions:

- Three hours of storage at ambient temperature followed by 30 minutes of warm-up operation
- Specified environmental conditions met
- Recommended calibration interval adhered to
- All internal automatic adjustments performed, if applicable

## Specifications with limits

Represent warranted product performance by means of a range of values for the specified parameter. These specifications are marked with limiting symbols such as  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ ,  $\pm$ , or descriptions such as maximum, limit of, minimum. Compliance is ensured by testing or is derived from the design. Test limits are narrowed by guard bands to take into account measurement uncertainties, drift and aging, if applicable.



## Specifications without limits

Represent warranted product performance for the specified parameter. These specifications are not specially marked and represent values with no or negligible deviations from the given value (e.g. dimensions or resolution of a setting parameter). Compliance is ensured by design.

## Typical data (typ.)

Characterizes product performance by means of representative information for the given parameter. When marked with  $<$ ,  $>$  or as a range, it represents the performance met by approximately 80 % of the instruments at production time. Otherwise, it represents the mean value.

## Nominal values (nom.)

Characterize product performance by means of a representative value for the given parameter (e.g. nominal impedance). In contrast to typical data, a statistical evaluation does not take place and the parameter is not tested during production.

## Measured values (meas.)

Characterize expected product performance by means of measurement results gained from individual samples.

## Uncertainties

Represent limits of measurement uncertainty for a given measurand. Uncertainty is defined with a coverage factor of 2 and has been calculated in line with the rules of the Guide to the Expression of Uncertainty in Measurement (GUM), taking into account environmental conditions, aging, wear and tear.

Device settings and GUI parameters are indicated as follows: "parameter: value".

Typical data as well as nominal and measured values are not warranted by Rohde & Schwarz.

# Specifications

The specifications of the R&S®Fxx-K30 noise figure measurement application are based on the data sheet specifications of:

- R&S®FSW signal and spectrum analyzer
- R&S®FSWP phase noise analyzer and VCO tester
- R&S®FSMR3000 measuring receiver
- R&S®FSVA3000 signal and spectrum analyzer (R&S®FSV3-K30)
- R&S®FSV3000 signal and spectrum analyzer (R&S®FSV3-K30)
- R&S®FPS signal and spectrum analyzer
- R&S®FSVA signal and spectrum analyzer (R&S®FSV-K30)
- R&S®FSV signal and spectrum analyzer (R&S®FSV-K30)
- R&S®FPL1000 signal and spectrum analyzer
- R&S®ZNL vector network analyzer

They have not been checked separately and are not verified during instrument calibration. Measurement uncertainties are given as 95 % confidence intervals. The specified errors, accuracies and uncertainties do not take into account systematic errors due to reduced signal-to-noise (S/N) ratio, uncertainties due to imperfect impedance matching, uncertainties of external measurement amplifiers and mixers, uncertainties due to a reduced measurement interval and uncertainties of the noise source. The specified errors, accuracies and uncertainties apply at calibrated measurement frequency points.

## Frequency

Frequency range	RF input	
	R&S®FSW-K30	same as R&S®FSW <sup>1</sup>
	R&S®FSWP-K30	same as R&S®FSWP <sup>1, 2</sup>
	R&S®FSMR3-K30	same as R&S®FSMR3000 <sup>1, 3</sup>
	R&S®FSV3-K30	same as R&S®FSVA3000/R&S®FSV3000
	R&S®FPS-K30	same as R&S®FPS
	R&S®FSV-K30	same as R&S®FSVA/R&S®FSV
	R&S®FPL1-K30	same as R&S®FPL1000/R&S®ZNL
	external mixer IF input <sup>4</sup>	
	R&S®FSW-K30	same as frequency range of used external mixer
	R&S®FSWP-K30	same as frequency range of used external mixer
	R&S®FSV3-K30	same as frequency range of used external mixer
	R&S®FSV-K30	same as frequency range of used external mixer

<sup>1</sup> Restricted IF overload, IF power trigger and auto level functionality depending on carrier frequency and bandwidth at carrier frequencies < 50 MHz.

<sup>2</sup> The R&S®FSWP-B1 option is a prerequisite for using the R&S®FSWP-K30 option with the R&S®FSWP phase noise analyzer.

<sup>3</sup> The R&S®FSMR3-B1 option is a prerequisite for using the R&S®FSMR3-K30 option with the R&S®FSMR3000 measuring receiver.

<sup>4</sup> R&S®FSW26/FSW43/FSW50/FSW67/FSW85 with the R&S®FSW-B21 option and external mixer, R&S®FSWP26/FSWP50 with the R&S®FSWP-B1 and R&S®FSWP-B21 options and external mixer, R&S®FSVA3030/FSVA3044/FSVA3050 with the R&S®FSV3-B21 option and external mixer, R&S®FSV3030/FSV3044/FSV3050 with the R&S®FSV3-B21 option and external mixer or R&S®FSV30/FSV40/R&S®FSVA30/FSVA40 with the R&S®FSV-B21 option and external mixer are required. Not available for R&S®FSMR3000, R&S®FPS, R&S®FPL1000 and R&S®ZNL.

## Configuration

DUT configuration		mode	base instrument	with -B10 <sup>5</sup> option	with -B21 <sup>4</sup> option	with -B21 and -B10 <sup>6</sup> options	
	RF input	direct	•	•	•	•	
		fixed LO, upconverter	•	•	•	•	
		fixed LO, downconverter	•	•	•	•	
		fixed LO, system downconverter	•	•	•	•	
		fixed IF, upconverter		•		•	
		fixed IF, downconverter		•		•	
		fixed IF, system downconverter		•		•	
	external mixer input <sup>4</sup>	direct				•	•
		fixed LO, upconverter				•	•
		fixed LO, downconverter				•	•
		fixed LO, system downconverter				•	•
		fixed IF, upconverter					•
		fixed IF, downconverter					•
		fixed IF, system downconverter					•
Measurement configuration	sweep mode	frequency sweep					
		frequency table (user-defined)					
	noise source type	noise diode, resistor, smart noise source <sup>7</sup>					
	ENR	constant, user-defined table, smart noise source table <sup>8</sup>					
	input loss	constant, user-defined table					
	output loss	constant, user-defined table					
	calibration loss	constant, user-defined table					
	frequency settings	start frequency, stop frequency, number of frequency points					
		center frequency, span, step size					
	measurement settings	RBW					
		sweep time					
settling time							
average							
level and range settings	reference level (auto, manual)						
	auto reference level range						
	RF attenuator (manual)						
second stage correction (calibration)	on/off						
Remote control	control via SCPI command set and application-specific extensions	R&S®FSW, R&S®FSWP and R&S®FSMR3000	•		LAN (VXI-11)		
		R&S®FSVA3000 and R&S®FSV3000	• <sup>9</sup>		•		
		R&S®FPS	•		•		
		R&S®FSVA and R&S®FSV	•		•		
		R&S®FPL1000 and R&S®ZNL	• <sup>10</sup>		•		

<sup>5</sup> R&S®FSW with the R&S®FSW-B10 option, R&S®FSWP with the R&S®FSWP-B1 and R&S®FSWP-B10 options, R&S®FSMR3000 with the R&S®FSMR3-B1 and R&S®FSMR3-B10 options, R&S®FSVA3000 with the R&S®FSV3-B10 option, R&S®FSV3000 with the R&S®FSV3-B10 option, R&S®FPS with the R&S®FPS-B10 option or R&S®FSV with the R&S®FSV-B10 option are required. Not available for R&S®FPL1000 and R&S®ZNL.

<sup>6</sup> R&S®FSW26/FSW43/FSW50/FSW67/FSW85 with the R&S®FSW-B10 and R&S®FSW-B21 options and external mixer, R&S®FSWP26/FSWP50 with the R&S®FSWP-B1, R&S®FSWP-B10 and R&S®FSWP-B21 options and external mixer, R&S®FSVA3030/FSVA3044/FSVA3050 with the R&S®FSV3-B10 and R&S®FSV3-B21 options and external mixer, R&S®FSV3030/FSV3044/FSV3050 with the R&S®FSV3-B10 and R&S®FSV3-B21 options and external mixer or R&S®FSV30/FSV40/R&S®FSVA30/FSVA40 with the R&S®FSV-B10 and R&S®FSV-B21 options and external mixer are required. Not available for R&S®FSMR3000, R&S®FPS, R&S®FPL1000 and R&S®ZNL.

<sup>7</sup> Smart noise source support not available for R&S®FSVA and R&S®FSV.

<sup>8</sup> Smart noise source table support not available for R&S®FSVA and R&S®FSV.

<sup>9</sup> R&S®FSVA3000 with the R&S®FSV3-B5 option or R&S®FSV3000 with the R&S®FSV3-B5 option is required.

<sup>10</sup> R&S®FPL1000 with the R&S®FPL1-B10 option or R&S®ZNL with the R&S®FPL1-B10 option is required.

Uncertainty calculator and result uncertainty calculation	uncertainty dialog and trace uncertainty	on/off
Preamplifier <sup>11</sup>	R&S®FSW-K30	30 dB/off
	R&S®FSWP-K30	30 dB/off
	R&S®FSMR3-K30	30 dB/off
	R&S®FSV3-K30	30 dB/off
	R&S®FPS-K30	on/off
	R&S®FSV-K30	on/off
	R&S®FPL1-K30	on/off

## Results

<b>R&amp;S®FSW-K30, R&amp;S®FSWP-K30, R&amp;S®FSMR3-K30, R&amp;S®FSV3-K30 for R&amp;S®FSVA3000/FSV3000, R&amp;S®FPS-K30, R&amp;S®FPL1-K30</b>		
Result display	result table	frequency selectable: noise figure, gain, temperature, Y factor, P hot, P cold, ENR measured, level (hot), level (cold), cal Y factor, cal level (hot), cal level (cold)
	marker table	marker reference, frequency selectable: noise figure, gain, temperature, Y factor, P hot, P cold, ENR measured, level (hot), level (cold), cal Y factor, cal level (hot), cal level (cold)
	graph results	noise figure, gain, temperature, Y factor, P hot, P cold, ENR measured, level (hot), level (cold), cal Y factor, cal level (hot), cal level (cold) x-axis according to frequency settings y-axis scaling automatic or user-defined
Trace	trace configuration	up to 4 traces clear/write, view, blank copy trace
	markers	up to 4 markers (normal/delta)
	limit lines	noise figure, gain, temperature, Y factor, ENR measured, cal level (hot), cal level (cold)

<b>R&amp;S®FSV-K30 for R&amp;S®FSVA/R&amp;S®FSV</b>		
Result display	result table	frequency, noise figure, noise temperature, gain
	graph results	noise figure, gain x-axis according to frequency settings y-axis scaling automatic or user-defined
	Trace	measurement traces, up to 3 memory traces copy trace
Trace	markers	up to 4 markers
	limit lines	noise figure, gain

<sup>11</sup> R&S®FSW8/FSW13/FSW26/FSW43/FSW50/FSW67 with the R&S®FSW-B24 option, R&S®FSWP8/FSWP26/FSWP50 with the R&S®FSWP-B24 option, R&S®FSMR3008/FSMR3026/FSMR3050 with the R&S®FSMR3-B24 option, R&S®FSVA3004/FSVA3007/FSVA3013/FSVA3030/FSVA3044/FSVA3050 with the R&S®FSV3-B24 option, R&S®FSV3004/FSV3007/FSV3013/FSV3030/FSV3044/FSV3050 with the R&S®FSV3-B24 option, R&S®FPS4/FPS7 with the R&S®FPS-B22 option, R&S®FPS13/FPS30/FPS40 with the R&S®FPS-B24 option, R&S®FSVA4/FSVA7 with the R&S®FSV-B22 option, R&S®FSVA13/FSVA30/FSVA40 with the R&S®FSV-B24 option, R&S®FSV4/FSV7 with the R&S®FSV-B22 option, R&S®FSV13/FSV30/FSV40 with the R&S®FSV-B24 option or R&S®FPL1000 with the R&S®FPL1-B22 option are required. Not available for R&S®ZNL.

## Measurement uncertainty (nominal)

Noise figure measurement range	noise source ENR	
	4 dB to 7 dB	0 dB to 20 dB
	12 dB to 17 dB	0 dB to 30 dB
	20 dB to 22 dB	0 dB to 35 dB
Resolution		0.01 dB
Instrument noise figure uncertainty	R&S®FSW-K30, R&S®FSWP-K30, R&S®FSMR3-K30	
	10 MHz to 50 GHz <sup>12</sup>	±0.05 dB <sup>13</sup>
	R&S®FSV3-K30	
	10 MHz to 50 GHz <sup>12</sup>	±0.05 dB <sup>14</sup>
	R&S®FPS-K30	
	10 MHz to 7 GHz <sup>12</sup>	±0.05 dB <sup>15</sup>
	> 7 GHz <sup>12</sup>	±0.05 dB <sup>16</sup>
	R&S®FSV-K30	
	10 MHz to 7 GHz <sup>12</sup>	±0.05 dB <sup>17</sup>
	> 7 GHz <sup>12</sup>	±0.05 dB <sup>18</sup>
	R&S®FPL1-K30	
	R&S®FPL1000: 10 MHz to 26 GHz <sup>12</sup>	±0.05 dB <sup>19</sup>
R&S®ZNL: 10 MHz to 3 GHz	±0.05 dB <sup>20</sup>	
Gain measurement range		-20 dB to +60 dB
Resolution		0.01 dB
Accuracy	R&S®FSW-K30, R&S®FSWP-K30, R&S®FSMR3-K30	
	10 MHz to 50 GHz <sup>12</sup>	±0.15 dB <sup>13</sup>
	R&S®FSV3-K30	
	10 MHz to 50 GHz <sup>12</sup>	±0.15 dB <sup>14</sup>
	R&S®FPS-K30	
	10 MHz to 7 GHz <sup>12</sup>	±0.15 dB <sup>15</sup>
	> 7 GHz <sup>12</sup>	±0.15 dB <sup>16</sup>
	R&S®FSV-K30	
	10 MHz to 7 GHz <sup>12</sup>	±0.15 dB <sup>17</sup>
	> 7 GHz <sup>12</sup>	±0.15 dB <sup>18</sup>
	R&S®FPL1-K30	
	R&S®FPL1000: 10 MHz to 26 GHz <sup>12</sup>	±0.15 dB <sup>19</sup>
R&S®ZNL: 10 MHz to 3 GHz	±0.15 dB <sup>20</sup>	

<sup>12</sup> The upper frequency limit depends on the instrument model.

<sup>13</sup> With internal preamplifier (R&S®FSW-B24/FSWP-B24/FSMR3-B24 option), gain: 30 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

<sup>14</sup> With internal preamplifier (R&S®FSV3-B24 option), gain: 30 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

<sup>15</sup> With internal preamplifier (R&S®FPS-B22 option), sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

<sup>16</sup> With external gain: 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

<sup>17</sup> With internal preamplifier (R&S®FSV-B22 option), sweep time > 300 ms, input attenuator = 0 dB.

<sup>18</sup> With external gain: 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB.

<sup>19</sup> With internal preamplifier (R&S®FPL1-B22 option), sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

<sup>20</sup> With external gain: 30 dB, noise figure < 5 dB, sweep time > 300 ms, input attenuator = 0 dB, measured Y factor > 10 dB.

## Recommended hardware

Designation	Type	Order No.
Smart noise source, 10 MHz to 18 GHz	R&S®FS-SNS18	1338.8008.18
Smart noise source, 10 MHz to 26.5 GHz	R&S®FS-SNS26	1338.8008.26
Smart noise source, 100 MHz to 40 GHz	R&S®FS-SNS40	1338.8008.40
Smart noise source, 100 MHz to 55 GHz	R&S®FS-SNS55	1338.8008.55
Smart noise source, 100 MHz to 67 GHz	R&S®FS-SNS67	1338.8008.67
Smart noise source, 60 GHz to 90 GHz	R&S®FS-SNS90	1338.8008.90
Smart noise source, 75 GHz to 110 GHz	R&S®FS-SNS110	1338.8008.11
<b>Accessories supplied with each R&amp;S®FS-SNS</b>		
Interface cable	R&S®SNSCABLE	1338.8020.00
Manual, carrying case		
<b>Optional accessories</b>		
Y adapter cable for legacy instruments	R&S®SNSCABLE-Y	1338.8066.00

Noise sources <sup>21</sup> (NoiseCom NC346)	RF connector	Frequency range	ENR
NC 346 A	SMA male	0.01 GHz to 18 GHz	5 dB to 7 dB
NC 346 A precision	APC 3.5 male	0.01 GHz to 18 GHz	5 dB to 7 dB
NC 346 A option1	N male	0.01 GHz to 18 GHz	5 dB to 7 dB
NC 346 A option 2	APC 7	0.01 GHz to 18 GHz	5 dB to 7 dB
NC 346 A option 4	N female	0.01 GHz to 18 GHz	5 dB to 7 dB
NC 346 B	SMA male	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 B precision	APC 3.5 male	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 B option 1	N male	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 A option 2	APC 7	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 A option 4	N female	0.01 GHz to 18 GHz	14 dB to 16 dB
NC 346 C	APC 3.5 male	0.01 GHz to 26.5 GHz	13 dB to 17 dB
NC 346 D	SMA male	0.01 GHz to 18 GHz	19 dB to 25 dB
NC 346 D precision	APC 3.5 male	0.01 GHz to 18 GHz	19 dB to 25 dB
NC 346 D option1	N male	0.01 GHz to 18 GHz	19 dB to 25 dB
NC 346 D option 2	APC 7	0.01 GHz to 18 GHz	19 dB to 25 dB
NC 346 D option 3	N female	0.01 GHz to 18 GHz	19 dB to 25 dB
NC 346 E	APC 3.5 male	0.01 GHz to 26.5 GHz	19 dB to 25 dB
NC 346 Ka	K male	0.1 GHz to 40 GHz	10 dB to 17 dB
NC 346 V	V male	0.1 GHz to 55 GHz	7 dB to 21 dB

<sup>21</sup> Noise sources supplied by NoiseCom; specifications from NoiseCom.



## Ordering information

### Noise figure measurement application

Designation	Type	Order No.
Noise figure measurement application	R&S®FSW-K30	1313.1380.02
Noise figure measurement application <sup>22</sup>	R&S®FSWP-K30	1325.4244.02
Noise figure measurement application <sup>23</sup>	R&S®FSMR3-K30	1345.3637.02
Noise figure measurement application	R&S®FSV3-K30	1330.5045.02
Noise figure measurement application	R&S®FPS-K30	1321.4104.02
Noise figure measurement application	R&S®FSV-K30	1310.8355.02
Noise figure measurement application (R&S®FPL1000, R&S®ZNL) <sup>24</sup>	R&S®FPL1-K30	1323.1760.02

### R&S®FSW signal and spectrum analyzer

Designation	Type	Order No.
<b>Base units</b>		
Signal and spectrum analyzer, 2 Hz to 8 GHz	R&S®FSW8	1331.5003.08
Signal and spectrum analyzer, 2 Hz to 13.6 GHz	R&S®FSW13	1331.5003.13
Signal and spectrum analyzer, 2 Hz to 26.5 GHz	R&S®FSW26	1331.5003.26
Signal and spectrum analyzer, 2 Hz to 43.5 GHz	R&S®FSW43	1331.5003.43
Signal and spectrum analyzer, 2 Hz to 50 GHz	R&S®FSW50	1331.5003.50
Signal and spectrum analyzer, 2 Hz to 67 GHz	R&S®FSW67	1331.5003.67
Signal and spectrum analyzer, 2 Hz to 85 GHz	R&S®FSW85	1331.5003.85
<b>Options</b>		
External generator control	R&S®FSW-B10	1313.1622.02
LO/IF connections for external mixers (R&S®FSW26)	R&S®FSW-B21	1313.1100.26
LO/IF connections for external mixers (R&S®FSW43, R&S®FSW50, R&S®FSW67)	R&S®FSW-B21	1313.1100.43
LO/IF connections for external mixers (R&S®FSW85)	R&S®FSW-B21	1313.1100.85
RF preamplifier, 100 kHz to 13.6 GHz (R&S®FSW8, R&S®FSW13)	R&S®FSW-B24	1313.0832.13
RF preamplifier, 100 kHz to 26.5 GHz (R&S®FSW26)	R&S®FSW-B24	1313.0832.26
RF preamplifier, 100 kHz to 43.5 GHz (R&S®FSW43)	R&S®FSW-B24	1313.0832.43
RF preamplifier, 100 kHz to 50 GHz (R&S®FSW50)	R&S®FSW-B24	1313.0832.49
RF preamplifier, 100 kHz to 67 GHz (R&S®FSW67)	R&S®FSW-B24	1313.0832.66

### R&S®FSWP phase noise analyzer and VCO tester

Designation	Type	Order No.
<b>Base units</b>		
Phase noise analyzer and VCO tester, 1 MHz to 8 GHz	R&S®FSWP8	1322.8003.09
Phase noise analyzer and VCO tester, 1 MHz to 26.5 GHz	R&S®FSWP26	1322.8003.27
Phase noise analyzer and VCO tester, 1 MHz to 50 GHz	R&S®FSWP50	1322.8003.51
<b>Options</b>		
External generator control	R&S®FSWP-B10	1325.5463.02
LO/IF connections for external mixers (R&S®FSWP26, R&S®FSWP50)	R&S®FSWP-B21	1325.3848.02
RF preamplifier, 100 kHz to 8 GHz (R&S®FSWP8)	R&S®FSWP-B24	1325.3725.08
RF preamplifier, 100 kHz to 26.5 GHz (R&S®FSWP26)	R&S®FSWP-B24	1325.3725.26
RF preamplifier, 100 kHz to 50 GHz (R&S®FSWP50)	R&S®FSWP-B24	1325.3725.50
<b>Mandatory options</b>		
Spectrum analyzer, 10 Hz to 8 GHz (R&S®FSWP8)	R&S®FSWP-B1	1322.9997.08
Spectrum analyzer, 10 Hz to 26.5 GHz (R&S®FSWP26)	R&S®FSWP-B1	1322.9997.26
Spectrum analyzer, 10 Hz to 50 GHz (R&S®FSWP50)	R&S®FSWP-B1	1322.9997.50

<sup>22</sup> The R&S®FSWP-B1 option is a prerequisite for using the R&S®FSWP-K30 option with the R&S®FSWP phase noise analyzer.

<sup>23</sup> The R&S®FSMR3-B1 option is a prerequisite for using the R&S®FSMR3-K30 option with the R&S®FSMR3000 measuring receiver.

<sup>24</sup> The R&S®FPL1-B5 option is a prerequisite for using the R&S®FPL1-K30 option with the R&S®FPL1000 signal and spectrum analyzer.

The R&S®ZNL3-B1 and R&S®FPL1-B5 options are prerequisites for using the R&S®FPL1-K30 option with the R&S®ZNL vector network analyzer.

## R&S®FSMR3000 measuring receiver

Designation	Type	Order No.
<b>Base units</b>		
Measuring receiver, 100 kHz to 8 GHz	R&S®FSMR3008	1345.4004.08
Measuring receiver, 100 kHz to 26.5 GHz	R&S®FSMR3026	1345.4004.26
Measuring receiver, 100 kHz to 50 GHz	R&S®FSMR3050	1345.4004.50
<b>Options</b>		
External generator control	R&S®FSMR3-B10	1345.3089.02
RF preamplifier, 100 kHz to 8 GHz (R&S®FSMR3008)	R&S®FSMR3-B24	1345.3108.08
RF preamplifier, 100 kHz to 26.5 GHz (R&S®FSMR3026)	R&S®FSMR3-B24	1345.3108.26
RF preamplifier, 100 kHz to 50 GHz (R&S®FSMR3050)	R&S®FSMR3-B24	1345.3108.49
<b>Mandatory options</b>		
Spectrum analyzer, 10 Hz to 8 GHz (R&S®FSMR3008)	R&S®FSMR3-B1	1345.3050.08
Spectrum analyzer, 10 Hz to 26.5 GHz (R&S®FSMR3026)	R&S®FSMR3-B1	1345.3050.26
Spectrum analyzer, 10 Hz to 50 GHz (R&S®FSMR3050)	R&S®FSMR3-B1	1345.3050.50

## R&S®FSVA3000 and R&S®FSV3000 signal and spectrum analyzers

Designation	Type	Order No.
<b>R&amp;S®FSVA3000 signal and spectrum analyzers</b>		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA3004	1330.5000.05
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSVA3007	1330.5000.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA3013	1330.5000.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA3030	1330.5000.31
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSVA3044	1330.5000.44
Signal and spectrum analyzer, 10 Hz to 50/54 GHz	R&S®FSVA3050	1330.5000.51
<b>R&amp;S®FSV3000 signal and spectrum analyzers</b>		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV3004	1330.5000.04
Signal and spectrum analyzer, 10 Hz to 7.5 GHz	R&S®FSV3007	1330.5000.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV3013	1330.5000.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV3030	1330.5000.30
Signal and spectrum analyzer, 10 Hz to 44 GHz	R&S®FSV3044	1330.5000.43
Signal and spectrum analyzer, 10 Hz to 50/54 GHz	R&S®FSV3050	1330.5000.50
<b>Options</b>		
Noise source control via BNC (for use with legacy noise sources)	R&S®FSV3-B28V	1330.6664.02
Additional interfaces	R&S®FSV3-B5	1330.3820.02
External generator control	R&S®FSV3-B10	1330.3859.02
LO/IF connections for external mixers (R&S®FSVA3030, R&S®FSVA3044, R&S®FSV3030, R&S®FSV3044)	R&S®FSV3-B21	1330.4010.02
RF preamplifier (R&S®FSVA3004, R&S®FSVA3007, R&S®FSV3004, R&S®FSV3007)	R&S®FSV3-B24	1330.4049.07
RF preamplifier (R&S®FSVA3013, R&S®FSV3013)	R&S®FSV3-B24	1330.4049.13
RF preamplifier (R&S®FSVA3030, R&S®FSV3030)	R&S®FSV3-B24	1330.4049.30
RF preamplifier (R&S®FSVA3044, R&S®FSV3044)	R&S®FSV3-B24	1330.4049.44

## R&S®FPS signal and spectrum analyzer

Designation	Type	Order No.
<b>Base units</b>		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FPS4	1319.2008.04
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FPS7	1319.2008.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FPS13	1319.2008.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FPS30	1319.2008.30
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FPS40	1319.2008.40
<b>Options</b>		
RF preamplifier, 9 kHz to 7 GHz (R&S®FPS4, R&S®FPS7)	R&S®FPS-B22	1321.4027.02
RF preamplifier, 9 kHz to 13.6 GHz (R&S®FPS13)	R&S®FPS-B24	1321.4279.13
RF preamplifier, 9 kHz to 30 GHz (R&S®FPS30)	R&S®FPS-B24	1321.4279.30
RF preamplifier, 9 kHz to 40 GHz (R&S®FPS40)	R&S®FPS-B24	1321.4279.40
<b>Mandatory option</b>		
Noise source supply, BNC female, switched 28 V, max. 100 mA, not retrofittable (option noise source control connector on rear panel of R&S®FPS)	R&S®FPS-B28V	1326.5996.02
<b>Recommended hardware:</b> external preamplifier (for frequency range > 7 GHz; gain: approx. 20 dB; noise figure: max. 5 dB)		

## R&S®FSVA and R&S®FSV signal and spectrum analyzers

Designation	Type	Order No.
<b>R&amp;S®FSVA signal and spectrum analyzers</b>		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSVA4	1321.3008.05
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSVA7	1321.3008.08
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSVA13	1321.3008.14
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSVA30	1321.3008.31
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSVA40	1321.3008.41
<b>R&amp;S®FSV signal and spectrum analyzers</b>		
Signal and spectrum analyzer, 10 Hz to 4 GHz	R&S®FSV4	1321.3008.04
Signal and spectrum analyzer, 10 Hz to 7 GHz	R&S®FSV7	1321.3008.07
Signal and spectrum analyzer, 10 Hz to 13.6 GHz	R&S®FSV13	1321.3008.13
Signal and spectrum analyzer, 10 Hz to 30 GHz	R&S®FSV30	1321.3008.30
Signal and spectrum analyzer <sup>25</sup> , 10 Hz to 40 GHz	R&S®FSV40	1321.3008.39
Signal and spectrum analyzer, 10 Hz to 40 GHz	R&S®FSV40	1321.3008.40
<b>Options for R&amp;S®FSVA and R&amp;S®FSV signal and spectrum analyzers</b>		
External generator control	R&S®FSV-B10	1310.9551.02
LO/IF ports for external mixers	R&S®FSV-B21	1310.9597.02
RF preamplifier, 9 kHz to 7 GHz (R&S®FSVA4, R&S®FSVA7, R&S®FSV4, R&S®FSV7)	R&S®FSV-B22	1310.9600.02
RF preamplifier, 9 kHz to 13.6 GHz (R&S®FSVA13, R&S®FSV13)	R&S®FSV-B24	1310.9616.13
RF preamplifier, 9 kHz to 30 GHz (R&S®FSVA30, R&S®FSV30)	R&S®FSV-B24	1310.9616.30
RF preamplifier, 9 kHz to 40 GHz (R&S®FSVA40, R&S®FSV40)	R&S®FSV-B24	1310.9616.40
<b>Recommended hardware:</b> external preamplifier (for frequency range > 7 GHz; gain: approx. 20 dB; noise figure: max. 5 dB)		

## R&S®FPL1000 signal and spectrum analyzer

Designation	Type	Order No.
<b>Base units</b>		
Signal and spectrum analyzer, 5 kHz to 3 GHz	R&S®FPL1003	1304.0004.03
Signal and spectrum analyzer, 5 kHz to 7.5 GHz	R&S®FPL1007	1304.0004.07
Signal and spectrum analyzer, 5 kHz to 14 GHz	R&S®FPL1014	1304.0004.14
Signal and spectrum analyzer, 5 kHz to 26.5 GHz	R&S®FPL1026	1304.0004.26
<b>Options</b>		
Additional interfaces	R&S®FPL1-B5	1323.1883.02
RF preamplifier (R&S®FPL1003, R&S®FPL1007)	R&S®FPL1-B22	1323.1719.02
RF preamplifier (R&S®FPL1014)	R&S®FPL1-B22	1323.1702.02
RF preamplifier (R&S®FPL1026)	R&S®FPL1-B22	1323.1777.02
GPIO interface	R&S®FPL1-B10	1323.1890.02

## R&S®ZNL vector network analyzer

Designation	Type	Order No.
<b>Base units</b>		
Vector network analyzer, 5 kHz to 3 GHz	R&S®ZNL3	1323.0012.03
Vector network analyzer, 5 kHz to 4.5 GHz	R&S®ZNL4	1323.0012.04
Vector network analyzer, 5 kHz to 6 GHz	R&S®ZNL6	1323.0012.06
Vector network analyzer, 5 kHz to 14 GHz	R&S®ZNL14	1323.0012.14
Vector network analyzer, 5 kHz to 20 GHz	R&S®ZNL20	1323.0012.20
<b>Options</b>		
Additional interfaces	R&S®FPL1-B5	1323.1883.02
GPIO interface	R&S®FPL1-B10	1323.1890.02
<b>Mandatory options</b>		
Spectrum analyzer function (R&S®ZNL3)	R&S®ZNL3-B1	1323.1802.02
Spectrum analyzer function (R&S®ZNL4)	R&S®ZNL4-B1	1303.8099.02
Spectrum analyzer function (R&S®ZNL6)	R&S®ZNL6-B1	1323.2067.02
<b>Recommended hardware:</b> external preamplifier (gain: approx. 20 dB; noise figure: max. 5 dB)		

<sup>25</sup> Maximum bandwidth = 10 MHz.

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