

Instrument  
Password  
"894129"



**ROHDE & SCHWARZ**

Test and Measurement  
Division

## Release Notes

# Firmware Release 4.75 (XP)

with Service Pack 4

**for FSQ Spectrum Analyzers** (Windows XP embedded)  
with order number: **1155.5001.xx** or  
**1313.9100.xx**

### New Features:

- FFT Analyzer: Signal source Digital Baseband Input supported.
- ACP Measurement: Improved dynamic range with activated noise correction and detector RMS.
- New 6 kHz RRC Filter available.
- Spectrum Emission Mask measurement:  
Additional customized configuration files for CDMA 2000.
- New remote command "DIAG:SERV:VERS?" available to query all the measurement application versions.
- New Remote Status Bits supported:  
Status Operation Register Bit 4: "Wait for TRIGger"  
Questionable Power Register Bit 7: "Input Overload"
- New Remote command ":TRAC:DATA:MEM?" to read a part of the trace data.
- FSP-B10: Support for SMB100A12, SMB100A20, SMB100A12 and HP83620.
- Multi Standard Radio Measurement Extensions
- Support for new instrument model R&S FSQ40 VAR39

Release Note Revision: 6

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## History

Date	Rel Note Rev	Changes
04 April 2011	1	First revision for V4.75.
09 June 2011	2	New manual order number.
18 August 2011	3	New functions and improvements with Service Pack 1 added.
29 September 2011	4	New functions and improvements with Service Pack 2 added.
20 December 2011	5	New functions and improvements with Service Pack 3 added, Example for remote command ":TRAC:IQ:CONV" corrected.
02 August 2012	6	Improvements with Service Pack 4 added.

# General Topics

## Firmware Update

This firmware may only be installed on instruments equipped with Windows XP Embedded.

### Generation of the update set

Since basic firmware version V4.35 a ZIP file with basic system firmware and the newest available applications is provided. This ZIP file is available in the instruments FIRMWARE section of the Service Board on GLORIS.

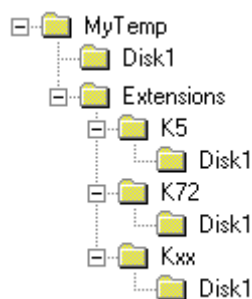
Since Version V4.75 the base system firmware is distributed in a single disk1 folder.

### Preparing installation via USB stick or LAN:

- Download the update set ZIP file.
- Extract the contents of the ZIP file to a temporary folder, e.g. C:\MyTemp.

Other files (e.g. release notes) shall not be stored in these directories. These files would be copied on harddisk and may cause a disk full problem on drive E:.

- Now copy the content of the temporary folder including all sub folders to a USB stick.
- The USB stick is now ready to for performing the update.



Following extension's sub folder are used for the instrument's applications:

- K5
- K10
- K30
- K40
- K70
- K72 (includes K73, K74, K74+)
- K76 (includes K77)
- K82 (includes K83)
- K84 (includes K85)
- K90 (includes K91)
- K92 (includes K93, K94)
- K100 (includes K101, K104, K105)
- K110

## Performing the firmware update on the instrument

A new method to install the base system and all required applications is available, if the installed base system firmware is V4.15 or newer. For updating to version 4.15 or newer first update the bases system only to get the new update manager. Then update the base system and all applications using the new update manager.

### Base System Update from version < 4.15 to 4.15 or newer:

Skip this step, if the installed base system firmware is V4.15 or newer. The firmware update process is performed in the following steps:

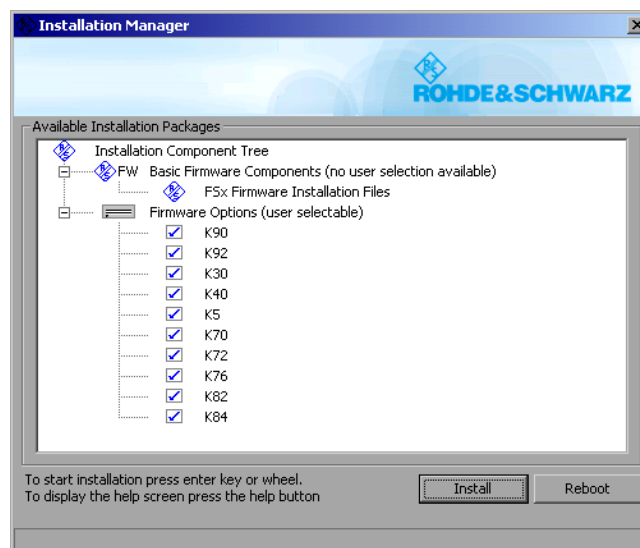
- Switch the instrument on and wait until the Analyzer has resumed operation.
- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK
- Confirm the copy process.
- The instrument will perform several automatic shutdowns, until the new base system firmware is installed properly.

**Do not switch the instrument off until the update process has been finished completely.**

### Complete Update with update manager:

- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK

The *Installation Manager* will terminate the analyzer application, search for available application update set and will show a selection list.



- Deselect applications, not to be installed and start the installation process with INSTALL.
- REBOOT will abort the update and restart the analyzer application without any changes.
- The instrument will perform several automatic shutdowns, until the new firmware and all applications are installed properly.

**Do not switch the instrument off until the update process has been finished completely.**

After a successful firmware update it is necessary to execute the instrument's self alignment process by pressing CAL and softkey CAL TOTAL.

## Known Issues during Firmware Update

### Firmware update with large USB Sticks (≥1GByte)

Older instruments using Windows XP SP1 may have problems to detect the USB memory stick. Use another memory stick if a reboot with connected memory stick does not help.

### A measurement application is not available after firmware update

The analyzer firmware checks the memory usage of all active measurement applications, e.g. K30, K72 against the available system memory. All measurement applications are disabled as default if the required system memory exceeds the available memory space. Please check/modify the activation state of the available option key(s) in dialog SETUP – GENERAL SETUP – OPTIONS in that case.

### Firmware update with FSQ-B18/19 (Removable Harddisk):

- At the final step of the setup, backup files are stored for the 'Analyzer Firmware Backup' (option during the start-up of the instrument). This backup is only available for analyzers equipped with hard disks. Therefore an error message "Add folder icon failed" occurs twice if the options FSU-B18/B19/B20 are installed.

**Workaround:** Accept that message via the 'OK' button twice. The firmware update will continue without any problem! -> This problem is solved with version 3.55 or later.

- A message box



is opened during firmware update and the update process is aborted.

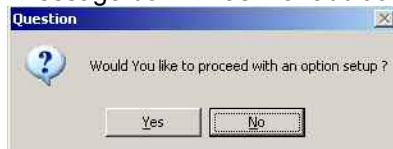
The disk space required for the installation process exceeds the disk space available with option FSQ-B18/19.

**Workaround:** Perform the update by following steps in that case:

- Switch the instrument on with an external keyboard/mouse connected.
- Close the analyzer application by pressing "ALT F4".
- Open the Windows Explorer
- Remove folder **D:\R\_S.fw\restore** and all sub folders.
- Select the disk1 sub folder of the base system's update set to be installed.
- Start SETUP.EXE (of sub folder DISK1).

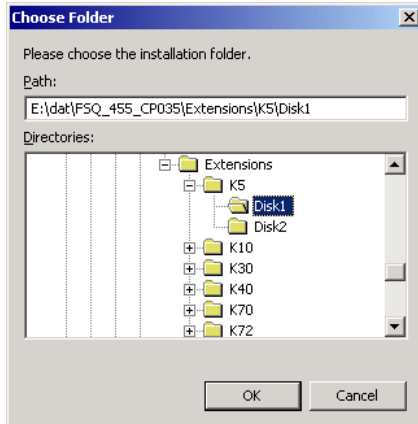
The installation of the base system is now started.

A message box will ask for additional applications to be installed:



- Confirm with YES. Setup will now be restarted to install the next application.

- Now select sub folder EXTENSIONS/K5/DISK1 and press "OK" to install K5.



- Repeat the previous two steps ("YES" for "proceed with an option setup" and selection of DISK1 of the next application) for the applications K10, K30, K40, K70, K72, K76, K82, K84, K90, K92, K100 and K110.
- After installation of K110 the dialog "proceed with an option setup" has to be answered with NO. In case of a wrong selection please reselect K110\disk1 again and use "NO" next time. The setup procedure will now finish the installation process.

**Note:** The restore of the previously installed firmware version is not possible due to limited disk space.

#### **Messagebox: Can't open front panel driver, errorcode=0x2**

For some constellations this messagebox occurs after the last reboot of the device. In that case:

- Switch the instrument off by pressing the ON/standby switch at the front panel.
- Switch the power off at the rear panel.
- Wait until the Standby LED on the front panel turns from yellow to black (off).
- Switch the power on at the rear panel.
- Switch the instrument on by pressing the ON/standby switch at the front panel.

If the message box still appears, connect an external keyboard and select the "Instrument Driver Actuator" from the Windows Start Menu.



**Automatic FSQ-B100 Hardware Configuration update may request for user action.**

If a changed hardware configuration file is detected in the FSQ-B100 board, the board will be reprogrammed during reboot after firmware update. A window requesting a shutdown will be displayed in that case. The following list shows the bases system firmware and the related B100 configuration file version:

Firmware Version	B100 HW Configuration Version
V3.95, V3.95, V3.95 SP2 V4.05, V4.05 SP1, V4.05 SP2	V3.08
V4.15, V4.15 SP2, V4.15 SP3	V3.09
V4.25, V4.25 SP1	V3.29
V4.35, V4.35 SP1, V4.45, V4.45 SP1	V3.34
V4.45 SP2	V3.36
V4.55	V3.39
V4.55 SP1, V4.55 SP2 V4.65, V4.65 SP1, V4.65 SP2, V4.65 SP3	V3.36
V4.75, V4.75 SP1, V4.75 SP2, V4.75 SP3, V4.75 SP4	V3.50

**Warning:** Due to the requested user action there will be a problem for remote updates if a changed B100 configuration file is detected.

## **Firmware installation of the R&S FS-K7 FM demodulator, R&S FS-K8 BLUETOOTH Analyzer software, R&S FS-K15 VOR/ILS Avionics Measurements Application and R&S FS-K9 Power Sensor Measurement**

The R&S FS-K7, R&S FS-K8, R&S FS-K9 and R&S FS-K15 application software package are included in the basic instrument firmware. It therefore needs no separate firmware update procedure.

### **Enabling these options via option key code entry**

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

For activation of these application software packages a license key for validation must be entered. The license key is printed either on a label on the rear panel of the R&S FSQ or delivered as a part of the software package.

The key sequence for entering the license key for every option is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

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

- On a successful validation the message "option key valid" will appear.
- If the validation failed, the option software is not installed.

## Compatibility to other Firmware Option Packages

The following firmware option packages are available with their own disks and they can be installed separately. Please refer to their release notes.

R&S FSQ V4.75 SP4 is compatible to the following firmware option releases:

R&S FS-K5	R&S FS-K10	R&S FS-K30	R&S FS-K40	R&S FSQ-K70	R&S FS-K72 FS-K73 FS-K74 FS-K74+	R&S FS-K76 FS-K77
4.70 SP1	4.70 SP2	4.70 SP1	4.70 SP1	4.72	4.70 SP2	4.70 SP1

R&S FS-K82 FS-K83	R&S FS-K84 FS-K85	R&S FSQ-K90 FSQ-K91	R&S FSQ-K92 FSQ-K93 FSQ-K94	R&S FSQ-K100 FSQ-K101 FSQ-K104 FSQ-K105	R&S FS-K110
4.70 SP1	4.70 SP1	4.71 SP3	4.70	4.72	4.70

**Hint:**

Applications with the version number 3.xx / 4.xx are only compatible with basic firmware 3.yy / 4.yy (see table above).

Do not install application firmware with versions 1.xx or 2.xx on an R&S FSQ with basic firmware 3.yy or 4.yy!

## New Functions in Version 4.75

- **FFT Analyzer:** Signal source Digital Baseband Input supported.
- **ACP Measurement:** Improved dynamic range with activated noise correction and detector RMS.
- **New 6 kHz RRC Filter** available.
- **Spectrum Emission Mask measurement:** Additional customized configuration files for CDMA 2000.
- **New remote command "DIAG:SERV:VERS?"** available to query all the measurement application versions.
- **Support for Status Questionable Power Register Bit "Input Overload".**
- **New Status Operation Register Bit "Wait for TRIGger"** supported for I/Q measurements using TRACE:IQ sub system.
- **New Remote command ":TRAC:DATA:MEM?"** to read a part of the trace data (with Service Pack 1).
- **FSP-B10:** Support for SMB100A12, SMB100A20, SMB100A12 and HP83620 (with Service Pack 1).
- **Multi Standard Radio Measurement Support** by new remote commands (with Service Pack 2).
 

<b>MMEM:LOAD:IQ:STAT</b>	Load IQW file (with FS-K72)
<b>MMEM:STOR:IQ:STAT</b>	Store IQ.TAR file
<b>TRAC:IQ:CONV</b>	Resample IQ.TAR file to IQW file
- **Support for new instrument model FSQ40 VAR39** added (with Service Pack 3).

## Improvements

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

- 1. (V4.65) Menu Setup – GENERAL SETUP – OPTIONS:** The dialog FIRMWARE OPTIONS indicates a wrong value for Available Memory in certain combinations of option keys.

As a result, an option may be marked as active but the related hot key is not visible.

- 2. (V4.65) Noise Correction: Setting the TRACE mode to VIEW deactivates the noise correction.**

Note: This issue is already fixed in V4.65 SP1.

- 3. (V4.65) A frequency domain sweep does not terminate.**

This issue may happen for certain combinations of Center Frequency, Span, Resolution Bandwidth, Video Bandwidth and Sweptime and is now fixed.

Note: This issue is already fixed in V4.65 SP3.

- 4. (V4.35) Marker Function Reference Fixed can not be switched off.**

It is not possible to switch off the marker function REFERENCE FIXED after following order of key strokes:

- MARKER – REFERENCE FIXED (activates Reference Fixed)
- MKR FCTN – NOISE MEAS (activates Noise Marker)
- MKR FCTN – NOISE MEAS (de activates Noise Marker)

Note: This issue is already fixed in V4.65 SP2.

- 5. (V4.65 SP2) Reduced execution speed for Center Frequency/Span changes** if a lot of transducer set files exist on the instruments harddisk,

Note: This issue is already fixed in V4.65 SP2.

**6. (V4.65) The AUTO RECALL button is named as "CANCEL" instead of "OK".**

**7. (V4.65) SETUP – TRANSDUCER: The transducer factor table list indicates a wrong transducer unit dBm.**

This happens only if a scroll down was required to activate the transducer and the dialog is reopened by SETUP – TRANSDUCER. The measurement with the selected transducer is not affected.

**8. (V4.65 SP2) SEM Measurement: The analyzer application crashes in some cases if a SEM standard configuration is loaded with LOAD STANDARD.**

This happens only if a scroll down was required to activate the transducer and the dialog is reopened by SETUP – TRANSDUCER. The measurement with the selected transducer was not affected.

**9. (V4.65 SP2) Spurious Emissions Measurement: A spurious signal appears when the marker position is modified.**

This issue does not affect the measurement results (e.g. the trace or the marker readout).

**10. (V4.65) ACP Measurement: The ACLR limit according to 3GPP TS 36.104 (Core Requirements) are used instead of the limits according to 3GPP TS 36.141 (Test Requirements).**

As a result the limit is changed from -45.0 dBc to -44.2 dBc.

**11. (V4.65) ACP Measurement: The Power Mode selection has no effect for a number of ADJ channels of 0.**

**12. (V4.65) HP Emulation: Marker resolution corrected for command MKF?.**

**13. (V4.65) An error message "Undefined header" is reported in remote operation, but the command is correct.**

This issue only occurs with a sequence using nested commands, e.g.  
"DISP:WIND:TRAC:Y 100 DB;;FREQ:CEN 28E+6;SPAN 3E+3".

**14. (V4.65) Remote command TRAC:IQ:DATA:MEM? returns wrong Q values in some cases.**

This issue only occurs if the format IQBlock is selected and the number of samples exceeds 523776 samples.

**15. (V4.65) The rotary knob direction is changed for File Manager, Save/Recall and Hardcopy dialogs.**

**16. (V4.65) The Option Key (de)activation state change is lost after reboot.**

Once installed, it is possible to enable/disable an option key in dialog SETUP – GENERAL SETUP - OPTIONS. A reboot is required for a few options. The message box "The system must be rebooted to effect the changes. Reboot now?" will be indicated in that case. With versions 4.65/4.65 SP1 the state change will get lost after reboot.

Note: This issue is already fixed in V4.65 SP2.

**17. (V4.65 SP2) B10: A GPIB address change for the external signal generator is ignored.**

The analyzer application is using the previous address until the external source is switch off and on again.

Note: This issue is already fixed in V4.65 SP2.

**18. (V4.65 SP1) FSQ-B71: The softkey LOW PASS 36 MHz of menu SETUP – SIGNAL SOURCE – ANALOG BASEBAND is not visible.**

Note: This issue is already fixed in V4.65 SP2.

**19. (V4.65 SP2) FS-K5: An IF Overload condition is indicated after performing the Level & Time Auto Adjust with certain EDGE signals.**

Note: This issue is already fixed in V4.65 SP3.

**20. (V4.65 SP2) A reduced display update speed occurs in remote operation for certain application changes if the display update is switched on.**

Changing from mobile applications K5/K7x/K8x to K10/K9x/K10x several times leads to a reduced display update speed in remote operation if the display update is switched on ("SYST:DISP:UPD ON"). The manual operation is not affected.

**21. (V4.55) FS-K8: Some results in EDR Spurious Emissions measurement do not include the Reference Level Offset.**

Note: This issue is already fixed in V4.65 SP2.

**22. (V4.65) FSQ-K70: Modulation Accuracy – FSK DEV ERROR Peak evaluation does not ignore the sign of the current value.**

As a result negative values are not correctly taken into account.

Note: This issue is already fixed in V4.65 SP1.

## Improvements with Service Pack 1

Service Pack 1 corrects the following issues. The version numbers in brackets indicate the version in which the issue was observed for the first time.

**1. (V4.65) The deactivation of the screen saver with remote command "DISP:PSAV:STAT OFF" does not switch on the display.**

The display will remain dark until a key stroke is performed in local mode. This has now been corrected.

**2. (V4.75) The remote command "TRAC:IQ:FORM?" returns the wrong settings as long as TRACE:IQ:STAT is not switched on.**

This has now been corrected.

**3. (V4.75) Menu MEAS – IQ Mode: The softkey DIG IQ OUT DEFAULT now indicates the usage of the DIG IQ OUT Default Settings.**

Pressing the softkey sets the I/Q settings to following defaults:

- IF Filter Bandwidth: 50 MHz
- Sample Rate: 81.6 MHz
- Trigger Source: EXTERN
- Trigger Slope: POSITIVE
- Pretrigger Samples: 0
- Data Format: PAIR

The softkey is now highlighted as long as one of these parameters is modified.

**4. (V4.75) ACP measurement: The CP/ACP measurement at Center Frequency 2.31 GHz (RBW 30kHz) uses a wrong internal bandwidth.**

As a result, the indicated CP/ACP power results are about 1dB too high. This has now been corrected.

**5. (V4.75) Option Upgrade keys K90U and K92U do not enable K91 or k93 in version V4.75.**

This has now been corrected.

**6. (V4.75) FS-K15: The Avonics Main Menu shows a wrong softkey SIGNAL SOURCE instead of the softkey BASEBAND.**

As a result, the functions BASEBAND SENSITIVITY is not available. This has now been corrected. The remote operation was not affected by this issue.

**7. (V4.75) Remote control: Bit 8 of the remote status register STATus:QUESTionable (UNCAL) is set now if the self alignment correction data usage is switched off with CAL:STAT OFF.**

**8. (V4.75) Function NOISE CORR does not support TRACE AVERAGE MODE LOG but the softkey is available.**

This has now been corrected.

## Improvements with Service Pack 2

Service Pack 2 corrects the following issues. All previous service packs are included.

**1. (V4.75) The Resolution Bandwidth 6.25kHz is not supported for filter type FFT.**

A Gauss filter was used instead. This has now been corrected.

**2. (V4.75 SP1) The Noise Correction does not support an active transducer factor.**

The calibration measurement locks up when the noise correction is activated and if a transducer factor is switched on at that time. This has now been corrected.

**3. (V4.75) HP-Emulation: Correction of Limit Line check result (command "LIMIFAIL?").**

**4. (V4.75) A Marker Count at 1031MHz with Center Frequency 1031MHz/Span 5MHz may stop the sweep.**

This has now been corrected.

## Improvements with Service Pack 3

Service Pack 3 corrects the following issues. All previous service packs are included.

**1. (V4.75) Several minimum peaks values below the noise floor are visible in some cases.**

This issue may occur in certain combinations of instrument settings:

- a huge Frequency Span (>> 1GHz)
- a huge number of Sweep Points (>> 1000)

This has now been corrected.

**2. (V4.75) FSP-B10: Maximum allowed frequency for SMB100A12 extended to 12.75 GHz.**

## Improvements with Service Pack 4

Service Pack 4 corrects the following issues. All previous service packs are included.

**1. (V4.75 SP3) A resource leak is visible on creation of a transducer file.**

This has now been corrected.

**2. (V4.75 SP3) Hardcopy configuration: The list of selectable printer devices is empty but a printer driver is installed.**

This has now been corrected.

**3. (V4.75 SP3) SEM measurement: The configuration file EUTRA-LTE\DL\CategoryA\BW\_03\_0\_MHz\_\_CFhigher1GHz.xml does not use Auto Sweeptime coupling.**

This has now been corrected.

**4. (V4.75) No firmware options available after firmware upgrade on instruments with less than 1 GByte system memory.**

This has now been corrected.

## Known Issues

This chapter includes firmware problems related to the basic instrument firmware.

For issues related to option packages R&S FS-Kxx please refer to the corresponding release notes of the individual option package.

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

**1. (V3.15) Wrong SELECT ITEMS TO SAVE/RECALL selection names with FSQ-K90/91 installed.**

For option FSQ-K90/K91 (WLAN), it is possible to select FSQ-K90/K91 specific items to save or recall:

- WLAN Results
- WLAN IQ Data
- WLAN User Limits

**2. (V3.45) The recall of data sets, saved with version 2.35, does not work.**

**3. (V4.45) The Network Configuration dialogs (menu SETUP – GENERAL SETUP – CONFIGURE NETWORK ) seem to lock up if no LAN is connected.**

A timeout of 60s is effective in some cases if no LAN is connected to the instrument and therefore the firmware seems to lock up.

**Work around:** Connect the instrument to a local network before modification of the LAN configuration.

**4. (V4.45) FSQ-B17: Continuous Digital Baseband output data stream is halted after configuration of the EX IQ Box.**

The analyzer stops to send digital baseband data to the R&S B17 output (MEAS - IQ MODE switched on and DIG IQ OUTSTREAM active) and the Ex-IQ-Box configuration is changed after activation of the Digital IQ Output Stream.

**Work around:** Reactivate the IQ MODE and the DIG IQ OUTSTREAM by pressing the related softkeys after leaving the EXIQ configuration dialog.

**5. (V4.45) FSQ-B17: The EX-IQ-Box is not recognized when connected during firmware update.**

**Work around:** Disconnect and reconnect the USB cable of the EX-IQ-Box.

**6. (V4.55) FSQ-B17 with Ex-IQ-Box: Sample Rate AUTO SET does not work for Logic Type SSI.**

The DUTs I/Q data sample rate depends on the SSI clock signal from the Device under Test and therefore the Ex-IQ-Box is not able to transfer the Digital Input Sample Rate to the analyzer.

**Work around:** Do not use the default AUTO SET mode and configure the Digital Input Sample Rate to the input data rate (e.g. menu SETUP – SIGNAL SOURCE – DIGITAL IN SAMPLE RATE).

**7. (V4.55) FSQ-B17 with Ex-IQ-Box: No additional warning is indicated to update the EX-IQ-Box firmware.**

Firmware 4.55 SP1 includes a new Ex-IQ-Box firmware (00-00-13-155). An update of the Ex-IQ-Box firmware to this version is required. This is indicated only by an enabled softkey FIRMWARE UPDATE of the EX-IQ-Box configuration menu. No additional warning is visible.

**Work around:** Check the softkey FIRMWARE UPDATE of menu EX-IQ-BOX and perform the update if the softkey is enabled. The EX-IQ-Box has to be connected to the instrument before.

**8. (V4.65) FSQ-B17: Capturing I/Q data with the Digital Baseband Input does not work if the number of samples is above 16 MSamples (with option R&S FSQ-B100/B102).**

**Work around:** Decrease the capture length.

### 9. (V4.75) Remote Control: An additional "\*OPC?" synchronization may be required for the remote commands INST:SEL and MMEM:LOAD:STAT.

When the analyzer receives a sequence of sequential commands, the execution of the previous command is finished before the current command is processed. An additional synchronization should not be required. In some cases the commands INST:SEL and MMEM:LOAD:STAT need an additional \*OPC? Before sending the next command.

Example:

```

...
"INST:SEL WLAN;*OPC?"           ' enter WLAN application and wait for the
                                '  OPC? Response before sending the next
                                command.
...
"MMEM:LOAD:STAT 1,'WLAN_EVM.FSP';*OPC?" load a save set (K91_EVM.FSP in this example)
                                ' and wait for the' OPC? Response before sending
                                ' the next command.
...

```

### 10. (V4.75) Spurious Measurement: The Trace Mode Average is currently not supported.

The Spurious Measurement does not support trace averaging but the related softkey is available.

**Work around:** Use an increased sweep time and the RMS or Average Detector instead.

## Modified Functions

The version numbers in brackets indicate the version in which the function was modified.

1. (V3.15) **Hardcopy screen comment changed to one comment, not one per screen.**
2. (V3.35) **Change to SMR setting files for external generator control:**  
This change enables significant improvements in frequency settling with logarithmic frequency step sizes.
3. (V3.45) **Active transducer and adjust reference level procedure:**  
If transducers are active and the adjust reference level procedure (in measurements like ACP, occupied bandwidth, signal statistics, etc.) is invoked, the *REFLVL ADJ AUTO/MANUAL* of the SETUP|TRANSDUCER menu is set to AUTO thus the best dynamic performance is obtained.
4. (V3.55) **External reference frequency is not any longer changeable via knob wheel to prevent changing that value by chance.**
5. (V3.55 SP2) **Spurious Emissions measurement - Limit check uses weaker limit.**  
When a limit line is defined in steps, the weaker limit is used at the frequency point with the straight vertical section.
6. (V3.65) **Marker peak list in continuous sweep mode.**  
In continuous sweep mode the marker peak list is not any longer executing a single sweep and then peak list search, but the peak list will immediately work on the current trace. This allows peak list functionality on averaged or max held traces in continuous sweep mode. The single sweep mode is unchanged.



**7. (V3.65 SP2) Dithering disabled for I/Q measurement in extended bandwidth mode.**

The internal dither signal is switched off for I/Q data measurement (TRACE:IQ sub-system) and sample rates between 20.4 MHz and 40.8 MHz, if filter flatness WIDE is selected (TRAC:IQ:FILT:FLAT WIDE).

**8. (V3.65) RS232 serial remote control commands added.**

Since version 3.65 the instrument goes in remote mode rather than in local mode when a command is send through the RS232 remote interface. This means the display disappears and the LOCAL softkey appears as when the GPIB bus is used. To change between local and remote mode the commands @LOC and @REM can be sent to the instrument.

**9. (V3.65) FFT Analyzer Mode for option FSQ-B71 is available.****10. (V3.65) VXI-11 channel is supported to remote control the instrument.****11. (V3.75) Harmonic measurement**

The mixer level within the harmonic measurement is changed to -10 dBm.

The value update in the lower screen happens during the sweep and not only at sweep end.

**12. (V3.75) TRACE:IQ - Lower limit for sample rate is now 400 Hz.****13. (V3.75) RF Attenuation setting unchanged when switching to baseband input.****14. (V3.85) Modifications to HP commands**

- Command IP resets format to O3

- Reading a trace with TRA; TRB or TRC is possible even if trace is blank

- Great changes of span (e.g. from 2GHz to 100 kHz) will not loose signal when marker track is on

- The R&S FSQ has now a mixer level of -10dBm instead of -25dBm

**15. (V3.85) new available remote control commands**

SENS:CORR:CVL:CAT?

SENS:LIST:RANG:COUN?

**16. (V3.85) FSQ-B71 Digital Down Converter available for Baseband Input.**

The R&S FSQ-B71 Option (baseband input) is capable of mixing signals from low carrier frequencies (e.g. low IF signals) towards baseband.

**17. (V3.85)FSQ-B71 FFT Analyzer: Trace Average Mode changed from LOG to LIN.**

In FFT analyzer mode the Trace Average Mode can now be independently configured. The default setting is LIN. In previous versions, the setting of the analyzer mode (default LOG) was used.

**18. (V3.95) CCDF measurement result table extended with 0.01% value.****19. (V3.95) New marker functions AUTO MAX PEAK and AUTO MIN PEAK.****20. (V3.95) HP emulation: HP Models 71100C, 71200C and 71209A are using 800 sweep points****21. (V4.05) Additional number of sweep points 201, 401, 801 and 1601.****22. (V4.05) HP emulation: Additional HP Models 8568A\_DC and 8568B\_DC using DC coupling.****23. (V4.05) HP emulation: GENERAL SETTINGS - GPIB menu extended by IF GAIN NORM / PULS.****24. (V4.05) The new spurious emissions measurement LIST EVALUATION is available.****25. (V4.05) FS-K7: The THD Unit is selectable (dB / %) in the AM signal / AF spectrum result.****26. (V4.05) New function MARKER FILE EXPORT.****27. (V4.05) FFT Analyzer: New trigger modes I LEVEL, Q LEVEL.****28. (V4.05) Signal Track: Enhanced sensitivity in marker tracking function.**

The marker is now set to the signal peak after very single sweep. This only occurred in earlier versions if the difference between signal peak and center frequency exceeded 20 % of the Resolution Bandwidth.

**29. (V4.05 SP1) HP emulation: Behaviour of KSK and MKPK changed in single sweep mode.**

The commands KSK (next peak) and MKPK NHINLINR (next high, next left, next right) do not perform a new sweep in single sweep mode.

**30. (V4.05 SP2) IF SHIFT B, additional shift for resolution bandwidth < 200 kHz.****31. (V4.15) Improved Firmware Update.**

- 
32. (V4.15) **New enhancement label to indicate filter type.**  
       3DB     Gauss filter 3dB  
       6DB     EMI filter 6dB  
       FFT     FFT filter  
       CHN     Channel filter  
       RRC     RRC filter
33. (V4.15) **Gated statistics measurements APD, CCDF.**
34. (V4.15) **FS-K8 Enhanced Data Rate (EDR) supported.**
35. (V4.15) **Support for Power Sensor NRP-Z81 is available.**
36. (V4.15) **GPIO: Basic remote control of the signal generator which is connected to the additional FSP-B10 GPIO Interface.**
37. (V4.15) **GPIO: SCPI format for binary block data extended for byte counts > 999.999.999 bytes.**
38. (V4.15) **GPIO: New commands available**  
       :[SENSe<1|2>:]CORRection:TRANsducer:ACTive?     returns active transducer  
       :CALCulate<1|2>:LIMit<1...8>:ACTive?     returns active limit line(s)
39. (V4.15) **Trigger Line for video trigger is now also visible outside of the trigger menu.**
40. (V4.15) **Support for FSQ-K100/K101 is available.**
41. (V4.15) **Extended resolution for the number of sweep points.**  
       In addition to currently allowed values an increment of 100 is possible now for number of points  $\geq 201$ .
42. (V4.15) **Support for FSQ-B17 Digital Baseband Output available.**
43. (V4.15) **HP emulation: The OL command returns the mixer level in byte 23.**
44. (V4.15) **HP emulation: The commands MKPK NH | NL | NR and KSK do not perform a sweep start when marker is already switched on.**
45. (V4.15) **HP emulation: The commands SNGLS and CONTS are setting the command complete bit (bit 4) in STB.**
46. (V4.15) **HP emulation: New softkey SETUP - GENERAL SETUP - GPIO - SWEEP REP ON/OFF".**
47. (V4.15) **HP emulation: New commands: VARDEF, CTA, ADD, SUB, MPY, DIV.**
48. (V4.15) **HP emulation: New command NORMLIZE for tracking generator.**
49. (V4.15) **HP emulation: The command LF performs a reset.**
50. (V4.15) **LXI Class C support.**
51. (V4.15SP1) **New CPU Board 1091.3104 supported.**
52. (V4.25) **New Save/Recall menu and dialogs available.**
53. (V4.25) **Easy access to Windows XP Start menu is available.**
54. (V4.25) **The required sweeptime is reduced for video bandwidth < resolution bandwidth.**
55. (V4.25) **ASCII Export function is available for Marker Peak List.**
56. (V4.25) **Adjustable marker position knob stepsize is available.**
57. (V4.25) **New trace average function Power is available.**
58. (V4.25) **HP emulation: Personality Spurious supported.**
59. (V4.25) **HP emulation: Personality Phase Noise supported.**
60. (V4.25) **FSP-B10: Upper frequency limit of SMF100A is now 43.5 GHz .**
61. (V4.25) **The Acquisition Time (for FFT filter) is now readable with remote command "SENS:SWE:TIME?".**
62. (V4.25) **Automatic FSQ-B100 Hardware Configuration update.**  
       If an old hardware configuration file is detected in the FSQ-B100 board, the board will be reprogrammed during reboot after firmware update. A window requesting a shutdown will be displayed in that case.  
**Warning:** Due to the requested user action there will be a problem for remote updates if a new B100 configuration file is detected.

63. (V4.25 SP1) For local lockout the alias remote command **SYSTem:KLOCK ON | OFF** is provided.
64. (V4.25 SP1) Function **TRACe:IQ:FILTER NORMAl | WIDE** changed.  
Since version 4.25 SP1 the extension of the filter flatness is possible for the sample rate range  $10.2 \text{ MHz} < \text{sample rate} \leq 20.4 \text{ MHz}$ .
65. (V4.25 SP1) **FSP-B10: Support for SMA100, SMB100 (1/2/3/6GHz), SMF (22/43GHz) SMJ (3/6GHz).**
66. (V4.25 SP1) **FSP-B10: Support for SMF100a - TTL mode.**
67. (V4.25 SP1) **FSU-B21 with Order Number 1157.1126.03 supported.**
68. (V4.35) **International keyboard driver package supported (German, Spanish, French, Italian and Portuguese).**
69. (V4.35) **New Filter Type 5-POLE DIGITAL supported for Analyzer Mode.**
70. (V4.35) **ACP: Extended upper limits for Channel Bandwidth (5 GHz) and Channel Spacing (20 GHz).**
71. (V4.35) **ACP: Overlapping Adjacent Channels allowed now for parallel measurements.**  
It is now possible to configure overlapping adjacent channels. Based on a common carrier channel setting, it is now possible to measure with two slightly different ADJ channel settings with one measurement.  
Example: TX Channel / TX Bandwidth (common for both measurement A and B)  
ADJ used for measurement A  
ALT1 used for measurement A  
  
ALT2 used as ADJ for measurement B  
ALT3 used as ALT1 for measurement B
72. (V4.35) **ACP: Result output format changed for number of ADJ channels > 3.**
73. (V4.35) **Additional soft keys are available to change the LAN configuration.**
74. (V4.35) **Save dialog reports a warning, if no item to save is selected.**
75. (V4.35) **The increment behaviour of the step keys for parameter SWEEP POINTS is changed.**  
The behaviour of the knob wheel still has the highest possible resolution.
76. (V4.35) **Dummy Video Bandwidth 0 Hz returned for active FFT filter.**
77. (V4.35) **Availability changed for Spurious Measurement.**  
The Spurious Measurement is not available if the ACP measurement is active.
78. (V4.35) **Remote: TRACe:IQ: Extended I/Q Sample Rate range for FSQ-B72 (400 MHz) and FSQ-B71 (200 MHz)**
79. (V4.35) **HP emulation: Additional remote commands are supported.**  
The following commands are supported: ML, MEAS, SUM, LIMIPURGE, EDITLIML, LIMIREL, SDEL, SADD, LIMF, LIMU, LIML, LIMM, LIMD, LIMTFL, LIMTSL, SDON, EDITDONE, LIMISAV, LIMIRCL, LIMITEST, LIMIFAIL
80. (V4.35) **HP emulation: A new softkey COUPLING FSP/HP is now available to change the Span/RBW and RBW/VBW default coupling.**
81. (V4.35) **HP emulation: The default for Sweep Repeats is now OFF for 856x and 859x.**
82. (V4.35) **FSU-B9: The number of sweep points allowed in analyzer mode is now supported in NETWORK mode, too.**
83. (V4.35) **FSQ-B17: Digital Baseband Input supports resampling for TRACe:IQ sub system.**
84. (V4.35) **FSQ-B17: R&S Ex-IQ-Box Control provided.**
85. (V4.35) **FS-K7: New measurement function MC PHASE RESPONSE.**
86. (V4.35) **FS-K7 and FSQ-K70: Digital Baseband Input supported.**
87. (V4.35) **FS-K7: Deemphasis is now additionally supported for active Weighting AF Filter CCTTT and CCIR.**
88. (V4.35) **Support added for new option VOR/ILS Avionics Measurements Application R&S FS-K15.**
89. (V4.35) **Support added for new option 3GPP HSPA+ Application Firmware R&S FS-K74+.**

90. (V4.35) Support added for option FSQ-K91n.
91. (V4.35) Application Setup Recovery restores previous settings after application exit.
92. (V4.35) Support added for option FSQ-K94.
93. (V4.45) Configurable Spectrum Emission Mask measurement is available in analyzer mode.
94. (V4.45) ACP measurement: User definable standards available.
95. (V4.45) ACP measurement: New standards for E-UTRA / LTE.
96. (V4.45) External Reference: Selectable PLL bandwidth and new "Fall Back to Internal" mode EXT [INT].
97. (V4.45) TOI Measurement: New TOI marker search function added (TOI MKR CALC/SRCH).
98. (V4.45) Additional overload indication OVTRC is available.
99. (V4.45) Auto Login Password changed for user instrument to "123456".  
It is now possible to enter the password after remote desktop connection by the front panel.
100. (V4.45) General Setup: Baudrate 19200 for the serial COM interface is now selectable.
101. (V4.45) Harmonic Measurement: Additional remote command to get the used resolution bandwidth settings:  
CALCulate1:MARKer1:FUNCTION:HARMonics:BANDwidth[:LIST]?
102. (V4.45) FS-K9: Support for Power Sensors NRP-Z56, NRP-Z57 and NRP-Z92.
103. (V4.45) FSP-B10: Support for SMBV100a, SMA100a and SMB (TTL mode).
104. (V4.45) Support for FS-K73+.
105. (V4.45) Additional support for options R&S FSQ-K100, K101, K102, K104, K105, K106 (E-UTRA / LTE) (as external or internal application).
106. (V4.45) HP emulation
- command OL expanded
  - no difference between local and remote sweep points
107. (V4.45) HP emulation for 8560E, 8561E, 8562E, 8563E, 8564E, 8565E
- Spurious Measurement: threshold line is take into account for calculating of resolution bandwidth and noise level, message box "RBW/VBW coupling adjusted" suppressed
  - Harmonic Measurement: modified algorithm for finding harmonics
  - Phase Noise Measurement: some minor adjustments
  - Support of 4 markers
  - Corrections of RBW calculation if FFT-Filter is switched on
  - Command MKNOISE, MKTRACK: correction of return value
  - Sweep time adjusted for gated sweep (command GATE)
108. (V4.45) HP emulation for 8566A/B, 8568A/B
- Support of 4 markers
109. (V4.45) HP emulation for 8591E, 8594E
- sweep time adjusted for gated sweep (command GATE)
110. (V4.45 SP1) Support for new option FS-K110 TETRA II.
111. (V4.45 SP1) Support for new board revisions of Wideband Detector Unit, Bandwidth Extension (FSQ-B72) and I/Q Memory Extension (FSQ-B100/B102).
- The presence of these boards can be checked by pressing *SETUP – SYSTEM INFO – HARDWARE*. A certain bit of the hardware code, listed in column *HWC* indicates the new board revision:

WBDET (Wideband Detector Board)	with HWC Bit 1 = 1 *)
Bandwidth Ext (FSQ-B72)	with HWC Bit 0 = 1 **)
IQ_MEM_EXT (FSQ-B100/B102)	with HWC Bit 0 = 1 **)

\*) HWC value divided by 2 is odd.

\*\*) HWC value is odd.

**Warning:** A backgrade to earlier firmware versions is not possible in the following cases:

- New Bandwidth Ext (FSQ-B72) **and/or** new IQ\_MEM\_EXT (FSQ-B100/B102).

- **New WBDet and Digital Baseband Input/Output (FSQ-B17) is installed.**

112. (V4.45 SP2) Support for new GSM/EDGE/EDGE Evolution Measurement Application R&S FS-K10.
113. (V4.55) New functions to temporary disable/enable option license keys.
114. (V4.55) New remote command "SYSTem:SHUTdown" to shutdown the instrument.
115. (V4.55) New Status Bit for Overload Trace (OVTRC) in the STATus:QUESTionable:POWER Register.
116. (V4.55) New function EXPORT/IMPORT DEV DATA to export and import device specific data (e.g. option licence keys).
117. (V4.55) New Channel Filter 7.5 kHz available.
118. (V4.55) ACP/Multi Carrier ACP with selectable Weighting Filter for TX, ACP and ALT channels supported.  
Since version 4.5x the following remote commands to not ignore the numeric suffix at CHAN or ALT accordingly.  
SENS:POW:ACH:FILT:STAT:CHAN<1 to 12>  
SENS:POW:ACH:FILT:STAT:ALT<1 to 11>  
SENS:POW:ACH:FILT:ALPH:CHAN<1 to 12>  
SENS:POW:ACH:FILT:ALPH:ALT<1 to 11>
119. (V4.55) Occupied Bandwidth measurement: New command ":CALC:MARK:FUNC:POW:RES? AOB | AOBW" returns the position and level of marker T1 and T2.
120. (V4.55) Transducer: New function VIEW TRANSDUCER available
121. (V4.55) Trace Export: Additional ASCII File entries "Preamplifier" and "Transducer"
122. (V4.55) HP emulation: New command "SER?" available to query the serial number
123. (V4.55) New "Instrument Driver Actuator" in the Windows Start menu
124. (V4.55) FSQ-B17: Remote command ":OUTPut<1|2>:DIQ[:STATe]" is only available now with TRACE:IQ:STAT ON.
125. (V4.55) FSQ-B17: The softkey DIG OUT ON/OFF is visible in several applications without being fully supported.  
The generation of a continuous digital baseband output stream is only supported using the I/Q Measurement mode (menu MEAS – IQ MODE, remote sub system TRACE:IQ). But the softkey DIG OUT ON/OFF was available in other operationing modes as well (e.g. K7, K70).
126. (V4.55) FSU-B21: Import of conversion loss tables from USB stick supported.
127. (V4.55) FSQ-B71: FFT Analyzer: I – Q Phase Difference Measurement / Frequency Domain available.
128. (V4.55) FS-K7: Maximum Meas Time increased by factor 8 for instruments with a system memory size of  $\geq 1$  GByte.
129. (V4.55) FS-K8: EDR Spuriuos: Remote Control read access allowed for Span, Start- and Stopfrequency.
130. (V4.55) Gated Statistics Measurement: Additional settings checks added (e.g. if the period time does not fit to the I/Q capture length).
131. (V4.55) Direct Ex-IQ-Box Configuration Dialog access via SETUP – SIGNAL SOURCE.  
The remote command "INST:SEL EXIQ", required in earlier versions to configure the EX-IQ-Box, is ignored.
132. (V4.55) New sub menus available for signal path dependent softkeys with options FSQ-B17 (Digital Baseband) and FSQ-B71 (Analog Baseband).
133. (V4.55) LXI Class C Support is now integral part of the base system firmware.
134. (V4.55SP2) It is possible now to read the current marker count state with remote command "CALC:MARK:COUN:STAT?" even if it is not possible to activate the marker count function.
135. (V4.55SP2) Ex-IQ-Box: The Word Alignment Default has been modified from MSB to LSB.

This change allows to connect an Ex-IQ-Box 1409.5505.02 (with 20 bit) to an Ex-IQ-Box 1409.5505K04 (with 18 bit) using the new default settings.

136. (V4.65) Auto Login Password for user INSTRUMENT is changed to "894129" for security reasons.
137. (V4.65) CONFIGURE NETWORK: An error message pops up if no LAN cable is connected. "NOT CONNECTED" is now visible.
138. (V4.65) Support for Noise Correction outside of ACP measurement .
139. (V4.65) Multi Carrier ACP: Number of TX channels increased from 12 to 18.
140. (V4.65) Multi Carrier ACP: Support for save/recall of user defined standards.
141. (V4.65) SEM measurement: Supports for save/recall of user defined standards.
142. (V4.65) SEM Measurement: Required Number of Sweep Points is not set.  
 The follow configuration for EUTRA/LTE Uplink needs 30001 sweep points to be set.
  - BW\_01\_4\_MHz.xml
  - BW\_03\_0\_MHz.xml
  - BW\_05\_0\_MHz.xml
 The number of sweep points is no automatically adjusted to this value.  
**Note:** The number of sweep points is not set to it's previous value if the SEM measurement is switched off or another SEM standard file is loaded.
143. (V4.65) SEM measurement: Ref Level dialog available to adjust the sweep list's level settings.
144. (V4.65) SEM measurement: Additional WIMAX configuration files available for DL ETSI (5MHz / 10MHz).
145. (V4.65) Extended Marker Peak List function including automatic peak list update.
146. (V4.65) FFT Analyzer: Indication of the Phase Offset for Freq. Domain - MAGNITUDE/PHASE.
147. (V4.65) HP emulation: new commands available
  - Command SYSTem:REVisiOn[:STRing] <new REV? response> to modify the response for the remote command REV?
  - Command SYSTem:REVisiOn:FACTory to select the default response for the remote command REV?
  - Plotter commands PA, PD and PU
148. (V4.65) FS-K7: New Fundamental Frequency AUTO/MANUAL setting for SINAD and THD measurement.
149. (V4.65) FS-K9: Indication of the power meter's serial number.
150. (V4.65SP1) New function REGISTRY READ ONLY supported.
151. (V4.65 SP1) Support for new board revisions of Wideband Detector Unit.  
 The presence of these boards can be checked by pressing *SETUP – SYSTEM INFO – HARDWARE*. A certain bit of the hardware code, listed in column *HWC* indicates the new board revision:
 

<b>WBDET (Wideband Detector Board)</b>	<b>with HWC Bit 2 = 1 <sup>*)</sup></b>
--	---

<sup>\*)</sup> HWC value divided by 4 is odd.

**Warning:** A backgrade to earlier firmware versions is not possible in that case.
152. (V4.65SP2) Resolution Bandwidth 6.25 kHz supported.  
**Hint:** The resolution bandwidth calculation with RBW AUTO ON (span coupling) may now result in a slightly different bandwidth setting compared to previous version for certain span ranges.
153. (V4.65SP2) FS-K9: Support for Power Sensor NRP-Z86 available.
154. (V4.65SP2) PSA / 89600 Emulation available.
155. (V4.65SP2) Support for the Status Operation Register Bits MEASuring/SWEeping.
156. (V4.75) FFT Analyzer: Signal source Digital Baseband Input supported.
157. (V4.75) ACP Measurement: Improved dynamic range with activated noise correction and detector RMS.

158. (V4.75) New 6 kHz RRC Filter available.
159. (V4.75) Spectrum Emission Mask measurement: Additional customized configuration files for CDMA 2000.
160. (V4.75) New remote command "DIAG:SERV:VERS?" available to query all the measurement application versions.
161. (V4.75) Support for Status Questionable Power Register Bit "Input Overload".
162. (V4.75) New Status Operation Register Bit "Wait for TRIGger" supported for I/Q measurements using TRACE:IQ sub system.
163. (V4.75) New remote command ":TRAC:IQ:TPIS?" available.
164. (V4.75SP1) New remote command ":TRAC:DATA:MEM? " available with analyzer mode.
165. (V4.75SP1) FSP-B10: Support for SMB100A12, SMB100A20, SMB100A12 and HP83620.
166. (V4.75SP2) Multi Standard Radio Measurement Support by new remote commands.
- |                   |                                  |
|-------------------|----------------------------------|
| MMEM:LOAD:IQ:STAT | Load IQW file (for FS-K72)       |
| MMEM:STOR:IQ:STAT | Store IQ.TAR file                |
| TRAC:IQ:CONV      | Resample IQ.TAR file to IQW file |

167. (V4.75SP2) FSQ-B72: Support for the replacement of I/Q BW Extension Board order number 1155.6008.02 by a board with order number 1155.6150.12

The I/Q BW Extension Board 1155.6008.02 (FSQ-B72) requires a RF Converter Board with order number 1130.4001.02 or 1130.4047.02 and a Synthesizer Board with order number 1166.2209.02.

Since firmware V4.75 SP2 the replacement of the I/Q BW Extension Board 1155.4001.02 with the newer board 1155.6150.12 is allowed.

As a result, a backgrade to firmware versions older than V4.75 SP2 is not allowed in following cases:

Board	Order Number	Model
I/Q BW Extension:		1155.6150.12
Synthesizer:		1166.2209.02
RF Converter:		1130.4001.02 or 1130.4047.02

The presence of these boards can be checked by pressing *SETUP – SYSTEM INFO – HARDWARE*. Check Order Number and Model for the lines "I/Q BW EXT.", "RF CONVERTER" and "SYNTHESIZER".

167. (V4.75SP2) Support for new instrument model FSQ40 VAR39.
168. (V4.75SP2) Spectrum Emission Mask measurement: Standard settings modified for LTE UL, 1.4 MHz and 3 MHz.
- The frequency span of the first and the last range is increased.

# Modifications to the Operating Manual

The order numbers for the manual set is:

## Operating Manual "Signal Analyzer FSQ3/8/26/40":

- 1313.9681.11-01 (German) and
- 1313.9681.12-01 (English).

The corresponding PDF-Files are separately available on the service board.

## Last minute changes to the operating manual

### Manual Operation

#### Quick Start Guide – Login

Windows XP requires that users identify themselves by entering a user name and password in a login window. The instrument provides a factory-installed auto login function, i.e. login is carried out automatically in the background. The ID used for auto login has administrator rights. As user name *instrument* (lowercase) is set. The valid password depends on the firmware version installed.

User:	"instrument" (lower case)	
Password:	"instrument" (lower case)	< V4.45
	"123456"	V4.45, V4.55
	"894129"	≥ V4.65

**Note:** The default password is modified by performing a firmware upgrade. A backgrade to an older firmware version will not restore the old password as it is not known to this firmware version. A password differing from the default value will not be modified during firmware update.

#### Quick Start Guide – Operating System Properties – Special Links

The windows start menu includes following special links

- *"Instrument Driver Actuator"*  
This link forces Windows XP to reload all instrument specific drivers.  
Use this link if a new hardware is not recognized or a problem with the frontpanel keyboard is reported.
- *"LXI Configuration"*  
This link opens a dialog to enable/disable LXI.
- *"R&S Analyzer Interface"*  
This link starts the analyzer application.



- *"Start – Program – Accessories – Sytem Tools – Activate Registry Readonly"*

This link activates function REGISTRY READONLY. Handle this function with care!

This function is only available if the Registry Write Filter package is installed. The installation package is available for Windows XP SP2 or SP3.

More details see chapter SETUP – GENERAL SETUP.

- *"Start – Program – Accessories – Sytem Tools – Dectivate Registry Readonly"*

This link deactivates function REGISTRY READONLY.

This function is only available if the Registry Write Filter package is installed. The installation package is available for Windows XP SP2 or SP3.

More details see chapter SETUP – GENERAL SETUP.

## Menu SETUP – GENERAL SETUP - NEXT

### REGISTRY READ ONLY

The softkey *REGISTRY READ ONLY* activates/deactivates a write protection for the Windows XP registry. Any modification in the windows registry is cashed into RAM and will get lost after reboot if *REGISTRY READ ONLY* is active.

This function is only available if the Registry Write Filter package is installed. The installation package is available for Windows XP SP2 or SP3.

The active write protection is also indicated in dialog SETUP – SYSTEM INFO – STATISTICS.

**Hint:** In addition, it is possible to deactivate/activate the function with the following links:  
*Start – Programs – Accessories – System Tools*  
*Activate Registry Readonly*  
*Deactivate Registry Readonly*

**Warning:** Do not perform any firmware/driver installation if the **REGISTRY READONLY** function is active! This will result in an incomplete installation.

**Remote command:** ---

## Remote Control – Description of the Status Registers

### STATus:OPERation Register

In the CONDition part, this register contains information on which actions the instrument is being executing or, in the EVENT part, information on which actions the instrument has executed since the last reading. It can be read using commands "STATus:OPERation:CONDition?" or "STATus:OPERation[:EVENT]?".

Bit No.	Meaning
0	<b>CALibrating</b> This bit is set as long as the instrument is performing a calibration.
1 to 2	These bits are not used
3	<b>SWEeping</b> This bit is set while the instrument performs a sweep. It is supported in analyzer mode only (Full Screen, frequency domain and time domain).
4	<b>MEASuring</b> This bit is set while the instrument performs a measurement. It is supported in analyzer mode only (Full Screen, frequency domain and time domain).
5	<b>Waiting for TRIGger</b> This bit is set while the instrument is waiting for a trigger. It is supported for I/Q measurements only (TRACE:IQ state activated).
6 to 7	These bits are not used
8	<b>HardCOPy in progress</b> This bit is set while the instrument is printing a hardcopy.
9	This bit is not used
10	<b>Sweep Break</b> This bit is set when end of sweep range is reached (spurious measurement, mode analyzer). Command "INIT:CONM" has to be used to proceed.
11 to 14	These bits are not used
15	This bit is always 0

**STATUS:QUES:POWER Register**

This register comprises all information about possible overloads of the unit. It can be queried with commands STATUS:QUESTIONable:POWer:CONDition? and STATUS:QUESTIONable:POWer[EVENT]?

Bit No.	Meaning
0	<b>OVERload</b> (Screen A) This bit is set if the RF input is overloaded. 'OVLD' will then be displayed.
1	<b>UNDERload</b> (Screen A) This bit is set if the RF input is underloaded. 'UNLD' will then be displayed.
2	<b>IF_OVERload</b> (Screen A) This bit is set if the IF path is overloaded. 'IFOVL' will then be displayed.
3	<b>Overload Trace</b> (Screen A) This bit is set if the input is overloaded (OVLD or IFOVL) and the Trace Modes AVERAGE , MAXHOLD or MINHOLD are active. 'OVTRC' will then be displayed. This bit only clears if the sweep is started again. A temporary overload will therefore be detected, e.g. if the overload condition occurs only on sweep number 10 of 1000 during the average process.
4 to 6	These bits are not used
7	<b>Input Overload</b> This bit is set if the RF input Overload detection becomes active. Use command "INP:ATT:PROT:RES" to re-connect the RF input with the input mixer.
8	<b>OVERload</b> (Screen B) This bit is set if the RF input is overloaded. 'OVLD' will then be displayed.
9	<b>UNDERload</b> (Screen B) This bit is set if the RF input is underloaded. 'UNLD' will then be displayed.
10	<b>IF_OVERload</b> (Screen B) This bit is set if the IF path is overloaded. 'IFOVL' will then be displayed.
11	<b>Overload Trace</b> (Screen B) This bit is set if the input is overloaded (OVLD or IFOVL) and the Trace Modes AVERAGE , MAXHOLD or MINHOLD are active. 'OVTRC' will then be displayed. This bit only clears if the sweep is started again. A temporary overload will therefore be detected, e.g. if the overload condition occurs only on sweep number 10 of 1000 during the average process.
12 to 14	These bits are not used
15	This bit is always 0

## Remote Control – Description of Commands

### DIAGnostic subsystem

#### :DIAGnostic:SERVice:VERSinfo?

This command queries the version information of all available measurement applications.

**Example:** "DIAG:SERV:VERS?" queries the version information.

#### Response:

Instrument Firmware|4.75,  
 BIOS|V2.1-20-1,  
 Image|01.21,  
 Data Sheet|01.01,  
 GSM K5 ANALYZER K5|4.70|permanent,  
 FM DEMODULATOR K7||permanent,  
 BLUETOOTH K8||permanent,  
 POWER METER K9||permanent,  
 NOISE MEASURE K30|4.70|permanent,  
 PHASE NOISE MEASURE K40|4.70|permanent,  
 VECTOR SIGNAL ANALYSIS K70|4.70|permanent,  
 WCDMA BTS ANALYZER K72|4.70|permanent,  
 WCDMA HSDPA BTS K74|4.70|permanent,  
 TD-SCDMA BTS ANALYZER K76|4.70|permanent,  
 TD-SCDMA MS ANALYZER K77|4.70|permanent,  
 CDMA2000 BTS K82|4.70|permanent,  
 CDMA2000 MS K83|4.70|permanent,  
 1X EV DATA ONLY BTS K84|4.70|permanent,  
 1X EV DATA ONLY MS K85|4.70|permanent,  
 WLAN ABG K91|4.70|permanent,  
 FSQ 802\_16E K93|4.70|permanent,  
 FSQ 802\_16 Mimo UPGRADE K94|4.70|permanent,  
 LTE FDD DOWNLINK K100|4.70|permanent

**Characteristics:** \*RST-Wert: -  
 SCPI: device-specific

### MMEMory subsystem (option FS-K72)

#### MMEMory:LOAD<1|2>:IQ:STATe, 1,<file\_name>

This command loads an I/Q data file with format IQW and performs the data analysis. "IQW" is the default extension.

Change to single sweep (INIT:CONT OFF) before loading the file.

Missing samples are filled with 0. As a result a sync error may occur if the IQW file's number of samples is not sufficient. Increase the number of samples for the I/Q capturing in that case.

As soon as a sweep is restarted with "INIT:IMM" the loaded I/Q data are overwritten by the new measurement.

**Note:** This function is available for remote operation only with R&S FSQ and R&S FSG.  
 It requires base system firmware V4.7x SP2 or newer.

**Parameter:** <file\_name> ' path/filename

**Example:** "INST:SEL WCDP;\*WAI" ' change to 3G FDD BS mode  
 "INIT:CONT OFF " ' single sweep

' now load IQW file  
 "MMEM:LOAD:IQ:STAT 1, 'D:\WCDMA0\_P25';\*OPC?"  
**Characteristics:** \*RST value: -  
 SCPI: device-specific

This command is an event and therefore has no \*RST value and no query.

## MMEMory subsystem

### MMEMory:STORe<1|2>:IQ:STATe, 1,<file\_name>

This command stores measured I/Q data in the specified file with format "IQ.TAR". It is required to perform an I/Q measurement before saving the data.

This command is available only for I/Q measurements with the TRACE:IQ sub system.

Use TRAC:IQ:CONV to perform a resampling (in terms of sample rate / frequency offset) and create IQW files to be used in other applications (e.g. K10, K72 or K100).

More details see description of command TRAC:IQ:CONV.

**Parameter:** <file\_name> ' path/filename without extension

**Example:** "TRAC:IQ:STAT ON" ' activate I/Q capture mode  
 "TRAC:IQ:DATA:FORM IQP" ' I/Q Format I/Q Pair  
 "TRAC:IQ:SET NORM,50MHz,81.6MHz,IMM,POS,0,10000"  
 ' Trigger Free Run  
 ' Sample Rate 81.6 MHz  
 ' Pre Trigger 0 samples  
 "INIT:IMM;\*OPC?" ' perform the I/Q measurement  
 "MMEM:STOR:IQ:STAT 1, 'D:\RAWIQ' "  
 ' Save the I/Q Data into file  
 ' D:\RAWIQ.IQ.TAR

**Characteristics:** \*RST value: -  
 SCPI: device-specific

This command is an event and therefore has no \*RST value and no query.

## TRACe subsystem

### :TRACE<1|2>[:DATA]:MEMory? TRACE1 | TRACE2 | TRACE3, <offset>, <number\_of\_points>

This query command reads a part of the trace data out of the instrument. <offset> defines the start of the readout. <number\_of\_points> defines the number of points to be read.

This command is only available in analyzer mode (frequency- and time domain). In case of I/Q capturing with TRACE:IQ state ON, use TRAC:IQ:DATA:MEM? instead.

**Example:** "\*RST" ' preset analyzer  
 "INIT:CONT OFF" ' set to single sweep  
 "SENS:SWE:POIN 1001" ' set number of points to 1001  
 "INIT:IMM;\*WAI" ' perform a sweep and wait for sweep end  
 "TRAC:MEM? TRACE1, 0, 100"  
 ' read out the first 100 points ( index 0 ..99)  
 "TRAC:MEM? TRACE1, 901,100"  
 ' read out the last 100 points (index 901 .1000)

<b>Characteristics:</b>	*RST-Wert:	-
	SCPI:	device-specific

## TRACe:IQ subsystem

### :TRACe<1|2>:IQ:TPISample?

This command determines the time offset of the trigger in the sample (trigger position in sample = TPIS). This value can only be determined in triggered I/Q measurements using external or IFPower triggers, otherwise the value is 0. The value is not user-definable.

**Example:**

```

**RST"
"TRAC:IQ:STAT ON"           ' activate I/Q capture mode
"TRAC:IQ:DATA:FORM IQP"     ' format I/Q pairs
"TRAC:IQ:SET NORM,10MHz,32MHz,EXT,POS,100,1024"
                              ' EXT Trigger
                              ' Sample Rate 32 MHz
                              ' 100 Pre Trigger samples
"TRAC:IQ:DATA?"             ' perform the measurement and read I/Q data
"TRAC:IQ:TPIS?"             ' read the timing correction value

```

<b>Characteristics:</b>	*RST-Wert:	-
	SCPI:	device-specific

### :TRACe<1|2>:IQ:CONVert <source\_file>, <standard>, <delta freq>, <dest\_file>

This command performs a resampling of previously measured and saved I/Q data and creates an IQW file to be loaded by the measurement applications FS-K10, FS-K72 or FSQ-K10x.

The command is only available in analyzer mode.

To analyze a Multi Standard Radio Signal (a mixed GSM/WCDMA and/or LTE signal) perform the following steps:

- Capture the I/Q data using TRACE:IQ subsystem with the required bandwidth / sample rate / pre trigger time (= pre trigger samples) / measurement time (= number of samples). The pre trigger time must be at least 2.9 ms.
- Store the I/Q data as IQ.TAR file
- Resample the I/Q data (for certain standard(s)/signal frequency offset(s)) to IQW file(s)
- Activate the related application, load the I/Q data file and perform the analysis of the signal(s)
- Repeat the analysis with the next application (for mixed standard signals)

<b>Parameter:</b>	<source_file>	Data source path/filename with format "IQ.TAR"
	<standard>	Type of signal <ul style="list-style-type: none"> <li>0 - GSM K10</li> <li>1 - WCDMA K72</li> <li>2 - LTE K10X BW 1.4 MHz</li> <li>3 - LTE K10X BW 3 MHz</li> <li>4 - LTE K10X BW 5 MHz</li> <li>5 - LTE K10X BW 10 MHz</li> <li>6 - LTE K10X BW 15 MHz</li> <li>7 - LTE K10X BW 20 MHz'</li> </ul>
	<delta freq>	Signal frequency offset (in relation to analyzer center frequency used to capture the IQ data)
	<dest_file>	Destination path/file name with file format "IQW"

The example below shows a measurement for 2 WCDMA signals at -2.5MHz and +2.5MHz frequency offset.

```

Example:      "*RST"
                  ' STEP1:
                  ' set Center Freq./Ref Level/...
                  '
                  "SENS:FREQ:CENT 1GHz"      ' set Center / Ref Level
                  "SENS:FREQ:SPAN 0Hz"       ' Zerospan
                  "TRAC:Y:RLEV -20.0dBm"

                  ' STEP2:
                  ' Capture data with extended I/Q Bandwidth
                  "TRAC:IQ:STAT ON"          ' activate I/Q capture mode
                  "TRAC:IQ:DATA:FORM IQP"    ' I/Q Format I/Q Pair
                  "TRAC:IQ:SET NORM,50MHz,81.6MHz,IMM,POS,240000,1870000"
                  ' Trigger Free Run
                  ' Sample Rate 81.6 MHz
                  ' Pre Trigger Samples:
                  ' for 2.9 ms pretrigger time
                  ' Number of Samples:
                  ' to capture for 23ms
                  "INIT:IMM;*OPC? "          ' perform the I/Q measurement

                  ' STEP3:
                  ' Store I/Q Data into IQ.TAR file
                  "MMEM:STOR:IQ:STAT 1, 'D:\RAWIQ' "
                  ' Store data to file
                  ' D:\RAWIQ.IQ.TAR

                  ' STEP4:
                  ' Resample IQ Data
                  "MMEM:CONV:IQ 'D:\RAWIQ', 1, 2.5e6, 'D:\WCDMA_P25'
                  ' WCDMA, Offset +2.5MHz
                  "MMEM:CONV:IQ 'D:\RAWIQ', 1, -2.5e6, 'D:\WCDMA_N25'
                  ' WCDMA, Offset -2.5MHz

                  ' STEP5:
                  ' Analyse I/Q data

                  ' analyse the WCDMA signals at
                  ' offset +2.5 MHz / -2.5 MHz
                  "INST:SEL WCDP;*OPC? "     ' enter K72
                  "INIT:CONT OFF"            ' set to single sweep
                  "MMEM:LOAD:IQ:STAT 1, 'D:\WCDMA_P25'"
                  ' load and analyse
                  ' Offset+2.5MHz file
                  ' now query required results
                  "MMEM:LOAD:IQ:STAT 1, 'D:\WCDMA_N25'"
                  ' load and analyse
                  ' Offset-2.5MHz file
                  ' now query required results
                  "INST:SEL SAN;*OPC?"       ' leave K72

```

**Characteristics:** \*RST-Wert: -  
**SCPI:** device-specific

## PSA Emulation with commands especially for the Agilent 89600 Software

Supported 89600 commands	Status
*CAL?	available in V4.65 SP2 and above
*CLS	available in V4.65 SP2 and above
*ESE	available in V4.65 SP2 and above
*ESR?	available in V4.65 SP2 and above
*IDN?	available in V4.65 SP2 and above
*IST?	available in V4.65 SP2 and above
*OPC	available in V4.65 SP2 and above
*OPT?	available in V4.65 SP2 and above
*PCB	available in V4.65 SP2 and above
*PRE	available in V4.65 SP2 and above
*PSC	available in V4.65 SP2 and above
*RST	available in V4.65 SP2 and above
*SRE	available in V4.65 SP2 and above
*STB?	available in V4.65 SP2 and above
*TRG	available in V4.65 SP2 and above
*TST?	available in V4.65 SP2 and above
*WAI	available in V4.65 SP2 and above
:CALibration:AUTO OFF ON ALERT	available in V4.65 SP2 and above
:CALibration:TCORrections AUTO ON OFF	available in V4.65 SP2 and above
:CONFigure:WAVEform	available in V4.65 SP2 and above
:DIAGnostic:EABY ON OFF	available in V4.65 SP2 and above
:DIAGnostic:LATCh:VALue <numeric>	available in V4.65 SP2 and above
:DIAGnostic:LATCh:SElect <string>	available in V4.65 SP2 and above
:DISPlay:ANNotation:TITLe:DATA <string>	available in V4.65 SP2 and above



Supported 89600 commands	Status
:DISPlay:ENABle OFF ON	available in V4.65 SP2 and above
:DISPlay:WINDow:TRACe:Y:[SCALe]:PDIVision <numeric>	available in V4.65 SP2 and above
:DISPlay:WINDow:TRACe:Y:[SCALe]:RLEVel <numeric>	available in V4.65 SP2 and above
:DISPlay:WINDow:TRACe:Y:[SCALe]:RLEVel:OFFSet <numeric>	available in V4.65 SP2 and above
:FORMat:BORDER NORMAl SWAPped	available in V4.65 SP2 and above
:FORMat[:DATA] ASCii REAL UINT MATLAB,<numeric>	available in V4.65 SP2 and above
:INITiate:CONTinuous OFF ON	available in V4.65 SP2 and above
:INITiate[:IMMEDIATE]	available in V4.65 SP2 and above
:INSTrument:CATalog?	available in V4.65 SP2 and above
:INSTrument:NSElect <numeric>	available in V4.65 SP2 and above
:MMEMory:CATalog? <dir_name>	available in V4.65 SP2 and above
:MMEMory:COPY <'file_name1'>,<'file_name2'>	available in V4.65 SP2 and above
:MMEMory:DATA <'file_name'>,<definite_length_block>	available in V4.65 SP2 and above
:MMEMory:DELeTe <'file_name'>	available in V4.65 SP2 and above
:MMEMory:LOAD:STATe 1,<'file_name'>	available in V4.65 SP2 and above
:MMEMory:LOAD:TRACe 1,<'file_name'>	available in V4.65 SP2 and above
:MMEMory:MDIRectory <'dir_name'>	available in V4.65 SP2 and above
:MMEMory:MOVE <'file_name1'>,<'file_name2'>	available in V4.65 SP2 and above
:MMEMory:STORE:STATe 1,<'file_name'>	available in V4.65 SP2 and above
:MMEMory:STORE:TRACe <numeric>,<'file_name'>	available in V4.65 SP2 and above
:READ:WAVform?	available in V4.65 SP2 and above
[[:SENSe]:FREQuency:CENTer <numeric>	available in V4.65 SP2 and above
[[:SENSe]:FREQuency:STARt <numeric>	available in V4.65 SP2 and above
[[:SENSe]:FREQuency:STOP <numeric>	available in V4.65 SP2 and above
[[:SENSe]:FREQuency:SPAN <numeric>	available in V4.65 SP2 and above
[[:SENSe]:POWer:ATTenuation <numeric>	available in V4.65 SP2 and above

Supported 89600 commands	Status
[.SENSe]:ROSCillator:EXTErnal:FREQuency <numeric>	available in V4.65 SP2 and above
[.SENSe]:ROSCillator:OUTPut OFF ON	available in V4.65 SP2 and above
[.SENSe]:ROSCillator:SOURce INTernal EXTernal EAUTo	available in V4.65 SP2 and above
[.SENSe]:SPECtrum:TRIGger:SOURce EXTErnal<1 2> IF IMMediate	available in V4.65 SP2 and above
[.SENSe]:WAVeform:ADC:RANGe P6	available in V4.65 SP2 and above
[.SENSe]:WAVeform:APER?	available in V4.65 SP2 and above
[.SENSe]:WAVeform:AVERage:TACount <numeric>	available in V4.65 SP2 and above
[.SENSe]:WAVeform:BWIDth:ACTive?	available in V4.65 SP2 and above
[.SENSe]:WAVeform:BWIDth:TYPE FLAT GAUSSian	available in V4.65 SP2 and above
[.SENSe]:WAVeform:IFGain <numeric>	available in V4.65 SP2 and above
[.SENSe]:WAVeform:IFPath NARRow WIDE	available in V4.65 SP2 and above
[.SENSe]:WAVeform:NCPTTrace ON OFF	available in V4.65 SP2 and above
[.SENSe]:WAVeform:PDIT ON OFF	available in V4.65 SP2 and above
[.SENSe]:WAVeform:SRATe <numeric>	available in V4.65 SP2 and above
[.SENSe]:WAVeform:SWEep:TIME <numeric>	available in V4.65 SP2 and above
[.SENSe]:WAVeform:TRIGger:EOFFset?	available in V4.65 SP2 and above
[.SENSe]:WAVeform:TRIGger:INTerpolation ON OFF	available in V4.65 SP2 and above
[.SENSe]:WAVeform:TRIGger:SOURce EXTErnal<1 2> IF IMMediate	available in V4.65 SP2 and above
:STATus:QUEStionable:CONDition?	available in V4.65 SP2 and above
:STATus:QUEStionable:ENABLE <number>	available in V4.65 SP2 and above
:STATus:QUEStionable:NTRansition <number>	available in V4.65 SP2 and above
:STATus:QUEStionable:PTRansition <number>	available in V4.65 SP2 and above
:STATus:QUEStionable[:EVENT]?	available in V4.65 SP2 and above
:STATus:QUEStionable:CALibration:CONDition?	available in V4.65 SP2 and above
:STATus:QUEStionable:CALibration:ENABLE <number>	available in V4.65 SP2 and above
:STATus:QUEStionable:CALibration:NTRansition <number>	available in V4.65 SP2 and above

Supported 89600 commands	Status
:STATus:QUESTionable:CALibration:PTRansition <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:CALibration[:EVENT]?	available in V4.65 SP2 and above
:STATus:QUESTionable:FREQuency:CONDition?	available in V4.65 SP2 and above
:STATus:QUESTionable:FREQuency:ENABLE <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:FREQuency:NTRansition <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:FREQuency:PTRansition <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:FREQuency[:EVENT]?	available in V4.65 SP2 and above
:STATus:QUESTionable:INTEgrity:CONDition?	available in V4.65 SP2 and above
:STATus:QUESTionable:INTEgrity:ENABLE <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:INTEgrity:NTRansition <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:INTEgrity:PTRansition <number>	available in V4.65 SP2 and above
:STATus:QUESTionable:INTEgrity[:EVENT]?	available in V4.65 SP2 and above
:STATus:OPERation:CONDition?	available in V4.65 SP2 and above
:STATus:OPERation:ENABLE <integer>	available in V4.65 SP2 and above
:STATus:OPERation:NTRansition <integer>	available in V4.65 SP2 and above
:STATus:OPERation:PTRansition <integer>	available in V4.65 SP2 and above
:STATus:OPERation[:EVENT]?	available in V4.65 SP2 and above
:SYSTem:COMMunicate:GPIB[:SELF]:ADDRes <integer>	available in V4.65 SP2 and above
:SYSTem:DATE <year>,<month>,<day>	available in V4.65 SP2 and above
:SYSTem:ERRor[:NEXT]?	available in V4.65 SP2 and above
:SYSTem:KLOCK?	available in V4.65 SP2 and above
:SYSTem:MESSage <string>	available in V4.65 SP2 and above
:SYSTem:PRESet	available in V4.65 SP2 and above
:SYSTem:TIME <hour>,<minute>,<second>	available in V4.65 SP2 and above
:SYSTem:VERSion?	available in V4.65 SP2 and above
:TRACe:COpy <src_trace>,<dest_trace>	available in V4.65 SP2 and above

Supported 89600 commands	Status
:TRACe[:DATA] TRACE1   TRACE2   TRACE3   TRACE4   TRACE5   TRACE6, <definite_length_block>   <comma_separated_ASCII_data>	available in V4.65 SP2 and above
:TRACe:MODE WRITe MAXHold MINHold VIEW BLANK	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:DELay <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:DELay:STATe OFF ON 0 1	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:EXTernal:DELay <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:EXTernal:LEVel <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:EXTernal:SLOPe POSitive NEGative	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:HOLDoff <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:IF:DELay <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:IF:LEVel <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:IF:SLOPe POSitive NEGative	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:SLOPe POSitive NEGative	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:SOURce IMMEDIATE VIDeo EXTernal<1 2>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:VIDeo:LEVel <numeric>	available in V4.65 SP2 and above
:TRIGger[:SEQuence]:VIDeo:LEVel:FREQuency <freq>	available in V4.65 SP2 and above

# R&S FS-K7 Extensions

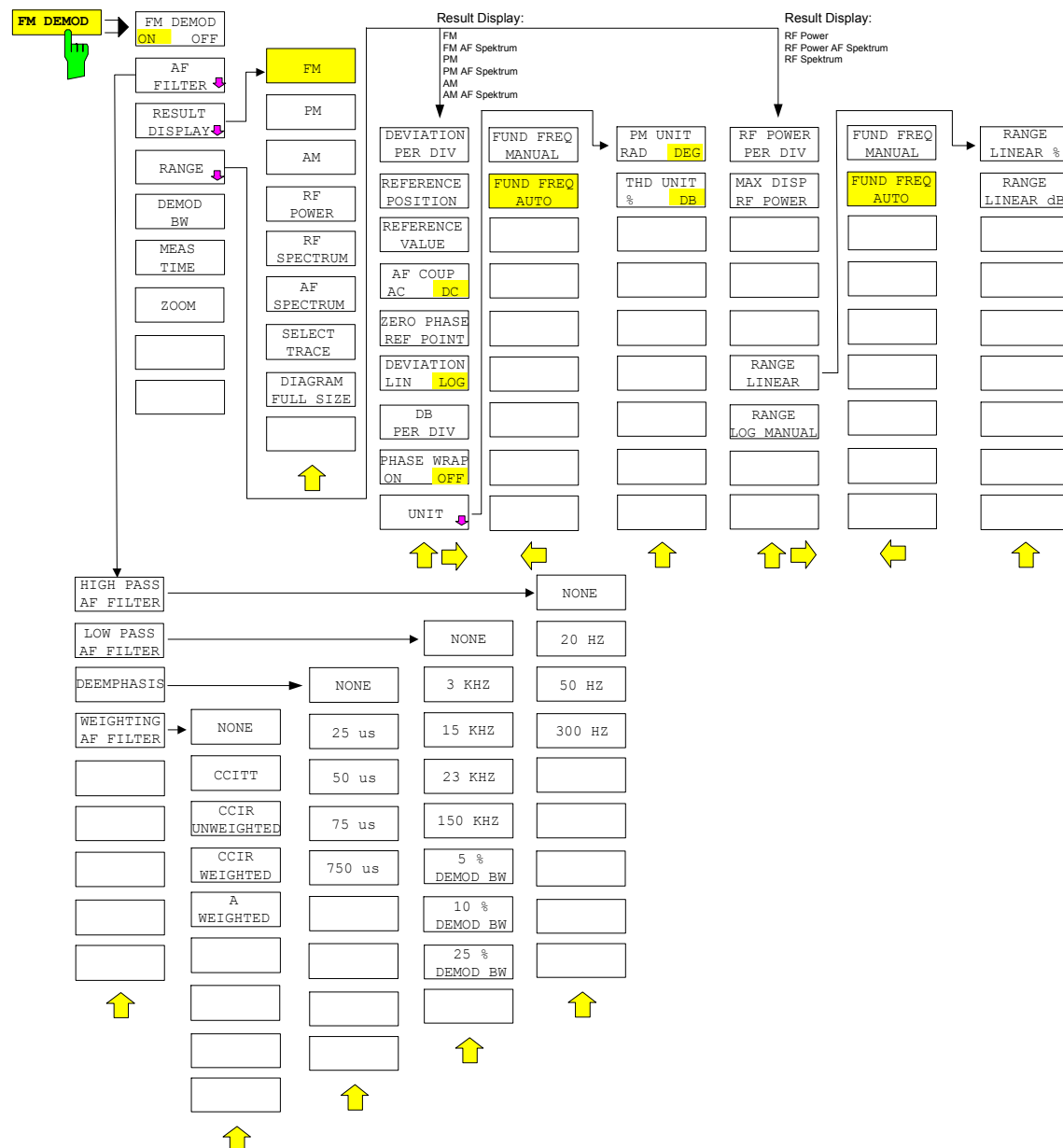
## Operating Manual "FM Measurement Demodulator R&S FS-K7":

- 1141.1821.42-06 (English). and
- 1141.1821.41-06 (German)

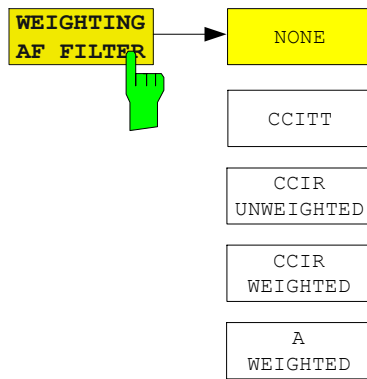
The corresponding PDF-Files are separately available on the service board.

## Last minute changes to the R&S FS-K7 operating manual

### FM Demodulator Main Menu



## Selection of Filter and Deemphasis – AF FILTER Menu



The *WEIGHTING AF FILTER* softkey opens the submenu for selecting the weighting filter.

**NONE:** Deactivates the weighting filter. This is the default setting.

**CCITT:** Switches on a CCIT P.53 weighting filter. The weighting filter is active in the following demodulation bandwidth range:

$$20 \text{ kHz} \leq \text{demodulation bandwidth} \leq 3 \text{ MHz}$$

**CCIR UNWEIGHTED:** Switches on the CCIR unweighted filter, which is the combination of the 20 Hz highpass and 23 kHz low pass filter. The weighting filter is active in the following demodulation bandwidth range:

$$50 \text{ kHz} \leq \text{demodulation bandwidth} \leq 1.6 \text{ MHz}$$

**CCIR WEIGHTED:** Switches on the CCIR weighted filter. The weighting filter is active in the following demodulation bandwidth range:

$$100 \text{ kHz} \leq \text{demodulation bandwidth} \leq 3 \text{ MHz}$$

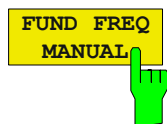
**A WEIGHTED:** Switches on the A weighted filter. The weighting filter is active in the following demodulation bandwidth range:

$$100 \text{ kHz} \leq \text{demodulation bandwidth} \leq 800 \text{ kHz}$$

### Remote commands:

```
:SENSe:FILTer:CCIR[:UNWeighted][:STATe] ON | OFF
:SENSe:FILTer:CCIR:WEIGHTed[:STATe] ON | OFF
:SENSe:FILTer:CCITt[:STATe] ON | OFF
:SENSe:FILTer:AWEighted[:STATe] ON | OFF
```

## Menu RANGE – NEXT



The *FUND FREQ MANUAL / FUND FREQ AUTO* softkeys switches between automatic or manual selection of the fundamental frequency used for the SINAD and THD calculations. With automatic selection the peak in the AF spectrum is used as the fundamental frequency.

When switching from AUTO to MANUAL the current modulation frequency result is used as a default if the measurement result is available at this time.

These softkeys are available, if result *AF SPECTRUM* is switched on.



### Remote commands:

```
:CALC:ADEM:THD:FREQ:FUND:AUTO ON | OFF
:CALC:ADEM:THD:FREQ:FUND:VALue <numeric value>
```

## Remote Control – Description of Commands

### CALCulate<1|2>:ADEMod:THD:FREQuency:FUNDamental:AUTO[:STATe] ON | OFF

This command switches between automatic or manual selection of the fundamental frequency used for the SINAD and THD calculations. With automatic selection the peak in the AF spectrum is used as the fundamental frequency.

When switching the auto state off, the current modulation frequency result is used as a default for CALC:ADEM:THD:FREQ if the measurement result is available at this time.

This command is available, if Result *AF SPECTRUM* is switched on.

**Example:** "CALC:ADEM:THD:FREQ:FUND:AUTO OFF" 'deactivates the auto se  
'lection and uses the  
'current Modulation Freq.  
'as fundamental frequency.  
"CALC:ADEM:THD:FREQ:FUND:VAL 1kHz" 'set the fundamental  
'frequency.

**Characteristics:** \*RST-Wert: ON  
SCPI: device-specific

### CALCulate<1|2>:ADEMod:THD:FREQuency:FUNDamental:VALue ON | OFF

This command sets the fundamental frequency used for the SINAD and THD calculations.

The query command is available only with "CALC:ADEM:THD:FREQ:FUND:AUTO OFF".

**Example:** "CALC:ADEM:THD:FREQ:FUND:AUTO OFF" 'deactivates the auto se  
'lection and uses the  
'current Modulation Freq.  
'as fundamental frequency.

**Characteristics:** \*RST-Wert: ON  
SCPI: device-specific

The numeric suffix <1 to 4> at marker is irrelevant with this command.

### :SENSe<1|2>:FILTer:AWeighted[:STATe] ON | OFF

This command activates/deactivates the A weighted filter. The weighting filter is active in the following demodulation bandwidth range:

100 kHz ≤ demodulation bandwidth ≤ 800 kHz

**Example:** ":SENS:FILT:AW ON" 'activates the A weighted filter

**Characteristics:** \*RST-Wert: OFF  
SCPI: device-specific

The numeric suffix <1|2> is irrelevant with this command.

### :SENSe<1|2>:FILTer:CCIR[:UNWeighted][:STATe] ON | OFF

This command activates/deactivates the CCIR unweighted filter which is the combination of the 20 Hz highpass and 23 kHz low pass filter. The filter is active in the following demodulation bandwidth range:

50 kHz ≤ demodulation bandwidth ≤ 1.6 MHz

**Example:** "SENS:FILT:CCIR ON" 'activates the unweighted CCIR filter

**Characteristics:** \*RST-Wert: OFF  
SCPI: device-specific

The numeric suffix <1|2> is irrelevant with this command.

**:SENSe<1|2>:FILTeR:CCIR:WEIGhted[:STATe]** ON | OFF

This command activates/deactivates the CCIR weighted filter. The filter is active in the following demodulation bandwidth range:

$100 \text{ kHz} \leq \text{demodulation bandwidth} \leq 3 \text{ MHz}$

**Example:** "SENS:FILT:CCIR:WEIG ON" ' activates the weighted CCIR filter

**Characteristics:** \*RST-Wert: OFF  
SCPI: device-specific

The numeric suffix <1|2> is irrelevant with this command.

## R&S FS-K8 Extensions

**Operating Manual "Application Firmware for Bluetooth Measurements R&S FS-K8":**

- 1157.2597.42-03 (English). and
- 1157.2597.41-03 (German)

The corresponding PDF-Files are separately available on the service board.

## Last minute changes to the R&S FS-K8 operating manual

None.



## R&S FS-K9 Extensions

In addition to the normal function of *MEAS->REF* and *REFERENCE VALUE* softkeys the unit of the power sensor display is changed from the absolute unit dBm or Watt to the relative unit dB or %. Use the *UNIT/SCALE* key if absolute units are required again.

### Software Manual "Measurements with Power Sensors, Application Firmware R&S FS-K9":

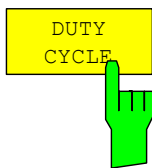
- 1157.3029.42-04 (English). and
- 1157.3029.44-04 (German)

The corresponding PDF-Files are separately available on the service board.

## Last minute changes to the R&S FS-K9 operating manual

None.

### Menu PWR METER - NEXT

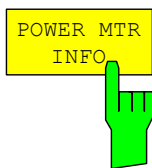


The DUTY CYCLE softkey opens a dialog to set the duty cycle to a percent value for the correction of pulsemodulated signals. With the correction activated, the sensor calculates the signal pulse power from this value and the mean power. The softkey is highlighted if the correction is switched on. Press the softkey again to switch the Duty Cycle correction off.

Valid entries are from 0.001 % to 99.999%; the stepsize is 0.1 %; the maximum resolution for numerical entries is 0.001 dB. The default setting is 99.999%

#### Remote command:

SENSe1:PMETer:DCYCLe:STATe ON | OFF  
SENSe1:PMETer:DCYCLe:VALue 0.001 ... 99.999 PCT



The POWER MTR INFO softkey open a list showing details of the power sensor:

POWER METER INFO	
Type	NRP-Z11
Serial Number	100057
Order Number	1138.3004.02

Remote command: -

## Remote Control Commands

### :**[SENSe<1|2>:]PMETer:DCYClE:STATe** ON | OFF

This command controls the calculation of the signal pulse power from the mean power. The duty cycle has to be set by SENS:PMET:DCYC:VAL according to characteristics of the input signal if the calculation is switched on.

**Example:**

" :SENS:PMET:STAT ON"	' activate power meter
" :SENS:PMET:DCYC:STAT ON"	' switch the correction on
" :SENS:PMET:DCYC:VAL 50.0"	' set the duty cycle to 50 %

**Properties:**

*RST value:	OFF
SCPI:	device-specific

### :**[SENSe<1|2>:]PMETer:DCYClE:VALue** 0.001 ... 99.999

This command sets the duty cycle to a percent value for the correction of pulsemodulated signals. With the correction activated (SENS:PMET:DCYC:STAT ON), the sensor calculates the signal pulse power from this value and the mean power. Valid entries are from 0.001% to 99.999%; the stepsize is 0.1%; the maximum resolution for numeral entries is 0.001%. The default setting is 99.999%

**Example:**

" :SENS:PMET:STAT ON"	' activate power meter
" :SENS:PMET:DCYC:STAT ON"	' switch the correction on
" :SENS:PMET:DCYC:VAL 50.0"	' set the duty cycle to 50 %

**Properties:**

*RST value:	99.999 PCT
SCPI:	device-specific

## R&S FS-K15 Extensions

The R&S FS-K15 VOR/ILS Avionics Measurements Application functions are included in a separate manual set. Please refer to the following order numbers:

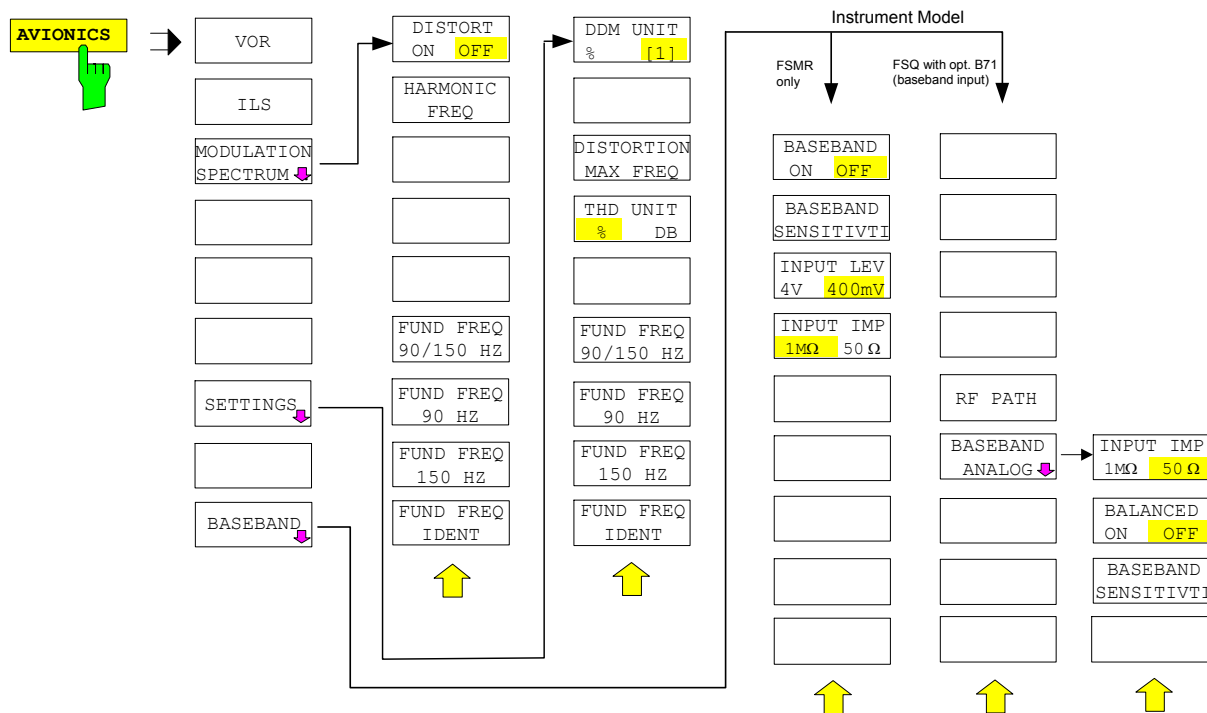
### Operating Manual "VOR/ILS Avionics Measurements Application Firmware R&S FS-K15":

- 1302.0942.42-02 (English)

The corresponding PDF-File ist separately available on the service board.

## Last minute changes to the R&S FS-K15 operating manual

### Avionics Demodulator Mode



All FSQ baseband specific softkeys are moved to a separate sub menu.

## R&S FSQ-B71 Extensions

## Last minute changes to the operating manual "Analog Baseband Input R&S FSQ-B71"

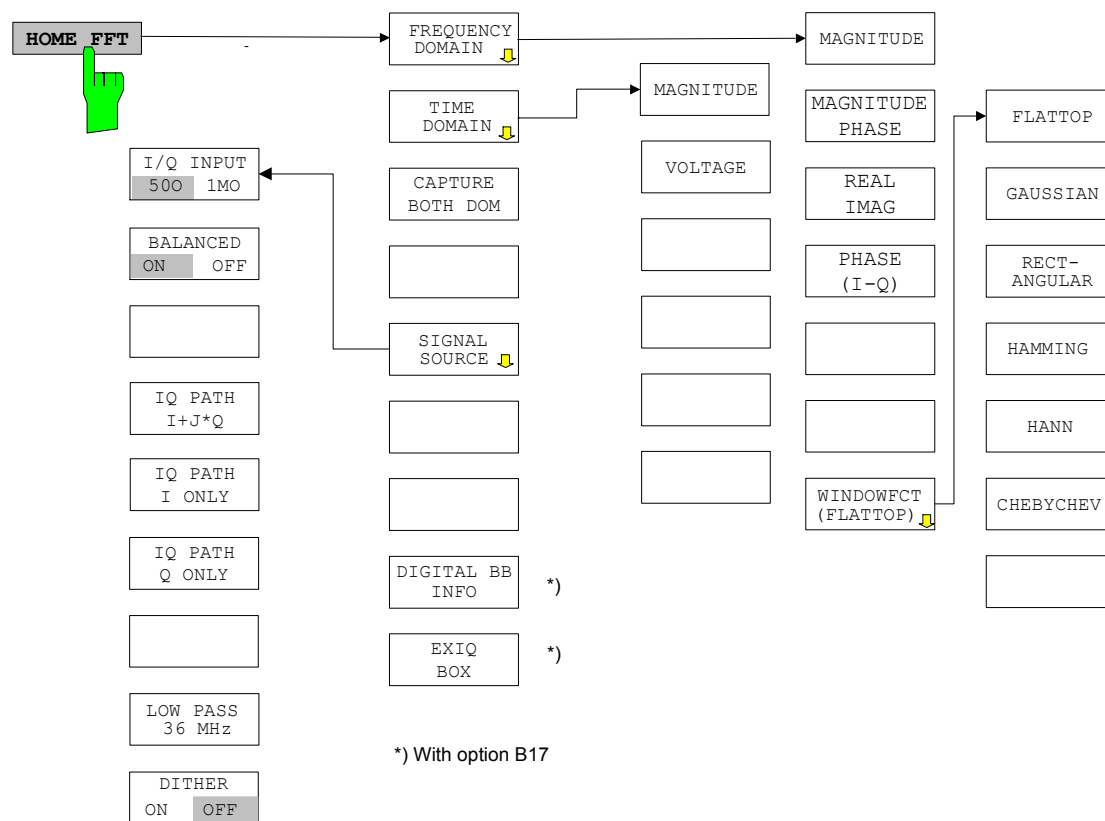
The order numbers for the manual set is:

## Operating Manual "Analog Baseband Input R&S FSQ-B71":

- 1157.0220.52-03 (English). and
- 1157.0220.54-03 (German)

The corresponding PDF-Files are separately available on the service board.

## Overview of menus



## Menu SETUP – SIGNAL SOURCE - NEXT

SETUP	SIGNAL SOURCE ↕	YIG FILTER ON OFF	
		RF PATH	
		BASEBAND ANALOG ↕	I/Q INPUT 50Ω / 1MΩ
			BALANCED ON / OFF
			IQ PATH I+j*Q
			IQ PATH I ONLY
			IQ PATH Q ONLY
			LOW PASS 36 MHz
			DITHER ON / OFF
		BASEBAND DIGITAL ↕	
		DIGITAL BB INFO	
		EX-IQ-Box	

## RF PATH

The softkey RF PATH selects the RF Input Path of the analyzer. This softkey is not available for the FFT analyzer mode.

**Note:** This softkey is only available with option FSQ-B17 or FSQ-B71.

**Remote command:** INPut<1|2>:SElect AIQ | DIQ | RF

## BASEBAND ANALOG

The softkey BASEBAND ANALOG opens a menu to configure the analog baseband input.

**Note:** This softkey is only available with option R&S FSQ-B71. Refer to the R&S FSQ-B71 Manual for more details.

**Remote command:** INPut<1|2>:SElect AIQ | DIQ | RF

## BASEBAND DIGITAL

The softkey BASEBAND DIGITAL opens a menu to configure the digital baseband input.

**Note:** This softkey is only available with option R&S FSQ-B17. Refer to the R&S FSQ-B17 Manual for more details.

## DIGITAL BB INFO

The softkey DIGITAL BB INFO opens a window to display the status information of the connected digital baseband device (input or output).

**Note:** This softkey is only available with option R&S FSQ-B17. Refer to the R&S FSQ-B17 Manual for more details.

## EXIQ BOX

The softkey opens a dialog to configure an R&S EX-IQ-Box connected to the digital baseband Input or Output.

**Note:** This softkey is only available with option R&S FSQ-B17. Refer to the R&S FSQ-B17 Manual for more details.

## Digital Down Converter for low carrier frequency using Baseband Inputs

The R&S FSQ-B71 Option (baseband input) is capable of mixing signals from low carrier frequencies (e.g. low IF signals) towards baseband. The allowed center frequency range is -35 MHz to +35 MHz. Both real-valued and complex-valued signals are supported.

The baseband signal is sampled, mixed from desired center frequency towards baseband and resampled towards the desired sample rate (cf. R&S FSQ-B71 functional description).

### Limitation of center frequency range depending on signal bandwidth:

Center frequency and sample rate are adjustable independently, though there are some restrictions to take care of:

The lower limit of the center frequency depends on the sideband suppression that is needed for a particular measurement application. To avoid overlap of the two sidebands of a real-valued signal, the theoretical lower limit of the intermediate frequency is **half the signal bandwidth**.

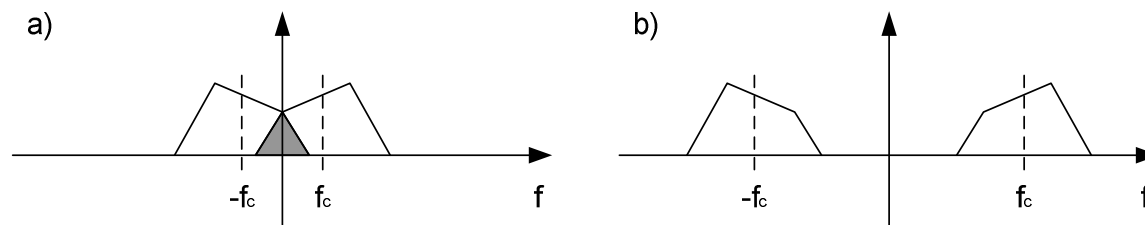


Fig. 1 Dependency between signal bandwidth and carrier frequency

The carrier frequency  $f_c$  in Fig. 1 - a) is lower than half the signal bandwidth, resulting in sideband overlap. The carrier frequency  $f_c$  in Fig. 1 - b) is high enough to separate the two sidebands.

In practice, the intermediate frequency must be increased for lower sideband crosstalk (limited filter edge steepness). All spectral components of the opposite sideband must be above the decimation filter stop band frequency. Thus, the center frequency must be higher than  $0.5 \times (\text{stop band frequency} + 0.5 \times \text{signal bandwidth})$ . The stop band frequency depends on the desired output sample rate and is specified in the following table:

Sampling rate from to		Decimation filter stop band frequency
81.6 MHz	>40.8 MHz	0.53 sample rate
40.8 MHz	>20.4 MHz	0.42 sample rate
20.4 MHz	>10.2 MHz	0.53 sample rate
10.2 MHz	>5.1 MHz	0.53 sample rate
5.1 MHz	>2.55 MHz	0.53 sample rate
2.55 MHz	>1.275 MHz	0.53 sample rate
1.275 MHz	>0.6375 MHz	0.53 sample rate
0.6375 MHz	>318.75 kHz	0.53 sample rate
318.75 kHz	>159.375 kHz	0.53 sample rate
159.375 kHz	>79.6875 kHz	0.53 sample rate
79.6875 kHz	>39.84375 kHz	0.53 sample rate
39.84375 kHz	>19.921875 kHz	0.53 sample rate
19.921875 kHz	10 kHz	0.53 sample rate

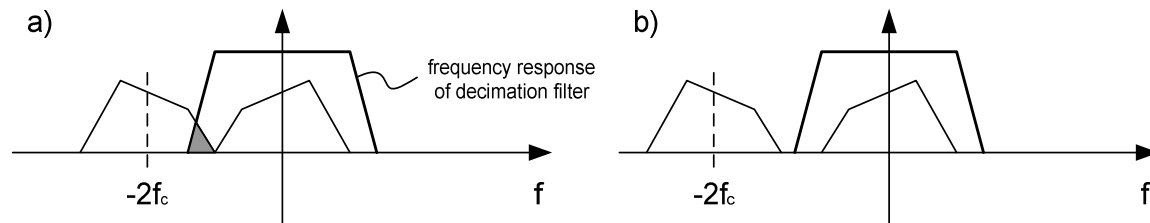


Fig. 2 Unwanted part of the opposite sideband real valued signals

In the signal shown in Fig. 2 - a) an unwanted part of the opposite sideband remains after decimation filtering, while figure Fig. 2 - b) depicts a decimation filtered signal free from sideband crosstalk.

The upper limit of the carrier frequency is specified by the available baseband input bandwidth. The entire signal spectrum must fit into the baseband input bandwidth, so the carrier frequency may not exceed  $\pm 0.5 \times (\text{baseband input bandwidth} - \text{signal bandwidth})$

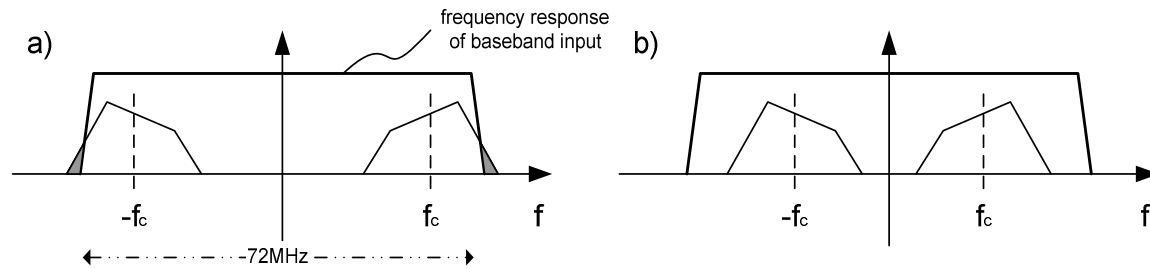
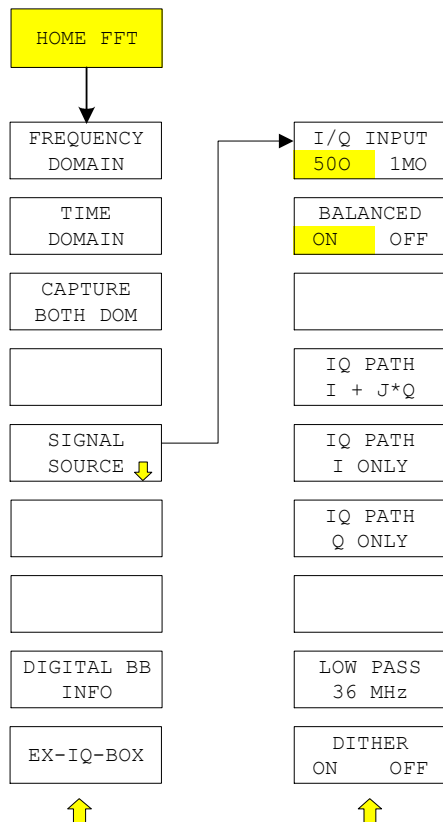


Fig. 3 Signal bandwidth exceeds baseband input bandwidth of option FSQ-B71.

In Fig. 3 - a) the signal spectrum is cut, because it exceeds the baseband input bandwidth of . Fig. 3 - b) shows a signal fitting entirely into the baseband input bandwidth.

#### Signal bandwidth limitation for real-valued input signals:

A theoretical upper bandwidth limit for an input signal on the lowest possible intermediate frequency ( $= 0.5 \times \text{signal bandwidth}$ ) is given by **the half of the baseband input bandwidth ( Fig. 4 )**.



Since firmware version V3.85, it is possible to set the type of baseband input signal (menu SETUP) and the center frequency in the range of 0 .... 35 MHz (I only, Q only) or -35 MHz to 35 MHz (I+j\*Q).

This function is supported in all applications but FS-K30 and FS-K40.

The PRESET settings are:

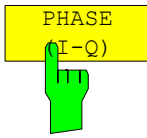
- signal path: I+j\*Q
- center frequency: 0 Hz

#### Remote command:

INP:IQ:TYPE IJQ | I | Q



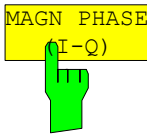
## Menu FFT HOME – FREQUENCY DOMAIN



Softkey PHASE activates the phase difference measurement between two scalar input signals connected to input I and input Q. Select signal source *I Only* to get the phase difference I-Q and *Q Only* for Q-I.

This function is only available if BOTH DOMAIN is switched on and if signal source is not set to I+j\*Q.

IEC/IEEE bus command:      CALCulate:FORMat DPHase



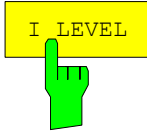
Softkey MAGN PHASE activates the phase difference/magnitude difference measurement between two scalar input signals connected to input I and input Q. Select signal source *I Only* to get the phase difference I-Q and *Q Only* for Q-I.

The upper window (Screen A) shows the phase difference. The lower window (Screen B) shows the magnitude difference.

This function is only available if BOTH DOMAIN is switched on and if signal source is not set to I+j\*Q.

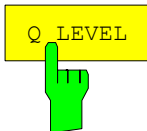
IEC/IEEE bus command:      CALCulate:FORMat DMPHase

## Menu TRIGGER



I LEVEL uses the real part of the signal as a trigger source. This function is only available in time domain - voltage, if BOTH DOMAIN is switched off. In case of trigger instability increase sweep time.

IEC/IEEE bus command:      TRIGger[:SEQ]:SOURce IONLY



Q LEVEL uses the imaginary part of the signal as a trigger source. This function is only available in time domain - voltage, if BOTH DOMAIN is switched off. . In case of trigger instability increase sweep time.

IEC/IEEE bus command:      TRIGger[:SEQ]:SOURce QONLY

## R&S FSQ-B17 Extensions

### General Hints

#### Using R&S AMU and R&S SMU as a signal source/sink for Digital Baseband Input/Output

To directly connect the signal generator R&S AMU or R&S SMU to the digital baseband input of the analyzer with option FSQ-B17 a minimum generator firmware version is required:

R&S AMU	2.10.111.53 (or newer)
R&S SMU	2.10.111.53 (or newer)

## Last minute changes to the R&S FSQ-B17 operating manual

#### Operating Manual "Digital Baseband Interface R&S FSQ-B17":

- 1303.4098.12-01 (English)

The corresponding PDF-Files are separately available on the service board.

### Operation of the R&S FSQ-B17 I/Q Input

The signal processing of the digital IQ data is split into an online section and a post processing section. Within the online section, the R&S FSQ-B17 receives the LVDS data stream from the channel link interface. A FIFO separates the LVDS clock domain from the analyzers clock domain. The enabled data values are stored in the IQ memory block.

The post processing part contains a lowpass filter, a resampler and a level adjustment block to convert the data to the desired target sample rate and to adapt the reference level. The following table lists the different clock and data rates and their valid frequency ranges.

$f_{clk}$	$66 \text{ MHz} \leq f_{clk} \leq 90 \text{ MHz}$	Clock rate of the LVDS interface
$f_{sys}$	$f_{sys} = 81.6 \text{ MHz}$	System frequency of the analyzer
$f_{en}$	$f_{en} \leq \min(f_{clk}, f_{sys})$	Average rate of enabled data words within the LVDS stream
$f_{s,in}$	$f_{s,in} = f_{en}$ for realtime systems, otherwise arbitrary	Digital input sample rate
$f_{s,out}$	$\frac{f_{s,in}}{4080} \leq f_{s,out} \leq 254 \cdot f_{s,in}$	Target sample rate after resampling

The lowpass filter preceding the resampler prevents aliasing from the resampling process. It restricts the useful bandwidth of the digital signal to

$$B = 0.76 \cdot f_{s,in}$$

From the analyzers point of view, the digital IQ data is just a stream containing numbers which is stored for further processing. To perform actual measurements on this data, a time and magnitude grid has to be imposed on the data vector by the following two parameters:

Manual Control	Remote Control	Unit	
DIGITAL IN SAMPLERATE	:INPut<1 2>:DIQ:SRATe <numeric_value>	Hz	Sample rate of the digital signal, i.e. the reciprocal of the time between two successive samples
DIGITAL IN FULL SCALE	:INPut<1 2>:DIQ:RANGe[:UPPer] <numeric_value>	Volt	Voltage of a digital full scale value

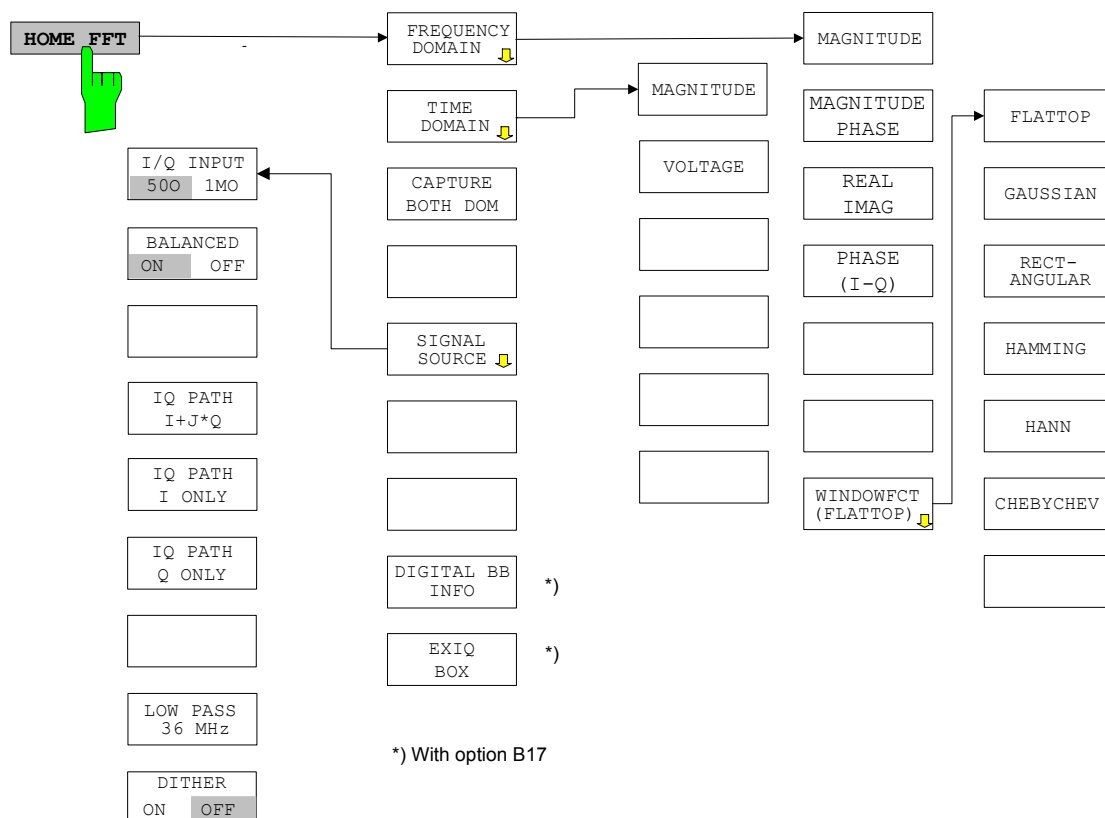
On the other hand, a measurement application within the analyzer expects a specific target sample rate and a reference level, by which the amplitudes are normalized. The necessary conversion is done by the resampler and the level adjustment in the post processing step:

$$\text{ResamplingFactor} = \frac{f_{s,out}}{f_{s,in}} = \frac{\text{Target Sample Rate}}{\text{Digital In Sample Rate}},$$

$$\text{Gain Factor} = \frac{A_{out}}{A_{in}} = \frac{1/\text{Reference Voltage}}{1/\text{Full Scale Voltage}} = \frac{\text{Full Scale Voltage}}{\text{Reference Voltage}}.$$

## Hotkey FFT

Since firmware version V4.75 the FFT Analyzer mode is available for Analog Basband Inputs (with option R&S FSQ-B71) and for Digital Baseband Input (with option R&S FSQ-B17) as well.



Using the digital baseband input the following softkeys are not available:

- CAPTURE BOTH DOMAIN ON / OFF (always switched off)
- I/Q INPUT 50Ω / 1MΩ
- BALANCED ON/OFF
- LOW PASS 36MHz
- DITHER ON/OFF

The allowed ranges for Span, Resolution Bandwidth and Sweeptime depend on the Digital Baseband Input Sample Rate.

## Menu SETUP – SIGNAL SOURCE

SETUP	SIGNAL SOURCE ↓	RF PATH	
		BASEBAND ANALOG ↓	
		BASEBAND DIGITAL ↓	DIGITAL IN FULL SCALE
			DIGITAL IN SAMPLE RATE
			FULL SCALE AUTO SET
			SAMPLE RATE AUTO SET
			DIGITAL BB INFO
			EX-IQ-Box
		DIGITAL BB INFO	
		EX-IQ-Box	

### RF PATH

The softkey RF PATH selects the RF Input Path of the analyzer. This softkey is not available for the FFT analyzer mode.

**Note:** This softkey is only available with option FSQ-B17 or FSQ-B71.

**Remote command:** INPut<1|2>:SElect AIQ | DIQ | RF

### BASEBAND ANALOG

The softkey BASEBAND ANALOG opens a menu to configure the analog baseband input.

**Note:** This softkey is only available with option FSQ-B71.

**Remote command:** INPut<1|2>:SElect AIQ | DIQ | RF

### BASEBAND DIGITAL

The softkey BASEBAND DIGITAL opens a menu to configure the digital baseband input.

**Note:** This softkey is only available with option FSQ-B17

**Remote command:** INPut<1|2>:SElect AIQ | DIQ | RF

## DIGITAL BB INFO

The softkey DIGITAL BB INFO opens a window to display the status information of the connected digital baseband device (input or output).

Dependent on the capability of the digital base band signal source the I/Q data's sample rate and/or the full scale value are passed to LVDS input interface of the analyzer and displayed in the Digital Baseband Info table. The analyzer automatically adjusts the related input parameters (DIGITAL IN FULL SCALE and DIGITAL IN SAMPLE RATE) if the AUTO SET functions are switched on.

This softkey is only available with option FSQ-B17.

DIGITAL BASEBAND INFO		
	INPUT	OUTPUT
Connected Device	AMU200A	-----
Serial Number	100266	
Port	Out A	
Full Scale	-----	
Sampling Rate	38.7 MHz	
Max Transfer Rate	100 MHz	
Connection Protocol	passed	
PRBS Test Deskewing	not yet started	

Fig. 1: R&S AMU200 used as a Digital Baseband Signal Source

The dialog lists the following items:

- **Connected Device:** The name of the connected device
- **Serial Number:** The serial number of the connected device
- **Port Name:** The port name of the connected device
- **Full Scale Value:** The full scale value of the I/Q data sent by the connected device.  
 "----" indicates this information is not sent by the connected device. FULL SCALE AUTO SET can not be used in that case and you have to manually configure this instrument setting.  
 "auto" indicates an active AUTO SET function. A warning appears if the value exceeds the allowed range of the analyzer.
- **Sample Rate:** The sample rate of the I/Q data sent by the connected device.  
 "----" indicates this information is not sent by the connected device. SAMPLE RATE AUTO SET can not be used in that case and you have to manually configure this instrument setting.  
 "auto" indicates an active AUTO SET function. A warning appears if the value exceeds the allowed range of the analyzer.
- **Max Transfer Rate:** The Maximum interface clock rate to transfer the I/Q data using the B17 connection.
- **Connection Protocol:** Indicates the state of the connection protocol. The analyzer is able to communicate with the sending/receiving device.

- **PRBS Test Deskewing:** An alignment process is started when the B17 input or output is connected to a digital baseband source/sink. The current state of this process is listed here. Possible indications are "not yet started", "failed" or "passed".

**Note:** This alignment is only started with operation modes supporting the digital baseband input.

Fig. 1 shows the result of an R&S AMU200A connected to the analyzer's digital baseband input. The sample rate of the I/Q data is 38.7 MHz. The Full Scale Value is not sent by the AMU and therefore the digital input full scale value has to be manually set. The connection protocol was successfully passed and the self alignment process was not yet started (cable connected in analyzer mode).

DIGITAL BASEBAND INFO		
	INPUT	OUTPUT
Connected Device	AMU200A	-----
Serial Number	100266	
Port	Out A	
Full Scale	-----	
Sampling Rate	38.7 MHz	auto
Max Transfer Rate	100 MHz	
Connection Protocol	passed	
PRBS Test Deskewing	passed	

Fig. 2: R&S AMU200, connection with analyzer established

In Fig. 2 the self alignment was successfully finished and indicated with "passed".

DIGITAL BASEBAND INFO		
	INPUT	OUTPUT
Connected Device	ExBox	-----
Serial Number	100064	
Port	IQ OUT	
Full Scale	-----	
Sampling Rate	100 MHz	auto
Max Transfer Rate	-----	
Connection Protocol	passed	
PRBS Test Deskewing	passed	
ExIQ-Box PLL	locked	

Fig. 3: The R&S Ex-IQ-Box connected to the digital baseband input

An additional PLL status line is available, if an Ex-IQ-Box is connected (see Fig. 3).

DIGITAL BASEBAND INFO		
	INPUT	OUTPUT
Connected Device	-----	ExBox
Serial Number		100064
Port		IQ IN
Full Scale		0.223607 V
Sampling Rate		100 MHz
Max Transfer Rate		-----
Connection Protocol		passed
PRBS Test Deskewing		done
EX-IQ-Box PLL		locked

Fig. 4: The R&S Ex-IQ-Box connected to the digital baseband output

**Remote command:**

:INPut&lt;1|2&gt;:DIQ:CDEvice?

:OUTPut&lt;1|2&gt;:DIQ:CDEvice?

:STAT:QUES:DIQ:COND?

**EX-IQ-BOX**

The softkey EXIQ BOX opens a dialog to configure an R&S EX-IQ-Box connected to the digital baseband Input or Output.

This softkey is only available with option FSQ-B17.

**Note:** In earlier firmware versions this dialog was open with a hotkey and you therefore had to leave the current application to configure the Ex-IQ-Box. Since V4.5x a new softkey is supported in the SETUP – SIGNAL SOURCE menu and/or in other application specific menus like VSA HOME (Vector Signal Analyzer Mode).

**DIGITAL IN  
FULL SCALE**

The softkey DIGITAL IN FULL SCALE opens a dialog to define the voltage corresponding to the maximum input value of the digital baseband input (value 7FFF hex). The default is 1 Volt.

The FULL SCALE AUTO SET function is switched off if the full scale value is manually configured.

This softkey is only available with option FSQ-B17.

**DIGITAL IN  
SAMPLE RATE**

The softkey DIGITAL IN SAMPLE RATE defines the input data sample rate read by the digital baseband input. The default value is 81.6 MHz.

The SAMPLE RATE AUTO SET function is switched off if the input data sample rate is manually configured.

This softkey is only available with option FSQ-B17.

**FULL SCALE  
AUTO SET****SAMPLE RATE  
AUTO SET**

Dependent on the capability of the digital base band signal source the I/Q data's sample rate and/or the full scale value are passed to the LVDS input interface of the analyzer. The analyzer automatically adjusts the related input parameters (DIGITAL IN FULL SCALE and DIGITAL IN SAMPLE RATE) if the AUTO SET functions for the Digital Input Full Scale Value or the Digital Input Sample Rate are active.

A conflict between the received values (full scale, sample rate) and the instrument's supported parameter ranges is indicated by a red colored "BDI" enhancement label at the right side of the grid.

The same happens if the AUTO SET function is active but the sending device does not support this feature. The related AUTO SET function has to be switched off and the parameter has to be manually configured in that case.

These softkeys are only available with option FSQ-B17.

**Remote command:** INPut<1|2>:DIQ:RANGe:AUTO ON | OFF  
INPut<1|2>:DIQ:SRATe:AUTO ON | OFF

## Option FSQ-B100 I/Q Memory Extension

Since version V3.95 SP2 the options FSQ-B100/B102 I/Q Memory Extension are supported.  
The available memory is listed in table SETUP - SYSTEM INFO STATISTICS, B100 Memory size.

I/Q Memory Extensions	Maximum memory size:
FSQ-B100	235 MSamples
FSQ-B100 + FSQ-B102	705 MSamples

The order numbers are:

1169.5244.02 FSQ-B100 I/Q Memory Extension - 235 MSamples

1169.5444.04 FSQ-B100 I/Q Memory Extension - extends to 705 MSamples

Press SETUP - SYSTEM INFO - STATISTICS to check the available I/Q memory:

FIRMWARE VERSIONS - STATISTICS	
Model	FSQ-8
Serial #	835526/054
Firmware Rev.	4.35
BIOS Rev.	V2.1-20-1
Specifications Version	12.34
Memory Size	512 MB
B100 Memory Size	6 GB
Operating Time (hours)	235
Power On Cycles	2783

The B100 Memory Size is rounded to Giga Bytes and listed in row *B100 Memory Size*:

2 GB for FSQ-B100 only  
6 GB for FSQ-B100 + FSQ-B102

Following functions in the base system and listed applications are affected:



Application:		Base System (TRACE:IQ sub system)						
RF Input								
	Sample Rate SR	Maximum Number of Samples			Comment			
		No B100	B100 only	B100 + B102				
	81.6 MHz < SR ≤ 400 MHz	16.776.704	234.880.512	704.642.560	with FSQ-B72			
	81.6 MHz < SR ≤ 100 MHz	16.776.704	234.880.512	704.642.560	without FSQ-B72			
	816 kHz < SR ≤ 81.6 MHz	16.776.704	469.761.536	1.409.285.632				
	400 Hz ≤ SR ≤ 816 kHz	16.776.704	335.543.808	1.006.632.448				
Analog Baseband Input								
	Sample Rate SR	Maximum Number of Samples			Comment			
		No B100	B100 only	B100 + B102				
	81.6 MHz ≤ SR ≤ 200 MHz	16.776.704	234.880.512	704.642.560				
	40.8 MHz ≤ SR < 81.6 MHz	$= \text{floor} \left\{ \left[ \text{MaxBuf} - \text{ceil} \left( 512 * \frac{81.6 \text{MHz}}{SR} \right) \right] * \frac{SR}{81.6 \text{MHz}} \right\}$ with: SR:     Sample Rate [Hz] MaxBuf: = <table><tr><td>16.777.216</td><td>234.881.024</td><td>704.643.072</td></tr></table>				16.777.216	234.881.024	704.643.072
	16.777.216	234.881.024	704.643.072					
	e.g. SR =							
	81.0 MHz	16.653.341	233.153.445	600.461.360				
	80.0 MHz	16.447.738	230.275.000	690.826.028				
	70.0 MHz	14.391.707	201.490.562	604.472.711				
	60.0 MHz	12.335.675	172.706.122	518.119.393				
	50.0 MHz	10.279.644	143.921.683	431.766.075				
	42.0 MHz	8.634.819	120.894.132	362.683.421				
	41.0 MHz	8.429.216	118.015.688	354.048.089				
	40.8 MHz	8.388.096	117.440.000	352.321.024				
816 kHz < SR < 40.8 MHz	16.776.704	469.761.536	1.409.285.632					
400 Hz ≤ SR ≤ 816 kHz	16.776.704	335.543.808	1.006.632.448					

Digital Baseband Input					
	Dig Input Sample Rate / Sample Rate Ratio $RR = \frac{DigInSR}{SR}$	Maximum Number of Samples			Comment
		No B100	B100 only	B100 + B102	
	$\frac{1}{254} \leq RR \leq 1.0$	16.776.704	167.771.648	503.315.968	
	1.0 < RR < 4080	$= floor \left\{ \left[ MaxBuf - ceil \left( 512 * \frac{DigInSR}{SR} \right) \right] * \frac{SR}{DigInSR} \right\}$  with: DigInSR: Digital Input Sample [Hz] SR: (Output) Sample Rate [Hz] MaxBuf: =			
	e.g. RR =  1.5 2.0 4.0 5.0 10.0 20.0 50.0 100.0	16.777.216  11.184.298 8.388.096 4.193.792 3.354.931 1.677.209 838.348 335.032 167.260	167.772.160  111.847.594 83.885.568 41.942.528 33.553.920 16.776.704 8.388.096 3.354.931 1.677.209	503.316.480  335.543.808 251.657.728 125.828.608 100.662.784 50.331.136 25.165.312 10.065.817 5.032.652	

Application: FSQ-K70 (VSA)					
RF Input					
	Symbol Rate SR	Maximum RECORD LENGTH [Symbols]			Comment
		No B100	B100 only	B100 + B102	
	20.4 MHz < SR ≤ 100 MHz	4.194.104	58.720.056	176.160.568	with FSQ-B72
	20.4 MHz < SR ≤ 25 MHz	4.194.104	58.720.056	176.160.568	without FSQ-B72
	10.2 MHz < SR ≤ 20.4 MHz	4.194.104	58.720.056	176.160.568	
	204 kHz < SR ≤ 10.2 MHz	4.194.104	117.440.312	352.321.336	
	100 Hz ≤ SR ≤ 204 kHz	4.194.104	83.885.880	251.658.040	
Analog Baseband Input					
	Sample Rate SR	Maximum Number of Samples			Comment
		No B100	B100 only	B100 + B102	
	20.4 MHz ≤ SR ≤ 50 MHz	4.194.104	58.720.056	176.160.568	
	10.2 MHz ≤ SR < 20.4 MHz	$= \text{floor} \left( \left\{ \left[ \text{MaxBuf} - \text{ceil} \left( 512 * \frac{81.6 \text{ MHz}}{\text{SR}} \right) \right] * \frac{\text{SR}}{81.6 \text{ MHz}} \right\} * \frac{1}{4} \right) - 72$			
		with:			
		SR: Symbol Rate [Hz]			
		MaxBuf [Samples]: =			
		16.777.216	234.881.024	704.643.072	
	e.g. SR =				
	20.4 MHz	4.194.104	58.720.056	176.160.568	
	20.25 MHz	4.163.263	58.288.289	174.865.268	
	20.0 MHz	4.111.862	57.568.678	172.706.435	
	17.5 MHz	3.597.854	50.372.568	151.118.105	
	15.0 MHz	3.083.846	43.176.458	129.529.776	
	12.5 MHz	2.569.839	35.980.348	107.941.446	
	10.5 MHz	2.158.632	30.223.461	90.670.783	
	10.25 MHz	2.107.232	29.503.850	88.511.950	
	10.2 MHz	2.096.952	29.359.928	88.080.184	
	204 kHz < SR < 10.2 MHz	4.194.104	117.440.312	352.321.336	
	100 Hz ≤ SR ≤ 204 kHz	4.194.104	83.885.880	251.658.040	

Digital Baseband Input					
	<b>Dig Input Sample Rate / Sample Rate Ratio</b>  $RR = \frac{DigInSR}{4 * SR}$  with:  DigInSR: Digital Input Sample [Hz]  SR: (Output) Symbol Rate [Hz]	<b>Maximum Number of Samples</b>			<b>Comment</b>
		<b>No B100</b>	<b>B100 only</b>	<b>B100 + B102</b>	
	$\frac{1}{254} \leq RR \leq 1.0$	4.194.104	41.942.840	125.828.920	
	$1.0 < RR < 4080$  $= floor \left\{ \left[ MaxBuf - ceil \left( 512 * \frac{DigInSR}{4 * SR} \right) \right] * \frac{SR}{DigInSR} \right\} - 72$  with: DigInSR: Digital Input Sample [Hz] SR: (Output) Symbol Rate [Hz] MaxBuf: =  16.777.216   167.772.160   503.316.480  e.g. RR =  1.5   2.796.002   27.961.826   83.885.880 2.0   2.096.952   20.971.320   62.914.360 4.0   1.048.376   10.485.560   31.457.080 5.0   838.660   8.388.408   25.165.624 10.0   419.230   4.194.104   12.582.712 20.0   209.515   2.096.952   6.291.256 50.0   83.686   838.660   2.516.382 100.0   41.743   419.230   1.258.091				

**Note:** Maximum Record Length noted for Points/Symbol  $\leq 4$ . If Points/Symbol is increased, the maximum Record Length is reduced by the same factor.

Application	Mode	User Parameter / Comments	Maximum I/Q Capture Length	
			B100 + B102	B100 only
<b>FS-K72/74</b> <b>FS-K73</b>	3G FDD BS 3G FDD UE	<b>Maximum CAPTURE LENGTH</b> for RF and Analog Baseband Input	3.000 frames	1.000 frames
<b>FS-K76</b> <b>FS-K77</b>	TDS BS TDS UE	<b>Maximum SET COUNT</b> for RF and Analog Baseband Input (1 set = 63 slots)	5.700 sets	1.900 sets
		<b>Number of captured chips</b>	310.262.400 Chips	103.420.800 Chips
		<b>Capture time</b>	242,4 sec	80,8 sec
<b>FS-K82</b> <b>FS-K83</b>	CDMA2k BS CDMA2k MS	<b>Maximum SET COUNT</b> for RF and Analog Baseband Input (1 set = 64 PCGs *) )	1.140 sets	380 sets
		<b>Number of captured chips</b>	112.066.560 Chips	37.355.520 Chips
		<b>Capture time</b>	91.2 sec	30.4 sec
<b>FS-K84</b> <b>FS-K85</b>	1xEVDO BS 1xEVDO MS	<b>Maximum SET COUNT</b> for RF and Analog Baseband Input (K84: 1 set = 32 slots) (K85: 1 set = 64 half slots)	1.710 sets	570 sets
		<b>Number of captured chips</b>	112.066.560 Chips	37.355.520 Chips
		<b>Capture time</b>	91.2 sec	30.4 sec

**Notes:**

\*) PCG: Power Control Group

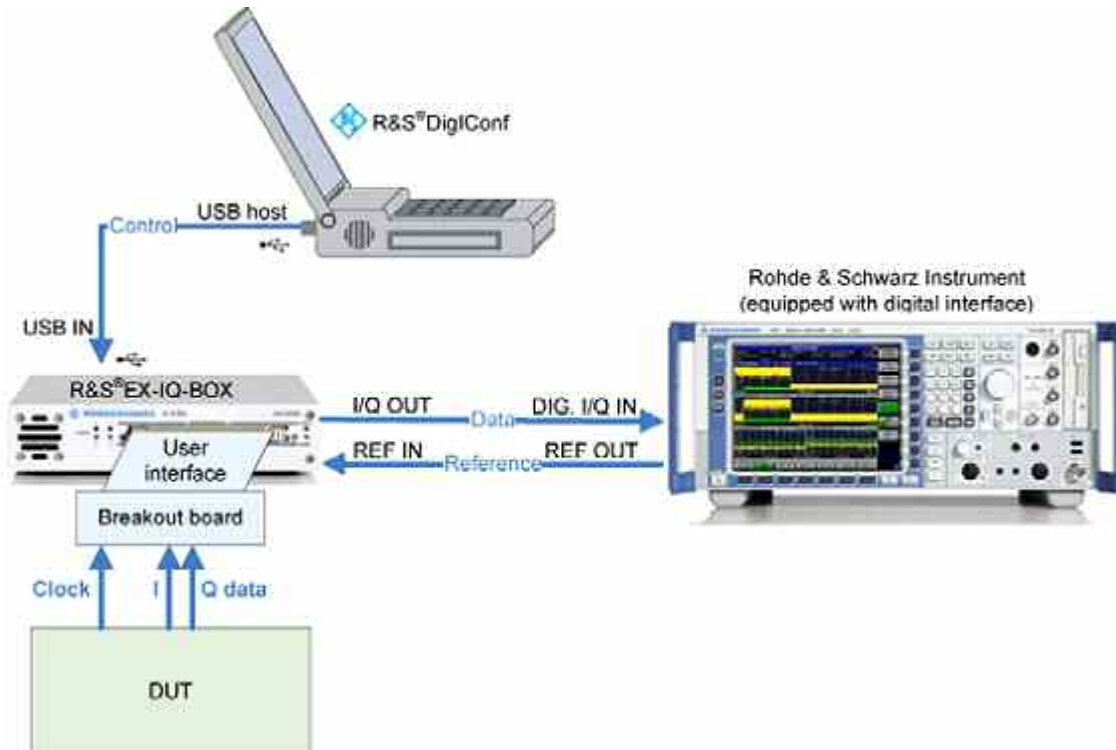
## R&S EX-IQ-Box Extensions

The Ex-IQ-Box is now available in two models:

- 1409.5505.02
- 1409.5505K04

The R&S FSQ currently supports the build-in configuration of the Ex-IQ-Box for model 02 only (menu SETUP – SIGNAL SOURCE – EX-IQ-BOX).

The configuration of model K04 requires the software R&S DigiIConv to be installed on a separate PC (see below).



### Last minute changes to the EX-IQ-Box operating manual

Operating Manual "External Signal Interface Module R&S EX-IQ-Box":

- 1409.5505.32-04 (English)

The corresponding PDF-File is separately available on the service board.

## FSx/FMU Settings - Menu EX-IQ-Box - NEXT

### SUPPORT

This section of the user manual describes the Support function, which stores necessary data files to be sent to Rohde & Schwarz support center.

On pressing the *Support* softkey a popup dialog box is displayed and the following data is stored on the harddisk, D:\USER\SUPPORT\KEXIQ\\*.\*:

- \*.reg Registry file
- \*.bin, \*.bak instrument configuration files
- \*.txt EX-IQ-Box Database Setting

**Note:** Attach all the files under D:\USER\SUPPORT\KEXIQ \*.\* to an email and send to our hotline.

**Remote command:** --

## 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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