Specifications

Specifications apply under the following conditions: 15 minutes warm-up time at ambient temperature, specified environmental conditions met and calibration cycle adhered to. Data without tolerances: typical values. Data designated as "nominal": design parameters, i. e. not tested.

		R&S®FSH3	R&S®FSH6
Frequency			
Frequency range		100 kHz to 3 GHz	100 kHz to 6 GHz
Reference frequency			
Aging		1 ppm/year	
Temperature drift	0 °C to 30 °C 30 °C to 50 °C	2 ppm in addition 2 ppm/10 °C	
Frequency counter			
Resolution		1 Hz	
Counter accuracy	S/N > 25 dB	± (frequency × reference frequency errror)	
Frequency span	1145.5850.13	0 Hz, 10 kHz to 3 GHz	–
	1145.5850.03/.23, 1145.5850.06/.26	0 Hz, 100 Hz to 3 GHz	0 Hz, 100 Hz to 6 GHz
Spectral purity			
SSB phase noise	f = 500 MHz, 20 °C to 30 °C		
30 kHz from carrier		<85 dBc (1 Hz)	
100 kHz from carrier		<100 dBc (1 Hz)	
1 MHz from carrier		<120 dBc (1 Hz)	
Sweep time	span = 0 Hz	1 ms to 100 s	
	span > 0 Hz	20 ms to 1000 s, min. 20 ms/600 MHz	
Bandwidths			
Resolution bandwidths (–3 dB)	1145.5850.13	1, 3, 10, 30, 100, 200, 300 kHz, 1 MHz	
	1145.5850.03/.23, 1145.5850.06/.26	in addition 100 Hz, 300 Hz	
Tolerance	≤300 kHz	±5 %, nominal	
	1 MHz	±10 %, nominal	
Resolution bandwidths (–6 dB)	with option R&S®FSH-K3 installed	in addition 200 Hz, 9 kHz, 120 kHz, 1 MHz	
Video bandwidths		10 Hz to 1 MHz in 1, 3 steps	

		R&S®FSH3	R&S®FSH6
Amplitude			
Display range		average noise level displayed to +20 dBm	
Maximum permissible DC voltage at RF input		50 V/80 V [1]	
Maximum power		20 dBm, 30 dBm (1 W) for max. 3 minutes	
Intermodulation-free dynamic range	third-order IM products, 2 × –20 dBm, reference level = –10 dBm	typ. 66 dB (typ. +13 dBm third-order intercept, IP3)	
Displayed average noise level	resolution bandwidth 1 kHz, video bandwidth 10 Hz, reference level ≤–30 dBm		
10 MHz to 3 GHz		<–105 dBm, typ. –114 dBm	<–105 dBm, typ. –112 dBm
3 GHz to 5 GHz		–	<–103 dBm, typ. –108 dBm
5 GHz to 6 GHz		–	<–96 dBm, typ. –102 dBm
With preamplifier	only models 1145.5850.03[2], 1145.5850.23, 1145.5850.06 and 1145.5850.26		
10 MHz to 2.5 GHz		<–120 dBm, typ. –125 dBm	<–120 dBm, typ. –125 dBm
2.5 GHz to 3 GHz		<–115 dBm, typ. –120 dBm	<–115 dBm, typ. –120 dBm
3 GHz to 5 GHz		–	<–115 dBm, typ. –120 dBm
5 GHz to 6 GHz		–	<–105 dBm, typ. –110 dBm
Inherent spurious	reference level ≤–20 dBm, f > 30 MHz, RBW ≤ 100 kHz	<–80 dBm	<–80 dBm
Input related spurious	mixer level –40 dBm, carrier offset >1 MHz		
Up to 3 GHz		<–70 dBc (nominal)	<–70 dBc (nominal)
3 GHz to 6 GHz		–	<–64 dBc (nominal)
Signal frequency minus –2.0156 GHz for signal frequencies 2 GHz to 3.2 GHz		typ. <–55 dBc	typ. <–55 dBc
2nd harmonic	mixer level –40 dBm	typ. <–60 dBc	typ. <–60 dBc
Level display			
Reference level		–80 dBm to +20 dBm in steps of 1 dB	
Display range		100 dB, 50 dB, 20 dB, 10 dB, linear	
Display units			
Logarithmic		dBm, dBµV, dBmV with transducer also dBµV/m and dBµA/m	
Linear		µV, mV, V, nW, µW, mW, W with transducer also V/m, mV/m and µV/m	
Traces		1 trace and 1 memory trace	
Detectors		auto peak, maximum peak, minimum peak, sample, RMS	
	with option R&S®FSH-K3 installed	in addition average and quasi-peak	
Level measurement error	frequency >1 MHz, at reference level down to –50 dB, 20 °C to 30 °C	<1.5 dB, typ. 0.5 dB	

[1] *80 V valid as of serial number 100900 (model 1145.5850.03) or 101600 (model 1145.5850.13); models 1145.5850.23, 1145.5850.06 and 1145.5850.26 all serial numbers.*

[2] *As of serial number 101362.*

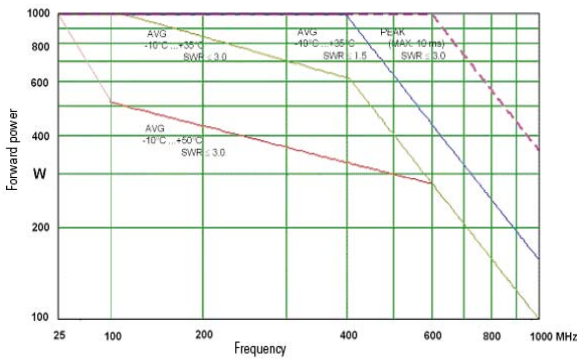
		R&S®FSH3	R&S®FSH6
Markers			
Number of markers or delta markers		max. 6	
Marker functions		peak, next peak, minimum, center = marker frequency, reference level = marker level, all markers to peak	
Marker displays		normal (level), noise marker, frequency counter (count)	
Trigger		free-running, video, external	
Audio demodulation		AM (video voltage without AGC) and FM	
Inputs			
RF input		N female	
Input impedance		50 Ω	
VSWR	10 MHz to 3 GHz 10 MHz to 6 GHz	typ. 1.5 –	– typ. 1.5
Trigger/external reference input		BNC female, selectable	
Trigger voltage		TTL	
Reference frequency		10 MHz	
Required level	from 50 Ω	10 dBm	
Outputs			
AF output		3.5 mm mini jack	
Output impedance Open-circuit voltage		100 Ω adjustable up to 1.5 V	
Tracking generator	only models 145.5850.13, 1145.5850.23 and 1145.5850.26		
Frequency range		5 MHz to 3 GHz	5 MHz to 6 GHz
Output level	model 1145.5850.13 model 1145.5850.23 model 1145.5850.26 f < 3 GHz f > 3 GHz	–20 dBm (nominal) 0 dBm/–20 dBm, selectable	 –10 dBm (nominal) –20 dBm (nominal)
Step attenuator	only model 1145.5850.26[3)]	20 dB step attenuator is adjustable in 1 dB steps	
Output impedance		50 Ω, nominal	
Interfaces			
RS-232-C optical interface			
Baud rate		1200, 2400, 9600, 19200, 38400, 57600, 115200 baud	
Power sensor		7-contact female connector (type Binder 712)	

3) *Starting serial no. 100500.*

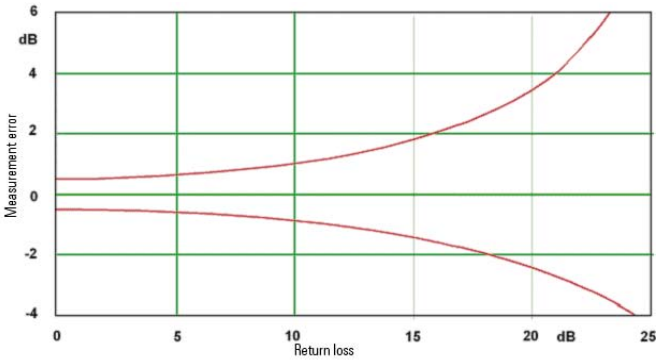
Accessories

		R&S®FSH3	R&S®FSH6
Power Sensors R&S®FSH-Z1 and R&S®FSH-Z18			
Frequency range			
R&S®FSH-Z1		10 MHz to 8 GHz	
R&S®FSH-Z18		10 MHz to 18 GHz	
VSWR 10 MHz to 30 MHz 30 MHz to 2.4 GHz 2.4 GHz to 8 GHz 8 GHz to 18 GHz		 <1.15 <1.13 <1.20 <1.25	
Maximum input power	average power peak power (<10 µs, 1 % duty cycle)	400 mW (+26 dBm) 1 W (+30 dBm)	
Measurement range		200 pW to 200 mW (–67 dBm to +23 dBm)	
Signal weighting		average power	
Effect of harmonics Effect of modulation		<0.5 % (0.02 dB) at harmonic ratio of 20 dBc <1.5 % (0.07 dB) for continuous digital modulation	
Absolute measurement uncertainty	sine signals, no zero offset		
10 MHz to 8 GHz 8 GHz to 18 GHz	15 °C to 35 °C 0 °C to 50 °C 15 °C to 35 °C 0 °C to 50 °C	<2.5 % (0.11 dB) <4.5 % (0.19 dB) <3.5 % (0.15 dB) <5.2 % (0.22 dB)	
Zero offset after zeroing		<150 pW	
Dimensions (W × H × D)		48 mm × 31 mm × 170 mm, connecting cable 1.5 m	
Weight		<0.3 kg	
Directional Power Sensor R&S®FSH-Z14			
Frequency range		25 MHz to 1 GHz	
Power measurement range		30 mW to 300 W	
VSWR referenced to 50 Ω		<1.06	
Power-handling capacity	depending on temperature and matching (see diagram below)	100 W to 1000 W	
Insertion loss		<0.06 dB	
Directivity		>30 dB	
Average power			
Power measurement range CW, FM, PM, FSK, GMSK Modulated signals	 CF: ratio of peak envelope power to average power	 30 mW to 300 W 30 mW to 300 W/CF	
Measurement uncertainty 25 MHz to 40 MHz 40 MHz to 1 GHz	sine signal, 18 °C to 28 °C, no zero offset	 4.0 % (0.17 dB) of measured value 3.2 % (0.14 dB) of measured value	
Zero offset	after zeroing	± 4 mW	
Range of typical measurement error with modulation FM, PM, FSK, GMSK AM (80 %) 2 equal-power CW carriers EDGE, TETRA	if standard is selected on the R&S®FSH	 0 % of measured value (0 dB) ±3 % of measured value (±0.13 dB) ±2 % of measured value (±0.09 dB) ±0.5 % of measured value (±0.02 dB)	

		R&S®FSH3	R&S®FSH6
Temperature coefficient 25 MHz to 40 MHz 40 MHz to 1 GHz		 0.40 %/K (0.017 dB/K) 0.25 %/K (0.011 dB/K)	
Peak envelope power			
Power measurement range for video bandwidth 4 kHz 200 kHz 600 kHz		 0.4 W to 300 W 1 W to 300 W 2 W to 300 W	
Measurement uncertainty	18 °C to 28 °C	same as for average power plus effect of peak hold circuit	
Accuracy of peak hold circuit for burst signals Duty cycle ≤ 0.1 and repetition rate ≤ 100/s 20/s ≤ repetition rate < 100/s 0.001 ≤ duty cycle < 0.1	video bandwidth 4 kHz 200 kHz 600 kHz	 ±(3 % of measured value + 0.05 W) at burst width > 200 µs ±(3 % of measured value + 0.20 W) at burst width > 4 µs ±(7 % of measured value + 0.40 W) at burst width > 2 µs ±(1.6 % of measured value + 0.15 W) ±0.10 W	
Temperature coefficient 25 MHz to 40 MHz 40 MHz to 1 GHz		 0.50 %/K (0.022 dB/K) 0.35 %/K (0.015 dB/K)	
Load matching			
Matching measurement range Return loss VSWR		 0 dB to 23 dB >1.15	
Minimum forward power	specs met at ≥ 0.4 W	0.06 W	



Power-handling capacity

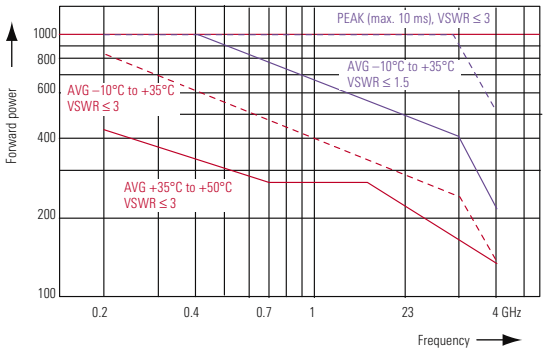


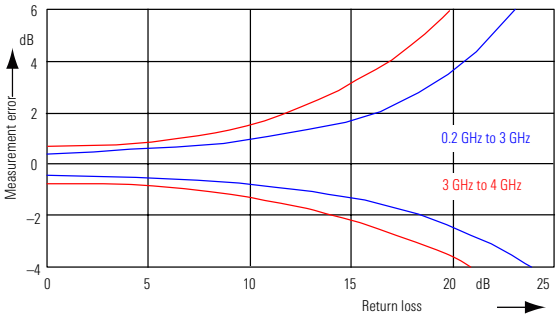
Limits of measurement uncertainty for matching measurements

Dimensions (W × H × D)		120 mm × 95 mm × 39 mm, connecting cable 1.5 m
Weight		0.65 kg

		R&S®FSH3	R&S®FSH6
Directional Power Sensor R&S®FSH-Z44			
Frequency range		200 MHz to 4 GHz	
Power measurement range		30 mW to 120 W (300 W with unmodulated envelope)	
VSWR referenced to 50 Ω 200 MHz to 3 GHz 3 GHz to 4 GHz		 <1.07 <1.12	
Power-handling capacity	depending on temperature and matching (see diagram below)	120 W to 1000 W	
Insertion loss 200 MHz to 1.5 GHz 1.5 GHz to 4 GHz		 <0.06 dB <0.09 dB	
Directivity 200 MHz to 3 GHz 3 GHz to 4 GHz		 >30 dB >26 dB	
Signal weighting		average power	
Measurement uncertainty 200 MHz to 300 MHz 300 MHz to 4 GHz	sine signals, 18 °C to 28 °C, no zero offset	 4 % of measured value (0.17 dB) 3.2 % of measured value (0.14 dB)	
Zero offset	after zeroing	± 4 mW	
Range of typical measurement error with modulation FM, PM, FSK, GMSK AM (80 %) cdmaOne, DAB 3GPP WCDMA, CDMA2000® DVB-T π/4-DQPSK	if standard is selected on R&S®FSH	 0 % of measured value (0 dB) ±3 % of measured value (±0.13 dB) ±1 % of measured value (±0.04 dB) ±2 % of measured value (±0.09 dB) ±2 % of measured value (±0.09 dB) ±2 % of measured value (±0.09 dB	
Temperature coefficient 200 MHz to 300 MHz 300 MHz to 4 GHz		 0.40 %/K (0.017 dB/K) 0.25 %/K (0.011 dB/K)	
Peak envelope power			
Power measurement range DAB, DVB-T, cdmaOne, CDMA2000®, 3GPP WCDMA Video bandwidth 4 kHz 200 kHz 4 MHz		 4 W to 300 W 0.4 W to 300 W 1 W to 300 W 2 W to 300 W	
Measurement uncertainty	18 °C to 28 °C	same as for average power plus effect of peak hold circuit	
Accuracy of peak hold circuit for burst signals Duty cycle ≥ 0.1 and repetition rate ≥ 100/s 20/s ≤ repetition rate < 100/s 0.001 ≤ duty cycle < 0.1 Burst width ≥ 0.5 µs Burst width ≥ 0.2 µs	video bandwidth 4 kHz 200 kHz 4 MHz	 ±(3 % of measured value + 0.05 W) at burst width ≥100 µs ±(3 % of measured value + 0.20 W) at burst width ≥4 µs ±(7 % of measured value + 0.40 W) at burst width ≥1 µs ±(1.6 % of measured value + 0.15 W) ±0.10 W ±5 % of measured value ±10 % of measured value	
Range of typical measurement error of peak hold circuit for cdmaOne, DAB DVB-T, CDMA2000®, 3GPP WCDMA	video bandwidth 4 MHz and standard selected on the R&S®FSH	±(5 % of measured value + 0.4 W) ±(15 % of measured value + 0.4 W)	
Temperature coefficient 200 MHz to 300 MHz 300 MHz to 4 GHz		 0.50 %/K (0.022 dB/K) 0.35 %/K (0.015 dB/K)	
Load matching			

Return loss		
200 MHz to 3 GHz		0 dB to 23 dB
3 GHz to 4 GHz		0 dB to 20 dB
VSWR		
200 MHz to 3 GHz		>1.15
3 GHz to 4 GHz		>1.22
Minimum forward power	specs met from 0.2 W	0.03 W

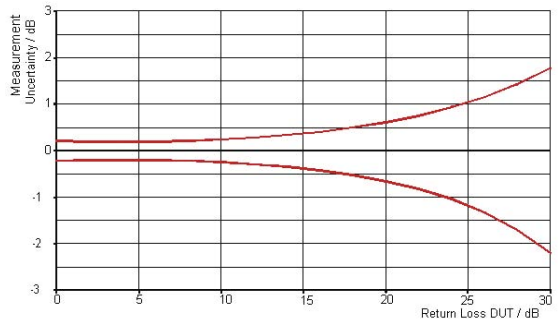




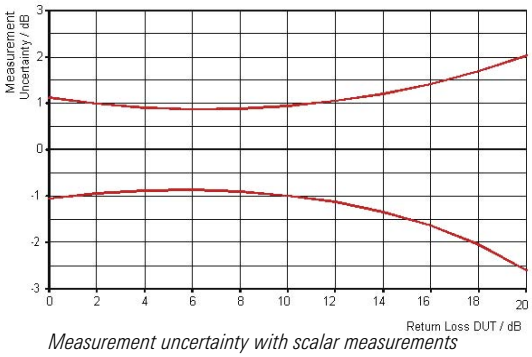
Dimensions (W × H × D)		120 mm × 95 mm × 39 mm, connecting cable 1.5 m
Weight		0.65 kg

		R&S®FSH3	R&S®FSH6
VSWR Bridge and Power Divider R&S®FSH-Z2			
Frequency range		10 MHz to 3 GHz	
Impedance		50 Ω	
VSWR bridge			
Directivity 10 MHz to 1 GHz 1 GHz to 3 GHz		 typ. 30 dB typ. 25 dB	
Directivity, corrected 10 MHz to 3 GHz	option R&S®FSH-K2	 typ. 43 dB	
Return loss at test port		typ. 20 dB	
Return loss, corrected	option R&S®FSH-K2	typ. 35 dB	
Insertion loss		typ. 9 dB	
Power divider			
Return loss at test port		typ. 20 dB	
Connectors			
Generator input/RF output		N male	
Test port		N female	
Control interface		7-contact connector (type Binder)	
Calibration standards			
Short/open		N male	
50 Ω load		N male	
Impedance		50 Ω	
Return loss	up to 3 GHz	>43 dB	
Power-handling capacity		1 W	
General data			
Power consumption		500 mW (nominal)	
Dimensions (W × H × D)		169 mm × 116 mm × 30 mm	
Weight		485 g	
Distance-to-Fault Measurement R&S®FSH-B1 (only model 1145.5850.13, 1145.5850.23 or 1145.5850.26)			
Display		301 pixels	
Maximum resolution, distance to fault	maximum zoom	cable length/1023 pixels	
Display range Return loss VSWR	 with option R&S®FSH-K2	 10, 5, 2, 1 dB/div, linear 1 to 2 and 1 to 6 in addition 1 to 1.2 and 1 to 1.5	
Cable length	depending on cable loss	3 m to max. 1000 m	
Maximum permissible spurious signal		1st mixer 1 dB compression point typ. +10 dBm IF overload at reference level typ. +8 dB	

		R&S®FSH3	R&S®FSH6
Transmission measurements (only with R&S®FSH3 models 1145.5850.13, 1145.5850.23 and R&S®FSH6 model 1145.5850.26)			
Frequency range		5 MHz to 3 GHz	5 MHz to 6 GHz
Dynamic range			
10 MHz to 2.2 GHz	scalar mode	typ. 60 dB	typ. 80 dB
	vector mode, option R&S®FSH-K2	typ. 80 dB	typ. 90 dB
2.2 GHz to 3 GHz	scalar mode	typ. 50 dB	typ. 70 dB
	vector mode, option R&S FSH-K2	typ. 65 dB	typ. 85 dB
3 GHz to 5 GHz	scalar mode	–	typ. 40 dB
	vector mode, option R&S®FSH-K2	–	typ. 55 dB
5 GHz to 6 GHz	scalar mode	–	typ. 35 dB
	vector mode, option R&S®FSH-K2	–	typ. 50 dB
Reflection measurements (only with R&S®FSH3 model 1145.5850.13 or 1145.5850.23, R&S®FSH6 model 1145.5850.26 and R&S®FSH-Z2)			
Frequency range		10 MHz to 3 GHz	10 MHz to 3 GHz
Display range of return loss		10, 20, 50, 100 dB, selectable	
VSWR display range		1 to 2 and 1 to 6, selectable, with option R&S®FSH-K2 also 1 to 1.2 and 1 to 1.5	
Measurement uncertainty		see diagrams	



Measurement uncertainty with vector measurements, (option R&S®FSH-K2)



Measurement uncertainty with scalar measurements

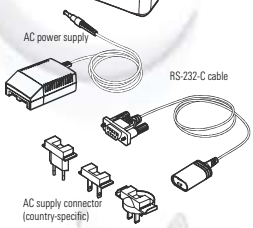
General data

Display	14 cm (5.7") LC color display
Resolution	320 × 240 pixels
Memory Settings and traces	CMOS RAM 100
Environmental conditions	
Temperature	
Operating temperature range R&S®FSH powered from internal battery R&S®FSH powered from AC power supply	 0 °C to 50 °C 0 °C to 40 °C
Storage temperature range	–20 °C to +60 °C
Battery charging mode	0 °C to 40 °C
Climatic conditions	
Relative humidity	95 % at 40 °C (EN 60068)
IP class of protection	51
Mechanical resistance	
Vibration, sinusoidal	complies with EN 60068-2-1, EN 61010-1 5 Hz to 55 Hz: max 2 g, 55 Hz to 150 Hz: 0.5 g constant, 12 minutes per axis
Vibration, random	complies with EN 60068-2-64, 10 Hz to 500 Hz, 1.9 g, 30 minutes per axis
Shock	complies with EN 60068-2-27, 40 g shock spectrum
RFI suppression	complies with EMC directive of EU (89/336/EEC) and German EMC legislation
Immunity to radiated interference Level display at 10 V/m (reference level ≤–10 dBm) Input frequency IF Other frequencies	10 V/m <–75 dBm (nominal) <–85 dBm (nominal) < displayed noise level

Power supply

AC supply	plug-in AC power supply (R&S®FSH-Z33) 100 V AC to 240 V AC, 50 Hz to 60 Hz, 400 mA
External DC voltage	15 V to 20 V
Internal battery	NiMH battery, type Fluke BP190 (R&S®FSH-Z32)
Battery voltage	6 V to 9 V
Operating time with fully-charged battery	4 h with tracking generator off, 3 h with tracking generator on
Lifetime	300 to 500 charging cycles
Power consumption	typ. 7 W
Safety	complies with EN 61010-1, UL 3111-1, CSA C22.2 No. 1010-1
Test mark	VDE, GS, CSA, CSA-NRTL
Dimensions (W × H × D)	170 mm × 120 mm × 270 mm
Weight	2.5 kg

Accessories and ordering information



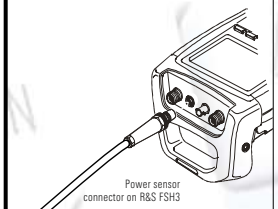
Ordering information

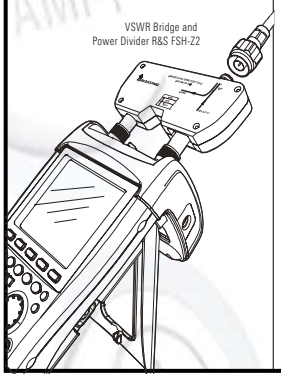
Designation	Type	Order No.
Handheld Spectrum Analyzer, 100 kHz to 3 GHz, with preamplifier	R&S®FSH3	1145.5850.03
Handheld Spectrum Analyzer, 100 kHz to 3 GHz, with tracking generator	R&S®FSH3	1145.5850.13
Handheld Spectrum Analyzer, 100 kHz to 3 GHz, with tracking generator and preamplifier	R&S®FSH3	1145.5850.23
Handheld Spectrum Analyzer, 100 kHz to 6 GHz, with preamplifier	R&S®FSH6	1145.5850.06
Handheld Spectrum Analyzer, 100 kHz to 6 GHz, with tracking generator and preamplifier	R&S®FSH6	1145.5850.26

Accessories supplied
External power supply, battery pack (built-in), RS-232-C optical cable, headphones, Quick Start manual, CD-ROM with Control Software R&S®FSH View and documentation

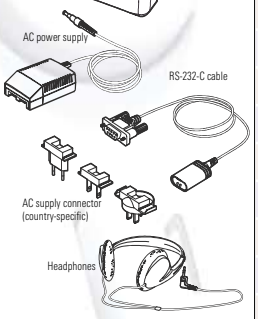
Options

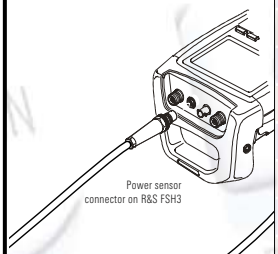
Designation	Type	Order No.
Distance-to-Fault Measurement (includes 1 m cable, R&S®FSH-Z2 required)	R&S®FSH-B1	1145.5750.02
Remote Control via RS-232-C	R&S®FSH-K1	1157.3458.02
Vector Transmission and Reflection Measurements	R&S®FSH-K2	1157.3387.02
Receiver Mode	R&S®FSH-K3	1157.3429.02

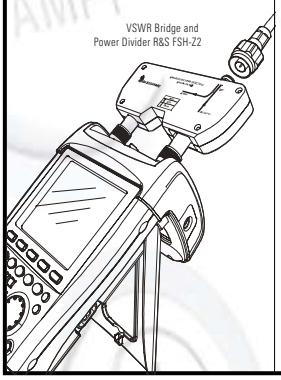




Accessories and ordering information







Optional accessories

Designation	Type	Order No.
Power Sensor, 10 MHz to 8 GHz	R&S®FSH-Z1	1155.4505.02
VSWR Bridge and Power Divider, 10 MHz to 3 GHz (open, short, 50 Ω load)	R&S®FSH-Z2	1145.5767.02
Directional Power Sensor, 25 MHz to 1 GHz	R&S®FSH-Z14	1120.6001.02
Power Sensor, 10 MHz to 18 GHz	R&S®FSH-Z18	1165.1909.02
Directional Power Sensor, 200 MHz to 4 GHz	R&S®FSH-Z44	1165.2305.02
Matching Pad 50/75 Ω, 0 Hz to 2700 MHz	R&S®RAZ	0358.5714.02
Spare RF Cable (1 m), connectors N male/N female for R&S®FSH-B1	R&S®FSH-Z20	1145.5867.02
12 V Car Adapter	R&S®FSH-Z21	1300.7579.02
Serial/Parallel Converter	R&S®FSH-Z22	1145.5880.02
Carrying Bag	R&S®FSH-Z25	1145.5896.02
Transit Case	R&S®FSH-Z26	1300.7627.02
Combined Short/Open and 50 Ω Load for VSWR and DTF calibration	R&S®FSH-Z29	1300.7504.02
Spare Short/Open Calibration Standard for R&S®FSH-Z2 for VSWR calibration	R&S®FSH-Z30	1145.5773.02
Spare 50 Ω Load Standard for R&S®FSH-Z2 for VSWR and DTF calibration	R&S®FSH-Z31	1145.5780.02
Spare Battery Pack	R&S®FSH-Z32	1145.5796.02
Spare AC Power Supply	R&S®FSH-Z33	1145.5809.02
Spare RS-232-C Optical Cable	R&S®FSH-Z34	1145.5815.02
Spare CD-ROM with Control Software R&S®FSH View and documentation	R&S®FSH-Z35	1145.5821.02
Spare Headphones	R&S®FSH-Z36	1145.5838.02
Spare USB Optical Cable	R&S®FSH-Z37	1300.7733.02
Matching Pad 50/75 Ω, 0 Hz to 1000 MHz	R&S®FSH-Z38	1300.7740.02
Active Directional Antenna	R&S®HE200	4050.3509.02
Near-Field Probe Set	R&S®HZ-15	1147.2736.02
Preamplifier for R&S®HZ-15	R&S®HZ-16	1147.2720.02