R&S®ZNH
FULL TWO-PORT HANDHELD VECTOR NETWORK ANALYZER

Low in complexity, high in precision

Product Brochure
Version 05.00

ROHDE&SCHWARZ
Make ideas real

AT A GLANCE

The R&S®ZNH is a full two-port handheld vector network analyzer (VNA) that offers one-port cable and antenna measurement and full two-port S-parameter measurements. The touch based interface simplifies operation and a configuration overview menu makes measurement preparation more efficient. The R&S®ZNH may have a small form factor, but it is complete in every detail and delivers high performance and all the key functionalities.

Maintaining the operation of RF communications systems requires fast identification of any defects in the system components. The R&S®ZNH, a multifaceted handheld vector network analyzer, helps on-site field engineers remedy defective components detected in the system. The basic version of the R&S®ZNH can perform one-port cable and antenna measurements and four S-parameter measurements up to 26.5 GHz. With the addition of the power meter, pulse measurement, wave ratio and wave quantities functionalities, the R&S®ZNH enables field engineers to maintain and restore radar and satellite systems swiftly.

The ordering concept for R&S®ZNH options is simple, straightforward and transparent, with no cross-option dependency.

The spaced out keys, backlit keypad and ruggedized housing make the R&S®ZNH suitable for indoor and outdoor use as well as stationary and mobile environments. The VNA is ideal for tasks such as antenna system installation and maintenance, distance-to-fault measurements (DTF) on cables, one-port cable loss measurements and antenna matching measurements. The analyzer can also be used for development, production and service tasks where the measurement locations and test requirements constantly change.

The R&S®ZNH offers flexible and straightforward operation. Depending on the application, it can be operated either via its 7" capacitive touchscreen (no display calibration required) or the keypad. The touchscreen enables users to adjust the most common settings, such as parameter settings, and manage markers with smartphone-like gestures.

Tapping the configuration overview icon provides quick access to the menu for checking and changing the display options and parameters. This helps to reduce the number of steps required during setup and measurement.

The R&S®ZNH enables flexible, user-defined calibration sequences.

BENEFITS

Lightweight design, heavyweight performance
- Receivers architecture
- Outstanding RF performance
- One-port cable and antenna measurements
- Four S-parameter measurements
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Optional measurement modes
- Power sensor support (R&S®ZNH-K9)
- Pulse measurement (R&S®ZNH-K29)
- DC bias variable voltage source (R&S®ZNH-K10)
- Vector voltmeter (R&S®ZNH-K45)
- Wave ratios and wave quantities (R&S®ZNH-K66)
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Simple to configure
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Simple to add value
- Comprehensive standard features
- Simple option ordering concept
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KEY FACTS

- Frequency range from 30 kHz to 4/8/18/26.5 GHz
- One-port cable and antenna measurement with basic instrument
- S-parameter (S_{11}, S_{12}, S_{21}, S_{22}) measurement with basic instrument
- 100 dB (typ.) dynamic range for filter and antenna isolation measurements
- Factory calibration over entire frequency range
- Built-in receiver step attenuator to increase port input power range linearity
- Built-in DC voltage supply (bias) for active components such as amplifiers
- Easy handling due to low weight (3.1 kg with battery) and spaced out function keys
- Fast boot time, non-reflective display, small form factor, ruggedized housing (IP51)
- 7" color touchscreen display for intuitive operation with smartphone-like gestures
- Measurement wizard to speed up measurements and eliminate human error
- Save measurement results onto an SD memory card or a USB flash drive
- Easy and cost-efficient upgrades for all options via software keycode

LIGHTWEIGHT DESIGN, HEAVYWEIGHT PERFORMANCE

With a small form factor, the R&S®ZNH offers outstanding RF performance in the handheld class and provides one-port cable and antenna measurements and full two-port S-parameter measurements as standard. It even has a built-in receiver step attenuator to increase the linearity of the port input power range.

Receivers architecture

The four-receiver architecture consists of two reference receivers and two test receivers at both port 1 and port 2. This allows the R&S®ZNH to support more advanced calibration types such as unknown through, open, short and match (UOSM) calibration. This calibration is useful for DUTs with different input or output connector types at the test ports. Through, Reflect, Line (TRL) for waveguides and coaxial DUTs including third party waveguide CalKits [1] for waveguide.

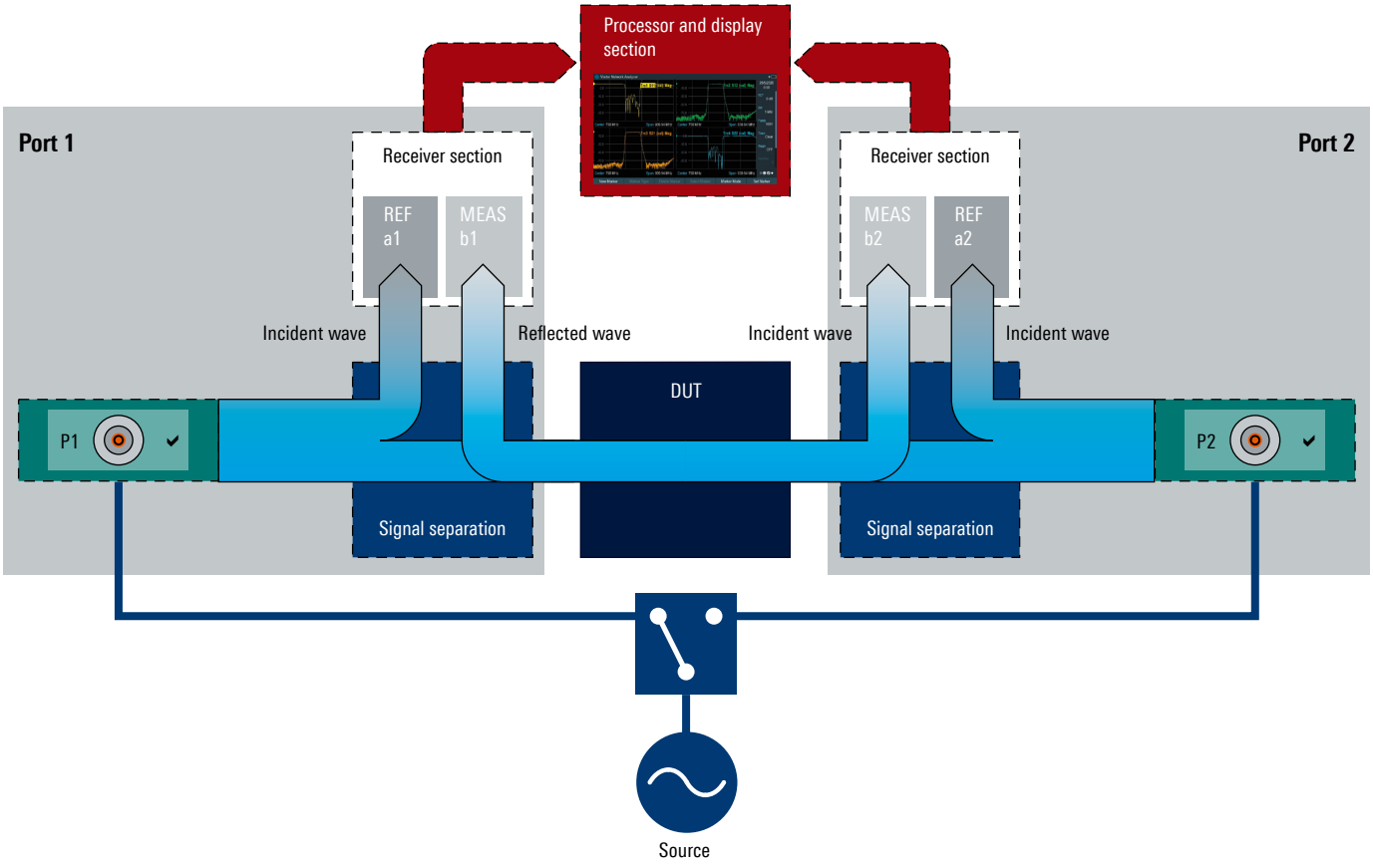
[1] Third party waveguide CalKits can be configured through InstrumentView Software.

Outstanding RF performance

When characterizing, identifying problem areas and verifying the performance of RF passive and active components and devices, it is crucial to use a T&M instrument with the following traits – such as the R&S®ZNH.

Trait	R&S®ZNH
Wide frequency range to support application tasks	30 kHz to 4/8/18/26.5 GHz
High dynamic range for a potential large variation between the maximum and minimum power levels in a measurement	up to 100 dB (typ.)
Low trace noise for high accuracy	► magnitude (RMS): 0.0015 db to 0.0040 dB (typ.) ► phase (RMS): 0.02° to 0.04° (typ.)

R&S®ZNH four-receiver architecture



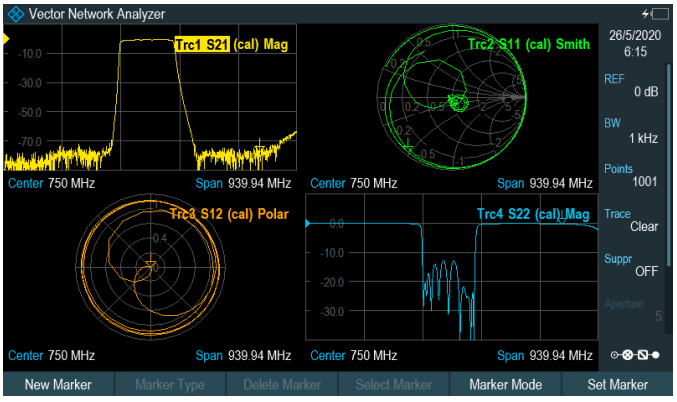
One-port cable and antenna measurements

With 16001 points per trace, the R&S®ZNH can measure electrically long cables with no limitations. This enables the detection of cable discontinuities, which is important for base station antenna installation. For the one-port cable loss measurement, only one end of the cable needs to be connected to the R&S®ZNH test port; the other end can be terminated with a short circuit or left open. Alternately, the antenna system performance can be assessed with reflection measurements. When a minimum amount of the transmitted signal is reflected, it indicates that the transmission energy efficiently covers the intended area. Unnecessarily high reflection makes the system inefficient and can damage components. Reflection measurements can be expressed in terms of return loss, VSWR and the reflection coefficient.

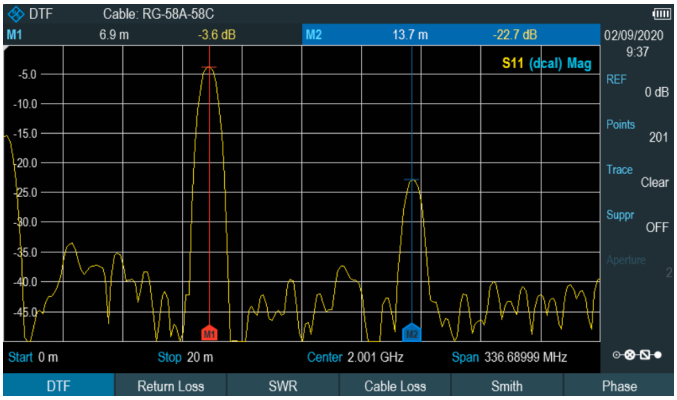
Four S-parameter measurements

S-parameters are the basic measured quantities of a network analyzer. They describe how the DUT modifies a signal that is transmitted or reflected in the forward or reverse direction. During product development and manufacturing, it is common to test component specifications and verify design simulations to ensure systems and their components work properly. In the field, S-parameter measurement helps to verify and troubleshoot deployed RF and microwave systems. The full two-port R&S®ZNH offers the four S-parameter (S_{11}, S_{21}, S_{12}, S_{22}) measurements as standard. The VNA features single, split, triple and quad display modes and various formats.

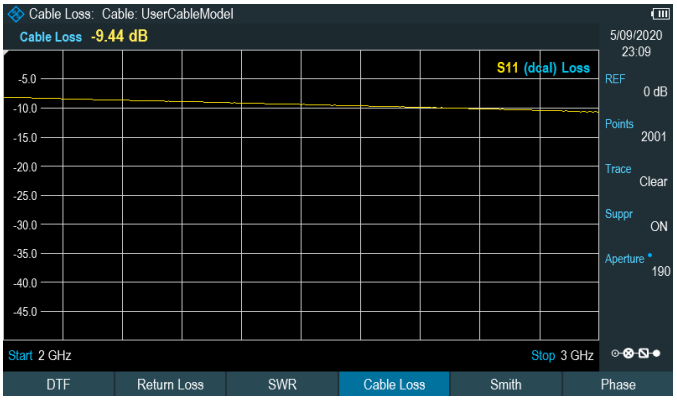
Filter measurement displayed in various formats.



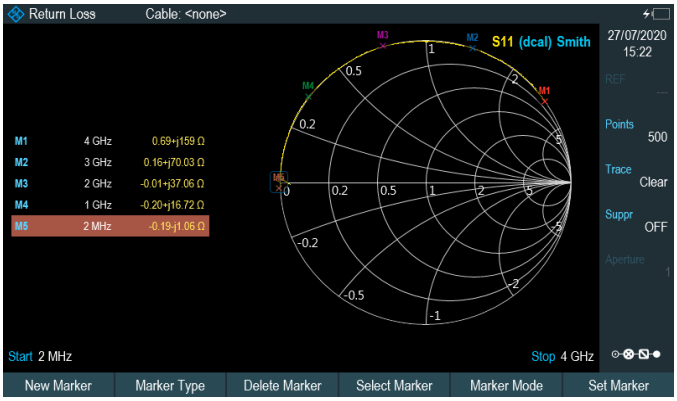
Distance-to-fault measurement.



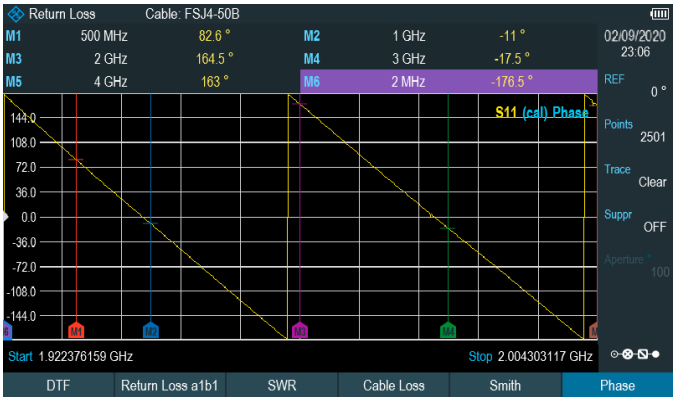
One-port cable loss measurement.



Return loss measurement – Smith chart display.



Return loss measurement – phase display.



OPTIONAL MEASUREMENT MODES

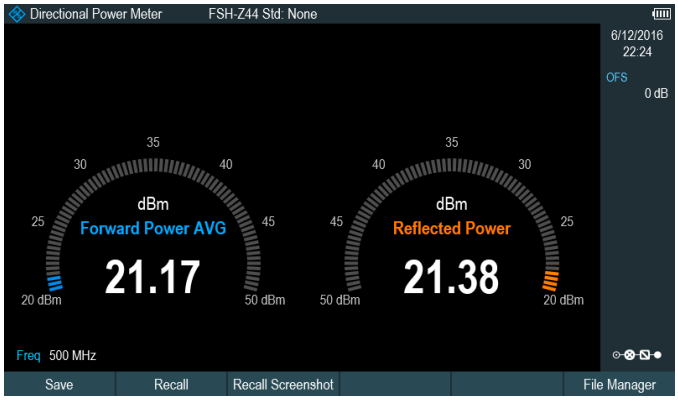
Power sensor support (R&S®ZNH-K9)

Any high-precision power measurement application, for instance level calibration, requires very high accuracy to measure and align transmitting power. When equipped with the R&S®NRPxx power sensors and the R&S®ZNH-K9 option, the R&S®ZNH becomes an accurate RF power meter with a wide measurement range. Calibration is not required prior to making measurements since the sensors are fully characterized over frequency, level and temperature and feature long-term stability. Zeroing is usually not required; the user can plug in a sensor and simply start measuring.

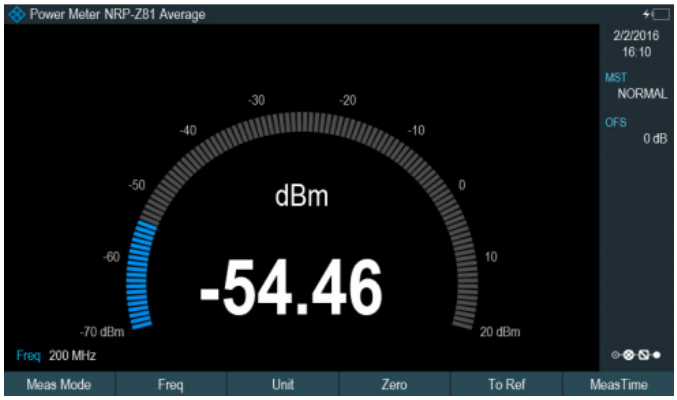
The R&S®FSH-Z14 and R&S®FSH-Z44 directional power sensors transform the R&S®ZNH into a full-featured directional power meter. The R&S®ZNH can then simultaneously measure the output power and the matching of transmitter system antennas under operating conditions. The power sensors measure average power up to 120 W and eliminate the need for extra attenuators. In addition, the peak envelope power (PEP) can be determined up to 300 W. A common application is the combined monitoring of the transmitter output and antenna reflected power of critical systems.

Power measurements may also include optical power measurements. Testing optical transport networks (OTN) during base station installation and maintenance is a prime example. The R&S®HA-Z360/-Z361 optical power meters connect to the R&S®ZNH USB port and visualize optical absolute power in dBm as well as relative power in dB on the instrument.

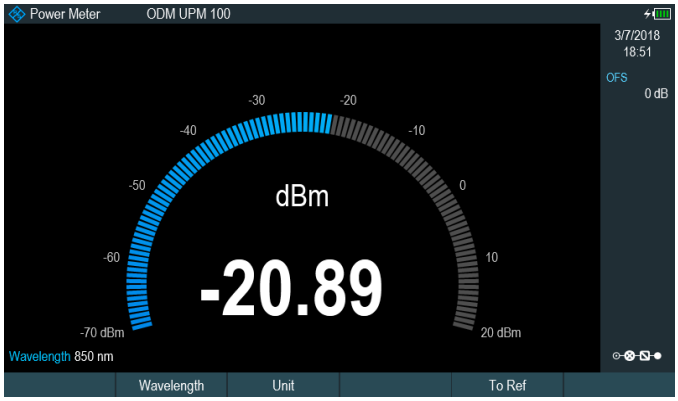
Forward and reflected power measurement with directional power sensor (R&S®FSH-Z44).



Accurate power measurement with power sensor.



Optical power measurement with optical power sensor.



Pulse measurement (R&S®ZNH-K29)

The R&S®ZNH-K29 option enables precise pulse and peak power measurements using the R&S®ZNH together with a Rohde&Schwarz wideband power sensor. Field applications benefit from this compact, powerful combination.

During installation and maintenance of radar systems, pulse characteristics and output power have to be measured. Due to a maximum video bandwidth of 30 MHz and a rise/fall time of < 13 ns, the sensors can measure pulses with a pulse width as short as 50 ns.

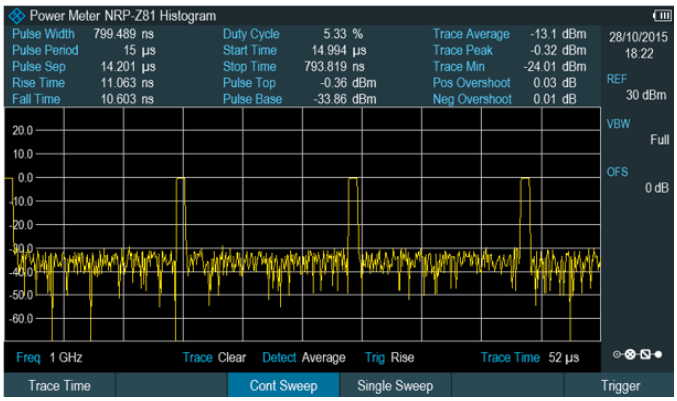
When installing and maintaining even the latest generation of microwave link modules, the user benefits from the sensor's high measurement speed and wide dynamic range.

Automatic pulse analysis helps the user measure important pulse parameters. This analysis eliminates the need for complex measurements using markers. Changes in the pulse shape are immediately taken into account in the measurement results.

The following parameters are determined by automatic pulse analysis:

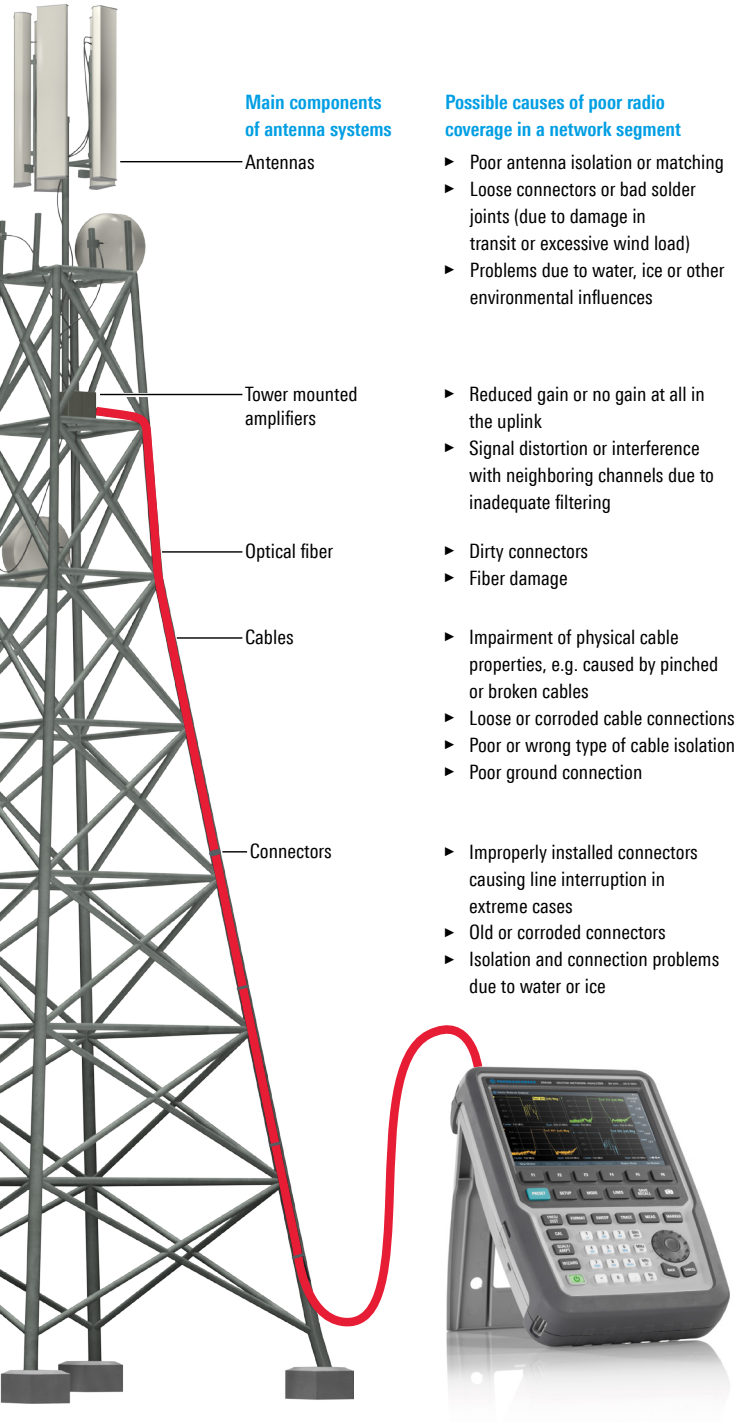
- Time parameters: rise/fall time, start/stop time, pulse width, duty cycle, pulse period
- Level parameters: pulse top, pulse base, peak, average, minimum, overshoot (positive and negative)

Pulse analysis with R&S®ZNH-K29 and R&S®NRP-Z81 wideband power sensors.



DC bias variable voltage source (R&S®ZNH-K10)

Certain systems, such as tower mounted amplifiers (TMA) for mobile communications applications, require DC power to be fed via the RF cable. Standard setups consist of a handheld analyzer, a 110 V/230 V plug-in power supply, a dedicated bias tee and cables. The R&S®ZNH has an integrated bias tee that does not require these components as additional external devices and can be battery operated. The VNA acts as a hassle-free variable voltage source to provide the power these systems need for testing, installation and maintenance.



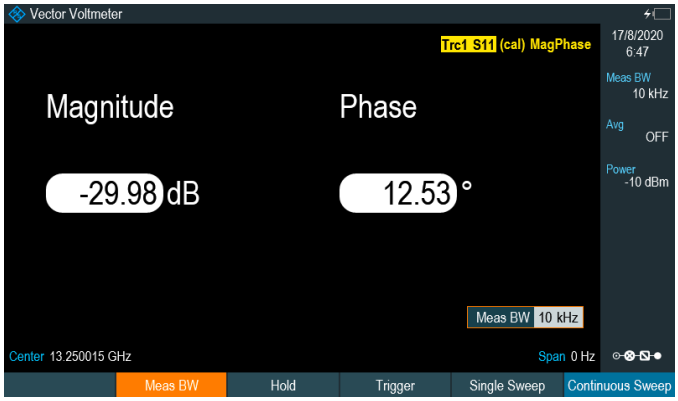
Vector voltmeter (R&S®ZNH-K45)

The R&S®ZNH-K45 vector voltmeter option displays the magnitude and phase of a DUT at a fixed frequency. The R&S®ZNH can therefore replace a conventional vector voltmeter for many applications. The required signal source and bridge are already available in the R&S®ZNH.

The setup is extremely simple, which makes R&S®ZNH-K45 ideal for field use. The results of relative measurements from a reference DUT can be stored at the push of a button. Comparison measurements, e.g. between various RF cables and a reference cable (golden device), can be quickly and easily performed. Typical applications are:

- Adjustment of electrical cable length
- Installation, maintenance and troubleshooting of phase-controlled antennas, for instance localizer antennas used in instrument landing systems (ILS) for air traffic control
- Calibration of monopulse radars

Vector voltmeter display.



Wave ratios and wave quantities (R&S®ZNH-K66)

The R&S®ZNH offers four fully coherent receivers/channels. This means there are two additional sets of measurement parameters, which have an unambiguous meaning even if the DUT is measured outside its linear range:

- Wave ratios provide the complex ratio of any combination of transmitted or received wave quantities
- Wave quantities provide the power of any of the transmitted or received waves

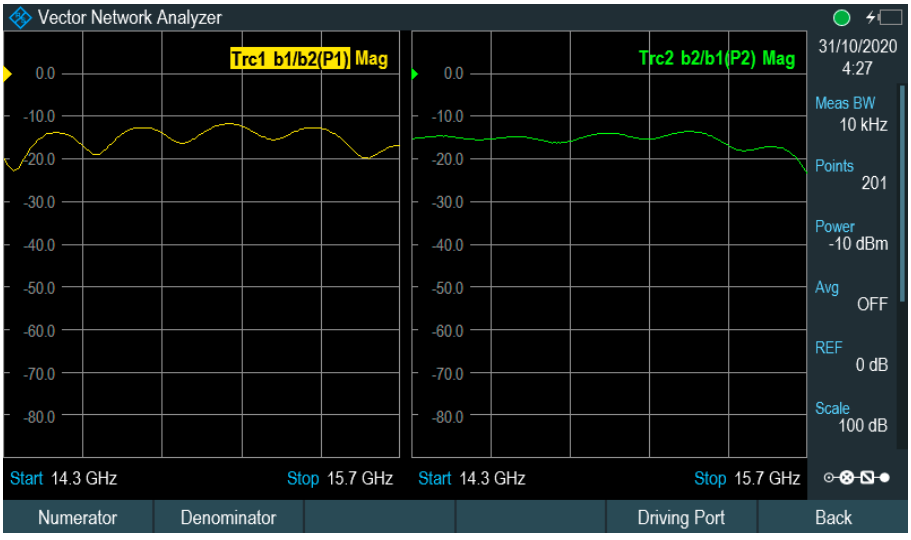
The wave quantities provide the absolute power and phase at the various receivers of the analyzer ports. Wave quantities are therefore suitable for the following measurement tasks:

- Use of the analyzer as a frequency selective power meter
- Harmonics

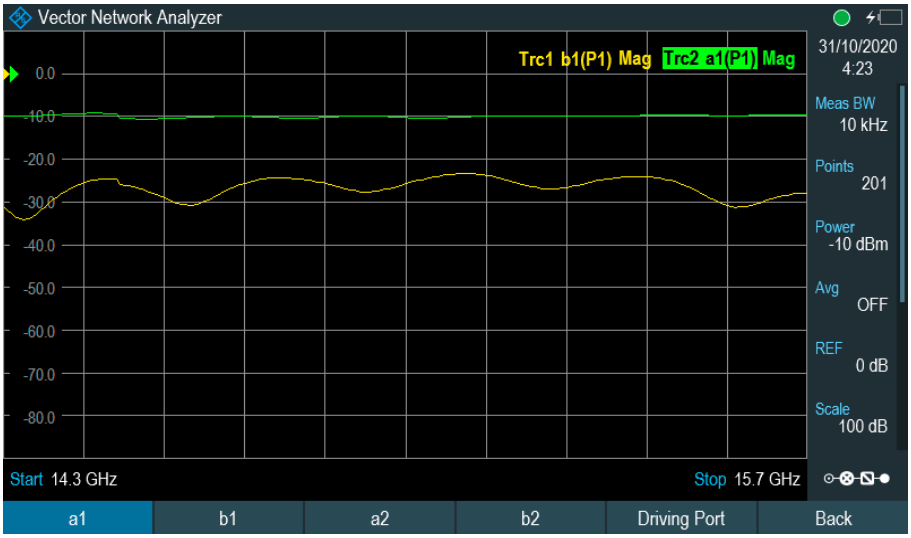
A measurement of wave ratios is particularly suitable for the following test scenarios:

- The test setup or some of its components (e.g. active components or non-reciprocal devices) do not allow system error correction and a complete S-parameter measurement is therefore not possible
- A ratio of two arbitrary waves that is not an element of the S-matrix (e.g. a ratio of the form ai/aj) is needed
- Two-channel, phase-coherent ratio measurement to align two RF channels in amplitude and phase, e.g. aligning phased array antennas

Wave ratio measurement.



Wave quantities measurement.



Mixed mode S-parameters (R&S®ZNH-K47)

The R&S®ZNH-K47 option enables mixed mode reflection measurement to analyze differential circuits. The two test ports of the R&S®ZNH allow mixed mode measurement for two different test setups. One is for DUTs with only single-ended ports and the other is for DUTs with one balanced port. The VNA provides information for four different transmission modes:

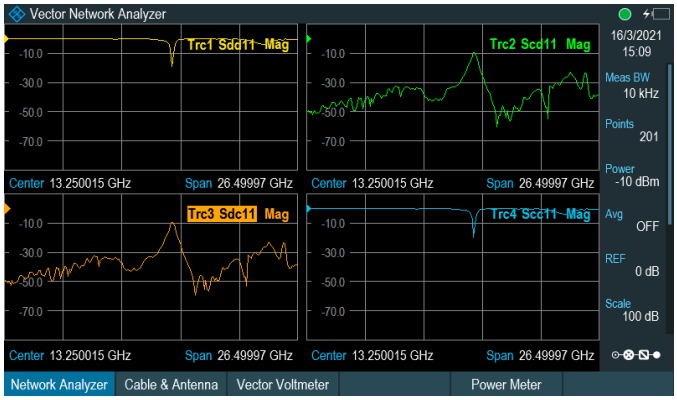
- Differential mode to differential mode (S_{dd11})
- Common mode to differential mode (S_{cd11})
- Differential mode to common mode (S_{dc11})
- Common mode to common mode (S_{cc11})

Power sensor measurement versus frequency (R&S®ZNH-K69)

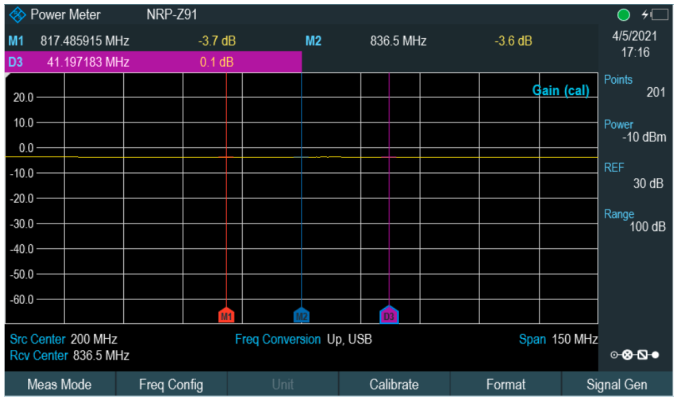
The R&S®ZNH-K69 option enables USB power sensor measurement versus frequency. This is used for characterizing the scalar transmission characteristics of frequency translating devices such as mixers or complete upconverter or downconverter modules with an internal or externally supplied local oscillator. Conversion loss or gain and the absolute power level are measured over the frequency range of interest. The source and receiver are independently controlled, enabling upconverting and downconverting measurements on both sidebands.

On the R&S®ZNH, port 1 is used for the stimulus signal for the converting stage and the power sensor is used as the measurement receiver that connects to the converter output. For example, when the source stimulates the DUT in the case of a downconversion, the power sensor measures the absolute power or the gain from the mixer IF port.

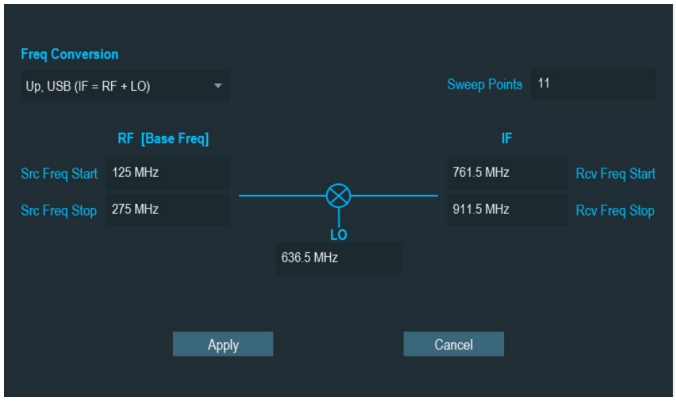
R&S®ZNH-K47 mixed mode measurement.



Mixer loss measurement with R&S®ZNH-K69 and the R&S®NRP-Z91 power sensor.



Mixer configuration setup.



Time domain analysis (R&S®ZNH-K68)

The R&S®ZNH-K68 option enables time domain analysis in the vector network analyzer mode. S-parameters are measured and displayed as a function of the time representation. The time domain analysis option offers a number of processing alternatives, such as the processing method, response, window shape and gating. Generally, time domain analysis is useful to characterize the DUT from a different perspective and to eliminate unwanted responses via the time gating function.

Time domain		
Device mode	CAT	VNA
K-option	standard, distance to fault, time domain reflectometry	R&S®ZNH-K68 time domain analysis
Processing method and response		
Bandpass mode		
Impulse response	•	•
Lowpass mode		
Impulse response	–	•
Step response	•	•
Windowing shape		
No profiling (rectangle)	–	•
Normal (Hann)	•	•
Low first sidelobe (Hamming)	–	•
Steep falloff (Bohman)	–	•
Time gate	–	•
Gate filter type		
Bandpass	–	•
Notch	–	•
Gate shape		
Steepest edges (rectangle)	–	•
Steep edges (Hamming)	–	•
Normal (Hann)	–	•
Maximum flatness (Bohman)	–	•
Arbitrary (Dolph-Chebychev)	–	•

SIMPLE TO OPERATE

Multi-touch screen

The multi-touch function is the pinch-to-zoom feature that is found on many smartphones and tablets. To zoom in, pinch the screen outwards using two fingers. To zoom out, perform the opposite motion, pinching inwards. Thanks to these gestures, users spend less time reading the manual and can start taking measurements quickly with the R&S®ZNH.

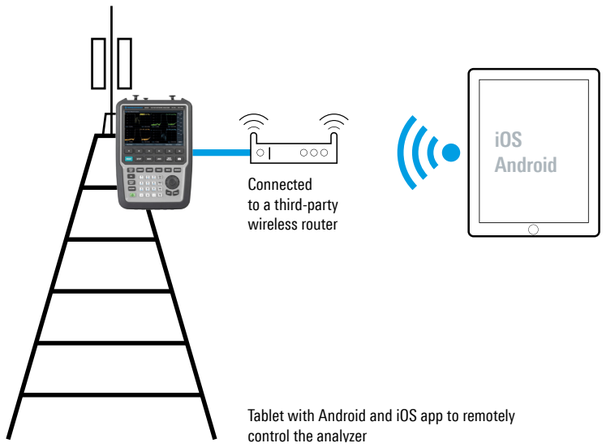
Simplify measurements with the wizard function

The measurement wizard simplifies measurements by automating, standardizing and optimizing test sequences. A sequence of standardized, recurring measurements can be performed quickly and easily without mistakes. The proven wizard function helps eliminate human error and supports the user in making correct measurements from the start.

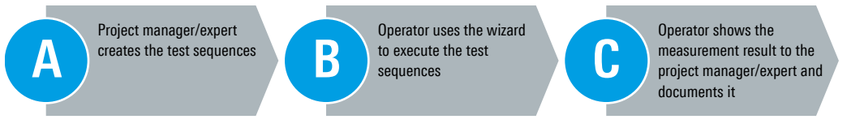
Remote control with Android/iOS app

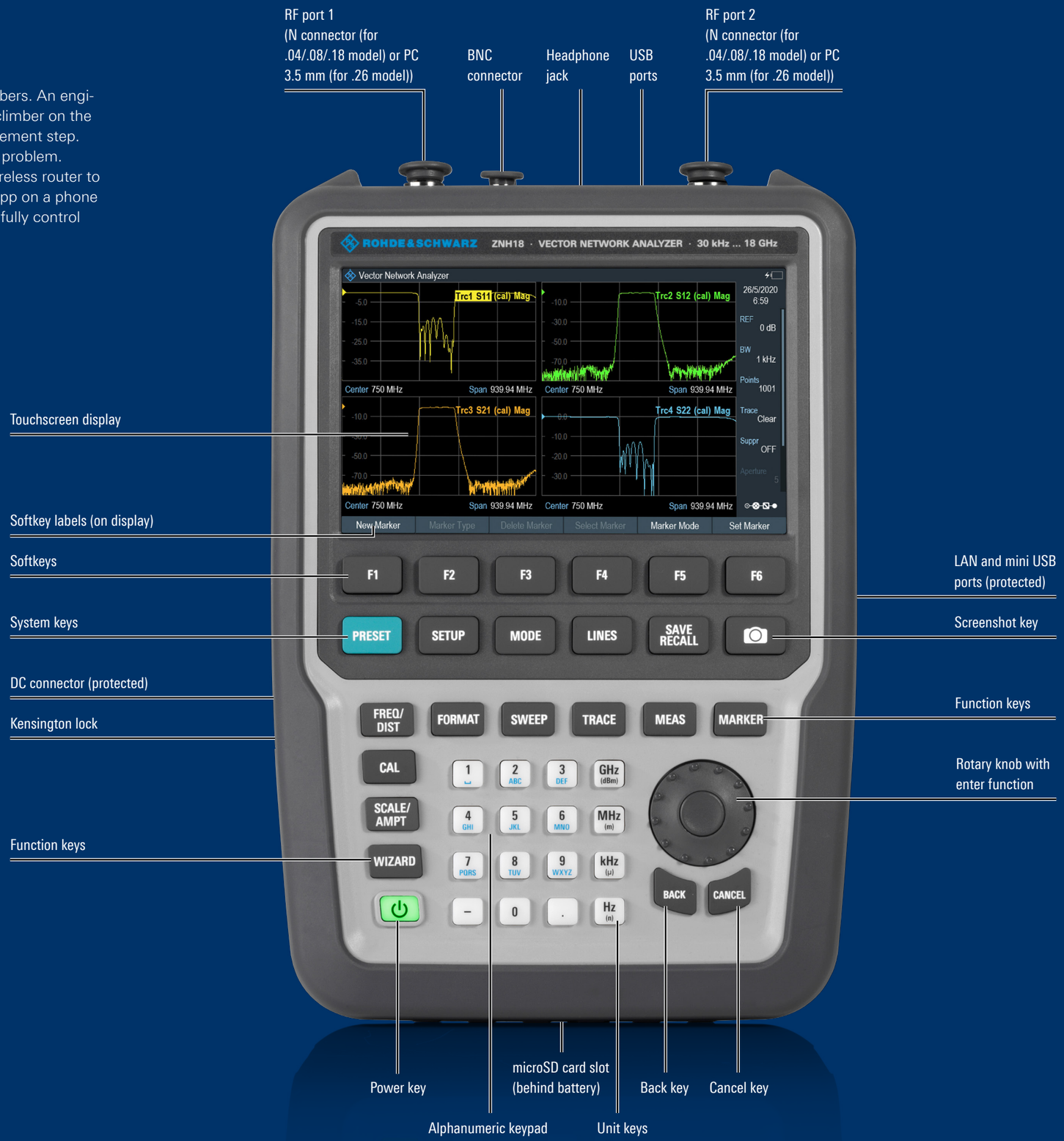
Not all qualified engineers are qualified climbers. An engineer on the ground might have to give the climber on the mast or tower instructions for every measurement step. Remote control of the R&S®ZNH solves this problem. Simply connect a commercially available wireless router to the analyzer and use the R&S®MobileView app on a phone or tablet to remote control the analyzer and fully control the measurements.

Application example of wireless remote operation via tablet



Three simple steps to use the measurement wizard





SIMPLE TO CONFIGURE

Simple and fast setup with configuration overview menu

The analyzer can be operated with the keys and rotary knob and with the touchscreen. The keys are large and well spaced out. This makes the analyzer ideal for operation with gloves.

The R&S®ZNH offers a new kind of user experience with its sensitive capacitive touchscreen:

- Directly interact with the elements on the screen
- Access menus quickly
- Change frequency and span
- Add/move/delete markers
- Change other settings
- And much more

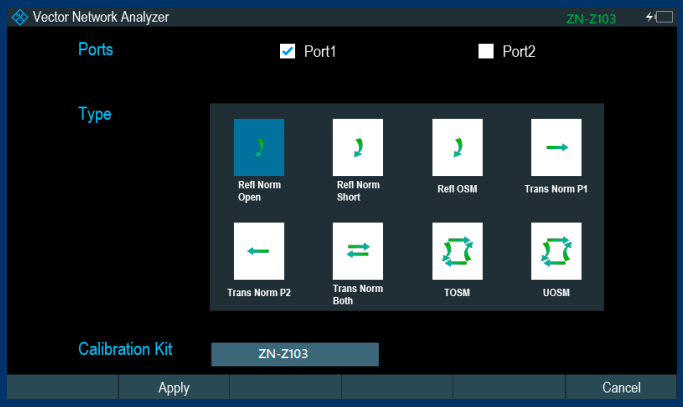
The configuration overview menu reduces the number of steps required to configure the measurement settings, allowing fast setup.

Flexible calibration approach

Rohde&Schwarz understands the need to perform measurements quickly, so the R&S®ZNH is factory-precalibrated for the supported frequency and temperature ranges. The factory calibration removes the drift error, which can be a hassle when you have to keep calibrating because the measured frequency and operating temperature change. No calibration reminder will pop up on the screen and interrupt measurements. The Rohde&Schwarz manufacturing line performs stringent calibration during production to minimize measurement errors and provide reliable measurement results. A calibration certificate is included with the analyzer. When the calibration interval has elapsed, the analyzer can be sent back to Rohde&Schwarz for recalibration.

The R&S®ZNH supports both manual calibration kits and automatic calibration units. Using a calibration unit such as the R&S®ZN-Z103 minimizes the time needed to perform full system error correction. The calibration unit is ready to use as soon as it is connected to the R&S®ZNH. A setup can be calibrated in just a few steps. This is especially advantageous in production environments, helping to save time and maximize throughput. The calibration unit performs calibration with a single click on the "Start Auto Cal" button.

Calibration selection menu.



Configuration overview menu.

SIMPLE TO ADD VALUE

Comprehensive standard features

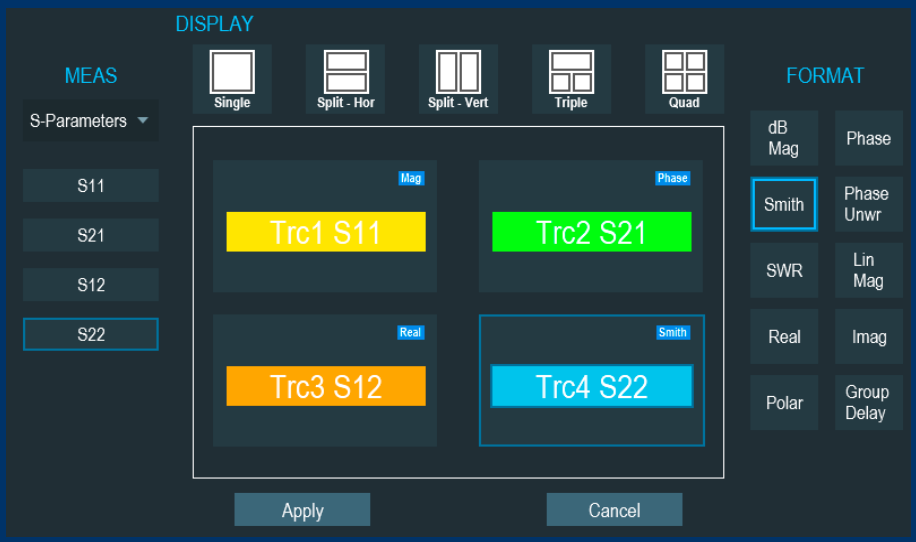
The R&S®ZNH basic unit includes:

- Distance-to-fault measurements – pinched cables and loose or corroded cable connections severely impair transmission of the transmit or receive signal. The distance-to-fault function measures the exact distance to the location of the fault. A threshold value defines which cable faults are out of tolerance and need to be added to the list of faults. This considerably simplifies the evaluation of the measurement.
- One-port cable loss measurements – the R&S®ZNH makes it easy to determine the cable loss of already installed cables. Simply connect one end of the cable to the R&S®ZNH test port and terminate the other end with a short circuit or leave it open.
- Reflection measurement – a reflection measurement measures the matching of antennas and amplifiers with high precision. The measurement is based on vector system error correction. Results are displayed either as return loss (in dB) or as VSWR.
- Transmission measurements – measure the transmission characteristics of components such as filters and amplifiers. The R&S®ZNH delivers insertion loss or gain characteristics in just a few operating steps. The high dynamic range of typically up to 100 dB enables the user to measure the isolation between antennas.
- Four S-parameters (S_{11}, S_{21}, S_{12}, S_{22}) – the R&S®ZNH is a full two-port vector network analyzer. Without additional options, the VNA uses S-parameter measurements to determine matching and transmission characteristics of filters and amplifiers. Measurement is done swiftly and with high accuracy in the forward and reverse direction with only one test setup. The analyzer can simultaneously display four different S-parameters in four different formats.

Simple option ordering concept

The R&S®ZNH has a scalable approach. When additional functions are needed, simply order the necessary option via its order number. All the options can be ordered transparently and independently, meaning there are no hidden costs and no confusion when ordering.

Fast display setup of S-parameters with the desired format.



SPECIFICATIONS IN BRIEF

Specifications in brief		
Network analysis		
Frequency range	R&S®ZNH4	30 kHz to 4 GHz
	R&S®ZNH8	30 kHz to 8 GHz
	R&S®ZNH18	30 kHz to 18 GHz
	R&S®ZNH26	30 kHz to 26.5 GHz
Test port connector	R&S®ZNH4	
	R&S®ZNH8	type N female
	R&S®ZNH18	
	R&S®ZNH26	3.5 mm, male
Number of test ports		2
Standard measurement functions	one-port cable and antenna measurement	reflection and transmission measurement, one-port cable loss, DTF measurement
	two-port vector network analysis	S_{11}, S_{21}, S_{12}, S_{22}
Result formats		► dB magnitude ► phase ► unwrapped phase ► Smith ► linear magnitude ► real ► imaginary ► SWR ► polar ► group delay
Calibration methods		► reflection normalization (open and short) ► reflection (OSM) ► transmission normalization (P1 and P2) ► transmission normalization in both directions ► TOSM ► UOSM ► TRL
Dynamic range		100 dB (typ.)
Output power		0 dBm (typ.)
Trace noise magnitude (RMS)		0.0015 dB (typ.)
Trace noise phase (RMS)		0.0015° (typ.)
Measurement speed		761 µs per point
Number of measurement points	selectable	3 to 16001
Measurement bandwidth	range	10 Hz to 100 kHz in 1/3/10 steps
Measurement range		–120 dB to +30 dB
Maximum rated input level	CW RF power	23 dBm (= 0.2 W)
	peak RF power	26 dBm (= 0.4 W)
DC bias output voltage	mode: internal	+2 V to +32 V in 0.1 V steps (nom.)
General data		
Display size	capacitive touchscreen	7"
Display resolution	WVGA	800 × 480 pixel
Battery (R&S®HA-Z306)	capacity	72 Wh (version E), 74.5 Wh (version F and above)
	voltage	11.25 V (nom., version E) 10.8 V (nom., version F and above)
Operating time with new, fully charged battery		4 h
Dimensions	W × H × D	202 mm × 294 mm × 76 mm (8.0 in × 11.6 in × 3 in)
Weight		3.1 kg (6.8 lb)

ORDERING INFORMATION

Designation	Type	Frequency range	Order No.
Base unit			
Handheld vector network analyzer, two-port, 4 GHz, type N	R&S®ZNH4		1321.1611.04
Handheld vector network analyzer, two-port, 8 GHz, type N	R&S®ZNH8		1321.1611.08
Handheld vector network analyzer, two-port, 18 GHz, type N	R&S®ZNH18		1321.1611.18
Handheld vector network analyzer, two-port, 26 GHz, PC 3.5 mm	R&S®ZNH26		1321.1611.26
Accessories supplied			
Lithium-ion battery pack, USB cable, AC power supply with country-specific adapters for EU, GB, USA, AUS, CH, getting started manual, side strap			
Software options			
Power sensor support	R&S®ZNH-K9		1334.6800.02
Pulse measurements with power sensor	R&S®ZNH-K29		1334.6823.02
DC bias variable voltage source	R&S®ZNH-K10		1334.6846.02
Vector voltmeter	R&S®ZNH-K45		1334.6852.02
Mixed mode S-parameters	R&S®ZNH-K47		1334.6875.02
Wave ratios and wave quantities	R&S®ZNH-K66		1334.6869.02
Time domain analysis	R&S®ZNH-K68		1334.6881.02
Power sensor measurement versus frequency	R&S®ZNH-K69		1334.6830.02
Calibration and verification			
Calibration kit, 50 Ω	R&S®ZCAN	0 Hz to 3 GHz	0800.8515.52
Calibration kit, 75 Ω	R&S®ZCAN	0 Hz to 3 GHz	0800.8515.72
Calibration kit, 50 Ω (combined open/short)	R&S®FSH-Z28	0 Hz to 8 GHz	1300.7810.03
Calibration kit, 50 Ω (combined open/short)	R&S®FSH-Z29	0 Hz to 3.6 GHz	1300.7510.03
Calibration kit, type N (m), 50 Ω (combined open/short/through calibration standard)	R&S®ZV-Z170	0 Hz to 9 GHz	1317.7683.02
Calibration kit, type N (f), 50 Ω (combined open/short/through calibration standard)	R&S®ZV-Z170	0 Hz to 9 GHz	1317.7683.03
Calibration kit, 3.5 mm (m), 50 Ω (combined open/short/through calibration standard)	R&S®ZV-Z135	0 Hz to 15 GHz	1317.7677.02
Calibration kit, 3.5 mm (f), 50 Ω (combined open/short/through calibration standard)	R&S®ZV-Z135	0 Hz to 15 GHz	1317.7677.03
Calibration kit	R&S®ZN-Z103	2 MHz to 4 GHz	1321.1828.02
Calibration kit	R&S®ZN-Z103	1 MHz to 6 GHz	1321.1828.12
Calibration unit, 2-port	R&S®ZN-ZE104	5 kHz to 4.5 GHz	1350.8040.04
Calibration unit, 2-port	R&S®ZN-ZE109	5 kHz to 9 GHz	1350.8040.09
Calibration unit, 2-port	R&S®ZN-ZE118	5 kHz to 18 GHz	1350.8040.18
Calibration unit, 2-port	R&S®ZN-ZE126	5 kHz to 26.5 GHz	1350.8040.26
Calibration kit, 3.5 mm (m)	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.02
incl. DCV data on CD	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.12
incl. accredited calibration	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.22
Calibration kit, 3.5 mm (f)	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.03
incl. DCV data on CD	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.13
incl. accredited calibration	R&S®ZN-Z135	0 Hz to 26.5 GHz	1328.8157.23
Calibration kit, type N (m)	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.02
incl. DCV data on CD	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.12
incl. accredited calibration	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.22
Calibration kit, type N (f)	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.03
incl. DCV data on CD	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.13
incl. accredited calibration	R&S®ZN-Z170	0 Hz to 18 GHz	1328.8163.23
Calibration kit, 3.5 mm (open/short/match/through male and female each)	R&S®ZN-Z235	0 Hz to 26.5 GHz	1336.8500.02

Designation	Type	Frequency range	Order No.
Test cables			
3.5 mm (f) to 3.5 mm (m)			
length: 0.6 m	R&S®ZV-Z93	0 Hz to 26.5 GHz	1301.7595.25
length: 1.0 m	R&S®ZV-Z93	0 Hz to 26.5 GHz	1301.7595.38
2.92 mm (f) to 2.92 mm (m)			
length: 0.6 m	R&S®ZV-Z95	0 Hz to 40 GHz	1301.7608.25
length: 1.0 m	R&S®ZV-Z95	0 Hz to 40 GHz	1301.7608.38
Type N (m) to type N (m)			
length: 0.6 m	R&S®ZV-Z191	0 Hz to 18 GHz	1306.4507.24
length: 1.0 m	R&S®ZV-Z191	0 Hz to 18 GHz	1306.4507.36
Type N (m) to 3.5 mm (m)			
length: 0.6 m	R&S®ZV-Z192	0 Hz to 18 GHz	1306.4513.24
length: 1.0 m	R&S®ZV-Z192	0 Hz to 18 GHz	1306.4513.36
3.5 mm (f) to 3.5 mm (m)			
length: 0.6 m	R&S®ZV-Z193	0 Hz to 26.5 GHz	1306.4520.24
length: 0.9 m	R&S®ZV-Z193	0 Hz to 26.5 GHz	1306.4520.36
length: 1.5 m	R&S®ZV-Z193	0 Hz to 26.5 GHz	1306.4520.60
2.92 mm (f) to 2.92 mm (m)			
length: 0.6 m	R&S®ZV-Z195	0 Hz to 40 GHz	1306.4536.24
length: 0.9 m	R&S®ZV-Z195	0 Hz to 40 GHz	1306.4536.36
Power sensors			
Power sensors supported by R&S®ZNH-K9 (for average power measurement) and wideband power sensors supported by R&S®ZNH-K29 (for pulse measurement)			
Directional power sensor	R&S®FSH-Z14	25 MHz to 1 GHz	1120.6001.02
Directional power sensor	R&S®FSH-Z44	200 MHz to 4 GHz	1165.2305.02
Universal power sensor, 100 mW, two-path	R&S®NRP-Z211	10 MHz to 8 GHz	1417.0409.02
Universal power sensor, 100 mW, two-path	R&S®NRP-Z221	10 MHz to 18 GHz	1417.0309.02
Wideband power sensor, 100 mW	R&S®NRP-Z81	50 MHz to 18 GHz	1137.9009.02
Wideband power sensor, 100 mW (2.92 mm)	R&S®NRP-Z85	50 MHz to 40 GHz	1411.7501.02
Wideband power sensor, 100 mW (2.40 mm)	R&S®NRP-Z86	50 MHz to 40 GHz	1417.0109.40
Wideband power sensor, 100 mW (2.40 mm)	R&S®NRP-Z86	50 MHz to 44 GHz	1417.0109.44
Three-path diode power sensor, 100 pW to 200 mW	R&S®NRP8S	10 MHz to 8 GHz	1419.0006.02
Three-path diode power sensor, 100 pW to 200 mW	R&S®NRP18S	10 MHz to 18 GHz	1419.0029.02
Three-path diode power sensor, 100 pW to 200 mW	R&S®NRP33S	10 MHz to 33 GHz	1419.0064.02
Three-path diode power sensor, 100 pW to 200 mW	R&S®NRP40S	50 MHz to 40 GHz	1419.0041.02
Three-path diode power sensor, 100 pW to 200 mW	R&S®NRP50S	50 MHz to 50 GHz	1419.0087.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP18T	0 Hz to 18 GHz	1424.6115.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP33T	0 Hz to 33 GHz	1424.6138.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP40T	0 Hz to 40 GHz	1424.6150.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP50T	0 Hz to 50 GHz	1424.6173.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP67T	0 Hz to 67 GHz	1424.6196.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP90T	0 Hz to 90 GHz	1424.6473.02
Thermal power sensor, 300 nW to 100 mW	R&S®NRP110T	0 Hz to 110 GHz	1424.6215.02
Average power sensor, 100 pW to 200 mW	R&S®NRP6A	8 kHz to 6 GHz	1424.6796.02
Average power sensor, 100 pW to 200 mW	R&S®NRP18A	8 kHz to 18 GHz	1424.6815.02
Pulse power sensors, 1 nW to 100 mW	R&S®NRP18P	50 MHz to 18 GHz	1444.1190.02
Pulse power sensors, 1 nW to 100 mW (2.92 mm)	R&S®NRP40P	50 MHz to 40 GHz	1444.1290.02
Pulse power sensors, 1 nW to 100 mW (2.40 mm)	R&S®NRP50P	50 MHz to 50 GHz	1444.1390.02
R&S®FSH-Zxx power sensors require the following adapter cable for operation with the R&S®ZNH			
USB adapter cable to connect the R&S®FSH-Z14/ R&S®FSH-Z44 to the R&S®ZNH, length: 1.8 m	R&S®FSH-Z144		1145.5909.02
R&S®NRP-Zxx power sensors require the following adapter cable for operation with the R&S®ZNH			
USB adapter cable (passive) to connect the R&S®NRP-Zxx to the R&S®ZNH, length: 2 m	R&S®NRP-Z4		1146.8001.02

Designation	Type	Frequency range	Order No.
R&S®NRP power sensors require the following adapter cable for operation with the R&S®ZNH			
USB interface cable to connect the R&S®NRP to the R&S®ZNH, length: 1.5 m	R&S®NRP-ZKU		1419.0658.03
Optical power sensors and accessories			
RF cable, armored, type N (m) and type N (f) connectors, length: 1 m	R&S®FSH-Z320	0 Hz to 8 GHz	1309.6600.00
RF cable, armored, type N (m) and type N (f) connectors, length: 3 m	R&S®FSH-Z321	0 Hz to 8 GHz	1309.6617.00
Attenuator, 50 W, 20 dB, 50 Ω, type N (f) to type N (m)	R&S®RDL50	0 Hz to 6 GHz	1035.1700.52
Attenuator, 100 W, 20 dB, 50 Ω, type N (f) to type N (m)	R&S®RBU100	0 Hz to 2 GHz	1073.8495.20
Attenuator, 100 W, 30 dB, 50 Ω, type N (f) to type N (m)	R&S®RBU100	0 Hz to 2 GHz	1073.8495.30
OEM USB optical power meter (germanium)	R&S®HA-Z360		1334.5162.00
OEM USB optical power meter (filtered InGaAs)	R&S®HA-Z361		1334.5179.00
SC adapter for optical power meter	R&S®HA-Z362		1334.5185.00
LC adapter for optical power meter	R&S®HA-Z363		1334.5191.00
2.5 mm universal adapter for optical power meter	R&S®HA-Z364		1334.5204.00
1.25 mm universal adapter for optical power meter	R&S®HA-Z365		1334.5210.00
Patch cord, SC-LC SM, SX, length: 1 m	R&S®HA-Z366		1334.5227.00
Patch cord, SC-SC SM, SX, length: 1 m	R&S®HA-Z367		1334.5233.00
Recommended extras			
GPS receiver	R&S®HA-Z340		1321.1392.02
Matching pad, 50 Ω/75 Ω, L section	R&S®RAM		0358.5414.02
Matching pad, 50 Ω/75 Ω, series resistor 25 Ω	R&S®RAZ		0358.5714.02
Matching pad, 50 Ω/75 Ω, L section, type N to BNC	R&S®FSH-Z38		1300.7740.02
Battery charger for the R&S®HA-Z306	R&S®HA-Z303		1321.1328.02
Lithium-ion battery pack, 6.4 Ah	R&S®HA-Z306		1321.1334.02
Spare power supply, incl. mains plug (for EU, GB, USA, AUS, CH)	R&S®HA-Z301		1321.1386.02
Car adapter	R&S®HA-Z302		1321.1340.02
Carrying holster	R&S®HA-Z322		1321.1370.02
Rainproof carrying holster	R&S®HA-Z322		1321.1370.03
Soft carrying bag	R&S®HA-Z220		1309.6175.00
Hardcase	R&S®HA-Z321		1321.1357.02
Hard shell protective carrying case	R&S®RTH-Z4		1326.2774.02
Spare USB cable	R&S®HA-Z211		1309.6169.00
Spare Ethernet cable	R&S®HA-Z210		1309.6152.00
Adapter type N (m) to BNC (f)			0118.2812.00
Adapter type N (m) to type N (m)			0092.6581.00
Adapter type N (m) to SMA (f)			4012.5837.00
Adapter type N (m) to 7/16 (f)			3530.6646.00
Adapter type N (m) to 7/16 (m)			3530.6630.00
Adapter type N (m) to FME (f)			4048.9790.00
Adapter type N (m) to banana (f)			0017.6742.00

Warranty		
Base unit		3 years
All other items [1]		1 year
Service options		
Extended warranty, one year	R&S®WE1	Contact your local Rohde&Schwarz sales office.
Extended warranty, two years	R&S®WE2	
Extended warranty with calibration coverage, one year	R&S®CW1	
Extended warranty with calibration coverage, two years	R&S®CW2	
Extended warranty with accredited calibration coverage, one year	R&S®AW1	
Extended warranty with accredited calibration coverage, two years	R&S®AW2	

[1] For options that are installed, the remaining base unit warranty applies if longer than one year. Exception: all batteries have a one-year warranty.