

## What's New in this Revision

This help describes version V2.50 of the R&S ZVT firmware. This firmware provides the following new features.

- Wizard for intermodulation distortion measurement and detailed intermodulation distortion **results** (with option R&S ZVA-K4)
- New "**Defined Coherence Mode** " (with option R&S ZVA-K6)
- Export of full sets of single-ended S-parameters to **Touchstone** files, irrespective of the balanced port configuration and the measured quantities.
- New LXI browser interface
- Extended functionality of DATA ENTRY keys (entry of characters).
- Absolute bandpass search (bandpass/bandstop **absolute level** )
- Fast power calibration mode
- Adjustable **Font Size** in diagrams
- **Channel Info** , shows or hides the channel list below the diagrams
- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- New command `SOURce:POWER:CORRection:COLLect[:ACQuire]:DEFault ON | OFF` , enables the analyzer to generate a default source power calibration with no need of using a power meter.
- New command `CALCulate<Chn>:GDAPerture:SCOUNT` , defines the aperture steps for the group delay calculation.
- New command `CALCulate<Ch>:DATA:ALL?` , return the response values of all traces in the active setup.
- *Align \*RST to User Defined Preset* switch in the *System Config – Preset* tab causes `*RST` and `SYSTEM:PRESet` restore the user-defined settings.
- New command `[SENSe<Ch>:]CORRection:CKIT:LABel` , assigns a label to a user-defined or imported calibration kit.
- New command `CALCulate<Chn>:DATA:NSweep:FIRSt?` , reads the sweep results in single sweep mode in ascending order.  
`CALCulate<Chn>:DATA:NSweep:COUNT?` returns the number of completed sweeps.
- New command `SOURce<Ch>:GROup<group_no>:PORTs` defines a port group with an arbitrary, not necessarily continuous port range.  
`SOURce<Ch>:GROup<group_no>:COUNT` queries the number of port groups.

Product improvements:

- A system error calibration during a power sweep can be started using the `[SENSe<Ch>:]CORRection:COLLect[:ACQuire]:SELEcted`. Restrictions in earlier firmware versions do not apply any longer.
- Improved automatic full n-port calibration with automatic adjustment of frequency

step size during the calibration.

- Equidistant time sweep for the full set of 60001 sweep points.
- The version of the data sheet that corresponds to the current firmware version is displayed in the Info dialog.



To check your R&S ZVT firmware version, click *Help – About Nwa...*



Contents of this help and of your documentation CD-ROM

This help system represents an up-to-date version of the ZVT documentation including all new features of the current firmware version. An updated printable (.pdf) file and CD-ROM is provided for each major (2-digit) firmware version.

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## New Features in Firmware V2.47 (Compared to V2.46)

- Support for **frequency converter** model R&S ZVA-Z75 (for analyzers with a maximum frequency of at least 20 GHz)

Fixed issues:

- In a mixer power calibration , the external power meter is controlled correctly.

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## New Features in Firmware V2.46 (Compared to V2.45)

- Added emergency power off in single sweep mode by means of command **OUTPut<Ch>[:STATE]** .

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## New Features in Firmware V2.45 (Compared to V2.40)

- Support for **frequency converter** model R&S ZVA-Z325 (for analyzers with a maximum frequency of at least 20 GHz)

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## New Features in Firmware V2.40 (Compared to V2.31)

- Extension to the TRL calibration: Calibration with three lines .
- **Renormalization** of port impedances can be based on two alternative waveguide circuit theories.
- The sweep segments for *Segmented Frequency* sweep type can overlap.
- Selectable field separators (semicolon, comma, tabulator, space) for trace export files (**Export Complex Data** , **Export Formatted Data** ).
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- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- A default directory 'C:\C:\Rohde&Schwarz\Nwa' can be set using `MMEMoRY:CDIRectory DEFault` .
- New command `[SENSe<Ch>:]CORRection:CKIT:DELeTe 'ckit_name'` , deletes a user-defined or imported cal kit.
- New command `SYSTem:LANGUage` selects the remote language for the analyzer.

Product improvements:

- In the *Port Configuration* dialog the source *Power Result* is always displayed.

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## New Features in Firmware V2.31 (Compared to V2.30)

- Two-Tone combiner for R&S ZVT20 network analyzers equipped with option R&S ZVT20-B11.

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## New Features in Firmware V2.30 (Compared to V2.21)

- **Ripple limit** test
- **Characterization** of R&S calibration units
- Support of *One Path Two Port* calibration by R&S calibration units
- Directory for *Additionally Available Cal Kits and Conn Types*: Cal kit files will be (re-) loaded automatically every time the NWA application is started (*System Config. - General* ).
- Possibility to raise the priority of the running NWA application (*System Config. - General* ).
- Transparent info fields for markers and trace statistics (*System Config. -General* ).
- The analyzer supports sweeps with a single sweep point. The maximum **Number of Points** is 60001.
- The NWA application is available for restricted users without administrator rights. Firmware update still requires administrator rights.
- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- New command `CALCulate<Ch>:PARAmeter:DELeTe:SGRoup` , deletes an S-parameter group
- New command `SYSTem:COMMunicate:RDEvice:PMETer<pmeter_no>:AZERo` , starts auto zeroing of an external power meter.
- New parameter `SENSe:CORRection:COLLect:DELeTe ALL` , deletes all system error correction data.

- New command `MMEMory:STORe:TRACe:CHANnel` , stores the trace data of all data traces in the specified channel to a trace file.
- New command `SYSTem:COMMUnicate:RDEvice:PMETer<pmeter_no>:CONFIgure:AUTO[:STATe]` , enables or disables Auto Config NRP-Zxx.
- New command `CALCulate<Ch>:LIMit:SEGMENT:COUNT?` , queries the number of limit line segments.
- New command `SYSTem:LOGGing:REMOte[:STATe]` , enables logging of all remote control commands transferred to the analyzer.
- New commands `[SENSe<Ch>:]CORRection:COLLect:AUTO:PORTs:TYPE` and `[SENSe<Ch>:]CORRection:COLLect:AUTO:TYPE` , start an automatic calibration with a specific calibration type.

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## New Features in Firmware V2.21 (Compared to V2.20)

- New remote control commands, define diagram names (`DISPlay:WINDow<Wnd>:NAME '<Name>'` ) return diagram numbers and names (`DISPlay:WINDow<Wnd>:CATalog?` ) and traces in diagrams (`DISPlay:WINDow<Wnd>:TRACe<WndTr>:CATalog?` ).

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## New Features in Firmware V2.20 (Compared to V2.13)

- Support for **frequency converters** (for analyzers with a maximum frequency of at least 20 GHz)
- Selectable source power settings in true differential mode
- Alternative use of compensated a-waves in amplitude and phase imbalance sweeps
- New source power calibration parameters : *Includes Flatness Cal, Includes Reference Receiver Cal*
- Extended **harmonic power calibration** dialog
- New **Resolution Enhancement Factor** for time domain measurements
- Automatic calibration of  $n > 2$  ports with full one-port, separate full two-port and full n-port calibrations possible
- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- New queries for the channel names and number of a particular trace: `CONFIgure:TRACe:CHANnel:NAME?` , `CONFIgure:TRACe:CHANnel:NAME:ID?`
- Extended preset: `SYSTem:FPReset` .
- New statistical parameter GAIN is command `CALCulate<Chn>:STATistics:RESult?`
- New command `DISPlay[:WINDow<Wnd>]:TRACe:EFEEd` displays a trace in a diagram area without numbering it.
- New command `DISPlay:CMAP<Element>:TRACe:RGB` for trace color definition.

- New commands for **harmonic power calibration**
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## New Features in Firmware V2.13 (Compared to V2.11)

- Support for new front module controller FMR7
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## New Features in Firmware V2.12 (Compared to V2.11)

- Support for R&S ZVT20 vector network analyzers

Fixed issues:

- Corrected function of the *Measure "a" Waves at* radio buttons in the *Port Configuration* dialog.
  - Corrected **marker formats** for complex reference impedance settings
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## New Features in Firmware V2.11 (Compared to V2.10)

This firmware version has been released for compatibility with a firmware version for R&S ZVA network analyzers.

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## New Features in Firmware V2.10 (Compared to V2.02)

- True differential mode (option R&S ZVA-K6)
  - Automatic calibration for arbitrary combinations of ports in manual control
  - Extended trace statistics: Gain/Slope/Flatness
  - New commands for trace names and numbers (`CONFigure:TRACe<Trc>:CATalog?` , `CONFigure:TRACe<Trc>:NAME` , `CONFigure:TRACe<Trc>:NAME:ID?` )
  - New command `OUTPut[:STATe]` switches internal and external power sources on or off.
  - New command for verification of a source power calibration `SOURce<Ch>:POWER<Pt>:CORRection[:ACquire]:VERification:RESult?`
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## New Features in Firmware V2.02 (Compared to V2.01)

- New commands to change trace names: `CONFigure:CHANnel<Ch>:TRACe:REName` , `CONFigure:TRACe<Trc>:REName` .
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## New Features in Firmware V2.01 (Compared to V2.00)

- Keyboard control of *Eval. Range* and *Define Limit Line* dialogs improved.
- Ready for Trigger signal switched off for pulsed measurements.

- Preset performance improved (delay time eliminated).
- Mixer measurements extended to the frequency range <50 MHz.
- Dialog performance improved compared to firmware version V2.00.

### Extended Functionality

- The C:\Program Files\Rohde&Schwarz\Network Analyser\Rsib directory contains the files needed for remote control via **RSIB protocol** (for programming in C/C++ and Visual Basic).

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## New Features in Firmware V2.00 (Compared to V1.92)

- **Pulsed measurements** (with option R&S ZVA-K7)
- Extension of the **Offset** menu: compensation of a frequency-dependent, port-specific loss.
- Selectable reference for stimulus value definitions in the *Port Configuration* dialog (*Stimulus* dialog).
- Selectable reference for power and frequency definitions for mixer measurements.
- Low-frequency extension for TRL calibration with an additional match or sliding match.
- Optional display of **time gate limits** in the diagram area.
- Import of **cal kit files** (\*.prn) generated with the PNA Cal Kit Editor.
- Improved display of hardware error messages .

- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- New status registers STATus:QUESTionable:INTEgrity... monitor hardware failures.
- Extended command `MMEMory:LOAD:LIMit` , can load limit lines from Touchstone files, assigning a response and stimulus offset.
- Extended command `MMEMory:STORE:TRACe` , can store traces with various data formats.
- New command `CALCulate<Chn>:PARAMeter:DEFine:SGRoup` creates the traces for all S-parameters associated with a group of logical ports. `CALCulate<Chn>:DATA:SGRoup?` returns the results.
- New command `[SENSe<Ch>:]BANDwidth|BWIDth[:RESolution]:SElect` defines the selectivity of the IF filters for unsegmented sweeps.
- New command `CALCulate<Chn>:MARKer<Mk>SEARCh:BFILter:RESult[:STATe]` to display or hide the results of a bandfilter search.
- New commands `CALCulate<Chn>:STATistics:MMPTpeak[:STATe]` , `CALCulate<Chn>:STATistics:MSTDev[:STATe]` , `CALCulate<Chn>:STATistics:RMS[:STATe]` , `CALCulate<Chn>:STATistics:EPDelay[:STATe]` to display or hide statistical information about traces.
- New command `FORMat:DEXPort:SOURce` , defines the format for traces retrieved with the ZVR-compatible command `TRACe[:DATA][:RESPonse][:ALL]?`

- New command  
`SOURce<Ch>:POWER<Pt>:CORREction:GENerator<Gen>:LEVel:OFFSet` defines an attenuation or gain in the signal path between an external generator and the calibrated reference plane.
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## New Features in Firmware V1.92 (Compared to V1.91)

- Support of configurable generator step attenuators (analyzer types R&S ZVB and R&S ZVA).

### Fixed Issues

- Interchanged remote control parameter names for `FORMat:BORDER NORMAL | SWAPped`.
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## New Features in Firmware V1.91 (Compared to V1.90)

- Support of ZVA40 vector network analyzers.
- Extended frequency range of TRL calibration due to a second line standard.
- A tooltip for remote command errors, to be activated in the *GPIB Settings* tab of the **System Configuration** dialog, is available. The tooltip is to provide information that can be useful for program development and optimization; it does not necessarily indicate that a remote control script is faulty or non-executable.
- Extended *GPIB Language* selection in the *GPIB Settings* tab of the **System Configuration** dialog.
- New remote control features

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- Optional trace name parameter (replaces numeric trace suffix) in the `DISPlay:WINDow:SCALE...` commands.

### Fixed Issues

- In time domain representation the exported formatted **trace files** contain the actual stimulus (time) values.
  - Memory traces can be handled in remote control (e.g. `CALCulate:PARAMeter...`) without limitation.
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## New Features in Firmware V1.90 (Compared to V1.86)

- Extensions to the TOSM calibration type: unknown through.
- New **Imbalance** parameter for balanced port configurations.
- Automatic identification of the port assignment between the analyzer and the calibration unit. The numbers of the connected ports must no longer match.
- Several calibration units may be USB-connected simultaneously. See also remote

control commands `SYSTem:COMMunicate:RDEvice:AKAL:ADDRess...`

- Extended diagram scaling functions: **Max and Min** .
- **Max Hold** function for the active trace.
- **Global Limit Check** returns the result of a composite limit check (on several traces).
- In the *Presets* tab of the **System Configuration** dialog, it is possible to specify a user-defined preset configuration.
- In the remote screen , it is possible to define user-defined softkeys and assign the functionality of function softkeys to them.
- A single menu command **All S-Params** displays all S-parameters.
- Improved calibration wizard for calibrations using a sliding match.
- Port frequencies for ports with a common synthesizer are no longer coupled unless the ports are used as permanent signal sources .
- *New remote control features*

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- Export of marker values to an ASCII file (`MMEMemory:MARKer<Mk>:STORE` )
- Optional port restriction parameters in the `[SENSe<Ch>:]CORRection:CKIT:<std_type>` command
- New parameter `MDATa` for `CALCulate:DATA` to read unformatted data after evaluation of the trace mathematics
- A trace generated with `CALCulate<Ch>:PARAMeter:SDEFine` automatically becomes the active trace
- The new command `[SENSe<Ch>:]CORRection:COLLect:AUTO:PORTs:CONNECTION?` queries the port assignment between the analyzer and a calibration unit.
- `SYSTem:KLOCK` locks or unlocks the local controls of the analyzer.
- New command `[SENSe<Ch>:]CORRection:COLLect:SCONNECTION<port_no>` selects the connector type of the ports using a string variable.
- New command `[SENSe<Ch>:]CORRection:FACTory[:STATE]` enables or disables the factory calibration
- New command `CONFigure:CHANnel<Ch>:NAME:ID? '<Ch_name>'` returns the channel number for a named channel.
- New command `SYSTem:USER:DISPlay:TITLe` changes the title of the remote display.
- Refined calibration unit settings: `SYSTem:COMMunicate:AKAL:CONNECTION` , `SYSTem:COMMunicate:AKAL:MMEMemory[:STATE]` , `MMEMemory:AKAL:FACTory:CONVersion` , `[SENSe<Ch>:]CORRection:COLLect:AUTO:CKIT`
- New commands for calibration: `[SENSe<Ch>:]CORRection:DATE?` , `[SENSe<Ch>:]CORRection:DATA:PARAMeter?` , `[SENSe<Ch>:]CORRection:SSTATE?`
- New commands `DISPlay:MENU:KEY:EXECute` and `DISPlay:MENU:KEY:SELEct` combine remote and manual control.
- New command `[SENSe<Ch>:]CORRection:CKIT:SELEct '<conn_type>'` , `'<ckit_name>'` selects a calibration kit for a connector type with arbitrary name.



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## New Features in Firmware V1.86 (Compared to V1.84 and V1.85)

- Systematic protection of the analyzer's RF amplifiers against excess input levels. An update to firmware version V1.86 is highly recommended to eliminate any possibility of damaging the instrument hardware.

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## Improvements in Firmware V1.84 (Compared to V1.83)

- The system error correction data is acquired at a constant IF gain. During the calibration sweep, the *IF Gain b* in the *Receiver* section of the *Port Configuration* menu is set to *Low Distortion*. A possible AGC (*Auto*) setting is suspended.

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## New Features in Firmware V1.83 (Compared to V1.80/V1.82)

- Support of calibration unit R&S ZV-Z52 (models 72 and 30 for frequencies up to 18 GHz and 24 GHz, respectively).
- Improvement of the power calibration process with active Automatic Level Control (ALC).
- Power calibration data acquired in *Power* sweep mode can be re-used for *Time* and *CW Mode* sweeps (for frequency sweeps this feature was already implemented in firmware V1.80).
- The sweep average (*Average On*, *Average Factor*) and the *Trigger* settings are also valid for calibration sweeps.

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## New Features in Firmware V1.80 (Compared to V1.78)

- **New measurement mode:** Frequency Conversion (option R&S ZVA-K4, including **Harmonic Distortion** measurements and Mixer Mode )
- **New calibration type:** Power calibration
- **Support for external test devices:** External **generators** and **power meters** can be controlled via USB, LAN, GPIB bus, or other interface types
- Adaptive Gain Control (AGC) of the receiver
- **Automatic Level Control (ALC)** of the source
- **Low Phase Noise mode**
- Extended bandfilter search mode: **Bandpass Search Ref to Marker**
- Improved access to the time domain and frequency domain stimulus values in the *Transform -Time Domain Stimulus Axis* menu.
- **Frequency Step Size** is a setting parameter for frequency sweeps
- **Marker values** can be exported to an ASCII file.
- New remote control command `[SENSe<Ch>:]CORRection:COLLect:METhod?` returns a list of all calibration types for channel <Ch>.
- New remote control commands `[SENSe<Ch>:]CORRection:CONNection` and `[SENSe<Ch>:]CORRection:CONNection:DELeTe` configure and delete user-defined connector types.

- New remote control command [SENSe<Ch>:]CORRection:CKIT:<std\_type> defines the parameters of arbitrary connector types.
- New remote control commands SYSTem:SOUNd:ALARm[:STATe] and SYSTem:SOUNd:ALARm[:STATe] switch alarm and status sounds on or off.

### Fixed Issues

- Trace mathematics can distinguish between voltages and dimensionless quantities (**Result is Wave Quantity**).
- **Zero Delay at Marker** can now be used for all ports, the arithmetic problems have been solved.

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## Improvements in Firmware V1.78 (Compared to V1.77)

- Performance improvements for very large numbers of simultaneous channels/traces

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## New Features in Firmware V1.77 (Compared to V1.75)

- New calibration standard: **Sliding match**.
- The 7-term calibration types *TOM*, *TRM*, *TRL*, and *TNA* can be used for an arbitrary number of ports.
- Two new calibration types : *TSM Enhanced* and *TOM Enhanced*.
- Sweep segment-specific IF gain for received waves including Automatic Gain Control (AGC).

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## New Features in Firmware V1.75 (Compared to V1.70)

- The **channel bits** are switched over without intermediate reset when the measuring channel is changed. The bits always correspond to the current measuring channel.
- During a calibration sweep the channel bits of the calibrated channel are activated (instead of the reset values).
- When a new channel is created, the channel bits automatically take on the values of the previous channel.
- Calibration via remote control works for all channels without restriction.
- Touchstone files for more than 4 (and up to 8) ports are supported.
- A measurement wizard for up to 4 ports is available for ZVT analyzers.
- Automatic calibration works correctly after a balanced port configuration is configured in the measurement wizard.

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## New Features in Firmware V1.70 (Compared to V1.62)

- **New measurement: Virtual Transform** (Embedding/deembedding)
- Sweep range can be defined by **Sweep Step Size**
- Alternative conversion of wave quantities in **trace mathematics**

- **Data to Memory** function can be applied to all data traces at once
- New softkey **Recall Last Cal Set**
- Export of **formatted trace** data
- Renormalization of **reference impedances** for the test ports with complex values
- Automatic power reduction for Calibration Unit in the initial tab of the **System Config** dialog
- *New remote control features*

The new features are also available via remote control; the SCPI commands are reported in the relevant reference sections. Besides the following remote-control features have been added:

- User defined color scheme settings (`DISPlay:CMAP...` ).
  - Cal standard data can be loaded from a Touchstone file (`MMEMoRY:LOAD:CKIT:SDATA...` )
  - New command `SYSTem:ERRor:ALL` reads complete error queue.
  - New command `FORMat:BOrDer` controls whether binary data is transferred in normal or swapped byte order.
-