R&S®RTB2000 Oscilloscope
Release Notes
Firmware Version 02.400

These Release Notes describe the following models and options:
R&S®RTB2004 Oscilloscope, order no. 1333.1005K04
R&S®RTB2002 Oscilloscope, order no. 1333.1005K02

New Features of V02.400:
- Device name function
- Up to six measurement places
- Measurement type 'Delay to Trigger'
- Second cursor source
- Track math functions

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The software makes use of several valuable open source software packages. For information, see the "Open Source Acknowledgment" provided with the product.
The following abbreviations are used throughout this document: R&S®RTB2000 is abbreviated as R&S RTB2000.

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Contents

1 Information on the Current Version and History

1.1 New Functions

The following table lists the new capabilities and indicates the version in which each was introduced:

New Function of Firmware V02.400:

Version	Function
V02.400	Device name. See setup menu.
V02.400	Up to six measurement places.
V02.400	New measure type 'Delay to Trigger'.
V02.400	Second cursor source.
V02.400	New math functions track: period, frequency, pulse with and duty cycle. See also App and Demo menu.
V02.400	Option RTB-B6: Symmetry function for waveform type Triangle

New Function of Firmware V02.300:

Version	Function
V02.300	Configurable function 'Action on Trigger' added to the 'Trigger' menu.
V02.300	Option to disable date and time on screen. See 'Date & Time' setup.
V02.300	Option to close dialog when screenshot if saved via 'Save/Load' dialog.
V02.300	Disable R&S logo in screenshot via 'Save/Load' dialog.
V02.300	Individual color selection for each math waveform.
V02.300	Maximum channel probe attenuation user factor expands to 10M with unit 'V'.
V02.300	Saving screenshot in internal memory possible
V02.300	FFT vertical scaling dBµV.
V02.300	SCPI commands for waveform generator burst function with option RTB-B6.
V02.300	SCPI commands for parallel clocked bus implemented.

New Function of Firmware V02.202:

Version	Function
V02.202	New 'Cut Waveform' feature for Option RTB-B6 Function generator allows user to select a portion of captured oscilloscope waveform in the arbitrary setup.
V02.202	New burst feature for option RTB-B6 Function generator allows user to specify a fixed number of waveform cycles.
V02.202	Number of math equations increased to five, and number of operators increased including differentiation and integration.
V02.202	Option RTB-K36: New Bode plot application allow the instrument to perform gain and phase testing.
V02.202	Oscilloscope simultaneously displays cursor results with measurement statistics.
V02.202	New capability for user to independently set offset and position values. User can assign vertical know to control either position or offset.
V02.202	Enhanced FFT usability.

New Function of Firmware V02.121:

Version	Function
V02.121	None

New Function of Firmware V02.101:

Version	Function
V02.101	Vertical zoom: Use the zoom tool from tool bar to draw a rectangle and zoom into.
V02.101	Quick Access: Pull out a menu item and drag onto the screen. Also use the tool in tool bar.
V02.101	Auto Scale in channel short menu. See channel short menu (touch on channel segment in signal bar if channel switched on).
V02.101	Option RTB-K15: History menu available. Touch on History item in the main menu.
V02.101	Option RTB-K15: Analyze functions Overlay, Average and Envelope in segment player. See menu 'History' item 'Show History'.
V02.101	Tool Menu History. See configuration tool bar.

New Function of Firmware V02.000:

Version	Function
V02.000	Automatic roll mode with programmable minimum roll timebase, see menu 'Acquire'.
V02.000	Hold off supported for all trigger types, see menu 'Trigger'.
V02.000	Cursor settable to next peak in FFT mode, see menu 'Cursor' with cursor source 'Spectrum'.
V02.000	Additional cursor measure value $\Delta Y/\Delta V$ with cursor type 'V-Marker'.
V02.000	Measurement type slew rate added, see menu 'Measure\Type\Horizontal'.
V02.000	MOSI/MISO functionality for SPI bus with option RTB-K1.
V02.000	Rx/Tx functionality for UART bus with option RTB-K2.
V02.000	Fast segmentation with history option RTB-K15, see menu 'Acquire' with active RTB-K15.
V02.000	Multiple language support for web interface.
V02.000	Support of temporary bandwidth options.
V02.000	Counter app replaces frequency counter app. Every analog channel can be used as source.

New Function of Firmware V01.210:

Version	Function
V01.210	None

New Function of Firmware V01.204:

Version	Function
V01.204	Support of additional hardware variant, mainly required for production purposes. No new user functions

New Function of Firmware V01.203:

Version	Function
V1.203	Additional languages supported: Czech, Polish, Italian, Portuguese
V1.203	Additional instrument demos integrated; requires option Demo-K0
V1.203	Trigger type "timeout" implemented.
V1.203	Label list supported in option RTB-K1 and RTB-K3.

New Function of Firmware V01.100:

Version	Function
V01.100	Support of options RTB-B1, RTB-K1, RTB-K2, RTB-K3 and RTB-K15

New Function of Firmware V01.000:

Version	Function
V01.000	None, as this is a first release

1.2 Modified Functions

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

Modifications of Firmware V02.400:

Version	Function
V02.400	Increased FFT waveform update rate for low start frequencies and activated 'Automatic RBW'.
V02.400	Removed extra treatment of ADC clipping values in waveform arithmetic average. Clipping values are now processed as normal ADC values and not emphasized in waveform.
V02.400	Option RTB-B6: Minimum difference between start and stop sweep frequency limited to 3Hz.

Modifications of Firmware V02.300:

Version	Function
V02.300	Waveform intensity with saving inverse screenshot to USB thumb drive only modified if intensity low.
V02.300	For Bode Plot application RTB-K36, waveform generator load is set to 50 Ohm by default. CAUTION: Amplitude is doubled on DUT if there is no 50 ohms termination!
V02.300	Acquisition mode High Resolution in memory mode Auto improved. Higher sampling rates available.
V02.300	In trigger type 'Timeout' range type 'Stays High | Low' removed.
V02.300	Improvements in GUI and languages.

Modifications of Firmware V02.202:

Version	Function
V02.202	Option RTB-K15: Exit button in history player added.
V02.202	Auto off time of annotation tool expanded to 30s if a color selected.
V02.202	Renaming 'σ-Deviation' to 'StdDev' in measure statistic table.
V02.202	Sample rate indicator in zoom window removed.
V02.202	FFT amplitude scale limit adapted to probe setting in vertical scale mode Veff.
V02.202	Number of decimal places for values in csv export depends on resolution now.
V02.202	Information text in zoom window if roll mode is running.
V02.202	Bus table displays data as defined in 'Display Setup'.
V02.202	Various improvements in GUI and languages.

Modifications of Firmware V02.121:

Version	Function
V02.121	Minor rework in self-alignment to improve robustness.

Modifications of Firmware V02.101:

Version	Function
V02.101	Option RTB-K15: Increased segment numbers with 50ksample, 500ksample and 5Msample record length.
V02.101	FFT start frequency value limited to 0 Hz and stop frequency limited to sample rate / 2.
V02.101	Reduced channel segments in signal bar when channel off.
V02.101	Initial roll mode: Trace fills screen from left side to right side.
V02.101	Note on frequency limitation of the Meter in footer.
V02.101	Closing button in zoom mode added.
V02.101	Acquisition memory is set to maximum when roll mode on.
V02.101	Front panel firmware updated to version 01.011. RTC battery management improved.
V02.101	Various improvements in GUI and languages.

Modifications of Firmware V02.000:

Version	Function
V02.000	20MHz BWL in channel short menu added, ground removed.
V02.000	Display of current record length when record length set to automatic, see menu 'Acquire'.
V02.000	After firmware update a message is displayed which version is installed.
V02.000	Option RTB-K15: Available segment numbers almost doubled in interleaved mode. (interleaved mode: one channel per channel pair active, channel pairs are channel 1/2, channel 3/4, D7..0/D15..8)
V02.000	Option RTB-K15: Separation of segment table and history player. Player can be used without segment table.
V02.000	Option RTB-B6 Function generator: adjusted limits for minimum and maximum frequencies with FSK modulation.
V02.000	Various improvements in GUI and languages.

Modifications of Firmware V01.210:

Version	Function
V01.210	Updates and corrections in every language for menu and help texts.

Modifications of Firmware V01.203:

Version	Function
V01.203	Pressing the hard key "Touch Lock" only disables the touch screen; in previous versions its disabled touchscreen and hard keys.
V01.203	Text 'Menu' added below R&S logo.
V01.203	New default settings in the tool bar.

Modifications of Firmware V01.100:

Version	Function
V01.100	None.

Modifications of Firmware V01.000:

Version	Function
V01.000	None, as this is a first release.

1.3 Improvements

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

Improvements of Firmware V02.300:

Version	Improvement
V02.400	Solved: RTB-B1: Predefined level not working for D15..D8.
V02.400	Solved: Firmware blocker after interrupted waveform download via web browser.
V02.400	Solved: Wrong measurement values after vertical scaling in stop mode with following zoom activation.
V02.400	Solved: Wrong amplitude in math waveform with math function Derivate and acquire mode 'Sample' or 'Peak Detect'.
V02.400	Solved: Wrong channel waveform position with probe attenuation lower than one.
V02.400	Solved: Cursor positioning with rotary knob 'Analysis' not possible with trace arithmetic average and active cursor 'Track Scaling'.
V02.400	Solved: Jumping resolution of statistic minimum and maximum values for measure type frequency.

Improvements of Firmware V02.300:

Version	Improvement
V02.300	Solved: Channel offset did not consider probe attenuation.
V02.300	Solved: Probe Adjust Wizard did not work for channel one in rare cases.
V02.300	Solved: Clear screen did not reset display annotation mode. Touch screen was disabled.
V02.300	Solved: User level could not be tuned to below 0V with rotary knob.
V02.300	Solved: With Option RTB-K2: Trigger source changed to RX if UART configuration menu closed.
V02.300	Solved: Cursor values L1 and L2 are not updated with changing cursor position in FFT mode.
V02.300	Solved: Wrong value in numeric input keypad after clear and new input that starts with '-'.
V02.300	Solved: Wrong waveform offset in XY diagram with measurement and statistic table.
V02.300	Solved: With option RTB-B6: Firmware blocker if a 'scp' setting is loaded into arbitrary pattern generator.
V02.300	Solved: With option RTB-B6: Quick access did not work with arbitrary pattern value.
V02.300	Solved: Download of channel two display data via MTP gets channel one data.

Improvements of Firmware V02.202:

Version	Improvement
V02.202	Solved: Wrong DC level value (0 Hz) in FFT with vertical scale Veff and high DC signal offset.
V02.202	Solved: Firmware blocker when waveform saving with 'Vis. Channels' or when saving bus table.
V02.202	Solved: Bus type bus one in trigger dialog window visible if bus two trigger source.
V02.202	Solved: Channel label did not move in zoom window with changing offset.
V02.202	Solved: Blinking waveforms with vertical scaling or positioning in run mode (RTM2002 only).
V02.202	Solved: More than one printed label in clocked parallel bus with extended honeycombs.
V02.202	Solved: Decoded bus disappears after switch to zoom in stop mode.
V02.202	Solved: Waveforms disappears in norm trigger when switched to zoom with no trigger.

Improvements of Firmware V02.121:

Version	Improvement
V02.121	Solved: Locked pattern generator menu when 'Audio - IS' or 'Audio - TDM' selected. The Audio items were removed in the pattern generator menu.
V02.121	Solved: Front panel firmware update to version did not work on rare devices.
V02.121	Solved: Wrong spectrum section copied to reference waveform when trigger reference point was not set to center.
V02.121	Solved: Connection via USB-TMC: Read function 'viReadSTB' does not answer.

Improvements of Firmware V02.101:

Version	Improvement
V02.101	Solved: Wrong calculation of counter threshold with clipped ADC data.
V02.101	Solved: Wrong displayed bus data with parallel or parallel-clocked bus if the horizontal position during stop mode changed.
V02.101	Solved: Firmware blocker if I2C bus decoded and 'Display Settings' set to 'ASCII'.
V02.101	Solved: In acquisition average or high resolution mode only coarse cursor positioning with horizontal cursors.
V02.101	Solved: Wrong date saved in CSV file if the acquisition not complete.
V02.101	Solved: Possible spike in waveform data with infinity persistence and manually device operation.
V02.101	Solved: Trigger offset of 10ns with peak detect and 625MSa sample rate.
V02.101	Solved: Option RTB-K15: After mask violation history player stops one segment to late.
V02.101	Solved: Option RTB-K15: History player overlays segment table with maximized waveform window.
V02.101	Solved: MTP function with Windows 10: Windows prevents copying files to the instrument with file extensions unknown to Windows.

Improvements of Firmware V02.000:

Version	Improvement
V02.000	Solved: XY mode with average on; wrong display of waveform in xy-diagram.
V02.000	Solved: Persistence with waveform color temperature: The dark blue color always shows infinite persistence, independent of the configuration.
V02.000	Solved: The SCPI commands for pulse function of waveform generator are implemented in a wrong path and are therefore not consistent with the documentation where the correct path in indicated.
V02.000	Solved: wrong amplitude and offset in high resolution mode with small segment size: • 10kSa from 50s to 500s • 20kSa from 100s to 500s • 50kSa with 500s • 100kSa with 500s
V02.000	Solved: Wrong behavior with channel probe unit 'A' and user defined attenuation ratio.
V02.000	Solved: Trigger jitter up to 6.4ns with acquisition memory size 1MSa.
V02.000	Solved: Wrong channel data after disable and enable of a channel in stop mode.
V02.000	Solved: After changing acquire mode in QuickMeas the acquire mode was not applied to all channels when QuickMeas is left.

Version	Improvement
V02.000	Solved: Universal rotary knob did change a wrong value after changing cursor type between 'Horizontal' and 'Vertical' and vice versa.
V02.000	Solved: With Russian language the numeric input keypad did not print 'Min' and 'Max' values.
V02.000	Solved: With infinite persistence, a menu open or close did clear the persistence in stop mode.
V02.000	Solved: Wrong frequencies in spectrum on channel 2 and 4 with timebase greater than 200µs.
V02.000	Solved: After using probe adjust wizard the pattern generator menu was not available.
V02.000	Solved: Pattern pin state stuck at last state when pattern generator turned off. Now the pin state stays low.
V02.000	Solved: Wrong UART framing in option RTB-K2.
V02.000	Solved: Cursor positions not restored with preset or loaded setup.
V02.000	Solved: Wrong offset in Math trace with operator multiplication and source attenuation greater than 1V.
V02.000	Webserver: Livescreen and Remote Front Panel creates a message if more than one user online.

Improvements of Firmware V01.210:

Version	Improvement
V01.210	Solved: Delete tool does not work on the Math waveform.
V01.210	Solved: Pinch to zoom uses incorrect origin if the reference point is not in center. The same behavior occurs when the time scale is changed instead of pinch to zoom.
V01.210	Solved: Options RTB-K1/2/3: When a parallel bus is active only a parallel bus can be activated as second bus, but not a serial bus.
V01.210	Solved: Sporadic data artifacts if a channel switched on with timebase greater 20ms.
V01.210	Solved: Data artifacts in waveform with timebase greater 20ms and auto trigger mode with free run.
V01.210	Solved: Firmware blocker if trigger time greater than 6 x timebase and timebase greater 20ms.
V01.210	Solved: Grid annotation in FFT mode disappears if only the average FFT trace visible.

Improvements of Firmware V01.203:

Version	Improvement
V01.203	Solved: Waveform disabled with persistence on in XY window.

Improvements of Firmware V01.100:

Version	Improvement
V01.100	Solved: Spike (wrong data value) in waveform date on start of trace in high resolution mode.
V01.100	Solved: X offset of trigger position on trace up to 10ns.
V01.100	Solved: Width trigger on channel 2 and 4 in interlace mode (2.5GSa) do not work.
V01.100	Solved: Reset of statistic function with SCPI is not synchronal with acquisition. After a faulty reset measure values and waveform counters are not correct cleared.

Improvements of Firmware V01.000:

Version	Improvement
V01.000	None, as this is a first release

1.4 Known Issues

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

Known issues of Firmware V02.400:

since	Issue
V01.000	Waveform disappears by changing timebase between 20ms and 50ms with active norm trigger without trigger event. Workaround: Use STOP mode before timebase change.
V02.202	Option RTB-K36: Wrong horizontal marker position via SCPI commands after horizontal shift of gain and phase waveform.

2 Modifications to the Documentation

The current documentation is up-to-date.

3 Firmware Update

3.1 Validity Information

Device	Order Number
RTB2002.FWU	Firmware image for R&S®RTB2002
RTB2004.FWU	Firmware image for R&S®RTB2004

3.2 Updating the Firmware

3.2.1 Possibility 1: Update using a USB Drive

Please transfer the update file to a USB drive and follow these steps to update the instrument firmware via USB drive:

Follow these steps to update the instrument firmware:

1. Insert the USB drive into the USB port on the front of the oscilloscope.

2. Touch on the R&S logo on the screen to open the main menu.

3. Scroll down the main menu until the "Setup" icon is visible.

4. Touch on the "Setup" icon to open the setup menu.

5. Select "Firmware Update"; the instrument will display the current version ("Installed") and the version on the USB drive ("New") for both the device firmware and the front controller firmware.

6. Select "Execute" to start the update process for the device firmware.

7. Wait until the update process has completed. This may take up to one minute. The instrument automatically reboots once the update process is finished.

8. If there is a newer version of the front controller firmware too, select "Execute" once again to update this firmware as well. The front controller firmware update only takes seconds and does not require a reboot of the instrument after it has completed.

> Interruption of the power during the update process can make the instrument unusable!

3.2.2 Possibility 2: Update using a PC with USB cable connection to the instrument

Follow these steps to update the instrument firmware via USB cable:

1. Setup the R&S®RTB2000 Interface settings to USB MTP. 'SETUP\INTERFACE\USB\PARAMETER' or touch on interface symbol below the date and time in the upper right corner.

2. Connect your PC to the R&S®RTB2000 with a USB cable. The PC's USB host port (type A) connects to the USB device port (type B) on the rear of the oscilloscope.

3. The PC will show a popup message asking if you would like to connect to the oscilloscope.

4. Click on "Open device to view files".

5. Then the primary directories (internal storage, live data and upload) appear.

6. Drag & drop the new version of the firmware to the upload directory.

7. Select 'EXECUTE' on the R&S®RTB2000 to start the update process.

8. Wait until the update process has completed. This may take up to one minute. The instrument automatically reboots once the update process is finished.

9. If there is a newer version of the front controller firmware too, select "Execute" once again to update this firmware as well. The front controller firmware update only takes seconds and does not require a reboot of the instrument after it has completed.

> Interruption of the power during the update process can make the instrument unusable!

4 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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