

# R&S®RTP, R&S®RTO and R&S®RTE Oscilloscopes

## Release Notes

### Firmware Version 4.80.1.0

These Release Notes are for following models of R&S®RTP, R&S®RTO and R&S®RTE:  
R&S® RTP 044, order no. 1320.5007K04, R&S® RTP 064, order no. 1320.5007K06,  
R&S® RTP 084, order no. 1320.5007K08, R&S® RTP 134, order no. 1320.5007K13,  
R&S® RTP 164, order no. 1320.5007K16

R&S® RTO 2002, order no. 1329.7002K02, R&S® RTO 2004, order no. 1329.7002K04,  
R&S® RTO 2012, order no. 1329.7002K12, R&S® RTO 2014, order no. 1329.7002K14,  
R&S® RTO 2022, order no. 1329.7002K22, R&S® RTO 2024, order no. 1329.7002K24,  
R&S® RTO 2032, order no. 1329.7002K32, R&S® RTO 2034, order no. 1329.7002K34,  
R&S® RTO 2044, order no. 1329.7002K44, R&S® RTO 2064, order no. 1329.7002K64

R&S® RTE 1022, order no. 1317.2500K22, R&S® RTE 1024, order no. 1317.2500K24,  
R&S® RTE 1032, order no. 1317.2500K32, R&S® RTE 1034, order no. 1317.2500K34,  
R&S® RTE 1052, order no. 1317.2500K52, R&S® RTE 1054, order no. 1317.2500K54,  
R&S® RTE 1102, order no. 1317.2500K02, R&S® RTE 1104, order no. 1317.2500K04,

R&S® RTE 1022, order no. 1326.2000K22, R&S® RTE 1024, order no. 1326.2000K24,  
R&S® RTE 1032, order no. 1326.2000K32, R&S® RTE 1034, order no. 1326.2000K34,  
R&S® RTE 1052, order no. 1326.2000K52, R&S® RTE 1054, order no. 1326.2000K54,  
R&S® RTE 1102, order no. 1326.2000K62, R&S® RTE 1104, order no. 1326.2000K64,  
R&S® RTE 1152, order no. 1326.2000K72, R&S® RTE 1154, order no. 1326.2000K74,  
R&S® RTE 1202, order no. 1326.2000K82, R&S® RTE 1204, order no. 1326.2000K84

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The following abbreviations are used throughout this document:

R&S® RTP is abbreviated as R&S RTP , R&S® RTO as R&S RTO,  
R&S® RTE as R&S RTE.

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# 1 Current Version and History

## 1.1 New Functions

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

Version	Function
4.80.1.0	Support for Option R&S® RTP/RTO-K134 Advanced Jitter and Noise Analysis
4.80.1.0	Support for Option R&S® RTP/RTO-K58 1000BASE-T1 Triggering & Decoding
4.80.1.0	Option R&S® RTO/RTP-K133: Additional reverse-lock CDR, GUI improvements, interleaved histograms for rising and falling edges, results for OBUJ components
4.80.1.0	Option R&S® RTO/RTP-K40: Added decoding support for RFFE 3.0
4.80.1.0	Added diagram splitter to allow easier resizing of diagrams
4.75.1.0	Option R&S® RTO/RTP-K133: GUI setup and reporting improvements, differentiation of periodic components in extrinsic / intrinsic, export of jitter result graphs, rotary knob support for diagram scaling
4.75.1.0	Option R&S® RTx-K3/K9: Display of more frame fields, stuffed bits and stuffed bits error
4.75.1.0	Clipping indicator for analog channels
4.75.1.0	Horizontal result lines for selected amplitude measurements
4.75.1.0	ZVC Zero offset compensation
4.75.1.0	Support of R&S®RT-Z2T
4.70.1.0	Support for Option R&S® RTP-K11 IQ Software Interface for RTP134 / 164
4.70.1.0	Support for Option R&S® RTP-K133 and RTO-K133 Advanced Jitter Analysis
4.70.1.0	Increase number of math channels from 4 to 8.
4.70.1.0	CSV delimiter and decimal point can be selected by the user for waveform xml and CSV exports
4.70.1.0	Added License Server to allow the firmware and VSE to access licenses in parallel
4.70.1.0	Option R&S® RTP-K40 and RTO-K40: Update to RFFE version 2.1
4.70.1.0	Option R&S® RTx-K8: Trigger support
4.70.1.0	Option R&S® RTP-K61 and RTO-K61: Decoding of compliance patterns
4.60.1.0	Launch version for RTP 13/ 16 GHz
4.60.1.0	Single ended channels can be combined to differential signal for analysis and display. Triggering on these signals, depending on channel configuration.
4.60.1.0	Support for Option R&S® RTP-K6 MIL-1553 Triggering & Decoding
4.60.1.0	Support for Option R&S® RTP-K7 ARINC 429 Triggering & Decoding
4.60.1.0	Support for Option R&S® RTP-K11 IQ Software Interface for RTP044/ 064/ 084
4.60.1.0	Support for Option R&S® RTx-K35 Bus Analysis
4.60.1.0	Support for Option R&S® RTP-K62 USB 3.1 Gen 2 Triggering & Decoding
4.60.1.0	Support for Option R&S® RTP-K65 SpaceWire Triggering & Decoding
4.60.1.0	Support for Option R&S® RTP-K130 TDR/ TDT Analysis
4.60.1.0	Support for Option R&S® RTP-K140 High Speed Serial Pattern Trigger (8 Gbps)
4.60.1.0	Support for Option R&S® RTP-K141 High Speed Serial Pattern Trigger (16 Gbps)
4.60.1.0	Support for Option R&S® RTO-K130 TDR/ TDT Analysis for RTO2000 2 GHz bandwidth upwards
4.60.1.0	Support of unit dBc in FFT/ Spectrum analysis
4.60.1.0	Number of mask segments of a single mask increased from 8 to 16 segments
4.60.1.0	RTE: Support of ABR trigger
4.60.1.0	RTE: Delay measurement with advanced user settings

Version	Function
4.60.1.0	RTE: Support of limit check including margins on measurement
4.60.1.0	Option R&S® RTP-K93: Decoding and eye analysis for DDR4 Signal Integrity Debug and Compliance Test
4.60.1.0	Option R&S® RTP-K121: Support of differential signals that are created from single ended channels
4.60.1.0	Option R&S® RTP-K121 and RTO-K121: New feature of "Proven Probe" and "Proven Cable" for measurement of S-parameters of cables and probes
4.50.1.0	Initial RTP version for 13/ 16 GHz only
4.20.1.0	Support of R&S®RT-Z1M MOhm Adapter for RTP
4.20.1.0	Support of R&S® RTO-B7 Differential Pulse Source
4.20.1.0	Support for option R&S® RTP-K60 USB 2.0 Trigger & Decoding (trigger for Low Speed and Full Speed only)
4.20.1.0	Cursor results can be docked automatically at the bottom of the display
4.20.1.0	Decode results can be docked automatically at the bottom of the display
4.20.1.0	The user can select, which results values of the measurement statistics shall be displayed
4.20.1.0	The math editor supports that a filter file can be loaded and applied to the waveform
4.20.1.0	RTx-K18: Spectrogram timelines can be used for different frames within one single acquisitions
4.20.1.0	RTx-B1: An MSO bus can be exported into a file
4.20.1.0	Full Autoselect for selected protocols (I <sup>2</sup> C, SPI, UART, CAN / FD, LIN, RFFE, Ethernet, 100BASE-T1, 8b10b)
4.20.1.0	Option R&S® RTx-K3: LIN description file (LDF) support and symbolic decoding
4.15.1.0	Support of R&S®RT-Z2T Probe Adapter
4.15.1.0	Support for option R&S® RTP-K8 Ethernet Decoding
4.15.1.0	Support for option R&S® RTP-K57 100BASE-T1 Triggering & Decoding
4.15.1.0	Support for option R&S® RTO-K121 Deembedding
4.15.1.0	Support of R&S® RTP-B7 Differential Pulse Source
4.15.1.0	Support of login "NormalUser" with standard user rights for instrument operation
4.15.1.0	Decoding and eye analysis for option R&S® RTO-K91 DDR3 Signal Integrity Debug and Compliance Test
4.15.1.0	RTO2000, RTE: New action item "Start executable" for event actions
4.15.1.0	RTO2000, RTE: New export format "OneFile" with user settings and reference waveforms for export and import. This also allows the export and import of mask tests based on reference waveforms
4.15.1.0	RTO2000, RTE: User setting to select if the shaded area of the mask test shall be inverted to shade the non-violation area
4.15.1.0	RTO2000, RTE: The command SYSTem:SHUTdown is added to shut down the instrument remotely
4.15.1.0	RTP: Support of TV-Trigger
4.15.1.0	RTE: It is selectable if every measurement can have its own measurement gate
4.15.1.0	Option R&S® RTx-K19: ZoneTrigger can be activated in history mode

## 1.2 Modified Functions

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

Version	Function
4.75.1.0	Option R&S® RTO/RTP-K12: Jitter Wizard removed
4.75.1.0	The RTx-B1 option can be used without a license key

Version	Function
4.70.1.0	License Server Update for option key handling, allowing VSE usage on the instrument without dongle.
4.70.1.0	Docking of cursor results is the default setting
4.70.1.0	When turning on FFT Math1 is used as default. Previously Math4 was used as default
4.70.1.0	Multiple measurements enabled by default for histogram and statistics
4.70.1.0	Device Footprint includes List of installed Microsoft Patches on the instrument
4.60.2.0	The mask test result display in the signal bar shows more results entries
4.60.1.0	RTP: Support of 40 GSa/s for RTP 4/6/8 GHz for serial numbers $\geq 103.000$
4.60.1.0	Roll mode does not support event actions. When the instrument is in roll mode and event actions are turned on, the device goes into normal mode
4.60.1.0	Slew Rate measurement unit was V*Hz. It is changed to V/sec.
4.20.1.0	The title bar of the docked measurement results is removed to have more display space available for the waveform diagrams
4.20.1.0	For the FFTmath channel the channel info shows the maximum value of the diagram grid instead of the offset. This is more consistent to Spectrum Analyzer behavior.
4.20.1.0	The video tutorials are not integrated into the firmware any more. The manual gives a link to the URL for viewing the videos instead.
4.15.1.0	Strong increase of value range for the channel delay
4.15.1.0	RTO2000: Support of operating systems Windows 7 Embedded as well as Windows 10 IoT Ent LTSB 2016
4.15.1.0	RTO2000: Sidebar is not only supported for the creation of elements but also for modification of these elements
4.15.1.0	RTO2000: Measurement dialog is updated for better ease of use
4.15.1.0	RTO2000, RTE: "Wait for trigger" dialog information moved into the horizontal settings signal bar
4.15.1.0	RTO2000, RTE: File Save/ Recall dialogs are updated for better ease of use
4.15.1.0	RTO2000, RTE: Menu structure is updated for better ease of use
4.15.1.0	RTO2000, RTE: Docking of measurement results is the default setting
4.15.1.0	RTO2000, RTE: The track functionality is part of the base functionality and available to all users
4.15.1.0	RTO2000, RTE:: Signal icons show the x-unit of track signals
4.15.1.0	RTO2000, RTE:: If a USB stick is connected to the instrument the USB stick is automatically selected for data export
4.15.1.0	RTO2000, RTE: The "Clear Screen" functionality is renamed to "Clear all" and now clears the waveform display, measurement statistics, histograms and the history.
4.15.1.0	RTO2000, RTE: Renaming of "Ultra segmentation" to "Fast segmentation"
4.15.1.0	RTO2000, RTE: Data logging export and fast segmentation data limits strongly extended
4.15.1.0	RTE: In the screenshot the signal bar is positioned next to the diagram areas to prevent overlapping of the waveforms by the signal bar
4.15.1.0	Option R&S® RTO/RTE-K1: Performance enhancements for I2C triggering & decoding
4.15.1.0	Option R&S® RTO/RTE-K8: Performance enhancements for Ethernet decoding
4.15.1.0	Option R&S® RTO-K42: Performance enhancements D-PHY triggering & decoding

### 1.3 Improvements

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

Version	Function
4.70.2.0	Option R&S® RTO/E-K18 and RTP-K37: Display of spectrogram diagram is fixed.
4.70.1.0	Scaling of zoom on track signals has been optimized

Version	Function
4.70.1.0	In some cases acquisition rate dropped when enabling differential/common signals and the vertical scaling was changed. This issue is fixed.
4.60.2.0	Option R&S® RTP-K11: Certain trigger position values caused an incomplete IQ data capture. This issue is fixed.
4.60.2.0	Option R&S® RTP-K130: The wizard of TDR/TDT showed a wrong dialog after certain input sequences. This issue is fixed.
4.60.2.0	Option R&S® RTP-K140 and RTP-K141: The startup alignment could fail if serial pattern trigger was active during instrument startup. This issue is fixed.
4.60.2.0	Option R&S® RTP-K140 and RTP-K141: When serial pattern trigger was active, the differential signal created from single ended channels was not correct. This issue is fixed.
4.60.1.0	Chrome web browser for the RTx instruments showed slow performance. This issue is fixed.
4.60.1.0	After using Find trigger level channels with AC coupling switched to DC coupling. This issue is fixed.
4.60.1.0	The parameter "Max results" in Peak List settings of the FFT was only available for Math4. This issue is fixed.
4.60.1.0	If track waveform for cursors was active and a clear results was used, the cursor results were not cleared. This issue is fixed.
4.60.1.0	Changing the signal Level Mode with the SCPI command REFL2:AUTO:MODE ABS to absolute peak leads to a failing of trigger unit. This issue is fixed.
4.60.1.0	RTE: When screenshot settings for print without channel information is activated, no additional empty space is created on the screenshot
4.20.3.0	In some cases the graphics interface could freeze sporadically. This issue is fixed.
4.20.2.2	There were cases when the option keys were not set correctly after instrument boot up. This issue is fixed
4.20.1.0	RTE: SaveSets did not include the corresponding screenshot, so that the graphical recall did not show a bitmap for such a SaveSets. It is fixed that SaveSets include the screenshot.
4.20.1.0	Performance of the saving of screenshots is strongly improved
4.20.1.0	Improved update performance when analog channels are displayed together with ZVC analog channels
4.20.1.0	A warning message occurs when the FFT does not use the complete waveform for the FFT calculations because of the selected user settings
4.20.1.0	When Japanese language is activated, the math editor displayed the text "3" where it should show "-". This issue is fixed
4.15.3.0	When the probe unit was set to "A" manually and the settings were saved, recalling the settings set the unit back to "V". Autoset also reset the manual probe unit setting "A" to "V". This issue is fixed
4.15.3.0	When a RT-ZM probe was attached and a selfalignment was done, the instrument needed a restart to handle the probe offset correctly. This issue is fixed
4.15.2.0	If the instrument language was set to a language other than English, the "Uncal" indicator was displayed after startup of the instrument even though the instrument was aligned. This issue is fixed
4.15.1.0	When connecting the instrument to an external monitor, the resolution handling for the connection is improved
4.15.1.0	RTO2000, RTE: In stop mode measurement results are not unnecessarily discarded
4.15.1.0	RTO2000, RTE: The roll mode is not automatically switched off when an X/Y diagram is active
4.15.1.0	RTO2000, RTE: In some cases the remote desktop connection to the instruments did not work correctly. This issue is fixed

## 1.4 Known Issues

The following table lists the known issues and indicates since which version the issue could be observed:

Since	Function

## 1.5 Modifications to the Documentation

Revision History:

Date	Release Notes Revision	Changes
17.12.2020	4.80.1.0	Added Option R&S® RTP/RTO-K134, RTP/RTO-K58. Added functionality for Option R&S® RTO/RTP-K133
28.05.2020	4.75.1.0	Horizontal result lines, new current probe RT-ZC31
18.02.2020	4.70.2.0	Option R&S® RTO/E-K18 and RTP-K37: Display of spectrogram diagram is fixed.
20.01.2020	4.70.1.0	Support for Option R&S® RTP-K133 and RTO-K133 Advanced Jitter Analysis
17.10.2019	4.60.2.0	Startup alignment with serial pattern trigger being active
27.08.2019	4.60.1.0	Launch version for RTP 13/ 16 GHz
27.07.2019	4.50.1.0	Initial version for RTP 13/ 16 GHz
29.03.2019	4.20.3.0	Sporadic graphics interface freeze
26.02.2019	4.20.2.2	Handling of option keys during boot up
12.02.2019	4.20.1.0	Support of R&S®RT-Z1M MOhm Adapter for RTP
21.11.2018	4.15.3.0	Correct handling when manually setting the probe unit "A"
30.10.2018	4.15.2.0	Display of "Uncal" indicator even though instrument is aligned
18.10.2018	4.15.1.0	Common version for RTP, RTO2000 and RTE

## 2 Firmware Update

Firmware updates for the R&S RTP, R&S RTO2000 and R&S RTE are available as a single download from the Rohde&Schwarz web page <http://www.rohde-schwarz.com>.

The installation file for R&S RTP, R&S RTO2000 and R&S RTE is named "**Setup\_Rtx\_V4.80.1.0\_x64.exe**".

After the update to this firmware version, the instrument will start with preset instrument settings. To check the installed firmware version select "Setup" from the "File" menu and switch to the system tab. The firmware version is shown in the upper left corner of this dialog.

### 2.1 Preparing the Installation

There are several ways how to update the device after downloading the firmware installation file.

Using a memory stick:

1. Copy the file(s) to a directory of the memory stick and insert the memory stick into one of the USB sockets of the instrument.

**Using the remote desktop and copying the installation files to a directory of the instrument:**

1. Connect the instrument to your LAN
2. Start the remote desktop on your PC (C:\winnt\system32\mstsc.exe)
3. Enter the TCP/IP address of the instrument that you want to update. Ensure that the "local resources" > "drives" option is selected and press the "Connect" button
4. Login to the instrument (user name: "instrument" and password "894129" by default)
5. Copy the firmware installation file from your PC to a new folder on the instrument
6. You can now access this directory with the installation file from the instrument firmware

**Using a network drive:**

1. Connect your instrument to your LAN, and establish a connection to one of your servers (ask your local IT administrator for support)
2. Copy the firmware installation file from your PC to a directory on this server
3. You can now access the directory with the installation file from the instrument firmware

## 2.2 Performing the Firmware Update on the Instrument

The firmware update process is performed with the following steps:

1. Switch the instrument on and wait until the Oscilloscope has resumed operation
2. Ensure that the acquisition mode is not running. If the RUN CONT or the RUN Nx SINGLE key is shining green, press this key to stop the acquisition
3. Press the SETUP key or select "Setup" from the "File" menu at the bottom of the screen
4. Select the "System" tab
5. The selected dialog box contains a box with the title "Select setup for firmware update". Press the Button "Open" within this box. A file selection dialog appears
6. Change the path to the drive and directory which you prepared in the step 2.1 (USB stick directory, remote PC directory or directory on a server) and close the dialog with the "Select" button
7. The installation starts and a new dialog box appears. Press the "Next" button to navigate to the selection of the firmware packages. By default all applications should be installed
8. Press the "Install" button to start the firmware update:  
The installation continues and the firmware is stopped. After a few minutes the system restarts automatically.  
Depending on the previously installed firmware version, a reconfiguration of the hardware may be required during the first start of the firmware. In this case, a message box is displayed and the update of the FPGA starts automatically. **Do not switch off the instrument during this update!** After the update of the FPGA the instrument performs another instrument restart automatically.  
If a special FPGA update is required the instrument must execute a cold boot. In such a case, a message appears on the screen asking to switch off the instrument. Press the "Ok" button and wait until the instrument is completely switched off. As a final step switch on the instrument. The instrument resumes operation.
9. After the firmware update a self alignment is recommended. Select "Self alignment" from the "File" menu. Select "Start Alignment" to start the self alignment procedure.  
A message box appears to indicate the running alignment procedure. Wait until this message box disappears. This will take several minutes.

Now the instrument is ready for operation.

## 2.3 Performing the Firmware Update without a running oscilloscope application

If a firmware update shall be executed without running firmware, the windows explorer can be started. Change the path to the drive and directory prepared in step 2.1. Make a double click on this file and proceed with step 7 to update the instrument firmware.

## 2.4 Firmware downgrade

A firmware downgrade is handled like a normal firmware installation with the following exceptions:

- RTE / RTO2000 / RTP
  - For devices a downgrade from version 4.70.1.0 or higher to version 4.60.2.0 or lower, the application R&S License Server must be manually uninstalled from the device.
- RTE
  - For Windows 7 devices a downgrade from version 4.60.1.0 or higher to version 3.70.1.0 or lower is not supported.
- RTO2000
  - For Windows 10 devices a downgrade from version 4.15.1.0 or higher to version 3.70.1.0 or lower is not supported.
  - For Windows 7 devices a downgrade from version 4.60.1.0 or higher to version 3.70.1.0 or lower is not supported.
- RTP
  - A downgrade from version 4.10.1.0 or higher to version 3.70.1.0 or lower is not supported.
  - For devices with serial numbers  $\geq 103.000$ , a downgrade from version 4.60.1.0 or higher to version 4.50.1.0 or lower is not supported.
  - For a downgrade from version 4.80 or higher to version 4.75 or lower it is required to execute the "Downgrade RTx\_V4.80.1.0.exe" with elevated privileges. The file can be downloaded on the Rohde & Schwarz RTP Homepage in the section firmware.

### **Downgrade restrictions after installing the Oct. 2020 cumulative security update**

After installing the cumulative security update KB4580346 or any other update containing this patch, only FW versions newer or equal 4.80 can be used.

## 2.5 Installing Firmware Options

The firmware update includes all currently available firmware options. No additional installation is required. A firmware update has no side effects to firmware options already installed.

The instructions in this chapter are only needed, if a firmware option is purchased and needs to be enabled on the instrument.

### **Enabling Options by Entering Option Key Codes**

To activate firmware options, 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. A dialog box appears. Select the “SW options” tab. The selected tab contains a box with the title “Install a new option”. There are two ways to install a firmware option:
  - a) If a file including the option key is provided, select “Open” in the box with the title “Install from file”. Navigate to the directory containing the option key file. Choose the file and click “Select”
  - b) If an option key number is provided double click on the data entry filed with the title “Enter new option key”. A key pad appears. Enter the option key number and press the “Enter” button.
2. After successful validation the message “option key valid” is displayed. If the validation failed, the firmware option is not installed.
3. If more than one firmware option shall be installed, step 1 and 2 needs to be repeated several times.
4. Reboot the device or restart the firmware.

## 3 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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