



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

Wireless LAN Test

Application Firmware

R&S FSQ-K90/K91/K91n/K91ac

Release 4.71

with Service Pack 4

for R&S FSQ, FSG, FMU Analyzer Firmware V4.7x SP5

New Features:

- Support for 802.11 AC standard

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History

<u>Date</u>	<u>Rel Note Rev</u>	<u>Changes</u>
17 October 2011	1	First revision for Wireless LAN Application Firmware 4.71.
27 October 2011	2	Improvements with Service Pack 1 added.
09 December 2011	3	New function with Service Pack 2 added.
10 August 2012	4	Improvements with Service Pack 3 added.
23 November 2012	5	Improvements with Service Pack 4 added.
06 February 2014	6	Update according to new operating manual revision.
12 January 2016	7	FSQ version V4.75 SP7 added.

General Topics

Compatibility of the R&S FSQ-K90/K91/K91n/K91ac Wireless LAN Application Firmware with other Firmware Releases

The following table shows the compatible versions of the basic analyzer firmware and the Wireless LAN Application Firmware:

Table of compatible versions:

R&S FSQ-K91 Application Firmware	R&S FSQ-K91n Application Firmware	R&S FSQ-K91ac Application Firmware	R&S FSQ Basic Firmware	R&S FMU Basic Firmware	R&S FSG Basic Firmware
4.71 SP4	4.71 SP4	4.71 SP4	4.75 SP7 4.75 SP5		4.79 SP5
4.71 SP3	4.71 SP3	4.71 SP3	4.75 SP4		4.79 SP4
4.71 SP2	4.71 SP2	4.71 SP2	4.75 SP3		4.79 SP3
4.71 SP1	4.71 SP1	4.71 SP1	4.75 SP2		4.79 SP2
4.71	4.71	4.71	4.75 SP1		4.79 SP1
4.70	4.70		4.75		4.79
4.62 SP1	4.62 SP1		4.65 SP1		4.69 SP1
4.62	4.62		4.65 SP1		4.69 SP1
4.61	4.61		4.65 SP1		4.69 SP1
4.60	4.60		4.65		4.69
4.51	4.51		4.55 SP2		4.59 SP1
4.50	4.50		4.55 SP1	-	4.59
4.40 SP1	4.40 SP1		4.45 SP1	-	4.49 SP1
4.40	4.40		4.45	-	4.49
4.30	4.30		4.35	4.38	4.39
4.30	4.30		4.35		4.39
4.21	-		4.25	-	4.29 SP2
4.20	-		-	-	4.29
4.10	-		4.15	-	-
4.00	-		4.05	-	-

R&S FSQ-K91 Application Firmware	R&S FSQ-K91n Application Firmware	R&S FSQ-K91ac Application Firmware	R&S FSQ Basic Firmware	R&S FMU Basic Firmware	R&S FSG Basic Firmware
3.90 SP1	-		3.95 SP1	-	-
3.90	-		3.95	-	-
3.80	-		3.85	-	-
3.70	-		3.75	-	-
3.60 SP1	-		3.65	-	-
3.60	-		3.65	-	-
3.52	-		3.55 SP1 3.55	-	-
3.50 SP1	-		3.55 SP1 3.55	-	-
3.50	-		3.55	-	-
3.42	-		3.45 SP4	-	-
3.40	-		3.45	-	-
3.31	-		3.35 SP1	-	-
3.30	-		3.35	-	-
-	-		3.25	-	-
-	-		3.15	-	-
-	-		3.05	-	-

Firmware Update of the R&S FSQ-K90/K91/K91n/K91ac Wireless LAN Application Firmware

Since basic firmware version 4.2x a ZIP file with the update sets of the basic system firmware and all available applications is provided. This ZIP file is available in the instruments FIRMWARE section, e.g. R&S FSQ of the Service Board on GLORIS.

Please follow the steps described in the instrument's basic firmware release note to perform a complete firmware update.

Enabling the Application Firmware via License Key Code Entry

This section can be skipped if the option key was entered once.

After installing the application firmware package a license key for validation must be entered. The license key is printed either on a label on the rear panel of the instrument or delivered as a part of the R&S FSQ-K90/K91/K91n/K91ac Wireless LAN application firmware package.

The key sequence for entering the license key is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

Use the numeric keypad to input the license key number and press ENTER.

- On a successful validation the message 'option key valid' will appear. The instrument will perform an automatic reboot.
- If the validation failed, the application firmware is not installed.

The most probable reason will be that the instrument is not equipped with the correct basic firmware version. Therefore a messagebox will appear asking for installation of the correct basic firmware version.

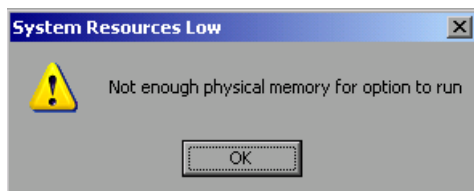
If the application firmware package was not installed prior to entering the license key code, a message will appear asking for installation of the application firmware package.

In any case please make sure that the correct basic firmware version and the application firmware package is installed prior to entering the license key code.

If upgrading to FSQ-K91 from FSQ-K90 then an upgrade key is supplied. This key needs to be entered (as described above) in addition to the existing FSQ-K90 key-code. Similarly if upgrading FSQ-K91 to include IEEE 802.11n or IEEE 802.11ac then additional upgrade keys are required.

System Memory Requirements

For FSQ-K90 Wireless LAN Application Firmware, an installed system memory of 512MByte is recommended. For FSQ-K91 Wireless LAN Application Firmware, an installed system memory of 512MByte is essential. The FSQ-K90/K91 will generate an error message during activation, if available system memory does not meet the requirements. This may happen for FS-K90, if eg.FS-K30 or FSQ-K70 was active before starting WLAN.



A reboot of the instrument after using eg. NOISE (FS-K30) or VSA (FSQ-K70), will allow FSQ-K90 to be activated without memory extension.

For instruments, shipped with 256MByte system memory, a memory extension FSQ-B512, order number 1157.1590.02, is available.

The system memory size can be easily checked by pressing SETUP – SYSTEM INFO – STATISTICS, item "Memory size". This item is available since version 3.25 of the base system firmware.

Memory requirements of the FSQ-K91ac option:

For R&S®FSQ with FMR6 upgrade to FMR7 R&S®FSQ is necessary : Please use R&S®FSQ-U3 UPGRADE WIN-XP option. This upgrade is required in case the following key sequence "SETUP | SYSTEM INFO | STATISTICS shows *Memory Size*" ≤ 512 Mbyte.

Using the FSQ-K91ac option for FMR6 FSQs [providing only 512MByte RAM] is not disabled. In this case, the user operates the FSQ-K91ac option at his own risk with respect to the stability of the FSQ-K91ac measurement application. Further more FSQ-K91ac software instabilities won't be supported for FMR6 FSQs by Rohde & Schwarz. Disabling not used software options in *SETUP | GENERAL SETUP | OPTIONS¹* will free additional RAM and might improve the stability in this case. Note: Rohde & Schwarz might disable the FSQ-K91ac software option for FMR6 FSQ's in future.

Capture time of the FSQ-K91n option:

The V4.71 SP1 allows the user longer capture times as specified in the data sheet. The usage of capture times beyond the values of the data sheet is done at the users own risk with respect to the stability of the FSQ-K91n measurement application. Further more FSQ-K91n software instabilities in relation with extended capture times won't be supported by Rohde & Schwarz. Disabling not used software options in *SETUP | GENERAL SETUP | OPTIONS¹* will free additional RAM and might improve the stability in this case. Note: Rohde & Schwarz might disable these extended capture times - beyond the values of the data sheet - in future.

Nominal Channel Bandwidth	Maximum Capture Time according to the data sheet	Maximum Capture Time that can be set by the sw on a FMR6 FSQ	Maximum Capture Time that can be set by the sw on a FMR7 FSQ
CBW20 MHz	25 ms	50 ms	50 ms
CBW40 MHz	12.5 ms	25 ms	50 ms

¹ Simply navigate with the 'down' 'up' arrow keys below the roll key to the software option to be disabled/enabled. Pressing the roll key respective *ENTER* key will toggle the state of the option.

New Functions in version 4.71

- Support for 802.11ac standard
- For the Spectrum Emission Mask (SEM) measurement, the trace data reduction mode is now selectable (with Service Pack 2).

Improvements with option R&S FSQ-K90/K91/K91n/K91ac Wireless LAN Application Firmware

The version numbers in brackets indicate the version in which the issue was observed for the first time.

1) (K90/K91 V3.60) Analysis times

In some cases with low powered signals measurement can take a long time to complete.

Workaround: Use auto-level or adjust the reference level to improve analysis speed. Reducing the amount of data to analyze by reducing the capture time can also help.

2) (V4.62) Level tracking not working for standard 802.11n

3) (V4.62) Peak Power result not correctly returned via remote control

The peak power results were not returned via the FETCH:BURSt:ALL? command. This has been corrected.

4) (K91n V4.62) High Dynamic setting not properly restored after a save recall

5) (K91n V4.70) Spectrum Flatness Results in Screen E show incorrect status

In some situations with IEEE 802.11n MIMO results the Spectrum Flatness results in Screen E show the wrong limit status.

6) (K91n V4.70) 2 Bursts required in order to measure first burst

For IEEE 802.11n signals when Source of Payload Len is set to Take from HT-Sig then 2 bursts need to be captured in order for the first burst to be successfully analyzed.

7) (K91n V4.70) Clipped signals give poor EVM results

For IEEE 802.11n signals, clipping of the signal provides poor EVM results.

8) (K90/K91/K91n V4.70) Missing remote control command for Pilots for Tracking Setting.

The setting Pilots for Tracking has no associated remote control command

9) (K91n MIMO V4.70) Missing remote control command for Joined Rx Sync and Tracking Setting.

The setting Joined Rx Sync and Tracking has no associated remote control command

Improvements with Service Pack 1

1) (K91n V4.71) K91n (MIMO) erroneously allows CBW80MHz channel bandwidth selection.

In case of IEEE 802.11n (MIMO) standard, the setting *Advanced Demod | Channel Bandwidth to measure* erroneously allows the CBW80MHz selection.

2) (K91n/K91ac V4.71) Changing the number of spatial streams during analysis, might cause the scalar results not updating properly any more.

In case of IEEE 802.11n (MIMO) or IEEE 802.11ac standard, reducing the number of spatial streams from 2 to 1 might cause the *Global Result Summary* and *Result Summary Rx k/Tx k/Stream k* updating not properly any more.

3) (K91n/K91ac V4.71) Missing remote control command for Nsts and Nsts to Use.

The settings Nsts and Nsts to use had no associated remote control commands

Improvements with Service Pack 3

1) (K91n V4.71 SP2) IF and RF overload with certain IF Filter Board revisions.

With instruments with IF Filter board revision 10 or higher RF and IF overloads could be experienced with auto-level. This has now been corrected .

Improvements with Service Pack 4

1) (K91n V4.71 SP3) Improvements to auto-level with certain IF Filter Board revisions.

The improvement made to correct IF and RF overload in V4.71.SP3 has been further refined. User can now select whether auto level is optimized for low distortion or low noise.

2) (K91n V4.71) Preamplifier option B24 not supported

Only the preamplifier with option B25 was previously supported. Preamplifier option B24 is now also supported.

3) (K91n V4.71) Results missing from table of results for IEEE 802.11b signals

In some circumstances some of the entries in the table of results for the IEEE 802.11b standard were not available.

4) (K91n V4.71) Incorrect entries in table of results when signal contains incomplete PPDU's

If a signal was measured with incomplete PPDU's then incorrect entries could be observed in the table of results.

5) (K91n V4.71) Calculation of Crest Factor not correct

The Crest Factor results were not correctly calculated

Known Issues with option R&S FSQ-K90/K91/K91n/K91ac Wireless LAN Application Firmware

The version numbers in brackets indicate the version in which the error was observed for the first time. Unless otherwise stated all errors apply to be FSQ-K90 and FSQ-K91

Manual Operation and IEC/IEEE Bus

1) (K90 V3.40) Memory usage on instrument with 256 Mbytes of memory

Performing combinations of calibration, activating and using the VSA (K70) option and activating and using FSQ-K90 on an instrument with 256 Mbytes of memory may lead to the FSQ-K90 option no longer being able to be activated due to insufficient memory.

Workaround: Ensure no other applications are running. Restarting the firmware after performing calibration also improves memory usage. Using Preset also releases memory.

2) (K90/K91 V3.50) Gating and negative trigger offset values

With the FSQ gating and negative trigger offset values can not be used together. Any negative trigger offset will internally be set to 0s.

3) (K90/K91 V4.70) Burst not detected if burst power varies by more than 1 dB

If the power of bursts in a single IEEE 802.11n capture buffer varies by more than 1 dB then not all bursts are analyzed.

4) (K91n MIMO/K91ac V4.71) After a save recall, the measurement window title bar info text might not be complete.

In case of IEEE 802.11n (MIMO) or IEEE 802.11ac standard, after a save/recall the measurement window title bar might not display MIMO related information.

5) (K91ac V4.71 SP1) IQ Offset tolerance limits are not available.

IEC/IEEE Bus only

1) (K90 V3.28) Selecting screen A/B

For selecting screen A or B, DISPLAY:<WINDOW[1|2]>:SELECT command does not work correctly.

Workaround: Instead of this command, an alias command is provided, which is:
DISPLAY:<WINDOW[1|2]>:SSELECT.

Modified Functions

The behaviour of the following functions changed compared to earlier versions (the number in brackets indicates the firmware version that introduced the individual change):

1) (V3.30) Limit values in table of results can now be modified whilst a measurement is running.

2) (V3.30) Spectrum Mask according to ETSI.

3) (V3.30) EVM Trace results can now be displayed in % of dB (User selectable).

4) (V3.40) Baseband board version VAR03 with baseband impedance of 1 MOhm supported

5) (V3.42) Single auto-level sequence can now be activated via SCPI (CONFIGure:POWer:AUTO ONCE)

6) (V3.42) The STATus:QUESTionable:SYNC and STATus:QUESTionable:ACPLimit registers are provided.

7) (V3.42) Marker to peak and to minimum functions are supported for the Spectrum Flatness measurement.

- 8) (V3.42) EVM Vs Symbol display: The boundaries of bursts are now highlighted with vertical lines.
- 9) (V3.42) Support for wideband extension (B72).
- 10) (V3.42) Support for preamplifier B23 & B25 options.
- 11) (V3.42) Error Vs Preamble measurements are provided for all standards. The results can be displayed in Phase or Frequency error Vs preamble.
- 12) (V3.42) Advanced settings for mechanical and electronic attenuators, YIG filter and baseband settings.
- 13) (V3.42) Support for IEEE 802.11g and 802.11 OFDM Turbo Mode standards added.
- 14) (V3.42) Gating support for Spectrum Mask and Spectrum ACP measurements).
- 15) (V3.42) The sample rate can be modified for IEEE 802.11a measurements.
- 16) (V3.42) IF Power trigger disabled for Spectrum Mask (ETSI) measurement
- 17) (V3.42) Minimum and Maximum payload length can now also be specified in time
- 18) (V3.42) The calculation for the rise and fall time results for IEEE 802.11b signals has been changed
- 19) (V3.42) List mode results accessible from frequency sweep measurements
- 20) (V3.60) IQ Data Export & Import available.
- 21) (V3.60) Sample rates between 20.4 MHz and 40.8 MHz now supported without the use of option B72.
- 22) (V3.70) Bursts analyzed with errors now marked in yellow.
- 23) (V3.70) Number of analyzed bursts available via IEC/IEEE Bus (FETCh:BURSt:COUNT?).
- 24) (V3.70) Number of symbols in each analyzed burst available via IEC/IEEE Bus (FETCh:SYMBol:COUNT?).
- 25) (V3.70) Sweep time for auto-level can be specified using the Auto Level Time setting in the Advanced Settings of the General Settings view.
- 26) (V3.80) Digital Down Converter available for low carrier frequency with Baseband input.
- 27) (V3.80) External trigger level can now be specified.
- 28) (V3.80) REFRESH hot-key for recalculation of results after data capture.
- 29) (V3.80) The new SUPPORT softkey has been provided to allow detailed information about the FS-K90/91 option to be saved to file.
- 30) (V3.90) New SCPI command CONFIgure:BURSt:PREAmble:SELEct PHASe | FREQuency.
- 31) (V4.10) The SEM measurement and SPECTRUM MASK softkey replaces the Spectrum ETSI / IEEE measurements.
- 32) (V4.20) Support for new instrument model R&S FSG.
- 33) (V4.20) Trace data now available via remote control in binary format for all traces.
- 34) (V4.30) The IEEE 802.11n standard is now supported
- 35) (V4.30) Option B17 is now supported.
- 36) (V4.30) Option FSU-B24 supported
- 37) (V4.30) Support for Application Recovery
- 38) (V4.50) Setting FFT Start Offset provided to allow improved EVM results.

- 39) (V4.60) **FETCH:BURSt:COUNT:ALL?** Command added to obtain complete number of analyzed bursts for a measurement, including bursts from multiple seeps.
- 40) (V4.60) **CONFigure:WLAN:PVError:MRANge** Command added. This command specifies whether the Peak Error Vector results are calculated over the complete burst or just over the PSDU.
- 41) (V4.61) Support files now stored in option specific folder.
- 42) (V4.62) New parameter **PEAK** was added to the command **[SENSe:]DEMod:FFT:OFFSet**.
- 43) (V4.62) Simultaneous analysis of up to 2 Tx antennas for IEEE 802.11n MIMO capable devices.
- 44) (V4.70) Simultaneous analysis of up to 4 Tx antennas for IEEE 802.11n MIMO capable devices.
- 45) (V4.70) Sequential analysis of up to 4 Tx antennas for IEEE 802.11n MIMO capable devices using the Rohde & Schwarz OSP switching box.
- 46) (V4.70) Sequential analysis of up to 4 Tx antennas for IEEE 802.11n MIMO capable devices.
- 47) (V4.70) Support for 802.11ac standard.
- 48) (V4.71 SP2) For the Spectrum Emission Mask (SEM) measurement, the trace data reduction mode is now selectable.

Modifications to the Operating Manual

The R&S FSQ-K90/K91/K91n/K91ac analyzer functions are included in a separate manual set. Please refer to the following order numbers:

- 1157.3135.42-08 (English)

The current documentation is up-to-date.

Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

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