

R&S®FSW

Signal and Spectrum Analyzer

Release Notes

Firmware Version V5.20

These Release Notes are for following models of the R&S®FSW Signal and Spectrum Analyzer:

R&S® FSW8,	part number 1331.5003K08,	R&S® FSW13,	part number 1331.5003K13,
R&S® FSW26,	part number 1331.5003K26,	R&S® FSW43	part number 1331.5003K43,
R&S® FSW50,	part number 1331.5003K50,	R&S® FSW67,	part number 1331.5003K67,
R&S® FSW85,	part number 1331.5003K85		

R&S® FSW8,	part number 1312.8000K08,	R&S® FSW13,	part number 1312.8000K13,
R&S® FSW26,	part number 1312.8000K26,	R&S® FSW43	part number 1312.8000K43,
R&S® FSW50,	part number 1312.8000K50,	R&S® FSW67,	part number 1312.8000K67,
R&S® FSW85,	part number 1312.8000K85		

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The software makes use of several valuable open source software packages. For information, see the "Open Source Acknowledgment" provided with the product.

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



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1 Information on the current version and history

1.1 New functions

The following table lists the new functions and indicates the version in which the new function was introduced:

New function of firmware V5.20:

Version	Function
V5.20	R&S FSW-K8: Bluetooth® basic rate / enhanced data rate / low energy measurements.
V5.20	R&S FSW-K60P: Transient phase noise measurements.
V5.20	R&S FSW-K175: ORAN measurements in line with O-RAN.WG4.CONF.0-v05.00.
V5.20	R&S FSW-VSE: Local VSE Enabler. This option allows you to use the R&S Vector Signal Explorer software installed directly on the instrument.
V5.20	Additional 8 MHz and 51 kHz 3-dB Gauss filter available for spectrum analyzer mode. The bandwidth can only be selected by entering the numeric value directly.
V5.20	TPIS correction available for all trigger sources except "Free Run" in I/Q Analyzer.
V5.20	R&S FSW85: Additional sweep optimization mode "transient" for fast measurements of transient signals in spectrum mode.
V5.20	New "signal path" parameter in amplitude dialog for R&S FSW50/67/85 and R&S FSW-B1200/B2001/B800R.
V5.20	R&S FSW-K17/-K17S: Support of trigger source "Time". New parameter "Raw Phase" for uncompensated display of the "Phase" and "Phase Difference" results. This parameter can be found in the "Meas Settings" dialog tab. The remote command is <code>SENSe:RAWPhase:STATE</code> .
V5.20	R&S FSW-K18: New feature "Power Servoing". New measurement "Detailed MSE". New results "AM/AM" and "AM/PM curve width peak-peak". Support of automatic TPIS correction in triggered mode.
V5.20	R&S FSW-K70: LSB first bit ordering is now supported as demodulation parameter.
V5.20	R&S FSW-K91: Support of auto levelling for R&S FSW-B1200/B2001.
V5.20	R&S FSW-K91AX/-K91BE: LDPC, BCC channel decoding results BER/CWER for SU and MU PPDU. R&S FSW-K91BE signal field EHT-SIG common field is supported. R&S FSW-K91BE spectrum flatness tolerance limits and spectrum flatness result summary.

V5.20	R&S FSW-K106: Supports save & load user-defined sets. Supports NB-IoT downlink test model (N-TM). Supports bitstream result display with BER results. Added NPDSCH settings.
V5.20	R&S FSW-K149: Data payload now also available via GUI. "Data Rate" shown as "PSDU Bit Rate" and "PHR Bit Rate". New measurements: "STS Bitstream", "Pulse Location & Polarity", "Mean Packet Power", "Peak Packet Power" and "I/Q Offset".
V5.20	R&S FSW-K144/-K145/-K147/-K148/-K171: Signal demodulation and analysis in line with TS38.211 V17.3.0. Time alignment, Transmit on/off Power, ACLR, SEM measurements in line with TS38.141-1/2 V17.6.0, TS38.521-1 V17.5.0 and TS38.521-2 V16.12.0. Bandwidth part specific filtering. Multi-numerology in uplink. PN sequence can optionally be generated for only DL symbols. Evaluate maximum crest factor over multiple frames. Visualize boosted/de-boosted allocations in constellation diagram. Provide allocation-specific color-coding in constellation diagram.
V5.20	R&S FSW-K171: Support 3GPP test models 2b and 3.1b according to TS38.141-1 V17.5.0.
V5.20	R&S FSW-K161R/-B512R/-K512RE/-B800R/-K800RE: Time Domain markers can be coupled using the Coupling Manager.
V5.20	R&S FSW-K553: Supports manually adjusting the attenuation of the analyzer with active external frontend input. The firmware version V5.20 includes the external frontend microcontroller firmware V2.1.15. If the firmware versions installed on the analyzer and the external frontend are incompatible, connection to the external frontend is refused. In that case, update the external frontend firmware (Input Source Config > External Frontend > Global Config > FW update dialog).

New function of firmware V5.10:

Version	Function
V5.10	R&S FSW-K171: 5G NR R17 Extension for Uplink / Downlink. Extending NR operation to 71GHz (Deploy frequency range FR2-2; Channel bandwidth up to 2 GHz; 480 kHz and 960 kHz for BWP, SS/PBCH blocks, PRACH; enhanced PUCCH formats 0/1/2/4). 1024 QAM modulation. 35 MHz and 45 MHz channel bandwidth.
V5.10	Support for the new external frontends R&S FE44S 44 GHz Up/Down Converter, part number 1338.7001.02, R&S FE50DTR 50 GHz Up/Down Converter, part number 1347.4099.02 and for the new option R&S FSW-K553 External Frontend Control. The I/Q Analyzer application provides I/Q measurements with an analysis bandwidth up to the bandwidth of the connected external frontend. The firmware version V5.10 includes the external frontend microcontroller firmware V2.1.6. If the firmware versions installed on the analyzer and the external frontend are incompatible, connection to the external frontend is refused. In that case, update the external frontend firmware (Input Source Config > External Frontend > Global Config > FW update dialog).

	R&S FE50DTR Simultaneous Mode requires SMM/SMW Firmware Version > 5.00.044.38.
V5.10	New result window "Phase vs Time" (unit rad) in I/Q Analyzer available.
V5.10	Additional 6 MHz 3dB-Gauss filter available for spectrum analyzer mode. The bandwidth can only be selected by entering the numeric value directly.
V5.10	Additional unit "dBm/Hz (Power)" available in amplitude dialog.
V5.10	Trace colors of active traces are indicated in the trace config dialog.
V5.10	R&S FSW67: Additional sweep optimization mode "transient" for fast measurements of transient signals in spectrum mode.
V5.10	R&S FSW-B10: Supports R&S SMM100A vector signal generator.
V5.10	R&S FSW-B24U: Support of Enhanced Dynamic Range Preamp upgrade kit.
V5.10	R&S FSW-B2071: Support of R&S RTO6.
V5.10	R&S FSW-K18D: Direct DPD now also available without active generator control.
V5.10	R&S FSW-K18M: New Hammerstein model and possibility to apply memory polynomial model to any given waveform.
V5.10	R&S FSW-K30: Added SCPI command for frequency readout.
V5.10	R&S FSW-K30: Added uncertainty calculation for frequencies above 67 GHz for R&S FSW85.
V5.10	R&S FSW-K60C: Chirp analysis using manually defined chirp time stamps and start/stop frequencies.
V5.10	R&S FSW-K70: New "DVB_RCS2" mappings for pi/2 BPSK, QPSK, 8PSK and 16QAM.
V5.10	R&S FSW-K70: Support for DVB-S2X super frame measurement added in DVB-S2(X) configuration tool.
V5.10	R&S FSW-K91: Improved auto level feature 'Optimize EVM'. K91BE: MIMO is supported. K91BE: IEEE802.11be SEM for EHT320 signals are supported.
V5.10	R&S FSW-K96: Support of MSRA mode and external frontend K553. Optional doubling of sample rate, phase compensation. Transform Decoding: User can select how to react on PILOT/DONTCARE cells. New version of R&S FSW-K96 Wizard: Higher QAM orders, user-defined constellations, store received symbols as pilot values, select cells by using step sizes.
V5.10	R&S FSW-K100/-K104: New 1024QAM test models (E-TMs 2b and 3.1b).
V5.10	R&S FSW-K144/-K145/-K147/-K148: Signal demodulation and analysis in line with TS38.211 V17.0.0. Time Alignment, Transmit On/Off Power, ACLR, SEM measurements in line with TS38.141-1/2 V17.4.0, TS38.521-1 V17.3.0 and TS38.521-2 V16.10.0. Time alignment error measurement supports intra-band contiguous carrier aggregation. PUCCH format 3 and 4. Optional transport block size calculation including allocation gaps.

K147: Improved measurement speed by advanced parallel processing.
K147: Capture mode "Tx only".

V5.10	R&S FSW-K980: Support of custom utilizations and custom device history entries.
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New function of firmware V5.00:

Version	Function
V5.00	R&S FSW-K96: Vector signal analysis software for generic OFDM signals.
V5.00	R&S FSW-K7: Support of Settling Time Measurements.
V5.00	Support of R&S®FS-SNS67: Smart noise sources for noise figure and gain measurement.
V5.00	Support for Three-Path Diode Power Sensor R&S NRP67SN-V, part number 1424.6415.02.
V5.00	Support for CPU board, part number 1206.3974.00.
V5.00	Support of floating licenses on R&S FSW. Requires options R&S FSW-FL or R&S FSW-LP-FL. See the R&S FSW datasheet for a detailed list of available floating options and ordering information.
V5.00	Support of a new Trace Labels function, allowing you to add trace specific-labels.
V5.00	New function to perform a self test automatically before a scheduled self alignment.
V5.00	User-defined parameter coupling supports coupling of reference level and center frequency with an R&S SMBV100B.
V5.00	New SCPI command to change the frequency indication between center/span and start/stop: <code>SENSe:FREQuency:ANNotation</code> .
V5.00	R&S FSW-B21: Show intermediate frequency in dialog or query via SCPI command: <code>SENSe:MIXer<n>:IF?</code> for Spectrum and I/Q mode.
V5.00	R&S FSW-B24: Support of new preamplifier boards (part numbers 1313.4967.65/73) for production internal reasons.
V5.00	R&S FSW-B1200/B2001 and R&S FSW-B4/6/8001: Support of low noise / low distortion optimization-mode.
V5.00	R&S FSW-K6: Supports segmented capture in combination with memory extension R&S FSW-B124. Increased numerical resolution of exported table results to 12 decimal places.
V5.00	R&S FSW-K18: Support of time trigger, auto level and power sensor. Automatic correction of input/output levels. New result summary value "Occupied Bandwidth". Increased capture length for FSWs with CPU boards IPC11.
V5.00	R&S FSW-K30: Trace export now supports .csv format. Loss tables support .s2p format: Files of .s2p format can be read in and converted into a loss table that can be used for K30.

V5.00	R&S FSW-K40: Trace export now supports .csv format.
V5.00	R&S FSW-K50: Increased numerical resolution of exported table results to 14 decimal places.
V5.00	R&S FSW-K60: Supports memory extension R&S FSW-B124.
V5.00	R&S FSW-K70: Configuration tool for DVB-RCS2 measurements available (linear modulation reference waveforms).
V5.00	R&S FSW-K91BE: Support of EHT Trigger based PPDU Format (UL). Support of auto demodulation for EHT MU PPDUs (DL) and EHT TB PPDUs (UL). R&S FSW-K91AX/BE. User can configure Wiener Relative Delay Spread.
V5.00	R&S FSW-K106: Support of NB-IoT non-anchor carriers: CONFigure[:LTE]:TYPE <ANCHor NANChor>.
V5.00	R&S FSW-K144/-K145/-K147/-K148: Signal demodulation and analysis in line with TS38.211 V16.7.0. Multi-processing of multi-carrier analysis for increased analysis speed. Analysis of multiple CSI antenna ports. New SCPI query returns all result summary entries at once. Optionally allow PDSCH in unused CORESET CCEs. Power mode "Average active symbols". Bitstream format "Symbols" or "Bits" selectable.
V5.00	R&S FSW-K149: Support of user-defined groups of packets, Evaluation Offset, MAC FCS, SRMarker, Pulse Rise-Time Measurement, STS Gap and finer burst/sync configuration.
V5.00	R&S FSW-K161R/-B512R/-B800R: Support of 3D Spectrogram and 3D Power vs Time Waterfall displays.
V5.00	R&S FSW-K980: HUMS history export. Additional tracking of the utilization of bandwidth extensions, frequency ranges, relays cycle counter, external reference settings.

New function of firmware V4.90:

Version	Function
V4.90	R&S FSW-B1017: DIG I/Q 40G Streaming Out Interface with maximum of 1000 MHz I/Q bandwidth supported in I/Q Analyzer for R&S FSW-B1200/-B2001/-B800R.
V4.90	R&S FSW-K18M: Memory Polynomial DPD.
V4.90	R&S FSW-K91BE: IEEE 802.11be EHT MU OFDMA/non-OFDMA measurements. For this release, the user has to provide the PPDU configuration.
V4.90	R&S FSW-K149: IEEE 802.15.4z HRP UWB Ultra-Wideband.
V4.90	R&S FSW-K980: Health and Utilization Monitoring Service.
V4.90	R&S FSW-B24: Support of new preamplifier boards (part numbers 1313.4967.64/72/86/87) with two gain stages (15/30 dB) for R&S FSW43, R&S FSW50 and R&S FSW67.

V4.90	Parameter coupling between R&S FSW and a connected R&S SMW is supported.
V4.90	I/Q data import supports AMMOS intermediate frequency data format (*.aid).
V4.90	Fixed frequency offset between marker and delta marker supported using the link to marker function.
V4.90	Last service date, last calibration date, next calibration due date and recommended calibration interval are indicated in the R&S support dialog.
V4.90	R&S FSW-T0: Support of R&S FSW-K18D/-K18M/-K60C/-K60H/-K70M/-K70P.
V4.90	R&S FSW-B2000: Supports R&S RTO1014 with R&S RTO-B204 option.
V4.90	R&S FSW-K6: Supports memory extension R&S FSW-B124.
V4.90	R&S FSW-K6: Supports segmented capture with R&S FSW-B4001/-B6001/-B8001.
V4.90	R&S FSW-K17/-K17S: Increased maximum number of carriers from 160.001 to 250.001.
V4.90	R&S FSW-K17/-K17S: New parameters for convenient configuration of doppler shift compensation (max clock offset is calculated from relative velocity). See dialog tab "Carrier Estimation" in dialog "Advanced Measurement Configuration".
V4.90	R&S FSW-K17/-K17S: New GUI dialog tab structure for better overview of parameters. This applies to dialogs "Multi Carrier Measurement Configuration" and "Advanced Measurement Configuration".
V4.90	R&S FSW-K50: Harmonics of the carrier are now identified and marked in the result summary.
V4.90	R&S FSW-K544: Added refresh button to parse files while the dialog is open.
V4.90	R&S FSW-B800R/-K800RE/-B512R/-K512RE: DIG I/Q 40G Streaming Out Interface with maximum of 600 Msample/s supported in real-time mode with R&S FSW-B517.
V4.90	R&S FSW-B800R/-B512R: Support for new "Mark Only" trigger mode to trigger with no blind time with DIG I/Q 40G Streaming Out interface.
V4.90	<p>R&S FSW-K144/-K145/-K147/-K148: Signal demodulation and analysis in line with TS38.211 V16.4.0. Time Alignment, Transmit On/Off Power, ACLR, SEM measurements in line with TS38.141-1/2 V16.6.0 and TS38.521-1/2 V16.6.0. Test models in line with TS38.141-1/2 V16.6.0. K147: Support Uplink. K147: Import of custom ACLR/SEM settings. RS Magnitude display. Frequency Error vs. Subframe display. Result summary display for UL in-band emission. Extension of Beamforming Summary for Average RS Weights and rel. Power results. 5G ACLR supports power unit dBm/MHz. CORESET reference data verification according to NR-TM PN23. Additional settings to ease the configuration of multi-carrier setups. Custom definition of symbol time position. Extension of Bitstream for total number of bits and bit errors of PDSCH/PUSCH.</p>

1.2 Modified functions

The following table lists the modified functions and indicates the version in which the modification was carried out:

Modifications of firmware V5.20:

Version	Function
V5.20	RF attenuation is set to 75 dB during shutdown.
V5.20	Modified the sweep settings to increase the dynamic range for span = 100 MHz and resolution bandwidth = 100 kHz.
V5.20	Updated NGINX to version 1.20.2.
V5.20	R&S FSW-B21: Improved amplitude accuracy for analysis bandwidths > 80MHz with R&S FSW-B512 in I/Q Analyzer mode.
V5.20	R&S FSW-B1200/-B2001: Optimized IF trigger level minimum and maximum calculation.
V5.20	R&S FSW-K7: Increased the number of digits to the right of the carrier offset decimal value in the result summary window.
V5.20	R&S FSW-K70: Predefined digital standards for Bluetooth® now set the bit ordering to LSB first.
V5.20	R&S FSW-K171: Updated available number of resource blocks per SCS and bandwidth part for FR2-2 according to 38.101-2 v17.6.0.

Modifications of firmware V5.10:

Version	Function
V5.10	Colors are used to improve the readability of selftest and self alignment results.
V5.10	The trace unit conversion for unit "dBm/MHz" was renamed to "dBm/MHz (Power)" and now takes the noise bandwidth into account. In earlier firmware versions the pulse bandwidth was used instead.
V5.10	In continuous gating, the maximum number of gate period count was extended from 1023 to 65535.
V5.10	The default date format was changed to "YYYY-MM-DD" in the GUI.
V5.10	Updated NGINX web server to version 1.20.2.
V5.10	Modified the synthesizer setup algorithm for sweep mode sweep to increase the dynamic range at 1.118 GHz.
V5.10	R&S FSW-B512R/-B800R/-K161R/-K512RE/-K800RE: The window number does not need to be a spectrogram for command DISPlay<n> : WINDow : ZOOM : STATe.
V5.10	R&S FSW-K7: Settling time measurement minimum y axis resolution for FM time domain display was reduced to 10 mHz/div.

V5.10	R&S-FSW-K18: "Force ARB mode" now recalculates header information of .wav files. AM/AM and AM/PM curve width – measurement point is now configurable.
V5.10	R&S FSW-K18D: Adjusts signal level when evaluation range is shorter than full reference signal, resulting in improved DPD for bursted signals.
V5.10	R&S FSW-K91AX/-K91BE: All RUs in an OFDMA signal are highlighted green within the PPDU Config dialog and produce results.
V5.10	R&S FSW-K91AX/-K91BE: Recommended remote syntax for the GUI parameter Amplitude Optimize EVM: :CONFigure:POWer:AUTO:OEVM OFF PAONLY FULL Estimation/Tracking Wiener Relative Delay Spread: :SENS:DEM:INT:WIEN:DSPR:STAT OFF MANUAL
V5.10	R&S FSW-K145: Transform precoding configurable also via physical settings dialog.
V5.10	R&S FSW-K147: New remote command to query all ACLR/SEM results at once.
V5.10	R&S FSW-K980: Reordered equipment tabs in HUMS device web. Added "Licenses" tab.

Modifications of firmware V5.00SP3:

Version	Function
V5.00SP3	Production related changes.

Modifications of firmware V5.00SP2:

Version	Function
V5.00SP2	R&S FSW-B160/B320: Optimized external trigger processing.
V5.00SP2	R&S FSW67 using part number 1321.5300.69: For measurements covering frequency ranges around 46 GHz and under specific conditions, the trace display calculation was optimized.
V5.00SP2	R&S VSE-K149: Payload octets start with the LSB as required in IEEE 802.15.4.

Modifications of firmware V5.00:

Version	Function
V5.00	Saving screenshots via SCPI has been optimized. If the chosen file format (HCOpy:DEVIce:LANGUage<n>) differs to the file type ending, the file is saved in the format of the file type.
V5.00	Optimized FFT synthesizer setup algorithm.
V5.00	The self-alignment algorithm for 1-dB RF attenuation steps on frontends with material no 1325.2806 were optimized.
V5.00	R&S FSW-B90G: Optimized the IF shift algorithm for R&S FSW85.
V5.00	R&S FSW-B10: Improved synthesizer settling time algorithm for 18G synthesizer board.

V5.00	R&S FSW-K144: Output payload bits also when CRC fails.
V5.00	R&S FSW-K144: Increased upper/lower limit of the freq error vs. symbol/subframe displays.
V5.00	R&S FSW-K144: Changed wording "DMRS-Downlink-r16" to "DMRS-Downlink" according to 38.211.
V5.00	R&S FSW-K144/K145: A multi-carrier channel spacing less than the nominal channel spacing can be configured.
V5.00	R&S FSW-K144/K145: Rename FR2 to FR2-1 according to 3GPP.
V5.00	R&S FSW-K980: Link to HUMS added to instrument web browser interface.

Modifications of firmware V4.90:

Version	Function
V4.90	R&S FSW67: The sweep settings for frequencies > 46 GHz with active YIG-preselector were modified.
V4.90	MSRA/MSRT: "MSRA Master" and "MSRT Master" renamed to "MSRA Primary" and "MSRT Primary".
V4.90	R&S FSW-B21: Deactivated an internal local oscillator output to improve dynamic.
V4.90	R&S FSW-K30: If an R&S SNS is connected to the device, the data of this SNS is shown in the ENR/Temp settings dialog.
V4.90	R&S FSW-K70: In order to better visualize the symbol transitions, the sample points are now connected in the density trace mode for result type 'Vector I/Q'.
V4.90	R&S FSW-K144: The frequency error limit check result is now also indicated for the Min and Max in the result summary.
V4.90	R&S FSW-K144: Frequency error limit check can be switched off.
V4.90	R&S FSW-K144/K145: In ACLR mode, the gated trigger is not activated automatically anymore when a trigger is activated.
V4.90	R&S FSW-K145: Improved precision of frame start offset in uplink.

1.3 Improvements

The following tables list the improvements and indicate since which version the issue could be observed:

Improvements of firmware V5.20:

since	Function
V5.10SP1	The SCPI recorder did not record the remote command for adding/replacing an I/Q-Vector display in I/Q Analyzer mode correctly. This issue is solved.
V5.00	Corrected remote command <code>SENS:ADJ:CONF:TRIG OFF</code> for automatic level measurements with active external trigger.
V5.00	R&S FSW-B17: Adding spectrum window via remote command <code>LAY:ADD:WIND? <WindowName>, <Direction></code> , <code>FREQ</code> activates single sweep mode, although continuous sweep mode was active. This issue is solved.
V4.90	R&S FSW-B517: For operation with R&S FSW-B512R/-B800R/-K512RE/-K800RE the signaling was corrected.
V5.10	R&S FSW-B1017: DIG I/Q 40G streaming could be interrupted by parameter changes. This issue is solved.
V5.10	R&S FSW-B2071: 5G NR and WLAN measurements with external analog trigger and long capture times were causing synchronization issues and bad demodulation results. This issue is solved.
V5.10	R&S FSW-K6: The command <code>SENSe:FREQuency:SPAN</code> was not supported for consistency with other options. Export Table to ASCII File was only available if an appropriate view is selected. These issues are solved.
V5.10	R&S FSW-K18: Phase displays provide unwrapping. Improved display update after changing phase unit. Improved K18M modelling in case DUT is highly non-linear.
V5.10	R&S FSW-K91: SCPI commands were missing for ACP Mode. This issue is solved.
V2.60	R&S FSW-K91N: For specific 802.11n antenna 2, 3, ... signals with cyclic shift delay the EVM might drop by approximately 1 dB. Solved by using the "Time sync. Ignore CSD" setting in the "MIMO Capture" dialog.
V4.90	R&S FSW-K144: For NR-TM 3.3 and 3.2, the <code>n_RNTI=0,2</code> PDSCH allocation must not be evaluated for the EVM. This issue is solved.
V5.10	R&S FSW-K544: Improvement of timing offset for user filters for R&S FSW-B4001/-B6001/-B8001 and number of I/Q samples >512.000.

Improvements of firmware V5.10SP1:

since	Function
V5.10	R&S FSW-K6: Timing accuracy has been improved for segmented capture with R&S FSW-B4001 and more than 1024 segments.
V5.10	R&S FSW-K18: Improved relation between “Max DUT Input Level” on K18 GUI and “Level Limit” on the signal generator GUI. Improved stability of signal generator connection during channel switching. Improved synchronization during parameter sweep for a known set of parameters.

Improvements of firmware V5.10:

since	Function
V5.00	The noise cancellation was not considered if the trace was in “View” mode. This issue is solved.
V4.90	In spurious emission measurements, the y-axis reference level did not update when changing the sweep list reference level. This issue is solved.
V5.00SP3	Firmware did not restart with previous settings after shutting down with remote command <code>SYSTem:SHUTdown</code> . This issue is solved.
V4.90	Opening multiple spectrum windows in Multiview mode and restarting the device possibly blocked the firmware application startup process. This issue is solved.
V5.00	Rohde & Schwarz web control file upload/download showed inaccessible “My Computer” folder. This issue is solved.
V4.90	In spurious emission measurement, a trace line was drawn in an empty range. This issue is solved.
V4.50SP1	R&S FSW-B17: On devices with R&S FSW-B512/-B1200/-B2001 with Digital Baseband Out Mode active, sample rate = 200 MHz and active swap I/Q, the streaming output signal was not swapped. This issue is solved.
V5.00SP1	R&S FSW-B21: For W-band frequencies or higher, the parameters handover frequency and second LO range must not be enabled in the external mixer config dialog. This issue is solved.
V4.70	R&S FSW-B512R/-B800R/-K161R/-K512RE/-K800RE: In some situations, changing the trigger offset caused the power vs. time trace to be shifted incorrectly. This issue is solved.
V4.60	R&S FSW-B512R/-B800R/-K161R/-K512RE/-K800RE: Under specific conditions the remote command <code>TRACe<n>:DATA:X?</code> did not return updated x-values. For PVT Waterfall display the remote command did not return frequency values. These issues are solved.
V4.60	R&S FSW-B512R/-B800R/-K161R/ K512RE/-K800RE: Performing a marker peak search on the Persistence Spectrum always used Spectrogram frame 0 for detection. This issue is solved.
V4.10	R&S FSW-B512R/-B800R/-K161R/-K512RE/-K800RE: Zooming twice resulted in a blank spectrogram display in some cases. This issue is solved.

V4.90	R&S FSW-B5000: B5000 self alignment failed when starting the self alignment with active R&S FSW-B21. This issue is solved.
V4.50	R&S FSW-B5000: R&S RTO2044 upgrade to R&S RTO2064 using R&S RTO-B246 was not supported. This issue is solved.
V1.40	R&S FSW-K17/-K17S: SCPI command TRAC<n> : DATA? TRACE1 (with n > 1) delivered an error response if no result window 1 was displayed. This issue is solved.
V5.00	R&S FSW-K91: For high signal power levels, the auto level did not settle under certain conditions. This issue is solved.
V4.90	R&S FSW-K145: In certain scenarios, the SRS periodicity and offset were not applied to the expected resource elements. The issue is solved.

Improvements of firmware V5.00SP3:

since	Function
V5.00SP2	R&S FSW-K18: Some UI elements of polynomial DPD were not available with R&S FSW-K18, only with R&S FSW-K18D. This issue is solved.
V4.90	R&S FSW-K6 with R&S FSW-B4001/-B6001/-B8001: When using segmented capture, the pre-trigger samples were invalidated in certain cases. This issue is solved.

Improvements of firmware V5.00SP1:

since	Function
V5.00	Production related changes.

Improvements of firmware V5.00:

since	Function
V4.90	Corrected overview dialog position in use with mini front panel.
V4.90	Pressing enter in file dialogs did not save or open the file. This issue is solved.
V4.90	In rare cases the message "waiting for trigger", indicating a missing trigger event, was not removed. This issue is solved.
V4.90	Rohde & Schwarz web control file upload failed for file sizes > 8 MB. This issue is solved.
V4.90	When installing R&S FSW firmware without connected R&S FS-SNSxx, the R&S FS-SNSxx was not recognized after installation. This issue is solved.
V4.90	Switching off the external generator control could lead to broken traces when in trace view mode. This issue is solved.
V4.80SP1	Exporting I/Q data with sample lengths larger than the committed RAM could lead to an "out of memory" warning. This issue is solved.
V4.70	Recalling old save sets from firmware versions older than V3.00 could fail. This issue is solved.

V4.80SP1	R&S FSW-B21: In some cases, measurements in band J could stop. This issue is solved.
V4.90	R&S FSW-B512R/-B800R: In a triggered "mark only" mode, setting trigger 2 to output "trigger armed" signal prevented trigger 3 from outputting a "device triggered" signal. This issue is solved.
V4.90	R&S FSW-K6: Export of Pulse Statistics table would export Pulse Results table instead. This issue is solved.
V4.90	R&S FSW-K18: Improved algorithm to "generate own signal", now supporting wide range of crest factors.
V2.00	R&S FSW-K91: General auto level improvements. For example in case of a triggered (external) measurement, the user can set [AUTO SET][Meastime Manual] <SignalPeriod>. In all other cases, [Meastime Auto] is fine.
V2.00	R&S FSW-K91AX: Unused Tone Error Result Summary. For some RU configurations, the adjacent channels were mixed up. This issue is solved.
V4.90	R&S FSW-K100: Decoded bitstream for PDSCH was not available in Channel Decoder result. The issue is solved. Note: PDSCH Subframe Configuration Detection has to be set to PDCCH Protocol, since the PDSCH channel coding parameters are supposed to be extracted from the PDCCH protocol.
V4.90	R&S FSW-K144/K145: In multi-carrier scenarios, the display of the RF up conversion phase compensation frequency in dependence of the global MC frequency was not adapted. The issue is solved.
V4.90	R&S FSW-K144/K145: In multi-carrier scenarios, the global MC frequency could not be increased above 40 GHz under special conditions. The issue is solved.
V4.90	R&S FSW-K161R/-B512R/-B800R: After the first sweep in Auto Rearm RUN CONT mode, time domain traces were not correctly aligned to the trigger. This issue is solved.
V4.60	R&S FSW-K161R/-B512R/-B800R: Trigger Mode was not set correctly when recalling a save set from before V4.60. This issue is solved.
V1.90	R&S FSW-K161R/-B512R/-B800R: Auto Adjust functions were not available in MSRT mode. This issue is solved.
V1.80	R&S FSW-K161R/-B512R/-B800R: "Device Triggered" mode for Frequency Mask Trigger was not available for trigger output 2. This issue is solved.
V1.80	R&S FSW-K161R/-B512R/-B800R: Subsequent graphical zooms on the spectrogram sometimes did not zoom into the correct region. This issue is solved.

Improvements of firmware 4.90:

since	Function
V4.90	Channel Power ACLR: Continuous gating trigger speed improvement in sweep type FFT.
V4.90	Revised warning "YIG Filter Limits Bandwidth" in spectrum mode and I/Q Analyzer.
V4.90	Save/Recall: A marker list window being part of a save set, may sometimes be hidden after recall. This issue is solved.

V4.90	R&S FSW-K18: Improved algorithm for compression point measurement.
V4.90	R&S FSW-K18D: New default value for power linearity tradeoff and modified algorithm. The new default value of 50% provides same results as previous versions with 100%.
V4.90	R&S FSW-K91AC/AX: Supports VHT160/HE160 signals with R&S R&S FSW-B8001.
V4.40	R&S FSW-B800R/-K800RE: Replay Zoom signaling was corrected. This issue is solved.
V4.70	R&S FSW-K161R/-B512R/-B800R/-K512RE/-K800RE: Persistence max hold was always enabled on recall. This issue is solved.

1.4 Known issues

The following tables list the known issues and indicate since which version the issue could be observed:

since	Function
V4.20	The "measurement zoom" button in the toolbar is always available although some options are not intended to support this feature and the button should be unavailable.
V4.20	Touch gestures with a y-scaling in "linear percent" or "linear with unit" do not always work.
V4.20	MSRA mode in I/Q Analyzer or K7: Dragging x-axes which reflect a time unit has no effect.
V5.10	R&S FSW-B10: With R&S SMBV100A firmware version <4.70.108.41 the TTL synchronization via handshake might lead to an TTL handshake error. In this case, upgrade the R&S SMBV100A firmware version to version 4.70.108.41 or higher.
V2.40	R&S FSW-B160R/-B512R/-B800R/-K160R/-K160RE/-K161R/-K512RE/-K800RE: Kaiser window not supported. If selected, a Blackmann Harris window is applied instead.
V2.40	R&S FSW-B512R: For some resolution bandwidths, a single sweep shows artifacts in the spectrum that are caused by the instrument itself.
V5.20	R&S FSW-B517: Temporary restricted valid sample rates > 300 MHz to fixed values of 300 MHz and 600 MHz. This issue will be solved in next version.
V2.20	R&S FSW-B2000: In some situations, after recalling a file with active B2000 configuration, the connection to the R&S RTO is not established. Workaround: After the recall, switching the B2000 state off and on again should solve the problem.
V2.90	R&S FSW-K6: When using B2000 or B5000 with segmented capture mode, the timestamps and PRI values may not be shown correctly.
V2.80	R&S FSW-K6: Segmented capture with R&S FSW-B512R can produce incorrect segment lengths.
V2.40	R&S FSW-K6: Using R&S FSW-B2000, you can set a larger amount of segmented data than is actually possible with certain RTO configurations. In this case, the lower number of available segments is analyzed and a warning displayed in the status bar.
V1.60	R&S FSW-K10: Cumulating Modulation Spectrum limits of carriers of a multicarrier BTS is not supported if the outermost carrier has a frequency offsets under 1.8 MHz.
V2.70	R&S FSW-K17/-K17S: In specific cases user-defined frequency response correction data (R&S FSW-K544) can cause an error message "FRCORR: (...) Demod BW (...) not covered completely by Combined Frequency Range (...)". As a workaround, use user-defined frequency response correction data that covers a larger bandwidth than the span configured in the R&S FSW-K17/-K17S.
V5.00	R&S FSW-K18: Zeroing, Meas->Ref, and Unit settings currently not available in power sensor mode.
V2.90	R&S FSW-K18: Markers are not available for Parameter Sweep measurements.
V2.60	R&S FSW-K60: Adding a marker to the spectrum resets the selected frame in the spectrogram.

V2.60	R&S FSW-K91AX Ext Range SU PDU: Only RU242 size is supported. No MIMO is supported.
V2.00	R&S FSW-K91: Use no more than three R&S FSW-K91 channels at maximum capture time - to ensure that the memory of the application is not exceeded.
V1.90	R&S FSW-K91: When measuring MIMO and recalling a save set containing the same IP-addresses of the connected devices the measurement stops working. Delete the shutdown file 'C:\R_S\Instr\results\Shutdown.dfl' and switch the R&S FSW off and on again using the main power switch at the rear of the instrument.
V2.90	R&S FSW-K95: When loading an I/Q file, an incorrect warning is displayed occasionally. The warning states that the sample rate of the file is different from the sample rate of the application, even though the sample rate of the file is equal to the application sample rate. Changing the sample rate back and forth causes the message to disappear.
V5.10	R&S FSW-K553: When trying to connect to an external frontend providing an invalid host name or aborting (e.g. setting connection state to OFF) an ongoing connection attempt, the application becomes unresponsive for a few seconds.
V4.90	R&S FSW-K800RE: For spans larger than 480 MHz, frequency domain measurements in Real-Time Spectrum and MSRT mode may stop occasionally. Workaround: Switch to I/Q Analyzer, set Analysis Bandwidth to 513 MHz, then switch back to Real-Time Spectrum mode.
V4.90	R&S FSW-K980: For very large HUMS database sizes, the remote commands <code>DIAGnostic:HUMS[:ALL]?</code> and <code>DIAGnostic:HUMS:UTILization:HISTory?</code> may fail. In this case, use SNMP and REST (Representational State Transfer).

1.5 Exchanging solid state disks between different types of CPU boards

For the R&S FSW spectrum analyzer with part number 1312.8000Kxx:

- Different CPU boards are in use: IPC10 with part number 1206.0223.00 and IPC11 with part numbers 1206.3216.00, 1206.3222.00, 1206.3574.00 and 1206.3974.00.
- The R&S FSW-B18 with part number 1313.0790.02 matches IPC10 and R&S FSW-B18 with part number 1313.0790.06 matches IPC11.

For the R&S FSW spectrum analyzer with part number 1331.5003Kxx:

- The CPU board IPC11 with part numbers 1206.3216.00, 1206.3222.00, 1206.3574.00 and 1206.3974.00 is in use.
- The R&S FSW-B18 with part number 1313.0790.10 matches IPC11.

If the solid state disk is exchanged between R&S FSWs with different types of CPU boards, the screen resolution is only 800x600 and a "Drive Access Error" is displayed by the firmware. Switch off the device and change back to the solid state drive which fits to the CPU board. The device boots as usual.

1.6 "Missing smartcard" message

For R&S FSW spectrum analyzers produced July 2017 or later, the message "Missing smartcard or smartcard not initialized" can appear after starting the device.

This only happens if firmware below V2.60 is used. Either because a downgrade to a version below V2.60 was performed, or the solid state drive was exchanged with a version below V2.60.

Solution: Install firmware V2.60 or higher. The device boots as usual.

2 Modifications to the documentation

The latest documentation is available for download from the Rohde & Schwarz website at:

<http://www.rohde-schwarz.com/manual/FSW>

3 Firmware update

The firmware update file for the R&S FSW is one file including the main firmware version number, e.g. `FSWSetup_V2.00.exe`. It is referred to as `FSWSetup.exe` throughout this text. You can find the file on the Rohde & Schwarz web page at:

<http://www.rohde-schwarz.com/firmware/FSW>

3.1 Providing access to the firmware update file

There are three ways to provide access to the `FSWSetup.exe` for the R&S FSW.

Using a USB storage device:

1. Copy the file to a directory of the storage device.
2. Insert the storage device in one of the USB connectors of the R&S FSW.

Using the remote desktop:

1. Connect the R&S FSW to your LAN.
2. Start the remote desktop on your PC (`C:\winnt\system32\mstsc.exe`).
3. Enter the required connection settings:
 - TCP/IP address of the instrument you want to update.
To get the TCP/IP address of the R&S FSW, select [Setup] > "Network + Remote". The IP address consists of 4 numbers between 0 and 255.
 - Enable the "local resources" > "drives" option.
4. Select "Connect".
5. Log in to the instrument using the user name: "instrument" and the default password "894129".
6. Copy the `FSWSetup.exe` from your PC to a new folder, e.g. `C:\FWUpdate`.
7. You can now access this directory with the `FSWSetup.exe` from the R&S FSW firmware.

Using a network drive:

1. Connect the R&S FSW to your LAN.
2. Establish a connection to one of your servers. (Ask the local IT administrator for support).
3. Copy the `FSWSetup.exe` from your PC to a directory on this server.
4. You can now access the directory with the `FSWSetup.exe` from the R&S FSW firmware.

3.2 Performing the firmware update on the instrument

1. Switch on the instrument and wait until the analyzer is ready for operation.
2. If a measurement is running, stop it by pressing the highlighted [Run Cont] or [Run Single] key. Do not update the firmware during a running measurement.
3. Select [Setup] > "System Config" > "Firmware Update" tab.
4. In the file selection dialog box, select the `FSWSetup*.exe` file from the prepared storage location.
"File Explorer": Instead of using the file manager of the R&S FSW firmware, you can also use the Microsoft Windows File Explorer to manage files.
5. Select "Install".
6. Select "Next".
A selection list of the available firmware packages is displayed.
7. By default, all applications are installed. Make sure the required applications are selected.
8. Select "Install" to start the update.

After the firmware update, the R&S FSW reboots automatically.

Depending on the previous firmware version, a reconfiguration of the hardware can be required during the first startup of the firmware. The reconfiguration starts automatically, and a message box informs you about the process. When the reconfiguration has finished, the instrument again reboots automatically.

Note: Do not switch off the instrument during the reconfiguration process!

Now the firmware update is complete.

9. After the firmware update, the "UNCAL" status is displayed in the status bar. Perform a self-alignment ([SETUP] > "Alignment" > "Start Self Alignment").

3.3 Performing the firmware update from a Windows PC

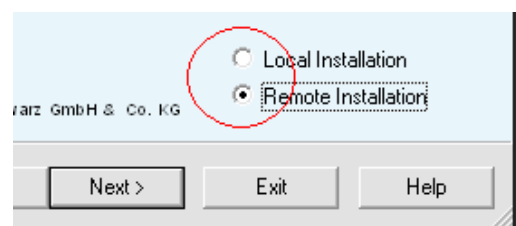
You can also update the firmware using a LAN connection between the instrument and a Windows PC.



Note for firewall users

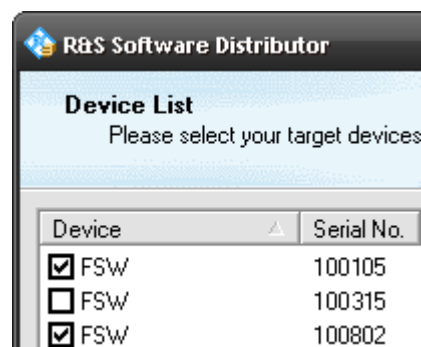
The `FSWSetup.exe` communicates with the instrument via LAN. Therefore, the `FSWSetup.exe` must pass the firewall. If necessary, add it to the firewall rules.

1. Run `FSWSetup.exe` on your PC.
2. Select "Remote Installation".



3. Select "Next".
4. Select the packages to install.
5. Select "Next".

Your LAN subnet is scanned to find all available instruments. If the required instrument is not found, check your firewall settings. After adding the `FSWSetup.exe` to the firewall rules, restart the scan by selecting "Rescan".



6. Select the instruments you want to update.
You can select up to 5 instruments to update in parallel.
7. If necessary, select "Help" to display additional help.
8. If necessary, select "Options" for further options.
9. Select "Install" to start the installation.
10. Confirm the message to reboot the instrument to activate the firmware update.
The instrument restarts automatically.

3.4 Operation with and without administrator rights

You can operate the analyzer with or without administrator rights. Some administrative tasks (e.g. network configuration) require administrator rights. Updating the firmware is also possible without administrator rights.

In the default configuration, auto-login is enabled, and the "Instrument" account with administrator rights is active. This means that no password is required, and the full functionality of the analyzer is available. An additional user account is predefined with the user name "NormalUser" and the default password "894129". Use standard Windows functionality to deactivate the auto-login mechanism and activate the "NormalUser" account. Also refer to the R&S FSW Getting Started manual.

3.5 Installing firmware options

3.5.1 Firmware options included in basic instrument

The R&S FSW-K7, R&S FSW-K19, R&S FSW-K33, R&S FSW-K54/K54CAL, R&S FSW-K161R, R&S FSW-K512RE, R&S FSW-K800RE and R&S FSW-K544 application software packages are included in the basic instrument firmware. Therefore, they do not have a separate item in the installer to be selected.

3.5.2 Other firmware options within the FSWSetup.exe file

The following optional application software packages have their own installation items and are therefore added to the selection list during the firmware update. Ensure that the checkbox is checked if you want to install them.

- R&S FSW-K6 Pulse measurements (with additional suboption R&S FSW-K6S)
- R&S FSW-K8 Bluetooth measurements
- R&S FSW-K10 GSM/EDGE/EDGE Evo/VAMOS measurements
- R&S FSW-K15 VOR/ILS measurements
- R&S FSW-K17 Multicarrier group delay measurements (with additional suboption R&S FSW-K17S)
- R&S FSW-K18 Amplifier measurements (with additional suboption R&S FSW-K18D/F/M)
- R&S FSW-K30 Noise figure measurements
- R&S FSW-K40 Phase noise measurements
- R&S FSW-K50 Spurious measurements
- R&S FSW-K60 Transient measurements (with additional suboptions R&S FSW-K60C/H/P)
- R&S FSW-K70 Vector signal analysis (with additional suboptions R&S FSW-K70M/P)
- R&S FSW-K72/73 3GPP FDD (WCDMA) BS/MS measurements
- R&S FSW-K76/77 TD-SCDMA BS/MS measurements
- R&S FSW-K82/83 CDMA2000 BS/MS measurements
- R&S FSW-K84/85 1xEV-DO BS/MS measurements
- R&S SW-K91 WLAN 802.11a/b/g measurements (with additional suboptions R&S FSW-K91N/AC/AX/BE/P)
- R&S FSW-K95/97 WLAN 802.11ad/ay measurements
- R&S FSW-K96 OFDM signal analysis
- R&S FSW-K10x and K201 UTRA/EUTRA/LTE measurements / OneWeb reverse link measurements
- R&S FSW-K118/119 VERIZON 5GTF downlink/uplink measurements
- R&S FSW-K144/145/147/148/171/175 5G-NR measurements
- R&S FSW-K149 HRP UWB measurements
- R&S FSW-K192/193 DOCSIS 3.1 OFDMA downstream/upstream measurements
- R&S FSW-K553 External Frontend Control

3.5.3 Enabling options by entering option key codes

To activate application software packages, you must enter a license key for validation. You only have to enter the option key once per option.

If an XML-file with an option key was sent to you, see the installation description below.

The license key is in the device certificate or delivered as a part of the software package.

To enable an option using an option key

1. Select [SETUP] > "System Config" > "Versions + Options" tab.
2. Select "Install Option".
A dialog box is displayed.
3. Enter the option key number using the keypad.
4. Press [ENTER].
After a successful validation, the "Option Key valid" message is displayed. If the validation fails, the option software is not installed.
5. Repeat the activation process for all options you want to install.
6. Reboot the device.
7. Check whether the options are available on the instrument ([SETUP] > "System Config" > "Versions + Options" tab).

To enable options via an XML-file

1. Select [SETUP] > "System Config" > "Versions + Options" tab.
2. Select "Install Option by XML".
A file browser is displayed.
3. Select the path to the XML file (e.g. network drive or USB storage device).
4. Press "Select".
After a successful validation, the "Option Key valid" message is displayed. If the validation fails, the option software is not installed.
5. Repeat the activation process for all options you want to install.
6. Reboot the device.

Check whether the options are available on the instrument ([SETUP] > "System Config" > "Versions + Options" tab).

4 Customer support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support or follow this QR code:



Figure 4-1: QR code to the Rohde & Schwarz support page