

# Release Notes

## R&S®FSH4/FSH8/FSH13/FSH20 Handheld Spectrum Analyzer

### Firmware Release 3.10

These Release Notes describe the following models and options of the R&S®Handheld Spectrum Analyzer:

- R&S®Handheld Spectrum Analyzer FSH4, all models
- R&S®Handheld Spectrum Analyzer FSH8, all models
- R&S®Handheld Spectrum Analyzer FSH13, all models
- R&S®Handheld Spectrum Analyzer FSH20, all models

#### New features in firmware V3.10:

- Support of waveguide calibration and DTF measurements with waveguides

#### Important notes:

- If a USB stick is used to update the firmware it needs to be formatted either in FAT16 or FAT32 format.
- Please refer to sections 6.2.3 and 6.2.4 before updating instruments from firmware version 1.11 or below.

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# 1 New Functions

The following table lists the new functions in V3.10:

Version	Function
V3.10	Support of waveguide calibration and DTF measurements with waveguides
V3.10	AM/FM demodulation in Maps and Spectrogram applications

The following table lists modifications, which were introduced in earlier versions, and indicates the version in which the modification was introduced:

Version	Function
V3.00	Support for R&S® ZN-Z103
V3.00	SCPI command to retrieve IQ data
V3.00	EMF Analysis Option <ul style="list-style-type: none"> <li>• Quick Scan mode (scan for signals above a threshold line)</li> <li>• Spectrum: check acquisition settings validity with a connected instrument (live edit)</li> </ul>
V3.00	Spectrum Analyzer: FFT based SEM & ACLR for NB-IoT :
V2.90	EMF Analysis Application (R&S®FSH-K105) added: New Option to perform EMF Analysis together with R&S®InstrumentView
V2.81	Support of 256 QAM Modulation for LTE
V2.81	FDD LTE NB-IoT BTS Application (R&S®FSH-K56) added: New Option Narrowband IoT for FDD LTE Basestation Test
V2.80	Support of HE400 antenna
V2.80	Support of optical power sensor UPM100 from ODM Inc.
V2.80	Display S21 & S11 or S21 & S22 measurements in one screen
V2.80	Support of Declassification procedures according to DoD 5220.22-M (see Instrument Security Procedures for more details)
V2.80	Added switch to force either sweep mode or FFT mode
V2.71	Support of FSH-K14 for long time recording
V2.71	Measuring the frame offset based on 1sec pulse in LTE SEM
V2.71	Unit dBuV in FSH-K15, FSH-K16 and FSH-K17
V2.71	Frequency Offset in Network Analyzer mode
V2.70	FSH-K15 extended to 72 hours of recording
V2.70	Support FSH-Z14 with USB-Adapter FSH-Z144
V2.70	Added tone feature to the spectrogram and spectrum analyzer.

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V2.70	Support for new USB power sensors R&S@NRPxxS/SNseries
V2.61	CW source operation was added to the tracking generator configuration in Network Analyzer mode. This is helpful for applications where a CW signal is needed for stimulating a DUT or for emulating an interfering signal.
V2.61	In Network Analyzer and DTF mode the tracking generator output power can be set directly in dBm (instead of using the parameter TG Att).
V2.61	In Network Analyzer and DTF mode a new parameter "tracking generator offset" was added to take external attenuators/amplifiers into account when setting the output power.
V2.61	New SCPI command added for the LTE options: FETCh:SUMMary:TAE
V2.60	new measurement application: R&S@FSH-K17 Indoor mapping
V2.60	new measurement application: R&S@FSH-K29 Pulse Measurements with Power Sensor (using the NRP-Z81, NRP-Z85 or NRP-Z86 power sensors). This feature is supported for instruments starting at serial number 105000. Instruments with serial numbers < 121000 require an R&S@FSH-Z129 adapter cable.
V2.60	Internal periodic trigger with selectable trigger cycle frequency added for instruments with serial # > 121000 to support spectrum measurements on pulsed signals (like e.g. TD-LTE).
V2.60	Frequency counter resolution is now selectable between 0.1 Hz (low) and 0.1 mHz (high)
V2.60	Limit lines in VSWR and Cable Loss measurement are now supported
V2.60	Limit lines can now be selected during Wizard execution
V2.60	R&S HL300 antenna transducer file added
V2.60	R&S ZCAN calibration data file added
V2.60	OBW was added to the Result Summary in the CDMA2000 and 1xEVDO measurement applications
V2.51	3GPP WCDMA BTS Application (R&S@FSH-K44): Enabled the automatic scrambling code selection if the antenna diversity is set to Over-The-Air
V2.50	LTE FDD Downlink Application (R&S@FSH-K50) and LTE TDD Downlink Application (R&S@FSH-K51): Added Carrier Aggregation measurement for measuring two or three carriers
V2.50	Power Meter Application: Added Channel Power Meter measurement for performing power measurements without a power sensor
V2.50	Support of power sensor R&S@NRP-Z52
V2.50	3GPP WCDMA BTS Application (R&S@FSH-K44): <ul style="list-style-type: none"> <li>- Added Tx diversity for measuring CPICH power and frequency error of two antennas</li> <li>- Carrier frequency error can be measured either of a single slot or for all slots of one frame at one go</li> <li>- Added possibility to analyze the entire frame without performing a channel search</li> </ul>
V2.50	Occupied Bandwidth added to the Result Summary display in the LTE FDD, LTE TDD and WCDMA Application
V2.50	Network Analyzer: Enabled zero span measurements

## 2 Modified Functions

The following table lists the functions modified in V3.10:

Version	Function
V3.10	Supports ZN-Z103 calibration up to 6 GHz
V3.10	Added SCPI support to acquire compass information

The following table lists modifications, which were introduced in earlier versions, and indicates the version in which the modification was introduced:

Version	Function
V3.00	Support of limit lines for the DTF measurement
V3.00	Compass: Update World Magnetic Model coefficients to 2015-2020
V2.81	TD-LTE & FDD LTE: Resource Allocation display: axis labelling starts now with zero
V2.80	Removed the limitation to 3 points for triangulation
V2.80	MIMO configuration per carrier within LTE Carrier aggregation
V2.71	Decrease minimum sweep time for Zero span to 100 us
V2.70	New setting for manually defining the amplitude range in Pulse Peak Power Measurement
V2.70	Increased max number of channels in channel table to 1000000
V2.70	Added LTE channel table 66
V2.70	Spectrogram Viewer (long time recording) in FSH4View improvements
V2.70	FSH4View now supports saving all traces from spectrogram file to CSV
V2.70	Added "+" and "-" to the alpha numeric keyboard (SMS mode)
V2.70	Optimized synthesizer setup table for frequency of 160 MHz
V2.61	The minimum measurement time in Pulse Peak Power measurements was adjusted to better reflect the capabilities of the power sensor.
V2.61	Optimized synthesizer setup table for FSH13/20 for frequencies 1.2 GHz and 6.981 GHz
V2.60	An indicator "(IA)" was added to the title bar in Interference Analyzer measurement mode
V2.51	3GPP WCDMA BTS Application (R&S@FSH-K44): The default span in the Spectrum Overview display is now 5 MHz
V2.50	Optimized synthesizer setup table

## 3 Improvements

The following table lists the issues eliminated in V3.10:

Version	Function
V3.10	Added "Waiting for Trigger" indication
V3.10	Enabled support for Rosenberger cables
V3.10	Improved Japanese translations for antenna settings
V3.10	Improved Spur performance
V3.10	Improved power level in zero span measurements with large RBW and small VBW

The following table lists the issues already eliminated in earlier versions and indicates the version in which the issues were eliminated:

Version	Function
V3.00	NB-IoT Standalone - Offset frequency display corrected
V2.90	Extended support for additional HE400 antenna variants
V2.80	Extension of carrier aggregation to 5 carriers
V2.80	Extended support for LTE band 65 (FSH8 only)
V2.80	Digital Demodulation: Improvements on isotropic antenna handling
V2.80	Improved trigger offset and marker display accuracy
V2.80	Improvements on gated trigger for small RBWs
V2.71	Increase maximum Reference Level from 30dB to 50dB in Network Analyzer mode
V2.70	Power Meter: Different improvements
V2.70	Receiver mode: Added coupling between RBW and Sweep Time.
V2.70	1xEVDO: power of data and the preamble is aligned
V2.70	Added the missing red dot displayed before label SWT in parameter view on setting manual Sweep time
V2.70	Make use of manual range when Spectrogram coupled to Spectrum
V2.70	Network Analyzer: Unit Menu options fixed for Magnitude + Phase measurement format
V2.70	Spectrogram: Settings improvements with spectrogram playback
V2.70	Spectrogram: Threshold selection improvements
V2.70	Network Analyzer: Fix on the switching frequency of the high/low band coupler
V2.70	FSH4View: Frequency Count accuracy included in report generator
V2.70	Transducer problem after shutdown and reboot is fixed
V2.70	Wizard hang issue after loading an invalid dataset is fixed

V2.61	1xEVDO measurements: Depending on the channel combination in the input signal the pilot power showed higher results than the RF channel total power.
V2.61	The synchronization algorithm for WCDMA signals was improved.
V2.61	WCDMA measurements: The SCPI command that returns the value for CPICH power of antenna 2 was corrected.
V2.61	Dependent on the hardware revision of the FSH-Z18 power sensor the FSH-Z18 was not recognized reliably. This has been fixed.
V2.61	Some Japanese and Chinese language translation improvements were applied.
V2.60	Channel numbers in LTE channel tables corrected. Channel tables for missing LTE and GSM frequency bands added.
V2.60	Channel Power Meter: the RF attenuation was not touched when automatically adjusting the measurement range
V2.60	Communication errors with GPS receiver R&S FSH-Z240 after it was linked to an R&S PR100
V2.60	Misleading messages during Easy 1-Port calibration were removed.
V2.60	User Preferences: new setting "Use Instrument Calibration Data" added. If set to ON, the current calibration data in Network Analyzer mode will be maintained when loading a dataset. If set to OFF, the calibration data stored in the dataset will be loaded (default behaviour).
V2.60	The SCPI command SWE:POIN? for Spectrum Analyzer and DTF was not working
V2.60	WCDMA channel detection needed improvement with special channel configurations
V2.60	SCPI commands for WCDMA Analysis Length and Carrier Frequency Error Meas Range were missing
V2.60	The power indicator in the interferer search map display sometimes showed different values to spectrum or receiver mode.
V2.60	Receiver Mode sometimes locks up when activating AM Marker Demodulation
V2.60	FSH4View: the Marker values were not correctly aligned for Digital Modulation applications when 1 marker is disabled
V2.60	FSH4View: the Preamp status in a dataset was not displayed
V2.60	FSH4View: GPS Position menu in Maps application didn't work
V2.60	FSH4View: invisible traces cannot be set to visible anymore
V2.60	FSH4View: With active MaxHold function inactive scrambling codes were not displayed in the scrambling code search overview
V2.51	3GPP WCDMA BTS Application (R&S@FSH-K44): <ul style="list-style-type: none"> <li>- The state of the antenna diversity setting was lost with active Over-The-Air measurement when switching between the Result Summary and Spectrum Overview display. This has been fixed.</li> <li>- Increased the number of decimal digits when querying the carrier frequency error using Remote Control</li> </ul>

## 4 Known Issues

The following table lists the known issues in V3.10:

Version	Function
V3.10	-----

## 5 Modifications to the Documentation

The latest manual can be downloaded from the R&S FSH4/8/13/20 spectrum analyzer product web page under: <http://www.rohde-schwarz.com>. Select "DOWNLOADS" and "MANUALS".



## 6 Installation Information

### 6.1 General Information

- Firmware release V3.10 corresponds to InstrumentView V2.2 or later, which is available on the Rohde & Schwarz web page as a separate software package.
- Although older versions of InstrumentView might be able to communicate with firmware release V3.10, an update of InstrumentView is highly recommended, as older InstrumentView versions might not support all functions included in the new firmware release.
- FSH4View (a predecessor of InstrumentView) might still be able to communicate with firmware release V3.10, but might not support all functions included in the new firmware release.

### 6.2 Firmware Update

The firmware update file for the R&S FSH4/FSH8 is one file with the name FSH4\_V3\_10.EXE from the Rohde & Schwarz web page.

The installation can be done via SD-Card or via USB-Stick

#### 6.2.1 Preparing the Installation via SD-Card

In order to update the device after downloading the FSH4\_V3.10.EXE installation file, an SD memory card is required, e.g. R&S HA-Z231 (1 GB), order # 1309.6217.00, or R&S HA-Z232 (2 GB), order # 1309.6223.00. Please make sure that your PC is equipped with an SD card reader.

##### **Make a backup of datasets, screenshots and modified files**

Before you start the firmware update, make sure that you created a backup with FSH4View of all datasets and screenshots which you previously stored on the instrument. The same holds true for all channel tables, standards, limit lines, transducer factors and cable models which you created or modified. The factory preset necessary to complete the firmware update procedure will otherwise erase or overwrite the files.

##### **Preparing the installation files**

1. Insert an SD card into the SD card reader and wait until Windows® has identified the SD card as a new volume (e.g. D:)
2. Copy FSH4\_V3\_10.EXE into the root directory of the SD card, e.g. D:\

Execute FSH4\_V3\_10.EXE. The self-extracting .ZIP file will be unpacked.

The SD card should now contain the following files:

bootloader\_SA\_V3\_10.bin  
osimage\_SA\_V3\_10.bin  
updater\_SA\_V3\_10.bin  
splashscreen\_SA.bmp  
FSH4\_V3\_10.EXE

**Note:**

Please make sure that only one file of each type is present on the SD card. The update mechanism will reject the card if it detects two versions of the same file type (e.g. bootloader\_SA\_V1\_01 and bootloader\_SA\_V3\_10) in the root directory and abort the update later on.

**Prepare the instrument**

1. Switch the instrument OFF.
2. Connect the R&S FSH to AC mains via its power adapter.

**Note:**

The instrument firmware will refuse to perform the update if the instrument runs on battery.

3. Insert the SD card into the SD card slot at the right side of the instrument.
4. Continue with “Performing the Firmware Update on the Instrument” in Section 6.2.3.

## 6.2.2 Preparing the installation via USB (instruments with serial numbers above 105000)

In order to update the device after downloading the FSH4\_V3\_10.EXE installation file, a USB stick is required.

**Make a backup of datasets, screenshots and modified files.**

Before you start the firmware update, make sure that you created a backup with FSH4View of all datasets and screenshots which you previously stored on the instrument. The same holds true for all channel tables, standards, limit lines, transducer factors and cable models which you created or modified. The factory preset necessary to complete the firmware update procedure will otherwise erase or overwrite the files.

**Preparing the installation files**

1. Insert a USB stick into the USB slot and wait until windows has identified the USB stick as a new volume (e.g. D:)
2. Copy FSH4\_V3\_10.EXE into the root directory of the USB stick, e.g. D:\

Execute FSH4\_V3\_10.EXE. The self-extracting .ZIP file will be unpacked.

The SD card should now contain the following files:

bootloader\_SA\_V3\_10.bin  
osimage\_SA\_V3\_10.bin  
updater\_SA\_V3\_10.bin  
splashscreen\_SA.bmp  
FSH4\_V3\_10.EXE

**Note:**

Please make sure that only one file of each type is present on the SD card. The update mechanism will reject the card if it detects two versions of the same file type (e.g. bootloader\_SA\_V1\_01 and bootloader\_SA\_V3\_10) in the root directory and abort the update later on.

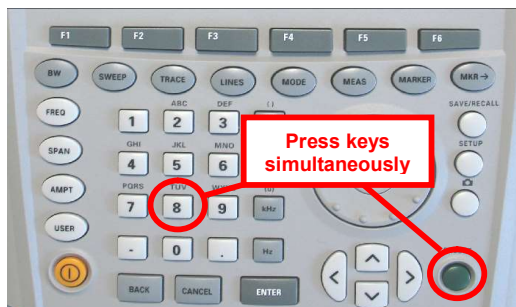
**Prepare the instrument**

1. Switch the instrument OFF.
2. Insert the USB stick into the USB slot of the instrument.

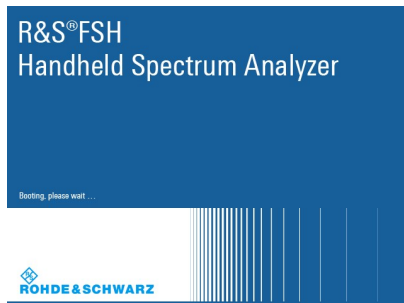
**6.2.3 Performing the Firmware Update on the Instrument**

The firmware update process is performed by the following steps:

1. Press the keys PRESET and 8 on the numeric keypad simultaneously.



2. Switch the instrument on and keep PRESET and 8 pressed for at least 5 seconds after the startup screen has appeared on the screen.



3. Release the keys PRESET and 8.

The FSH will continue its boot process and after a couple of seconds the following information will appear on the screen:

---

**Instrument Firmware Update**

Searching for firmware update (updater\_\*.bin)  
...Found \USB\updater\_SA\_V3\_10.bin  
...OK  
Checking updater\_SA\_V3\_10.bin: ... OK

---

Update instrument to software version V3.10  
Press [ENTER] to update the firmware.  
Press [CANCEL] to abort firmware updating.

---

**Note:**

If the AC mains connection is missing at the start of the firmware update process, the following message will appear at the bottom of the screen in step 3:

---

Instrument not powered by the power adapter. Please connect power adapter.  
Press [ENTER] to retry.  
Press [CANCEL] to abort firmware updating.

---

In this case check the power supply connection.  
Continue the update process with step 4.

4. Press ENTER to start the firmware update process.

The instrument will perform the firmware update. This will take about 5 minutes. The progress of the update will be displayed in a sequence of messages on the screen.

**Warning:**

Do not switch the instrument off during the update process in order to avoid data corruption of the internal flash memory!

5. As soon as the firmware update is completed, the R&S FSH will display the following message at the bottom of the screen:

---

Firmware updating is successfully completed.  
Please switch off the instrument.

---

Switch the instrument off and on again. The FSH will boot with the new firmware version.

6. After the boot process is completed, press SETUP – INSTRUMENT SETUP. Select "RESET TO FACTORY SETTINGS" by moving the cursor down the list with the cursor keys or the rotary knob. Confirm the selection with ENTER, and re-confirm with YES when prompted. Please be patient: the subsequent reset and reboot process will take about a minute to complete.

**Note:**

Restoring the factory settings is necessary to update the pre-installed channel tables, cable models and transducer factors. If this step is omitted, bug fixes and updates to these pre-installed files will not be installed.

7. For instrument models .14, .18, .24 and .28 perform a self alignment according to chapter 6.2.4, if the instrument was equipped with firmware version 1.10 or below.

## 6.2.4 Performing the Self Alignment on the Instrument



**This section is relevant for R&S FSH4.14, R&S FSH8.18, R&S FSH4.24 and R&S FSH8.28 when being updated from firmware versions below V2.00.**

In Network operating mode the instrument models R&S FSH4.14, R&S FSH8.18, R&S FSH4.24 and R&S FSH8.28 support a default set of calibration data, the so-called factory calibration. This dataset is used whenever the instrument displays "fcal" in the title bar.

Instruments equipped with firmware versions below V2.00 need an update of this dataset, as V3.10 uses improved algorithms which need more data in order to obtain optimum results.

The self alignment procedure requires a calibration standard R&S FSH-Z28 (order # 1300.7810.03), which is suitable for R&S FSH8 and R&S FSH4 instruments, or at least a calibration standard R&S FSH-Z29 (order # 1300.7510.03) for R&S FSH4 instruments. In addition a RF cable with two N connectors is required in order to provide a through connection between measurement port 1 and port 2.

The self alignment is performed by the following steps:

1. Switch the instrument on
2. Select Network operation by pressing MODE – NETWORK.
3. Make sure that the instrument runs for at least 30 minutes at room temperature.
4. Press the keys SETUP – INSTRUMENT SETUP. Place the cursor on the menu entry "Self Alignment" by scrolling the menu bar down with the rotary knob and press ENTER.

The instrument will prompt you to confirm that the factory calibration data will be overwritten.

5. Press softkey YES.

The self alignment procedure will start and prompt you to connect the calibration standards and the through connection to port 1 and 2 in the sequence.

6. Follow the instructions until the instrument reports "Self Alignment Done!".
7. Press softkey EXIT to return to the measurement screen.

## 6.3 Installing Firmware Options

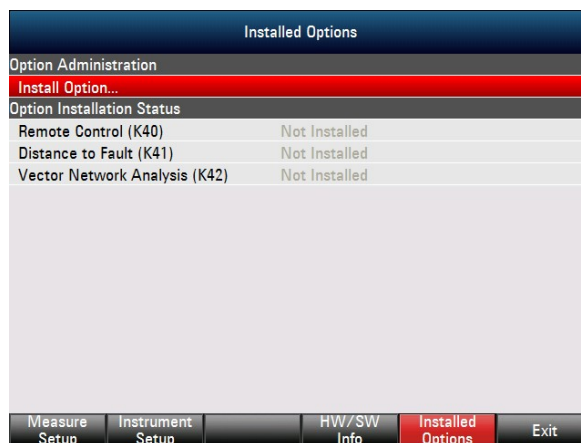
### 6.3.1 Enabling Options by Entering Option Key Codes



This section can be skipped if the option keys were already entered once. Option keys are not affected by a firmware update.

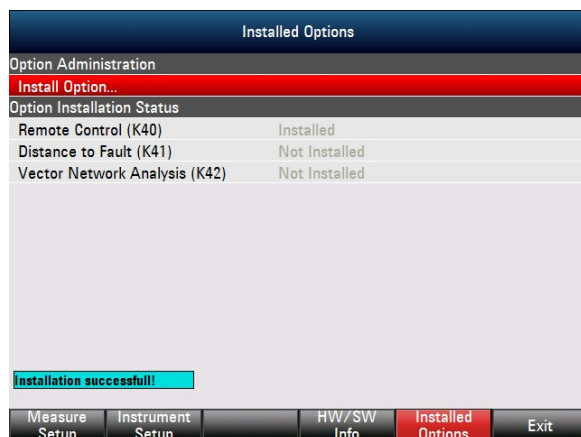
To activate application software packages, you must enter a license key for validation. The license key is in the device certificate or delivered as a part of the software package. The process is performed in the following steps:

1. Press the SETUP key.
2. Press the softkey INSTALLED OPTIONS.
3. Use the rotary knob or the cursor keys to select the INSTALL OPTION... menu item and confirm the entry with the ENTER key.
4. Enter the key code ( 32 digit number) for the option with the numeric keys and confirm with the ENTER key.



If the correct key code is entered, the R&S FSH displays "Installation successful", and the option is marked as "Installed" in the option list (example: Remote Control (K40)).

If an invalid key code is entered, the R&S FSH displays "Invalid key code!". The correct key code can then be entered.



### 6.3.2 Enabling Options via the R&S License Manager

This feature is only available starting with firmware version V1.40 and higher.

Prerequisite: Your PC must be connected via Ethernet to the instrument and to the internet.

1. Open your browser and type in the IP address of your instrument.

The screenshot shows the R&S License Manager web interface. The top navigation bar includes the Rohde & Schwarz logo and the GLORIS (Global Rohde & Schwarz Information System) logo. The main content area is titled "R&S License Manager" and displays the following information:

**Connected Device**

FSH4	Device ID:	1309.6000K24-900204-nk
FSH4	IP Address:	172.17.75.1
Version: V1.40	Host Name:	localhost

**What do you want to do?**

- [Install Registered License Keys and Activate Licenses](#)
- [Register Licenses, Install License Keys and Activate Licenses](#)
- [Reboot Device](#)

**Help**

**Register Licenses, Install License Keys and Activate Licenses:**

An unregistered license must be registered for a particular Rohde & Schwarz device, before the functions enabled by the license can be used on that device.

Use "Register Licenses, Install License Keys and Activate Licenses" to register such licenses. The R&S License Manager will then automatically register the licenses and install registered license keys on your device, which activates the licenses. You will be requested to enter the un-registered license keys and to select the Device ID of the target device.

2. Select "License Manager" > "Manage Licenses".
3. Choose "Register Licenses, Install License Keys and Activate Licenses" and follow the instructions.

## 7 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.

#### Europe, Africa, Middle East

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