R&S®ZVH
Handheld Cable and
Antenna Analyzer
Quick Start Manual

ROHDE&SCHWARZ

Contents

Safety Instructions

Make sure to read through and observe the following safety instructions!
All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standard of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for an intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product. The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following

safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Symbols and safety labels:

⚠	Observe product documentation
⏚	PE terminal
⏚	Ground terminal
⚡	Danger of electric shock
🔥	Warning! Hot surfaces
⏚	Ground
⚠	Attention! Electrostatic sensitive devices

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations.Therefore, carefully read through and adhere to the following safety instructions before putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.

Tags and their meaning

DANGER	DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	NOTICE indicates a property damage message. In the product documentation, the word ATTENTION is used synonymously.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the tags

described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. The R&S ZVH is protected against dripping water and dust (IP degree 51). Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude 4600 m above sea level, max. transport altitude 12000 m above sea level. A tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.

2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel authorized by Rohde & Schwarz. Only original parts may

be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses, batteries). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test).

3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

4. If products/components are mechanically and/ or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.

5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered

by electromagnetic radiation. The employer/ operator is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.

6. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.

7. Prior to switching on the product, it must be ensured that the nominal voltage setting on the power supply matches the nominal voltage of the AC supply network.

8. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.

9. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.

10. The product may be operated only from TN/TT supply networks fused with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).

11. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, this can result in sparks, fire and/or injuries.

12. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.

13. For measurements in circuits with voltages Vrms > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.

14. Ensure that the connections with information technology equipment comply with IEC 950/ EN 60950.

15. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.

16. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that suitable protection is provided for users and products.

17. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.

18. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.

19. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.

20. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. Do not short-circuit batteries and storage batteries. If batteries or storage

batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries must be recycled and kept separate from residual waste. Batteries and storage batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

21. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.

22. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc.The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.

23. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract

the driver of the vehicle. The driver is always responsible for the safety of the vehicle. The manufacturer assumes no responsibility for accidents or collisions.

24. Prior to cleaning, disconnect the product from the AC supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluent for cellulose lacquers.

25. Any additional safety instructions given in this manual are also to be observed.

Informaciones Elementales de Seguridad

¡Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!
El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad. Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de

consecuencias a causa del mal uso del producto. Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones de la correspondiente documentación de producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos profundos y conocimientos básicas del idioma inglés. Por eso se debe tener en cuenta que el producto sólo pueda ser operado por personal especializado o personas minuciosamente instruidas con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto y entréguela a usuarios posteriores.

Símbolos y definiciones de seguridad

Ver documentación de producto

Conexión a conductor protector

Conexión a masa conductora

Peligro de golpe de corriente

¡Advertencia! Superficie caliente

Conexión a tierra

¡Cuidado! Elementos de construcción con peligro de carga electroestática

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en el capítulo correspondiente de la documentación de producto y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por el grupo de empresas Rohde & Schwarz bajo la denominación de "producto" entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO   Identifica un peligro directo con riesgo elevado de provocar muerte o lesiones de gravedad si no se toman las medidas oportunas.

ADVERTENCIA	Identifica un posible peligro con riesgo medio de provocar muerte o lesiones (de gravedad) si no se toman las medidas oportunas.
ATENCIÓN	Identifica un peligro con riesgo reducido de provocar lesiones de gravedad media o leve si no se toman las medidas oportunas.
AVISO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo. En la documentación del producto se emplea de forma sinónima el término CUIDADO..

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación de producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales
1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento. R&S ZVH está protegido contra roción y polvo

(modo de protección IP 51). Si no se convino de otra manera, es para los productos R&S válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 4600 m sobre el nivel del mar, transporte hasta 12000 m sobre el nivel del mar. Se aplicará una tolerancia de ±10% sobre el voltaje nominal y de ±5% sobre la frecuencia nominal.

2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal especializado autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles, baterías), solamente podrán ser sustituidos por partes originales. Después de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de la corriente conductora, control de funcionamiento).

3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se produccieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averiguar los motivos de estas reacciones.

4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.

5. Ciertos productos, como por ejemplo las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente.También las personas con un

bypass pueden correr peligro a causa de la radiación electromagnética. El empresario/ usuario está comprometido a valorar y señalar áreas de trabajo en las que se corra un riesgo aumentado de exposición a radiaciones para evitar riesgos.

6. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.

7. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el fuente alimentación equivalga a la del la red de distribución.

8. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (según la medida del cable de distribución, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en

bastidores o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

9. No utilice nunca el producto si está dañado el cable eléctrico. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.

10. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A (utilización de fusibles de mayor amperaje sólo previa consulta con el grupo de empresas Rohde & Schwarz).

11. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.

12. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.

13. En las mediciones en circuitos de corriente con una tensión de entrada de Ueff > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios

de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).

14. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos del estándar IEC950/EN60950.

15. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar heridas, fuego o daños en el producto.

16. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, el circuito de suministro de corriente deberá estar protegido de manera que usuarios y productos estén suficientemente protegidos.

17. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir cortocircuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.

18. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.

19. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.

20. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. No cortocircuitar baterías ni acumuladores. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención células de litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Las baterías y acumuladores deben reutilizarse y no deben acceder a los vertederos. Las baterías y acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de evacuación y reciclaje.

21. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.

22. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de

horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean observadas. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.

23. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo. El fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.

24. Antes de proceder a la limpieza, desconecte el producto de la red. Realice la limpieza con un paño suave, que no se deshilache. No utilice de ninguna manera agentes limpiadores químicos como, por ejemplo, alcohol, acetona o nitrodiluyente.

25. Deben observarse las indicaciones de seguridad adicionales del presente manual.

1 Hints

1.1 Certificate of quality

Dear Customer,

You have decided to buy a Rohde & Schwarz product.
You are thus assured of receiving a product that is manufactured using the most modern methods available.This product was developed, manufactured and tested in compliance with our quality management system standards.

The Rohde & Schwarz quality management system is certified according to:

DIN EN ISO 9001:2000
DIN EN 9100:2003
DIN EN ISO 14001:2004

1.2   Support Center

For quick, expert help with any Rohde & Schwarz
equipment, contact one of our Customer Support
Centers. A team of highly qualified engineers
provides telephone support and will work with
you to find a solution to your query on any aspect
of the operation, programming or applications of
Rohde & Schwarz equipment.

To keep your instrument up-to-date and to be
informed about new application notes related
to your instrument, please send an e-mail to the
Customer Support Center stating your instrument
and your wish. We will take care that you will get
the right information.

2 Putting into Operation

This chapter describes the way of putting the R&S ZVH into operation for the first time. It also provides information on the user interface and connectors of the R&S ZVH.

2.1 Unpacking the R&S ZVH

The R&S ZVH is delivered in formfitting packaging. It consists of an upper and a lower shell. The two shells are held together by tape.

The packaging contains all accessories that are supplied with the instrument.

▶ Undo the tape to unpack the analyzer.

▶ Remove the R&S ZVH and its accessories.

▶ Remove the protective film from the screen.

> *Using the master PIN*
>
> *Each R&S ZVH comes with a unique master PIN. Keep this master PIN in a secure place away from the R&S ZVH. If you enter an incorrect PIN three times in succession, the R&S ZVH cannot be used until you enter the correct master PIN.*
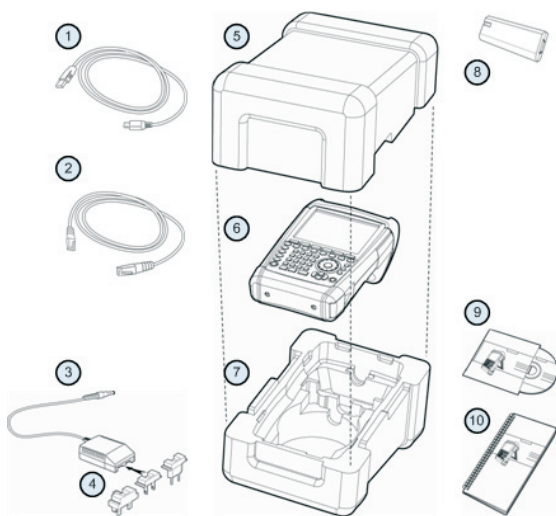
1. USB cable
2. LAN cable
3. AC Adapter
4. AC plug (country-specific)
5. Upper shell
6. R&S ZVH
7. Lower shell
8. Lithium ion battery
9. CD-ROM
10. Quick Start manual

2.2   Overview of Controls

1. RF input (N-connector)
2. Headphone jack
3. BNC connectors (behind protective cap)
4. LAN and Mini USB ports (behind protective cap)
5. Softkey labels (on display)
6. Softkeys
7. Function keys
8. Alphanumeric keypad
9. Kensington lock
10. DC port
11. On/Off key
12. Entry keys
13. Unit keys
14. Cursor keys
15. Preset key
16. Rotary knob
17. Screenshot key
18. Setup key
19. Display
20. SD card slot / USB port (behind protective cap)
21. Tracking generator output (N-connector)
22. Power sensor jack

2.3   Setting up the R&S ZVH

The R&S ZVH has been designed for lab operation as well as for service and maintenance applications on-site.

Depending on the environment, you can adjust the viewing angle of the display and either lay it out flat or prop it up using the fold-out support on the back of the R&S ZVH.

When laid out flat for operation from above, the R&S ZVH is still tilted forward slightly because of the grip on its top. This position provides the optimum viewing angle for the display.

To allow easy operation from the front and still be able to read the display, you can fold out the support on the back of the R&S ZVH.

For use on-site or service measurements, it is best to hold the instrument in both hands. All controls are easy to reach. It is also recommended to use the R&S HA-Z222 carrying bag in order to leave both hands free for work on the device under test (DUT).

You can also use the grip on the top of the R&S ZVH to, for example, hang it from cabinet doors.

Before you turn on the R&S ZVH, you should insert the lithium ion battery included in the delivery into the battery compartment. The battery compartment is located on the bottom right of the R&S ZVH.

1. Press a finger against the recessed grip and push the cover down.

2. Open the cover.

3. Push the battery into the R&S ZVH as far as it will go with the beveled side facing up and the grip on the right side.

4. Close the cover.

5. Push it upward until it clicks fully into place.

You can operate the R&S ZVH with the AC adapter or the battery both included in the delivery.

2.3.1. Using the AC Adapter

Connect the AC adapter (R&S HA-Z201) to the DC port of the R&S ZVH on the left side of the R&S ZVH (1). Make sure to fully insert the plug into the port.

Depending on the system you need, firmly connect the appropriate plug included in the delivery (2) to the AC adapter.

Finally, connect the plug to an AC power outlet.

The voltage range of the AC power supply is 100 V to 240 V AC.

After the R&S ZVH is supplied with power, you can turn it on with the ⓞ button on the front panel.

NOTICE

Risk of damage to the instrument
- *Only use the supplied power supply R&S HA-Z201.*
- *AC supply voltage must be compatible to the voltage specified on the power supply unit.*
- *Attach the appropriate adapter to the power supply.*

2.3.2. Battery Operation

The lithium ion battery has a capacity of approximately 4 Ah and allows operation of up to three hours when it is fully charged.

The actual operation time depends on the current charge status, the ambient temperature and the operating mode of the R&S ZVH.

The R&S ZVH shows current charge status at the top of the display:

When fully charged, the battery icon is completely white. As it loses power, the white color disappears in four steps until just the battery outline indicates that the battery is flat.

Note that the battery is not fully charged when it is dispatched. For battery operation you have to charge it first.

To charge the battery, connect the AC power adapter included in the delivery. For more information see Using the AC Adapter on page 31.

Charging time is about 2.5 hours when the R&S ZVH is switched off. If it is switched on, the charging time is extended to about 3.5 hours, because the charging current is reduced by the power drain of the R&S ZVH.

A replacement battery (R&S ZVH-Z206) with a capacity of approximately 6 Ah and an operating time of 4.5 hours is available for order. Charging time for the replacement battery is about 3.5 hours if the R&S ZVH is switched off and about 4.5 hours if the R&S ZVH is switched on.

Using an external battery charger

You can also use an external battery charger (R&S HA-Z203, order number 1309.6123.00) to charge an additional replacement battery.

To charge the battery externally, put the battery into the external charger and supply it with power via the AC power adapter.

An orange LED (CHARGE) on the charger indicates the charging process. The LED turns off when the battery is fully charged. Instead a green LED (READY) turns on.
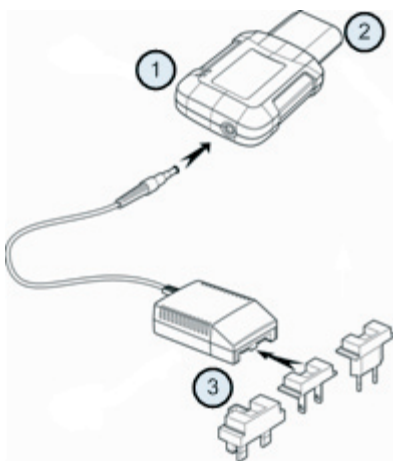
1. External charger R&S HA-Z203
2. Lithium ion battery R&S HA-Z204 or HA-Z206
3. Power supply unit R&S Z201 or car adapter R&S HA-Z202

During operation in the field, you can also charge the battery with the R&S HA-Z202 car adapter (order number 1309.6117.00). You can connect the car adapter to the corresponding DC port. With the car adapter, you are able to charge the R&S ZVH via the car's cigarette lighter socket.

⚠ CAUTION

Turn off the R&S ZVH while driving or while the engine is on.
Operation of the R&S ZVH via the cigarette lighter socket while driving or while the engine is on is prohibited.

When running, the R&S ZVH displays an arrow within the battery charge status indicator at the top right of the display to show that it is connected to the mains and is charging.

16:54

Fig.: Battery is charging

> **Flat battery**
> *Note that if the battery is completely flat, you cannot switch on the R&S ZVH, even though it is connected to the AC supply.*
>
> *In that case, charge the battery for a while with the R&S ZVH switched off.*

If the battery is fully charged, a plug icon is displayed instead of the battery icon.

16:50

Fig.: R&S ZVH is being powered by the AC supply and the battery is fully charged

You can set up the R&S ZVH to automatically turn off if no input is made after a particular time period. The possible range is from 0 to 99 minutes. For more information see Display Settings on page 56.

In the default state, the automatic cut-off is inactive.

2.4   Connectors on the R&S ZVH

The R&S ZVH has several connectors. The connectors are either on the upper, left or right side.

2.4.1.   RF Input

The RF input is located on the top of the R&S ZVH.

Connect a cable or DUT via a cable to the RF input with an N connector. Make sure not to overload the R&S ZVH.

The maximum power that is permissible at the RF input is 20 dBm (or 100 mW).

The R&S ZVH may be loaded with up to 30 dBm (or 1 W) for up to three minutes. If you apply 1 W for a longer period, the R&S ZVH may be destroyed.

The RF input is protected from static discharges and voltage pulses by a limiting circuit.

⚠ WARNING

Risk of electrical shock
In order to avoid electrical shock the DC input voltage must never exceed the value specified on the housing.

NOTICE

Risk of damage to the R&S ZVH
To avoid damage to the coupling capacitor, input attenuator or the mixer, the DC input voltage must never exceed the value specified in the data sheet.

2.4.2. Tracking Generator Output

The tracking generator output is located on the top of the R&S ZVH.

The tracking generator output power of the R&S ZVH is 0 dBm nominal.

With an integrated step attenuator, you can reduce the tracking generator output power by a maximum of 40 dB in 1 dB steps.

NOTICE

Risk of damage to the R&S ZVH
To avoid damage to the tracking generator output, the reverse voltage up to the voltage stated on the R&S ZVH housing must not be exceeded..

2.4.3. Power Sensor Port

The connector for power sensors is located on the top of the R&S ZVH.

The connector is configured especially for power sensors. It is used for both the power supply and data transfer via the power sensor interface.

Additionally, you can connect the R&STS-EMF isotropic antenna (order number 1158.9295.13) to this connector.

2.4.4. Headphone Jack

The 3.5 mm connector for headphones is located on the top of the R&S ZVH.

The internal impedance of the connector is approximately 10 Ohm.

2.4.5. AUX Input

The AUX input is located on the left side of the R&S ZVH under a protective cap.

You can connect various accessories like the GPS receiver R&S HA-Z240 (order number 1309.6700.02) to the AUX connector.

2.4.6. BNC Connectors

The BNC connectors are located on the left side of
the R&S ZVH behind a protective cap.

You can configure both BNC connectors for various
applications. The names of the connections are
embossed on the insides of the protective caps.

> *You can configure both BNC connectors*
> *for various applications. The names of the*
> *connections are embossed on the insides*
> *of the protective caps.*

2.4.6.1. EXT TRIG / EXT REF

The first (upper) BNC connector is for application
of an external trigger or an external reference
signal.

The external trigger is only for input configuration.
It controls the start a measurement and has to
be selected in the "Sweep" menu. The trigger
threshold is similar to that of TTL signals.

The 10 MHz reference signal that you can apply is used for frequency synchronization. The level of the reference signal must be larger than 0 dBm. If the input is configured for the external reference and but no reference signal is present, the R&S ZVH will show a warning in the display. This is to prevent users from carrying out a measurement without a valid reference.

2.4.6.2. BIAS Port 1 / BIAS Port 2

When you use them as BIAS ports, the two BNC connectors are direct current inputs.

Active equipment under test can be supplied with power via the BIAS Port 1 and BIAS Port 2 direct current inputs. Direct current is supplied with the assistance of a suitable power adapter (600 mA max. / 50 V max.).

2.4.6.3. IF Output / Video Out

The second (lower) BNC connector can be used as an intermediary frequency output (21.4 MHz) or a video output.

Risk of damage to the R&S ZVH
*To avoid damage to the tracking generator output,
never apply currents greater than 600 mA or
voltages greater than 20 V to the BNC connectors
if the BNC connectors are not configured as BIAS
input ports.*
*If they are configures as BIAS ports, never apply
currents greater than 600 mA or voltages greater
than 50 V.*

2.4.7. Mini USB and LAN Ports

The mini USB and LAN ports are located on the left
side of the R&S ZVH behind a protective cap.

You can connect the R&S ZVH to a PC via USB or
LAN and transfer data in both directions.

Configure the USB and LAN connection via the
"Instrument Setup". For more information see
Configuring the R&S ZVH on page 47.

2.4.8. Mechanical Locking Device

A Kensington Lock can be anchored to the R&S ZVH housing to secure the R&S ZVH to a workstation mechanically.

2.4.9. DC Port

The DC port is located on the left side of the R&S ZVH.

The R&S ZVH is supplied with power by the AC/DC transformer power supply via the DC connector. You can also use the DC connector to charge the battery.

2.4.10. USB Port

The USB port is located on the right side of the
R&S ZVH behind a protective cap.

You can use the USB interface to connect a
memory stick and store data sets or screenshots.

2.4.11. SD Card Slot

The SD Card slot is located on the right side of the
R&S ZVH behind a protective cap.

2.5   Installing Options

For special measurement tasks, you can fit the
R&S ZVH with various software options.

2.5.1.   Enabling Options

To enable options, you have to enter a key code.
The key code is based on the unique serial number
of the R&S ZVH.

▶ Press the SETUP key.

▶ Press the "Installed Options" softkey.

▶ Select the "Install Option..." item.

▶ Press the ENTER key.

The R&S ZVH opens an entry field to enter the
option key.

▶ Enter the appropriate option key.

▶ Confirm the entry with the ENTER key.

If you have entered the correct code, the R&S ZVH shows:

Installation successful !

If you have entered an incorrect code, the R&S ZVH shows

Invalid key code!

▶ Enter the correct code again.

2.5.2. Checking Installed Options

In the "Setup" menu, the R&S ZVH shows all options that are currently installed.

▶ Press the SETUP key.

▶ Press the "Installed Options" softkey.

The R&S ZVH shows a list of all available options and the current status of the option:

• "Installed": the option is installed and working.

• "Installed Portable": the option is installed and working, the license is a portable one.

• "Removed: <option key>": indicates that a portable license has been removed from the R&S ZVH and is ready to be transferred to another R&S ZVH.The corresponding option key

2.6 Configuring the R&S ZVH

In the "Instrument Setup" dialog box, the
R&S ZVH provides various general settings that
are independent of the operating mode of the
R&S ZVH.

▶ Press the SETUP key.

▶ Press the "Instrument Setup" softkey.

   The R&S ZVH opens the corresponding dialog
   box.

▶ Select the item you want to adjust with the
   rotary knob or the cursor keys.

2.6.1. Hardware Settings

The hardware settings contain settings that
concern internal and connected hardware.

Hardware	
Auto Accessory Detection	On
Detected Accessory	
BNC 1	Trigger Input
BNC 2	IF Out

Using auto accessory detection

▶ In the "Instrument Setup" dialog box, select the
   "Auto Accessory Detection" item.

▶ Press the ENTER key.

   A drop-down menu to turn automatic detection
   on and off opens.

Auto Accessory Detection	On
	Off
	On

▶ Select "On" to turn automatic accessory detection on.

▶ Confirm the selection with the ENTER key.

If active, the R&S ZVH automatically detects accessories connected to the R&S ZVH.The corresponding accessory is displayed in the "Detected Accessory" field.

Configuring the BNC connectors

You can use the BNC connectors for various applications. For more information, see BNC Connectors on page 41.

▶ In the "Instrument Setup" dialog box, select the "BNC 1" item.

▶ Press the ENTER key.

A drop-down menu to turn automatic detection on and off opens.

BNC 1	Trigger Input
	Trigger Input
	Reference Input
	DC Bias Port 2
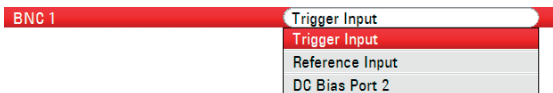
▶ Select the application that you require.

▶ Confirm the selection with the ENTER key.

The way to configure the second BNC connector is similar.

▶ Instead of selecting the "BNC 1" item select the "BNC 2" item.

BNC 2	IF Out
	IF Out
	DC Bias Port 1

Configuring the internal DC bias

For both ports, you can also activate an internal DC bias.

▶ In the "Instrument Setup" dialog box, select the "Internal DC Bias Level" item.

▶ Press the ENTER key.

A drop-down menu to turn the internal DC bias on and off opens.

Internal DC Bias	Off
	Off
	Port 1
	Port 2
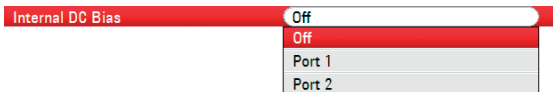
▶ Select the port for the internal DC bias.

▶ Confirm the selection with the ENTER key.

The voltage range is from 12 V to 32 V in 1 V steps.

▶ In the "Instrument Setup" dialog box, select the "Internal DC Bias Level" item.

▶ Press the ENTER key.

Internal DC Bias Level (Volt)	12 V

▶ Set the internal DC bias level you need. The unit is Volt.

NOTICE

Risk of damage to the DUT
Be careful when using the DC bias as it may damage the DUT.

2.6.2. Configuring the GPS Receiver

The R&S ZVH can locate your exact position if you equip it with the HS-Z240 GPS receiver (order number 1309.6700.02).

GPS reference frequency
Note that the reference frequency is automatically adjusted as soon as the GPS receiver function is enabled and there is a fix connection with enough satellites.

The "Instrument Setup" dialog box provides all settings necessary to configure the GPS receiver.

GPS	
GPS	Enabled
Show GPS Information	Enabled
Coordinate Format	ddd° mm′ ss.sss″
GPS Receiver Connected	Yes
Position Fix	Invalid
Number of Tracked Satellites	0
Signal Quality	Insufficient

In addition, the R&S ZVH shows some information about the GPS connection like the number of tracked satellites or the signal quality.

Enabling the GPS receiver

▶ In the "Instrument Setup" dialog box, select the "GPS Function" item.

▶ Press the ENTER key.

A drop-down menu to turn the GPS receiver on and off opens.

GPS	Disabled
	Disabled
	Enabled

▶ Select the "Enabled" menu item to activate the GPS receiver.

▶ Confirm the selection with the ENTER key.

▶ In the "Instrument Setup" dialog box, select the "Show GPS Information" item.

▶ Press the ENTER key.

A drop-down menu to turn the display of the GPS coordinates on and off opens.

Show GPS Information	Disabled
	Disabled
	Enabled

▶ Select the "Enabled" menu item to activate the GPS receiver.

▶ Confirm the selection with the ENTER key.

Setting the coordinate format

▶ In the "Instrument Setup" dialog box, select the "Coordinate Format" item.

▶ Press the ENTER key.

A drop-down menu to select the coordinate format opens.

Coordinate Format	ddd° mm′ ss.sss"
	ddd° mm′ ss.sss"
	ddd° mm.mmmm′

▶ Select the format you are most comfortable with from the drop-down menu.

▶ Confirm the selection with the ENTER key.

Display of the GPS information
The R&S ZVH shows the GPS information in a blue bar below the hardware settings.

When the connection to a satellite is lost, the bar turns red and the GPS coordinates are shown in brackets. However, the R&S ZVH still shows the last valid position.
The state of the satellite lock is shown in the title bar:

GPS in the title bar indicates that the GPS receiver is enabled and that there is a fix connection with enough satellites for the GPS receiver to provide the coordinates. The GPS information bar is blue.

GPS 13/02/09 09:47
Position: Latitude 48° 07' 40" N Longitude 11° 36' 46" E
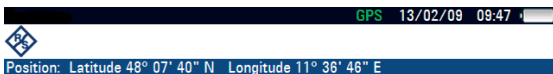
[GPS] in the title bar indicates that the GPS receiver is enabled but that there is no fix connection to a satellite. The GPS information bar is red. The coordinates are not updated.

[GPS] 13/02/09 10:26
[Position: Latitude 48° 07' 40" N Longitude 11° 36' 46" E]
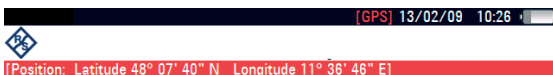
GPS in the title bar indicates that the GPS receiver is enabled, but that the receiver is not connected, not connected properly or defective. The GPS information bar is red. The coordinates are not updated.

The title bar shows no symbol, if the GPS receiver is not enabled.
If the GPS receiver is connected and enabled when you boot the R&S ZVH, it asks whether to restore the GPS coordinates that were active just before it was shut down.

2.6.3. Setting the Date and Time

The R&S ZVH has an internal clock that can apply a date and time stamp. In the "Instrument Setup" dialog box, you can set both date and time.

Date and Time	
Set Date	14/06/2010
Set Time	16:12:17

Setting the date

▶ In the "Instrument Setup" dialog box, select the "Set Date" item.

▶ Press the ENTER key

▶ Enter the date you want with the numeric keys. The sequence depends on the date format.

Set Date	(14/06/2010)

▶ Confirm the entry with the ENTER key.

Setting the time

▶ In the "Instrument Setup" dialog box, select the "Set Time" item.

▶ Press the ENTER key.

▶ Enter the time you want with the numeric keys.

Set Time	16:12:51

▶ Confirm the entry with the ENTER key.

After you have entered the time, the R&S ZVH verifies the validity of the time. If it's not valid, the R&S ZVH sets the next valid time.

2.6.4. Regional Settings

The regional settings allow to select a different language, date format and length unit.

Regional	
Language	English
Date Format	dd/mm/yyyy
Length Unit	meter

Selecting the language

The R&S ZVH provides several languages for the user interface.

▶ In the "Instrument Setup" dialog box, select the "Language" item.

▶ Press the ENTER key.

A dropdown menu opens to select the language.

Language	English
	English
	French
	German
	Spanish
	Italian
	Portuguese
	Japanese
	Chinese
	Korean
	Russian
	Hungarian
	Chinese Traditional

▶ Select one of the languages from the dropdown menu.

▶ Confirm the selection with the ENTER key.

Setting the date format
The R&S ZVH provides several date formats.

▶ In the "Instrument Setup" dialog box, select the "Date Format" item.

▶ Press the ENTER key.

A dropdown menu opens to select the date format.

Date Format	dd/mm/yyyy
	dd/mm/yyyy
	mm/dd/yyyy

▶ Select the date format you are most comfortable with from the dropdown menu.

▶ Confirm the selection with the ENTER key.

Setting the length unit

▶ In the "Instrument Setup" dialog box, select the "Length Unit" item.

▶ Press the ENTER key.

A dropdown menu opens to select the length unit.

Length Unit	meter
	meter
	feet

▶ Select the length unit you are most comfortable with from the dropdown menu.

▶ Confirm the selection with the ENTER key.

2.6.5. Display Settings

The display settings configure the display of the R&S ZVH.

Display	
Display Backlight	50 %
Display Color Scheme	Color

The display of the R&S ZVH is a TFT color LCD display.

Indoors, its brightness depends on the intensity of the backlight. To strike a balance between battery operating time and screen display quality, set the backlight intensity to the minimum brightness needed.

To optimize the viewing angle, adjust the color settings. To achieve maximum contrast, the screen can be switched from color display to black-and-white display.

Under extreme light conditions, it can be advantageous to select the high-contrast monochrome display.

Adjusting the display backlight

▶ In the "Instrument Setup" dialog box, select the "Display Backlight" item.

▶ Press the ENTER key.

▶ Enter the backlight intensity you want with the numeric keys.

Display Backlight	50 %

The backlight intensity is a percentage from 0% to 100% with 100% being the brightest.

▶ Confirm the entry with the ENTER key.

Selecting the display color scheme

▶ In the "Instrument Setup" dialog box, select the "Display Color Scheme" item.

▶ Press the ENTER key.

A dropdown menu opens to select the color scheme.

Display Color Scheme	Color
	Color
	Black & White
	Printer Friendly
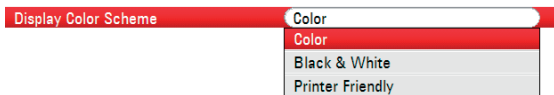
▶ Select "Color" to set the display to color display or "Black & White" to set it to monochrome display.
The "Printer Friendly" color scheme inverses the colors.

▶ Confirm the selection with the ENTER key.

2.6.6. Audio Settings

The audio settings include the key click and system beeper volume.

Audio	
Key Click Volume	30%
System Beeper Volume	30%

Setting the key click volume

The key click volume sets the volume of the click that the R&S ZVH produces when you press a key or softkey.

▶ In the "Instrument Setup" dialog box, select the "Key Click Volume" item.

▶ Press the ENTER key.

▶ Enter the volume you want with the numeric keys.

Key Click Volume	30 %

The key click volume is a percentage from 0% to 100% with 100% being the loudest.

▶ Confirm the entry with the ENTER key.

Setting the system beeper volume

The system beeper volume sets the volume of the system beeper of the R&S ZVH, used for example if a message box turns up.

▶ In the "Instrument Setup" dialog box, select the "System Beeper Volume" item.

▶ Press the ENTER key.

▶ Enter the volume you want with the numeric keys.

System Beeper Volume	30 %

The system beeper volume is a percentage from 0% to 100% with 100% being the loudest.

▶ Confirm the entry with the ENTER key.

2.6.7. Power Settings

The power settings show the status of the current power source and configure it.

Power	
Current Power Source	Battery
Battery Level	24 %
Battery Low Level	20 %

Setting the battery low level
When the battery low level is reached, the battery symbol in the title bar turns red and starts blinking.

▶ In the "Instrument Setup" dialog box, select the "Battery Low Level" item.

▶ Press the ENTER key.

▶ Enter the threshold you want in percent of a fully charged battery with the numeric keys.

Battery Low Level	20 %

▶ Confirm the entry with the ENTER key.

The current battery level is displayed in the "Battery Level" line.

2.6.8. Self Alignment

The self alignment calibrates the instrument settings for vector network analyzer and overrides the manufacturer's calibration stored in the instrument.

For the self alignment a short circuit (Short), an open circuit (Open) and 50 ohm match (Load) is required. In addition, a through connection must be established with an appropriate cable.

▶ In the "Instrument Setup" dialog box, select the "Self Alignment" item.

Self Alignment	
Self Alignment	
Last Alignment Date	07/06/2010

▶ Press the ENTER key.

The R&S ZVH initiates the self alignment procedure and shows a warning message box.

! Warning !
Self Alignment overwrites the factory calibration data.
Are you sure?
Press YES to continue, press NO to cancel

If you press "Yes", the self alignment begins. Follow the instructions shown on the screen.

If you press "No", the R&S ZVH aborts the self alignment.

2.6.9. Resetting the R&S ZVH

You can either preset the R&S ZVH or reset it to factory settings.

Presetting the R&S ZVH
The PRESET key resets the R&S ZVH to the default setup of the currently active operating mode.

This allows you to define a new configuration based on defined measurement parameters without parameters from a previous measurement unintentionally still being active.

▶ Press the PRESET key.

Resetting the R&S ZVH
A "Reset to Factory Settings" resets the R&S ZVH to the factory defaults.

All settings in the different menus are set to the original factory settings. All saved datasets, user defined transducer factors, limit lines, standards, channel tables and cable models will be deleted. Only the factory default files will be re-installed.

NOTICE

Risk of data loss
All datasets you have saved will be deleted during a factory reset.

▶ In the "Instrument Setup" dialog box, select the "Reset to Factory Settings" item.

Reset
Reset to Factory Settings

▶ Press the ENTER key.

The R&S ZVH initiates the reset procedure and shows a warning message box.

! Warning !
Reset to Factory Defaults?
(All saved datasets will be lost)
Press YES to continue, press NO to cancel
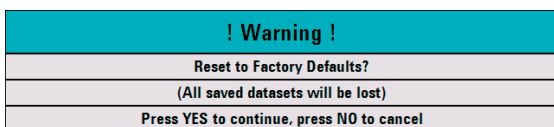
If you press "Yes", the R&S ZVH performs the reset. During the reboot, it shows an information window.

If you press "No", the R&S ZVH aborts the reset.

2.7 Connecting the R&S ZVH to a PC

The R&S ZVH comes with the R&S ZVHView software tool. It is made to document measurement results, create limit lines or channel tables, etc on your PC.

You can set up a connection between the R&S ZVH and R&S ZVHView either via its LAN port or its mini USB port.

You have to install the R&S ZVHView software on the PC before the connection is made. To do this, place the CD-ROM supplied in the CD drive. From the autostart menu select the R&S ZVHView menu item to install the software. Follow the instructions on the screen.

> **Firewall settings**
> *If no connection can be established between the software and the R&S ZVH after successful configuration, check the firewall settings on your PC.*

2.7.1.   Connection via LAN

You can connect the R&S ZVH directly to the PC with the LAN cable that is supplied with the delivery. The LAN port is located on the left side of the R&S ZVH behind a protective cap. For more information see "Mini USB and LAN Ports."

You can set up the LAN connection in the "Instrument Settings" dialog box.

LAN Port	
MAC Address	00-90-b8-18-81-aa
DHCP	Off
IP Address	10.114.10.1
Subnet Mask	255.255.255.0
Gateway	0.0.0.0

By default, DHCP (Dynamic Host Configuration Protocol) on the R&S ZVH is active. It has to be switched off for direct connection.

▶ In the "Instrument Setup" dialog box, select the "DHCP" item.

▶ Press the ENTER key.

   A dropdown menu opens to set the DHCP state.

DHCP	On
	Off
	On

▶ Select "Off" to deactivate DHCP.

Setting an IP address

To establish the connection, the IP address of the
PC and that of the R&S ZVH must be identical,
except for the digits following the last dot.

Example

IP address PC	172.76.68.30
IP address R&S ZVH	172.76.68.24

▶ Identify the IP address of your PC, e.g. in the
Microsoft Windows TCP/IP Properties.

Internet Protocol (TCP/IP) Properties   [?] [X]

General

You can get IP settings assigned automatically if your network supports
this capability. Otherwise, you need to ask your network administrator for
the appropriate IP settings.

○ Obtain an IP address automatically

⊙ Use the following IP address:

IP address: 172 . 76 . 68 . 30
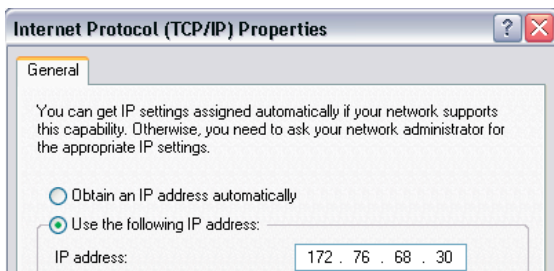
▶ In the "Instrument Setup" dialog box, select the
"IP Address" item.

▶ Press the ENTER key.

▶ Enter the IP address of the PC with the numeric
keys.

IP Address   (172.17.75.1)

▶ Confirm the entry with the ENTER key.

64

1309.6900.12-01

Setting the subnet mask

You have to also match the subnet mask of the PC and the R&S ZVH to establish a connection.

▶ Identify the subnet mask of your PC, e.g. in the Microsoft Windows TCP/IP Properties.

Internet Protocol (TCP/IP) Properties	? X

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

⊙ Use the following IP address:

IP address: 172 . 76 . 68 . 30

Subnet mask: 255 . 255 . 255 . 0
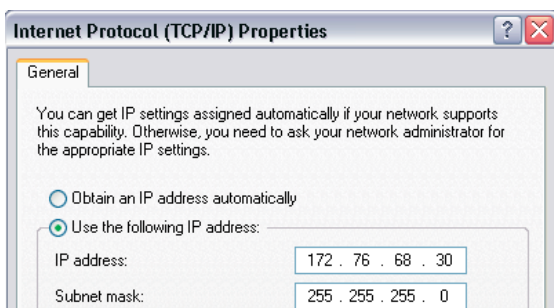
▶ In the "Instrument Setup" dialog box, select the "Subnet Mask" item.

▶ Press the ENTER key.

▶ Enter the subnet mask of the PC with the numeric keys.

Subnet Mask   255.255.255.0

▶ Confirm the entry with the ENTER key.

Configuring the R&S ZVHView software

▶ Start R&S ZVHView.

▶ Select the "LAN" tab in the "Instrument Connect" dialog box.
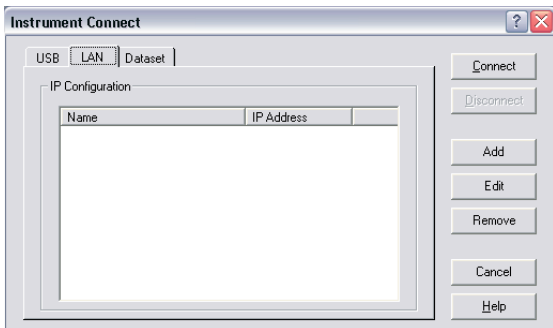
▶ Press the "Add" button to create a new network connection.
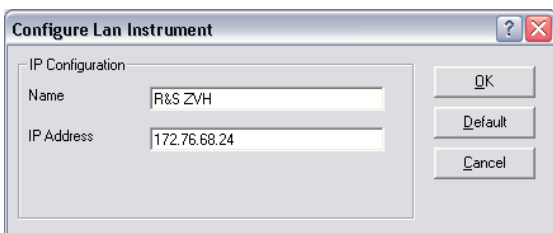
▶ Specify a name for the new network connection, e.g. R&S ZVH.

▶ Enter the IP address for the R&S ZVH (in this case 172.76.68.24)

▶ Confirm the entry with the "OK" button.

  The connection is now created and configured and is added to the IP Configuration list.
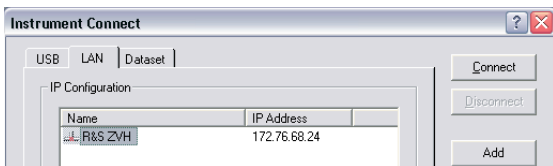
▶ Select the new connection labelled R&S ZVH.

▶ Press the Connect button to establish the connection.

2.7.2. Connection via an Existing LAN

You can either draw the R&S ZVH IP address automatically from the DHCP server or manually assign a fixed address. With manual allocation, a fixed IP address and subnet mask must be assigned to the R&S ZVH as described in the chapter on direct LAN connection. Then the R&S ZVHView software has to be configured as described with the assigned IP address.

> **Free IP address**
> *Contact your IT system manager to get a free IP address.*

In networks with a DHCP server, DHCP permits automatic allocation of the network configuration to the R&S ZVH connected via LAN cable. For this purpose, DHCP has to be active on the R&S ZVH.

DHCP is active by default. If not, proceed as follows:

▶ In the "Instrument Setup" dialog box, select the "DHCP" item.

▶ Press the ENTER key.

A dropdown menu opens to set the DHCP state.

DHCP	On
	Off
	On
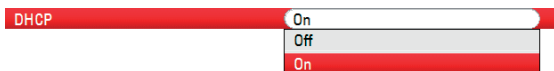
▶ Select "On" to activate DHCP.

The R&S ZVH is now allocated an IP address and the subnet mask by the DHCP server. This can take several seconds.

The IP address and subnet mask are automatically set in the corresponding menu entries and are no longer available for editing.

2.7.3. Connection via USB

When you connect the R&S ZVH for the first time, the "Found New Hardware Wizard" pops up on the computer monitor.

▶ Select the "Install the software automatically (recommended)" item.

▶ Confirm the selection by pressing the "Next" button.
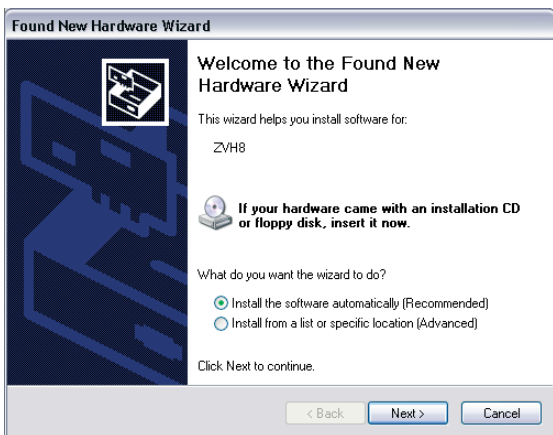
> **Required USB drivers**
> *Note that you have to install the R&S ZVHView software on the PC. Only then can the hardware wizard fi nd the necessary drivers for the USB connection.*

If successful, the wizards reports that the software for the new hardware has been installed after a few seconds.

▶ Complete the installation with the "Finish" button.

▶ Start R&S ZVHView on the PC.

▶ Select the "USB" tab in the "Instrument Connect" dialog box.
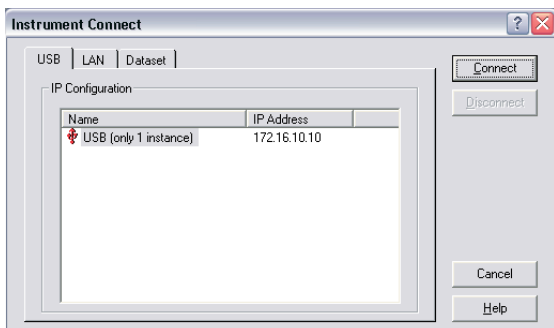
▶ Select the R&S ZVH connection.

▶ Confirm the selection with the "Connect" button.

> *The R&S ZVH internally emulates a LAN connection. The IP address displayed by R&S ZVHView for the USB connection is for information only. It is fixed to 172.16.10.10 and cannot be changed.*

Getting Started

This chapter provides a short overview of the first steps of the measurements you can perform with the R&S ZVH.

3.1 Using the Measurement Wizard

The measurement wizard allows you to combine several individual measurement setups to a sequence of measurements or measurement set. The wizard is therefore a good way to save time when performing measurements on-site because you do not have to (and cannot) change most of the R&S ZVH parameters after each measurement.

This chapter provides basic information on how to apply the functionality of the wizard. For a more comprehensive guide see the Operating Manual.

Note that it is necessary to use the functionality of the R&S ZVHView software package if you want to use the measurement wizard.

3.1.1. Defining Measurement Sets

Before you start to use the measurement wizard you have to define a measurement set with the R&S ZVHView software.

A measurement set consists of several datasets. A dataset is a file that contains the settings of a specific R&S ZVH configuration, e.g. frequency, scaling etc..To get a dataset, set up the R&S ZVH as you need and save the configuration or use a predefined dataset.

For more information on datasets see "Saving and Recalling Results and Settings on page 93" and the operating manual.

▶ Start the R&S ZVHView software.

▶ Select the "Wizard Definition Tool" with the ⬛ button.

In the dialog that opens, you can

• combine several datasets to a measurement set

• specify instructions about the measurement procedure

• define cable characteristics

• define the calibration method.

▶ Set up the measurement set as you like by adding or removing datasets and by adding instructions for each stage of the measurement.

▶ Save the measurement set. The file type of a measurement set is *.mdf.

3.1.2. Uploading Measurement Sets

The next step is to transfer the measurement set you have defined to the R&S ZVH. You can transfer files from and to the R&S ZVH with the R&S ZVHView software.

▶ Select the "Wizard Definition Control" function via the ⬛ button.

The software stores a copy of the measurement set on the memory of the R&S ZVH. Alternatively, you can use a memory stick or SD card to access a measurement set on the R&S ZVH.

3.1.3.   Performing Measurements

Now that the measurement set is available on the R&S ZVH you can start performing measurements.

▶ Press the WIZARD key.

The R&S ZVH opens the "Measurement Wizard" dialog box.

The "Measurement Wizard" dialog shows various information about the measurement set. Note that you can edit some of the parameters listed in the dialog, e.g. "User" or "Site Name."

▶ Press the "Load Meas Set" softkey.

The R&S ZVH opens the file manager.

▶ Select a measurement set.

The R&S ZVH loads the measurement set and shows the setup in the "Measurement Wizard" dialog box.

▶ Press the "Start Meas Set" softkey.

The R&S ZVH starts the measurement procedure by showing the instructions for the first measurement.

Preparing new Measurement (Measure Cable x)

After calibration
- firmly connect RF cable to R&S ZVH input
- firmly connect measurement cable to RF cable
- start measuring

The contents of the message box are the same you have defined for each measurement with R&S ZVHView.

▶ Follow the instructions shown in the message box.

▶ Press the "Confirm" softkey to confirm the successful preparation.

The R&S ZVH automatically starts the measurement and shows the corresponding results.

Note that it is not possible to change any measurement parameters while using the measurement wizard. Marker functionality is, however, available.

Now that you have the results of the measurement, you have several options:

• continue with the next measurement

• repeat the current measurement

• abort the measurement set

After you have completed all actions defined in the measurement set, save the results.

▶ Press the "Save Meas Results" softkey.

The R&S ZVH saves the results in its internal memory.

The results for a measurement set consist of a number of files. The files are stored in a directory that is named after the measurement name and site. The syntax is 'sitename_measurement_#'.

Each file in the directory contains the results of one individual measurement that is part of the measurement set.

3.1.4. Evaluating the Results

Before you can evaluate the results you have to transfer the results back to the PC.

You can do so with the R&S ZVHView software by using the "Wizard Report Control" (button).

To evaluate and interpret the results with a measurement report, you have to use R&S ZVHView again.

▶ Select the "Wizard Report Editor" with the button.

With the report editor, you can create measurement reports for the full measurement set or a selection of dataset only. You can also analyze the results further by setting markers etc.

▶ Add the results you want to include in the report by setting a checkmark or removing the checkmark in the report pane.

▶ Select the report format you would like.

▶ Create the report with the "Save" button.

3.2 Identifying Cable Faults

One of the basic measurement tasks for the R&S ZVH is to find cable faults with the distance-to-fault measurement.

Test setup
The test setup requires an R&S ZVH, an RF cable (e.g. R&S FSH-Z320) and a calibration standard (e.g. R&S FSH-Z28 or R&S FSH-Z29).

• For measurements on DUTs that require an external voltage supply (e.g. power amplifiers), connect the supply voltage from a suitable AC power supply to the BIAS PORT 1 input.

• Connect the RF test cable to the RF input of the R&S ZVH.

You have to use the RF test cable. Else the measurement results are invalid.
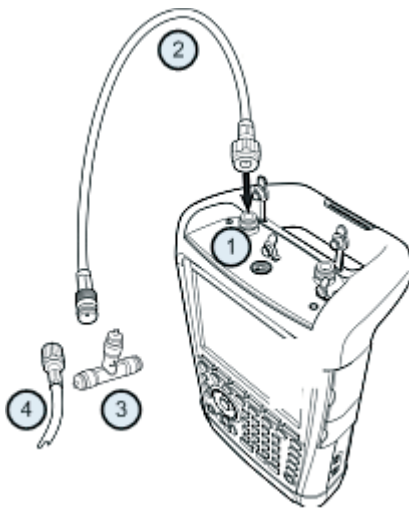
1. RF input (port 1)
2. RF cable
3. Calibration standard
4. Test cable (DUT)

▶ Press the MODE key.

▶ Press the "Antenna & Cable Test" softkey.

By default, the R&S ZVH shows the magnitude of the reflection (S11). You can also measure the distance to fault, the transmission or the cable loss.

▶ Press the MEAS key.

▶ Press the "Distance-to-Fault" softkey.

The R&S ZVH starts the distance-to-fault measurement.

To get the best results, you should adjust the center frequency to that of the DUT and set the measurement bandwidth.

▶ Press the FREQ/DIST key.

▶ Press the "Center" softkey.

▶ Enter the center frequency you need with the numeric keys (e.g. that of the antenna at the other end of the cable).

▶ Press the SWEEP/BW key.

▶ Press the "Meas BW" softkey.

▶ Enter 100 kHz as the measurement bandwidth.

Specifying the cable model
To perform cable tests, you have to specify the cable type and its approximate length.

▶ Press the MEAS key.

▶ Press the "Cable Config" softkey.

▶ Select the "Cable Model" item.

   The R&S ZVH opens a dialog box to select the cable model.

Cable Model			19/08/10 17:14	
Stat	Name	Size	Date	Time
◄□	\Public\Cable Models\...			
✎	\Public			
	5088-HLFR.cblmod	1 kB	23/07/2010	03:57
	5092-HLFR.cblmod	1 kB	23/07/2010	03:57
	5128-HLFR.cblmod	1 kB	23/07/2010	03:57
	5168-HLFR.cblmod	1 kB	23/07/2010	03:57
	5228-HLFR.cblmod	1 kB	23/07/2010	03:57
	5328-HLFR.cblmod	1 kB	23/07/2010	03:57
	5438-HLFR.cblmod	1 kB	23/07/2010	03:57
	5528-HLFR.cblmod	1 kB	23/07/2010	03:57
	FLC114-50J.cblmod	1 kB	23/07/2010	03:57
	FLC12-50J.cblmod	1 kB	23/07/2010	03:57
	FLC158-50J.cblmod	1 kB	23/07/2010	03:57
	FLC78-50J.cblmod	1 kB	23/07/2010	03:57
	HCC12-50J.cblmod	1 kB	23/07/2010	03:57
	HCC158-50J.cblmod	1 kB	23/07/2010	03:57
	HCC300-50J.cblmod	1 kB	23/07/2010	03:57
	HCC78-50J.cblmod	1 kB	23/07/2010	03:57
	HCF12-50.cblmod	1 kB	23/07/2010	03:57
	HJ12-50.cblmod	1 kB	23/07/2010	03:57
				Free: 13 MB
	Select	Sort/ Show		Refresh	Exit

▶ Select the cable model that you need from the list of cables.

▶ Confirm the selection with the "Select" softkey.

The currently active cable model is always shown in the display header.

You can also define new cable models on the R&S ZVH or with the R&S ZVHView software and then transfer them to the R&S ZVH. For more information see the operating manual.

In addition to the cable model, you should also specify the maximum distance of the cable.

▶ Press the FREQ key.

▶ Press the "Stop Distance" softkey.

▶ Enter the maximum distance of the cable you are testing.

The range is from 3 m (10 ft) to 1500 m (4921 ft). The unit depends on the regional settings. It is either meter or feet. For more information see Regional Settings on page 54.

The R&S ZVH uses the maximum distance to determine the optimal span for the measurement and for scaling the horizontal axis. For best results, the cable should be specified 20% to 50% longer than the actual cable length.

Calibrating the test setup
The R&S ZVH provides several calibration routines in antenna and cable test mode. For calibration, you ca use a calibration kit like the R&S FSH-Z28. For more information on the routines refer to the operating manual.

▶ Press the CAL key.

The R&S ZVH opens a menu that contains all available calibration routines.

▶ Press the "Full 1-Port" softkey.

The R&S ZVH asks you to connect a "Short", an "Open" and a "Load" to the measurement cable.

Calibrate OPEN
For calibration, please connect an "OPEN" to Port 1.
Press "Continue" to start the calibration.

▶ Firmly connect the short, the open and the load to the output end of the cable.

▶ After each step, proceed with the "Continue" softkey.

After the calibration, the R&S ZVH shows that it is calibrated by displaying (CAL).

▶ Screw the cable under test back to the measurement cable.

> *The R&S ZVH performs calibration over its entire span. It is thus not necessary to perform a new calibration after changing the frequency range or cable length.*
>
> *The calibration data is stored in the R&S ZVH memory. Thus, the calibration is valid after you change the operating mode or after you turn off the R&S ZVH..*

The R&S ZVH now shows the cable characteristics over its entire length. With a marker, you can easily detect the distance to the cable fault.

Using markers

The R&S ZVH has markers to read out signal levels and frequencies. Markers are always positioned on the trace. Both the level and frequency at their current positions are displayed on the screen.

▶ Press the MARKER key.

The R&S ZVH activates a marker and puts it on the maximum value on the trace.

A blue vertical line represents the position of the marker on the horizontal axis (e.g. the frequency).

A small blue horizontal dash represents the marker position on the vertical axis (e.g. the level).

The R&S ZVH shows the coordinates of all markers in a table above the diagram.

Selecting the measurement format
By default, the R&S ZVH shows the magnitude of the cable fault.

For some result displays, you can also select other measurement formats.

▶ Press the FORMAT/SPAN key.

▶ Press the softkey labelled with the measurement format you want to see.

Measuring the cable loss

In addition to the distance to the cable fault, you might also be interested in the loss that the cable has over a particular frequency span.

▶ Press the MEAS key.

▶ Press the "Cable Loss" softkey.

The R&S ZVH now shows how much power is lost for a particular frequency span.

Using markers, you can determine the magnitude of the cable loss for any particular frequency.

3.3 Measuring Transmissions (Option R&S ZVH-K39)

With option R&S ZVH-K39 (order number 1309.6830.02) you can perform transmission measurements (S12).

This measurement example measures the transmission characteristics of a highpass filter.

Test setup
To measure the transmission, connect the input of the filter to the generator output and the output of the filter to the RF input.

Setting the frequency span
Before calibrating the R&S ZVH, you should define the frequency span the R&S ZVH should measure the filter.

▶ Press the FREQ/DIST key.

▶ Press the "Start" softkey.

▶ Enter 10 MHz as the start frequency.

▶ Press the "Stop" softkey.

▶ Enter 100 MHz as the stop frequency.

Calibrating the measurement
For transmission measurements you have to perform a full 2-port calibration to get the best results.

▶ Press the CAL key.

▶ Press the "Full 2-Port" softkey.

   The R&S ZVH asks you to connect an "Open", a "Short" and a "Load" to port 1.

▶ Firmly connect the open, the short and the load to the output end of the cable.

▶ After each step, proceed with the "Continue" softkey.

   After port 1 has been calibrated, the R&S ZVH asks you to connect a "Through" to both ports.

▶ Firmly connect the through to both ports of the R&S ZVH.

▶ Proceed with the "Continue" softkey.

After the calibration, the R&S ZVH shows that it is calibrated by displaying (CAL).

▶ Reconnect the filter to the ports of the R&S ZVH.

The R&S ZVH now shows the characteristics of the highpass filter.
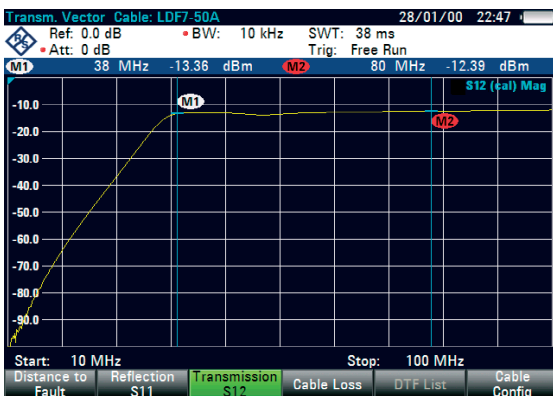
3.4 Using a Power Sensor (Option R&S ZVH-K9)

For highly accurate power measurements, you can connect one of the power sensors that are available for the R&S ZVH.

To control and power the power sensor, connect it to the corresponding RS-232-C interface at the top of the R&S ZVH.

3.4.1. Measuring the Power with a Power Sensor

The power sensors R&S FSH-Z1 and R&S FSH-Z18 measure the power in the range from 10 MHz to 8 GHz and 18 GHz respectively.

NOTICE

Risk of damaging the power sensor
Because of high input power,
• *the continuous power applied to the power sensor's input must not exceed 400 mW (26 dBm).*
• *use an attenuator for measurements on highpower transmitters.*

However, brief power peaks ≤10 µs up to 1 W (30 dBm) are permissible.

Test setup
▶ Connect the cable of the power sensor to the power sensor jack of the R&S ZVH.
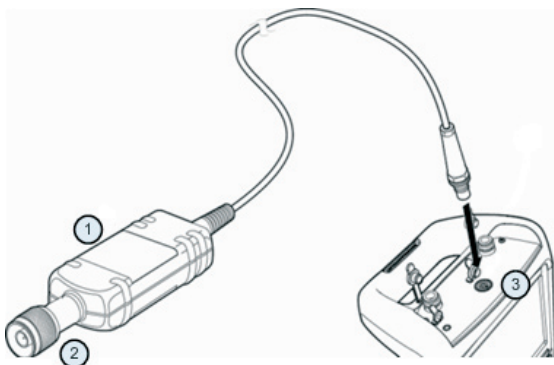
1. Power sensor R&S FSH-Z1 or R&S FSH-Z18
2. Power sensor connector (DUT)
3. Power sensor jack

Measuring the power

▶ Press the MODE key.

▶ Press the "Power Meter" softkey.

The R&S ZVH switches its operating mode.

If the R&S ZVH recognizes a power sensor, it sets up a connection via the interface and after a few seconds shows the measured power.

If no power sensor has been connected or is not connected appropriately, the R&S ZVH shows nothing.

If there are communication problems between the R&S ZVH and the power sensor, the R&S ZVH displays an error message that indicates a possible cause. For more information see the operating manual.

Zeroing the power sensor

To compensate for internal offset of the power meter, it needs to be compensated before starting the measurement.

▶ Press the "Zero" softkey.

The R&S ZVH asks you not to apply any signals to the power sensor while zeroing is active.

Zeroing Power Sensor
Before zeroing the Power Sensor, please
remove all signals from the sensor input.
Press "Continue" to start zeroing...

▶ Disconnect the power sensor from any signal sources.

▶ Press the "Continue" softkey to start zeroing.

The R&S ZVH immediately starts the zeroing process. It asks to to wait until it is finished.

After zeroing is done, the R&S ZVH outputs the message "Power Sensor Zero OK" and again shows the power sensor softkey menu.

▶ Connect the signal under test to the power sensor.

The R&S ZVH shows the measured power level in dBm.
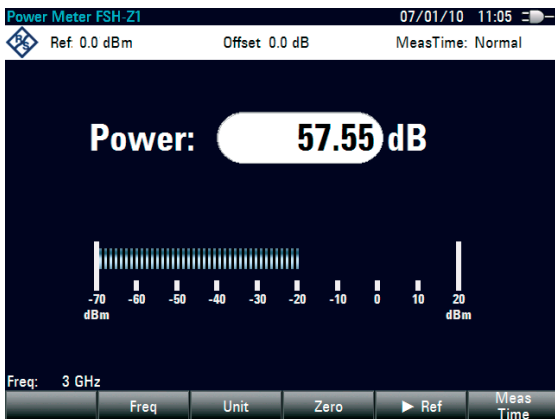
Entering the frequency

To get the best results, also enter the frequency of the signal under test.

▶ Press the "Freq" softkey.

▶ Enter the frequency of the signal.

▶ Confirm the entry with one of the unit keys.

The R&S ZVH transfers the new frequency to the power sensor which then corrects the measured power readings.

3.4.2. Measuring Power and Return Loss

With the directional power sensors R&S FSH Z14 and R&S ZVH-Z44 you can measure the power in both directions.

When you connect the directional power sensor between the source and the load, the R&S ZVH measures the power from source to load (forward power) and from load to source (reverse power).

The ratio between forward and reverse power is a measure of the load matching. The R&S ZVH displays it as the return loss or standing wave ratio.

The power sensors for the R&S ZVH have an asymmetrical design. Therefore, they have to be inserted into the test setup in such a way that the "Forward" arrow on the sensor points toward the load (= in the direction of the power flux).

When measuring high powers, pay strict attention to the following instructions to avoid personal injury and to prevent the power sensor from being destroyed

⚠ CAUTION

Danger of skin burns and damage to the instrument
- *Never exceed the permissible continuous power.*
- *See diagram on the rear of the sensor for the permissible continuous power.*
- *Turn off the RF power to connect the sensor.*
- *Screw the RF connectors tightly.*

Test setup
Connect the cable of the power sensor to the power sensor jack of the R&S ZVH and insert the directional power sensor between the source and the load.
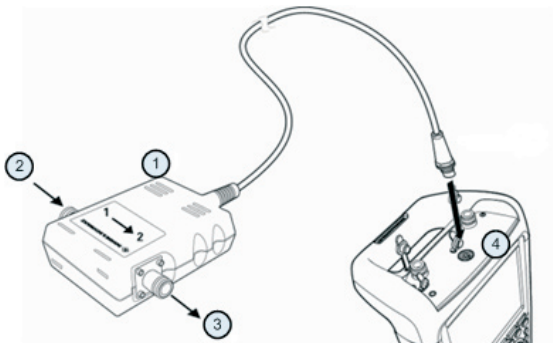
1. Directional power sensor R&S FSH-Z14 or Z44
2. Source
3. Load
4. Power sensor jack

Measuring the power

▶ Press the MODE key.

▶ Press the "Power Meter" softkey.

As soon as the R&S ZVH recognizes the power sensor, the R&S ZVH shows the type of the directional power sensor that is connected in the diagram header. After a few seconds the R&S ZVH also shows the forward power and return loss currently measured at the load.

Zeroing the power sensor

Before performing the power measurement, you should zero the power sensor. For more information, see Measuring the Power with a Power Sensor on page 86.

After zeroing is done, the R&S ZVH outputs the message "Power Sensor Zero OK" and again shows the power sensor softkey menu.

▶ Connect the R&S FSH-Z14 or R&S FSH-Z44 between the source and the load.

The R&S ZVH displays the measured forward power in dBm and the SWR of the load.
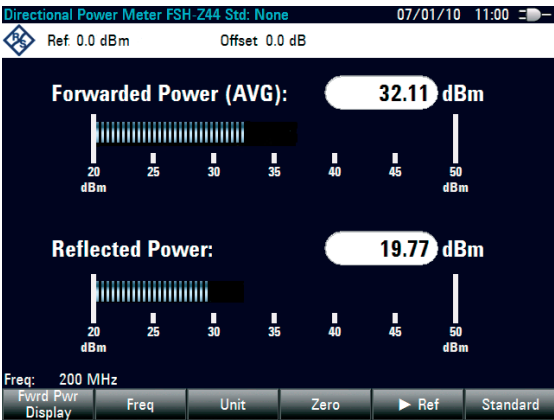
To get the best results, you should also define the frequency of the signal. For more information see Measuring the Power with a Power Sensor on page 86.

3.5 Saving and Recalling Results and Settings

The R&S ZVH can store measurement results and settings in the internal memory, on a removable SD memory card or on a memory stick via the USB interface.

Results and settings are always stored together, allowing them to be interpreted in context when recalled. The R&S ZVH can store at least 100 data records in the internal memory which are differentiated by their names.

The R&S ZVH provides a USB port and a SD card slot. For more information see USB Port on page 45 and SD Card Slot on page 45.

To use the SD card (e.g. R&S HA-Z231, order number 1309.6217.00), insert it into the slot until it audibly clicks into place. Remove the SD card, by pressing it in and then pulling it out.

3.5.1. Saving Measurement Results

▶ Press the SAVE/RECAL key.

▶ Press the "Save" softkey.

   The R&S ZVH opens the file manager dialog box.

1. Available data sets and folder structure
2. Data set name input field
3. Remaining memory on selected data storage
4. File manager softkey menu

▶ Specify a name for the data set in the input field of the dialog box with the number keys.

Character assignment is similar to that of a cell phone. In addition, ▼ moves the cursor to the left, ▲ moves it to the right and the BACK key deletes a character.

You can either

• overwrite a data set that already exists by selecting it from the available data sets with the cursor keys or

• edit the name of an existing data set with the cursor keys and the numeric keys or

• create a new data set by entering a new name with the numeric keys.

▶ Select the storage medium you want to use.

▶ Press the "Save" softkey.

The R&S ZVH saves the data set.

3.5.2. Recalling Measurement Results

Use the R&S ZVH's recall function to review previously saved measurement results and settings.

▶ Press the SAVE/RECALL key.

▶ Press the "Recall" softkey.

A list of all saved data sets opens.

If you want to recall results from the SD card or a USB stick, select it first to view its contents.

Select a data set from the list with the cursor keys.

▶ Confirm your selection with the "Recall" softkey.

102