

# R&S®FSV

## Signal and Spectrum Analyzer Specifications

**4TECT**

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# CONTENTS

<b>Definitions .....</b>	<b>3</b>
<b>Specifications.....</b>	<b>4</b>
Frequency .....	4
Sweep time.....	6
Resolution bandwidths.....	6
Level.....	7
Measurement speed .....	13
Trigger functions.....	13
I/Q data .....	14
Inputs and outputs .....	15
General data.....	17
<b>Options .....</b>	<b>18</b>
R&S®FSV-B3 audio demodulator.....	18
R&S®FSV-B5 additional interfaces.....	18
R&S®FSV-B9 tracking generator.....	19
R&S®FSV-B10 external generator control.....	20
R&S®FSV-B17 digital baseband interface.....	20
R&S®FSV-B21 LO/IF ports for external mixers (for R&S®FSV30 and R&S®FSV40 only).....	20
R&S®FSV-B30 DC power supply for 12 V/24 V supply voltage .....	21
R&S®FSV-B32 Lithium-ion battery pack.....	21
R&S®FSV-B34 charger for R&S®FSV-B32 battery pack.....	21
<b>Ordering information .....</b>	<b>22</b>
Options.....	22
Upgrades .....	23
Recommended extras.....	24
Power sensors supported by the R&S®FSV-K9 option .....	25

# Definitions

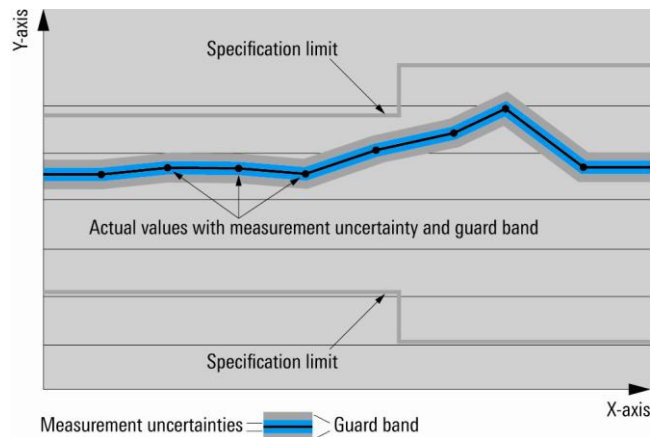
## General

Product data applies under the following conditions:

- Three hours storage at ambient temperature followed by 30 minutes 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

Specifications apply under the following conditions: 30 minutes warm-up time at ambient temperature, specified environmental conditions met, calibration cycle adhered to, and all internal automatic adjustments performed. Data without tolerances: typical values only. Data designated "nominal" applies to design parameters and is not tested.

Rohde & Schwarz equipment is designed for reliable operation up to an altitude of 3000 m above sea level, and for transport up to an altitude of 4500 m above sea level.

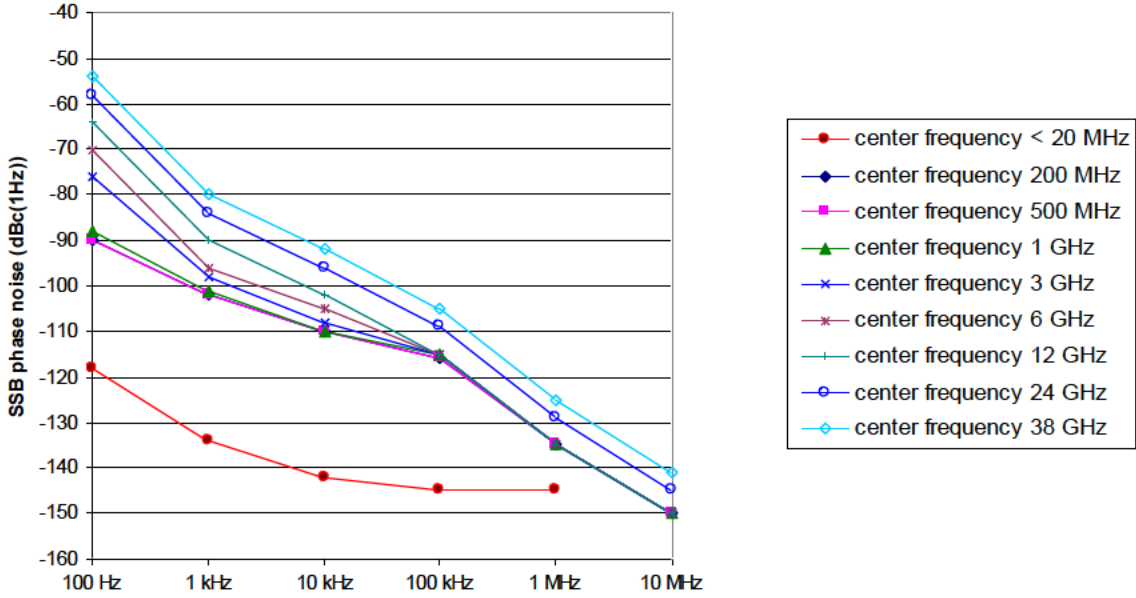
### Frequency

<b>Frequency range</b>	R&S®FSV4	
	DC coupled	10 Hz to 4 GHz
	AC coupled	1 MHz to 4 GHz
	R&S®FSV7	
	DC coupled	10 Hz to 7 GHz
	AC coupled	1 MHz to 7 GHz
	R&S®FSV13	
	DC coupled	10 Hz to 13.6 GHz
	AC coupled	10 MHz to 13.6 GHz
	R&S®FSV30	
	DC coupled	10 Hz to 30 GHz
	AC coupled	10 MHz to 30 GHz
	R&S®FSV40	
	DC coupled	10 Hz to 40 GHz
AC coupled	10 MHz to 40 GHz	
<b>Frequency resolution</b>	0.01 Hz	

<b>Reference frequency, internal</b>		
Accuracy		(time since last adjustment × aging rate) + temperature drift + calibration accuracy
Aging per year	standard	$1 \times 10^{-6}$
	with R&S®FSV-B4 OCXO reference frequency option	$1 \times 10^{-7}$
	with R&S®FSV-B14 ultra-high precision reference frequency option	$4 \times 10^{-9}$
Temperature drift (0 °C to +50 °C)	standard	$1 \times 10^{-6}$
	with R&S®FSV-B4 OCXO reference frequency option, model .02	$1 \times 10^{-7}$
	with R&S®FSV-B4 OCXO extended frequency stability option, model .03	$1 \times 10^{-8}$
	with R&S®FSV-B14 ultra-high precision reference frequency option	$5 \times 10^{-10}$
Achievable initial calibration accuracy	standard	$5 \times 10^{-7}$
	with R&S®FSV-B4 OCXO reference frequency option	$5 \times 10^{-8}$
	with R&S®FSV-B14 ultra-high precision reference frequency option	$1 \times 10^{-10}$

<b>Frequency readout</b>		
Marker resolution		1 Hz
Uncertainty		$\pm(\text{marker frequency} \times \text{reference uncertainty} + 10 \% \times \text{resolution bandwidth} + \frac{1}{2} (\text{span} / (\text{sweep points} - 1)) + 1 \text{ Hz})$
Number of sweep (trace) points	default value	691
	range	101 to 32001
Marker tuning frequency step size	marker step size = sweep points	$\text{span} / (\text{sweep points} - 1)$
	marker step size = standard	$\text{span} / (\text{default sweep points} - 1)$
Frequency counter resolution		0.001 Hz
Count accuracy		$\pm(\text{frequency} \times \text{reference uncertainty} + \frac{1}{2} (\text{last digit}))$
Display range for frequency axis		0 Hz, 10 Hz to max. frequency
Resolution		0.1 Hz
Max. span deviation		0.1 %

Spectral purity		
SSB phase noise	frequency = 500 MHz, carrier offset	
	100 Hz	< -84 dBc (1 Hz)
	1 kHz	< -101 dBc (1 Hz)
	10 kHz	< -106 dBc (1 Hz)
	100 kHz	< -115 dBc (1 Hz)
	1 MHz	< -134 dBc (1 Hz)
	10 MHz	-150 dBc (1 Hz) (typ.)
Residual FM	frequency = 500 MHz, RBW = 1 kHz, sweep time = 100 ms	< 3 Hz (nom.)



Typical phase noise at different center frequencies.

## Sweep time

Range	span = 0 Hz	1 $\mu$ s to 16000 s
	span $\geq$ 10 Hz, swept	1 ms to 16000 s <sup>1</sup>
	span $\geq$ 10 Hz, FFT	7 $\mu$ s to 16000 s <sup>2</sup>
Sweep time accuracy	span = 0 Hz	0.1 % (nom.)
	span $\geq$ 10 Hz, swept	1 % (nom.)

## Resolution bandwidths

Sweep filters and FFT filters		
Resolution bandwidths (-3 dB)	span $\geq$ 10 Hz, sweep filters	1 Hz to 10 MHz in 1/2/3/5 sequence
	span $\geq$ 10 Hz, FFT filters	1 Hz to 3 MHz in 1/2/3/5 sequence
	span = 0 Hz, all models except R&S®FSV40, model .39	20 MHz, 28 MHz additionally
	with R&S®FSV-B70 option, span = 0 Hz, f $\leq$ 7 GHz	40 MHz additionally
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:3 dB		< 5 (nom.)

Channel filters		
Bandwidths (-3 dB)	standard (RRC = root raised cosine)	100 Hz, 200 Hz, 300 Hz, 500 Hz 1/1.5/2/2.4/2.7/3/3.4/4/4.5/5/6/8.5/9/10/ 12.5/14/15/16/18 (RRC)/20/21/ 24.3 (RRC)/25/30/50/100/150/192/200/ 300/500 kHz
		1/1.228/1.28 (RRC)/1.5/2/3/ 3.84 (RRC)/4.096 (RRC)/5/10 MHz
	all models except R&S®FSV40, model .39 with R&S®FSV-B70 option, f $\leq$ 7 GHz	20 MHz, 28 MHz additionally
		40 MHz additionally
Bandwidth uncertainty		< 2 % (nom.)
Shape factor 60 dB:3 dB		< 2 (nom.)

EMI filters (with R&S®FSV-K54 only)		
Bandwidths (-6 dB)		10 Hz, 100 Hz, 200 Hz, 1 kHz, 9 kHz, 10 kHz, 100 kHz, 120 kHz, 1 MHz
Bandwidth uncertainty		< 3 % (nom.)
Shape factor 60 dB:6 dB		< 4 (nom.)

Video bandwidths	standard	1 Hz to 10 MHz in 1/2/3/5 sequence
	all models except R&S®FSV40, model .39	20 MHz, 28 MHz additionally
	with R&S®FSV-B70 option, f $\leq$ 7 GHz	40 MHz additionally

Signal analysis bandwidth (equalized)	f $\leq$ 7 GHz	
	all models except R&S®FSV40, model .39	28 MHz (nom.)
	with R&S®FSV-B70 option	40 MHz (nom.)
	with R&S®FSV-B160 option	160 MHz (nom.)
	R&S®FSV40, model .39	10 MHz (nom.)

<sup>1</sup> Net sweep time without additional hardware settling time.

<sup>2</sup> Time for data acquisition for FFT calculation.

## Level

Display range	displayed noise floor up to +30 dBm
---------------	-------------------------------------

<b>Max. input level</b>		
DC voltage	AC coupled	50 V
	DC coupled	0 V
CW RF power	RF attenuation 0 dB	
	RF preamplifier = off	20 dBm (= 0.1 W)
	with R&S®FSV-B22 or R&S®FSV-B24 option, RF preamplifier = on	13 dBm (= 0.02 W)
	RF attenuation ≥ 10 dB	
	RF preamplifier = off	30 dBm (= 1 W)
	with R&S®FSV-B22 or R&S®FSV-B24 option, RF preamplifier = on	23 dBm (= 0.2 W)
Pulse spectral density	RF attenuation 0 dB, RF preamplifier = off	97 dB μV/MHz
Max. pulse voltage	RF attenuation ≥ 10 dB	150 V
Max. pulse energy	RF attenuation ≥ 10 dB, 10 μs	1 mWs

<b>Intermodulation</b>		
1 dB compression of input mixer	RF attenuation 0 dB, RF preamplifier = off	
	f ≤ 7 GHz	+3 dBm (nom.)
	f > 7 GHz	+5 dBm (nom.)
	with R&S®FSV-B22 or R&S®FSV-B24 option, RF preamplifier = on, RF attenuation 0 dB	
	f ≤ 7 GHz	-12 dBm (nom.)
	f > 7 GHz	-25 dBm (nom.)
Third-order intercept point (TOI)	RF attenuation 0 dB, level 2 × -15 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger, RF preamplifier = off	
	10 MHz ≤ f <sub>in</sub> < 100 MHz	> 12 dBm, 15 dBm (typ.)
	100 MHz ≤ f <sub>in</sub> < 3.6 GHz	> 13 dBm, 16 dBm (typ.)
	3.6 GHz ≤ f <sub>in</sub> ≤ 40 GHz	> 15 dBm, 18 dBm (typ.)
	with R&S®FSV-B22 or R&S®FSV-B24 option, RF preamplifier = on, RF attenuation 0 dB, level 2 × -45 dBm, Δf > 5 × RBW or 10 kHz, whichever is larger	
	10 MHz ≤ f <sub>in</sub> < 100 MHz	-3 dBm (nom.)
	100 MHz ≤ f <sub>in</sub> < 3.6 GHz	-2 dBm (nom.)
	3.6 GHz ≤ f <sub>in</sub> < 7 GHz	0 dBm (nom.)
	7 GHz ≤ f <sub>in</sub> ≤ 40 GHz	-10 dBm (nom.)
Second harmonic intercept (SHI)	RF attenuation 0 dB, level -10 dBm, RF preamplifier = off	
	100 MHz < f <sub>in</sub> ≤ 3.5 GHz	45 dBm (typ.)
	3.5 GHz < f <sub>in</sub> ≤ 20 GHz	
	standard	80 dBm (typ.)
	with R&S®FSV-B24 option	75 dBm (typ.)
	with R&S®FSV-B22 or R&S®FSV-B24 option, RF preamplifier = on, RF attenuation 0 dB, level -40 dBm	
	100 MHz < f <sub>in</sub> ≤ 3.5 GHz	25 dBm (nom.)
3.5 GHz < f <sub>in</sub> ≤ 20 GHz	10 dBm (nom.)	

<b>Displayed average noise level without preamplifier options</b>	
0 dB RF attenuation, termination 50 $\Omega$ , log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed	
R&S®FSV4, R&S®FSV7	
9 kHz $\leq$ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz $\leq$ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz $\leq$ f < 1 GHz	< -152 dBm, -155 dBm (typ.)
1 GHz $\leq$ f < 3.6 GHz	< -150 dBm, -153 dBm (typ.)
3.6 GHz $\leq$ f < 6 GHz	< -148 dBm, -151 dBm (typ.)
6 GHz $\leq$ f $\leq$ 7 GHz	< -146 dBm, -149 dBm (typ.)
R&S®FSV13, R&S®FSV30	
9 kHz $\leq$ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz $\leq$ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz $\leq$ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz $\leq$ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz $\leq$ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz $\leq$ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz $\leq$ f < 15 GHz	< -148 dBm, -151 dBm (typ.)
15 GHz $\leq$ f $\leq$ 30 GHz	< -144 dBm, -147 dBm (typ.)
R&S®FSV40	
9 kHz $\leq$ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz $\leq$ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz $\leq$ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz $\leq$ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz $\leq$ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz $\leq$ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz $\leq$ f < 15 GHz	< -145 dBm, -148 dBm (typ.)
15 GHz $\leq$ f < 34 GHz	< -142 dBm, -145 dBm (typ.)
34 GHz $\leq$ f $\leq$ 40 GHz	< -136 dBm, -139 dBm (typ.)
with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
0 dB RF attenuation, termination 50 $\Omega$ , log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed	
10 Hz	< -90 dBm (nom.)
20 Hz	< -100 dBm, -110 dBm (typ.)
100 Hz	< -110 dBm, -120 dBm (typ.)
1 kHz	< -120 dBm, -130 dBm (typ.)
with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	



**Displayed average noise level with R&S®FSV-B22 preamplifier option**

0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = off

**R&S®FSV4, R&S®FSV7**

9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -152 dBm, -155 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -150 dBm, -153 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -148 dBm, -151 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -146 dBm, -149 dBm (typ.)

**R&S®FSV13, R&S®FSV30**

9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -148 dBm, -151 dBm (typ.)
15 GHz ≤ f ≤ 30 GHz	< -144 dBm, -147 dBm (typ.)

**R&S®FSV40**

9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -151 dBm, -154 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -149 dBm, -152 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -146 dBm, -149 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -144 dBm, -147 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -145 dBm, -148 dBm (typ.)
15 GHz ≤ f < 34 GHz	< -142 dBm, -145 dBm (typ.)
34 GHz ≤ f ≤ 40 GHz	< -136 dBm, -139 dBm (typ.)

with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz

0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = on

**R&S®FSV4, R&S®FSV7**

100 kHz ≤ f < 1 MHz	< -150 dBm, -155 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -162 dBm, -165 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -160 dBm, -163 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -158 dBm, -161 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -156 dBm, -159 dBm (typ.)

**R&S®FSV13, R&S®FSV30, R&S®FSV40**

100 kHz ≤ f < 1 MHz	< -145 dBm, -148 dBm (typ.)
1 MHz ≤ f < 20 MHz	< -155 dBm, -158 dBm (typ.)
20 MHz ≤ f < 1 GHz	< -161 dBm, -164 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -159 dBm, -162 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -156 dBm, -159 dBm (typ.)
6 GHz ≤ f ≤ 7 GHz	< -154 dBm, -157 dBm (typ.)

with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz

0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = off

10 Hz	< -90 dBm (nom.)
20 Hz	< -100 dBm, -110 dBm (typ.)
100 Hz	< -110 dBm, -120 dBm (typ.)
1 kHz	< -120 dBm, -130 dBm (typ.)

with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz

<b>Displayed average noise level with R&amp;S®FSV-B24 preamplifier option</b>	
0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = off	
R&S®FSV13, R&S®FSV30	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -150 dBm, -153 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -147 dBm, -150 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -144 dBm, -147 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -141 dBm, -144 dBm (typ.)
7.4 GHz ≤ f < 13.6 GHz	< -145 dBm, -148 dBm (typ.)
13.6 GHz ≤ f < 15 GHz	< -143 dBm, -146 dBm (typ.)
15 GHz ≤ f ≤ 30 GHz	< -141 dBm, -144 dBm (typ.)
R&S®FSV40	
9 kHz ≤ f < 100 kHz	< -130 dBm, -140 dBm (typ.)
100 kHz ≤ f < 1 MHz	< -145 dBm, -150 dBm (typ.)
1 MHz ≤ f < 1 GHz	< -150 dBm, -153 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -147 dBm, -150 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -144 dBm, -147 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -141 dBm, -144 dBm (typ.)
7.4 GHz ≤ f < 13.6 GHz	< -143 dBm, -146 dBm (typ.)
13.6 GHz ≤ f < 15 GHz	< -141 dBm, -144 dBm (typ.)
15 GHz ≤ f < 34 GHz	< -139 dBm, -142 dBm (typ.)
34 GHz ≤ f ≤ 40 GHz	< -132 dBm, -135 dBm (typ.)
with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 1 kHz, VBW = 3 kHz, zero span, sweep time 50 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = on	
R&S®FSV13, R&S®FSV30, R&S®FSV40	
100 kHz ≤ f < 1 MHz	< -145 dBm, -148 dBm (typ.)
1 MHz ≤ f < 20 MHz	< -155 dBm, -158 dBm (typ.)
20 MHz ≤ f < 1 GHz	< -160 dBm, -163 dBm (typ.)
1 GHz ≤ f < 3.6 GHz	< -157 dBm, -160 dBm (typ.)
3.6 GHz ≤ f < 6 GHz	< -153 dBm, -156 dBm (typ.)
6 GHz ≤ f < 7.4 GHz	< -150 dBm, -153 dBm (typ.)
7.4 GHz ≤ f < 15 GHz	< -164 dBm, -167 dBm (typ.)
15 GHz ≤ f < 34 GHz	< -159 dBm, -162 dBm (typ.)
34 GHz ≤ f ≤ 40 GHz	< -154 dBm, -156 dBm (typ.)
with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	
0 dB RF attenuation, termination 50 Ω, log. scaling, normalized to 1 Hz RBW, RBW = 5 Hz, VBW = 5 Hz, zero span, sweep time 500 ms, sample detector, trace average, sweep count = 20, mean marker, R&S®FSV-B160 option not installed, RF preamplifier = off	
10 Hz	< -90 dBm (nom.)
20 Hz	< -100 dBm, -110 dBm (typ.)
100 Hz	< -110 dBm, -120 dBm (typ.)
1 kHz	< -120 dBm, -130 dBm (typ.)
with R&S®FSV-B160 option installed, add 1.5 dB to the above specifications for f > 7 GHz	

<b>Spurious responses</b>		
Image response	20 MHz ≤ f ≤ 7 GHz	
	$f_{in} - 2 \times 8409.9$ MHz (1st IF)	< -80 dBc (typ.)
	$f_{in} - 2 \times 729.9$ MHz (2nd IF)	< -80 dBc
	$f_{in} - 2 \times 89.9$ MHz (3rd IF)	< -80 dBc
	7 GHz < f ≤ 30 GHz	
	$f_{in} \pm 2 \times 729.9$ MHz (1st IF)	< -80 dBc
	$f_{in} - 2 \times 89.9$ MHz (2nd IF)	< -80 dBc
	30 GHz < f ≤ 40 GHz	
	$f_{in} \pm 2 \times 729.9$ MHz (1st IF)	< -70 dBc
	$f_{in} - 2 \times 89.9$ MHz (2nd IF)	< -80 dBc
Intermediate frequency response	20 MHz ≤ f ≤ 7 GHz	
	1st IF (8409.9 MHz)	< -70 dBc (typ.)
	2nd IF (729.9 MHz)	< -80 dBc
	3rd IF (89.9 MHz)	< -80 dBc
	7 GHz < f ≤ 40 GHz	
	1st IF (729.9 MHz)	< -80 dBc
Residual spurious response	0 dB RF attenuation	
	f ≤ 1 MHz	< -90 dBm
	f > 1 MHz	< -103 dBm
Local oscillator related spurious	f < 15 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< -70 dBc
	carrier offset > 10 MHz	< -80 dBc
	15 GHz ≤ f < 30 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< -64 dBc
	carrier offset > 10 MHz	< -74 dBc
	30 GHz ≤ f ≤ 40 GHz	
	1 kHz ≤ carrier offset ≤ 10 MHz	< -58 dBc
carrier offset > 10 MHz	< -68 dBc	
<b>Other interfering signals</b>		
Subharmonic of 1st LO	20 MHz ≤ f < 7 GHz, spurious at 8410 MHz - 2 × f <sub>in</sub>	< -70 dBc
Harmonic of 1st LO	mixer level < -25 dBm, spurious at f <sub>in</sub> - 4205 MHz	< -70 dBc

<b>Level display</b>		
Logarithmic level axis		1 dB to 200 dB, in steps of 1/2/5
Linear level axis		10 % of reference level per level division, 10 divisions or logarithmic scaling
Number of traces		6
Trace detector		max. peak, min. peak, auto peak (normal), sample, RMS, average
	with R&S®FSV-K54	quasi-peak additionally
Trace functions		clear/write, max. hold, min. hold, average, view
Setting range of reference level		-130 dBm to (-10 dBm + RF attenuation - RF preamplifier gain), in steps of 0.01 dB
Units of level axis	logarithmic level display	dBm, dBμV, dBmV, dBμA, dBpW
	linear level display	μV, mV, μA, mA, pW, nW

<b>Level measurement uncertainty</b>		
Absolute level uncertainty at 64 MHz	RBW = 10 kHz, level -10 dBm, reference level -10 dBm, RF attenuation 10 dB	
	+20 °C to +30 °C	< 0.2 dB ( $\sigma = 0.07$ dB)
	0 °C to +50 °C	< 0.35 dB ( $\sigma = 0.12$ dB)
Frequency response referenced to 64 MHz	DC coupling, RF attenuation 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, +20 °C to +30 °C	
	9 kHz $\leq$ f < 10 MHz	< 0.5 dB ( $\sigma = 0.17$ dB)
	10 MHz $\leq$ f < 3.6 GHz	< 0.3 dB ( $\sigma = 0.1$ dB)
	3.6 GHz $\leq$ f < 7 GHz	< 0.5 dB ( $\sigma = 0.17$ dB)
	7 GHz $\leq$ f < 13.6 GHz, span < 1 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	13.6 GHz $\leq$ f < 30 GHz, span < 1 GHz	< 2 dB ( $\sigma = 0.66$ dB)
	30 GHz $\leq$ f $\leq$ 40 GHz, span < 1 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	any setting of RF attenuation, RF preamplifier = off, 0 °C to +50 °C	
	9 kHz $\leq$ f < 3.6 GHz	< 1 dB ( $\sigma = 0.33$ dB)
	3.6 GHz $\leq$ f < 7 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	7 GHz $\leq$ f < 13.6 GHz	< 2.5 dB ( $\sigma = 0.83$ dB)
	13.6 GHz $\leq$ f < 30 GHz	< 3 dB ( $\sigma = 1$ dB)
	30 GHz $\leq$ f $\leq$ 40 GHz	< 3.5 dB ( $\sigma = 1.33$ dB)
	any setting of RF attenuation, RF preamplifier = on, 0 °C to +50 °C	
	9 kHz $\leq$ f < 3.6 GHz	< 1 dB ( $\sigma = 0.33$ dB)
	3.6 GHz $\leq$ f < 7 GHz	< 1.5 dB ( $\sigma = 0.5$ dB)
	7 GHz $\leq$ f < 13.6 GHz	< 3 dB ( $\sigma = 1$ dB)
	13.6 GHz $\leq$ f < 30 GHz	< 3.5 dB ( $\sigma = 1.17$ dB)
	30 GHz $\leq$ f $\leq$ 40 GHz	< 4 dB ( $\sigma = 1.33$ dB)
DC coupling, RF preamplifier = off, 0 °C to +50 °C		
10 Hz $\leq$ f < 20 Hz	< 1.5 dB (nom.)	
20 Hz $\leq$ f < 9 kHz	< 1 dB ( $\sigma = 0.33$ dB)	
Attenuator switching uncertainty	f = 64 MHz, 0 dB to 70 dB, referenced to 10 dB attenuation	< 0.2 dB ( $\sigma = 0.07$ dB)
Uncertainty of reference level setting		0 dB <sup>3</sup>
Bandwidth switching uncertainty	referenced to RBW = 10 kHz	
	sweep filters	< 0.1 dB ( $\sigma = 0.04$ dB)
	FFT filters	< 0.2 dB ( $\sigma = 0.07$ dB)
<b>Display nonlinearity</b>		
Logarithmic level display	+5 °C to +40 °C, S/N > 16 dB	
	0 dB to -70 dB	< 0.1 dB ( $\sigma = 0.04$ dB)
	0 °C to +50 °C, S/N > 16 dB	
	0 dB to -50 dB	< 0.1 dB ( $\sigma = 0.04$ dB)
	-50 dB to -60 dB	< 0.15 dB ( $\sigma = 0.05$ dB)
	-60 dB to -70 dB	< 0.2 dB ( $\sigma = 0.07$ dB)
Linear level display	S/N > 16 dB, 0 dB to -70 dB	5 % of reference level
<b>Total measurement uncertainty</b>		
signal level 0 dB to -70 dB below reference level, S/N > 20 dB, sweep time auto, sweep type = sweep, RF attenuation 10 dB, 20 dB, 30 dB, 40 dB, RF preamplifier = off, span/RBW < 100, 95 % confidence level, +20 °C to +30 °C		
	9 kHz $\leq$ f < 10 MHz	0.39 dB
	10 MHz $\leq$ f < 3.6 GHz	0.28 dB
	3.6 GHz $\leq$ f < 7 GHz	0.39 dB
	7 GHz $\leq$ f < 13.6 GHz	1 dB
	13.6 GHz $\leq$ f < 30 GHz	1.32 dB
	30 GHz $\leq$ f $\leq$ 40 GHz	1.65 dB

<sup>3</sup> The setting of the reference level affects only the graphical representation of the measurement result on the display, not the measurement itself. Therefore, the reference level setting causes no additional uncertainty in measurement results.

## Measurement speed

Max. sweep rate, manual operation		1 ms (1000/s) (nom.)
Max. sweep rate, remote operation <sup>4,5</sup>	trace average = on	0.9 ms (1100/s) (nom.)
Remote measurement and LAN transfer <sup>4</sup>		2.8 ms (357/s) (nom.)
Marker peak search <sup>4</sup>		1.3 ms (nom.)
Center frequency tune + sweep	f ≤ 7 GHz	15 ms (nom.)
+ sweep data transfer via remote control <sup>4</sup>	f > 7 GHz	28 ms (nom.)

## Trigger functions

<b>Trigger</b>		
Trigger source		free run, video, external, IF power
Trigger source	signal analysis bandwidth > 40 MHz	free run, external
Trigger offset	span ≥ 10 Hz	31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of offset)
	span = 0 Hz	(–sweep time) to 30 s, min. resolution 31.25 ns (or 1 % of offset)
Max. deviation of trigger offset		±(7.8125 ns + (0.1 % × trigger offset))
<b>IF power trigger</b>		
Sensitivity	min. signal power	–60 dBm + RF attenuation – RF preamplifier gain
	max. signal power	–10 dBm + RF attenuation – RF preamplifier gain
IF power trigger bandwidth	RBW > 500 kHz, swept	40 MHz (nom.)
	RBW > 20 kHz, FFT	
	RBW ≤ 500 kHz, swept	6 MHz (nom.)
	RBW ≤ 20 kHz, FFT	
<b>Gated sweep</b>		
Gate source		video, external, IF power
Gate delay		31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of delay)
Gate length		31.25 ns to 30 s, min. resolution 31.25 ns (or 1 % of gate length)
Max. deviation of gate length		±(7.8125 ns + (0.1 % × gate length))

<sup>4</sup> Measured with personal computer equipped with Intel® Core™2 Duo 2.13 GHz and Gbit LAN interface.

<sup>5</sup> Measurement is performed with a sweep count of 1000. The indicated speed is the average speed of 1 sweep.

**I/Q data**

Interface		GPIB or LAN interface
Memory length		max. 200 Msample I and Q
Word length of I/Q samples	sampling rate > 64 MHz or number of samples > 100 Msample	18 bit
	otherwise	24 bit
Sampling rate	all models except R&S®FSV40, model .39	100 Hz to 45 MHz
	with R&S®FSV-B70 option	100 Hz to 128 MHz
	with R&S®FSV-B160 option	100 Hz to 400 MHz
	R&S®FSV40, model .39	100 Hz to 12.5 MHz
Max. signal analysis bandwidth (equalized)	$f \leq 7$ GHz	
	all models except R&S®FSV40, model .39	28 MHz
	with R&S®FSV-B70 option	40 MHz
	with R&S®FSV-B160 option	160 MHz
	R&S®FSV40, model .39	10 MHz

**Signal analysis bandwidth  $\leq 40$  MHz <sup>6</sup>**

Amplitude flatness	$f \leq 7$ GHz	$\pm 0.3$ dB (nom.)
Deviation from linear phase	$f \leq 7$ GHz	$\pm 1^\circ$ (nom.)
Nonlinearity of displayed level		see section "Nonlinearity of displayed level"
Level measurement uncertainty (at center frequency)		see section "Total measurement uncertainty"
Displayed average noise level (at center frequency)		see section "Displayed average noise level"
ADC related third-order intermodulation distortion	$f \geq 100$ MHz two $-30$ dBm tones at input mixer within analysis bandwidth	$-80$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 100$ MHz	$-90$ dBm (nom.)
Other spurious responses		see section "Spurious responses"

**Signal analysis bandwidth 40 MHz to 160 MHz <sup>7</sup>**

The specifications in this section apply for a maximum frequency of 7 GHz.

Amplitude flatness	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	$100 \text{ MHz} \leq f < 4 \text{ GHz}$	$\pm 0.7$ dB (nom.) <sup>8</sup>
	$4 \text{ GHz} \leq f < 6 \text{ GHz}$	$\pm 1.0$ dB (nom.) <sup>8</sup>
	$6 \text{ GHz} \leq f \leq 7 \text{ GHz}$	$\pm 1.5$ dB (nom.) <sup>8</sup>
Deviation from linear phase	RF attenuation $\geq 10$ dB, RF preamplifier = off	
	$100 \text{ MHz} \leq f < 4 \text{ GHz}$	$\pm 2^\circ$ (nom.) <sup>9</sup>
	$4 \text{ GHz} \leq f < 6 \text{ GHz}$	$\pm 2.5^\circ$ (nom.) <sup>9</sup>
	$6 \text{ GHz} \leq f \leq 7 \text{ GHz}$	$\pm 3^\circ$ (nom.) <sup>9</sup>
Nonlinearity of displayed level	0 dB to $-70$ dB	$< 0.15$ dB (nom.)
Level measurement uncertainty (at center frequency)		add 0.2 dB (nom.) to the values in section "Total measurement uncertainty"
Displayed average noise level (at center frequency)		add 5 dB (nom.) to the values in section "Displayed average noise level"
ADC related third-order intermodulation distortion	$f \geq 100$ MHz two $-30$ dBm tones at input mixer within analysis bandwidth	$-65$ dBc (nom.)
Residual spurious response	RF attenuation 0 dB, $f \geq 100$ MHz	$-90$ dBm (nom.)
Image response	$f \geq 100$ MHz	$-65$ dBc (nom.)
ADC related spurious response	$f \geq 100$ MHz mixer level = $-20$ dBm reference level = signal level single tone within analysis bandwidth	$-65$ dBc (nom.)
Other spurious responses		see section "Spurious responses"

<sup>6</sup> Requires R&S®FSV-B70 or R&S®FSV-B160 option.<sup>7</sup> Requires R&S®FSV-B160 option.<sup>8</sup> With R&S®FSV-B24 option installed, add 0.2 dB to the specifications.<sup>9</sup> With R&S®FSV-B24 option installed, add  $1^\circ$  to the specifications.

## Inputs and outputs

<b>RF input</b>		
Impedance		50 $\Omega$
Connector	R&S®FSV4, R&S®FSV7, R&S®FSV13	N female
	R&S®FSV30	APC 3.5 mm/N female test port adapter
	R&S®FSV40	2.92 mm (K)/N female test port adapter
VSWR	RF attenuation $\geq 10$ dB	
	10 MHz $\leq f < 3.6$ GHz	< 1.5, 1.3 (typ.)
	3.6 GHz $\leq f < 20$ GHz	< 2, 1.8 (typ.)
	20 GHz $\leq f < 27$ GHz	< 2.2, 2 (typ.)
	27 GHz $\leq f < 30$ GHz	
	DC coupled	< 2.2, 2 (typ.)
	AC coupled	2.5 (typ.)
	30 GHz $\leq f \leq 40$ GHz	
	DC coupled	< 2.5, 2.2 (typ.)
	AC coupled	3 (typ.)
	RF attenuation < 10 dB, DC coupled	
	10 MHz $\leq f < 7$ GHz	2 (typ.)
	7 GHz $\leq f < 30$ GHz	2.5 (typ.)
30 GHz $\leq f \leq 40$ GHz	3 (typ.)	
Setting range of attenuator	standard	0 dB to 75 dB, in 5 dB steps
	with R&S®FSV-B25 option	0 dB to 75 dB, in 1 dB steps
Setting range of electronic attenuator	with R&S®FSV-B25 option, $f \leq 7$ GHz	0 dB to 25 dB, in 1 dB steps
	with R&S®FSV-B25 option, $f > 7$ GHz	0 dB to 9 dB, in 1 dB steps
RF preamplifier gain	with R&S®FSV-B22 option	20 dB (nom.)
	with R&S®FSV-B24 option	
	$f \leq 7$ GHz	20 dB (nom.)
	$f > 7$ GHz	30 dB (nom.)
<b>Probe power supply</b>		
Supply voltages		+15 V DC, -12.6 V DC and ground, max. 150 mA (nom.)
<b>Noise source drive</b>		
Connector		BNC female
Output voltage		0 V/28 V, switchable, max. 100 mA (nom.)
<b>Power sensor</b>		
Connector		6-pin LEMOSA female for supported R&S®NRP-Zxx power sensors
<b>USB interface</b>		
		2 ports, type A plug, version 2.0
<b>Reference output</b>		
Connector		BNC female
Impedance		50 $\Omega$
Output frequency	internal reference	10 MHz
	external reference	same as reference input signal
Level		> 0 dBm (nom.)
<b>Reference input</b>		
Connector		BNC female
Impedance		50 $\Omega$
Input frequency range		1 MHz $\leq f_{in} \leq 20$ MHz, in 100 kHz steps
Required level		> 0 dBm into 50 $\Omega$

<b>External trigger/gate input</b>		
Connector		BNC female
Trigger voltage		0.5 V to 3.5 V
Input impedance		10 k $\Omega$
<b>IEC/IEEE bus control</b>		
		interface in line with IEC 625-2 (IEEE 488.2)
Command set		SCPI 1997.0
Connector		24-pin Amphenol female
Interface functions		SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C0
<b>LAN interface</b>		
		10/100/1000BASE-T
Connector		RJ-45
<b>External monitor</b>		
Connector		VGA-compatible, 15-pin, mini D-Sub



## General data

<b>Display</b>		21 cm LC TFT color display (8.4")
Resolution		800 × 600 pixel (SVGA resolution)
Pixel failure rate		$< 1 \times 10^{-5}$
<b>Data storage</b>		
Internal	standard	hard disk $\geq 40$ Gbyte (nom.)
	with R&S®FSV-B18 option	solid-state drive $\geq 8$ Gbyte (nom.)
External		supports USB-2.0-compatible memory devices
<b>Environmental conditions</b>		
Temperature	operating temperature range	+5 °C to +40 °C
	operating temperature range, with R&S®FSV-B18 option	0 °C to +50 °C
	permissible temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Climatic loading		+40 °C at 90 % rel. humidity, in line with EN 60068-2-30
<b>Mechanical resistance</b>		
Vibration	sinusoidal	5 Hz to 55 Hz 0.15 mm constant amplitude (1.8 g at 55 Hz), 55 Hz to 150 Hz acceleration: 0.5 g constant, in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E Method No. 516.4 Procedure I, MIL-PRF-28800F
<b>EMC</b>		in line with EMC Directive 2004/108/EC including: IEC/EN 61326-1 <sup>10, 11</sup> , IEC/EN 61326-2-1, CISPR 11/EN 55011 <sup>10</sup> , IEC/EN 61000-3-2, IEC/EN 61000-3-3
<b>Recommended calibration interval</b>		2 years <sup>12</sup>
<b>Power supply</b>		
AC supply		100 V to 240 V, 3 A to 1.25 A; 50 Hz to 400 Hz, class of protection I, in line with VDE 411
Power consumption	R&S®FSV4, R&S®FSV7	90 W (typ.), max. 180 W with all options
	R&S®FSV13, R&S®FSV30, R&S®FSV40	115 W (typ.), max. 180 W with all options
Safety		in line with EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA-C22.2 No. 61010-1
Test mark		VDE, GS, CSA, CSA-NRTL
<b>Dimensions and weight</b>		
Dimensions (nom.)	W × H × D	412 mm × 197 mm × 417 mm (16.22 in × 7.76 in × 16.42 in)
Net weight, without options (nom.)	R&S®FSV4, R&S®FSV7	9.5 kg (20.94 lb)
	R&S®FSV13	10.3 kg (22.7 lb)
	R&S®FSV30	10.7 kg (23.58 lb)
	R&S®FSV40	11.1 kg (24.46 lb)

<sup>10</sup> Emission limits for class A equipment.

<sup>11</sup> Immunity test requirement for industrial environment (EN 61326 table 2).

<sup>12</sup> Two years apply for instruments with order number 1321.3008.xx and serial numbers starting from:

R&S®FSV4: 101570, R&S®FSV7: 101640, R&S®FSV13: 101590, R&S®FSV30: 103190, R&S®FSV40: 101060, R&S®FSV40 model .39: 101415.

To extend earlier instruments to a recommended calibration interval of 2 years, please contact your Rohde & Schwarz service center.

# Options

## R&S®FSV-B3 audio demodulator

<b>Demodulation</b>		
AF demodulation types		AM and FM
Audio output		loudspeaker and phone jack
Marker stop time in spectrum mode		100 ms to 60 s

<b>AF output</b>		
Connector		3.5 mm mini jack
Output impedance		10 $\Omega$
Open-circuit voltage		up to 1.5 V, adjustable

## R&S®FSV-B5 additional interfaces

<b>User port</b>		
Connector		9-pin D-Sub male
Output		TTL-compatible, 0 V/5 V, max. 15 mA
Input		TTL-compatible, max. 5 V

<b>IF/video/demod out</b>		
Connector		BNC female, 50 $\Omega$
<b>IF out</b>		
Bandwidth		equal to RBW setting
IF frequency		32 MHz
Output level (gain versus RF input)	RF attenuation 0 dB, RF preamplifier = off, span = 0 Hz	0 dB (nom.)
<b>Video out</b>		
Bandwidth		equal to VBW setting
Output scaling	log. display scale	logarithmic
	lin. display scale	linear
Output level	center frequency > 10 MHz, span = 0 Hz, signal at reference level and center frequency	1 V (nom.), open circuit

<b>Trigger out</b>		
Connector		BNC female
Output		TTL-compatible, 0 V/5 V

<b>USB interface</b>		2 ports, type A plug, version 2.0
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## R&S®FSV-B9 tracking generator

<b>Frequency</b>		
Frequency range	R&S®FSV4	100 kHz to 4 GHz
	R&S®FSV7, R&S®FSV13, R&S®FSV30, R&S®FSV40	100 kHz to 7 GHz
<b>Frequency offset</b>		
Setting range		±1 GHz
Setting resolution		1 Hz
<b>Spectral purity</b>		
SSB phase noise	frequency = 1000 MHz, carrier offset = 100 kHz	-90 dBc (1 Hz) (typ.)
<b>Level</b>		
Setting range	normal mode	-60 dBm to 0 dBm, in 0.1 dB steps
	with AM, I/Q	-60 dBm to -10 dBm, in 0.1 dB steps
Max. deviation of output level	frequency = 64 MHz, +20 °C to +30 °C, output level = -10 dBm, frequency offset = 0 Hz, modulation = off	< 1 dB
Frequency response	output level = -10 dBm, referenced to level at 64 MHz, 100 kHz ≤ f ≤ 7 GHz, frequency offset = 0 Hz, modulation = off	< 3 dB
<b>Dynamic range</b>		
	RBW = 1 kHz, f > 10 MHz	110 dB
<b>Harmonics, non-harmonic spurious</b>		
	output level = -10 dBm	-30 dBc
<b>Modulation</b>		
Modulation format	external	I/Q, AM, FM
AM	f > 10 MHz	
	modulation depth	0 % to 100 %
	modulation frequency range	0 Hz to 1 MHz
FM	f > 10 MHz	
	modulation depth	0 Hz to 10 MHz
	modulation frequency range	0 Hz to 10 kHz
<b>RF output</b>		
Connector		N female, 50 Ω
VSWR		1.3 (nom.)
<b>TG I/AM IN</b>		
Connector		BNC female, 50 Ω
Input voltage		1 V (pp)
<b>TG Q/FM IN</b>		
Connector		BNC female, 50 Ω
Input voltage		1 V (pp)

## R&S®FSV-B10 external generator control

Interface		
IEC/IEEE bus control		24-pin Amphenol female
Aux control		9-pin D-Sub female
Supported signal generators		
		R&S®SGS100A, R&S®SGT100A, R&S®SMA100A, R&S®SMA100B, R&S®SMB100A, R&S®SMB100B, R&S®SMBV100A, R&S®SMBV100B, R&S®SMC100A, R&S®SME, R&S®SMF100A, R&S®SMG, R&S®SMGL, R&S®SMGU, R&S®SMH, R&S®SMHU, R&S®SMIQ, R&S®SMJ100A, R&S®SML, R&S®SMP, R&S®SMR, R&S®SMT, R&S®SMU200A, R&S®SMV03, R&S®SMW200A, R&S®SMX, R&S®SMY

## R&S®FSV-B17 digital baseband interface

I/Q data IN		
Connector		26-pin female Mini D Ribbon
Data lines	number of data lines (differential lines)	8
	bit rate (on each data line)	396 MHz to 600 MHz
	level	LVDS
Clock	clock rate	66 MHz to 100 MHz
	level	LVDS
Communications lines		bidirectional 2-wire interface
	level	3.3 V
I/Q data OUT		
Connector		26-pin female Mini D Ribbon
Data lines	number of data lines (differential lines)	8
	bit rate (on each data line)	600 MHz
	level	LVDS
Clock	clock rate	100 MHz
	level	LVDS
Communications lines		bidirectional 2-wire interface
	level	3.3 V

## R&S®FSV-B21 LO/IF ports for external mixers (for R&S®FSV30 and R&S®FSV40 only)

LO signal		
Frequency range		7.73 GHz to 15.23 GHz
Level	+20 °C to +30 °C	+15.5 dBm ± 1 dB
	+5 °C to +40 °C	+15.5 dBm ± 3 dB

IF input		
IF frequency		729.9 MHz
Full-scale level	2-port mixer (LO output/IF input, front panel)	-20 dBm
	3-port mixer (IF input, front panel)	-20 dBm
Level uncertainty	IF input level -30 dBm, RBW 30 kHz, 2-port mixer, LO output/IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
	+5 °C to +40 °C	< 3 dB
	IF input level -30 dBm, RBW 30 kHz, 3-port mixer, IF input (front panel)	
	+20 °C to +30 °C	< 1 dB
+5 °C to +40 °C	< 3 dB	

Inputs and outputs		
LO output/IF input		SMA female, 50 Ω
IF input		SMA female, 50 Ω

## R&S®FSV-B30 DC power supply for 12 V/24 V supply voltage

Input voltage range		10 V to 28 V
Output voltage		120 V to 360 V DC
Input current	$V_{in} = 12$ V, instrument without options, preset settings	
	R&S®FSV4, R&S®FSV7	10 A (typ.)
	R&S®FSV13, R&S®FSV30, R&S®FSV40	13 A (typ.)
Temperature	operating temperature range	0 °C to +50 °C
	storage temperature range	-40 °C to +70 °C
Dimensions	W x H x D	201 mm x 125 mm x 56 mm (7.91 in x 4.92 in x 2.20 in)
Net weight		1 kg (2.2 lb)

## R&S®FSV-B32 Lithium-ion battery pack

<b>Battery pack</b>		
Output voltage		12 V (nom.)
Operating time	instrument without options, preset settings	2 h (nom.)
Charge time	with R&S®FSV-B34 charger, T = +25 °C	3.5 h (nom.)
Temperature	operating temperature range, discharge	0 °C to +50 °C
	operating temperature range, charge	0 °C to +45 °C
	storage temperature range	-20 °C to +60 °C <sup>13</sup>
Dimensions	W x H x D	406 mm x 71 mm x 241 mm (16 in x 2.76 in x 9.49 in)
Net weight		3.4 kg (7.5 lb)

## R&S®FSV-B34 charger for R&S®FSV-B32 battery pack

AC input voltage range		100 V to 240 V, ±10 % (nom.)
AC supply frequency		50 Hz to 60 Hz (nom.)
Power consumption		max. 300 W (nom.)
Dimensions	W x H x D	400 mm x 127 mm x 203 mm (15.75 in x 5 in x 8 in)
Net weight		3.1 kg (6.9 lb)

<sup>13</sup> The battery packs should be stored in an environment with low humidity, free from corrosive gas at a recommended temperature range < +21 °C. Extended exposure to temperatures above +45 °C could degrade battery performance and life.

## Ordering information

Designation	Type	Order No.
Signal and spectrum analyzer	R&S®FSV4	1321.3008.04
Signal and spectrum analyzer	R&S®FSV7	1321.3008.07
Signal and spectrum analyzer	R&S®FSV13	1321.3008.13
Signal and spectrum analyzer	R&S®FSV30	1321.3008.30
Signal and spectrum analyzer <sup>14</sup>	R&S®FSV40	1321.3008.39
Signal and spectrum analyzer	R&S®FSV40	1321.3008.40
<b>Accessories supplied</b>		
Power cable and quick start guide		
R&S®FSV30: test port adapter with 3.5 mm female (1021.0512.00) and N female (1021.0535.00) connectors		
R&S®FSV40: test port adapter with 2.92 mm (K) female (1036.4790.00) and N female (1036.4777.00) connectors		

## Options

Designation	Type	Order No.	Retrofittable	Remarks
Ruggedized housing	R&S®FSV-B1	1310.9500.02	no	
Audio demodulator	R&S®FSV-B3	1310.9516.02	yes	retrofit in service center
OCXO reference frequency	R&S®FSV-B4	1310.9522.02	yes	user-retrofittable
OCXO extended frequency stability	R&S®FSV-B4	1310.9522.03	yes	user-retrofittable
Additional interfaces	R&S®FSV-B5	1310.9539.02	yes	IF out, video out, AUX port, trigger out, 2 x USB
Tracking generator, 100 kHz to 7 GHz	R&S®FSV-B9	1310.9545.02	yes	retrofit in service center
External generator control	R&S®FSV-B10	1310.9551.02	yes	retrofit in service center, excludes R&S®FSV-B160
Ultra-high precision frequency reference	R&S®FSV-B14	1310.9980.02	yes	retrofit in service center, excludes R&S®FSV-B160
Digital baseband interface	R&S®FSV-B17	1310.9568.02	yes	user-retrofittable, for details ask service center, not available for R&S®FSV40, model .39
Solid-state drive (removable hard drive) <sup>15</sup>	R&S®FSV-B18	1310.9697.10	yes	user-retrofittable
Spare hard drive (removable hard drive) <sup>15</sup>	R&S®FSV-B19	1310.9574.10	yes	user-retrofittable
LO/IF ports for external mixers	R&S®FSV-B21	1310.9597.02	no	
RF preamplifier, 9 kHz to 7 GHz	R&S®FSV-B22	1310.9600.02	yes	user-retrofittable
RF preamplifier, 9 kHz to 13.6 GHz	R&S®FSV-B24	1310.9616.13	no	
RF preamplifier, 9 kHz to 30 GHz	R&S®FSV-B24	1310.9616.30	no	
RF preamplifier, 9 kHz to 40 GHz	R&S®FSV-B24	1310.9616.40	no	
Electronic attenuator, 1 dB steps	R&S®FSV-B25	1310.9622.02	yes	user-retrofittable
DC power supply for 12 V/24 V supply voltage	R&S®FSV-B30	1329.0243.02	yes	user-retrofittable
Lithium-ion battery pack	R&S®FSV-B32	1321.3750.04	yes	user-retrofittable, requires R&S®FSV-B1, R&S®FSV-B30 and R&S®FSV-B34
USB mass memory write protection	R&S®FSV-B33	1309.5991.02	no	pre-installation ex factory
Lithium-ion battery charger	R&S®FSV-B34	1321.3950.02	yes	user-retrofittable
40 MHz analysis bandwidth	R&S®FSV-B70	1310.9645.02	yes	user-retrofittable, for frequencies ≤ 7 GHz, not available for R&S®FSV40, model .39
160 MHz analysis bandwidth	R&S®FSV-B160	1311.2015.02	yes	for R&S®FSV4 and R&S®FSV7, excludes R&S®FSV-B10 and R&S®FSV-B14
160 MHz analysis bandwidth	R&S®FSV-B160	1311.2015.13	yes	for R&S®FSV13 for frequencies ≤ 7 GHz, excludes R&S®FSV-B10 and R&S®FSV-B14
160 MHz analysis bandwidth	R&S®FSV-B160	1311.2015.40	yes	for R&S®FSV30 and R&S®FSV40 for frequencies ≤ 7 GHz, excludes R&S®FSV-B10 and R&S®FSV-B14. not available for R&S®FSV40, model .39

<sup>14</sup> Max. bandwidth 10 MHz.

<sup>15</sup> For instruments delivered with Windows 10 ex factory or instruments with upgrade R&S®FSV-U4 only. For other models and spare parts contact your local Rohde & Schwarz service center.

Designation	Type	Order No.	Retrofittable	Remarks
<b>Firmware/software</b>				
Analog modulation analysis for AM, FM, $\phi$ M	R&S®FSV-K7	1310.8103.02		
FM stereo measurements	R&S®FSV-K7S	1310.8126.02		requires R&S®FSV-K7
Bluetooth®/EDR measurements	R&S®FSV-K8	1310.8155.02		
Power sensor measurement with R&S®NRP power sensors	R&S®FSV-K9	1310.8203.02		supports R&S®NRP-Zxx power sensors
Analysis of GSM, EDGE and EDGE evolution signals	R&S®FSV-K10	1310.8055.02		
Spectrogram measurements	R&S®FSV-K14	1310.8255.02		
Noise figure and gain measurements	R&S®FSV-K30	1310.8355.02		
Phase noise measurement application	R&S®FSV-K40	1310.8403.02		
EMI measurement application	R&S®FSV-K54	1310.0425.02		
CISPR calibration for R&S®FSV-K54 (ISO 17025)	R&S®FSV-K54CAL	1329.0237.02		requires R&S®FSV-K54
Vector signal analysis	R&S®FSV-K70	1310.8455.02		
Analysis of 3GPP FDD base station signals incl. HSPA+	R&S®FSV-K72	1310.8503.02		
3GPP FDD UE analysis incl. HSPA+	R&S®FSV-K73	1310.8555.02		
3GPP TD-SCDMA BTS measurements	R&S®FSV-K76	1310.8603.02		
TD-SCDMA UE measurements	R&S®FSV-K77	1310.8655.02		
Analysis of CDMA2000® base station signals	R&S®FSV-K82	1310.8703.02		
CDMA2000® MS measurements	R&S®FSV-K83	1310.8755.02		
Analysis of 1xEV-DO base station signals	R&S®FSV-K84	1310.8803.02		
1xEV-DO MS measurements	R&S®FSV-K85	1310.8778.02		
Analysis of WLAN 802.11a, b, g, j signals	R&S®FSV-K91	1310.8903.02		not available for R&S®FSV40, model .39
WLAN 802.11ac measurement application	R&S®FSV-K91AC	1310.8926.02		requires R&S®FSV-B160, not available for R&S®FSV40, model .39
Extension of R&S®FSV-K91 to 802.11n	R&S®FSV-K91n	1310.9468.02		requires R&S®FSV-B70, not available for R&S®FSV40, model .39
Analysis of WiMAX™ 802.16 SISO signals	R&S®FSV-K93	1310.8955.02		not available for R&S®FSV40, model .39
Analysis of EUTRA/LTE FDD downlink signals	R&S®FSV-K100	1310.9051.02		not available for R&S®FSV40, model .39
Analysis of EUTRA/LTE FDD uplink signals	R&S®FSV-K101	1310.9100.02		not available for R&S®FSV40, model .39
EUTRA/LTE downlink MIMO measurements	R&S®FSV-K102	1310.9151.02		requires R&S®FSV-K100 or R&S®FSV-K104, not available for R&S®FSV40, model .39
Analysis of EUTRA/LTE TDD downlink signals	R&S®FSV-K104	1309.9774.02		not available for R&S®FSV40, model .39
Analysis of EUTRA/LTE TDD uplink signals	R&S®FSV-K105	1309.9780.02		not available for R&S®FSV40, model .39
5G NR downlink analysis	R&S®FSV-K144	1329.0537.02		not available for R&S®FSV40, model .39

## Upgrades <sup>16</sup>

Designation	Type	Order No.	Retrofittable	Remarks
Windows 10 upgrade for R&S®FSV with FMR11 CPU board	R&S®FSV-U4	1329.0437.10	yes	retrofit in service center, for details contact your local Rohde & Schwarz service center

<sup>16</sup> The upgrade kit R&S®FSV-U4 is suitable for instruments starting from the following serial numbers:

R&S®FSV4: 103000, R&S®FSV7: 103000, R&S®FSV13: 103000, R&S®FSV30: 103396, R&S®FSV40: 101472, R&S®FSV40, model.39: 101119.  
For instruments with lower serial numbers and R&S FSV 1307.9002.xx, contact your local Rohde & Schwarz service center.

## Recommended extras

Designation	Type	Order No.
Headphones		0708.9010.00
IEC/IEEE bus cable, length: 1 m	R&S®PCK	0292.2013.10
IEC/IEEE bus cable, length: 2 m	R&S®PCK	0292.2013.20
19" rack adapter (not for R&S®FSV-B1)	R&S®ZZA-478	1096.3248.00
19" rack adapter, pre-installed ex factory (not for R&S®FSV-B1)	R&S®FSV-B478	1310.9951.02
Soft carrying case (gray)	R&S®ZZT-473	1109.5048.00
<b>Matching pads, 50/75 Ω</b>		
L section, matching at both ends	R&S®RAM	0358.5414.02
Series resistor, 25 Ω, matching at one end (taken into account in instrument function RF INPUT 75 Ω)	R&S®RAZ	0358.5714.02
<b>SWR bridges, 50 Ω</b>		
SWR bridge, 5 MHz to 3 GHz	R&S®ZRB2	0373.9017.5x
SWR bridge, 40 kHz to 4 GHz	R&S®ZRC	1039.9492.5x
<b>High-power attenuators</b>		
Attenuator 100 W, 3/6/10/20/30 dB, 1 GHz	R&S®RBU100	1073.8495.xx (xx = 03/06/10/20/30)
Attenuator 50 W, 3/6/10/20/30 dB, 2 GHz	R&S®RBU50	1073.8695.xx (xx = 03/06/10/20/30)
Attenuator 50 W, 20 dB, 6 GHz	R&S®RDL50	1035.1700.52
<b>Connectors and cables</b>		
N-type adapter for R&S®RT-Zxx probes	R&S®RT-ZA9	1417.0909.02
Probe power connector, 3-pin		1065.9480.00
LVDS cable for connecting digital baseband interfaces	R&S®SMU-Z6	1415.0201.02
<b>DC blocks</b>		
DC block, 10 kHz to 18 GHz (type N)	R&S®FSE-Z4	1084.7443.02
<b>External harmonic mixers (for R&amp;S®FSV30/FSV40 with R&amp;S®FSV-B21 option)</b>		
Harmonic mixer by RPG <sup>17</sup>		
Harmonic mixer, 40 GHz to 60 GHz	RPG FS-Z60	1048.0171.02
Harmonic mixer, 50 GHz to 75 GHz	RPG FS-Z75	3638.2240.02
Harmonic mixer, 60 GHz to 90 GHz	RPG FS-Z90	3638.2270.02
Harmonic mixer, 75 GHz to 110 GHz	RPG FS-Z110	3638.2292.02
<b>For R&amp;S®FSV30 only</b>		
Test port adapter, N male		1021.0541.00
Test port adapter, 3.5 mm male		1021.0529.00
Microwave measurement cable with test port adapter set (N male and 3.5 mm male)	R&S®FSE-Z15	1046.2002.02
<b>For R&amp;S®FSV40 only</b>		
Test port adapter, N male		1036.4783.00
Test port adapter, K male		1036.4802.00
Test port adapter, 2.4 mm female	R&S®FSE-Z5	1088.1627.02

<sup>17</sup> RPG is the abbreviation of Radiometer Physics GmbH, a Rohde & Schwarz company.



## Power sensors supported by the R&S®FSV-K9 option <sup>18</sup>

Designation	Type	Order No.
<b>Universal power sensors</b>		
10 MHz to 8 GHz, 100 mW, 2-path	R&S®NRP-Z211	1417.0409.02
10 MHz to 8 GHz, 200 mW <sup>19</sup>	R&S®NRP-Z11	1138.3004.02
10 MHz to 18 GHz, 100 mW, 2-path	R&S®NRP-Z221	1417.0309.02
10 MHz to 18 GHz, 200 mW <sup>19</sup>	R&S®NRP-Z21	1137.6000.02
10 MHz to 18 GHz, 2 W <sup>19</sup>	R&S®NRP-Z22	1137.7506.02
10 MHz to 18 GHz, 15 W <sup>19</sup>	R&S®NRP-Z23	1137.8002.02
10 MHz to 18 GHz, 30 W <sup>19</sup>	R&S®NRP-Z24	1137.8502.02
<b>Power sensor modules with power splitter</b>		
DC to 18 GHz, 500 mW	R&S®NRP-Z27	1169.4102.02
DC to 26.5 GHz, 500 mW	R&S®NRP-Z37	1169.3206.02
<b>Thermal power sensors</b>		
0 Hz to 18 GHz, 100 mW	R&S®NRP18T	1424.6115.02
0 Hz to 18 GHz, 100 mW	R&S®NRP18TN	1424.6121.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33T	1424.6138.02
0 Hz to 33 GHz, 100 mW	R&S®NRP33TN	1424.6144.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40T	1424.6150.02
0 Hz to 40 GHz, 100 mW	R&S®NRP40TN	1424.6167.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50T	1424.6173.02
0 Hz to 50 GHz, 100 mW	R&S®NRP50TN	1424.6180.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67T	1424.6196.02
0 Hz to 67 GHz, 100 mW	R&S®NRP67TN	1424.6209.02
0 Hz to 110 GHz, 100 mW	R&S®NRP110T	1424.6215.02
<b>Average power sensors</b>		
8 kHz to 6 GHz, 200 mW	R&S®NRP6A	1424.6796.02
8 kHz to 6 GHz, 200 mW	R&S®NRP6AN	1424.6809.02
9 kHz to 6 GHz, 200 mW <sup>19</sup>	R&S®NRP-Z91	1168.8004.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18A	1424.6815.02
8 kHz to 18 GHz, 200 mW	R&S®NRP18AN	1424.6821.02
<b>Three path diode power sensors</b>		
100 pW to 200 mW, 10 MHz to 8 GHz	R&S®NRP8S	1419.0006.02
100 pW to 200 mW, 10 MHz to 8 GHz, LAN version	R&S®NRP8SN	1419.0012.02
100 pW to 200 mW, 10 MHz to 18 GHz	R&S®NRP18S	1419.0029.02
100 pW to 200 mW, 10 MHz to 18 GHz, LAN version	R&S®NRP18SN	1419.0035.02
1 nW to 2 W, 10 MHz to 18 GHz	R&S®NRP18S-10	1424.6721.02
10 nW to 15 W, 10 MHz to 18 GHz	R&S®NRP18S-20	1424.6738.02
30 nW to 30 W, 10 MHz to 18 GHz	R&S®NRP18S-25	1424.6744.02
100 pW to 200 mW, 10 MHz to 33 GHz	R&S®NRP33S	1419.0064.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version	R&S®NRP33SN	1419.0070.02
100 pW to 200 mW, 10 MHz to 33 GHz, LAN version, TVAC-compliant	R&S®NRP33SN-V	1419.0129.02
100 pW to 100 mW, 50 MHz to 40 GHz	R&S®NRP40S	1419.0041.02
100 pW to 100 mW, 50 MHz to 40 GHz, LAN version	R&S®NRP40SN	1419.0058.02
100 pW to 100 mW, 50 MHz to 50 GHz	R&S®NRP50S	1419.0087.02
100 pW to 100 mW, 50 MHz to 50 GHz, LAN version	R&S®NRP50SN	1419.0093.02
<b>Wideband power sensors</b>		
50 MHz to 18 GHz, 100 mW	R&S®NRP-Z81	1137.9009.02
50 MHz to 40 GHz, 100 mW (2.92 mm)	R&S®NRP-Z85	1411.7501.02
50 MHz to 40 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.40
50 MHz to 44 GHz, 100 mW (2.40 mm)	R&S®NRP-Z86	1417.0109.44

<sup>18</sup> For average power measurement only.

<sup>19</sup> Product discontinued.

Service options		
Extended warranty, one year	R&S®WE1	Please 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	

#### Extended warranty with a term of one to two years (WE1 to WE2)

Repairs carried out during the contract term are free of charge <sup>20</sup>. Necessary calibration and adjustments carried out during repairs are also covered. Simply contact the forwarding agent we name; your product will be picked up free of charge and returned to you in top condition a couple of days later.

#### Extended warranty with calibration (CW1 to CW2)

Enhance your extended warranty by adding calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated, inspected and maintained during the term of the contract. It includes all repairs <sup>20</sup> and calibration at the recommended intervals as well as any calibration carried out during repairs or option upgrades.

#### Extended warranty with accredited calibration (AW1 and AW2)

Enhance your extended warranty by adding accredited calibration coverage at a package price. This package ensures that your Rohde & Schwarz product is regularly calibrated under accreditation, inspected and maintained during the term of the contract. It includes all repairs <sup>20</sup> and accredited calibration at the recommended intervals as well as any accredited calibration carried out during repairs or option upgrades.

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<sup>20</sup> Excluding defects caused by incorrect operation or handling and force majeure. Wear-and-tear parts are not included.