

Release Notes for R&S ZVA Firmware Version 4.0

New features:

- Explicit selection of averaging mode *Magnitude Phase* or *Real Imag*.
- Frequency converter mode:
 - Additional frequency converter test setups
 - NWA ports not used as converter or LO ports can be calibrated and measured at arbitrary frequencies
 - Flatness power calibration for all converter types

Product improvements:

- Time domain: Improved step response implementation
- Power Reduction at Sweep End now also applies to external generators
- Frequency converter mode:
 - Revised amplitude and phase imbalance sweep
 - Improved Trudi and Coherence adjustment
- Immediate activation of generator step attenuators in single sweep mode
- Color schemes now support 20 trace styles (instead of 16)
- Trace numbers and channel numbers are displayed in the Trace Manager and Channel Manager, respectively
- R&S NRP2 Power Meter: support for power sensor channel A
- In mathematical mode (*Trace > Trace Funct > Math = User Def*), 'Math' can be displayed instead of the measured quantity of the related trace
- Enhanced wave correction: A warning message is displayed if traces are annulled due to missing system error correction data
- The *Export S-Matrix* dialog now remembers its *Impedance* setting
- HP8510 and HP8530 emulation improvements
- Improved parser error messages in calibration and trace import commands
- **New and modified remote commands**
 - `[SENSe<Ch>:]FREQUency:CONVersion:DEVIce:CONFIgure <#ConvPorts>, INTernal | EXTernal`
New remote command to define the *Converter Setup*. Extended configuration possibilities compared to `[SENSe<Ch>:]FREQUency:CONVersion:DEVIce:MODE`
 - `SOURce<Ch>:POWEr<Pt>:CONVerter:TRANsfer:SLOPe <slope>`
Minimum, resolution and increment value was changed from 1 to 0.01
 - `[SENSe<Ch>:]AVERage:Mode AUTO | FLATten | REDuce`
New remote command to set the *Average Mode*.
 - `CALCulate<Chn>:MATH:DISPlay:STATe <Boolean>`
New command to enable/disable *Display 'Math' as Measured Quantity*.
 - `DISPlay:WINDow<Wnd>:Y[:SCALE]:AUTO ONCE`
New command implementing the *Autoscale All* GUI function.
 - `DISPlay[:WINDow<Wnd>]:TRACe<WndTr>:Y[:SCALE]:COUPlE[:STATe] ON | OFF [, '<trace_name>']`
New command implementing the *Couple All / Decouple All* function for all traces in a diagram.
 - `DISPlay[:WINDow<Wnd>]:TRACe<WndTr>:Y[:SCALE]:COUPlE:ALL ON | OFF [, '<trace_name>']`

New command implementing the *Couple All / Decouple All* function for all traces.

- `SYSTEM:INIT:WAIT ON | OFF`

New command implementing the *Wait for Data Ready after Single Sweep* setting.

- For de-/embedding networks that are defined using touchstone files, the paths of the loaded touchstone files can now be read using the query form of the corresponding `MMEMORY:LOAD` command:

`MMEMORY:LOAD:VNETworks:BALanced:DEEMbedding?`

`MMEMORY:LOAD:VNETworks:BALanced:EMBedding?`

`MMEMORY:LOAD:VNETworks:GLOop:DEEMbedding?`

`MMEMORY:LOAD:VNETworks:GLOop:EMBedding?`

`MMEMORY:LOAD:VNETworks:PPAir:DEEMbedding?`

`MMEMORY:LOAD:VNETworks:PPAir:EMBedding?`

`MMEMORY:LOAD:VNETworks:SENDEd:DEEMbedding?`

`MMEMORY:LOAD:VNETworks:SENDEd:EMBedding?`

- `SYSTEM:TIME:LOCAL?`

New command to query the instrument's local time (according to Windows time zone settings)

Resolved issues for the following measurements / operating modes:

- ZVA40: Power dropouts at frequencies higher than 24 Ghz, when an IF-bandwidth of 1 MHz is selected
- Sporadic errors with large number of measurement points, also in combination with external trigger
- Intermodulation measurement with an external generator as upper tone source.
- Intermodulation source power calibration at the receiver port (via remote control)
- Measurement speed for segmented sweeps with large number of sweep segments in certain configurations
- *Print to File*: Image resolution in generated diagrams is now independent of the screen size
- Error message when 2 USB frequency converters are connected
- Prevent sweep restart when only the trace format is changed
- Trace format for stability traces
- Repeated execution of a reference receiver power calibration
- *PCal* label missing for 1-point CW sweeps
- 180 degree phase steps when max hold is active and trace settings are changed
- Marker navigation in a segmented sweep with decreasing stimulus frequency
- Import trace files in UTF-8 format
- Creation of 75 Ohm cal kits via parser

Changes in Firmware V3.90 (Compared to V3.80)

New features:

- *Sanitize* function for calibration units R&S ZN-Zxx/Z1xx

Product improvements:

- Intermodulation distortion measurement:
 - Relative intermodulation distortion quantities are displayed in *dBc* units

- Relative upper intermodulation products are displayed relative to the upper tone
- Relative major intermodulation products are displayed relative to the lower or upper tone, whichever is smaller
- Improved *Auto Length* correction and *Fixture Compensation*
- Averaging remains enabled during receiver power calibration
- Automatic driver selection for power sensors R&S NRPxxSN connected via LAN
- Support for frequency down-converters RPG ZRXxxx
- **New and modified remote commands**
 - `SYSTEM:COMMunicate:RDEvice:AKAL:SANitize`
New remote command to securely erase all user characterization data from the internal memory of a cal unit R&S ZN-Zxx/Zxxx

Resolved issues for the following measurements / operating modes:

- Exported wave quantities in true differential mode
- Windows "scan and fix" message after connecting a R&S ZN-Zxx/Z1xx calibration unit
- Update problem when offset length or offset delay is modified
- Recognizing harmonic grid conditions for certain configurations
- R&S ZVA67: Small spikes in power sweep under certain conditions
- Marker values/units for certain differing combinations of trace and marker format
- Automatic display update after certain remote commands
- System error correction via remote control: execution error for power and CW sweeps

Changes in Firmware V3.80 (Compared to V3.70)

Product improvements:

- Frequency converter mode: small improvements of the dialogs for
 - port configuration
 - defined coherence mode
 - power calibration
- New default connector type "4.3-10"
- New R&S NRP power meter drivers
- Driver file for power meter Keysight N1914A

Resolved issues for the following measurements / operating modes:

- Frequency converter mode
 - operation in true differential mode or defined coherence mode
 - error messages for remote commands when invalid ports are specified
 - `SOURce:POWer:CONVerter:TRANsfer:ATTenuator ELECTronic` was accepted for frequency converters without electronic attenuator
 - in special cases, setting the power control mode didn't take effect for frequency converters with electronic attenuator
- Intermodulation distortion measurement for instruments with four sources and special port combinations
- Phase stability (not relevant for standard measurements) for R&S ZVA24, ZVA40 and ZVA67 with new synthesizer board / four sources

- Problems with markers in delta mode at lower or upper sweep end
- Small corrections in online help

Changes in Firmware V3.70 (Compared to V3.60)

New features:

- Drive port bits can be configured as additional channel bits
- Amplitude and phase tolerance for defined coherence mode and true differential mode can be configured (either in the Defined Coherence Mode dialog or in the True Diff Mode tab).

Product improvements:

- The display of SWR traces is no longer limited to values less or equal than 9999
- The Open Source Acknowledgement is now part of the firmware and can be displayed from the analyzer GUI
- New driver files for Keysight 83620A and R&S SMW signal generators
- Marker values are now interpolated according to the current trace format, when trace and marker format are different
- Possibility to disable the power cal traces during remote power calibration
- **New and modified remote commands**
 - **OUTPut<Ch>:UPOrt:ECBits**
New remote command to configure drive port bits as extended channel bits
 - **SOURce<Ch>:CMODE:TOLerance:AMPLitude**
SOURce<Ch>:CMODE:TOLerance:PHASe
SOURce<Ch>:TDIF:TOLerance:AMPLitude
SOURce<Ch>:TDIF:TOLerance:PHASe
New commands to set the tolerance for defined coherence and true differential mode
 - **SYSTem:DISPlay:UPDate**
New option **FReeze** to disable trace update
 - **MEMory:SElect?**
Query the active setup
 - **OUTPut<Ch>:UPOrt[:VALue]** and **CONTRol:AUXiliary:C[:DATA]**
Extended value range 0 to 255

Resolved issues for the following measurements / operating modes:

- Remote configuration of power meters when using "Other" interface like TCP/IP socket connection (**:SYSTem:COMMunicate:RDEvice:PMETer1:DEFine**)
- Missing K27 option in demo license key on certain R&S ZVA67 instruments
- Suboptimal CW sweep time on R&S ZVA24/ZVA40 with four sources
- Tab delimiters in touchstone header file
- LO frequency when using an internal port as LO source during an intermodulation distortion measurement on a R&S ZVA67 or ZVA24/ZVA40 with four sources
- Smoothing for *Phase* trace format on 360° phase jumps
- Measurement speed for large IF bandwidths and trigger modes other than free run
- Remote command error for **CALCulate:PARAmeter:DELeTe:CALL** for setups with memory traces
- Consideration of smoothing or linearity deviation for marker display in complex trace formats (*Smith, Inverted Smith, Polar*)

- Interpolation of marker values according to trace format
- Mouse cursor not shown during remote desktop operation on instruments with Windows 7 operating system
- Reset of busy signal at beginning of sweep if previous sweep has been canceled

Changes in Firmware V3.60 (Compared to V3.50)

New features:

- Support for frequency converter models R&S ZCxxx
- Support for power sensors R&S NRPxxS/SN
- Support for R&S ZVAX-TRM option B3x (low noise amplifiers)
- Last modification date of user-defined calibration kits is tracked and can be displayed
- Possibility to set the default value for calibration wizard setting *Same Sweep Setup for all Standards*

Product improvements:

- *Triggered Meas Sequence* and *Trigger Delay* now also supported in Free Run Mode
- Possibility to export S-Parameters with "Replace Missing Values By 0" in combination with renormalization
- Minor GUI improvements
- Small signal quality improvements for R&S ZVA40 with four sources and R&S ZVA67 with new synthesizer board
- Improved stability and robustness
- **New and modified remote commands**
 - `[SENSe<Ch>:]CORRection:CKIT:MDATe? '<ckit_name>'`
New remote command to query the last modified date of a user-defined calibration kit
 - `MMEMory:STORe:TRACe:PORTs:INComplete`
Removed the restriction that the connector impedances of all ports had to be equal
 - `MMEM:STOR:TRAC:PORT:INC`
Harmonization with behavior of related GUI dialog
 - `SOURce<Ch>:POWER<Pt>:CONVerter:TRANsfer:PATH`
Only the query was working
 - `[SENSe]{1...4}:TEUNit:LNAMplifier{1...2}[:STATe]`
New command to switch the low noise amplifiers of a R&S ZVAX-TRM ON or OFF

Resolved issues for the following measurements / operating modes:

- Double-clicking the *Span* area in status line did not always open the corresponding numeric entry bar
- Marker placement for CW sweeps with more than 20001 points
- Renormalization with balanced ports for some special cases
- *Automatic Power Reduction for Calibration Unit* was also applied to LO ports of auxiliary mixers
- For Intermodulation Distortion Measurements the power calibration step did not switch off an external generator in special cases
- Characterization of a calibration unit for segmented sweeps

- Special combination of system error correction, segmented sweep and stimulus display option
- Marker format "R+jX" for special balanced port configurations
- Getting trace data via remote commands in very special cases in combination with trace functions and switched off display
- Special combination of mixer mode with an external generator in fast sweep mode used for LO-signal and alternating sweep mode
- Scalar mixer measurement power calibration data that are linked to the calibration pool sometimes weren't updated automatically after the calibration
- *Repeat previous calibration* (calibration dialog) for sweep types other than frequency sweep
- Conflicts between Defined Coherence and Alternating Sweeps mode
- Calibration state label for CW and power sweep for mixer noise measurement
- Transfer of large amounts of data from cal unit R&S ZV-Z58 to the analyzer
- Time Domain: the *Set Harmonic Grid and Keep Stop Frequency and Number of Points* function in the *Low Pass Settings* did not recalculate the start frequency if the grid was already harmonic
- Noise figure setup guide: restoring IF bandwidth after receiver power calibration step

Changes in Firmware V3.50 (Compared to V3.40)

New features:

- Optional power reduction at end of sweep

Product improvements:

- Support of new CPU board FMR11 and Windows 7 operating system
- Help system: improved description of CSV file format for *Export/Import Complex Data*
- **New and modified remote commands**
 - `MEMory:SElect` now accepts setup file names with and without `.zvx` extension (independent of Windows Explorer setting "Hide extensions for known file types")
 - New remote command to control power reduction at sweep end
`SOURce<Ch>:POWer<Pt>:REDuce ON|OFF`

Resolved issues for the following measurements / operating modes:

- Compression point measurements: issues with *Shift Stimulus Value* and compression point marker
- For 2nd generation calibration units with SD port, user characterization data sometimes weren't properly written to the inserted SD card, if the SD card was very slow
- Remote command `CALCulate<Chn>:LDEVIation:AUTO ONCE` when display mode was off
- Remote commands `SENSe:NFIGure:ISNoise`, `SENSe:NFIGure:NDUT` and `SENSe:NFIGure:SEQuential` didn't take immediate effect
- Enabled/disabled state of OK button in *Export S-Matrix* dialog
- Fast sweep mode: stimulus list update at R&S SMF100 when rapidly switching between stimulus lists
- Missing `WinUSB.dll` for older Windows XP disk images

Changes in Firmware V3.40 (Compared to V3.30)

New features:

- Generator step attenuator: possibility to readout the attenuation selected by the automatic generator attenuation algorithm via remote command
- Possibility to turn off triggering for selected segments in segmented sweep mode

Product improvements:

- Vector mixer measurement (option R&S ZVA-K5): automatic calibration via remote commands
- For setups with waveguide ports, *Renormalize S-Parameter* is by default disabled in *Export S-Matrix* and *Import Complex Data* dialogs
- Mixer Noise Figure Measurement with Embedded LO (R&S ZVA-K31): improved measurement for devices with very low input power
- Redesign of frequency converter control
- Frequency converters: extended test setup configuration for R&S ZVA24/40 analyzers with four independent sources
- Streamlined definition and handling of active display range (for trace statistics and marker search)
- Support of special reflectometer versions for R&S ZVA24/67
- Minor improvements in dialog navigation
- **New and modified remote commands**
 - Generator step attenuator: new remote command `SOURce<x>:POWer<y>:ATTenuation:AUTO:VALue?` to readout the attenuation selected by the automatic generator attenuation algorithm
 - Vector mixer measurement (option R&S ZVA-K5): new remote command `[SENSe<Ch>:]CORRection:COLLect:AUTO:VMIXer:ACQuire` for automatic calibration
 - Missing documentation for R&S ZVAX-TRM remote commands `SYST:COMM:RDEV:TEUN:IDN?`, `SYST:COMM:RDEV:TEUN:OPT?` and `SYST:COMM:RDEV:TEUN:COUNt?` added
 - New trigger setting for segmented sweeps:
 - `[SENSe<Ch>:]SEGMENT<Seg>:TRIGger:STATE`
 - `[SENSe<Ch>:]SEGMENT<Seg>:TRIGger:CONTROL`
 - New remote commands for converter configuration
 - `[SENSe<Ch>:]CONVerter:ASSign<Port>`
 - `SOURce<Ch>:POWer<Pt>:CONVerter:TRANsfer:DSET`
 - `SOURce<Ch>:POWer<Pt>:CONVerter:TRANsfer:PATH`
 - Modified remote commands for converter configuration:
 - `SENS:CONV:AMOD` modifies all ports, now system global, deprecated
 - `SENS:CONV:PATH` modifies all ports, now system global, deprecated
 - `SENS:CONV:DESC` extended, modifies all ports, now system global, deprecated
 - `SOUR:POW:CONV:TRAN:DESC` extended, now system global
 - `SOUR:POW:CONV:TRAN:AMODEl` extended, now system global, deprecated

Compatibility:

In contrast to previous firmware versions the advanced power transfer model settings for frequency converters is now a system global, port specific setting. The settings are not stored together with setup files. Settings stored in older setup files are ignored.

Resolved issues for the following measurements / operating modes:

- Configuration of mixer mode intermodulation distortion measurement
- After changing from segmented sweep to CW or time sweep via remote control, the number of sweep points could not be changed in the user interface
- Fast sweep mode for external generator R&S SMF100A for small frequency step sizes
- Setting dispersion and delay values of the Unknown Through standard with remote command `SENS:CORR:COLL:ACQ:SEL`
- Wrong command syntax in examples for remote commands
`SENSe:TEUN:PMOD:SOUR` and `SENSe:TEUN:PMOD:INV`
- Calibration unit port detection for point trigger mode in combination with CW sweep type and alternating mode
- `SYST:COMM:RDEV:TEUN:OPT?` returned the wrong R&S ZVAX-TRM model
- Moving traces to another diagram using the *Trace Manager* dialog did not move associated memory traces
- *Data -> Mem* modified the evaluation range setting
- *Eval Range* for trace statistics was modified by commands
`CALCulate:MARKer:FUNCTion:DOMain:USER:SHOW`, `CALCulate:MARKer[:STATe]` and *Search Range* dialog
- Renormalization for waveguide ports during *Import Complex Data*
- Several communication issues for mixer delay measurements with external receiver
- Active trace wasn't adjusted when changing the active channel via *Select Channel*
- Missing delay for powermeter measurement on R&S ZVA67 and R&S ZVA24/ZVA40 with four independent sources

Changes in Firmware V3.30 (Compared to V3.21)

New features:

- Support for R&S ZVAX-TRM extension unit

Product improvements:

- Possibility to retain port group settings for calibrations with calibration unit. (Particularly useful for calibrating *Simultaneous Measurement with Frequency Offset* with a calibration unit.)
- New version of the GPIB Explorer tool
- New version of R&S NRP-Z power meter drivers
- Improvements of HP 8753 emulation mode (immediate execution of commands without EOI and newline character, optional suppression of device clear)
- Configuration file for new revision of R&S ZVA-Z90 frequency converter
- Default calibration kit file for Anritsu 3654D calibration kit
- **New and modified remote commands**
 - New command `SENSe<Ch>:CORRection:COLLect:AUTO:RPGrouP` to retain port group settings for calibration with calibration unit
 - New command `SENSe:CORRection:COLLect:AUTO:CKIT:PORTs` for characterization of calibration unit with arbitrary port assignment
 - New commands for R&S ZVAX-TRM: `[SENSe<Ch>:]TEUNit:...`

- Remote command `SENSe:CORRection:COLLect:AUTO:CKIT` now allows to explicitly characterize a calibration unit either with or without through standards
- For reflect standards the query `SENS:CORR:CKIT:<std_type>?` now always returns the load model

Resolved issues for the following measurements / operating modes:

- Sporadic loss of keyboard focus when closing online help
- ALC error message showing up in defined coherence mode
- Merging of one port calibrations with `MMEMoRY:LOAD:CORRection:MERGE`
- When opening the *Split Manager* dialog, the first entry of the drop-down list was empty
- Automatic sweep update after remote calibration
- Ground loop embedding and port pair embedding not deactivated during calibration (only relevant for trace display during manual calibration or automatic port detection for automatic calibration)
- Minor deviations of parser-preset (`*RST, SYSTem:PRESet`) and instrument preset
- Configuration of long distance mixer delay setup (option R&S ZVA-K10) using the *Mixer Delay Measurement Setup* dialog
- Delayed start of firmware when another process has 100% CPU load
- Reset of noise figure setup guide settings during system preset
- Update of port configuration table when unplugging a power sensor
- No "?" appended to *Cal* label when *Dynamic Bandwidth at Low Frequencies* was activated
- Calculation of delta marker when using different marker formats
- Handling of special cases for sync generator settings
- Using pulse trigger in time sweep
- Harmonic Power Cal in combination with *Use Reference Receiver Only* setting
- Unnecessary reset of mixed mode S-Parameter settings in *More S-Parameters* dialog when switching true differential mode on or off
- *Data -> Mem* restarts the sweep
- Modification of calibration kit connector impedance when changing the match standard offset line impedance
- Deletion of all calibration pool entries when using the mouse wheel in the calibration pool list under certain conditions
- Missing `hidserv.dll` for special external keyboards
- Corrections for display of user defined softkeys
- Query for calibration standards definition for standards with port restriction
- Corrected command definition for `SENS:CORR:CKIT:<std_type>` parameter list
- Firmware crash when pressing a hardkey in power calibration dialog when *RF Off* is active
- User defined preset taking effect with delay in HP and Anritsu emulation mode
- Small corrections in R&S ZVA-Z110 frequency converter configuration diagram in system configuration dialog
- Firmware crash when turning power correction off in port configuration under certain conditions

Changes in Firmware V3.21 (Compared to V3.20)

New features:

- Support for new revision of R&S ZVA67 synthesizer board
- Support for R&S ZVA24 and R&S ZVA40 with four independent sources

Resolved issues for the following measurements / operating modes:

- Improper sweep initialization when switching between setups with different IF bandwidth settings
- Unnecessary short power reduction at the start of a CW sweep for ZVA40 and ZVA50

Changes in Firmware V3.20 (Compared to V3.12)**New features:**

- Mixer Noise Figure Measurement with Embedded LO
- Possibility to read out time of calibration via remote command
- For calibration units with SD slot (e.g. R&S ZN-Z51), characterization data can be stored to and read from SD card

Product improvements:

- Generator frequency limits can be read dynamically from an external generator (instead from configuration file)
- New version of "GPIB Explorer" tool
- Reworked automatic port detection for calibration units: better performance in situations with low port power or high attenuation
- Automatic generation of minidump files in case of internal firmware errors
- Auto-completion in file dialogs now only displays files of correct type
- Reduction of small power transients at some frequency points when internal switching occurs
- Default calibration kit for R&S ZV-Z129
- Manual changes of port power are now synchronized back to "Define Mixer Measurement Dialog"
- Display of "Power" column in port configuration dialog now possible without option R&S ZVA-K4
- New calibration unit models retain last switched calibration standard after calibration
- Display of informative tooltip when frequency converter configuration can not be applied in system configuration dialog
- Predefined SMA connector type
- Small improvements for certain HP emulation parsers
- **New and modified remote commands**
 - **Commands**
[SENSe<Ch>:]CORRection:DATA:PARAmeter<Cal>? [<info>]
and
SOURce<Ch>:POWer<Pt>:CORRection:DATA:PARAmeter<Cal_index>?
<info>
can now return the calibration time
 - New command PROGram[:SElected]:RETVAl? to query the exit code of an external program
 - SOURce:LPORT can now also redefine single ended ports

- When balanced/redefined ports are dissolved using `SOURce:LPORt:CLEAr`, affected traces are redefined consistently

Resolved issues for the following measurements / operating modes:

- Printing active marker table
- Wrong help hyperlink in description of `DISP:WIND:TRAC:FEED`
- Error message when using multiport calibrations with more than two ports and AVG detector
- Print to file when application window is not maximized
- Prevent conflicting mixer power calibration settings in combination with external generators
- Possible inconsistent internal firmware states after `SOUR:LPOR:CLEAR`
- Conversion of scattering parameters to impedance values for cases with complex reference impedance
- Exiting the firmware for special cases
- Frequency converter reference receiver power calibration
- During S-parameter calibration the source power calibration was turned off when linked to the calibration pool
- Small memory leak when creating diagram areas
- Internal error for certain incorrect user defined math formulas
- Manual "Repeat Previous Cal" was enabled after automatic calibration
- Sporadic internal firmware error when quickly changing the number of sweep points in CW sweep mode
- Several `SENS:EUN` remote commands not returning an error code when hardware option is not present
- Auxiliary LO port driving under certain conditions although not configured
- Firmware hanging with 100% CPU load when changing "Receiver Measured Wave Quantities" for certain devices with receiver step attenuators
- Inconsistent LO power settings possible during vector mixer measurement setup
- Magnitude of time domain DC value was limited to 1
- Simultaneous measurement of port groups for certain setups with wave quantities
- Input of numerical quantities for calibration standard model constants
- ALC on R&S ZVA67 for special cases
- Matlab .dat file format
- Start of power calibration not possible when no trace is present
- Display of "More than 20 traces ..." error message when moving coupled traces between diagram areas
- Restrictions when using a four port calibration unit on a two port device
- Calculation of standard deviation for complex valued trace formats
- Unnecessary sweep interrupts for special setups with multiple IF bandwidths in one sweep
- Unnecessary extra sweep for `SOUR:POW:CORR:MIX:RF:ACQ` for vector mixer measurement
- Performance improvement of several dialogs for setups with a high number of channels
- *Limit Fail Trace Color* was only applied to active *Ripple Tests* if Limit Check was also enabled
- Internal firmware errors when working with snp files with higher number of ports than available on analyzer

- Sporadic "Illegal math operation ..." errors for one path two port or TOSM calibration
- Wrongly displayed "Receiver step attenuator settings are not in accordance with system error correction data" messages for settings that result in a $Ca?$ calibration label
- Calibration unit port detection frequency for mixer measurement setups
- Simultaneous measurement of port groups for special cases
- Wrong order of S12 and S21 data for s2p file export of calibration unit characterization data
- Possibility to set an approximate sweep time although only a DC trace is present
- Enhanced wave correction could be enabled for a mixer delay measurement and harmonic measurements although not supported
- Firmware hanging for very special remote command sequences
- Handling of special cases when configuring pulse generators via `PULS:GEN:MODE`
- Internal firmware error when characterizing a two port calibration unit with thru connections on a four port device without using automatic port detection
- Search limit lines not removed when turning off markers
- Missing update of receiver frequency display in port configuration dialog when changing the frequency stimulus axis
- Delta marker showing absolute units
- Calibration unit port settings are unnecessarily changed after automatic port detection when deselecting a port for calibration
- Wrong power limits of frequency converter LO ports for setups with an external generator connected to the LO port
- R&S ZVA67: Compensation for loss of external power splitter for frequency converter setups with external generator
- R&S ZVA67: IF bandwidths above 1MHz and frequencies above 40GHz resulted in a-wave dropouts (for certain measurement setups)
- Context sensitive help for imbalance sweep types mixed up
- *Noise Figure Setup Guide*: the option to reduce generator step attenuator setting to 0 dB during *Receiver Power Calibration* should not be offered if "Preamp or Direct Receiver Access Used" was selected
- Manual DC extrapolation for time domain option not considering trace math
- Display of "Server Busy"/"Switch To..." dialog when installing an option key from an USB stick

Changes in Firmware V3.12 (Compared to V3.11)

New features:

- Simultaneous measurement of port groups with frequency offset
- Support for calibration units with new controller board

Product improvements:

- Meaning of unit keys of the "DATA ENTRY" keypad changed from "G, M, k" to "n, u, m" for unit less quantities (unit "1U") like linear trace format
- Availability of *Port 2 Pwr Offset* control in *Noise Figure Setup Guide* is now directly coupled to option *Preamp or Direct Receiver Access Used*
- Definition of port groups and simultaneous measurement of port groups can now be set independently of each other

- Added warning about potential system reboot when performing *LAN Config Initialize* command in the *LXI configuration* dialog
- Increased size of drop-down list in *Select Ports* child dialogs of *Export S-Matrix* dialog
- Explicit warning for incompatible combinations of permanent driving ports (*Gen* column in port configuration) and intermodulation distortion measurement
- Rearranged menu items on *Trace Data* (Import/Export) menu
- *Range Limit Lines On* remains enabled when changing the active marker's search range
- Disabled automatic selection of *Apply* button in calibration wizard
- A modal info dialog is displayed while creating/saving a system report
- **New and modified remote commands**
 - New commands to activate/deactivate simultaneous measurement of port groups:
`SOURce<Ch>:GROup:SIMultaneous:STATe`
 - New commands to activate/deactivate and configure *Simultaneous Measurement with Frequency Offset*:
 - `SOURce<Ch>:GROup:SIMultaneous:FOFFset[:STATe]`
 - `SOURce<Ch>:GROup:SIMultaneous:FOFFset:CONDition?`
 - `SOURce<Ch>:GROup:SIMultaneous:FOFFset:MOFFset:MODE`
 - `SOURce<Ch>:GROup:SIMultaneous:FOFFset:MOFFset:DVALue`
 - `SOURce<Ch>:GROup:SIMultaneous:FOFFset:MOFFset:BWFactor`
 - New commands to manipulate the analyzer's identification string:
 - `SYSTem:IDENtify:STRing`
 - `SYSTem:IDENtify:FACTory`
 - New command to select the master channel for continuous pulse mode:
`[SENSe<Ch>:]PULSe:GENerator<gen_no>:MCHannel`
 - For setups with multiple channels, command `PULSe:GENerator:MODE` now behaves as documented and consistent with manual control
 - In command `[SENSe<Ch>:]CORRection:COLLect:RPSHift`, the reference plane shift can now be specified per calibration

Resolved issues for the following measurements / operating modes:

- Displayed frequency range in *Mixer Power Cal* dialog diagram for IF range receiver power cal
- Mixer power calibration for LO port when using an external generator and selected option *Reference Receiver Cal*
- New user characterization not displayed in *Characterize Cal Unit* dialog directly after calibration unit characterization
- Offered calibrations in *Intermod Dist Meas Power Cal* dialog in combination with option *Prepare Enhanced Wave Correction*
- Internal error in compression point search when evaluation range was outside of sweep range
- Memory leaks in configuration dialogs, when using calibrations in combination with *Simultaneous Measurement of Port Groups*
- Removed redundant "Conv x" receiver power cal dropdown list entries for R&S ZVA110 systems
- Firmware crash when pressing preset in "HP8510" compatibility mode.
- ALC auto mode settings for R&S ZVB20 and R&S ZVT20 and frequencies below 1 GHz
- Possible short-term output power present on ports when deactivating *RF Off*

- `OUTPut OFF` remote command could be canceled by following commands under certain conditions
- Option *Dynamic Bandwidth at Low Frequencies* in combination with *Measure Source Port Waves at: Receiver Frequency* and frequency converting configurations
- Internal error when combining balanced ports with *Simultaneous Measurement of Port Groups* under certain conditions.
- Combination of S-parameter measurement and mixer delay measurement (option R&S ZVA-K9) in one channel
- `:DISPlay:MENU:KEY:SElect` remote command not working under certain conditions
- ALC warning message not reset correctly under certain conditions
- Modifying the preset configuration caused unnecessary *Preset*
- Inconsistent behaviors of user defined presets in combination with *Frequency Converter* settings
- Prevent selection of UTI (upper tone at DUT input) measurement quantity for intermodulation distortion measurements with two tone output at external device and external generator as upper tone source
- Wrong result of `SOURce:POWer:CORRection:DATA:PARAmeter? WAVE` query for frequency converter source power calibration
- Cal label of noise figure trace when number of points are changed
- Prevent activation of ALC for defined coherence and true differential mode
- Loading a setup file generated on a R&S ZVA40 on a R&S ZVA24 when segmented sweep is active
- Power meter trace removed after change in port configuration when an external generator is involved
- S-parameter calibration for intermodulation distortion measurement in CW and power sweep mode
- Calibration state labels for intermodulation distortion measurement in combination with enhanced wave correction
- IF range S-Parameter calibration for mixer measurement
- Power calibration for intermodulation distortion measurement with an external generator selected for *Upper Tone* and *Ext. Dev.* selected for *Two Tone Output*
- Trace format reset when changing between S-parameters
- Display of *RF Off* in channel list when power stimulus axis is set to port x.
- Marker function *Span = Marker*
- Calibration units with different connector types
- Inconsistent behavior of the *Meas* column in true differential mode.
- Status bar erroneously showing error log entries under specific conditions
- Step size not saved for certain settings
- Marker display for power sensor traces in linear trace format
- Display of *PCal* labels in arbitrary mode under special conditions
- Inconsistencies when using predefined configs in *Balanced Ports and Port Groups* dialog after configuring port groups
- Update of calibration unit connector type in *Characterize Cal Unit* dialog
- Update of displayed formula in *Shift Response Value* dialog
- Inconsistent availability of *Compression Point* and *Define Compression Value* menu commands
- Calculation of compression point when coincident with a sweep point
- Overwriting a noise figure calibration when calibration pool link is active

- Overwriting a power calibration via remote control when a pool link is active
- Performing a remote source power calibration for intermodulation distortion measurement with `SOURCE:POWER:CORRECTION:IMODULATION:SPORTS:ACQUIRE` when using an external generator as upper tone source
- Performing a power calibration via remote command when *Additional Two-Port* is configured
- Scrolling in *Available Connector Types* list not possible if list of predefined connector types exceeds dialog size
- Mixer delay calibration under certain conditions
- Display of ALC flag for ratios in trace list
- Settings of `PULSE:GEN:MODE` not visible in GUI; remote behavior not consistent with documentation and GUI; possibly inconsistent settings for setups with multiple channels
- Shift stimulus value for CW sweep type
- Mixer power calibration for LO port, when configured as external generator
- Automatic calibration unit port detection in segmented frequency sweep mode

Changes in Firmware V3.11 (Compared to V3.10)

Resolved issues for the following measurements / operating modes:

- ALC in CW sweep mode on R&S ZVA67
- Touchstone file export with renormalization turned off generated scattering parameters in wrong order under certain conditions
- User Defined Preset taking effect with delay on some instruments
- Compatibility of `MMEM:LOAD:CKIT` remote command with legacy `SENS:CORR:CKIT` commands (without specifying label)
- Performing a flatness power calibration using reference receiver only and a calibration pool link
- Switching of step attenuators creating minor power spikes on certain instruments

Changes in Firmware V3.10 (Compared to V3.02)

New features:

- New calibration method NIST Multiline TRL
- Complete revision of automatic level control (ALC):
 - Complete redesign of dialogs
 - Relocation of ALC Config in *Power Bandwidth Average* menu
 - ALC settings are now channel specific
 - Complete redesign of *Auto* mode
 - Support of ALC over the whole frequency range of the instrument
 - Display of ALC status in trace list
 - Improved warning and error messages
 - Support for frequency converting applications

Note that due to concept changes some old port-specific ALC remote commands are not 100% downward compatible.
- Complete revision of intermodulation distortion measurement (IMD):
 - Power calibration for each intermodulation product frequency
 - Support of enhanced wave correction for IMD measurement
 - Receiver step attenuator adjustable in IMD dialog
 - Complete redesign of IMD power calibration dialog
 - Support of automatic level control
 - Improvements for cases with external generator as upper tone port

- Support for new Netcon hardware board with increased amount of memory

Product improvements:

- Improvement of Time Domain menu structure and dialogs (option R&S ZVAB-K2)
- Improved time gating in bandpass mode. Reduced artifacts due to band limitation in certain configurations at the diagram borders in frequency domain display
- When loading a power calibration with a *Cal Power Offset* setting, the *Port Power Result* value is kept constant now
- Three-Port and Four-Port calibration menus now provide the selection of the calibration method
- Compression point measurement considers actual reference receiver reading when appropriate
- Power calibration wizards with tree view now retain the display of performed calibrations when settings are changed via *Modify Settings*
- Several improvements of the HP compatibility parser
- Display of *External Reference* state in status bar
- Display of information message in setup info if virtual memory is disabled
- Improved source calibration state display in receiver power calibration dialog
- Improved keyboard navigation in several dialogs
- **New and modified remote commands**
 - **New commands for automatic level control (ALC):**
 - `SOURce<Ch>:POWer<Pt>:ALC:AUBW`
 - `SOURce<Ch>:POWer<Pt>:ALC:BANDwidth`
 - `SOURce<Ch>:POWer<Pt>:ALC:COUPle`
 - `SOURce<Ch>:POWer<Pt>:ALC:CStAtE`
 - `SOURce<Ch>:POWer<Pt>:ALC:LPNOise`
 - `SOURce<Ch>:POWer<Pt>:ALC:POFFset`
 - `SOURce<Ch>:POWer<Pt>:ALC:RANGe`
 - `SOURce<Ch>:POWer<Pt>:ALC:SOFFset`
 - `SOURce<Ch>:POWer<Pt>:ALC:STOLerance`
 - **Commands modified for ALC:**
 - `SOURce<Ch>:POWer<Pt>:ALC:CLAMp`
 - `SOURce<Ch>:POWer<Pt>:ALC[:STATe]`
 - **New command for "NIST Multiline TRL":**
 - `[SENSe<Ch>:]CORRection:COLLect:RPSHift`
 - **Commands modified for "NIST Multiline TRL":**
 - `[SENSe<Ch>:]CORRection:CKIT:<std_type>` and other commands for calibration standard definition
 - `[SENSe<Ch>:]CORRection:COLLect[:ACQuire]:SELected`
 - `[SENSe<Ch>:]CORRection:COLLect:METhod:DEFine`
 - `[SENSe<Ch>:]CORRection:DATA:PARAMeter<Cal>? [<info>]`
 - **New commands for intermodulation distortion measurements:**
 - `[SENSe<Ch>:]CORRection:COLLect:IMODulation[:STATe]`
 - `[SENSe<Ch>:]CORRection:POWer<port_no>:IMODulation:RPORT:ACQuire`
 - `[SENSe<Ch>:]FREQuency:IMODulation:PEWCorr[:STATe]`
 - `SOURce<Ch>:POWer<Pt>:CORRection:IMODulation:RPORT[:ACQuire]`
 - `SOURce<Ch>:POWer<Pt>:CORRection:IMODulation:SPORTs[:ACQuire]`

Resolved issues for the following measurements / operating modes:

- Noise Cal status not displayed in trace table when no system error correction is present
- Time domain step response display with time gating
- Sporadic error log entry "Phase synchronization failed" on R&S ZVA67
- Target search next in combination with delta markers
- Changing to remote control mode when dialog windows are still open
- Inconsistencies in definition of port groups in *Port Config* dialog
- Legacy commands for creating, selecting, deleting and saving calibration kits were not completely downwards compatible
- Calibration kit user connectors with different impedances could not be created
- ALC unlevelled messages
- ALC not automatically turned off during power calibration
- ALC timeout for slow filters (20Hz)
- User Defined Math dialog not completely visible when "Numeric Value" was extended
- IMD: *Upper Tone at DUT In* measurement when two tone output at port 1 is selected
- ALC for certain frequency converting configurations
- Missing update after `SENS:FREQ:IMOD:TTO` and `SENS:PORT:ZREF` remote commands
- Accuracy of IMD noise level trace
- IMD power calibration for upper tone port when two tone output at port 1 is selected
- Measurement of major IMD product at DUT in when two tone output at *Ext. Dev.* is selected
- UOSM calibration with calibration unit for certain configurations
- External generators could not be set to "0 Hz + ..." when stimulus axis was not set to "fb"
- S21 trace showing small spikes after a transmission normalization calibration
- Small differences in timing of calibration sweep in comparison to later measurement for certain configurations
- Compatibility issues of `MMEM:STOR:CKIT` (in combination with labels) with older firmware versions
- Automatic power reduction for remote calibration with calibration unit
- Firmware crash in Cal Kits dialog under certain conditions
- Marker number clipped in movable marker table
- `CONT:HAND` remote commands did not return error code if option is not available
- `SENS:CORR:DATA:PAR?` did also return data of factory calibration
- Minor correction of time domain bandpass mode with even number of points
- Minor corrections in extended sliding load calibration
- Wrong file exists error message when exporting data with the option "Export all Channels"
- Resource leak in `HCOpy` remote command
- Overwriting a power calibration in the calibration pool with a new calibration or adding a power calibration to the calibration pool
- Memory leak when viewing error log or creating a system report

Changes in Firmware V3.02 (Compared to V3.01)

Resolved issues for the following measurements / operating modes:

- Reduced dynamic range for network analyzers with an odd number of ports
- Adjustments for the production of R&S ZVA67 systems

Changes in Firmware V3.01 (Compared to V3.00)**Product improvements:**

- Clarified descriptions in online help:
 - Scattering parameter normalization during export
 - remote commands for trace export
 - remote command `SOURce:GROup:PORTs`
- Improved calibration standard frequency check in cases where multiple calibration standards are used to cover the desired frequency range
- Default calibration kit definition file for Maury 8050 calibration kit
- Marker and calibration standard definition was only possible up to 1 THz. Changed to 2 THz
- New remote commands:
 - Auxiliary command to support writing system error correction data to be used with enhanced wave correction:
`[SENSe<Ch>]:CORRection:POWEr<Pt>:AWAVE:IPMMatch[:STATe]`
- Changed remote commands:
 - In firmware V3.00 optional renormalization was inconsistently also added for remote command `MMEMoRy:STORe:TRACe`. This behavior is again removed in Firmware V3.01. See `MMEMoRy:STORe:TRACe` and `MMEMoRy:STORe:TRACe:PORTs` for a detailed explanation of renormalization in combination with remote commands.
 - `ABORt` command now can be used to stop a sweep that has been started with `INIT:IMM`

Resolved issues for the following measurements / operating modes:

- Inconsistent averaging count when stopping sweep and restarting sweep with certain menu commands
- Unnecessary restart of sweep when turning on bandpass search
- Error during certain remote calibrations with calibration unit when user characterization was active
- `:SOUR:FREQ:CONV:ARB:CFR` was only working for frequency converters with electronic attenuator
- In power meter configuration files parameter `POWERMEAS_SETUPDELAY` only took effect if parameter `POWERMEASSETUP` was set
- Marker Export when impedance format was selected
- Incomplete screen update after print to file
- Port group definition was deleted when performing a calibration
- Using external generator for two tone generation in group delay measurement
- Remote command for selection of DC measurement was not completely compatible with old firmware versions
- USB sticks could not be safely removed on certain devices with FMR7 CPU board and Windows XP Service Pack 3 disk images
- Improved calculation of switchover frequency for TRL calibration, when the thru standard is not the shortest calibration standard
- Intermodulation measurement traces could not be set via remote control in special cases

- Error when loading an old setup file where a mixer measurement with decreasing frequency axis was active
 - Marker unit display in time domain mode with distance axis
 - Remote calibration with calibration unit when device ports were not in increasing order
 - Repeat previous cal when using AVG detector for calibration
 - Interchanged order of S₂₁ and S₁₂ parameter in exported s2p file when renormalization is disabled
 - Improved calculation of image frequency in very special cases
 - Defined coherence mode on R&S ZVA67 when using more than two ports
 - Restart menu command did not restart an ongoing sweep
 - `SENS:CORR:DATA:PAR` did also return factory calibration
-

Changes in Firmware V3.00 (Compared to V2.92)

New features:

- Frequency converting noise figure measurement (option R&S ZVA-K31)
- Possibility to use higher order interpolation of calibration data for special measurement scenarios.
- Measurement of image gain for scalar mixer measurement.
- Renormalization of scattering parameters during import and export can be freely configured; see Import/Export Data.
- Restart Hold All menu command
- Support to simultaneously define calibration kits with the same name but different label; see `[SENSe<Ch>:]CORRection:CKIT...` with Labels
- Extensions of power meter configuration file, like modification of measurement result by a general mathematical formula, to support special external power meters
- Reworking of power calibration wizards; see e.g. Mixer Power Cal....
- Checkbox *Narrowband DUT* in Define Noise Figure dialog.

Product improvements:

- Mixer power cal wizards now propose two source power calibrations for enhanced accuracy when enhanced wave correction is activated
- Relaxed restriction on calibration unit port assignment list. Now more special cases are allowed.
- Diagram windows shown in calibration dialogs now use the same color scheme as the main diagram area.
- Improved display color of title bar in color scheme *Light Background*.
- Reflect calibration standards in ideal kits changed to Short.
- Improved error messages in *Import Complex Data* dialog.
- Export of unconventional cases like S₂₁ or S_{dd11} to an *.s1p file improved. Reference impedance written to Touchstone file is adjusted appropriately, if possible
- For multipoint calibrations with reduced number of Through connections, the measured Through connections are listed in the calibration manager and setup info
- Improved frequency range check of calibration standards and warning messages
- Setting of power stimulus axis to input port of device under test when adding traces from within noise figure setup guide

- New version of *GPIB Explorer* tool
- Calibration unit characterization info shows a message if Through characterization is missing
- Improved handling of low memory situations
- Improved handling of power correction data in segmented sweep mode
- Improved calibration in power sweep type
- Dialog *Define Scalar Mixer Measurement*: display of frequency and power settings from the sub-dialogs in the mixer diagram
- *Add External Generator* dialog in *System Configuration: Identify Type* button now always enabled
- Suppressed warning *Problem concerning external generator ...* when generator is not used in setup
- Explicit display of preparation sweep for calibrations with certain frequency converters
- Improved display of detected USB switch matrices in *System Configuration*
- Improved error messages for frequency converter mode
- When performing a power calibration out of the noise figure setup guide, a warning is shown when the IF bandwidth is too high or the generator power too low
- Remote error messages are deleted when returning to local mode
- For frequency converters without electronic attenuator, flatness calibration is deactivated by default
- *RF Off* state is checked when performing a calibration.
- New driver files for R&S NRP power sensors
- *Load Match Corr* menu command is now only enabled for frequency converting configurations
- **New remote commands**
 - **To read out calibration properties:**
 - SOURce<Ch>:POWer<Pt>:CORRection:DATA:PARAmeter<wave>
 - SOURce<Ch>:POWer<Pt>:CORRection:DATA:PARAmeter:COUNT?
 - [SENSE<Ch>:]CORRection:DATA:PARAmeter:COUNT?
 - [SENSE<Ch>:]CORRection:DATA:PARAmeter (extended)
 - **For dynamic bandwidth reduction:**
 - [SENSE<Ch>:]BANDwidth[:RESolution]:DREDuction
 - **For querying the noise calibration state:**
 - SENSE<Ch>:CORRection:NState
 - **For renormalization of scattering parameters during import and export:**
 - MMEmory:SETTings:RENORM:MODE
 - MMEmory:SETTings:RENORM:RIMPedance
 - MMEmory:SETTings:RENORM:State
 - **For narrowband DUT:**
 - SENSE<Ch>:NFIGure:NDUT
 - **To change segment name and spurious avoidance in segmented sweep mode:**
 - [SENSE<Ch>:]SEGMENT<Seg>:NAME
 - [SENSE<Ch>:]SEGMENT<Seg>:SBAND
 - [SENSE<Ch>:]SEGMENT<Seg>:SBAND:CONTROL
 - **New (modified) commands to support calibration kits with the same name but different label:**
 - MMEmory:STORe:CKIT:WLABel
 - [SENSE<Ch>:]CORRection:CKIT:<connector_type>:LSElect
 - [SENSE<Ch>:]CORRection:CKIT:LCATalog?
 - [SENSE<Ch>:]CORRection:CKIT:LDElete

- [SENSe<Ch>:]CORRection:CKIT:LLABel
- [SENSe<Ch>:]CORRection:CKIT:LSElect
- [SENSe<Ch>:]CORRection:CKIT:<standard_type>:WLABel
- To query and modify the system time and date
 - SYSTem:TIME
 - SYSTem:DATE.
- To change the computer name
 - SYSTem:COMMunicate:NETwork:HOSTname

Resolved issues for the following measurements / operating modes:

- Improved handling of automatic gain control during calibration for models R&S ZVA40 and R&S ZVA50
- Channel not sweeping after remote command `DISPlay:WINDow:STATe`
- Hiding of displayed columns in *Port Configuration* table, when deselecting a whole display group
- Small correction in the calculation of the optimum number of points in the *Define Pulse Profile* dialog
- Step size of sweep time property not handled correctly when using the rotary knob
- Resolved several issues with fast sweep mode of external generators:
 - error messages when having multiple channels with different number of points;
 - sporadic missing of first trigger pulse after firmware start;
 - multiple channels with CW sweep type;
 - setting of measurement delay in certain cases;
 - unnecessary learning of list after *Restart* menu;
 - timeout during learning of lists;
 - sporadic crashes when opening error log several times;
 - clear error message when maximum number of points is exceeded;
 - detection of extra trigger impulse in very rare cases
- Issues with *Fit Frequency Range* for intermodulation distortion measurements with higher order intermodulation products
- Port power could be set to $0\text{ dBm} + \dots$ (independent of P_b) although the stimulus axis was set to this port
- Overlapping properties in channel info line.
- Usage of external generator during defined coherence mode under certain conditions
- Exceptions during *Refresh Tables* when defining external generators under certain conditions
- Power calibration in segmented sweep mode for certain constellations
- Improved frequency range check for calibration with calibration unit for frequency converting configurations
- Measurement of relative intermodulation products
- Unnecessary display of *Unknown Through Characteristics* dialog in very special cases.
- Detection of external generator via VXI-11 interface
- Calibration in frequency converting configurations in sweeps with fixed frequencies
- External generator not sweeping in certain frequency converting setups with true differential mode
- Commands following a device clear in HP emulation mode
- One Path Two Port calibrations with calibration unit out of noise figure setup guide
- Several fixes regarding the `ROUTE:PORTs` command:
 - functionality when only one channel was present;
 - channel not sweeping after command

- Displaying LTI in intermodulation distortion measurement when the port with highest port number was used as upper tone
- Display of calibration frequency for remote power calibration in frequency converting mode
- *Bandwidth Fine Adjust* dialog elements disabled in certain cases
- Step size for port power offset in *Noise Figure Setup Guide* dialog
- `SENSe:CORR:SState?` also returned the noise calibration state
- Improved width of *Stimulus* column in printout of marker table
- Source noise figure not displayed correctly during source noise calibration
- Remote calibration for vector mixer measurement
- Frequency setting for external generator when intermodulation distortion measurement is active in special cases
- Update of sweep settings after power calibration in combination with enhanced wave correction
- Corrections in product help:
 - timing of output signals;
 - description of *Split All* menu command;
 - description of `SENS:CORR:SST?`, `SENS:CORR:PST?` and `SENS:POW:ATT`.
- Option R&S ZVA-K10 when using slave R&S ZVA as LO source
- LO power calibration in mixer mode when using cal power offset
- Importing a load standard with offset length from a `*.prn` file. Automatic detection of gender during import of calibration kit from `*.csv` format. Import of offset loss of a match from `*.csv` format
- Application crash when opening *Define Vector Mixer Meas* Dialog for very large setups
- Automatic changing of traces with external generator as drive port when making changes in port configuration
- Misleading display of frequency transformation equation under special conditions
- Unnecessary reset of stop time in time sweep when performing certain setup changes
- *Remote Display Active* screen when no setup is loaded.
- Correction in queries of `SENSe1:CORRection:COLlect:METhod` for calibration types `OPTport` and `ROPTport`
- No automatic display update after remote command `MMEMory:LOAD:TRACe`
- Sweep preparation phase of `SENSe2:CORRection:POWer2:ACQuire` could not be canceled by device clear command.
- Free disk space returned by `MMEMory:CATalog?`
- Power calibration quality label for special cases, like interpolation in segmented sweep mode

Changes in Firmware V2.92 (Compared to V2.91)

Resolved issues for the following measurements / operating modes:

- Output power stability for R&S ZVA67 under certain conditions

Changes in Firmware V2.91 (Compared to V2.90)

New features:

- Dynamic reduction of measurement bandwidth at low frequencies; see *Bandwidth Fine Adjust*

Product improvements:

- Improvements in HP compatibility parsers
- Option R&S ZVAB-B14, Universal Interface:
 - Improved timing of pass/fail strobe signal
 - Support of port E and F
- Display of calibration frequency instead of base frequency during remote mixer power calibration
- Added default calibration kit for R&S ZV-Z135
- Definition of additional through standards in default calibration kits 85052D and 85054D for TOSM calibration method
- Single step power calibration over whole frequency range for R&S ZVA80 and R&S ZVA110 systems
- New remote commands:
`CONTrol:HANDler:E[:DATA]`
`CONTrol:HANDler:F[:DATA]`

Resolved issues for the following measurements / operating modes:

- Sporadic hanging sweeps and error dialogs for setups with high number of points on devices with new FMR9 CPU board
- Transmission coefficient settings were not considered for remote power calibration sweep diagram
- Noise figure setup guide update of displayed attenuator settings when returning from a sub dialog
- New remote commands for calibration with calibration unit and multiple port assignments did not consider channel number
- Rounding issues when entering mechanical offset values
- Display issues in mixer measurement wizard for segmented sweeps or when setting the stimulus axis to *All Receivers*
- Base power could not be changed in mixer measurement wizard for specific configurations
- Unnecessary calibration sweeps during remote mixer power calibration for specific setups
- Default port assignment for calibration with calibration unit if only one port is selected
- *RF Off* in single sweep mode taking effect only after restart of sweep
- Configuration of upper tone frequency for mixer delay measurement with fixed RF frequency
- Calibration with calibration unit in segmented sweep mode when one or more segments were switched off
- Saving a characterization of calibration unit in rare cases
- Check for cutoff frequency for calibration with waveguide connectors in segmented sweep mode



To check your R&S ZVA firmware version, click *Help – About Nwa...* in the network analyzer's main application window. Refer to section *Firmware Update* in the help system for information about an upgrade of your network analyzer firmware.

Changes in Firmware V2.90 (Compared to V2.86)

New features:

- Mixer measurement wizard now supports up to two mixer stages and internal frequency multiplication factors
- Support for multiple port assignments for calibration unit. For example it is now possible to perform a four port calibration with a two port calibration unit
- Support for multiport calibrations with reduced number of Through connections
- Calibration sweep diagram for remote power calibration
- Display update during execution of remote commands; see Switchover to Remote Control.
- The switchover frequencies for a multi-line TRL calibration can now be influenced; see TRL Extensions
- Support for ELVA power meter 4806
- Support for socket based Ethernet communication for external devices

Product improvements:

- Documentation of file format for external generator and power meter configuration files incorporated into online help; see section Configuration Files
- Support of second GPIB1 bus to configure external generators with two GPIB adapters
- New softkey Max Unambiguous Range for time domain transform
- New power meter driver version and support of new models like NRP-Z211 or NRP-Z221
- Small improvements on noise figure setup guide
- New version of GPIB explorer tool
- Device clear softkey in remote mode; see Switchover to Remote Control.
- New keywords for device driver configuration files to better support non SCPI compliant devices
- Cal and Corr at Base Freq now also considers power calibration
- Improved firmware stability in low memory situations
- Improvements in HP compatibility parsers
- Driver file for Hittite generator HMC-T2240
- Possibility to replace not measured S-parameters during export with zero; see Select Ports
- **New remote commands**
 - `SYSTEM:PRESet:REMOte[:STATe] ON | OFF`
 - Extension to `CALCulate:DATA:NSWeep:FIRSt?` to read several sweeps at once.
 - `CALCulate:PARAmeter:DELeTe:ALL`
 - `CALCulate<Ch>:PARAmeter:DELeTe:CALL`
 - `MMEMOry:STORe:TRACe:PORTs:INCOmplete`
 - `[SENSe<Ch>:]CORRection:COLLect:AUTO:ASSIgnment<ASg>:DEFine`
 - `[SENSe<Ch>:]CORRection:COLLect:AUTO:ASSIgnment<ASg>:ACQuire`
 - `[SENSe<Ch>:]CORRection:COLLect:AUTO:ASSIgnment<ASg>:DELeTe:ALL`
 - `[SENSe<Ch>:]CORRection:COLLect:AUTO:CONFIgure`
 - `[SENSe<Ch>:]CORRection:COLLect:AUTO:SAVE`

- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:FIXEd **extended**
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:FUNDamental **extended**
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:TFREQUency **extended**
- SOURce<Ch>:FREQUency:CONVersion:MIXer:FUNDamental **extended**
- SOURce<Ch>:FREQUency:CONVersion:MIXer:PFIXEd **extended**
- SOURce<Ch>:FREQUency:CONVersion:MIXer:PMODE
- SOURce<Ch>:POWer:CORRection:MIXer:LO[:ACQUire] **extended**
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:IFPort
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:LOMultiplier
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:LOPort
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:MFFixed
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:RFMultiplier
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:RFPort
- [SENSe<Ch>:]FREQUency:CONVersion:MIXer:STAGes

Resolved issues for the following measurements / operating modes:

- Improved import of .csv files
- Refinement of frequency grid during calibration with calibration unit will not be saved in correction data
- Side effects for remote operation when switching back from frequency converter mode
- Remaining *Port Power Unleveled* warning when using ALC with several channels
- *Port Power Unleveled* warning was only reset at end of sweep even when settings were changed
- Small power peaks when switching between certain frequency points
- Wrong unit of scaling displayed under certain conditions
- `SYSTEM:PRESet:USER:NAME` did not use default path and did not show an error if file did not exist
- Entering sweep time when defining sweep segments
- Open sub menus when switching to remote control
- Wrong default format when changing a trace from admittance to scattering parameters
- Wrong display of channel info line for segmented frequency sweep under certain conditions
- Application crash in port configuration dialog under special condition
- Application crash in frequency converter tab in system configuration under special condition
- Behaviour of limit line between two measurement points under certain conditions
- [SENSe<Ch>:]CORRection:COLLect:METHod:DEFine with empty calibration name
- Setting up a scalar mixer measurement in CW mode under certain conditions
- Using frequency converter R&S ZVA-Z325 on a R&S ZVA80-BU device
- Wrong estimation of sweep time for frequency converting modes
- Display of sweep time for segmented frequency sweep under certain conditions
- `SYSTEM:WAIT` could not be interrupted by device clear
- Pressing *Preset* was possible during remote operations which could cause undefined instrument states
- Error dialog box when deleting external generator while in use

- Display of *Cal* quality label for bidirectional transmission normalization
 - Checkmark for softkeys *Couple all Traces*.
 - Global meas delay for segmented sweep
 - Noise figure setup guide *Add* and *Replace* button if more than one channel present
 - Power calibration for vector mixer meas under certain conditions
 - Correction in NRVD power meter configuration file (no service request for zeroing)
 - Application crash in *More Harmonics* dialog under special conditions
 - Slowly responding firmware with large setups under certain conditions
 - Active trace changes after remote power calibration
 - Mixer power cal verification sweep was available when flatness cal was turned off
 - Corrected error in SML generator configuration file
 - `DISPlay:MENU:KEY:SElect` caused user interface to be unconditionally active during remote operation which can lead to undefined instrument states and application crashes
-

Changes in Firmware V2.86 (Compared to V2.85)

New features:

- New menu command *Cal* and *Corr* at Base Freq to force calibration and system error correction to be performed at base frequency for setups with external frequency conversion
- Re-enabled Anritsu parser; see Remote Settings. A basic command set is supported

Resolved issues for the following measurements / operating modes:

- S-parameter correction for ports at channel base frequency in arbitrary mode
 - Correction at base frequency for R&S ZVR emulation mode
 - UOSM dialog showing up when selecting *Repeat Previous Cal* after TOSM calibration
 - Source power calibration for external generator
 - Configuration of external generators under certain conditions
 - Source power calibration with setting *Reference Receiver Only* and interpolation
 - Power normalization for true differential mode with frequency converters
 - Display of *Cal Off* label under certain frequency converting configurations
 - Mixer mode S-Parameter correction now independent of setting *Enhanced Wave Correction*. Correction can be switched off by *Correction Off*
-

Changes in Firmware V2.85 (Compared to V2.81)

New features:

- Load match correction for scalar mixer measurement
- Receiver power calibration allows selection of reference power value
- User characterization info message for calibration units can be turned off; see Characterize Cal Unit

Product improvements:

- Improved user interface responsiveness for setups with large number of points
- Mixer power calibration: IF range sweep display update

- Display of source port in trace names for wave quantities and ratios
- Display of active trace properties in status bar
- Reference for power and frequency stimulus axis indicated more clearly
- Several improvements in calibration unit dialogs
- Power meter correction accessible from *Trace – Measure – Power Sensor* dialog
- Changed default setting for *Frequency Information for Power Meter* (see Power Meter Correction)
- New menu command *Trace – Scale – Couple All* to easily couple the scaling of all traces
- Support for calibration units with different connector types
- New version of GPIB Explorer tool
- New version of rsib32.dll for RSIB communication channel
- Generator configuration file for HP83620A
- Extended frequency grid for UOSM calibration
- New remote commands
`SOURce<Ch>:POWer:CORRection:CONVerter:LEVel:OFFSet`
`SOURce<Ch>:TDIF:CRFRequency`

Resolved issues for the following measurements / operating modes:

- Averaging for intermodulation measurement quantities
- Keep trigger settings for output power calibration
- Deactivate automatic IF bandwidth reduction for output power calibration
- Remote command `[SENSe]:PAE:EXPRession` (C10 and C1 were interchanged)
- Application crash for coupled markers in very special cases
- Shift response value for noise figure traces
- Export of S-matrix if folder name contains a period
- Long Distance Mixer Delay (R&S ZVA-K10) calibration with remote commands under certain conditions
- *Frequency out of Range* warning when disconnecting power meter
- Loading of setup files from other instruments under special conditions
- *Undo* function under certain conditions
- Calibration in CW mode with calibration unit
- `AVERAGE:COUNT:CURRENT?` when no averaging active
- Display order of LAN 1 and 2 connections in LXI configuration dialog
- *Define Mixer Delay Measurement* dialog allowed incompatible port selection
- Gender setting missing when loading calibration kit on R&S ZVA110
- Display of *Source power reduced to limit* for defined coherence mode
- Switching between setup with different internal/external reference settings
- Trace info table not formatted correctly when maximizing diagram area
- Resizing main window with maximized diagram area
- Multiple through calibration standards for overlapping UOSM calibrations
- Missing tooltip in *Compile Calibrations* dialog if sweep start is below waveguide cutoff frequency
- Cal label for wave quantities

Changes in Firmware V2.81 (Compared to V2.80)

Product improvements:

- Two alternative calibration methods for optimum accuracy or calibration speed. See Same Sweep Setup for All Standards

Resolved issues for the following measurements / operating modes:

- Increased calibration time in specific configurations (see *Product improvements* above)
 - Definition of Offset Short 2 and 3 calibration standard via remote control
 - Calibration via remote command when receiver step attenuator is set
 - Power reduction for unknown mixer standard for vector mixer measurement calibration (option R&S ZVA-K5) with calibration unit
 - Calibration with AVG detector in combination with isolation term
 - Possible error messages in combination with new CPU board (under very rare conditions)
 - Calibration in combination with sweep averaging
-

Changes in Firmware V2.80 (Compared to V2.79)**New features:**

- Enhanced mixer measurement
- Gain-corrected noise figure measurement
- Noise figure setup guide
- Calibration unit support for vector mixer measurement calibration (option R&S ZVA-K5)
- Enhanced wave correction
- Configurable *RF Off* behavior; see *System Configuration – Power*
- Defined coherence mode support for certain frequency-converting configurations
- Support for data set-based advanced power transfer model for frequency converters. Calibration data can be acquired by means of the *R&S ZVA Frequency Converter Leveling Tool*

Product improvements:

- Improved stability under low memory conditions
- Additional correction of non driving port wave quantities in defined coherence mode
- Improved calibration speed for setups with a large number of points (for devices with maximum frequency above 8 GHz)
- Existence of error log entries is signaled by status bar icon
- Support for new revision of CPU boards
- Support for option R&S ZVAX-B203, Low-Noise Preamplifier. Refer to sections ZVAX Path Configuration and Noise Figure Measurement
- Support for Windows XP Embedded Service Pack 3
- New version of the GPIB Explorer tool
- `SYSTem:USER:DISPlay:TITLe` supports multiple text lines lines.
- New menu entry for easy access of two port UOSM calibration
- Support for demo option keys with longer duration
- Reference for power stimulus axis is indicated in channel info line
- Global system configuration is retained in case of firmware crash

- Improvements of true differential and defined coherence mode in frequency converting configurations
- Safely remove USB stick now possible when storing setup on USB stick
- Option R&S-ZVAB-B14: New commands `CONTROL:AUXiliary:A`, `CONTROL:AUXiliary:B`, write the active channel number to the handler ports A and B
- New remote commands `CALCulate<Ch>:DATA:CALL:CATalog?` and `CALCulate<Ch>:DATA:CALL?`, return all S-parameter traces in the active channel or in the active system error correction
- Support of DC measurements in true differential mode
- Support for S-parameter measurements with average detector; see More S-Parameters
- Possibility to set the channel power stimulus axis out of the power calibration dialog

Resolved issues for the following measurements / operating modes:

- Combo box problems during bandfilter search for certain dialogs
- Minor corrections for extended power transfer mode for converters
- Defined coherence mode when port 1 is not involved
- Reference marker default value in special cases
- Bandfilter marker tracking in delta mode
- Moving delta marker with mouse freezes trace under special conditions
- Delta markers in discrete marker mode
- No error code was returned for R&S ZVAX extension unit remote commands if no unit was present
- Reset values of Handler-IO board R&S ZVAB-B14
- Port power limit not considered for defined coherence mode
- `CALCulate:PARAMeter:SElect` did not change the active trace in diagram area for memory traces
- Misleading display of *Calint* calibration state label in true differential and defined coherence mode
- Several calibration unit dialog issues
- HCOPY remote command image artifacts under certain conditions
- Pulse profile mode in frequency converting configurations
- R&S SMF signal generator driver file frequency limits extended
- Scalar mixer power cal dialog issues when no LO port is selected
- Firmware crash when creating new channel when a mixer delay trace is active
- Improved convergence of true differential and defined coherence mode
- R&S ZVA67 output power issues under rare conditions
- Corrected documentation for remote command `[SENSe<Ch>:] EUnit:PGENerator:ASSignment`
- Corrected unit of "Detector Meas Time has been limited" warning
- Issues with "Offset / Mechanical Length" softkey
- Display update after remote command `DISPlay:WINDow1:TRACe1:Y:SCALE:AUTO ONCE`
- Missing 1 mm, 1.85 mm and 2.4 mm connector definitions for `[SENSe]:CORRection:COLLect:CONNection`
- Calibration issues in certain frequency-converting configurations

Changes in Firmware V2.79 (Compared to V2.78)

New features:

- Arbitrary (one or two-port) S-parameters may be exported to a *.s1p Touchstone file. Use Export S-Matrix to export a full set of S-parameters
- New command [SENSE<Ch>:]CORRection:PState?, queries the power calibration state label

Product improvements:

- Improved compatibility of SYSTem:ERRor? and SYSTem:ERROR:ALL? response for PNA emulation
- Measurement info (extended header) for Touchstone export; see Touchstone Files

Resolved issues for the following measurements / operating modes:

- Power Calibration dialog when pressing "Take Cal Sweep" several times
- Scalar mixer power calibration IF range
- Display of PCao and PCal Off attributes
- Scroll bars in Fixture Compensation and Step Attenuators dialogs
- Sporadic measurement delays with external generators over GPIB under special conditions
- Calibration Unit: automatic port assignment detection for Defined Coherence mode
- Sweep progress marker, special cases
- Defined Coherence and True Differential mode amplitude accuracy for special cases

Changes in Firmware V2.78 (Compared to V2.76)

New features:

- Power meter correction list
- Extended power transfer mode for converters with and without electronic attenuators
- True differential mode in combination with frequency converters; see True Diff Mode
- True differential mode in combination with frequency-converting mode; see True Differential Mode on Frequency-Converting DUTs
- Possibility to generate a system report; see Obtaining Technical Support
- Isolation term can be considered for one path two port and TOSM calibrations
- Customization of BUSY signal
- Password protection for calibration unit characterizations
- Set all traces to zero on sweep restart; see System Configuration – General
- Password protection for frequency info; see System Configuration – General
- Sweep progress marker; see Marker Tracking
- Short form of bandfilter search info for small displays; see System Configuration – General
- Phase preview in Calibration – Measure Standards dialog is optional
- Center frequency calculation for bandfilter search is configurable; see System Configuration – General
- **New remote control commands**

- `HCOPY:MITem... and HCOpy:MPAGe:WINDow`, configure the output to a printer file
- `MMEMemory:LOAD:CORRection:MERGe`, supports merging of power calibrations
- `[SENSe<Ch>:]CORRection:STIMulus?`, queries the current stimulus value
- `SYSTem:COMMunicate:RDEvice:AKAL:PREduction[:STATe]`, enables or disables automatic power reduction during an automatic calibration
- `SOURce<Ch>:POWer:CORRection:CONVerter<Converter_Number>:STATe`, enables or disables the source power calibration for a frequency converter with electronic attenuators
- `CALCulate<Chn>:FORMat:WQUType POWer | VOLTage`, selects voltage or power units for wave quantities
- `MMEMemory:AKAL:USER:CONVersion`, copies an arbitrary (e.g. user-defined) set of calibration data for the active calibration unit to a directory
- New command group `[SENSe<Ch>]:UDSParams<Pt>...`, defines user-defined (virtual) analyzer ports

Product improvements:

- New checkbox in the mixer delay calibration dialog to divide the calibration data by two
- Improved support of device clear (remote command `*DCL`) for cancelling long operations
- Better signaling if time grid is too close in time sweep mode
- Added default `.calkit` files for several Anritsu/Wiltron calibration kits
- Frequency converter default `.calkit` files are loaded as read-only files to prevent issues when changing the connector settings
- New GPIB driver
- New version of the GPIB Explorer tool
- Improvements of TOM calibration procedure (consideration of non-ideal Match and Through)
- The setting of the sync generator type is preserved when temporarily setting the pulse type to constant high or low
- Changed handling of the up/down arrows when navigating trace lists

Resolved issues for the following measurements / operating modes:

- Combination of S-parameter measurements with frequency conversion in one channel
- Power correction of `b1` wave in special conditions with active scalar mixer mode
- R&S ZVAB-K9 calibration under special conditions
- Hanging power meters in rare cases
- Connector gender issue with sexless connectors
- Intermodulation measurement at fixed intermediate frequency
- Saving of setups via remote command under certain conditions
- Calculation of the sideband filter ranges for vector mixer measurements
- Stopped power cal verification sweep with high number of points
- Irregularities with `PCal` attribute under certain conditions
- Problems with `CALC:DATA:ALL?` when deleting traces

- Display problems in intermodulation distortion power calibration dialog
- Global ALC settings with more than one open setup
- Distributed LXI configuration setup in certain cases
- Calibration unit characterization with sexless connectors
- Output power stability for R&S ZVA67 under certain conditions at high IF bandwidths
- Reduced power stability
- TRL with multiple lines, when through standard is longer than the line standards
- Loading .calkit files with special characters in the connector name

Changes in Firmware V2.76 (Compared to V2.75)

New features:

- Support for vector network analyzers R&S ZVA80
- Support for timed and unregistered option keys
- Support for frequency converter R&S ZVA-500 (with calibration kit R&S ZV-WR02)
- New remote command `[SENSe<Ch>:]CORRection:COLLect:CONNEction:GENDeRs`, qualifies whether the genders of the connectors at the analyzer ports (but not their types) are equal or independent

Changes in Firmware V2.75 (Compared to V2.70)

New features:

- Support for frequency converter R&S ZVA-Z220 (with calibration kit R&S ZV-WR05)
- Extensions to the mixer delay measurement: external receiver with LXI connection
- Extensions to *Virtual Transform*: port pair (de-)embedding
- Configurable ALC settings
- Port-specific trigger delay
- Extensions to source power calibration: auto zero and sensitivity correction for power meter
- Extensions to the vector mixer measurement (option R&S ZVA-K5): Independent power setting and remote control commands for auxiliary LO signal (Aux LO)
- Extended LXI pages: Utilities for event and status logging and for connection tests
- New calibration types for calibration units R&S ZV-Z51 ... -Z59: Bidirectional, forward or reverse transmission normalization. Selection of node port for one path two port calibration
- *IF Gain a* setting in the Port Configuration table; defines the IF gain in the reference receiver path.
- **New remote control features**
 - New command `MMEMoRY:LOAD:CORRection:MERGe`, merges several cal group files for a channel
 - New command `SYSTem:SHUTdown`, switches the analyzer to standby mode.
 - New command `[SENSe<Ch>:]AVERAge:COUNT:CURRent?`, returns currently measured sweep (progress of sweep average).

Changes in Firmware V2.71 (Compared to V2.70)

New features:

- Support for network analyzer R&S ZVA67 with 4 ports
- Support for frequency converters R&S ZVA-Z140 and R&S ZVA-Z170 (with calibration kits R&S ZV-WR08 and R&S ZV-WR06)
- Primed wave quantities for two-tone measurements with a port-specific frequency offset
- New source power calibration modes: Use Reference Receiver only, Use Reference Receiver after n Power Meter Readings. See Modify Source Power Cal Settings
- **New remote control features**
 - New parameter `CALCulate<Chn>:DATA? TSData`, used to retrieve the raw measurement data in pulse profile mode
 - New command `SOURce<Ch>:POWER<Pt>[:LEVel] [:IMMediate] LLIMit:DGRaccess`, optimizes the automatic level control (ALC) for test setups where the additional connectors of option R&S ZVA-B16 are used
 - New parameter `IPORts` for `MMEMemory:LOAD:VNETworks:SENDED:DEEMbedding` etc., interchanges port numbers in imported *.s2p files.
 - New parameter `ALL` for `MMEMemory:LOAD:CORRection` and `MMEMemory:LOAD:CORRection:RESolve`, used to apply a calibration to all channels or resolve the pool link for all channels.
 - New commands `CALCulate<Chn>:STATistics:DOMain:USER:SHOW`, `CALCulate<Chn>:MARKer<Mk>:FUNction:DOMain:USER:SHOW`, display or hide range limit lines
 - New commands `PROGram[:SElected]:INIParameter`, `PROGram[:SElected]:INIMessage`, configure the preferences file (*.ini) for external applications
 - New command `SYSTem:FREQuency?`, queries the frequency range of the analyzer
 - New command `SYSTem:PRIority`, selects the priority of the running NWA application.

Changes in Firmware V2.70 (Compared to V2.62)**New features:**

- Support for network analyzer R&S ZVA67
- Support for frequency converter R&S ZVA-Z90E (with calibration kit R&S ZV-WR12)
- Noise figure measurement (option R&S ZVAB-K30)
- *Average* detector, calculates the arithmetic mean value of the complex results over a selectable measurement time
- Ground loop (de-)embedding, adds (compensates) the effect of a non-ideal ground connection of the DUT
- Support of Universal Interface (option R&S ZVAB-B14)
- New trace functions, calculate the linearity deviation of the active trace
- Extended parameter lists for the commands `MMEMemory:LOAD:CKIT:SDATA`, `[SENSe<Ch>:]CORRection:COLLect[:ACQuire]`, `[SENSe<Ch>:]CORRection:COLLect[:ACQuire]:SElected`, select multiple offset short standards
- New commands to query connector types, calibration kits, and standards: `[SENSe<Ch>:]CORRection:CONNectioN:CATalog?`

[SENSe<Ch>:]CORRection:CKIT:CATalog?
 [SENSe<Ch>:]CORRection:CKIT:STANdard:CATalog?

Product improvements:

- Simplified menu for limit check and ripple limit check; common fail beep
- *Frequency Conversion Off* softkeys for various frequency-converting measurements renamed: *Reset Frequency Conversion*

Changes in Firmware V2.62 (Compared to V2.61)

Product improvements:

- Performance improvements for R&S ZVB20 and R&S ZVT20

Changes in Firmware V2.61 (Compared to V2.60)

New features:

- Port-specific source power limits
- New commands `CALCulate<Chn>:MARKer<Mk>:NAME`, `CALCulate<Chn>:MARKer<Mk>:REFeRence:NAME`, define marker names.
- Automatic configuration for all USB-connected NRP-Zxx power meters
- *Frequency Conversion Off* softkeys, disable an active *Intermodulation* or *Mixer Delay* measurement
- Export of system error corrected but incomplete S-parameter sets to Touchstone (*.snp) files is possible

Product improvements:

- Remote control of frequency converters with electronic attenuators R&S ZVA-Z110E improved

Changes in Firmware V2.60 (Compared to V2.53)

New features:

- Support for extension unit R&S ZVAX24
- Support for frequency converter with electronic attenuator R&S ZVA-Z110E
- Internal pulse generator (option R&S ZVA-K27)



The pulse generator option R&S ZVA-K27 requires network analyzers equipped with motherboards part no. 1305.6470.02 (see *Info Hardware Info*). Please contact your Rohde & Schwarz service representative should you experience any problems on older network analyzers

- Mixer delay measurement without LO control (option R&S ZVA-K9) with support of primed wave quantities and ratios



To ensure accurate mixer delay results, network analyzers R&S ZVA40 and R&S ZVA50 must be equipped with reflectometer (RM) control boards part no. 1305.3042.40 or newer (see *Info Hardware Info*, e.g. *Rm 1 Generator RM44 CONTROL 1305.3042.40*). Please contact your Rohde & Schwarz service representative should you experience any problems

-
- Vector mixer measurement (option R&S ZVA-K5)
 - Min Hold mode for traces
 - Faster algorithm for the correction of measurement results based on the system error correction data (Fast Multiport Correction)
 - New calibration types: *Forward transmission normalization, reverse transmission normalization*
 - Convergence Factor for source power calibration
 - **New remote control features**
 - New command `DISPlay[:WINDow<Wnd>]:TRACe<WndTr>:SHOW`, display or hides all data or memory traces
 - New commands for external generators and power meters:
`SYSTem:COMMunicate:RDEvice:GENerator:COUNT?`,
`SYSTem:COMMunicate:RDEvice:GENerator:CATalog?`,
`SYSTem:COMMunicate:RDEvice:PMETER:COUNT?`,
`SYSTem:COMMunicate:RDEvice:PMETER:CATalog?`
 - New reference marker commands
`CALCulate<Chn>:MARKer<Mk>:REFerence:MODE` and
`CALCulate<Chn>:MARKer<Mk>:REFerence[:STATE]`
 - New command `SOURce<Ch>:POWER<Pt>:GENerator<Gen>:STATE`, turns an external generator on or off
 - Command `CALCulate:DATA` can be used to write a memory trace
 - Commands `SOURce<Ch>:POWER<Pt>:ALC:CONTROL` and
`SOURce<Ch>:POWER<Pt>:ALC[:STATE]`, define channel-specific ALC settings.
 - New command `[SENSe<Ch>:]SEGMENT<Seg>:SWEep:TIME:SUM?`, returns the total duration of a segmented sweep.

Product improvements:

- Frequency values queried via remote control are returned as 12-digit numbers. This ensures a frequency resolution of 1 Hz at RF frequencies >10 GHz
- Support of new external power sensor and generator types. The supported types are listed in the *System Configuration – External Power Meters – Add External Power Meter* and in the *System Configuration – External Generators – Add External Generator* dialogs
- Network analyzers are configured with enabled virtual memory paging file
- Improved bandfilter search functions
- Data lines in Touchstone files are terminated with a newline character

Changes in Firmware V2.53 (Compared to V2.52)

New features:

- Support for calibration unit R&S ZV-Z55.

Resolved issues for the following measurements / operating modes:

- Occasional problems with stimulus range definition solved
 - The port groups for system error correction data and power calibration data stored together in a cal group file are independent from each other. In firmware versions V2.50 and V2.51, the power-calibrated ports (including drive ports) had to be a subset of the system error-corrected ports.
-

Changes in Firmware V2.52 (Compared to V2.51)

New features:

- Fixture Compensation, corrects the measurement result for the effects of a test fixture
- New command `CALCulate:DATA:DALL?`, returns the trace data of all data traces.
- New parameter `HCOPY:DESTINATION 'DEFPRN'`, selects the default printer for printing

Changes in Firmware V2.51 (Compared to V2.50)

New features:

- The network analyzer application can be started with a minimized window; see Startup Procedure
- `CALCulate<Chn>:DATA` can be used to write memory traces.
- Bandstop Search ref to Marker searches the absolute minimum in the active search range. The response value for the lower and upper band edges is calculated as the response value at the active marker position plus / minus x dB, where x is equal to the <x dB Bandwidth> value

Product improvements:

- Corrections to the help system: `[SENSe<Ch>:] CORRection:LOSS<port_no>:OFFSet <DC_loss>` defines the frequency-independent part (DC value) of the offset loss. R&S ZVR-compatible command `[SENSe<Ch>:]CORRection:OFFSet<port_no>:MAGNitude <DC_loss>` defines the frequency-independent part (DC value) of the offset loss. `[SENSe<Ch>:] CORRection:LOSS<port_no> <ref_loss>` defines the offset loss at the reference frequency

Changes in Firmware V2.50 (Compared to V2.47)

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)
- New "Low Noise" mode for generator step attenuators
- 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
- *System Configuration* – Matrix Configuration tab
- **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

Changes in Firmware V2.47 (Compared to V2.46)

New features:

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

Resolved issues for the following measurements / operating modes:

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

Changes in Firmware V2.46 (Compared to V2.45)

New features:

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

Changes in Firmware V2.45 (Compared to V2.40)

New features:

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

Changes in Firmware V2.40 (Compared to V2.30)

New features:

- 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)
- **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 for mass memory storage can be set using `MMEMemory: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

Changes in Firmware V2.30 (Compared to V2.21)

New features:

- 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.
-

Changes in Firmware V2.21 (Compared to V2.20)

New features:

- Support of R&S ZVA50 vector analyzers including generator and receiver attenuators. Notice the maximum attenuation factors: 50 dB for generator attenuators, 35 dB for receiver attenuators
 - 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?`).
-

Changes in Firmware V2.20 (Compared to V2.13)

New features:

- Support for frequency converters (for analyzers with a maximum frequency of at least 20 GHz)
- Compliance with LXI class C
- 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:EFEd` 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
-

Changes in Firmware V2.13 (Compared to V2.12)

New features:

- Support for new CPU board FMR7
-

Changes in Firmware V2.12 (Compared to V2.11)

Resolved issues for the following measurements / operating modes:

- Corrected function of the *Measure "a" Waves at* radio buttons in the Port Configuration dialog
 - Corrected marker formats for complex reference impedance settings
-

Changes in Firmware V2.11 (Compared to V2.10)

Resolved issues for the following measurements / operating modes:

- Occasional problems with Automatic Level Control (ALC) in combination with active automatic generator attenuation fixed (no error message "Port <n> output power unlevelled")
-

Changes in Firmware V2.10 (Compared to V2.02)

New features:

- 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?`
-

Changes in Firmware V2.02 (Compared to V2.01)

New features:

- New commands to change trace names: `CONFigure:CHANnel<Ch>:TRACe:REName`, `CONFigure:TRACe<Trc>:REName`
-

Changes in Firmware V2.01 (Compared to V2.00)

New features:

- 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)

Changes in Firmware V2.00 (Compared to V1.92)

New features:

- 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
- Extension of the frequency range for R&S ZVA 24 vector network analyzers up to 25 GHz (specified range 10 MHz to 24 GHz)
- **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 `MMEMemory:LOAD:LIMit`, can load limit lines from Touchstone files, assigning a response and stimulus offset
- Extended command `MMEMemory: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.

Changes in Firmware V1.92 (Compared to V1.91)

New features:

- Support of configurable generator step attenuators
- The generator step attenuators can be controlled from the Port <Port_no> Source Power dialog

Resolved issues for the following measurements / operating modes:

- Interchanged remote control parameter names for `FORMat:BORDER NORMAL | SWAPped`.

Changes in Firmware V1.91 (Compared to V1.90)

New features:

- Support of R&S 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

Resolved issues for the following measurements / operating modes:

- 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.

Changes in Firmware V1.90 (Compared to V1.86)

New features:

- 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:ADDRes...`

- 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 (`MMEMOry: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:MMEMOry[:STATe],`
`MMEMOry: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

Changes in Firmware V1.86 (Compared to V1.84 and V1.85)

New features:

- 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

Changes in Firmware V1.84 (Compared to V1.83)**Product improvements:**

- 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

Changes in Firmware V1.83 (Compared to V1.80/V1.82)**New features:**

- 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

Changes in Firmware V1.80 (Compared to V1.78)**New features:**

- **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

Resolved issues for the following measurements / operating modes:

- 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