

R&S®NRT2

Power Reflection Meter

User Manual



1178.5550.02 – 03

This manual describes firmware version FW 1.10 and later of the R&S NRT2.
It describes the following R&S®NRT2 model:

- R&S®NRT2 (1430.0509.02)

© 2017 Rohde & Schwarz GmbH & Co. KG
Mühlhofstr. 15, 81671 München, Germany
Phone: +49 89 41 29 - 0
Fax: +49 89 41 29 12 164

Email: info@rohde-schwarz.com

Internet: www.rohde-schwarz.com

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Throughout this manual, products from Rohde & Schwarz are indicated without the ® symbol , e.g. R&S®NRT2 is indicated as R&S NRT2.

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built 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, you must 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 any purpose 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, in some cases, 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.

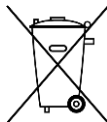
Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, 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. For product-specific information, see the data sheet and the product documentation.

Safety labels on products

The following safety labels are used on products to warn against risks and dangers.

Symbol	Meaning	Symbol	Meaning
	Notice, general danger location Observe product documentation	○	ON/OFF Power
	Caution when handling heavy equipment	⏻	Standby indication
	Danger of electric shock	≡	Direct current (DC)

Basic Safety Instructions

Symbol	Meaning	Symbol	Meaning
	Caution ! Hot surface		Alternating current (AC)
	Protective conductor terminal To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth		Direct/alternating current (DC/AC)
	Earth (Ground)		Class II Equipment to identify equipment meeting the safety requirements specified for Class II equipment (device protected by double or reinforced insulation)
	Frame or chassis Ground terminal		EU labeling for batteries and accumulators For additional information, see section "Waste disposal/Environmental protection", item 1.
	Be careful when handling electrostatic sensitive devices		EU labeling for separate collection of electrical and electronic devices For additional information, see section "Waste disposal/Environmental protection", item 2.
	Warning! Laser radiation For additional information, see section "Operation", item 7.		

Signal words and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates information considered important, but not hazard-related, e.g. messages relating to property damage.

In the product documentation, the word ATTENTION is used synonymously.

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

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Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
predefined operating position is always with the housing floor facing down, IP protection 2X, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of $\pm 10\%$ shall apply to the nominal voltage and $\pm 5\%$ to the nominal frequency, overvoltage category 2, pollution degree 2.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or even death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or even death.

Electrical safety

If the information on electrical safety is not observed either at all or to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the mains-supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with a protective conductor contact and protective conductor.
3. Intentionally breaking the protective conductor either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If there is no power switch for disconnecting the product from the mains, or if the power switch is not suitable for this purpose, use the plug of the connecting cable to disconnect the product from the mains. In such cases, always ensure that the power plug is easily reachable and accessible at all times. For example, if the power plug is the disconnecting device, the length of the connecting cable must not exceed 3 m. Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, the disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cables on a regular basis to ensure that they are 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, for example, tripping over the cable or suffering an electric shock.

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6. The product may be operated only from TN/TT supply networks fuse-protected with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket provided for this purpose. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages $V_{rms} > 30$ V, suitable measures (e.g. appropriate measuring equipment, fuse protection, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC 60950-1 / EN 60950-1 or IEC 61010-1 / EN 61010-1 standards that apply in each case.
11. 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.
12. If a product is to be permanently installed, the connection between the protective conductor terminal on site and the product's protective conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fuse-protected in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.
14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1). Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

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

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2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal/Environmental protection", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. Laser products are given warning labels that are standardized according to their laser class. Lasers can cause biological harm due to the properties of their radiation and due to their extremely concentrated electromagnetic power. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).
8. EMC classes (in line with EN 55011/CISPR 11, and analogously with EN 55022/CISPR 22, EN 55032/CISPR 32)
 - Class A equipment:
Equipment suitable for use in all environments except residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings
Note: Class A equipment is intended for use in an industrial environment. This equipment may cause radio disturbances in residential environments, due to possible conducted as well as radiated disturbances. In this case, the operator may be required to take appropriate measures to eliminate these disturbances.
 - Class B equipment:
Equipment suitable for use in residential environments and environments that are directly connected to a low-voltage supply network that supplies residential buildings

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.

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2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, protective conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
5. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
6. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
7. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
8. Follow the transport stipulations of the carrier (IATA-DGR, IMDG-Code, ADR, RID) when returning lithium batteries to Rohde & Schwarz subsidiaries.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.
2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.

Instrucciones de seguridad elementales

3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal/Environmental protection

1. Specially marked equipment has a battery or accumulator that must not be disposed of with unsorted municipal waste, but must be collected separately. It may only be disposed of at a suitable collection point or via a Rohde & Schwarz customer service center.
2. Waste electrical and electronic equipment must not be disposed of with unsorted municipal waste, but must be collected separately.
Rohde & Schwarz GmbH & Co. KG has developed a disposal concept and takes full responsibility for take-back obligations and disposal obligations for manufacturers within the EU. Contact your Rohde & Schwarz customer service center for environmentally responsible disposal of the product.
3. If products or their 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 by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
4. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

For additional information about environmental protection, visit the Rohde & Schwarz website.

Instrucciones de seguridad elementales

¡Es imprescindible leer y cumplir 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. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad de la UE 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.

Instrucciones de seguridad elementales

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 sin tener en cuenta las instrucciones 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 conforme a las indicaciones de la correspondiente documentación del 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 técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría 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 entréguelas a usuarios posteriores.

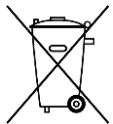
Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios. Los datos específicos del producto figuran en la hoja de datos y en la documentación del producto.

Señalización de seguridad de los productos

Las siguientes señales de seguridad se utilizan en los productos para advertir sobre riesgos y peligros.

Símbolo	Significado	Símbolo	Significado
	Aviso: punto de peligro general Observar la documentación del producto		Tensión de alimentación de PUESTA EN MARCHA / PARADA
	Atención en el manejo de dispositivos de peso elevado		Indicación de estado de espera (standby)
	Peligro de choque eléctrico		Corriente continua (DC)
	Advertencia: superficie caliente		Corriente alterna (AC)
	Conexión a conductor de protección		Corriente continua / Corriente alterna (DC/AC)

Instrucciones de seguridad elementales

Símbolo	Significado	Símbolo	Significado
	Conexión a tierra		El aparato está protegido en su totalidad por un aislamiento doble (reforzado)
	Conexión a masa		Distintivo de la UE para baterías y acumuladores Más información en la sección "Eliminación/protección del medio ambiente", punto 1.
	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)		Distintivo de la UE para la eliminación por separado de dispositivos eléctricos y electrónicos Más información en la sección "Eliminación/protección del medio ambiente", punto 2.
	Advertencia: rayo láser Más información en la sección "Funcionamiento", punto 7.		

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.



Indica una situación de peligro que, si no se evita, causa lesiones graves o incluso la muerte.



Indica una situación de peligro que, si no se evita, puede causar lesiones graves o incluso la muerte.



Indica una situación de peligro que, si no se evita, puede causar lesiones leves o moderadas.



Indica información que se considera importante, pero no en relación con situaciones de peligro; p. ej., avisos sobre posibles daños materiales.

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 del 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 interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Instrucciones de seguridad elementales

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz 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, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal. Categoría de sobrecarga eléctrica 2, índice de suciedad 2.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, se pueden causar lesiones o, en determinadas circunstancias, incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, o bien si el interruptor existente no resulta apropiado para la desconexión de la red, el enchufe del cable de conexión se deberá considerar como un dispositivo de desconexión. El dispositivo de desconexión se debe poder alcanzar fácilmente y debe estar siempre bien accesible. Si, p. ej., el enchufe de conexión a la red es el dispositivo de desconexión, la longitud del cable de conexión no debe superar 3 m). Los interruptores selectores o electrónicos no son aptos para el corte de la red eléctrica. Si se

Instrucciones de seguridad elementales

integran productos sin interruptor en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.

5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.
6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. 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. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión $U_{\text{eff}} > 30 \text{ V}$ se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. 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 lesiones, fuego o daños en el producto.
12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.

Instrucciones de seguridad elementales

17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados —los llamados alérgenos (p. ej. el níquel)—. Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación/protección del medio ambiente", punto 1.
5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalizar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. Los productos con láser están provistos de indicaciones de advertencia normalizadas en función de la clase de láser del que se trate. Los rayos láser pueden provocar daños de tipo biológico a causa de las propiedades de su radiación y debido a su concentración extrema de potencia electromagnética. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).
8. Clases de compatibilidad electromagnética (conforme a EN 55011 / CISPR 11; y en analogía con EN 55022 / CISPR 22, EN 55032 / CISPR 32)
 - Aparato de clase A:
Aparato adecuado para su uso en todos los entornos excepto en los residenciales y en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.
Nota: Los aparatos de clase A están destinados al uso en entornos industriales. Estos aparatos

Instrucciones de seguridad elementales

pueden causar perturbaciones radioeléctricas en entornos residenciales debido a posibles perturbaciones guiadas o radiadas. En este caso, se le podrá solicitar al operador que tome las medidas adecuadas para eliminar estas perturbaciones.

- Aparato de clase B:

Aparato adecuado para su uso en entornos residenciales, así como en aquellos conectados directamente a una red de distribución de baja tensión que suministra corriente a edificios residenciales.

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.
5. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
6. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
7. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Instrucciones de seguridad elementales

8. En caso de devolver baterías de litio a las filiales de Rohde & Schwarz, debe cumplirse las normativas sobre los modos de transporte (IATA-DGR, código IMDG, ADR, RID).

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.
2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación/protección del medio ambiente

1. Los dispositivos marcados contienen una batería o un acumulador que no se debe desechar con los residuos domésticos sin clasificar, sino que debe ser recogido por separado. La eliminación se debe efectuar exclusivamente a través de un punto de recogida apropiado o del servicio de atención al cliente de Rohde & Schwarz.
2. Los dispositivos eléctricos usados no se deben desechar con los residuos domésticos sin clasificar, sino que deben ser recogidos por separado.
Rohde & Schwarz GmbH & Co.KG ha elaborado un concepto de eliminación de residuos y asume plenamente los deberes de recogida y eliminación para los fabricantes dentro de la UE. Para desechar el producto de manera respetuosa con el medio ambiente, diríjase a su servicio de atención al cliente de Rohde & Schwarz.
3. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polvos con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
4. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

Se puede encontrar más información sobre la protección del medio ambiente en la página web de Rohde & Schwarz.

Customer Support

Technical support – where and when you need it

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

Up-to-date information and upgrades

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

Europe, Africa, Middle East

Phone +49 89 4129 12345
customersupport@rohde-schwarz.com

North America

Phone 1-888-TEST-RSA (1-888-837-8772)
customer.support@rsa.rohde-schwarz.com

Latin America

Phone +1-410-910-7988
customersupport.la@rohde-schwarz.com

Asia/Pacific

Phone +65 65 13 04 88
customersupport.asia@rohde-schwarz.com

China

Phone +86-800-810-8228 /
+86-400-650-5896
customersupport.china@rohde-schwarz.com



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1 Preface

This chapter provides information safety related information an introduction to the R&S NRT2.

1.1 For Your Safety

The R&S NRT2 is designated for use in industrial, administrative, and laboratory environments. Use the R&S NRT2 only for its designated purpose. Observe the safety and usage instructions documented in the user manual, as well as operating conditions and performance limits stated in the data sheet.

The product documentation helps you to use the R&S NRT2 safely and efficiently. Keep the product documentation in a safe place and pass it on to the subsequent users.

Safety information is part of the product documentation. It warns you about the potential dangers and gives instructions how to prevent personal injury or damage caused by dangerous situations. Safety information is provided as follows:

- In the "Basic Safety Instructions", safety issues are grouped according to subjects. For example, one subject is electrical safety. The "Basic Safety Instructions" are delivered with the R&S NRT2 in different languages in print.
- Throughout the documentation, safety instructions are provided when you need to take care during setup or operation. Always read the safety instructions carefully. Make sure to comply fully with them. Do not take risks and do not underestimate the potential danger of small details such as a damaged power cable.

1.2 Documentation Overview

This section provides an overview of the R&S NRT2 user documentation. Unless specified otherwise, you find the documents on the R&S NRT2 product page at:

www.rohde-schwarz.com/manual/NRT2

1.2.1 Getting Started Manual

Introduces the R&S NRT2 and describes how to set up and start working with the product. A printed version is delivered with the instrument.

1.2.2 User Manuals and Help

Separate user manuals are provided for the base unit and the firmware applications:

- Base unit manual

Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.

- **Firmware application manual**
Contains the description of the specific functions of a firmware application, including remote control commands. Basic information on operating the R&S NRT2 is not included.

The contents of the user manuals are available as help in the R&S NRT2. The help offers quick, context-sensitive access to the complete information for the base unit and the firmware applications.

All user manuals are also available for download or for immediate display on the Internet.

1.2.3 CD-ROM

Provides quick access to valuable information about the usage of the R&S NRT2. Delivered with the R&S NRT2. Most of the information is also provided at the R&S Internet site, but on different pages.

- Useful software for installation, operation and remote control
- Product documentation
- Certificates
- Links to useful sites on the Rohde & Schwarz website

1.2.4 Tutorials

Tutorials offer guided examples and demonstrations on operating the R&S NRT2. They are provided on the product page of the internet.

1.2.5 Basic Safety Instructions

Contains safety instructions, operating conditions and further important information. The printed document is delivered with the instrument.

1.2.6 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S NRT2. It also lists the firmware applications and their order numbers, and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/NRT2

1.2.7 Release Notes and Open Source Acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The open source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/NRT2

1.2.8 Application Notes, Application Cards, White Papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/NRT2

2 Key Features

The R&S NRT2 offers the following key features:

- Simple touchscreen operation on a 5" color touchscreen
- Simultaneous display of forward and reverse power
- Measurement of average power, average burst power, peak power, crest factor, CCDF and mismatch
- Analog bargraph and autoscale
- Visual limit monitoring
- Frequency-range from 25 MHz to 4 GHz (sensor-dependent)

3 Instrument Tour

3.1 Front Panel Tour

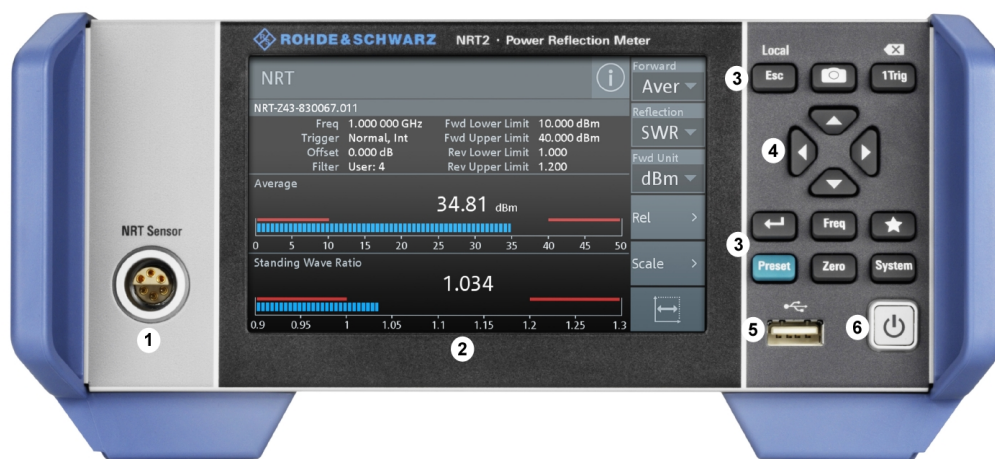


Figure 3-1: Front View of R&S NRT2

- 1 = NRT Sensor connector (see "NRT Sensor" on page 11)
- 2 = Touch panel (see "Touch Panel" on page 11)
- 3 = Hardkeys (see "Hardkeys" on page 12)
- 4 = Cursor block for scrolling in the menus, marking of parameters to be set and for numeric entries (see "Cursor Block" on page 13)
- 5 = USB host interface (see "USB Host Interface" on page 13)
- 6 = On/Standby key (see "On/Standby Key" on page 13)

NRT Sensor

See [Figure 3-1](#).

To the left of the display, the R&S NRT2 provides the power sensor connector. The R&S NRT2 recognizes the sensor in an initialization routine a few seconds after the connection is made or after power-up, respectively, and immediately start measurements.

The R&S NRT2 supports the following sensor types:

- R&S NRT-Z14
- R&S NRT-Z43
- R&S NRT-Z44

Touch Panel

See [Figure 3-1](#).

The R&S NRT2 displays results in windows. Depending on the measurement mode, values are displayed digitally or graphically.



False triggers of the touch panel in the presence of static electricity

If an object (e.g. a human finger) that is charged with static electricity is brought in the vicinity of the touch panel, this can result in false triggers.

This behavior is caused by the principle of operation of a PCAP (projected capacitive) touch panel.

Hardkeys

See [Figure 3-1](#).

- ESC / Local



- Changes to the next-higher menu hierarchy level.
- Escapes from the entry mode in text boxes and drop-down lists.
- Closes dialog boxes and menus without losing any entries that have been made.
- Switches from remote control mode (all controls disabled) to manual mode.

- SCREENSHOT



Creates a screenshot of the current display.

- 1 TRIG / Delete



- Enables and triggers single-shot measurements in the trace mode.
- Deletes numbers or text in a field so that a new entry can be made.

- ENTER



Confirms entries in text fields and dialog boxes and to confirm selections in the drop-down lists.

- FREQ



Sets the carrier frequency of the applied signal to obtain the specific measurement uncertainty.

- Favorites



Displays a list of favorite measurements.

- PRESET



- Sets the R&S NRT2 to its default setting. Default settings are sensor specific.
- Sets the R&S NRT2 to a setting selected from the recall list.

- ZERO



- Starts the zero calibration.
- Displays zeroing status.
- Displays sensor status.

- SYSTEM



Opens the "System Overview" dialog.

Cursor Block

See [Figure 3-1](#).

The cursor keys are context-sensitive and used as follows:

- Selecting a menu.
- Selecting the active window.
- Moving the cursor in text boxes.
- Changing the value of an entry in a text box.
- Selecting an element from a drop-down list.

USB Host Interface

See [Figure 3-1](#).

USB 2.0 (universal serial bus) interfaces of the type A (host USB). Used to connect external devices like a keyboard, mouse, memory stick, or to perform a firmware update.

On/Standby Key

See [Figure 3-1](#).

The ON/STANDBY key toggles the R&S NRT2 between standby and ready state.

The following states are possible:

- Off (no color)
The AC power switch on the back of the R&S NRT2 is switched off. The R&S NRT2 is disconnected from the AC power supply.
- Ready (green)
The R&S NRT2 is ready for operation.
- Standby (red)
The power supply has the operating voltage supplied to it.

For operating details, see [Chapter 4.1.4, "Starting"](#), on page 22.

3.2 Rear Panel Tour



Figure 3-2: Rear View of R&S NRT2

- 1 = TRIG IN / OUT2 and OUT1 / TRIG OUT connectors (see ["TRIG IN / OUT2 and OUT1 / TRIG OUT Connectors"](#) on page 14)
- 2 = ETHERNET interface (see ["ETHERNET Interface"](#) on page 14)
- 3 = USB device interface (see ["USB Device Interface"](#) on page 14)
- 4 = USB host interface (see ["USB Host Interface"](#) on page 15)
- 5 = AC supply and power switch (see ["AC Supply and Power Switch"](#) on page 15)
- 6 = IEC 625/IEEE 488 interface (see ["IEC 625/IEEE 488 Interface"](#) on page 16)

TRIG IN / OUT2 and OUT1 / TRIG OUT Connectors

See [Figure 3-2](#).

The BNC connector OUT1 / TRIG OUT outputs an analog signal with a voltage between 0 V and 2.5 V. It can be used to output a voltage that is proportional to the measured value (e.g. for level regulation) or a digital signal for threshold monitoring.

The BNC connector TRIG IN / OUT2 can be used either as an external trigger input with a switchable impedance (10 kΩ or 50 Ω) or as a second analog output.



By default, the connectors TRIG IN / OUT2 and OUT1 / TRIG OUT are in status OFF.

ETHERNET Interface

See [Figure 3-2](#).

The Ethernet connector is a RJ45 socket for remote controlling the R&S NRT2 via a network.

USB Device Interface

See [Figure 3-2](#).

USB 2.0 (universal serial bus) interface of the type B (receptacle). Used to connect the R&S NRT2 to a computer.

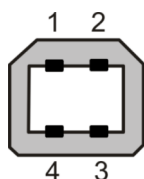


Table 3-1: Pin assignment

Pin	Abbreviation	Signal
1	VBUS	+5 V input
2	D-	Data -
3	D+	Data +
4	GND	Ground

USB Host Interface

See [Figure 3-2](#).

USB 2.0 (universal serial bus) interfaces of the type A (host USB). Used to connect external devices like a keyboard, mouse, memory stick, or to perform a firmware update.

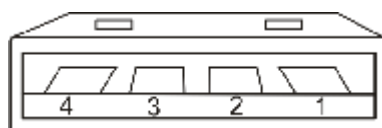


Table 3-2: Pin assignment

Pin	Signal name	Description
1	VBUS	Power + 5 V / + 0.5 A max.
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground

AC Supply and Power Switch

See [Figure 3-2](#).

When the R&S NRT2 is connected to the AC supply, it automatically sets itself to the correct range for the applied voltage. The range is printed on the type label. There is no need to set the voltage manually.

For more details, see [Chapter 4.1.3.2, "Connecting to the AC Power Supply"](#), on page 21.

IEC 625/IEEE 488 Interface

See [Figure 3-2](#).

IEC bus (IEEE 488) interface for remote control of the R&S NRT2. Used to connect a controller to remote control the R&S NRT2. Use a shielded cable for the connection.

Characteristics of the IEC bus (IEEE 488) interface:

- 8-bit parallel data transfer
- Bidirectional data transfer
- Three-wire handshake
- High data transfer rate
- Up to 15 R&S NRT2s can be connected
- Maximum length of connecting cables 15 m (single connection 2 m)
- Wired OR operation with parallel connection of several R&S NRT2s

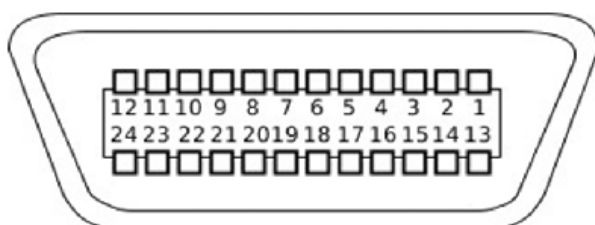


Table 3-3: Pin assignment

Pin	Abbreviation	Signal
1	IEC_D0	Data bit 0 (LSB)
2	IEC_D1	Data bit 1
3	IEC_D2	Data bit 2
4	IEC_D3	Data bit 3
5	IEC_EOI	End of identify
6	IEC_DAV	Data valid
7	IEC_NRFD	Not ready for data
8	IEC_NDAC	Not data accepted
9	IEC_IFC	Interface clear
10	IEC_SRQ	Service request
11	IEC_ATN	Attention
12	GND	Ground
13	IEC_D4	Data bit 4
14	IEC_D5	Data bit 5
15	IEC_D6	Data bit 6
16	IEC_D7	Data bit 7

Pin	Abbreviation	Signal
17	IEC_REN	Remote enable
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground

4 Preparing for Use

WARNING

Risk of injuries

To avoid injuries to yourself or others, always follow the instructions provided in the following chapters. Furthermore, observe the general safety instructions at the beginning of this manual.

NOTICE

Risk of instrument damage due to inappropriate operating conditions

Specific operating conditions are required to ensure accurate measurements and to avoid damage to the instrument. Observe the information on appropriate operating conditions provided in the basic safety instructions and the instrument's data sheet.

4.1 Putting into Operation

This chapter describes the basic steps to be taken when setting up the R&S NRT2 for the first time.

- [Unpacking](#)..... 18
- [Setting Up](#)..... 19
- [Connecting the Instrument](#).....21
- [Starting](#).....22

4.1.1 Unpacking

When you have removed the meter from its packing, check that nothing is missing using the delivery note and the accessory lists.

If there is any damage, contact the carrier. Keep all the packing to support any claims for compensation.



Retain the original packing material. If the instrument needs to be transported or shipped later, you can use the material to prevent control elements and connectors from being damaged.

4.1.2 Setting Up

NOTICE**Risk of instrument damage due to inappropriate operating conditions**

An unsuitable operating site or test setup can damage the instrument and connected devices. Before switching on the instrument, observe the information on appropriate operating conditions provided in the data sheet. In particular, ensure the following:

- All fan openings are unobstructed and the airflow perforations are unimpeded. The minimum distance from the wall is 10 cm.
 - The instrument is dry and shows no sign of condensation.
 - The instrument is positioned as described in the following sections.
 - The ambient temperature does not exceed the range specified in the data sheet.
 - Signal levels at the input connectors are all within the specified ranges.
 - Signal outputs are connected correctly and are not overloaded.
-

The R&S NRT2 is designed for use under laboratory conditions.

Bench Top Operation

If the R&S NRT2 is operated on a bench top, the surface should be flat. The instrument can be used in horizontal position. With the two tiltable feet, the angle of the instrument can be adjusted.

⚠ WARNING**Risk of injuries**

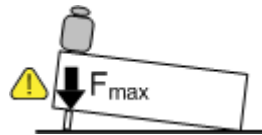
If the R&S NRT2 is not set up securely, you or others can be injured.

Place the R&S NRT2 on a stable and level surface. Do not place anything on top of the R&S NRT2, if the R&S NRT2 is not in a level position.

⚠ WARNING**Risk of injury if feet are folded out**

The feet can fold in if they are not folded out completely or if the instrument is shifted. Collapsing feet can cause injury or damage the instrument.

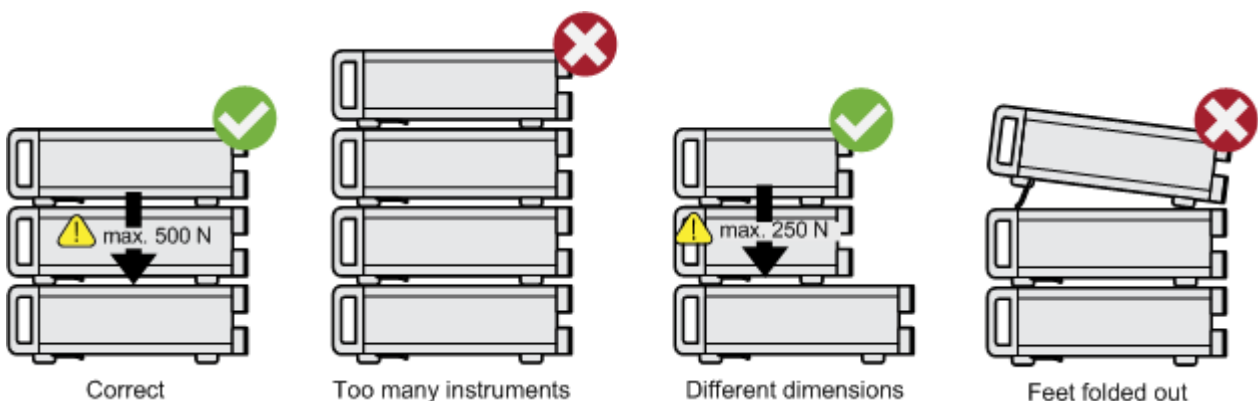
- Fold the feet completely in or out to ensure stability of the instrument. Never shift the instrument when the feet are folded out.
- When the feet are folded out, do not work under the instrument or place anything underneath.
- The feet can break if they are overloaded. The overall load on the folded-out feet must not exceed 500 N.

**⚠ WARNING****Risk of injury when stacking instruments**

A stack of instruments can tilt over and cause injury if not stacked correctly. Furthermore, the instruments at the bottom of the stack can be damaged due to the load imposed by the instruments on top.

Observe the following instructions when stacking instruments:

- Never stack more than three instruments. If you need to stack more than three instruments, install them in a rack.
- The overall load imposed on the lowest instrument must not exceed 500 N.
- It is best if all instruments have the same dimensions (width and length). If you need to stack smaller instruments on the top, the overall load imposed on the lowest instrument must not exceed 250 N.
- If the instruments have foldable feet, fold them in completely.



4.1.3 Connecting the Instrument

4.1.3.1 Preventing Electromagnetic Interference

To prevent electromagnetic interference, the R&S NRT2 must be operated with all shielding covers fitted. Only suitable and shielded signal and control cables may be used.

USB interfaces

To connect the USB interfaces, only use peripheral equipment that does not cause limit violations.

- Use suitable double-shielded cables.
- Do not use USB connecting cables exceeding 5 m.
- Use only USB devices that remain within the permissible EMI limits.

LAN interface

To connect the LAN interface, use as minimum a single-shielded cable.

All other cables can be single-shielded. The AC cable is unshielded.

4.1.3.2 Connecting to the AC Power Supply

The R&S NRT2 can be used with different AC power voltages and adapts itself automatically to them. Adjusting the R&S NRT2 to a particular AC supply voltage is therefore not required. Refer to the data sheet for the requirements of voltage and frequency.

WARNING

Shock hazard

Observe the basic safety instructions at the beginning of this manual, especially the instructions on electrical safety.

Take care that the AC voltage lies within the limits printed on the AC power connector of the R&S NRT2 and listed in the data sheet.

The power switch can be set to two positions:

- **0**: The instrument is disconnected from the mains.
 - **I**: The instrument is power-supplied. It is either ready for operation (STANDBY) or in operating mode.
- Connect the R&S NRT2 to the AC power supply, using the power cable that is supplied. The AC power connector is located on the rear panel of the R&S NRT2.

The R&S NRT2 complies with safety class EN61010-1. The R&S NRT2's power supply must be connected to a socket with protective conductor.

4.1.3.3 Connecting USB and External Devices

Using the USB interfaces, you can directly connect USB devices to the R&S NRT2. This number can be increased as necessary by using USB hubs.

Due to the large number of available USB devices, there is almost no limit to the possible expansions. In the following, USB devices that can be useful are listed.

- Memory stick for easy transfer of data to/from a computer (e.g. firmware updates).
- Keyboard for entering comments, file names. etc.
- Mouse if you prefer this way of operation over a touchscreen.

4.1.4 Starting

Switching on

WARNING

Shock hazard

Observe the basic safety instructions at the beginning of this manual, especially the instructions on electrical safety.

Be aware that in standby mode, the R&S NRT2 is still power-supplied.

1. To turn on the power, press the main power switch at the rear to position "I" (On). After power-up, the instrument is in standby or ready state, depending on the state of the instrument when it was switched off for the last time.
2. Press the ON/STANDBY key to switch the instrument from the standby to ready state.

Startup

- Press the ON/STANDBY key to switch to ready state. The R&S NRT2 initiates its startup procedure, i.e. it boots the operating system, automatically performs a self-test and starts the instrument firmware. If the previous session was terminated regularly, the instrument uses the last setup with the relevant instrument settings.



Use the PRESET key to return the instrument to its definite reset/preset state, if the current setup is no longer relevant.

4.2 Connecting Sensor

The sensors have to be connected between source and load. They measure the power flux in both directions, i.e. from the source to the load (forward power) and conversely (reverse power). The ratio of forward and reverse power is a measure for the matching of the load which can be expressed as standing wave ratio (SWR), return loss or reflection coefficient.



Figure 4-1: R&S NRT2 base unit

- 1 = Connection sensor - R&S NRT2
- 2 = Connector to source
- 3 = Connector to load

5 Operation

There are different ways to operate the R&S NRT2.

- Manual operation
- Remote operation
- Manual operation via cursor keys only

5.1 Manual Operation

5.1.1 Starting the R&S NRT2

To start the R&S NRT2, press the On/Standby key on the front side. The boot screen appears.

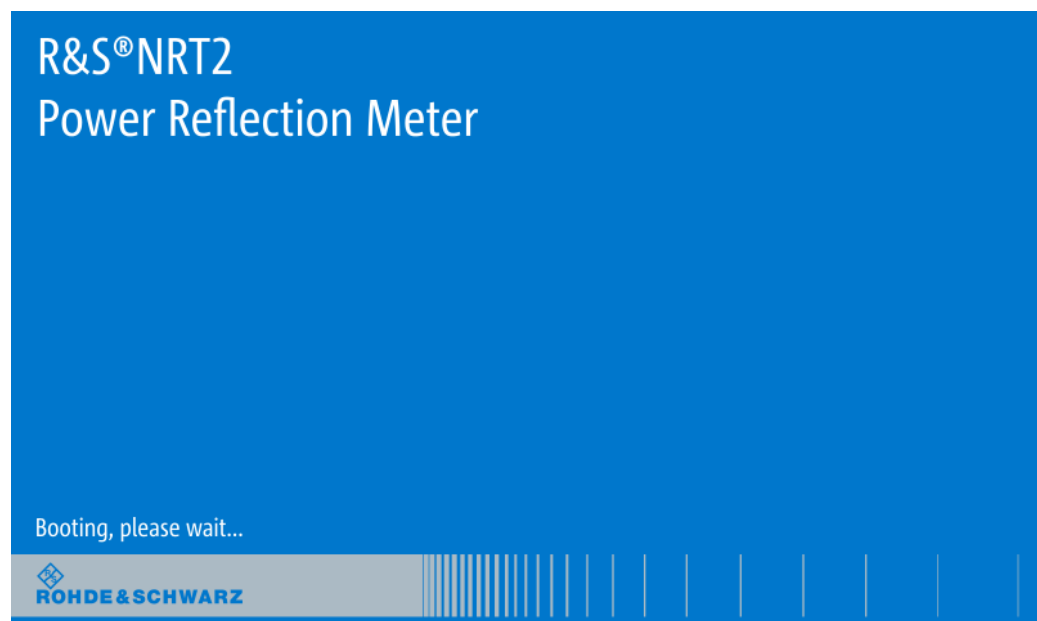


Figure 5-1: R&S NRT2 boot screen

After the successful booting of the instrument, the start dialog of the R&S NRT2 appears.

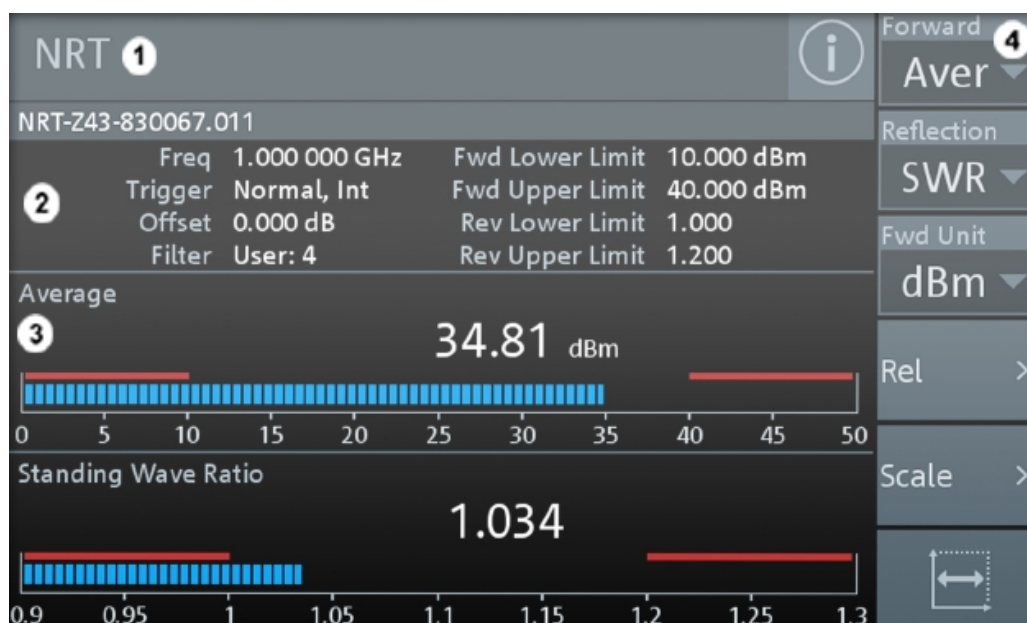


Figure 5-2: R&S NRT2 - Start Dialog

- 1 = Status bar
- 2 = Measurement settings view
- 3 = Level View
- 4 = Measurement settings configuration

In the status bar, the measurement mode, the connected sensor type and the status information of the notification center is displayed.

The measurement settings view displays the setting of the current measurement.

The level view displays the measurement values (analog or digital) for the specified measurements.

On the right side of the start dialog, the following settings can be configured.

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Scale.....	26
L Forward Scale Lower Limit.....	26
L Forward Scale Upper Limit.....	26
L Reverse Scale Lower Limit.....	27
L Reverse Scale Upper Limit.....	27

Forward

See "Forward" on page 32.

Reflection

See "Reflection" on page 33.

Fwd Unit

Allows to specify the unit of the forward power.

"dB"	Represents the quotient of the power values as dB.
"Δ%"	Represents the difference between the power values in W, given in % (0 % means the powers in both channels are equal).
"x1"	Represents the quotient of the power values (non-logarithmic).

Rel

Sets the Measurement Reference Values.

Note: In the start display, this function is only available, when the display format is "Scalar Analog".

Forward Relative Value ← Rel

The reference value can be directly entered or edited.

Forward Reference State ← Rel

Relates a forward power or a forward power ratio to a reference value.

"Off"	Absolute power measurement or measurement of the power ratio of two measurement channels is performed.
"On"	Relative power measurement or relative power ratio measurement.
"Set"	Assigns the current measurement result as reference value.

Reverse Relative Value ← Rel

The reference value can be directly entered or edited.

Reverse Relative State ← Rel

Relates a reverse power or a forward power ratio to a reference value.

"Off"	Absolute power measurement or measurement of the power ratio of two measurement channels is performed.
"On"	Relative power measurement or relative power ratio measurement.
"Set"	Assigns the current measurement result as reference value.

Scale

Sets the upper and lower limits of the analog display.

Note: This function is only available, when the display format is "Scalar Analog".

Forward Scale Lower Limit ← Scale

Sets the lower limit of the scale for the forward measurement.

Forward Scale Upper Limit ← Scale

Sets the lower limit of the scale for the forward measurement.

Reverse Scale Lower Limit ← Scale

Sets the lower limit of the scale for the reverse measurement.

Reverse Scale Upper Limit ← Scale

Sets the upper limit of the scale for the reverse measurement.

5.1.2 Usage of the Touchscreen

A touchscreen allows you to interact with the software using various finger gestures on the screen. The basic gestures supported by the software and the most important applications are described here. Further actions using the same gestures may be possible.

**Tapping**

Touch the screen quickly, usually on a specific element.

You can tap most elements on the screen.

5.1.3 Editing Parameters

In order to edit parameters, a numeric and an alphanumeric editor are available.

Numeric Editor

The numeric editor shows for each parameter the specific value range (min, max).

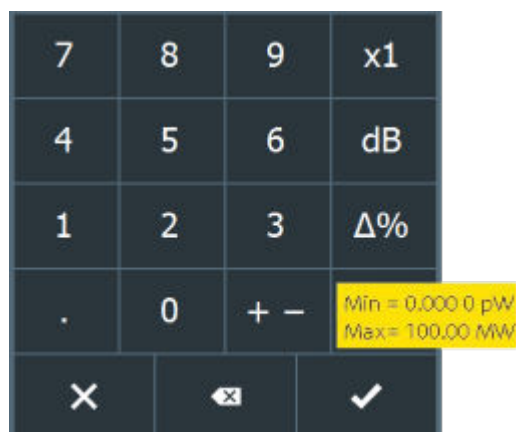


Figure 5-3: numeric editor

The alphanumeric editor can be used as a standard keyboard.

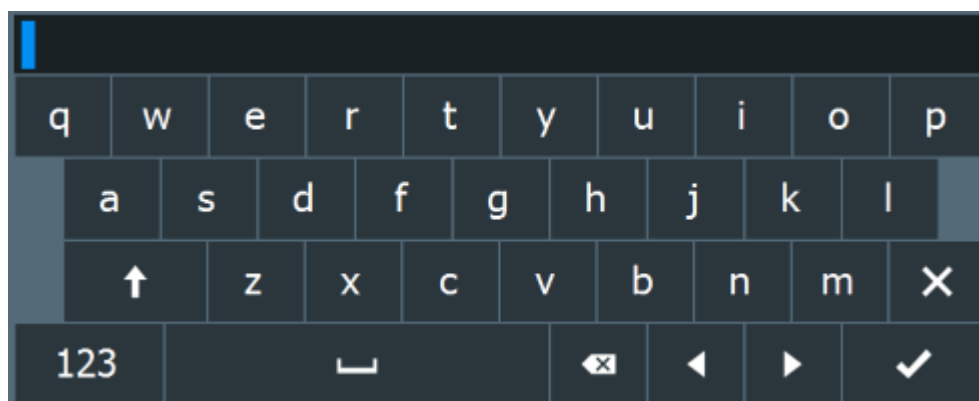


Figure 5-4: Alphanumeric editor

5.1.4 Notification Center

The Notification Center collects all info, warning and error messages during the operation of the instrument. It is divided in two different parts. In the "System" part, all messages concerning the instrument are listed. In the "SCPI Error Queue", messages related to the remote command functionality are collected.

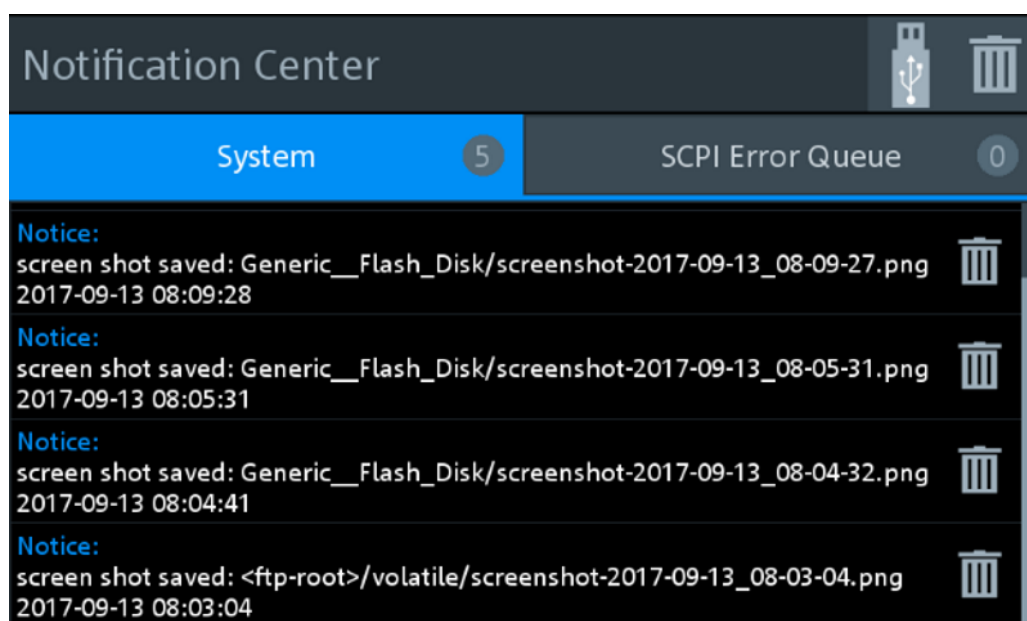


Figure 5-5: Notification Center

Symbol	Description
	Indicates, that no message is available.
	Indicates a notice.
	Indicates at least one warning message.
	Indicates at least one error message.

5.2 Remote Operation

The Power Meter R&S NRT2 is equipped with various interfaces that can be connected to a controller for remote control.

- IEC/IEEE bus interface (standard equipment) in line with the standards IEC 60625.1 (IEEE 488.1) and IEC 60625.2 (IEEE 488.2)
- Ethernet 10/100 BASE T interface
- USB 2.0 interface for remote control and firmware update.

Connectors are installed at the rear of the power meter. The interfaces support the SCPI (Standard Commands for Programmable Instruments) standard, version 1999.0 of May 1999. The SCPI standard is based on the IEEE 488.2 standard and defines a standardized command language for controlling measuring and test instruments with functions beyond the scope of the IEEE 488.2 standard.

For a detailed description of the remote commands, see [Chapter 13, "Remote Control"](#), on page 73.

5.2.1 Switchover to Remote Control (REMOTE)

It is assumed that a link has been established between the controller and the R&S NRT2 has been correctly configured.

After power up, the R&S NRT2 is always in manual control mode "LOCAL". The R&S NRT2 switches to remote control irrespective of the selected interface as soon as it receives a SCPI command.

5.2.2 Return to Manual Operation (LOCAL)

In the remote mode, all front-panel controls are disabled, except for the ESC/LOCAL key and the topmost softkey. The softkey used to open the window with the SCPI error queue. The device remains in remote mode until it is switched back to manual control either by using the front panel ESC/LOCAL or with the remote control command `GTL`.



The remote control command `LLO` also allows the ESC/LOCAL key to be disabled. In this case, return to manual operation is only possible by remote control or by switching the R&S NRT2 off and on again (Power On Reset).

The return to manual operation (LOCAL) is also possible via the symbol in the touch screen, which is displayed, when the remote mode is active.

5.3 Manual Operation via Cursor Keys only

In this mode, the operation via the graphical-user interface is not possible. All configurations are done via the hardkeys and the cursor keys.



Figure 5-6: R&S NRT2 cursor keys

6 Configuring a Measurement

6.1 General Settings

To configure the basic settings for measurement, perform the following steps.

- 1. In start view of the R&S NRT2, tap in the measurement area of the display.
The "Measurement Overview" dialog opens.
- 2. Tap "Measurement".
The "Measurement Main Configuration" dialog opens.
- 3. Specify the parameters according to your needs.

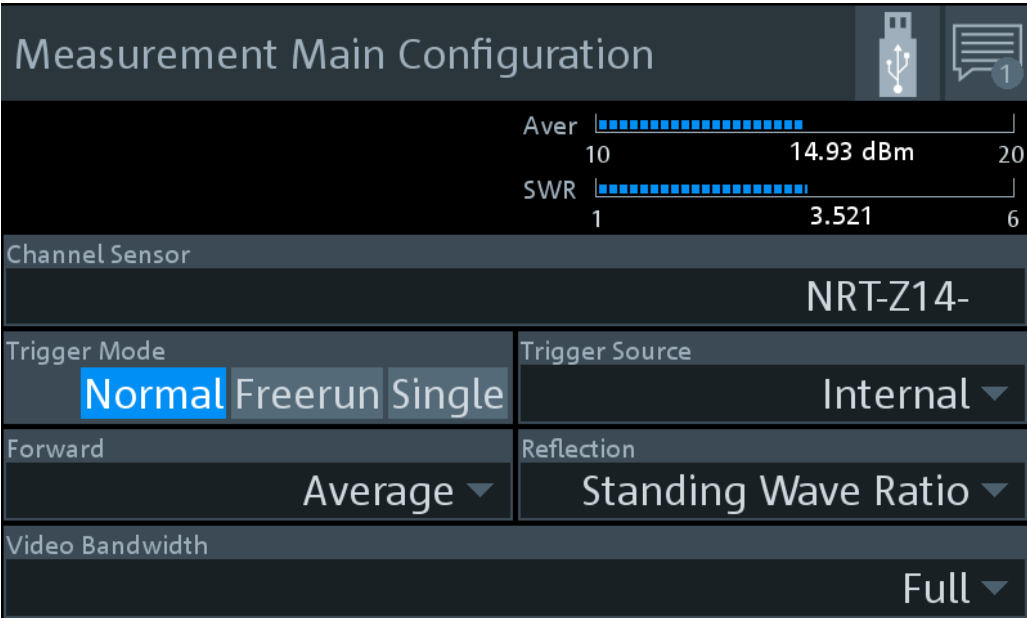


Figure 6-1: Measurement Main Configuration

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Trigger Mode

Selects the trigger mode.

"Normal" Continuous triggering with regular trigger events.

"Freerun"	This setting automatically starts a measurement if no trigger event has occurred after 300 ms.
"Single"	This setting disables continuous triggering so that only one trigger event at a time is executed.

Trigger Source

Selects the trigger source for the selected sensor.

"Internal"	The trigger event for the selected sensor is derived from the measured signal.
"External"	The trigger event for the selected sensor is derived from the trigger bus. The trigger signal on the trigger bus is either input at the TRIG IN / OUT2 connector at the rear of the instrument or it is provided by another sensor.

Forward

Measurement of power in the direction from source to the load.

"Average"	This function indicates the average power.
"CCDF"	This function provides information about the probability of the peak envelope power exceeding a preset threshold. It is suitable e.g. for assessing the power distribution of spread-spectrum signals (CDMA or similar). The sensors NRT-Z43/44 provide this function. The video bandwidth can be selected.
"Peak Envelope Power"	This is the periodically recurring peak value of the carrier power at maximum modulation. The PEP is an important parameter for describing the modulation characteristics of transmitter output stages. The level difference between PEP and AVG may be between 0 dB (CW signal) and some 10 dB (radar bursts).
"Absorption Average"	This function Indicates the difference between forward and reverse power.
"Crest Factor"	The crest factor indicates the level difference between the PEP value and the average power in dB. It allows thus to recognize larger modulation distortions.
"Absorption PEP"	This function Indicates the difference between forward and reverse power (PEP).
"Burst Average"	This term is used for pulsed RF signal to define the average carrier power within the burst. The average burst is equal to the PEP (Peak Envelope Power) value if the burst is unmodulated and has no overshoots. The NRT2 measures the average burst power by multiplying the average power with the ratio of burst period to burst width. The two burst parameters must either be user-defined or the ratio is automatically determined by the NRT2. Manual entry of the parameters is possible any time and the sensors NRT-Z43/44 also allow automatic measurement.
"Absorption Burst"	This function Indicates the difference between forward and reverse power (burst).

Reflection

Measurement of power in the direction from load to the source.

"Reverse Power"	Reverse power (in W or dBm. according to power indication).
"Standing Wave Ratio"	This is an expression for the ratio of forward and reverse power. It is a measure for the matching of the load.
"Return Loss"	This is an expression for the ratio of forward and reverse power (in dB). It is a measure for the matching of the load.
"Reflection Coefficient"	This is an expression for the ratio of forward and reverse power (value between 0 and 1). It is a measure for the matching of the load.
"Reflection Ratio"	This is an expression for the ratio of forward and reverse power (value between 0 % and 100 %). It is a measure for the matching of the load.
"OFF"	The reverse power is not measured.

Video Bandwidth

For measuring the peak envelope power, the video bandwidth used for measuring the detected RF signal has to be specified

The video bandwidths are sensor-dependent. The bandwidths below – "4 kHz", "200 kHz", and "Full" – can be set with sensors R&S NRT-Z43/44. "Full" means that the maximum bandwidth of the sensor, i.e. approx. 4 MHz, is used.

"Full"	The maximum bandwidth of the sensor is used.
"4 kHz"	The bandwidth of the sensor is set to 4 kHz.
"200 kHz"	The bandwidth of the sensor is set to 200 kHz.

CCDF Threshold ← Video Bandwidth

Sets the CCDF threshold. The power in a settable time interval is measured and subsequently subjected to a statistical evaluation (CCDF).

Note: Only if Forward is CCDF.

"Max."	The maximum CCDF threshold is 100.00 MW.
"Min."	The minimum CDF threshold is 0.000 nW.

PEP Hold Time ← Video Bandwidth

Sets the PEP hold time.

Note: Only if Forward is PEP or Absorption PEP.

"max."	The maximum PEP hold time is 100.00 ms.
"min.."	The minimum PEP hold time is 1.000 ms.

7 Configuring the Measurement Representation

To configure the settings of the measurement representation on the display, perform the following steps.

1. In start view of the R&S NRT2, tap the measurement area of the display.
The "Measurement Overview" dialog opens.
2. Tap "Representation".
The "Measurement Representation" dialog opens.
3. Specify the parameters according to your needs.

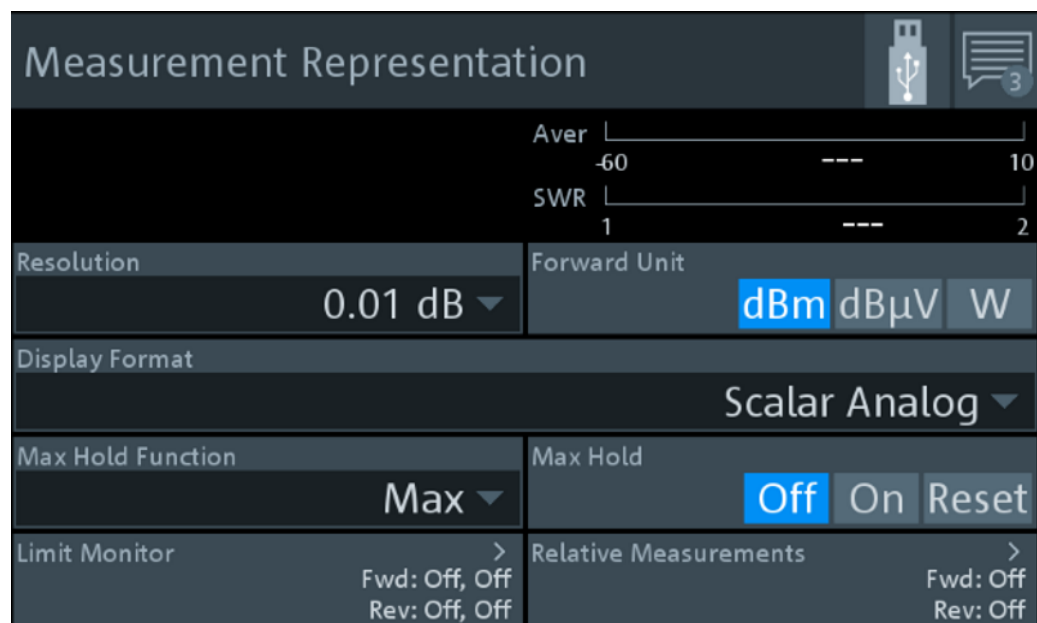


Figure 7-1: Measurement Representation

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Resolution

Configures the resolution of the measurement.

"1 dB | 0.1 dB | Sets the resolution to a specific value.
0.01 dB |
0.001dB "

Forward Unit

Specifies the unit of measurement in forward direction.

"dBm"	Represents power in dBm.
"dBμV"	Represents power in dBμV.
"W"	Represents power in W.
"dB"	Represents the quotient of the power values as dB.
"Δ%"	Represents the difference between the power values in W, given in % (0 % means the powers in both channels are equal).
"x1"	Represents the quotient of the power values (non-logarithmic).

Display Format

Specifies the display format of the measurement.

"Scalar Digital"	Measured values are displayed in numeric format.
"Scalar Ana- log"	Measured values are indicated by a marker on a scale.

Max Hold Function

The R&S NRT2 is able to store the maximum and minimum values as well as the differences thereof for all measurement functions.

The selected setting applies to both power and reflection indication. Changeover between maximum, minimum or difference display is possible any time without the ongoing max/min determination being interrupted or reinitialized.

"Max"	Display of maximum value.
"Min"	Display of minimum value.
"Max – Min"	Display of difference between maximum and minimum value.

Max Hold

Displays the highest value measured for each point (pixel) of the selected display type.

"Off | On" Switch on or off "Max Hold".

Limit Monitor

An upper and a lower limit for each window with digital ("Dig") or digital/analog ("D&A") result display can be set.

Forward Lower Limit State ← Limit Monitor

Switches the monitoring function for the forward lower limit on or off.

"Off" Stop the monitoring function.

"On" Start the monitoring function.

Forward Lower Limit ← Limit Monitor

Specifies the value for the forward lower limit.

"Min." 0.000 dBm

"Max" 210.000 dBm

Forward Upper Limit State ← Limit Monitor

Switches the monitoring function for the forward upper limit on or off.

"Off" Stop the monitoring function.

"On" Start the monitoring function.

Forward Upper Limit ← Limit Monitor

Specifies the value for the forward upper limit.

"Min." 0.000 dBm

"Max" 210.000 dBm

Reverse Lower Limit State ← Limit Monitor

Switches the monitoring function for the reverse lower limit on or off.

"Off" Stop the monitoring function.

"On" Start the monitoring function.

Reverse Lower Limit ← Limit Monitor

Specifies the value for the reverse lower limit.

Reverse Upper Limit State ← Limit Monitor

Switches the monitoring function for the reverse upper limit on or off.

"Off" Stop the monitoring function.

"On" Start the monitoring function.

Reverse Upper Limit ← Limit Monitor

Specifies the value for the reverse upper limit.

Relative Measurements

The relative measurement settings activate or deactivate relative power measurement, or assign a measurement result as reference.

Forward Relative Value ← Relative Measurements

The reference value can be directly entered or edited.

Forward Reference State ← Relative Measurements

Relates a forward power or a forward power ratio to a reference value.

"Off"	Absolute power measurement or measurement of the power ratio of two measurement channels is performed.
"On"	Relative power measurement or relative power ratio measurement.
"Set"	Assigns the current measurement result as reference value.

Reverse Relative Value ← Relative Measurements

The reference value can be directly entered or edited.

Reverse Relative State ← Relative Measurements

Relates a reverse power or a forward power ratio to a reference value.

"Off"	Absolute power measurement or measurement of the power ratio of two measurement channels is performed.
"On"	Relative power measurement or relative power ratio measurement.
"Set"	Assigns the current measurement result as reference value.

8 Configuring a Channel

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8.1 Configuring the Channel Mode

To configure the "Channel Mode", perform the following steps.

- In start view of the R&S NRT2, tap the measurement area of the display.
The "Measurement Overview" dialog opens.
- Tap "Channel Sensor Configuration".
The "Channel Configuration" dialog opens.
- Tap "Mode".
The "Channel Mode Configuration" dialog opens.
- Specify the parameters according to your needs.

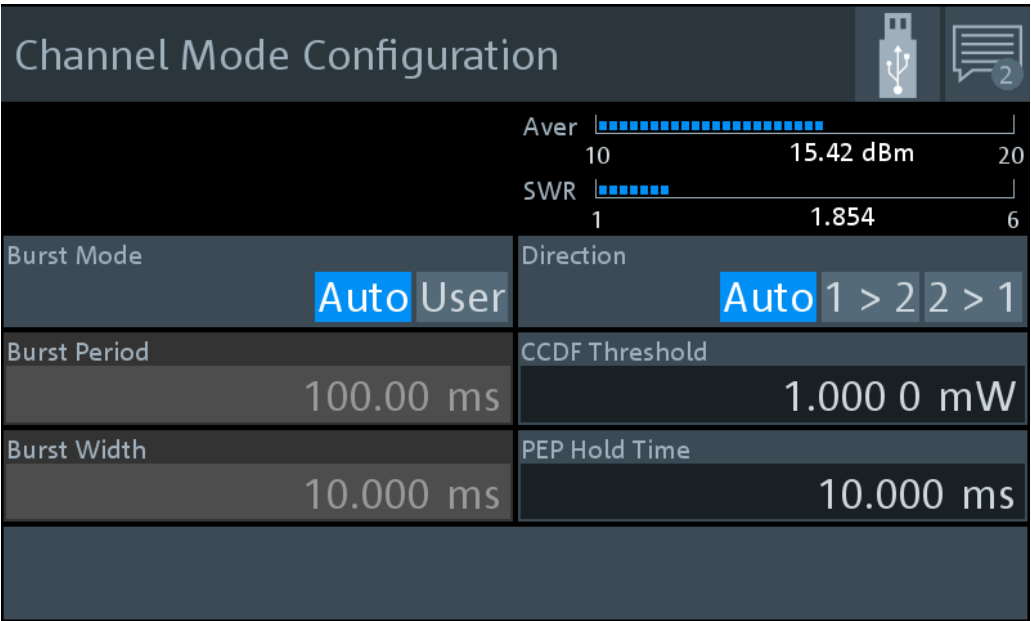


Figure 8-1: Channel Mode Configuration

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NRT

Displays the channel mode configuration settings for the NRT mode.

Burst Mode ← NRT

Sets the burst mode.

"Auto"	The sensor automatically measures the average burst power. This applies also to multiple bursts and to duty cycles variable in time. To ensure proper operation of the automatic function, the video bandwidth has to be defined (see " Video Bandwidth " on page 42).
"User"	The burst characteristic must be specified by defining the burst period and burst width.

Remote command:

[SENSe<Sensor>:BURSt:MODE](#) on page 132

Burst Period ← NRT

Sets the burst period.

"Max."	The maximum burst period is 1.000 s.
"Min."	The minimum burst period is 0 ns.

Remote command:

[SENSe<Sensor>:BURSt:PERiod](#) on page 133

Burst Width ← NRT

Sets the burst width.

"Max."	The maximum burst width is 1.000 s.
"Min."	The minimum burst width is 0 ns.

Remote command:

[SENSe<Sensor>:BURSt:WIDTh](#) on page 133

Direction ← NRT

The direction of the forward power can be fixed from port 1 to port 2 ($1 > 2$) and vice versa ($2 > 1$). The ports 1 and 2 are marked on each directional power sensor.

"Auto"	Automatic selection of power flow direction. The greater of the two powers measured by the sensor is assumed to be the forward power.
"1 > 2"	The forward power direction is fixed from port 1 to port 2.
"2 > 1"	The forward power direction is fixed from port 2 to port 1.

CCDF Threshold ← NRT

Sets the CCDF threshold. The power in a settable time interval is measured and subsequently subjected to a statistical evaluation (CCDF).

"Max."	The maximum CCDF threshold is 100.00 MW.
"Min."	The minimum CDF threshold is 0.000 pW.

Remote command:
[SENSe<Sensor>:] POWer:CCDFunction:REference on page 137

PEP Hold Time ← **NRT**
Sets the PEP hold time.

- "max." The maximum PEP hold time is 100.00 ms.
- "min.." The minimum PEP hold time is 1.000 ms.

8.2 Configuring the Channel Correction

To configure the "Channel Correction", perform the following steps.

1. In start view of the R&S NRT2, tap the measurement area of the display.
 The "Measurement Overview" dialog opens.
2. Tap "Channel Sensor Configuration".
 The "Channel Configuration" dialog opens.
3. Tap "Correction".
 The "Channel Correction Configuration" dialog opens.
4. Specify the parameters according to your needs.

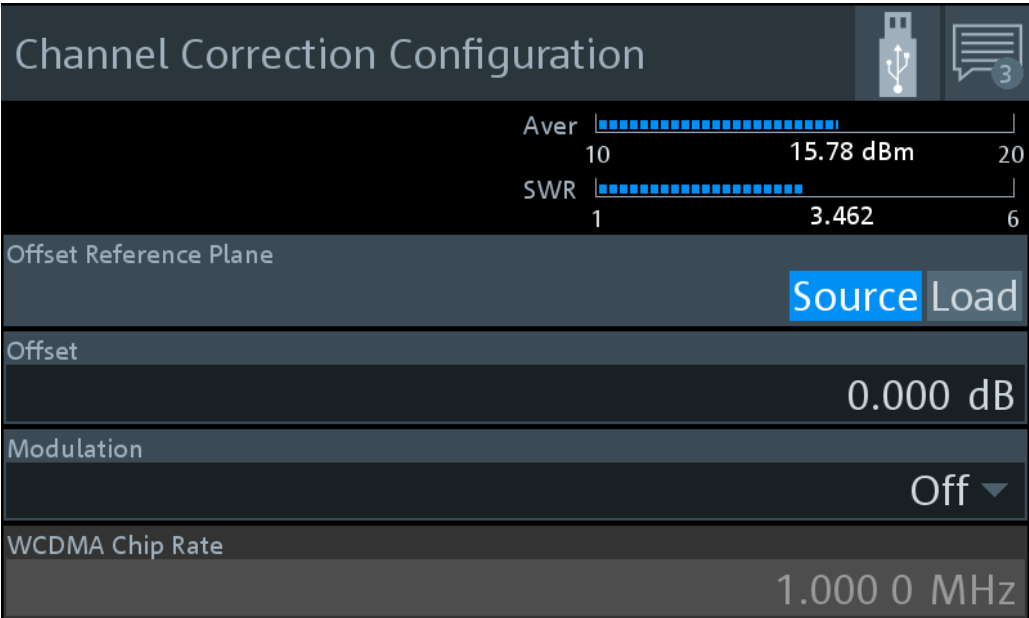


Figure 8-2: Channel Correction Configuration

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NRT

Displays the channel correction settings for the NRT mode.

Offset Reference Plane ← NRT

Selects the reference plane. It defines the sensor port to which the measurement results are to be referred to.

"Source"	Measurement of forward and reverse power at the source connector.
"Load"	Measurement of forward and reverse power at the load connector.

Offset ← NRT

After defining the reference plane the R&S NRT2 requests the entry of the cable loss (OFFSET) between the sensor and the measurement point desired.

"Min."	0.0 dB
"Max."	100.0 dB

Remote command:

`INPut<Sensor>:PORT:OFFSet` on page 113

Modulation ← NRT

Allows parameters to be entered that are transferred to the sensor and taken into account, e.g. the type of communication standard.

"Off"	The correction of modulation-specific deviations is switched off.
"IS95"	Reduces systematic deviations occurring in power measurements on base stations (BTS) according to standard IS- 95 CDMA.
"WCDMA"	Reduces systematic deviations occurring in power measurements on BTS according to standard WCDMA.
"DVBT"	Reduces systematic deviations occurring in power measurements on terrestrial DVB TV transmitters.
"DAB"	Reduces systematic deviations occurring in power measurements on DAB radio transmitters.

Remote command:

`[SENSe<Sensor>:]DM:STANdard` on page 134

WCDMA Chip Rate ← NRT

In contrast to other communication standards WCDMA is not based on a fixed RF bandwidth but on a bandwidth which varies according to the chip rate selected. This means that, if the standard "WCDMA" is selected, the chip rate must be entered

"Min."	0.000 Hz
"Max"	8.200 MHz

Remote command:

`[SENSe<Sensor>:]DM:WCDMa:CRATe` on page 134

8.3 Configuring a Channel Filter

To configure the "Channel Filter", perform the following steps.

1. In start view of the R&S NRT2, tap the measurement area of the display.
The "Measurement Overview" dialog opens.
2. Tap "Channel Sensor Configuration".
The "Channel Configuration" dialog opens.
3. Tap "Filter".
The "Channel Filter Configuration" dialog opens.
4. Specify the parameters according to your needs.

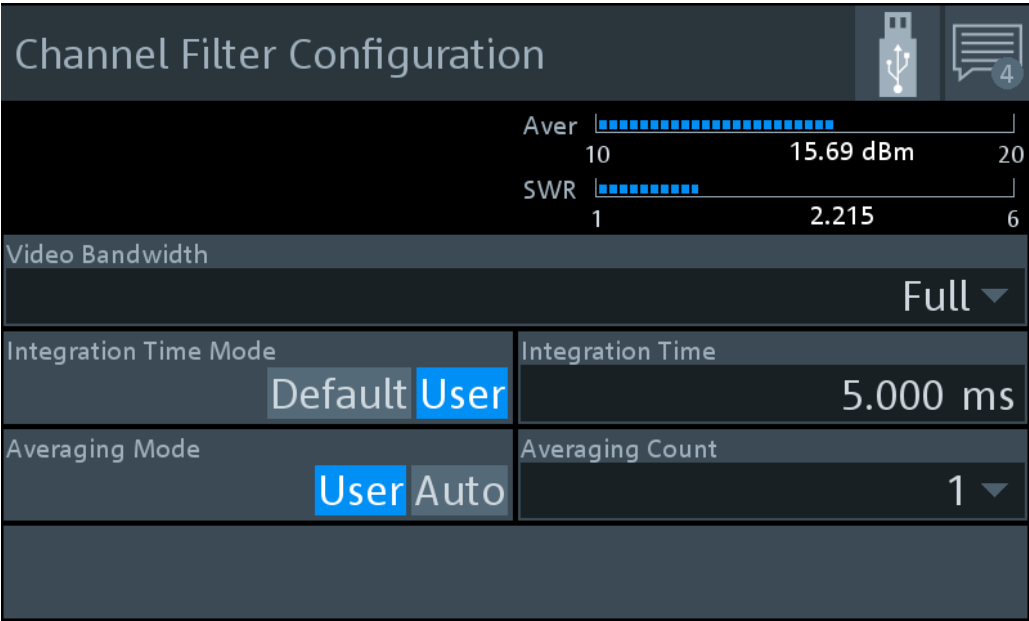


Figure 8-3: Channel Filter Configuration

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NRT
 Displays the filter configuration settings for NRT mode.

Video Bandwidth ← NRT
 For measuring the peak envelope power, the video bandwidth used for measuring the detected RF signal has to be specified.
 "4 kHz" The bandwidth of the sensor is set to 4 kHz.

"200 kHz" The bandwidth of the sensor is set to 200 kHz.

"Full" The maximum bandwidth of the sensor is used.

Remote command:

[SENSe<Sensor>:]BANDwidth:VIDeo:FNUMber on page 129

Integration Time Mode ← NRT

Specifies, if the integration time for a single measurement is configured user-specific or the default setting is used.

"Default" Use the default settings.

"User" Define a user specific "Filter Integration Time" (see "Integration Time" on page 43).

Integration Time ← NRT

If the "Integration Time Mode" is set to "User", you can define an individual "Integration Time", which determines the integration time for a single measurement.

"Min" 10.000 µs

"Max" 2.000 0s

Averaging Mode ← NRT

Sets the averaging mode.

"User" The "Averaging Count" can be set user-specific.

"Auto" The "Averaging Count" is set automatically.

Averaging Count ← NRT

Sets the filter length i.e. the number of readings to be averaged for one measured value. The higher the count the lower the noise and the longer it takes to obtain a measured value.

"1 | 2 | 4 | 8 | Possible values for the filter length.

16 | 32 | 64 |

128 | 264 "

9 Configuring General Settings

9.1 Connection Settings

In this dialog, following settings are displayed and can be configured.

- Settings related to the integration of the R&S NRT2 in a network.
 - Settings related to remote operation.
 - Settings related to the BNC connectors at the rear of the R&S NRT2.
1. Press the hardkey SYSTEM on the front of the R&S NRT2.
The dialog "System Overview" opens.
 2. Select the tab "Connections".
 3. Open the dialog "Network" and specify the parameters according to your needs (see "Network" on page 45).
 4. Open the dialog "Remote" and specify the parameters according to your needs (see "Remote" on page 47).
 5. Open the dialog "I/O" and specify the parameters according to your needs (see "I/O" on page 48).
 6. Open the dialog "Sensor Manager" and specify the parameters according to your needs (see "Sensor Manager" on page 51).

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Network

These settings specify the parameters which are required to integrate a R&S NRT2 in a network.

Overview ← Network

In the "Overview" view, the following parameters are displayed:

Host Name ← Overview ← Network

Displays the host name of the R&S NRT2. In this field, the host name can be modified.

Remote command:

`SYSTem:COMMunicate:NETWork[:COMMON]:HOSTname` on page 150

IP Address ← Overview ← Network

Displays the address mode and the IP address of the R&S NRT2 (read-only).

Default Gateway ← Overview ← Network

Displays the IP address of the default gateway of the local subnet (read-only).

DNS Server ← Overview ← Network

Displays the IP address of the DNS server of the local subnet (read-only).

IPv4 ← Network

In the "IPv4" tab, the following parameters can be configured:

Network	
Overview	IPv4
Address Mode	DNS Suffix
Dynamic Static	rsint.net
IPv4 Address	
10.214.2.100	
Subnet Mask	Default Gateway
255.255.252.0	10.214.0.1
DNS Server	
10.0.2.166	

Figure 9-1: Network > IPv4

Address Mode ← IPv4 ← Network

Assigns the IP address either manually or automatically.

- "Dynamic" For dynamic assignment, a DHCP server must be available in the network. If the R&S NRT2 is to be integrated into a larger network, contact your network administrator regarding the data to be set. The instrument assigns address and gateway automatically. The dynamic configuration mode uses DHCP server to obtain the instrument IP address.
- "Static" For the static configuration mode, the static IP address, subnet mask, and default gateway are used to configure the LAN. Obtain the IP address and subnet mask for the R&S NRT2 and the IP address for the local default gateway from your network administrator.

Remote command:

`SYSTem:COMMunicate:NETWork[:IPAddress]:MODE` on page 148

DNS Suffix ← IPv4 ← Network

Displays the primary DNS (Domain Name System) suffix, that means the DNS name without the hostname part. The DNS system uses the suffix for registration and name resolution for unique identification of the instrument in the entire network.

Remote command:

`SYSTem:COMMunicate:NETWork[:COMMON]:DOMAIN` on page 149

IPv4 Address ← IPv4 ← Network

Sets the IP address of the R&S NRT2.

Remote command:

`SYSTem:COMMunicate:INET[:SELF]:ADDRESS` on page 148

Subnet Mask ← IPv4 ← Network

Sets the subnet mask of your local subnet.

Remote command:

`SYSTem:COMMunicate:NETWork[:IPAdDress]:SUBNet:MASK` on page 149

`SYSTem:COMMunicate:INET[:SELF]:SUBNetmask:ADDDress` on page 149

Default Gateway ← IPv4 ← Network

Sets the gateway address of your local subnet.

Remote command:

`SYSTem:COMMunicate:NETWork[:IPAdDress]:GATeway` on page 148

`SYSTem:COMMunicate:INET[:SELF]:GATeway:ADDDress` on page 148

DNS Server ← IPv4 ← Network

Sets the DNS server address of your local subnet.

Remote

These settings are required to specify the relevant parameters for the remote usage of the R&S NRT2.

VISA Resource ← Remote

The VISA resource string is required to establish a communication session between the controller and the instrument in a LAN. The resource string is a unique identifier, composed of the specific IP address of the instrument and some network and VISA-specific keywords.

"VISA "	VISA Resource
"USBTMC"	USB::0x0aad::0x1b::000000
"GPIB"	GPIB::20::INSTR
	• GPIB = denotes the used interface • <channel address> = the used channel • [::INSTR] = indicates the instrument resource class (optional)

Settings ← Remote

Specify the settings for the available protocols.

GPIB Address ← Settings ← Remote

To be able to control the instrument via the GPIB bus, the instrument and the controller must be linked by a GPIB bus cable. A GPIB bus card, the card drivers and the program libraries for the programming language used must be provided in the controller.

The controller must address the instrument with the GPIB bus channel. GPIB provides channel addresses from 1 to 30.

"Max."	30
"Min."	1

Remote command:

`SYSTem:COMMunicate:GPIB[:SELF]:ADDDress` on page 148

Emulations ← Remote

Emulate a remote control command set of another Rohde & Schwarz signal generator.

Language ← Emulations ← Remote

Specify the language for the remote commands.

"SCPI" The remote commands are based on SCPI.

Customization of *IDN? ← Emulations ← Remote

Customize the instrument identification string.

"Off" No customization of the instrument identification string.

"User" In addition to the preset values, a user-defined identification string can be entered, e.g. to provide individual identification for each generator (see ["Custom IDN String"](#) on page 48).

Custom IDN String ← Emulations ← Remote

Specify the instrument identification string to be used.

Customization of *OPT? ← Emulations ← Remote

Customize the option identification string.

"Off" No customization of the option identification string.

"User" A user-defined option string can be created, also to the automatically created one (see ["Custom OPT String"](#) on page 48).

Custom OPT String ← Emulations ← Remote

Specify the option identification string to be used.

I/O

There are two multifunction BNC connectors at the rear of the R&S NRT2 (TRIG IN / OUT2 and OUT1 / TRIG OUT). They can be used as either trigger input or trigger output, or as analog output. If used as analog output they either output a signal that is proportional to the measured value or a TTL signal for threshold monitoring. The functions of these connectors are specified in this dialog box.

Remote command:

[OUTPut:MODE<output> on page 123](#)

[OUTPut:REOrder<output>:LIMit:LOWer:CCDF on page 125](#)

[OUTPut:REOrder<output>:LIMit:UPPer:CCDF on page 127](#)

[OUTPut:REOrder<output>:LIMit:LOWer:RATio:RCoefficient on page 126](#)

[OUTPut:REOrder<output>:LIMit:UPPer:RATio:RCoefficient on page 127](#)

[OUTPut:REOrder<output>:LIMit:LOWer:RATio:RFRatio on page 126](#)

[OUTPut:REOrder<output>:LIMit:UPPer:RATio:RFRatio on page 127](#)

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[OUTPut:REOrder<output>:LIMit:UPPer:RATio:RLOSs on page 128](#)

[OUTPut:REOrder<output>:LIMit:LOWer:RATio:SWR on page 126](#)

[OUTPut:REOrder<output>:LIMit:UPPer:RATio:SWR on page 128](#)

I/O 1 ← I/O

This section describes the functions of the analog signal output at the "OUT1 / TRIG OUT" connector and their settings.

Mode ← I/O 1 ← I/O

Selects the function of the OUT1 / TRIG OUT connector.

Off ← Mode ← I/O 1 ← I/O

Deactivates port OUT1 / TRIG OUT.

Forward Analog Out ← Mode ← I/O 1 ← I/O

The forward output provides an analog voltage which is proportional to the value displayed.

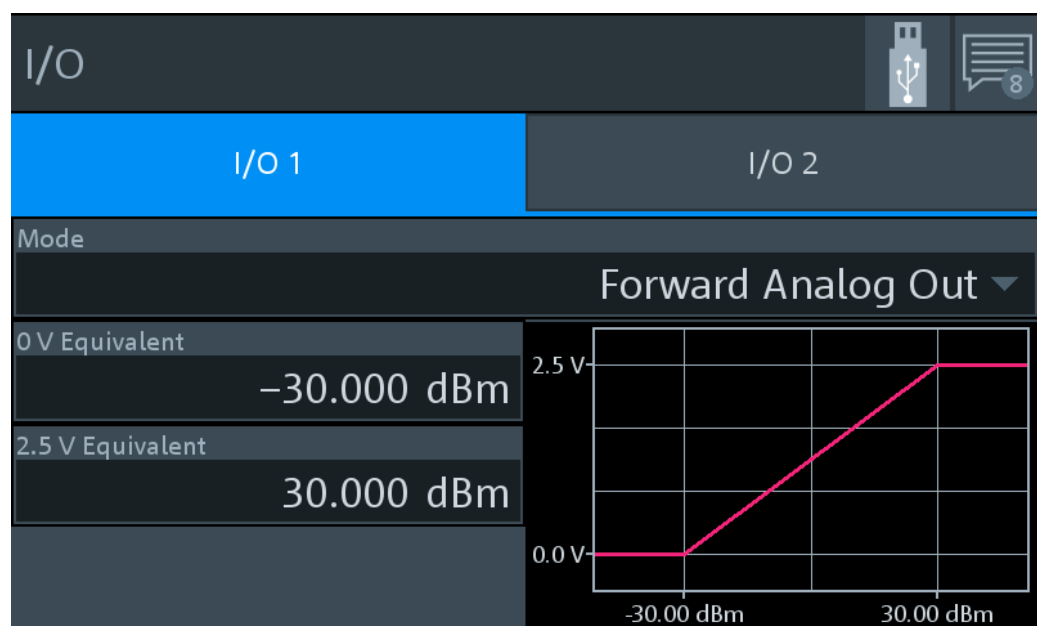


Figure 9-2: Forward Analog Out

"0 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 0 V.

"2.5 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 2.5 V.

Reflection Analog Out ← Mode ← I/O 1 ← I/O

The reflection output provides an analog voltage which is proportional to the value displayed.

"0 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 0 V.

"2.5 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 2.5 V.

Forward Limit Violation ← Mode ← I/O 1 ← I/O

Sets the logic forward output level for limit violation of measurement results. The value range is 0 V to 5 V.

"Fail Voltage" Low: Corresponds to an output voltage of 0 V, if a limit is violated.
 High: Corresponds to an output voltage of 5 V, if a limit is violated.

Reflection Limit Violation ← Mode ← I/O 1 ← I/O

Sets the logic reflection output level for limit violation of measurement results. The value range is 0 V to 5 V.

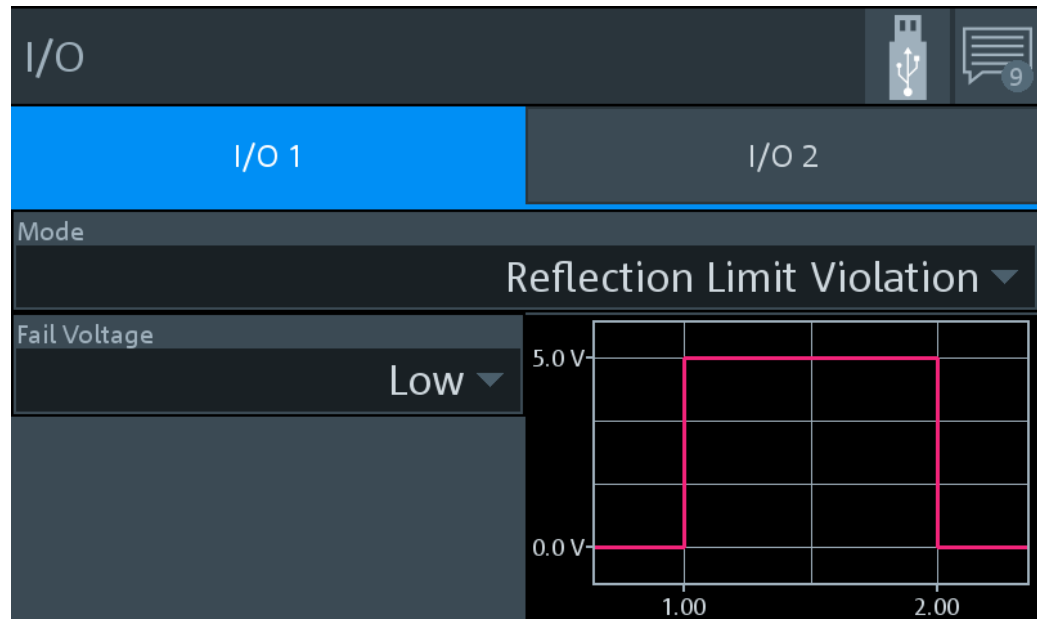


Figure 9-3: Reflection Limit Violation - Fail Voltage "Low"

"Fail Voltage" Low: Corresponds to an output voltage of 0 V, if a limit is violated.
 High: Corresponds to an output voltage of 5 V, if a limit is violated.

I/O 2 ← I/O

This section describes the functions and settings of the analog trigger input / analog output at the "TRIG IN / OUT2" connector.

Mode ← I/O 2 ← I/O

Selects the function of the TRIG IN / OUT2 connector.

Off ← Mode ← I/O 2 ← I/O

No output via the "TRIG IN / OUT2" connector.

Forward Analog Out ← Mode ← I/O 2 ← I/O

The output provides an analog voltage, which is proportional to the value displayed in the selected window:

"0 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 0 V.

"2.5 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 2.5 V.

Reflection Analog Out ← Mode ← I/O 2 ← I/O

The output provides an analog voltage, which is proportional to the value displayed in the selected window:

"0 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 0 V.

"2.5 V Equivalent Power" Entry of the measurement value that corresponds to the output voltage of 2.5 V.

Trigger In ← Mode ← I/O 2 ← I/O

The connector is used as input. An external trigger signal can be applied.

Sensor Manager

Displays the available sensor.

Available Sensors ← Sensor Manager

This table displays the details for the available sensors.

"Port"	Displays the port of the selected sensor.
"Type"	Displays the type of the selected sensor.
"Name"	Displays the name of the selected sensor.

9.2 Security Settings

In this dialog, the settings concerning LAN security, passwords and external memory devices can be configured.

1. Press the hardkey SYSTEM on the front of the R&S NRT2.
The dialog "System Overview" opens.
2. Select the tab "Instrument Info".
3. Open the dialog "Security".
4. Open the dialog "General" and specify the parameters according to your needs (see ["General"](#) on page 52).
5. Open the dialog "LAN Settings" and specify the parameters according to your needs (see ["LAN Settings"](#) on page 53).
6. Open the dialog "Security Password" and specify the parameters according to your needs (see ["Security Password"](#) on page 54).

Security

In this dialog, the settings concerning LAN security, passwords and external memory devices can be configured.

General ← Security

In the "General" dialog, the access rights for storage devices and restrictions for the user interface are configured.

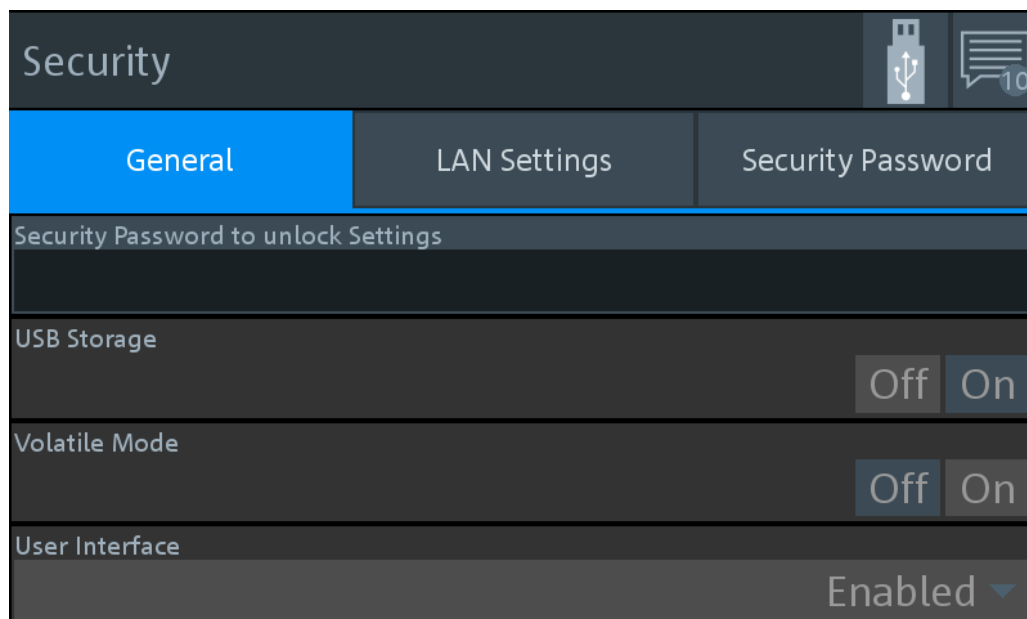


Figure 9-4: Security > General

Security Password to unlock Settings ← General ← Security

Enter the password that is required to enable or to disable the settings protected by a security password. Default is 123456.

Note:

- We recommend that you change the default security password before connecting the instrument to the network.
- The security settings are not assigned until you select the "Accept" button.

USB Storage ← General ← Security

Enables or disables the file transfer via USB storage.

"Off" No file transfer via USB storage is allowed.

"On" The file transfer via USB storage is allowed. Enter the "Password" and click "Accept".

Nonvolatile Memory ← General ← Security

Allows you to define, if information can be written to the hard disk memory permanently or not.

"Off" Activates volatile mode, so that no information can be written to the hard disk memory permanently.

"On" Activates non-volatile mode, so that information can be written to the hard disk memory permanently.

LAN Settings ← Security

Allows to configure the LAN interface in general or to configure all LAN services individually.

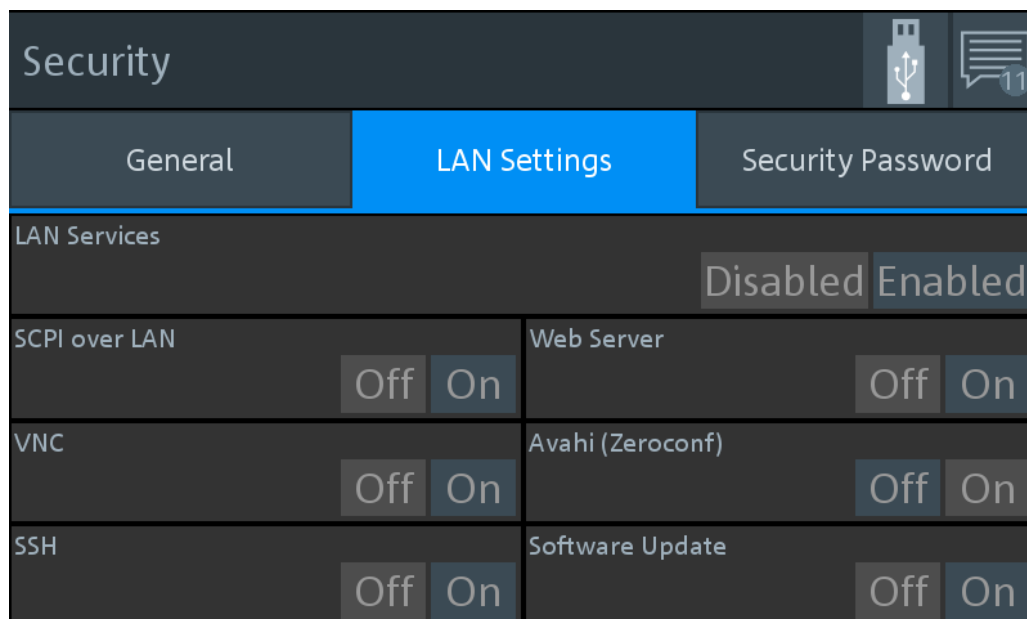


Figure 9-5: Security > LAN Settings

LAN Services ← LAN Settings ← Security

Allows to enable or disable the LAN services in general.

- "Disabled" Disables the LAN interface in general.
- "Enabled" Enables the LAN interface in general, and thus provides remote access via all unlocked services.

SCPI over LAN ← LAN Settings ← Security

Allows access over LAN to control the instrument remotely, by using SCPI (Standard Commands for Programmable Instruments) commands.

- "Off" No SCPI commands over LAN are possible.
- "On" SCP commands can be performed over LAN.

Web Server ← LAN Settings ← Security

Activates a web server and allows access via web application.

- "Off" The web server is deactivated.
- "On" The web server is activated.

VNC ← LAN Settings ← Security

Activates access via VNC (Virtual Network Computing) interface, a graphical desktop sharing system that uses RFB protocol to control the instrument remotely.

- "Off" The VNC interface is disabled.
- "On" The VNC interface is activated.

Avahi (Zeroconf) ← LAN Settings ← Security

Activates Avahi, a service for automatic configuration of the instrument in a network environment.

"Off" The service is disabled.

"On" The service is activated.

SSH ← LAN Settings ← Security

Activates access via SSH (Secure Shell), a network protocol for secure data communication.

"Off" The SSH protocol is disabled.

"On" The SSH protocol is activated.

Software Update ← LAN Settings ← Security

Allows updating the software.

"Off" The automatic software update is disabled.

"On" The automatic software update is activated.

Security Password ← Security

Allows to change the security password.

Figure 9-6: Security > Security Password

Old Password ← Security Password ← Security

Enters the currently used security password. The default password is '123456'.

Note: We recommend that you change the default password before connecting the instrument to a network.

The security password is required when changing the status of the USB and LAN interface.

New Password ← Security Password ← Security

Enters the new security password.

Confirm Password ← Security Password ← Security

Confirms the new security password by repeating.

Note: The new password is not assigned until you select the "Change Password" button.

Change Password ← Security Password ← Security

Changes the password accordingly.

10 Save / Recall / Preset

Possibly you would like to restore or repeat a signal generation you performed under specific conditions on the instrument. Or, in a test setup with more than one signal generators, you want to transfer the used settings to another instrument. Some test setups also require similar settings in all instrument paths. In these cases, you can save and recall instrument and user settings, and possibly other related data.

In each of these cases, you can create a file with the complete instrument settings or you can choose to save only the settings belonging to a particular digital standard. The instrument uses a similar save/recall principle; both ways are scope of this section.

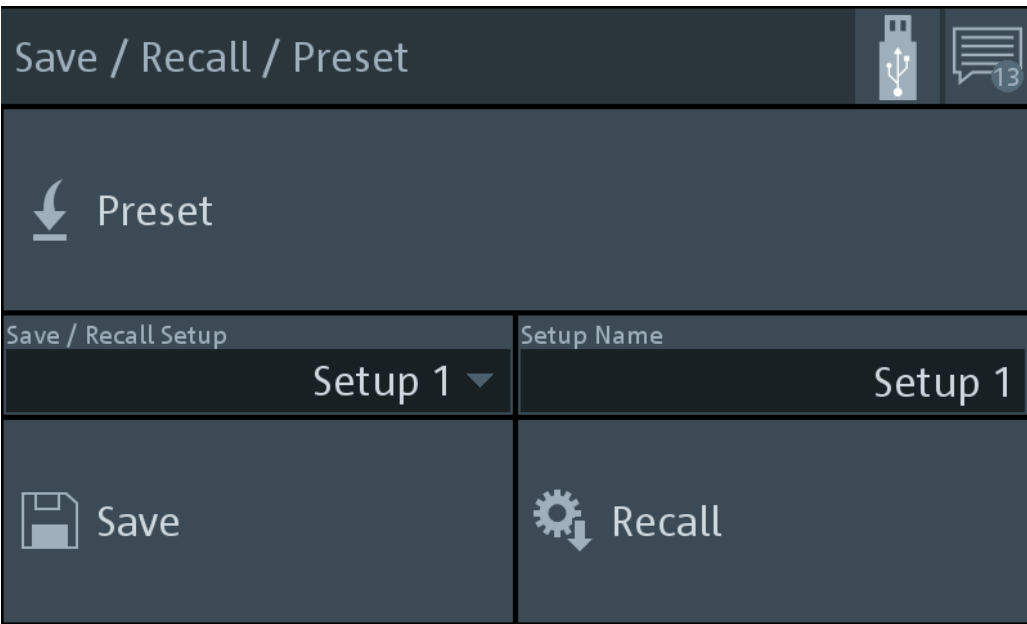


Figure 10-1: Save/Recall/Preset

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Preset

If the instrument is switched on, it is not the preset state that is active, but rather the instrument state that was set when the instrument was switched off.

To prevent any previous settings from causing incorrect results, it is recommended that you set the R&S NRT2 and the R&S Power Sensors to defined initial states.

Remote command:
[SYSTem:PRESet](#) on page 154

Save / Recall Setup

Allows to select a specific setup file for saving or recalling. A maximum of 20 setup files can be administered.

Setup Name

Allows to specify an individual name for a setup configuration.

Save

Saves the current instrument settings or the settings belonging to a digital standard under the defined filename.

Recall

Restores the selected configuration. During recall, the instrument considers all related settings, for example sweeps in active state or lists. An error message indicates the settings which cannot be implemented.

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11.1 Instrument Info

The "Instrument Info" dialog the relevant instrument information concerning general system information, security settings and hardware options.

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System

Displays a list of device specific parameters.

Manufacturer ← System

Displays the manufacturer.

Type ← System

Displays the type of the power meter.

Stock Number ← System

Displays the stock number of the power meter.

Serial ← System

Displays the serial number of the power meter.

Device ID ← System

Displays the device ID of the power meter.

SW Build ← System

Displays the software build number of the power meter.

Options ← System

Displays the installed options for the power meter.

MAC Address ← System

Displays the MAC address of the power meter.

Hostname ← System

Displays the host name of the power meter.

IP Address ← System

Displays the IP address of the power meter.

Custom *IDN? ← System

Displays the used instrument identification string.

Custom *OPT? ← System

Displays the used option identification string.

Date ← System

Displays the current date in the following format.

YYYY-MM-DD

Time ← System

Displays the current time in the following format.

HH:MM:SS

Time Zone ← System

Allows to specify the time zone.

Remote command:

[SYSTem:TIME:DSTime:RULE](#) on page 160

[SYSTem:TIME:DSTime:RULE:CATalog?](#) on page 160

Options

Displays the installed options for the R&S NRT2.

HW Options ← Options

Displays the available hardware options.

Details ← Options

Displays the details for the available hardware options.

Security

In this dialog, the settings concerning LAN security, passwords and external memory devices can be configured.

General ← Security

In the "General" dialog, the access rights for storage devices and restrictions for the user interface are configured.

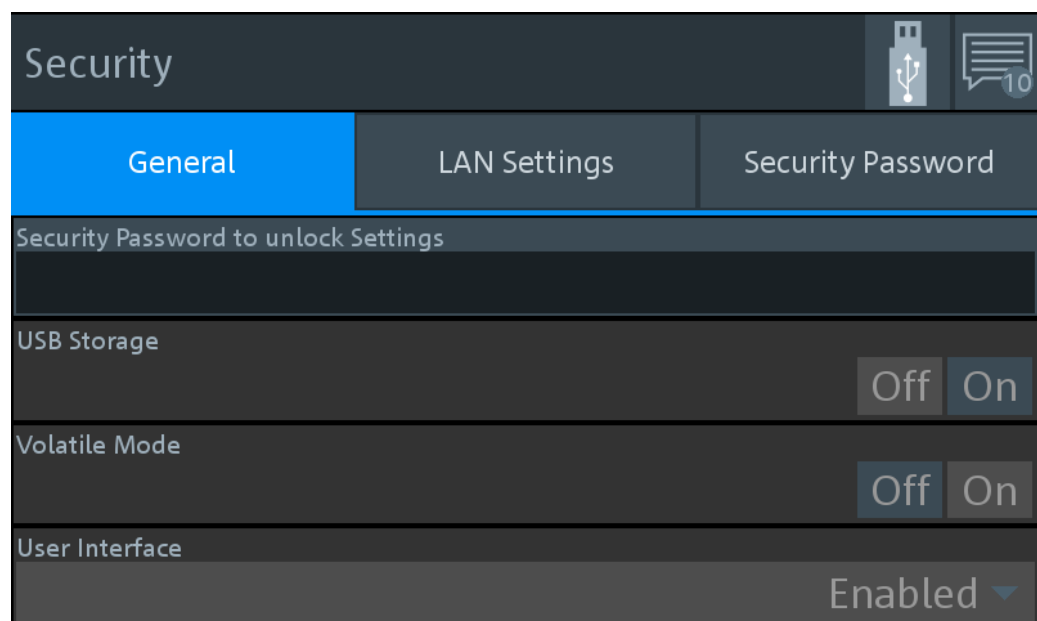


Figure 11-1: Security > General

Security Password to unlock Settings ← General ← Security

Enter the password that is required to enable or to disable the settings protected by a security password. Default is 123456.

Note:

- We recommend that you change the default security password before connecting the instrument to the network.
- The security settings are not assigned until you select the "Accept" button.

USB Storage ← General ← Security

Enables or disables the file transfer via USB storage.

"Off" No file transfer via USB storage is allowed.

"On" The file transfer via USB storage is allowed. Enter the "Password" and click "Accept".

Nonvolatile Memory ← General ← Security

Allows you to define, if information can be written to the hard disk memory permanently or not.

"Off" Activates volatile mode, so that no information can be written to the hard disk memory permanently.

"On" Activates non- volatile mode, so that information can be written to the hard disk memory permanently.

LAN Settings ← Security

Allows to configure the LAN interface in general or to configure all LAN services individually.

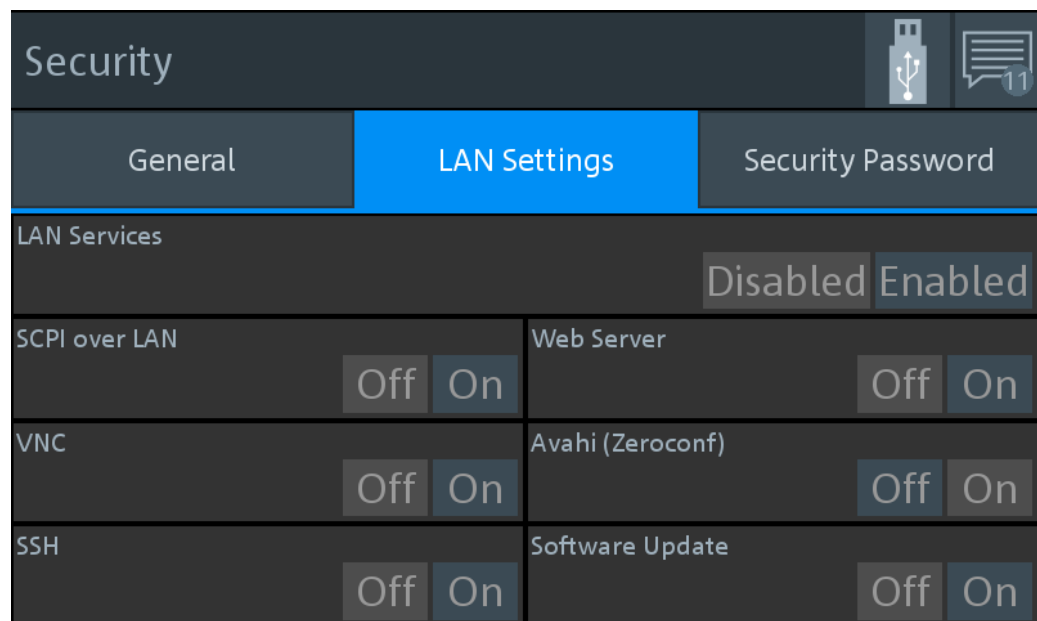


Figure 11-2: Security > LAN Settings

LAN Services ← LAN Settings ← Security

Allows to enable or disable the LAN services in general.

"Disabled" Disables the LAN interface in general.

"Enabled" Enables the LAN interface in general, and thus provides remote access via all unlocked services.

SCPI over LAN ← LAN Settings ← Security

Allows access over LAN to control the instrument remotely, by using SCPI (Standard Commands for Programmable Instruments) commands.

"Off" No SCPI commands over LAN are possible.

"On" SCP commands can be performed over LAN.

Web Server ← LAN Settings ← Security

Activates a web server and allows access via web application.

"Off" The web server is deactivated.

"On" The web server is activated.

VNC ← LAN Settings ← Security

Activates access via VNC (Virtual Network Computing) interface, a graphical desktop sharing system that uses RFB protocol to control the instrument remotely.

"Off" The VNC interface is disabled.

"On" The VNC interface is activated.

Avahi (Zeroconf) ← LAN Settings ← Security

Activates Avahi, a service for automatic configuration of the instrument in a network environment.

"Off" The service is disabled.

"On" The service is activated.

SSH ← LAN Settings ← Security

Activates access via SSH (Secure Shell), a network protocol for secure data communication.

"Off" The SSH protocol is disabled.

"On" The SSH protocol is activated.

Software Update ← LAN Settings ← Security

Allows updating the software.

"Off" The automatic software update is disabled.

"On" The automatic software update is activated.

Security Password ← Security

Allows to change the security password.

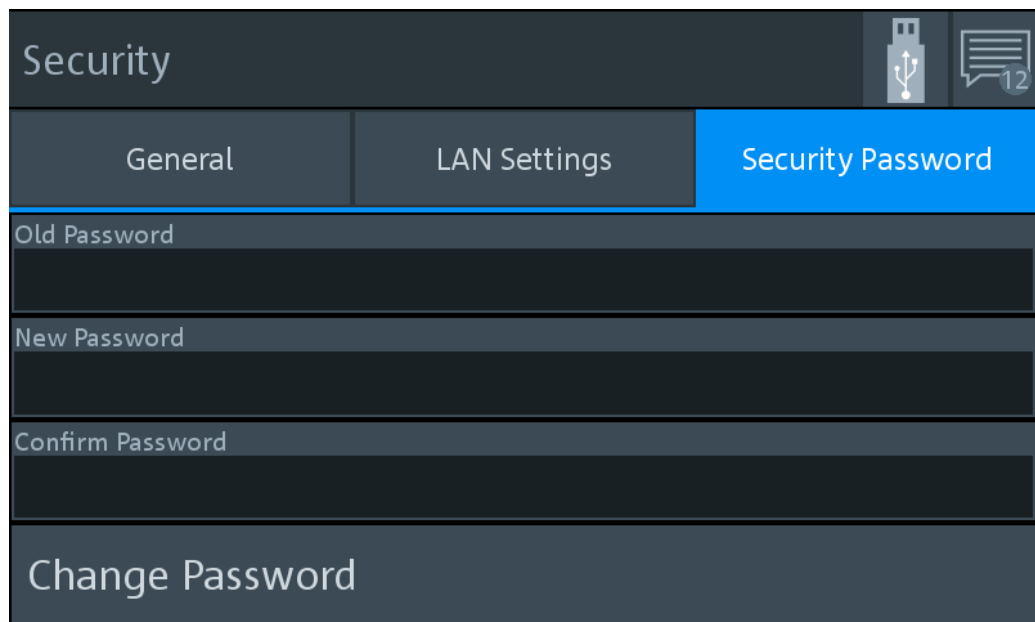


Figure 11-3: Security > Security Password

Old Password ← Security Password ← Security

Enters the currently used security password. The default password is '123456'.

Note: We recommend that you change the default password before connecting the instrument to a network.

The security password is required when changing the status of the USB and LAN interface.

New Password ← Security Password ← Security

Enters the new security password.

Confirm Password ← Security Password ← Security

Confirms the new security password by repeating.

Note: The new password is not assigned until you select the "Change Password" button.

Change Password ← Security Password ← Security

Changes the password accordingly.

Open Source Licenses

Displays the license texts of used open source components

11.2 Hardware Config

This dialog displays the hardware details of the assemblies of the R&S NRT2.

Assembly.....	64
Part Number.....	64
Serial.....	64
Revision.....	64

- Assembly**
Displays the assemblies of the R&S NRT2.
- Part Number**
Displays the part number of a specific assembly.
- Serial**
Displays the serial number of a specific assembly.
- Revision**
Displays the revision of a specific assembly.

11.3 Test

This dialog offers tests for the keyboard, display and touch panel. The results (passed or failed) are displayed beside the tests.

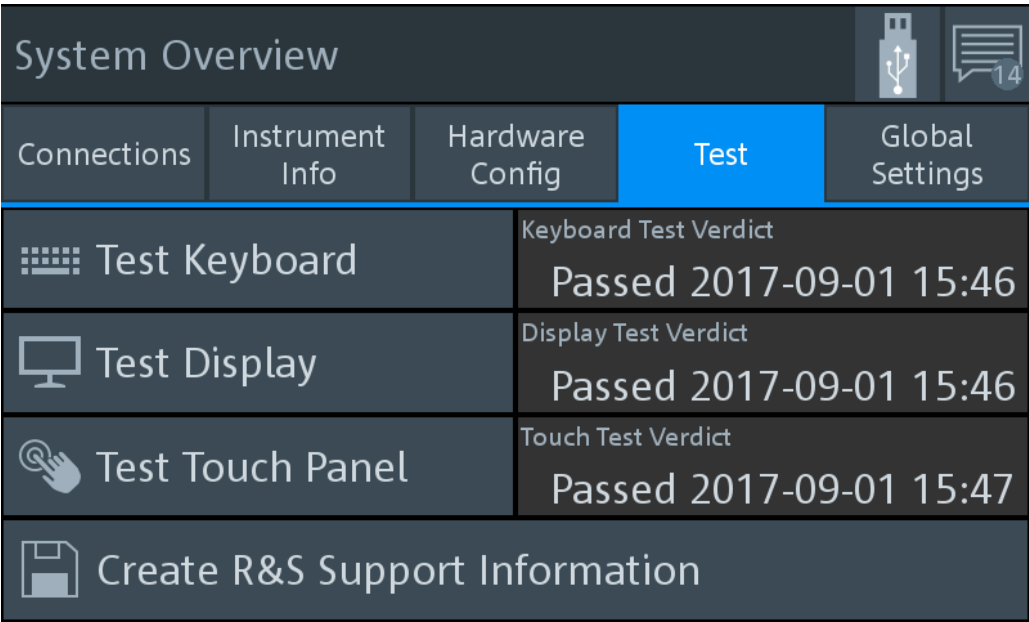


Figure 11-4: Test

Test Keyboard.....	65
Test Display.....	65
Test Touch Panel	65
Create R&S Support Information.....	65

Test Keyboard

Press and release all front panel keys.

Check that the color of a pressed key change in the graphics on the right according to the legend.



"Restart"	Restart the keyboard test again.
"Exit with Pass"	Press this tile, when all keyboard tests are finished successfully (all keys in the graphic are green).
"Exit with Fail"	Press this tile, when at least one of the keyboard tests has failed.

Test Display

Press any front panel key except ESC repeatedly to show the different test patterns.



You may return to this screen from any test patten by pressing ESC.

"Exit with Pass"	Press this tile, when all test patterns are finished successfully.
"Exit with Fail"	Press this tile, when at least one of the test patterns is not OK.

Test Touch Panel

Select a touch size and press the front panel key ENTER to open the touch test.

Then repeatedly touch the white circles appearing to the screen.

To return to this screen from the touch test, press ESC.



"Exit with Pass"	Press this tile, when the minimum number of tests is done without any failure.
"Exit with Fail"	Press this tile, when the minimum number of tests is not done without any failure.
"Touch Size"	Specify the size of the white circles appearing on the screen. Small Medium Large

Create R&S Support Information

Creates a file containing information about software errors, hardware status, the current "device footprint" and the current device settings. This file is compressed to an archive (file format tar.gz). This archive is directly written to a connected USB stick (FAT32) or can be transferred via SSH.



11.4 Global Settings

Visualize Non Preset State.....	66
Tabs Position.....	66

- Visualize Non Preset State**
 Settings, which are different to the preset state, are visualized with a yellow pen on the display.

"Off"	The visualization mode is deactivated.
"On"	The visualization mode is activated.
- Tabs Position**
 Specifies the position of the tabs in the dialogs..

"Top"	The tabs are on top of a dialog.
"Bottom"	The tabs on bottom of a dialog.

12 Firmware Update

This chapter contains information on installing/updating the firmware on the R&S NRT2.

Use the Firmware Update program (PureFW) to load new firmware for the R&S NRT2. It is part of the R&S NRP Toolkit that is supplied on a CD-ROM together with the power sensors.

12.1 Hardware and Software Requirements

The system requirements to perform a firmware update are as follows:

- PC with free USB port (alternatively: PC and instrument are connected to an Ethernet network)
- USB cable (USB-A plug to USB-B plug) (alternatively: Ethernet cable)
- Operating system Microsoft Windows 7, Microsoft Windows 8 or Microsoft Windows 10
- **VISA software must be installed on your PC.**
- The R&S NRP Toolkit software must be installed on your PC (includes Firmware Update program).
- A Rohde & Schwarz update file (*.rsu) for the sensor must be available.

The latest firmware update files are available on our Internet site at www.rohde-schwarz.com.

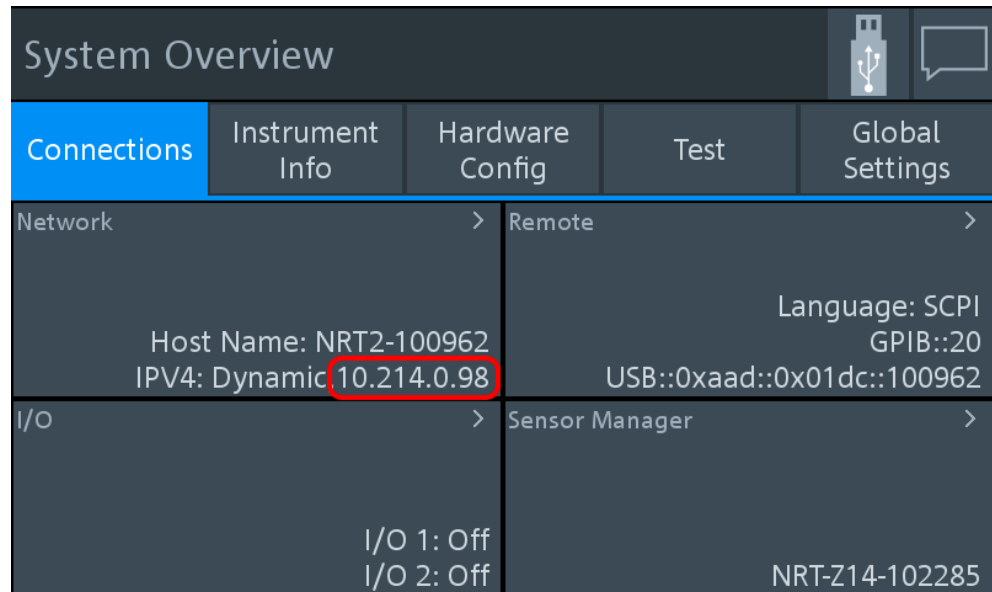
12.2 Preparing an Update

To prepare an update via USB connection:

1. Make sure a recent VISA software is installed. Firmware update with PureFW can only be performed with the device recognized as a VISA device.
2. Connect the R&S NRT2 to the PC using a USB cable. If the instrument is off, switch it on.
Shortly afterwards, the PC should have identified the new USB hardware in case the instrument is connected via USB.
If no recent VISA software is installed, Windows will try in vain to find a USB driver for the instrument. If this happens, the instrument is highlighted by a yellow exclamation mark in the Windows device manager.
⇒ Abort the installation process and install a recent VISA software.

To prepare an update via network connection:

1. Make sure a recent VISA software is installed. Firmware update with PureFW can only be performed with the device recognized as a VISA device.
2. Connect the R&S NRT2 to the network. If the instrument is off, switch it on. To check that the instrument is assigned an IP address, press the hardkey SYSTEM on the front of the R&S NRT2, choose the "Connections" tab, and check the IPv4 status under "Network":



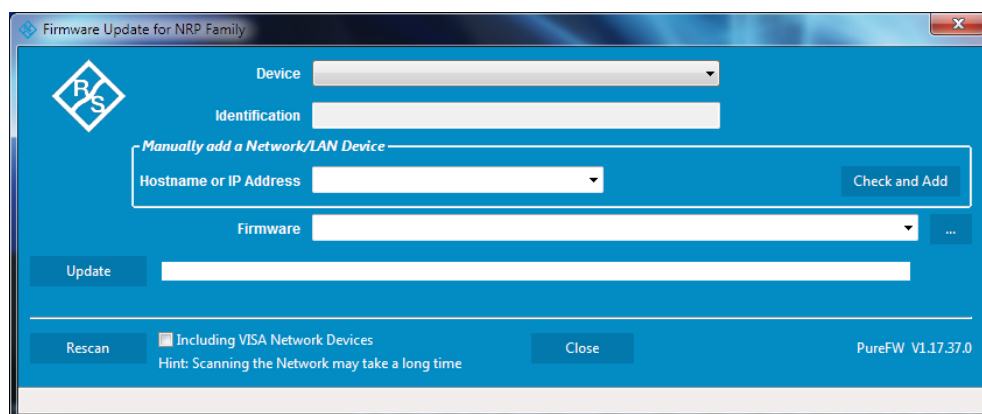
If the instrument is not assigned an IP address, perform the following:

- a) Open the dialog "Network" and check whether the network settings are correct.
 - b) Check the cable used to connect the instrument to the network.
3. Register the instrument as a VISA device. Refer to to documentation of your VISA software for details.

12.3 Updating the Application Firmware

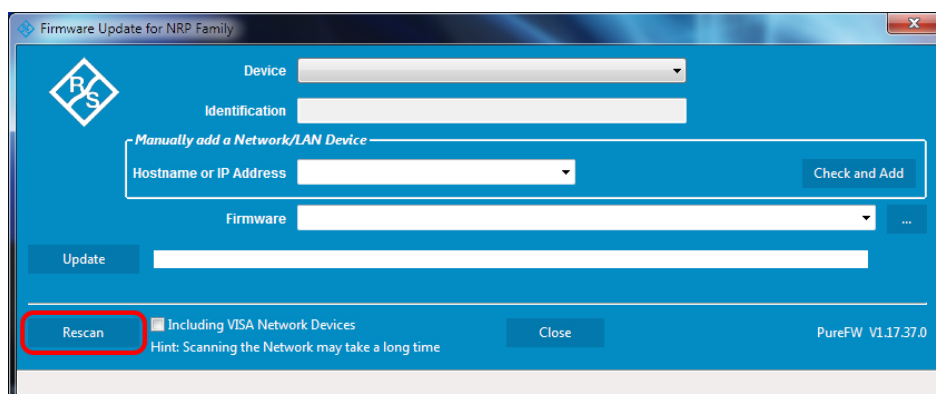
To perform a firmware update:

1. Start the Firmware Update program (PureFW) via "Start menu > NRP-Toolkit > Firmware Update". The following window should appear:

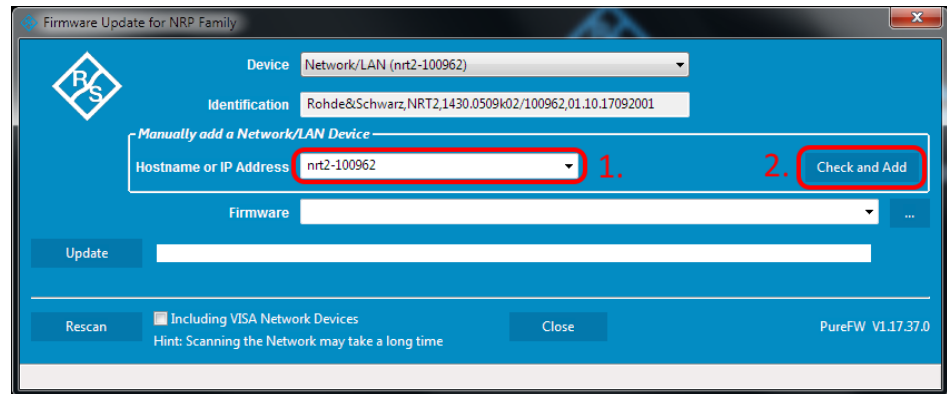


The program automatically starts scanning for R&S power sensors and meters attached via USB. When the scan is completed, all recognized power sensors and meters are listed in the "Device" dropdown control.

2. If the instrument you want to update is not listed in the "Device" dropdown control, perform one of the following:
 - a) If the instrument is connected to the PC via USB, press "Rescan" to search for R&S power sensors and meters attached via USB.

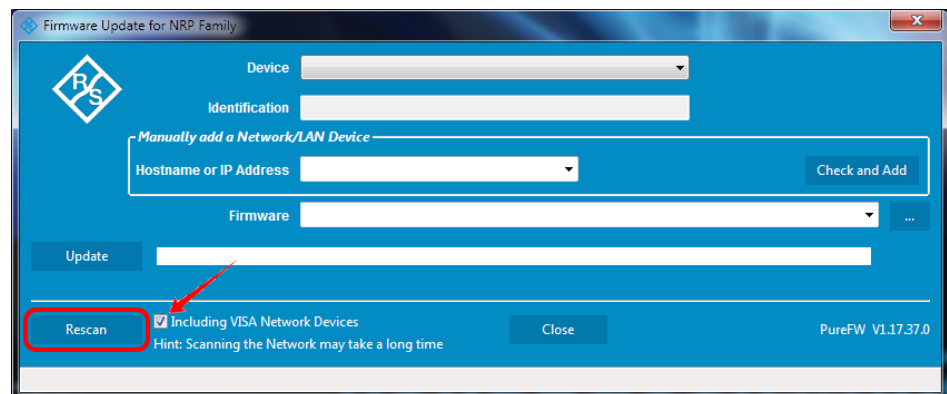


- b) If the instrument is connected to the network, enter the hostname or the IP address of the instrument in the field "Manually add a Raw SCPI Device" and then press "Check and Add" or Enter.

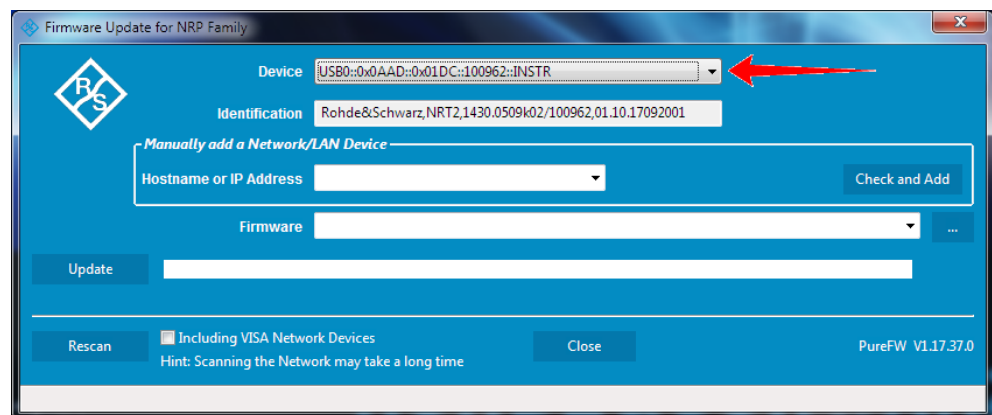


The program searches for the specified instrument on the network and adds it to the "Device" list.

- c) It is also possible to scan the local network for VISA network devices automatically. This may be more time-consuming than adding the device manually as described above. To do this, check the setting "Including VISA Network Devices" before you press "Rescan".

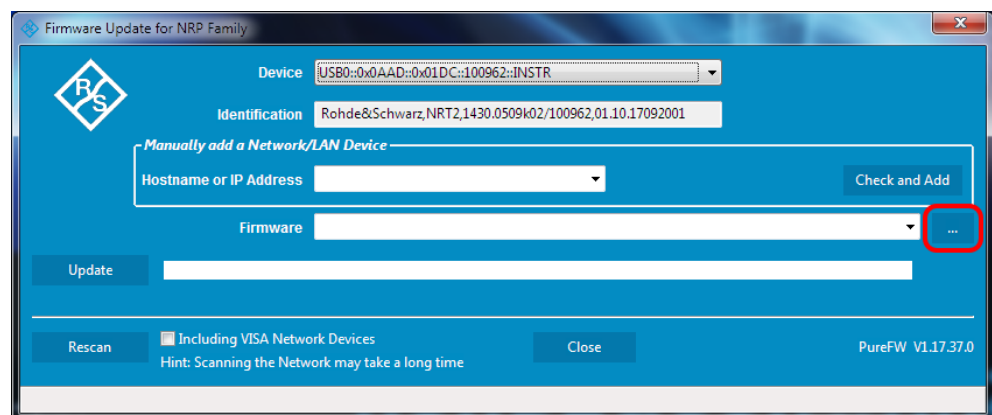


- d) Check whether a VISA library is installed on the computer.
 If no VISA library is installed on the computer, no VISA instrument will be accessible.
 If a network connection is used: Check whether the instrument is registered as a VISA device.
3. In the "Device" line select the instrument you want to update.

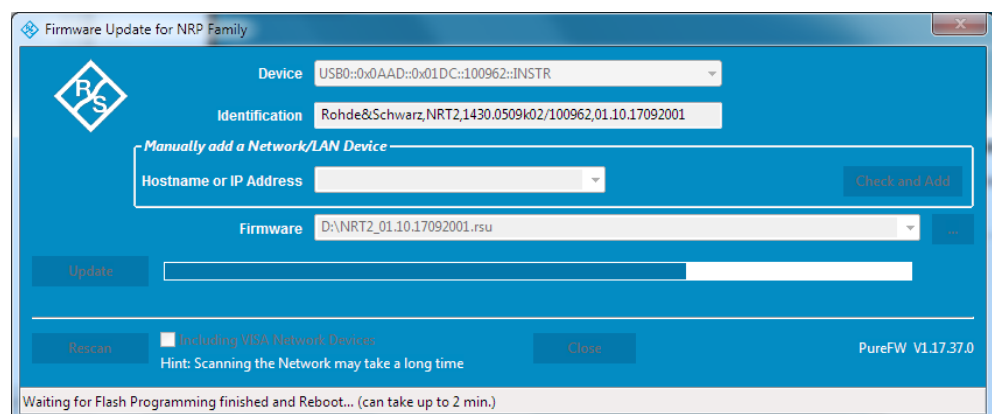


The "Hostname or IP Address" field is not used during this procedure and should therefore be left empty.

4. In the "Firmware" field enter the full path and file name of the update file or press the ellipsis button to browse the file system for it. New firmware for the R&S NRT2 generally has an *.rsu (Rohde & Schwarz Update) extension.

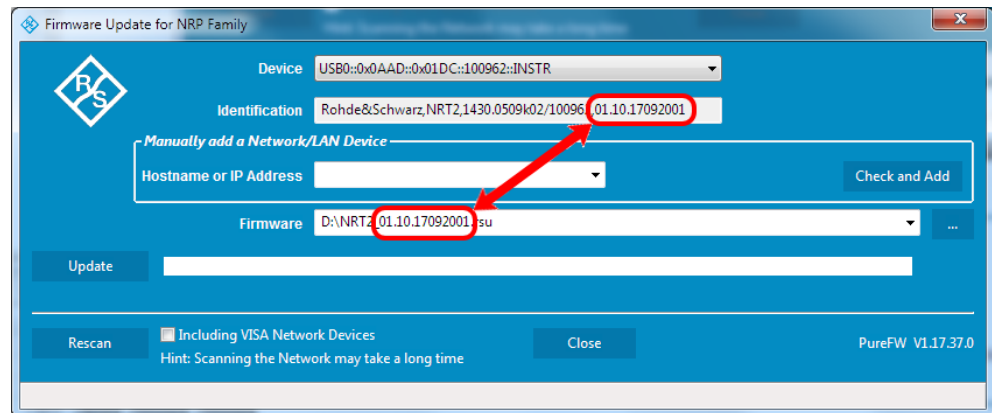


5. Click on the "Update" button to download the new firmware and program it into the flash memory of the instrument.



During the update process the progress is shown through a progress bar. The update sequence may take a couple of minutes.

6. Check if the update was successful. This is the case if the firmware version in the "Identification" field is the same as the one you loaded in the "Firmware" field.



NOTICE

Potential damage to the firmware of the device

Disconnecting the power supply while an update is in progress may lead to missing or faulty firmware.

Special care must be taken on not disconnecting the power supply while the update is in progress. Interrupting the power supply during the firmware update will most likely lead to an unusable device which needs to be sent in for maintenance.

13 Remote Control

13.1 Notation for SCPI Commands

In the following sections, all commands implemented in the device are listed according to the command system and then described in detail. For the most part, the notation used complies with SCPI specifications. The commands are separated in high-level and low-level commands, where the high-level commands combine several low-level commands in one command.

Numeric suffixes <n>

If a command can be applied to multiple instances of an object, e.g. specific sensors, the required instances can be specified by a suffix added to the command. Numeric suffixes are indicated by angular brackets (<1...4>, <n>, <i>) and are replaced by a single value in the command. Entries without a suffix are interpreted as having the suffix 1.

Optional keywords []

Some command systems permit certain keywords to be inserted into the header or omitted. These keywords are marked by square brackets in the description. The instrument must recognize the long command to comply with the SCPI standard. Some commands are considerably shortened by these optional mnemonics.

Therefore, not only is there a short and a long form for the commands (distinguished here by lowercase and uppercase letters) but also a short form which is created by omitting optional keywords.

Example:

Command [SENSe<[1]..4>]:CORRection:GAIN2[:INPut][:MAGNitude] 1
can be written as:

SENSe1:CORRection:GAIN2:INPut:MAGNitude 1

SENSe1:CORRection:GAIN2:INPut 1

SENSe1:CORRection:GAIN2 1

SENSe:CORRection:GAIN2 1

CORRection:GAIN2 1

Parameters

Parameters must be separated from the header by a "white space". If several parameters are specified in a command, they are separated by a comma (,).

Example:

Definition: OUTPut:AUDiobits <audiobits>

Command: OUTP:AUD 24

Special characters | and { }

	A vertical bar in parameter definitions indicates alternative possibilities in the sense of "or". The effect of the command differs, depending on which parameter is used. Example: Definition: INITiate:CONTinuous ON OFF Command INITiate:CONTinuous ON starts the measurements Command INITiate:CONTinuous OFF stops the measurements
{ }	Parameters in braces may be included in the command once, several times or not at all.

13.2 Status Reporting System



For the command syntax, see [Chapter 13.14, "STATus"](#), on page 142.

The status reporting system stores all information on the present operating state of the instrument, e.g. that the instrument presently carries out an AUTORANGE and on errors which have occurred. This information is stored in the status registers and in the error queue. The status registers and the error queue can be queried via IEC bus.

The information is of a hierarchical structure. The register status byte (STB) defined in IEEE 488.2 and its associated mask register service request enable (SRE) form the uppermost level. The STB receives its information from the standard event status register (ESR) which is also defined in IEEE 488.2 with the associated mask register standard event status enable (ESE) and registers STATus:OPERation and STATus:QUES-tionable which are defined by SCPI and contain detailed information on the instrument.

The IST flag ("Individual STATus") and the parallel poll enable register (PPE) allocated to it are also part of the status reporting system. The IST flag, like the SRQ, combines the entire instrument status in a single bit. The PPE fulfills an analog function for the IST flag as the SRE for the service request.

The output buffer contains the messages the instrument returns to the controller. It is not part of the status reporting system but determines the value of the MAV bit in the STB .

13.2.1 Structure of an SCPI Status Register

Each SCPI register consists of 5 parts which each have a width of 16 bits and have different functions (cf. [Figure 13-1](#)). The individual bits are independent of each other, i.e. each hardware status is assigned a bit number which is valid for all five parts. For example, bit 3 of the STATus:OPERation register is assigned to the hardware status "wait for trigger" in all five parts. Bit 15 (the most significant bit) is set to zero for all parts. Thus the contents of the register parts can be processed by the controller as positive integer.

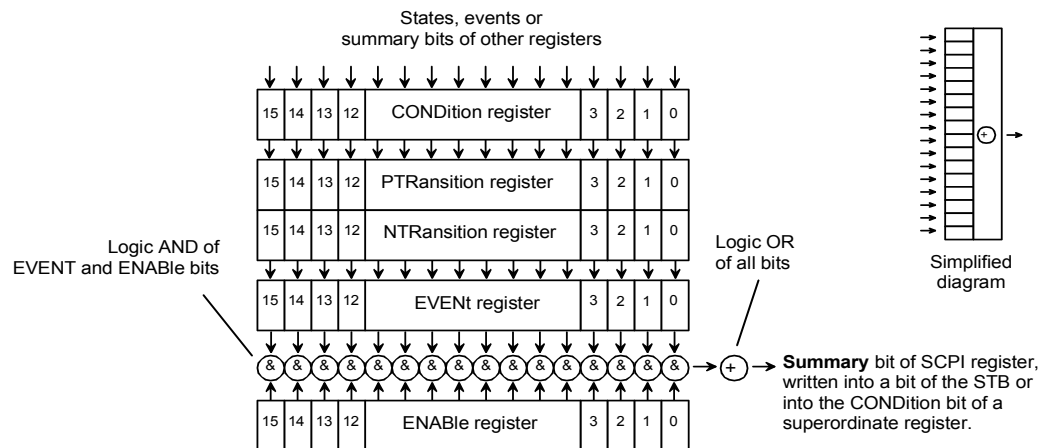


Figure 13-1: Standard SCPI status register

CONDition part

The CONDition part is directly written into by the hardware or the sum bit of the next lower register. Its contents reflects the current instrument status. This register part can only be read, but not written into or cleared. Its contents are not affected by reading.

PTRansition part

The Positive-TRansition part acts as an edge detector. When a bit of the CONDition part is changed from 0 to 1, the associated PTR bit decides whether the EVENT bit is set to 1.

PTR bit =1: the EVENT bit is set.

PTR bit =0: the EVENT bit is not set.

This part can be written into and read at will. Its contents are not affected by reading.

NTRansition part

The Negative-TRansition part also acts as an edge detector. When a bit of the CONDition part is changed from 1 to 0, the associated NTR bit decides whether the EVENT bit is set to 1.

NTR bit =1: the EVENT bit is set.

NTR bit =0: the EVENT bit is not set.

This part can be written into and read at will. Its contents are not affected by reading.

With these two edge register parts the user can define which state transition of the condition part (none, 0 to 1, 1 to 0 or both) is stored in the EVENT part.

EVENT part

The EVENT part indicates whether an event has occurred since the last reading, it is the "memory" of the condition part. It only indicates events passed on by the edge filters. It is permanently updated by the instrument. This part can only be read by the user. Upon reading, its contents are set to zero. In colloquial language, this part is often equated with the entire register.

ENABLE part

The ENABLE part determines whether the associated EVENT bit contributes to the sum bit (cf. below). Each bit of the EVENT part is ANDed with the associated ENABLE bit (symbol '&'). The results of all logical operations of this part are passed on to the sum bit via an OR function (symbol '+').

ENAB bit =0: the associated EVENT bit does not contribute to the sum bit

ENAB bit =1: if the associated EVENT bit is "1", the sum bit is set to "1" as well.

This part can be written into and read by the user at will. Its contents are not affected by reading.

Sum bit

As indicated above, the sum bit is obtained from the EVENT and ENABLE part for each register. The result is then entered into a bit of the CONDition part of the higher-order register.

The instrument automatically generates the sum bit for each register. Thus an event, e.g. a PLL that has not locked, can lead to a service request throughout all levels of the hierarchy.

Note:

The service request enable register SRE defined in IEEE 488.2 can be taken as ENABLE part of the STB if the STB is structured according to SCPI. By analogy, the ESE can be taken as the ENABLE part of the ESR.

13.2.2 Overview of the Status Registers

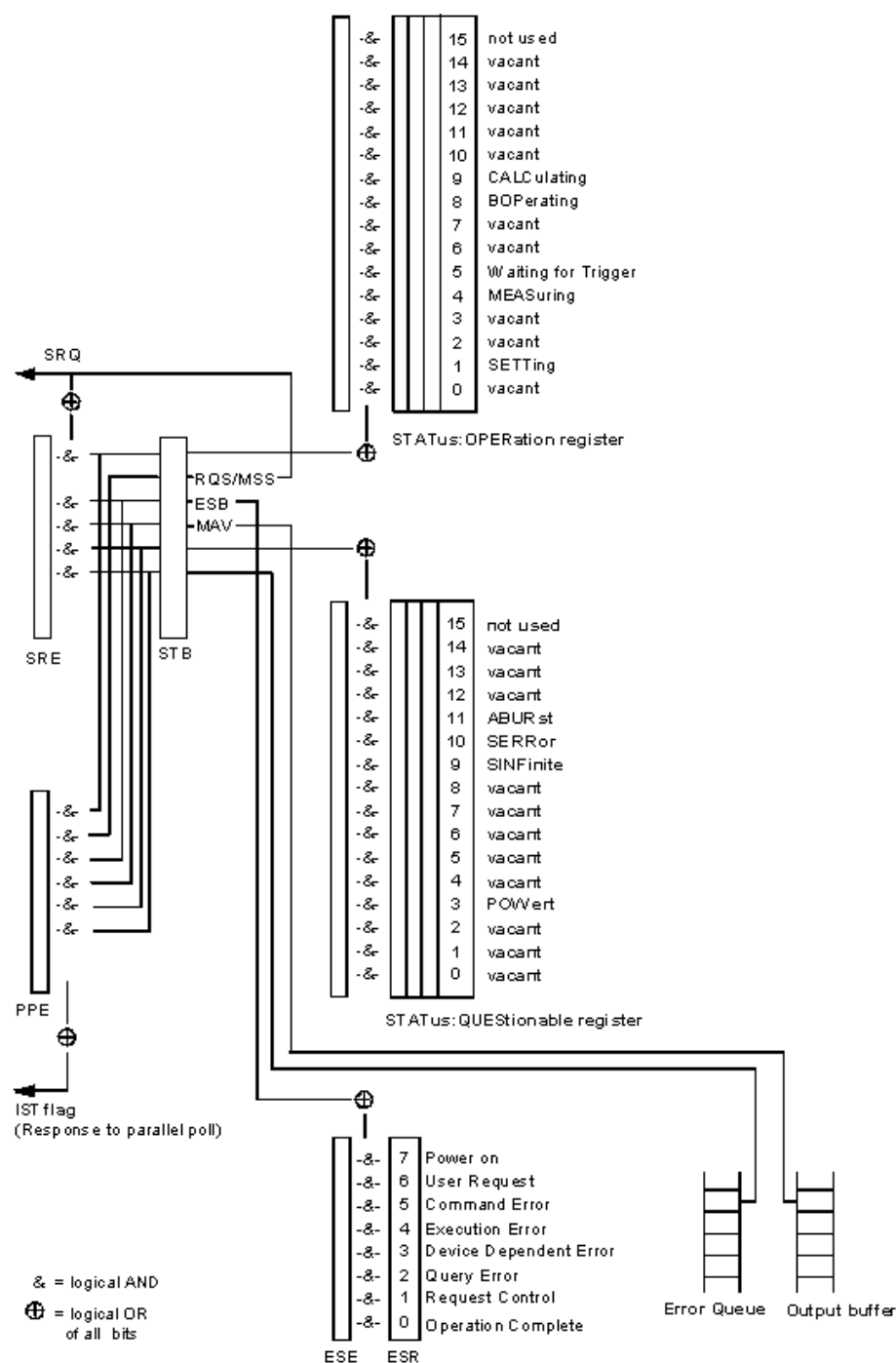


Figure 13-2: Overview Status Reporting System Structure

13.2.3 Description of the Status Registers

13.2.3.1 Status Byte (STB) and Service Request Enable Register (SRE)

The STB is already defined in IEEE 488.2. It provides a rough overview of the instrument status by collecting the pieces of information of the lower registers. It can thus be compared with the CONDition part of an SCPI register and assumes the highest level within the SCPI hierarchy. A special feature is that bit 6 acts as the sum bit of the remaining bits of the status byte.

The STATUS BYTE is read out using the command `*STB?` or a serial poll.

The STB is linked to the SRE. The latter corresponds to the ENABLE part of the SCPI registers in its function. Each bit of the STB is assigned a bit in the SRE. Bit 6 of the SRE is ignored. If a bit is set in the SRE and the associated bit in the STB changes from 0 to 1, a Service Request (SRQ) is generated on the IEC bus, which triggers an interrupt in the controller if this is appropriately configured and can be further processed there.

The SRE can be set using command `*SRE` and read using `*SRE?`.

Table 13-1: Meaning of the bits used in the status byte

Bit no.	Meaning
2	Error Queue not empty The bit is set when an entry is made in the error queue. If this bit is enabled by the SRE, each entry of the error queue generates a Service Request. Thus an error can be recognized and specified in greater detail by polling the error queue. The poll provides an informative error message. This procedure is to be recommended since it considerably reduces the problems involved with IEC/IEEE-bus control.
3	QUESTIONable status sum bit The bit is set if an EVENT bit is set in the QUESTIONable status register and the associated ENABLE bit is set to 1. A set bit indicates a questionable instrument status, which can be specified in greater detail by polling the QUESTIONable status register.
4	MAV-Bit (Message AVailable) The bit is set if a message is available in the output buffer which can be read. This bit can be used to enable data to be automatically read from the instrument to the controller.
5	ESB bit Sum bit of the event status register. It is set if one of the bits in the event status register is set and enabled in the event status enable register. Setting of this bit indicates a serious error which can be specified in greater detail by polling the event status register.

Bit no.	Meaning
6	MSS-Bit (Master Status Summary bit) The bit is set if the instrument triggers a service request. This is the case if one of the other bits of this register is set together with its mask bit in the service request enable register SRE.
7	OPERation status register sum bit The bit is set if an EVENT bit is set in the OPERation status register and the associated ENABLE bit is set to 1. A set bit indicates that the instrument is just performing an action. The type of action can be queried by polling the OPERation status register.

13.2.3.2 IST Flag and Parallel Poll Enable Register (PPE)

Analog to the SRQ, the IST flag combines the entire status information in a single bit. It can be queried by a parallel poll (see [Chapter 13.2.4.3, "Parallel Poll"](#), on page 82) or using the command `*IST?`.

The parallel poll enable register (PPE) determines which bits of the STB contribute to the IST flag. The bits of the STB are ANDed with the corresponding bits of the PPE, with bit 6 being used as well in contrast to the SRE. The IST flag results from the ORing of all results. The PPE can be set using command `*PRE` and read using command `*PRE?`.

13.2.3.3 Event Status Register (ESR) and Event Status Enable Register (ESE)

The ESR is already defined in IEEE 488.2. It can be compared with the EVENT part of an SCPI register. The event status register can be read out using command `*ESR?`.

The ESE is the associated ENABLE part. It can be set using the command `*ESE` and read using the command `*ESE?`.

Table 13-2: Meaning of the bits used in the event status register

Bit no.	Meaning
0	Operation Complete This bit is set on receipt of the command <code>*OPC</code> exactly when all previous commands have been executed.
2	Query Error This bit is set if either the controller wants to read data from the instrument without having sent a query, or if it does not fetch requested data and sends new instructions to the instrument instead. The cause is often a query which is faulty and hence cannot be executed.
3	Device-dependent Error This bit is set if a device-dependent error occurs. An error message with a number between -300 and -399 or a positive error number, which denotes the error in greater detail, is entered into the error queue.
4	Execution Error This bit is set if a received command is syntactically correct but cannot be performed for other reasons. An error message with a number between -200 and -300, which denotes the error in greater detail, is entered into the error queue.

Bit no.	Meaning
5	Command Error This bit is set if a command which is undefined or syntactically incorrect is received. An error message with a number between -100 and -200, which denotes the error in greater detail, is entered into the error queue.
6	User Request This bit is set on pressing the SEL/ LOCAL key, i.e., when the instrument is switched over to manual control.
7	Power On (supply voltage on) This bit is set on switching on the instrument.

13.2.3.4 STATus:OPERation Register

In the CONDition part, this register contains information on which actions the instrument is being executing or, in the EVENT part, information on which actions the instrument has executed since the last reading. It can be read using one of the commands `STATus:OPERation:CONDition?` or `STATus:OPERation [:EVENT]?`.

Table 13-3: Meaning of the bits used in the STATus:OPERation register

Bit no.	Meaning
1	SETTing This bit is set when the sensor is initialized.
4	MEASuring This bit is set while the instrument is performing a measurement.
5	Waiting for TRIGGER This bit is set as long as the instrument is waiting for a trigger event.
8	BOPeration This bit is set in the case of battery operation.
9	CALCulating This bit is set when the instrument performs a limit check.

13.2.3.5 STATus:QUESTionable Register

This register contains information on questionable instrument states. They can occur, e.g. if the instrument is operated outside its specified range. It can be queried using one of the commands `:STATus :QUESTionable:CONDition?` or `:STATus:QUESTionable[:EVENT]?`.

Table 13-4: Meaning of the bits used in the *STATus:QUESTionable* register

Bit no.	Meaning
3	POWer This bit is set if one on the following conditions is fulfilled: • Sensor overload: The forward or reverse power exceeds the maximum values specified for the sensor. • Power control: The measured values for power or matching exceed the limit values for the corresponding bargraphs and the control function over the AUX TTL socket is active. • Power supply: The central supply voltage for sensor and basic instrument exceeds/ falls below the allowed limits.
9	SINFinite Setting this bit corresponds to the acoustic message sent when the SWR or forward power threshold is exceeded.
10	SERRor This bit is set when the sensor signals an exceptional situation. Example: The sensor is operated outside its allowed temperature range.
11	ABURst This bit is set in the case of conflicting burst parameters (the burst period set is smaller than the burst width). The R&S NRT2 then returns measured results corresponding to the unmodulated signal.

13.2.4 Application of the Status Reporting Systems

To effectively use the status reporting system, the information contained there must be transmitted to the controller and further processed there. There are several methods which are outlined in the following.

13.2.4.1 Service Request, Making Use of the Hierarchy Structure

Under certain circumstances, the instrument can send a service request (SRQ) to the controller. Usually this service request initiates an interrupt at the controller, to which the control program can react appropriately. As evident from Fig. 3-4 (Section 3.7.2), an SRQ is always initiated if one or several of bits 2, 3, 4, 5 or 7 of the status byte are set and enabled in the SRE. Each of these bits combines the information of a further register, the error queue or the output buffer. The corresponding setting of the ENABLE parts of the status registers can achieve that arbitrary bits in an arbitrary status register initiate an SRQ. To use the possibilities of the service request effectively, all bits should be set to "1" in the enable registers SRE and ESE.

Examples (cf. Fig. 3-4, Section 3.7.2 and Annex D, "Programming examples"):

Example:

Use command "*OPC" to generate an SRQ.

- Set bit 0 in the ESE (Operation Complete)
- Set bit 5 in the SRE (ESB)

After its settings have been completed, the instrument generates an SRQ.

Example:

Indication of the end of a measurement by an SRQ with the controller.

- Set bit 7 in the SRE (sum bit of the STATus:OPERation register)
- Set bit 4 (measuring) in the STATus:OPERation:ENABLE.
- Set bit 4 in the STATus:OPERation:NTRansition to make sure that the transition of measuring bit 4 from 1 to 0 (end of measurement) is recorded in the EVENT part.
After a sweep has been completed, the instrument generates an SRQ.

The SRQ is the only possibility for the instrument to become active on its own. Each controller program should set the instrument such that a service request is initiated in the case of malfunction. The program should react appropriately to the service request. A detailed example for a service request routine can be found in Annex D, "Programming examples".

13.2.4.2 Serial Poll

In a serial poll, as upon the command `*STB`, the status byte of an instrument is queried. However, the query is made via interface messages and is thus clearly faster. The serial-poll method has already been defined in IEEE 488.1 and used to be the only standard possibility for different instruments to poll the status byte. The method also works for instruments which do not adhere to SCPI or IEEE 488.2.

The quick-BASIC command for executing a serial poll is `IBRSP()`. The serial poll is used to obtain a fast overview of the state of several instruments connected to the IEC bus.

13.2.4.3 Parallel Poll

In a parallel poll, up to eight instruments are simultaneously requested by the controller with a single command to transmit 1 bit of information each on the data lines, i.e., to set the data line allocated to each instrument to a logic "0" or "1". By analogy to the SRE register which determines under which conditions an SRQ is generated, there is a parallel poll enable register (PPE) which is ANDed with the STB bit by bit, considering bit 6 – AND as well. The results are ORed, the result is then sent (possibly inverted) as a response to the parallel poll of the controller. The result can also be queried without parallel poll with the command `*IST`.

The instrument first has to be set for the parallel poll using the quick-BASIC command `IBPPC()`. This command allocates a data line to the instrument and determines whether the response is to be inverted. The parallel poll itself is executed using `IBRPP()`.

The parallel-poll method is used to quickly find out after an SRQ which instrument has sent the service request if there are many instruments connected to the IEC bus. To this effect, SRE and PPE must be set to the same value. A detailed example for a parallel poll can be found in 'Annex D, "Programming Examples".

13.2.4.4 Query by Means of Commands

Each part of any status register can be read by queries. The individual commands are listed in the detailed description of the registers in [Chapter 13.2.3, "Description of the Status Registers"](#), on page 78. What is returned is always a number which represents the bit pattern of the register queried. Evaluating this number is effected by the controller program.

Queries are usually used after an SRQ to obtain more detailed information on the cause of the SRQ.

13.2.4.5 Error Queue Query

Each error state in the instrument leads to an entry in the error queue. These entries are detailed plain-text error messages. If a sensor is connected, the errors concerning this sensor can be accessed in manual control via the `UTIL - TEST - SENS` menu. In general, the error queue is queried via the IEC bus using the command `SYSTem:ERRor?`. Each call of `SYSTem:ERRor?` provides one entry from the error queue. If no error messages are stored there any more, the instrument responds with `0, No error`.

The error queue should be queried after every SRQ in the controller program as the entries describe the cause of an error more precisely than the status registers. Especially in the test phase of a controller program the error queue should be queried regularly since faulty commands from the controller to the instrument are recorded there as well.

13.2.5 Reset Values of the Status Reporting Systems

[Table 13-5](#) comprises the different commands and events causing the status reporting system to be reset. None of the commands, except for `*RST` and `SYSTem:PRESet` influence the functional instrument settings. In particular, `DCL` does not change the instrument settings.

Table 13-5: Resetting instrument functions

Event Effect	Switching on supply voltage		DCL, SDC (Device Clear, Selected Device Clear)	*RST or SYS- Tem:PRE- Set	STA- Tus:PRESet	*CLS
	Power-On-Status-Clear					
	0	1				
Clear STB, ESR	---	yes	---	---	---	yes
Clear SRE, ESE	---	yes	---	---	---	---
Clear PPE	---	yes	---	---	---	---

Clear EVENT parts of the registers	---	yes	---	---	---	yes
Clear ENABLE parts of all OPERATION-and QUESTIONable registers, Fill ENABLE parts of all other registers with "1"	---	yes	---	---	yes	---
Fill PTRansition parts with „1" Clear NTRansition parts	---	yes	---	---	yes	---
Clear error queue	yes	yes	---	---	---	yes
Clear output buffer	yes	yes	yes	1)	1)	1)
Clear command processing and input buffer	yes	yes	yes	---	---	---

¹⁾ Every command being the first in a command line, i.e. immediately following a <PROGRAM MESSAGE TERMINATOR> clears the output buffer.

13.3 Common Commands

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&DFC.....	85
&GET.....	85
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>M.....	86
>R.....	86
&HFC.....	86
&LLO.....	86
&NREN.....	86
*CLS.....	86
*DEV.....	86
*DMC.....	87
*EMC.....	87
*ESE.....	87
*ESR?.....	87
*GCLS.....	87

*GMC?	87
*GOPC?	88
*GWAI	88
*IDN?	88
*IST?	88
*LMC?	88
*OPC	89
*OPT?	89
*PMC	89
*PRE	89
*PSC	89
*RCL	90
*RMC	90
*RST	90
*SAV	90
*SRE	90
*SRQ?	91
*STB?	91
*TRG	91
*TST?	91
*WAI	91
*XESE	92
*XESR?	92
*XPRES	92
*XSRE	92
*XSTB?	92

&ABO

Device clear

Usage: Event

&DFC

Disable flow control

Usage: Event

&GET

Group execute trigger

Usage: Event

>L

Goto local

Usage: Event

>M

Goto local with remote state.

Usage: Event

>R

Goto remote

Usage: Event

&HFC

Hardware flow control

Usage: Event

&LLO

Local lockout

Usage: Event

&NREN

Not remote enabled (goto local)

Usage: Event

***CLS**

CLear Status

Resets the:

- Status byte (STB)
- Standard event register (ESR)
- `EVENT` part of the `QUESTIONable` and the `OPERation` register
- Error/event queue

The command does not alter the `ENABLE` and `TRANSition` parts of the registers.

Usage: Event

***DEV [<instrument_no>]**

This command returns the selected "instrument" of the device. The command can be used to select between different "instruments" in a multichannel device.

Parameters:

<instrument_no> The assigned instrument.

***DMC** <Label>, <Macro>

***DMC?** <Label>

Defines a macro command.

Parameters:

<Macro>

Parameters for setting and query:

<Label>

***EMC** <Enable>

Enables macro command.

Parameters:

<Enable>

***ESE** <register>

Event Status Enable

Sets the event status enable register to the specified value. The query returns the contents of the event status enable register in decimal form.

Parameters:

<register>	Range:	0 to 255
	*RST:	0

***ESR?**

Event Status Read query

Returns the contents of the event status register in decimal form (0 to 255) and subsequently sets the register to zero.

Usage: Query only

***GCLS**

Clears all status information in all internal "instruments".

Usage: Event

***GMC?** <Label>

Get macro content.

Query parameters:

<Label>

Return values:

<Macro>

<dblock>

Usage:

Query only

***GOPC?**

Analogon of *OPC? for all instruments in multichannel device.

Return values:

<gopc>

"1" is return if all pending operations in all internal "instruments" are finished.

Usage:

Query only

***GWA**

Waits for all pending operations in all internal "instruments".

Usage:

Event

***IDN?**

IDeNtification query

Returns a string with information on the sensor's identity (device identification code). In addition, the version number of the installed firmware is indicated.

Usage:

Query only

***IST?**

Individual SStatus query

Returns the current value of the IST flag in decimal form. The IST flag is the status bit which is sent during a parallel poll.

Usage:

Query only

***LMC?**

List macro commands.

Return values:

<Label>

Usage:

Query only

***OPC**

Operation Complete

Sets bit 0 in the event status register when all preceding commands have been executed. This bit can be used to initiate a service request. *OPC must be sent at the end of a program message.

The query form returns a "1" when all previous commands have been processed. It is important that the read timeout is set sufficiently long.

Since *OPC? waits until all previous commands are executed, "1" is returned in all cases.

*OPC? basically functions like the *WAI command, but *WAI does not return a response.

*OPC? is preferred to *WAI because with *OPC?, the execution of commands can be queried from a controller program before new commands are sent. This prevents overflow of the input queue when too many commands are sent that cannot be executed.

Unlike *WAI, *OPC? must be sent at the end of a program message.

***OPT?**

OPTION identification query

Returns a comma-separated list of installed options.

Usage: Query only

***PMC**

Purge macro command.

Usage: Event

***PRE <register>**

Parallel poll Register Enable

Sets the parallel poll enable register to the specified value or queries the current value.

Parameters:

<register>	Range:	0 to 255
	*RST:	0

***PSC <psc>**

Writes/reads the power on status clear flag (PSC).

Parameters:

<psc>	Power on status clear flag.
-------	-----------------------------

***RCL <number>**

ReCaLI

Calls the device state which has been stored with the [*SAV](#) command under the specified number.

Setting parameters:

<number> Range: 0 to 9
 *RST: 0

Usage: Setting only

***RMC <Label>**

Remove macro content.

Setting parameters:

<Label>

Usage: Setting only

***RST**

ReSeT

Sets the sensor to the default state, i.e. the default settings for all parameters are loaded. The command corresponds to the command [SYSTem:PRESet](#).

Usage: Event

***SAV <number>**

SAVe

Stores the current device state under the specified number. The storage numbers 0 to 9 are available.

Setting parameters:

<number> Range: 0 to 9
 *RST: 0

Usage: Setting only

***SRE <register>**

Service Request Enable

Sets the service request enable register to the specified value. This command determines under which conditions a service request is triggered.

Parameters:

<register> Range: 0 to 255
 *RST: 0

***SRQ? [<timeout>]**

A generic `srq wait` command to be used without `srq event transport`. It is simply read from the interface.

Query parameters:

<timeout>

Return values:

<srq>

Usage: Query only

***STB?**

STatus Byte query

Returns the contents of the status byte in decimal form.

Usage: Query only

***TRG**

TRiGger

Triggers a measurement. This command is only valid if the power sensor is in the `WAIT_FOR_TRIGGER` state and the trigger source is set to `BUS`

Usage: Event

***TST?**

Selftest query

Triggers a self test of the instrument and outputs an error code in decimal form. 0 indicates that no errors have occurred.

Example: *TST?
Query
0
Response: Passed

Example: *TST?
Query
1
Response: Failed

Usage: Query only

***WAI**

WAI to continue

Prevents the execution of the subsequent commands until all preceding commands have been executed and all signals have settled.

Usage: Event

***XESE <xese>**

This command specifies the standard event status enable register (ESE). This register determines which events from the standard event status register (ESR) are summarized in bit 5 (the event summary bit ESB) of the status byte.

Parameters:

<xese> <expr>

***XESR?**

This command reads the standard event status register (ESR). This command causes the register to be cleared.

Return values:

<xesr> <expr>

Usage: Query only

***XPRES <xpre>**

This command reads/writes the parallel pll enable register (PRE).

Parameters:

<xpre> <expr>
Parallel poll enable register.

***XSRES <xsre>**

The service request enable register. This command can be used to enable service requests.

Parameters:

<xsre> <expr>
Service request enable register (SRE).

***XSTB?**

Reads the status byte.

Return values:

<xstb> <expr>
Status byte (STB).

Usage: Query only

13.4 CALCulate

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CALCulate<Measurement>:DMODE <mode>

Selects the display mode. Digital only (SDIG) or digital and analog (SAN).

Suffix:

<Measurement> 1...100

Parameters:

<mode> SDIGital | SANalog
*RST: SANalog

CALCulate<Measurement>:HOLD:FUNCTION <function>

Configures the MaxHold function, holding the maximum (MAX), minimum (MIN) or difference of max - min (DIFF).

Suffix:

<Measurement> 1...100

Parameters:

<function> MAX | MIN | DIFFerence
*RST: MAX

CALCulate<Measurement>:HOLD[:STATe] <state>

Enables or disables the MaxHold function or reset the currently hold values.

Suffix:

<Measurement> 1...100

Parameters:

<state> OFF | ON | RESet

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer:STATe <state>

Enables or disables the checking of the lower limit.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<state>

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:CCDF
<value>**

Lower limit value for CCDF.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 0.0
 Default unit: pct

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:
RCoefficient <value>**

Lower limit value for reflection coefficient.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 1.0
 Default unit: -

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:
RFRatio <value>**

Lower limit value for ratio of forward/reverse power.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 0.0
 Default unit: pct

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:
 RLOss <value>**

Lower limit value for return loss.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: -200.0
 Default unit: dB

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio:
 SWR <value>**

Lower limit value for SWR.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1e18
 *RST: 1.0
 Default unit: -

**CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA]:RATio[:
 VALue] <value>**

Lower limit value for power ratio.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 1e-2
 Default unit: -

CALCulate<Measurement>:LIMit<DirectionalChannel>:LOWer[:DATA][:POWER]
 <value>

Lower limit value for power value.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-9
 Default unit: W

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer:STATe <state>

Enables or disables the checking of the upper limit.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<state>

CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:CCDF
 <value>

Upper limit value for CCDF.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 100.0
 Default unit: pct

**CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:
 RCOefficient <value>**

Upper limit value for reflection coefficient.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 5.0
 Default unit: -

**CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:
 RFRatio <value>**

Upper limit value for ratio of forward/reverse power.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 100.0
 Default unit: pct

**CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:
 RLOSS <value>**

Upper limit value for return loss.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: 200.0
 Default unit: dB

**CALCulate<Measurement>:LIMit<DirectionalChannel>:UPPer[:DATA]:RATio:
 SWR <value>**

Upper limit value for SWR.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1e18
 *RST: 2.0
 Default unit: -

CALCulate<Measurement>:LIMIT<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] <value>

Upper limit value for power ratio.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 100.0
 Default unit: -

CALCulate<Measurement>:LIMIT<DirectionalChannel>:UPPer[:DATA][:POWER] <value>

Upper limit value for power value.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-2
 Default unit: W

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:CCDF <value>

Lower limit value for CCDF bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 0.0
 Default unit: pct

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:RCoefficient <value>

Lower limit value for reflection coefficient bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 1.0
 Default unit: -

**CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:
 RFRatio <value>**

Lower limit value for ratio of forward/reverse power bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 0.0
 Default unit: pct

**CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:
 RLOSS <value>**

Lower limit value for return loss bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: -200.0
 Default unit: dB

**CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio:
 SWR <value>**

Lower limit value for SWR bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1e18
 *RST: 1.0
 Default unit: -

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA]:RATio[:VALue] <value>

Lower limit value for power ratio bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 1e-2
 Default unit: -

CALCulate<Measurement>:METer<DirectionalChannel>:LOWer[:DATA][:POWER] <value>

Lower limit value for power value bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-9
 Default unit: W

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:CCDF <value>

Upper limit value for CCDF bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 100.0
 Default unit: pct

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:RCoefficient <value>

Upper limit value for reflection coefficient bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 5.0
 Default unit: -

**CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:
 RFRatio <value>**

Upper limit value for ratio of forward/reverse power bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 100.0
 Default unit: pct

**CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:
 RLOSS <value>**

Upper limit value for return loss bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: 200.0
 Default unit: dB

**CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio:
 SWR <value>**

Upper limit value for SWR bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1e18
 *RST: 2.0
 Default unit: -

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA]:RATio[:VALue] <value>

Upper limit value for power ratio bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 100.0
 Default unit: -

CALCulate<Measurement>:METer<DirectionalChannel>:UPPer[:DATA][:POWer] <value>

Upper limit value for power value bargraph display.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-2
 Default unit: W

CALCulate<Measurement>:RELative<DirectionalChannel>:CCDF <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 50.0
 Default unit: pct

CALCulate<Measurement>:RELative<DirectionalChannel>:POWer <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-3
 Default unit: W

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RCoefficient
 <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100
 <DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1.0
 *RST: 0.5
 Default unit: -

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RFRatio
 <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100
 <DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 100.0
 *RST: 50.0
 Default unit: pct

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:RLOSs <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100
 <DirectionalChannel> 1..2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: 0.0
 Default unit: dB

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio:SWR <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 0.0 to 1.0
 *RST: 0.5
 Default unit: -

CALCulate<Measurement>:RELative<DirectionalChannel>:RATio[:VALue]
 <value>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 1.0
 Default unit: -

CALCulate<Measurement>:RELative<DirectionalChannel>[:STATe] <state>

DirectionalChannel means Forward and Reverse.

Suffix:

<Measurement> 1...100

<DirectionalChannel> 1..2

Parameters:

<state> OFF | ON | SET

CALCulate<Measurement>:RESolution <resolution>

Selects the result resolution. This affects both the display resolution as well as resolution settings for the sensor(s).

Suffix:

<Measurement> 1...100

Parameters:

<resolution> I | OI | OOI | OOOI
 *RST: OOI

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNT:AUtO[:STATe] <state>

Enables or disables the mode for determining the Average Count automatically from the level of the input signal.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<state> *RST: ON

CALCulate<Measurement>[:CHANnel<Channel>]:AVERage:COUNT[:VALue] <value>

Sets the filter length i.e. the number of readings to be averaged for one measured value. The higher the count the lower the noise and the longer it takes to obtain a measured value.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 1 to 65536
*RST: 4

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:RPLane <plane>

Selects the source (SOURce) or the load (LOAD) port as the reference plane for measurements.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<plane> SOURce | LOAD
*RST: SOURce

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet:STATe <state>

Enables or disables a selected frequency dependent offset table per channel.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<state>

CALCulate<Measurement>[:CHANnel<Channel>]:CORRection:OFFSet[:MAGNitude] <value>

Sets an offset correction value for the selected reference plane. This can correct the influence of cables etc. and does not influence measurement accuracy.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: -200.0 to 200.0
 *RST: 0.0
 Default unit: dB

CALCulate<Measurement>[:CHANnel<Channel>]:FEED <function>

Select the measurement function for a given channel.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<function> *RST: POWER:FORWard:AVERage

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture:MODE <mode>

Selects a user-defined value (USER) or the default (DEFAULT) value for the integration time.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<mode> DEFAULT | USER
 *RST: DEFAULT

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:APERture[:VALue] <value>

Defines the integration time if the *Aperture* mode is set to USER.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 10.0e-6 to 2.0
 *RST: 0.03667
 Default unit: s

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:MODE <mode>

Defines the mode for average burst power results, either calculated (USER) or measured (AUTO).

Suffix:

<Measurement> 1...100
 <Channel> 1...2

Parameters:

<mode> AUTO | USER
 *RST: AUTO

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:PERiod <value>

Period of a burst sequence (for selected burst USER mode).

Suffix:

<Measurement> 1...100
 <Channel> 1...2

Parameters:

<value> Range: 0.0 to 1.0
 *RST: 0.1
 Default unit: s

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:BURSt:WIDTh <value>

Burst width (for selected burst USER mode).

Suffix:

<Measurement> 1...100
 <Channel> 1...2

Parameters:

<value> Range: 0.0 to 1.0
 *RST: 0.01
 Default unit: s

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:CCDF:THReshold <value>

Defines a threshold power level used for CCDF, where the probability is measured that the envelope power exceeds a given threshold.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 0.0 to 100e6
 *RST: 0.001
 Default unit: W

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DIRection <direction>

Selects the direction of forward power relative to defined ports 1 and 2. In **AUTO** mode the port with the greater measured power is interpreted as forward power.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<direction> AUTO | FORWard | REVerse
 *RST: AUTO

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation:WCDMa:CRATe <value>

Defines the WCDMA chip-rate.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 0.0 to 8.2e6
 *RST: 1.0e6
 Default unit: Hz

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:DMODulation[:VALue] <modulation>

Selects a certain communication standard for the modulation correction.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<modulation> OFF | IS95 | WCDMa | DVBT | DAB
 *RST: OFF

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:PEP:HOLD:TIME <value>

Specifies the hold time of the peak hold circuit. If the entry is valid, the `USER` mode is automatically switched on and the default setting is switched off.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 1e-3 to 1e-1
 *RST: 0.01
 Default unit: s

CALCulate<Measurement>[:CHANnel<Channel>]:NRT:VBWidth[:VALue] <value>

Selects a certain video bandwidth filter (0..2). The actual filter bandwidth is sensor specific. For example [4 kHz, 200 kHz, 600 kHz] for NRT-Z14 or [4 kHz, 200 kHz, 4 MHz] for NRT-Z43/-Z44.

Suffix:

<Measurement> 1...100

<Channel> 1...2

Parameters:

<value> Range: 0 to 2
 *RST: 2

CALCulate<Measurement>:LIMit[:STATe] <state>

These commands are used to start (ON) or stop (OFF) the search for the min/max values, which cover the measurement functions set under subsystem `SENSE<n>:FUNCTION[:ON] <measurement function>`. The min/max memories are automatically reset upon start. During a search for the max/min values, the value set under subsystem `CALCulate<n>:LIMit:TYPE` (maximum, minimum or the difference thereof) is returned to a request for data, not however the currently measured value. The request for data is in the form of the query `SENSE<n>:DATA?`.

Suffix:

<Measurement> 1...100

Parameters:

<state> ON | OFF
 *RST: OFF

Example: `CALC1:LIM ON`

CALCulate<Measurement>:LIMit:TYPE <type>

The command allows selection of the value to be output.

Suffix:
 <Measurement> 1...100
 xxx

Parameters:
 <type> MAX | MIN | DIFFerence
MAXimum
 Maximum value
MINimum
 Minimum value
DIFFerence
 Difference between maximum and minimum value
 *RST: MAX

Example: CALC1:LIM:TYPE MAX

13.5 CALibration

CALibration<Sensor>:ZERO..... 111

CALibration<Sensor>:ZERO

This command causes zeroing to be carried out for the sensor connected to port <sensor>. No RF power shall be applied to the sensor during zeroing.

Zeroing must be completed before a new measurement can be started. The command *WAI allows to recognize the end of a zeroing procedure.

Example: CAL2:ZERO

Usage: Event

13.6 DIAGnostic

DIAGnostic:INFO:OTIMe?..... 111

DIAGnostic:INFO:OTIMe?

This command returns the count of the built-in elapsed-time meter. The count is always output in hours [h] and cannot be changed from outside.

The command is in the form of a query and therefore has no *RST value.

Example: DIAG:INFO:OTIM?

Usage: Query only

13.7 FORMat

FORMat:SREGister.....	112
FORMat[:DATA].....	112

FORMat:SREGister <sregister>

Specifies which format is used for the return value of *STB?.

Parameters:

<sregister> ASCII | HEXadecimal | OCTal | BINary
 *RST: ASCII

Example: FORM:SREG ASC

FORMat[:DATA] [<data,length>, <length>]

Specifies whether numeric data is sent as block data in binary form (REAL) or as character strings in plain text (ASCII). Also specifies the length.

Parameters:

<data,length> ASCII | REAL
 *RST: ASCII

 <length> Range: 0 to 64
 *RST: 0

Example: FORM ASC,12

13.8 FREQuency

FREQuency<Sensor>.....	112
------------------------	-----

FREQuency<Sensor> <value>

Sets the carrier frequency of the applied signal. This corrects any frequency- dependent effects introduced by the sensor. If the sensor is to reach the specified measurement accuracy, the signal frequency must be entered.

Parameters:

<value> Default unit: Hz

13.9 INPut

INPut<Sensor>:PORT:OFFSet.....	113
INPut<Sensor>:PORT:POSition.....	113
INPut<Sensor>:PORT:SOURce[:VALue].....	113
INPut<Sensor>:PORT:SOURce:AUTO.....	114

INPut<Sensor>:PORT:OFFSet <offs>

This command allows the transmission loss in a cable connecting the desired measurement point and the sensor to be taken into account. If the measurement position is set to LOAD, i.e. INPut<n>:PORT:POSition LOAD, the cable is assumed to be connected between the sensor and the load, otherwise between the sensor and the source.

Parameters:

<offs> Range: 0.0 to 100.0
 *RST: 0.0
 Default unit: dB

Example: INP1:PORT:OFFS 1.25

Manual operation: See "Offset" on page 41

INPut<Sensor>:PORT:POSition <pos>

This command selects the reference plane. It defines the sensor port to which the measurement results are to be referred to.

Parameters:

<pos> SOURce | LOAD
 SOURce
 Referred to source.
 LOAD
 Referred to load.
 *RST: SOURce

Example: INP2:PORT:POS SOUR

INPut<Sensor>:PORT:SOURce[:VALue] <val>

Defines the forward direction for the given input if the automatic assignment has been switched off by INPut{Sensor{1...128}}:PORT:SOURce:AUTO OFF.

Parameters:

<val> Range: 1 to 2
 *RST: 1

INPut<Sensor>:PORT:SOURce:AUTO <auto>

This command switches the automatic assignment of the forward direction on or off.

Parameters:

<auto>

ON

With automatic assignment of the forward direction, the direction in which the greater power flows is taken as the forward direction.

OFF

If the automatic assignment is switched off, e.g. to obtain a clear assignment in the case that forward and reverse power are almost equal, the orientation of the sensor is to be defined with the **INPut<Sensor>:PORT:SOURce** command.

*RST: 0

Example:

INP2:PORT:SOUR:AUTO OFF

13.10 MMEMory

MMEMory:ALlases?	114
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MMEMory:ALlases? {<alias>, <path>}...

Reads the current list of predefined path aliases to be used with the MMEM commands. In case there are no aliases defined, a single empty string is returned.

Return values:

<alias>	The token to be used instead of a given path.
<path>	The path that is expanded in MMEM commands for the associated alias definition.

Usage: Query only

MMEMory:ATTRibute <path_name>, <attributes>

MMEMory:ATTRibute? <path_name>

This instruction permits a setting and/or a resetting of file attributes.

The indication of path depends on Windows conventions for file names and can contain Wildcards.

Note: This commands is limited to files (does not function for listings).

Setting parameters:

<attributes>	String, which contains the information for the setting/resetting of attributes.
+	Sets an attribute. Permissible syntax of the string for the setting/deletion of attributes: For everyone of the attributes which can be treated must be placed in front his letter "+" for setting and/or "-" for deletion.
-	Deletes an attribute.
R	Attribute for write protected file.
A	Attribute for archiving file.
S	Attribute for system file.
H	Attribute for hid file.
*RST:	-

Parameters for setting and query:

<path_name>	Path indication
-------------	-----------------

Return values:

<file_entry>	Response string containing <file_name>, <attributes>
--------------	--

Example:

MMEM:ATTR 'D:\USER\DATA*.LOG', '-R -A'
Deletes the attribute for write protected file and the attribute for archiving file for all *.LOG files in the D:\USER\DATA directory.

Example:

MMEM:ATTR? 'D:\USER\DATA*.*'
Returns a list of all files and their attributes in the D:\USER\DATA directory.

MMEMory:CATalog? <path_name>[, <format>]

Returns the subdirectories and files in the specified directory. If no directory and no drive are specified, the subdirectories and files in the default directory on the default drive are returned.

Query parameters:

<path_name>

<format> ALL | WTime

Return values:

<used_memory> Response string: used bytes in this directory

<free_memory>

<file_entry> Response string: "<file_name>,<file_type>,<filesize_in_bytes>"

Example:

MMEM:CAT? '\\Server\DATA*.LOG'

Returns all files in the \\Server\DATA directory with the *.LOG extension.

Example:

MMEM:CAT? 'D:\user'

Returns all files at the highest directory level of the memory stick.

```
127145265,175325184, "test,DIR,0",
"temp,DIR,0", "readme.txt,ASC,1324",
"state.savracl,STAT,5327", "waveform.wv,BIN,
2342"
```

Response: The D:\user directory contains the test and temp subdirectories as well as the readme.txt, state.savracl and waveform.wv files which have different file types.

Usage: Query only

MMEMory:CATalog:LENGth? [<path_name>]

Returns the number of files in the specified directory. If no directory and no drive are specified, the number of files in the default directory on the default drive are returned.

Query parameters:

<path_name>

Return values:

<count>

Example:

MMEM:CAT:LENG? 'E:\'

Returns the number of files at the highest directory level of the memory stick.

1

Response: There is 1 file at the highest directory level of the memory stick.

Usage: Query only

MMEMory:CDIRectory [<directory_name>]

MMEMory:CDIRectory? [<directory_name>]

Changes the default directory. This directory is used for all **MMEM** commands if no path is specified. It is also possible to change to a higher directory using two dots '..'.

Parameters:

<directory_name> *RST: D:\

Example:

MMEM:CDIR 'test'

Changes from the current directory level to the `test` subdirectory.

MMEMory:COPY <file_source>[, <file_destination>]

Copies the specified file or directory (first parameter) to the specified destination (second parameter).

Setting parameters:

<file_source>

<file_destination> If the file destination not specified, <file_source> is copied to the default directory on the default drive.
Files with the same name that already exist in the destination directory are overwritten without an error message.

Example:

MMEM:COPY 'D:\user\test1.savrcl','E:'

Copies the `test1.savrcl` file in the `user` directory on the `D:` drive to the memory stick without changing the file name.

Usage:

Setting only

MMEMory:DATA <file_name>, <data>[, <append>]

MMEMory:DATA? <file_name>

Writes the <data> to the file identified by <file_name>. The IEC/IEEE bus terminator should be set to EOI in order to ensure correct data transfer.

The associated query transfers the specified file from the R&S NRT2 to the control computer. Make sure that the intermediate memory on the control computer is large enough to receive the file. In this case, the setting for the IEC/IEEE bus terminator is irrelevant.

This command can be used to read or transfer stored instrument settings or waveforms directly from/to the instrument.

Parameters:

<data> **<block>**
 The binary data block has the following structure:
 #234<block_data>
 #
 Always comes first in the binary block.
<number>
 Indicates how many digits the subsequent length entry has (2 in example).
<number>
 Indicates the number of subsequent bytes (34 in example).
<block data>
 Block data for the specified length.
 *RST: -

Setting parameters:

<append> APPend

Parameters for setting and query:

<file_name>

Example: "MMEM:DATA 'TEST1.WV', #3767<block_data>"
 Writes the block data to the test1.wv file.
 MMEM:DATA? 'TEST1.WV'
 Sends the data of the Test1.wv file from the R&S NRT2 to the control computer in the form of a binary block.

MMEMory:DCATalog? [<path_name>]

Returns the subdirectories of the specified directory in a list. The subdirectory names are separated by commas. If no directory is specified, the default directory is read out.

Query parameters:

<path_name>

Return values:

<file_entry> Response string: subdirectory name

Example: MMEM:DCAT?
 Returns the subdirectories of the default directory.
 'test', 'wave', 'digital'
 Response: The test, wave and digital subdirectories exist in the default directory.

Usage: Query only

MMEMory:DCATalog:LENGth? [<path_name>]

Returns the number of subdirectories in the specified directory. If no directory is specified, the default directory is read out.

Query parameters:

<path_name>

Return values:

<file_entry_count> Response string: number of subdirectories.

Example:

MMEM:DCAT:LENG

Returns the number of subdirectories in the current directory.

3

Response: There are 3 subdirectories in the current directory.

Usage:

Query only

MMEMory:DELeTe <file_name>

Deletes the specified file.

Setting parameters:

<file_name>

Example:

MMEM:DEL 'D:\user\test1.savrc1'

Deletes the test1.savrc1 file in the user directory on the internal hard disk.

Usage:

Setting only

MMEMory:DRIVes?

Returns a list of the logical drive assembly designators.

Return values:

<drive>

Example:

MMEM:DRIVes?

"A:\", "C:\", "D:\", "E:\", "H:\", "I:\", "J:\",
 "\", "K:\", "M:\", "N:\", "O:\", "P:\", "Q:\",
 "\", "S:\", "T:\", "U:\", "V:\", "W:\", "X:\",
 "\", "Y:\", "Z:\"

Response: List of the drive assemblies.

Usage:

Query only

MMEMory:LOAD:ITEM <item_path>, <file_name>

Loads a specific part of a system application. This is also called a partial recall.

Setting parameters:

<item_path>

<file_name>

Usage:

Setting only

MMEMory:LOAD:MACRo <label>, <file_name>[, <msus>]

Loads a remote macro from file.

Setting parameters:

<label>

<file_name>

<msus>

Usage: Setting only

MMEMory:LOAD:STATe <sav_rcl_state_number>, <file_name>[, <msus>]

Loads the specified file stored under the specified name in an internal memory.

The *RCL command is used to load the immediate instrument setting.

Setting parameters:

<sav_rcl_state_number> the instrument setting of the selected file is set directly in the R&S NRT2.
 ≠ 0: load the intermediate instrument setting using *RCL on page 90 (for details see example).

<file_name>

<msus>

Example: MMEM:LOAD:STAT 0, 'D:\user\test1.savrcl'
 Loads the test1.savrcl file in the user directory of the internal hard disk and activates the associated instrument setting.

Example: MMEM:STOR:STAT 4, 'D:\user\test4.savrcl'
 Saves the test4.savrcl file in the user directory of the internal hard disk.
 MMEM:LOAD:STAT 4, 'D:\user\test4.savrcl'
 Loads the test4.savrcl file in the user directory of the internal hard disk.
 *RCL 4
 Activates the instrument setting of the test4.savrcl file.

Usage: Setting only

MMEMory:MDIRectory <directory_name>

Creates a new subdirectory or a directory tree in the specified directory. If no directory is specified, the subdirectory/directory tree is created in the default directory.

Setting parameters:

<directory_name>

Example: MMEM:MDIR 'carrier'
 Creates the carrier subdirectory in the default directory.

Usage: Setting only

MMEMory:MOVE <file_source>, <file_destination>

If no path is specified for <file_destination>, renames <file_source>.

If a path is specified for <file_destination>, moves <file_source> to the specified path and stores it under its original file name or, if specified, under a new file name.

Setting parameters:

<file_source> File that is moved and/or renamed.

<file_destination> File destination and, if you want to rename the file, new file name.

Example:

```
MMEM:MOVE 'test1.savrcl','keep1.savrcl'
Renames the test1.savrcls file as keep1.savrcl.
MMEM:MOVE 'test1.savrcl','\test\keep1.savrcl'
Moves the test1.savrcls file to the test subdirectory and
stores it there under the name keep1.savrcl.
```

Usage: Setting only

MMEMory:MSIS [<msus>]

Sets the drive or network resource in the case of networks (MSIS = mass storage identification string). This setting is effective for all MMEMory commands where the drive is not explicitly specified.

Parameters:

<msus> *RST: D:\

Example:

```
MMEM:MSIS 'E:'
Selects the memory stick as the default drive.
```

MMEMory:RCL <file_name>[, <msus>]**Setting parameters:**

<file_name>

<msus>

Usage: Setting only

MMEMory:SAV <file_name>[, <msus>]

Saves directly to a file. This is an alternative to *SAV <num>MMEM:STOR:STAT <num>,<filename>.

Setting parameters:

<file_name>

<msus>

Usage: Setting only

MMEMory:RDIRectory <directory_name>

Deletes the specified subdirectory in the specified directory. If no directory is specified, the specified subdirectory is deleted in the default directory.

Setting parameters:

<directory_name>

Example:

MMEM:RDIR 'carrier'

Deletes the `carrier` subdirectory in the default directory.

Usage:

Setting only

MMEMory:STORe:ITEM <item_name>, <file_name>

Implements the partial save of specific application data.

Setting parameters:

<item_name>

<file_name>

Usage:

Setting only

MMEMory:STORe:MACRo <label>, <file_name>[, <msus>]

Store remote macro definition to file.

Setting parameters:

<label>

<file_name>

<msus>

Usage:

Setting only

MMEMory:STORe:STATe <sav_rcl_state_number>, <file_name>[, <msus>]

Saves the current instrument setting in the specified file.

Setting parameters:

<sav_rcl_state_number> the current instrument setting is stored directly in the specified file.

≠ 0: save the intermediate instrument setting using [*SAV](#) on page 90 (for details see example).

<file_name>

<msus>

Example:

MMEM:STOR:STAT 0, 'D:\USER\TEST1.ss'

Saves the current instrument setting in the `TEST1.ss` file in the `USER` directory on the internal hard disk.

Example: `MMEM:STOR:STAT 4, 'D:\user\test4.savrc1'`
`*SAV 4`
 Saves the `test4.savrc1` file in the user directory of the internal hard disk.

Usage: Setting only

13.11 OUTPut

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OUTPut:REcorder<output>:LIMit:UPPer:RATio:RCOefficient.....	127
OUTPut:REcorder<output>:LIMit:UPPer:RATio:RFRatio.....	127
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OUTPut:LIMit:FAIL <mode>

Specifies the value which should be applied to output 1 if the measured value causes a limit violation and the output is in TTL mode (`OUTPut:MODE<output>` on page 123).

Parameters:

<mode> LOW | HIGH
 HIGH
 Corresponds to an output voltage of 2.5 V, if a limit is violated.
 *RST: LOW

OUTPut:MODE<output> <mode>

Switches the operating mode of the I/O connector.

Connector 1 can be configured as analog output. Analog output may be a DA conversion of a measurement result or a signaling of a limit violation (0 V or 2.5 V).

Connector 2 can be configured as analog output or as trigger input.

Suffix:

<output> 1...2

Setting parameters:

<mode> OFF | REcorder | FREcorder | RREcorder | LIMit | FLIMit | RLIMit | TOUT | TIN

OFF
The connector is disabled.

FREcorder
The output voltage of the connector follows the forward power of the measurement.

RREcorder
The output voltage of the connector follows the reflection power of the measurement.

FLIMit
TTL mode of connector 1. Output is either 0 V or 2.5 V depending on the measured forward power and the setting of **OUTPut: LIMit: FAIL** on page 123 (connector 1 only).

RLIMit
TTL mode of connector 1. Output is either 0 V or 2.5 V depending on the measured reflection power and the setting of **OUTPut: LIMit: FAIL** on page 123 (connector 1 only).

TIN
Connector is configured as trigger input (connector 2 only).

***RST:** OFF

Usage: Setting only

Manual operation: See "**I/O**" on page 48

OUTPut:REcorder<output>:LIMit:LOWer:RATio[:VALue] <value>

Specifies the lower power limit of the characteristic for one of the two analog outputs if the associated calculate block returns a power ratio (unit **DB**, **DPCT** or **O**) as the measured value.

Unit: **DB** | **DPCT** | **O**

Suffix:

<output> 1...2

Parameters:

<value> Range: 1e-18 to 1e18
***RST:** 1.0
 Default unit: -

OUTPut:REcorder<output>:LIMit:LOWer[:POWER] <lower_limit>

Specifies the lower power limit of the characteristic for one of the two analog outputs if the associated calculate block returns a power (unit **DBM**, **W** or **DBUV**) as measured value.

Units: **DBM** | **W** | **DBUV**

Suffix:

<output> 1...2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1e-6
 Default unit: W

OUTPut:RECOder<output>:LIMit:UPPer:RATio[:VALue] <value>

Specifies the upper power limit of the characteristic for one of the two analog outputs if the associated calculate block returns a power ratio (unit **DB**, **DPCT** or **O**) as the measured value.

Unit:DB | DPCT | O**Suffix:**

<output> 1...2

Parameters:

<value> Range: 1e-18 to 1e18
 *RST: 10.0
 Default unit: -

OUTPut:RECOder<output>:LIMit:UPPer[:POWer] <value>

Specifies the upper power limit of the characteristic for one of the two analog outputs if the associated calculate block returns a power (unit **DBM**, **W** or **DBUV**) as the measured value.

Unit:DBM | W | DBUV**Suffix:**

<output> 1...2

Parameters:

<value> Range: 1e-15 to 1e12
 *RST: 1.0
 Default unit: W

OUTPut:RECOder<output>:LIMit:LOWer:CCDF <value>

Specifies the lower limit of the characteristic for one of the two analog outputs. Below this limit, the output is set to 0 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 0.0
 Default unit: pct

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:LOWer:RATio:RCOefficient <value>

Specifies the lower limit of the characteristic for one of the two analog outputs. Below this limit, the output is set to 0 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 0.0
 Default unit: -

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:LOWer:RATio:RFRatio <value>

Specifies the lower limit of the characteristic for one of the two analog outputs. Below this limit, the output is set to 0 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 0.0
 Default unit: pct

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:LOWer:RATio:RLOSs <value>

Specifies the lower limit of the characteristic for one of the two analog outputs. Below this limit, the output is set to 0 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -180.0 to 180.0
 *RST: 0.0
 Default unit: dB

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:LOWer:RATio:SWR <value>

Specifies the lower limit of the characteristic for one of the two analog outputs. Below this limit, the output is set to 0 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 1.0
 Default unit: -

Manual operation: See "I/O" on page 48**OUTPut:RECOder<output>:LIMit:UPPer:CCDF <value>**

Specifies the upper limit of the characteristic for one of the two analog outputs. Above this limit, the output is set to 2.5 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 1.0
 Default unit: pct

Manual operation: See "I/O" on page 48**OUTPut:RECOder<output>:LIMit:UPPer:RATio:RCOefficient <value>**

Specifies the upper limit of the characteristic for one of the two analog outputs. Above this limit, the output is set to 2.5 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 1.0
 Default unit: -

Manual operation: See "I/O" on page 48**OUTPut:RECOder<output>:LIMit:UPPer:RATio:RFRatio <value>**

Specifies the upper limit of the characteristic for one of the two analog outputs. Above this limit, the output is set to 2.5 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 100.0
 Default unit: pct

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:UPPer:RATio:RLOSs <value>

Specifies the upper limit of the characteristic for one of the two analog outputs. Above this limit, the output is set to 2.5 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -180.0 to 180.0
 *RST: 10.0
 Default unit: dB

Manual operation: See "I/O" on page 48

OUTPut:RECOder<output>:LIMit:UPPer:RATio:SWR <value>

Specifies the upper limit of the characteristic for one of the two analog outputs. Above this limit, the output is set to 2.5 V.

Suffix:

<output> 1...2

Parameters:

<value> Range: -1e18 to 1e18
 *RST: 10.0
 Default unit: -

Manual operation: See "I/O" on page 48

13.12 SENSe

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[SENSe<Sensor>:]AVERage:COUNT:AUTO[:STATe] <state>

Enables auto averaging mode.

Parameters:

<state> *RST: ON

[SENSe<Sensor>:]AVERage:COUNT[:VALue] <count>

Sets the filter length, i.e. the number of readings that are averaged for one measured value. The higher the count, the lower the noise, and the longer it takes to obtain a measured value.

Parameters:

<count> Range: 1 to 65536
 *RST: 4

[SENSe<Sensor>:]BANDwidth:VIDeo:FNUMber <fnum>

Sets the video bandwidth for the Trace mode.

Parameters:

<fnum> Range: "FULL", "5 MHz", "1.5 MHz", "300 kHz"
 *RST: depending on sensor

Manual operation: See "[Video Bandwidth](#)" on page 42

[SENSe<Sensor>:]BWIDth:VIDeo:FNUMber <fnum>

Sets the video bandwidth for the Trace mode.

Parameters:

<fnum> Range: "FULL", "5 MHz", "1.5 MHz", "300 kHz"
 *RST: depending on sensor

Example:

SENS1:BAND:VID:FNUM 3

[SENSe<Sensor>:]FUNCTION[:ON] <function>

Sets the sensor to the selected measurement mode.

In remote control, the timing (SENS:TIM:EXCL:STAR and -:STOP) and the trigger system of all measurement modes (except the Burst mode) are user-selectable.

Note:

To increase measurement accuracy, the sensors measure each signal twice in the Burst, Timeslot and Trace measurement modes (exception: in the Trace mode, with SENS:TRAC:REAL ON). As long as the trigger system is set to internal or external triggering, this is usually of no importance to the user. If TRIG:SOUR HOLD or BUS is used, however, then each measurement must be triggered twice (with *TRG or TRIG:IMM).

Error messages:

24	" Sensor mode not supported ": A sensor does not support a measurement mode.
28	" Sensor not idle ": The sensor is not in the IDLE state.
-151	" Invalid string data ": An invalid parameter was transmitted for <string>.

Parameters:

<function>

POWer:CFACtor**Crest Factor**

The crest factor indicates the level difference between the PEP value and the average power in dB. It allows thus to recognize larger modulation distortions.

POWer:FORWard:AVERAge**Average**

Indicates the average power

POWer:FORWard:AVERAge:BURST**Average Burst Power**

This term is used for pulsed RF signal to define the average carrier power within the burst. The average burst is equal to the PEP (Peak Envelope Power) value if the burst is unmodulated and has no overshoots. The NRT2 measures the average burst power by multiplying the average power with the ratio of burst period to burst width. The two burst parameters must either be user-defined or the ratio is automatically determined by the NRT2. Manual entry of the parameters is possible any time and the sensors NRT-Z43/44 also allow automatic measurement.

POWer:FORWard:PEP**Peak Envelope Power**

This is the periodically recurring peak value of the carrier power at maximum modulation. The PEP is an important parameter for describing the modulation characteristics of transmitter output stages. The level difference between PEP and AVG may be between 0 dB (CW signal) and some 10 dB (radar bursts).

POWer:FORWard:CCDFunctio**CCDF**

This function provides information about the probability of the peak envelope power exceeding a preset threshold. It is suitable e.g. for assessing the power distribution of spread-spectrum signals (CDMA or similar). The sensors NRT-Z43/44 provide this function. The video bandwidth can be selected.

POWer:ABSorbition:AVERAge**Average Absorbed Power**

This function Indicates the difference between forward and reverse power.

POWer:ABSorbition:AVERAge:BURSt**Average Absorbed Burst Power**

This function Indicates the difference between forward and reverse power (burst).

POWer:ABSorbition:PEP**Absorbed Peak Envelope Power**

This function Indicates the difference between forward and reverse power (PEP).

POWer:REVerse**Reverse Power**

Reverse power (in W or dBm, according to power indication).

*RST: POWER:AVG

[SENSe<Sensor>:][POWER:][AVG:][APERture[:VALue] <integration_time>

Determines the integration time for a single measurement in the ContAv mode. To increase the measurement accuracy, this integration is followed by a second averaging procedure in a window with a selectable number of values. The filter window is configured with the [SENSe<[1]..4>]:AVERage commands.

Parameters:

<integration_time> Range: 10.0e-6 to 2.00
 *RST: 0.03667
 Default unit: s

[SENSe<Sensor>:][FREQuency[:CW] <frequency>

This command informs the NRT of the carrier frequency of the specified sensor.

The entered frequency value is required to correct the frequency-dependent response of the sensor. For this purpose NRT sensors contain a ROM with all sensor-specific data. For NAP sensors frequency-dependent calibration factors can be entered via the CALibration system.

Parameters:

<frequency> Range: 0.0 to 110.0e9
 *RST: 1.0e9
 Default unit: Hz

Example: SENS1:FREQ 10 MHz

[SENSe<Sensor>:][FREQuency:FIXed <frequency>

This command informs the NRT of the carrier frequency of the specified sensor.

The entered frequency value is required to correct the frequency-dependent response of the sensor. For this purpose NRT sensors contain a ROM with all sensor-specific data. For NAP sensors frequency-dependent calibration factors can be entered via the CALibration system.

Parameters:

<frequency> Range: 0.0 to 110.0e9
 *RST: 1.0e9
 Default unit: Hz

Example: SENS1:FREQ 10 MHz

SENSe<Sensor>:BURSt:MODE <mode>

This command instructs the NRT how to measure the average burst power.

Parameters:

<mode> AUTO | USER

AUTO

The sensor automatically recognizes the duty cycle of the burst series and calculates the average burst power from this duty cycle and the average power. An appropriate video bandwidth has to be set. For NAP-sensors, AUTO cannot be selected.

USER

The duty cycle is defined by the burst width and burst period, see [SENSe<Sensor>:BURSt:PERiod](#) on page 133 and [SENSe<Sensor>:BURSt:WIDTh](#) on page 133. The NRT calculates the average burst power from this duty cycle and the average power.

*RST: AUTO

Example:

SENS1:BURS:MODE AUTO

Manual operation: See "[Burst Mode](#)" on page 39**SENSe<Sensor>:BURSt:PERiod <value>**

This command defines the burst period. It is only valid in the "USER" mode, see [SENSe<Sensor>:BURSt:MODE](#) on page 132.

Parameters:

<value> Range: 0.0 to 1.0
*RST: 0.1
Default unit: s

Example:

SENS1:BURS:PER 1ms

Manual operation: See "[Burst Period](#)" on page 39**SENSe<Sensor>:BURSt:WIDTh <width>**

This command defines the width of a burst. It is only valid in the "USER" mode, see [SENSe<Sensor>:BURSt:MODE](#) on page 132.

Parameters:

<width> Range: 0.0 to 1.0
*RST: 0.01
Default unit: s

Example:

SENS1:BURS:WIDTh 10ms

Manual operation: See "[Burst Width](#)" on page 39

[SENSe<Sensor>:]DM:STANdard <standard>

This command selects the communication standard. Which settings are available depends on the sensor used. The settings are valid only if the modulation correction is switched on via the `INPut<n>:DM:STATe ON` command.

Parameters:

<standard> IS95 | WCDMa | DVBT | DAB
 *RST: IS95

Example: SENS1:DM:STAN IS95

Manual operation: See "Modulation" on page 41

[SENSe<Sensor>:]DM:STATe <state>

This command switches the correction of the measurement value for modulated signals on or off. Selection of a communication standard, see [\[SENSe<Sensor>:\]DM:STANdard](#) on page 134, is enabled only if the correction is switched on.

Parameters:

<state> Range: "ON", "OFF"
 *RST: 0

Example: SENS1:DM:STAT ON

[SENSe<Sensor>:]DM:WCDMa:CRATe <value>

This command defines the chip rate for the communication standard WCDMA. The allowed range is sensor-dependent; the value is always entered without the unit (s^{-1}).

Parameters:

<value> Range: 0.0 to 8.2e6
 *RST: 1.0e6
 Default unit: Hz

Example: SENS1:DM:WCDM:CRAT 4.096E6

Manual operation: See "WCDMA Chip Rate" on page 41

[SENSe<Sensor>:]DATA? [<function>]

This command provides access to the results of the current measurement(s). It is possible to request the result of a certain measurement function or to query the results of all measurement functions switched on. The measurement functions are configured with the `SENS<n>:FUNC . . .` commands.

The responses are output in the unit selected for the corresponding function. For some functions, the unit can be selected.

By defining the measurement function, the result of a special measurement function is requested. Without this specification the results of all active functions are queried. The responses are given in the sequence of the measurement functions listed under

[SENS<n>:] FUNC: ON.

The command is a query and therefore has no *RST value.

Query parameters:

<function>

Example:

SENS2:DATA? "POW:FORW:AVER"

Returns the measured result for the average forward power.

Usage:

Query only

[SENSe<Sensor>:]FUNCTION:CONCurent <concurrent>

This command defines whether several measurement functions may be simultaneously activated.

Parameters:

<concurrent>

ON

Two measurement functions may be simultaneously active. If two measurement functions are mutually exclusive, the error message. -221 "Settings conflict" is generated and the first setting retained. All POW:FORW and POW:ABS functions are mutually exclusive. This applies also to the POW:REV and POW:S11 functions.

OFF

Only a single function can be active. If a new measurement function is switched on, the previously active function is switched off automatically.

*RST: ON

Example:

SENS2:FUNC:CONC ON

[SENSe<Sensor>:]FUNCTION:OFF:ALL<Channel>

This command switches off all measurement functions referring to a specific channel no. <m>, i.e. SENSe<Sensor>:Function:OFF:ALL1 switches off all forward measurement functions, SENSe<Sensor>:Function:OFF:ALL2 switches off all measurement functions in the reverse channel.

The command is a function call and therefore has no *RST-value.

Suffix:

<Channel>

1...2

Example:

SENS1:FUNC:OFF:ALL1

Usage:

Event

[SENSe<Sensor>:]FUNCTION:OFF[:FUNC] <function>

This command switches off a specified measurement function. If the command is in the form of a query, the headers of all switched-off measurement functions will be returned in the sequence defined under [SENS<n>]:FUNC:ON.

The command is a function call or query and therefore has no *RST value.

Setting parameters:

<function>

Example:

```
SENS2:FUNC:OFF "POW:REV"
```

```
SENS2:FUNC:OFF?
```

The following response would be possible:

```
"POW:CFAC","POW:FORW:AVER:BURS","POW:FORW:PEP",  
"POW:FORW:CCDF","POW:ABS:AVER",  
"POW:ABS:AVER:BURS","POW:ABS:PEP","POW:REV"
```

Usage:

Setting only

[SENSe<Sensor>:]FUNCTION:STATe? <function>

This command returns the status of the measurement function:

- Response 0: measurement function switched off
- Response 1: measurement function switched on

All functions defined under SENS<n>:FUNC:ON are available as measurement functions.

The command is a query and therefore has no *RST value.

Query parameters:

<function>

Example:

```
SENS2:FUNC:STAT? "POW:REV"
```

Usage:

Query only

[SENSe<Sensor>:]INFormation?

This command returns the condensed data of the sensor in form of an ASCII string.

Example:

```
SENS2:INF?
```

Usage:

Query only

[SENSe<Sensor>:]NAME <name>

Set a user selectable name for the sensor. This has no further influence on other functions. It exists for naming a sensor according to user requirements.

Parameters:

<name>

[SENSe<Sensor>:]POWer:CCDFunction:REFerence <ref>

This command defines the threshold for the cumulative distribution function (CCDF). The distribution function states the probability (in %) of the envelope power lying above the threshold. Units W or dB or dBm.

Parameters:

<ref> Range: 0.0 to 100.0e6
 *RST: 1.0e-3
 Default unit: W

Example: SENS2:POW:CCDF:REF 10W

Manual operation: See "[CCDF Threshold](#)" on page 39

[SENSe<Sensor>:]POWer:REFLection:RANGe:AUTO <state>

This command switches the automatic adaptation of the bargraph scaling for the reflection indication on or off.

Parameters:

<state> **ON**
 If auto-ranging is switched on, the scale limits of the bargraphs are automatically adapted to the current measured value.
 OFF
 If it is switched off, the scale limits remain fixed.
 *RST: 1

Example: SENS1:POW:REFL:RANG:AUTO OFF

[SENSe<Sensor>:]POWer:REFLection:RANGe:LIMit:DETECT <value>

This command defines the conditions for a logic high level (> 2.7 V) being output at the AUX TTL connector if this connector has been defined as a monitoring output for the power indication (e.g. with the command `SENSe<n>:POWer:RANGe:LIMit ON`).

Parameters:

<value> INBound | OUTBound | HIGH
 INBound
 A high level is output if the measured power is within the range specified by the scale limits of the lefthand bargraph.
 OUTBound
 A high level is output if the measured power is out of the range defined by the scale limits of the lefthand bargraph.
 HIGH
 A high level is output if the measured power exceeds the upper scale limit of the lefthand bargraph.
 *RST: HIGH

Example: SENS1:POW:RANG:LIM:DET INB

[SENSe<Sensor>:]POWer:REFLection:RANGe:LIMit[:STATe] <state>

This command can be used to define the AUX TTL connector as a monitoring output for the reflection (ON state). In the OFF state, the connector may be defined either as a monitoring output for the power indication or as a trigger input. If the AUX TTL connector is assigned more than one function, the error message –221 "Settings conflict" is generated and the first setting retained.

Parameters:

<state> Range: "ON", "OFF"
 *RST: OFF

Example:

```
TRIG:SOUR INT
SENS1:POW:RANG:LIM OFF
SENS1:POW:REFL:RANG:LIM ON
```

[SENSe<Sensor>:]POWer:REFLection:RANGe:LOWer <lower>

This command defines the lower scale limit for the righthand bargraph (power indication).

Since the entry is made without unit, the following should be observed:

- The meaning of the entered numeric value depends on the display mode selected. The value 1.0 may mean matching (SWR indication) or total mismatch (indication of reflection coefficient).
- The entered numeric value remains the same when another display mode is selected (SWR, return loss, reflection coefficient or reverse power) so that a change of the display mode also changes the meaning of the scale limit.
- For the entered scale limit to become effective, the automatic scaling of the bargraph has to be switched off.

Parameters:

<lower> Range: -1999.0 to 1999.0
 *RST: 0.0

Example:

The following commands set the lower scale limit to an SWR of 1.0:

```
SENS1:POW:REFL:RANG:AUTO OFF
SENS1:POW:REFL:RANG:LOW 1.0
SENS1:FUNC "POW:REFL"
UNIT1:POW:REFL SWR
```

[SENSe<Sensor>:]POWer:REFLection:RANGe[:UPPer] <upper>

This command defines the upper scale limit for the righthand bargraph (reflection indication). The entry is made without unit. For further details, see [\[SENSe<Sensor>:\]POWer:REFLection:RANGe:LOWer](#) on page 138.

Parameters:

<upper> Range: -1999.0 to 1999.0
 *RST: 1.0

Example: The following commands set the upper scale limit to a reverse power of 100 W:

```
SENS1:POW:REFL:RANG:AUTO OFF
SENS1:POW:REFL:RANG 100
SENS1:FUNC "POW:REV"
UNIT1:POW W
```

[SENSe<Sensor>:]POWer:PEP:HOLD <time>

Sets the hold time of the peak hold circuit of the sensor.

Parameters:

<time> Range: 1.0e-3 to 1.0e-1
 *RST: 6.0e-2
 Default unit: s

[SENSe<Sensor>:]POWer[:POWer]:RANGe:AUTO <state>

This command switches the automatic adaptation of the bargraph scaling to the measured power value on or off.

Parameters:

<state> **ON**
 If auto-ranging has been selected, the scale limits of the bargraphs are automatically adapted to the current measured value.
 OFF
 If auto-ranging is switched off, the limits and hence the scale remain fixed.
 *RST: 1

Example: SENS1:POW:RANG:AUTO OFF

[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit:DETECT <value>

This command defines the conditions for a logic high level (> 2.7 V) being output at the AUX TTL connector if this connector has been defined as a monitoring output for the power indication (eg with the command `SENSe<n>:POWer:RANGe:LIMit ON`).

Parameters:

<value> INBound | OUTBound | HIGH

INBound

A high level is output if the measured power is within the range specified by the scale limits of the lefthand bargraph.

OUTBound

A high level is output if the measured power is out of the range specified by the scale limits of the lefthand bargraph.

HIGH

A high level is output if the measured power exceeds the upper scale limit of the lefthand bargraph.

*RST: HIGH

Example:

SENS1:POW:RANG:LIM:DET INB

[SENSe<Sensor>:]POWer[:POWer]:RANGe:LIMit[:STATe] <state>

This command can be used to define the AUX TTL connector as a monitoring output for the power indication (ON state). In OFF state, the connector may be defined either as a monitoring output for the matching or as a trigger input.

If the AUX TTL connector is assigned more than one function, the error message –221 "Settings conflict" is generated and the first setting retained.

Parameters:

<state> Range: "ON", "OFF"
*RST: OFF

Example:

TRIG:SOUR INT
SENS1:POW:REFL:RANG:LIM OFF
SENS1:POW:RANG:LIM ON

[SENSe<Sensor>:]POWer[:POWer]:RANGe:LOWer <lower>

This command defines the lower scale limit for the lefthand bargraph (power indication).

Since the entry is made without unit, the following should be observed:

- The selected unit is decisive for the absolute value of the scale limit.
- The entered numeric value remains the same when another unit is selected (W, dBm, %, dB) so that a change of the unit also causes a change of the scale limit.
- For the entered scale limit to become effective, the automatic scaling of the bargraph has to be switched off.

Parameters:

<lower> Range: -1999.0 to 1999.0
*RST: 0.0

Example: A lower scale limit of 150 mW is set with the following commands:

```
SENS1:POW:RANG:AUTO OFF
SENS1:POW:RANG:LOW 0.15
UNIT1:POW W
```

[SENSe<Sensor>:]POWer[:POWer]:RANGe[:UPPer] <upper>

This command defines the upper scale limit for the lefthand bargraph (power indication). The entry is made without unit. For details, see

SENSe<Sensor>:POWer[:POWer]:RANGe:LOWer.

Parameters:

<upper> Range: -1999.0 to 1999.0
 *RST: 1.0

Example: An upper scale limit of 35.7 dBm is set with the following commands:

```
SENS1:POW:RANG:AUTO OFF
SENS1:POW:RANG 35.7
UNIT1:POW DBM
```

[SENSe<Sensor>:]POWer:REFeRence <ref>

Enters the reference values (in W or dBm) for the relative power indication (in %, dB, or dBm). Units: Watt or dBm.

Parameters:

<ref> Range: 0.0 to 100.0e6
 *RST: 1.0
 Default unit: W

[SENSe<Sensor>:]RRESolution <rres>

This command changes the measurement resolution. This has an effect on the accuracy of the measurement, its duration, and on the number of digits indicated in the display.

Parameters:

<rres> LOW | HIGH
 *RST: LOW

Example: SENS1:RRES LOW

[SENSe<Sensor>:]SWR:LIMit <limit>

This command sets the limit value for the SWR at which an alarm is triggered. For an alarm signal to be output, the forward power must also exceed a preset threshold THReshold.

Parameters:

<limit> Range: 1.0 to 100.0
 *RST: 3.0

Example: SENS1:SWR:LIM 1.5

[SENSe<Sensor>:]SWR:SIGNal[:TTLSignal]:LEVel <level>

This command is used to define the logic level of the SWR alarm at the AUX TTL connector.

Parameters:

<level> LOW | HIGH
 *RST: HIGH

Example: SENS1:SWR:SIGN:LEV HIGH

13.13 SERVICE

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SERVice:UNLock <password>

Before other SERVice system commands are accepted, they must be enabled with
 SERV:UNL 1234.

Setting parameters:

<password> *RST: 0

Usage: Setting only

13.14 STATus

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STATus:OPERation:CONDition?

Return values:

<RegisterValue>

Usage: Query only

STATus:OPERation:ENABle <RegisterValue>

Parameters:

<RegisterValue>

STATus:OPERation:NTRansition <RegisterValue>

Parameters:

<RegisterValue>

STATus:OPERation:PTRansition <RegisterValue>

Parameters:

<RegisterValue>

STATus:OPERation[:EVENT]?

Return values:

<RegisterValue>

Usage: Query only

STATus:OPERation:BIT<bitno>:CONDition?

Suffix:

<bitno> 8..12

Return values:

<RegisterBit>

Usage: Query only

STATus:OPERation:BIT<bitno>:ENABle <RegisterBit>**Suffix:**

<bitno> 8..12

Parameters:

<RegisterBit>

STATus:OPERation:BIT<bitno>:NTRansition <RegisterBit>**Suffix:**

<bitno> 8..12

Parameters:

<RegisterBit>

STATus:OPERation:BIT<bitno>:PTRansition <RegisterBit>**Suffix:**

<bitno> 8..12

Parameters:

<RegisterBit>

STATus:OPERation:BIT<bitno>[:EVENT]?**Suffix:**

<bitno> 8..12

Return values:

<RegisterBit>

Usage:

Query only

STATus:PRESetResets the edge detectors and **ENABle** parts of all registers to a defined value.**Usage:**

Event

STATus:QUEStionable:CONDition?**Return values:**

<RegisterValue>

Usage:

Query only

STATus:QUEStionable:ENABle <RegisterValue>**Parameters:**

<RegisterValue>

STATus:QUEStionable:NTRansition <RegisterValue>

Parameters:
<RegisterValue>

STATus:QUEStionable:PTRansition <RegisterValue>

Parameters:
<RegisterValue>

STATus:QUEStionable[:EVENT]?

Return values:
<RegisterValue>

Usage: Query only

STATus:QUEStionable:BIT<bitno>:CONDition?

Suffix:
<bitno> 9..12

Return values:
<RegisterBit>

Usage: Query only

STATus:QUEStionable:BIT<bitno>:ENABLE <RegisterBit>

Suffix:
<bitno> 9..12

Parameters:
<RegisterBit>

STATus:QUEStionable:BIT<bitno>:NTRansition <RegisterBit>

Suffix:
<bitno> 9..12

Parameters:
<RegisterBit>

STATus:QUEStionable:BIT<bitno>:PTRansition <RegisterBit>

Suffix:
<bitno> 9..12

Parameters:
<RegisterBit>

STATus:QUEStionable:BIT<bitno>[:EVENT]?**Suffix:**

<bitno> 9..12

Return values:

<RegisterBit>

Usage:

Query only

STATus:QUEue[:NEXT]?

Queries the most recent error queue entry and deletes it.

Positive error numbers indicate sensor specific errors, negative error numbers are error messages defined by SCPI. If the error queue is empty, the error number 0, "No error", is returned.

Return values:

<ErrorCode>

<ErrorDescription>

Usage:

Query only

13.15 SYSTem

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SYSTem:COMMunicate:GPIB[:SELF]:ADDRess <address>

Sets the address with which the R&S NRT2 can be addressed via the IEC/IEEE bus. The address is factory-set to 12 and is not changed by a reset.

Parameters:

<address> int_value
 Range: 1 to 30
 *RST: 12

Manual operation: See ["GPIB Address"](#) on page 47

SYSTem:COMMunicate:INET[:SELF]:MODE <state>**SYSTem:COMMunicate:NETWork[:IPAddress]:MODE** <mode>

Selects if the IP address is assigned automatically or manually.

Parameters:

<mode> AUTO | STATic
 AUTO
 Assigns the IP address automatically, provided the network supports DHCP.
 STATic
 Enables assigning the IP address manually.
 *RST: AUTO

Example: :SYST:COMM:NETW:IPAD:MODE AUTO
 The IP address is assigned automatically.

Manual operation: See ["Address Mode"](#) on page 46

SYSTem:COMMunicate:INET[:SELF]:ADDRess x.y.z.a**SYSTem:COMMunicate:NETWork[:IPAddress][:ADDRess]** <IPaddress>

Sets the IP address of the R&S NRT2.

Note: Choosing an invalid IP-Address may disturb the traffic on your LAN. If you are not sure how to configure these settings, please ask your network administrator.

Parameters:

<IPaddress> The four parameter form the IP address x.y.z.a. For example, IP address 104.0.0.255 is entered as
 SYSTem:COMMunicate:NETWork:IPADress:ADDRess
 108.0.0.255.

SYSTem:COMMunicate:INET[:SELF]:GATeway:ADDRess x.y.z.a**SYSTem:COMMunicate:NETWork[:IPAddress]:GATeway** <Gateway>

Sets the IP address of the default gateway, if the [SYSTem:COMMunicate:NETWork\[:IPAddress\]:MODE](#) on page 148 is set to **STATic**.

Parameters:

<Gateway>

Example:

```
SYSTem:COMMUnicate:NETWork:IPADdress:GATeway
'192.168.10.254'
```

Sets the IP address of the default gateway to
192.168.10.254.

Manual operation: See ["Default Gateway"](#) on page 47

SYSTem:COMMUnicate:INET[:SELF]:SUBNetmask:ADDRes x.y.z.a

SYSTem:COMMUnicate:NETWork[:IPADdress]:SUBNet:MASK <Mask>

Sets the subnet mask, if [SYSTem:COMMUnicate:NETWork\[:IPADdress\]:MODE](#) on page 148 is set to `STATic`.

Parameters:

<Mask>

Example:

```
SYSTem:COMMUnicate:NETWork:IPADdress:SUBNet:
MASK '255.255.255.0'
```

Sets the subnet mask to 255.255.255.0 .

Manual operation: See ["Subnet Mask"](#) on page 47

SYSTem:COMMUnicate:INET[:SELF]:DNS:ADDRes <server>

SYSTem:COMMUnicate:NETWork[:IPADdress]:DNS <DNS>

Determines or queries the network DNS server to resolve the name.

Parameters:

<DNS>

SYSTem:COMMUnicate:INET[:SELF]:DNS:SUFFix <suffix>

Stores a DNS suffix which can be used in name resolution queries.

Parameters:

<suffix>

SYSTem:COMMUnicate:NETWork[:COMMON]:DOMain <domain>

Sets the domain of the network.

Parameters:

<domain>

Example:

```
:SYSTem:COMMUnicate:NETWork:COMMON:DOMain
ABC.DE
```

Sets the domain of the network to `ABC.DE`.

Manual operation: See ["DNS Suffix"](#) on page 46

SYSTem:COMMunicate:NETWork[:COMMON]:HOSTname <hostname>

Sets the individual host name of the power sensor.

In a LAN that uses a DNS server (Domain Name System server), each instrument connected in the LAN can be accessed via an unambiguous host name, instead of the IP address. The DNS server translates the host name to the IP address. This is especially useful when a DHCP server is used, as a new IP address may be assigned each time the instrument is restarted.

The sensor performs the change of the hostname immediately after the command is sent. For this purpose the sensor restarts its connection to the network. During this time that may take several seconds the sensor cannot be addressed. After the restart the sensor can be addressed only through the newly set hostname.

Note: It is recommended that you do not change the default host name in order to avoid problems with the network connection. However, if you change the host name be sure to use a unique name.

Parameters:

<hostname>

Example:

```
SYSTem:COMMunicate:NETWork:COMMON:HOST
'powersensor-2nd-floor'
Sets the hostname to powersensor-2nd-floor.
```

Manual operation: See ["Host Name"](#) on page 45

SYSTem:COMMunicate:NETWork[:COMMON]:WORKgroup <Workgroup>

Sets an individual workgroup name for the instrument.

Parameters:

<Workgroup>

SYSTem:COMMunicate:NETWork:REStart

Restarts the network connection to the instrument, i.e. terminates the connection and sets it up again.

Usage: Event

SYSTem:COMMunicate:NETWork:STATus?

Queries the network configuration state.

Example:

```
SYSTem:COMMunicate:NETWork:STATus?
Response: UP
The network is active.
```

Usage: Query only

SYSTem:COMMunicate:NETWork:MACaddress?

Queries the MAC address of the network adapter.

Parameters:

<MacAddress> string

Usage: Query only

SYSTem:DATE <year>, <month>, <day>

Queries or sets the date for the instrument-internal calendar.

This parameter is protected, in order to prevent accidental changes.

Parameters:

<year> <year>,<month>,<day>

<month> Range: 1 to 12

<day> Range: 1 to 31

SYSTem:DEvice:ID?

Get R&S device ID.

Return values:

<DeviceID>

Usage: Query only

SYSTem:DFPRint [<Path>]

Generate device footprint.

Setting parameters:

<Path>

Return values:

<XMLDeviceFootprint><dblock>

SYSTem:DFPRint:HISTory:COUNT?

Request the number of device footprints in history.

Return values:

<Count>

Usage: Query only

SYSTem:DFPRint:HISTory:ENTRY? <index>

Return a device footprint from the history. Index "0" returns the most recent one.

Query parameters:

<index>

Return values:

<XmlDeviceFootprint><dblock>

Usage: Query only**SYSTem:DID?**

Get R&S device ID.

Return values:

<DeviceID>

Usage: Query only**SYSTem:DISPlay:UPDate** <displayupdate>**Parameters:**

<displayupdate>

SYSTem:INFO[:INFO]? [<argument>]

Returns information about the system.

If queried without parameters, the command returns all available information in the form of a list of strings separated by commas.

If you want to query specific information, add the query parameter:

SYST:INFO? "<string>"

Query parameters:

<argument>

Usage: Query only**SYSTem:IDN:MODE** <mode>

Allows to decide, whether the automatically created instrument identification string is used or a user-defined option string can be created and used.

Parameters:

<mode>

AUTO | USER

AUTO

The automatically instrument identification string is used.

USER

The user-defined instrument identification string is used.

*RST: AUTO

SYSTem:IDN:ANSWer <string>

Displays the return value for the *IDN query. The maximum string length is 128 characters.

Parameters:

<string>

SYSTem:IDN:AUTO <state>

Activates/deactivates return of the user-defined string for the *IDN query.

Parameters:

<status> *RST: 1

SYSTem:OPT:MODE <mode>

Allows to decide, whether the automatically created option identification string is used or a user-defined option string can be created and used.

Parameters:

<mode> AUTO | USER

AUTO

The automatically option identification string is used.

USER

The user-defined option string is used.

*RST: AUTO

SYSTem:OPT:ANSWer <string>

Displays the return value for the *OPT query. The maximum string length is 128 characters.

Parameters:

<string>

SYSTem:OPT:AUTO <state>

Activates/deactivates return of the user-defined string for the *OPT query.

Parameters:

<status> *RST: 1

SYSTem:SPEed <mode>

The data processing speed of the R&S NRT2 can be increased when **FAST** is selected. The display is switched off and the measured values are no longer displayed since the continuous update of the screen content requires computation time.

Parameters:

<mode> NORMal | FAST
*RST: NORMal

SYSTem:PRESet

Triggers a sensor reset.

Usage: Event

Manual operation: See "Preset" on page 56

SYSTem:REBoot

Reboots the power sensor.

Usage: Event

SYSTem:ERRor:ALL?

Queries all unread entries in the error/event queue and removes them from the queue. The response is a comma-separated list of error numbers and a short description of the error in the first in first out order.

Positive error numbers are instrument-dependent. Negative error numbers are reserved by the SCPI standard.

Usage: Query only

SYSTem:ERRor:CODE:ALL?

Queries all unread entries in the error/event queue and removes them from the queue. Only the error numbers are returned and not the entire error text.

Example: SYSTem:ERRor:CODE:ALL?
 Queries all entries in the error queue.
 Response: 0
 No errors have occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor:CODE[:NEXT]?

Queries the oldest entry in the error queue and then deletes it. Only the error number is returned and not the entire error text.

Example: SYSTem:ERRor:CODE
 Queries the oldest entry in the error queue.
 Response: 0
 No errors have occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor:COUNT?

Queries the number of entries in the error queue.

Example: SYSTem:ERRor:COUNT
Queries the number of entries in the error queue.
Response: 1
One error has occurred since the error queue was last read out.

Usage: Query only

SYSTem:ERRor[:NEXT]?

Queries the error/event queue for the oldest item and removes it from the queue. The response consists of an error number and a short description of the error.

Positive error numbers are instrument-dependent. Negative error numbers are reserved by the SCPI standard.

Example: SYSTem:ERRor?
Queries the oldest entry in the error queue.
Response: 0, 'no error'
No errors have occurred since the error queue was last read out.

Usage: Query only

SYSTem:HCOPY [<filename>]

Triggers a screenshot (hardcopy) of the current display. If a filename is given, this is used as a target file. Otherwise an internal name is generated which can be read by the query function.

Parameters:
<filename>

SYSTem:INFO:TERMchar <termination>

Selects the termination character(s) for returned information.

Parameters:
<termination> CR | LF | CRLF
 *RST: CRLF

SYSTem:VERSion?

Queries the SCPI version the sensor's command set complies with.

Example: SYSTem:VERSion?
Queries the SCPI version.
Response: 1999.0
The sensor complies with the SCPI version from 1999.

Usage: Query only

SYSTem:FWUPdate <fwudata>

This command is used to load new operating firmware into the device.

Rohde & Schwarz provides new firmware in form of *.rsu files. An *.rsu file often can be downloaded from the Rohde & Schwarz web sites or can be supplied by the customer support or the product marketing. The *.rsu file is usually packed in a *.zip archive that must be extracted before.

If you want to integrate a firmware update function in their own application, use the SYSTem:FWUPdate command. The parameter of this command is a "Definite Length Arbitrary Block Data" containing the direct copy of the binary *.rsu file.

A "Definite Length Datablock" has a well-defined format. It consists of:

- A '#' sign.
- A single digit indicating the length of the number which represents the size of the binary file.
- The binary data.
- An appended delimiter (LF, 0x0a).

Example:

Lets assume that this file has a size of 10242884 bytes.

To send the file to the sensor for updating the firmware, your application has to assemble a memory block containing:

- The command.
- The "Definite Length Block" header.
- The contents of the *.rsu file.
- A trailing delimiter (0x0a = Linefeed).

First, have a look at the size of the binary data; it is 10242884 in this case. This number has 8 digits. Now you have all the information to assemble everything:

- The SYST:FWUP command
- A blank as a separator
- The '#' sign
- The '8' for the length of the file size
- The '10242884' specifying the size of the file
- (the contents of the *.rsu file).....
- 0x0a as a delimiter

In this example, you would write exactly 10242905 bytes to the sensor (for example via a 'viWrite()' function).

The result sums up from the values of the above list to:

$$9 + 1 + 1 + 1 + 8 + 10242884 + 1 = 10242905$$

In a (pseudo) string notation, it is:

SYST:FWUP #810242884.....(file content)..... <LF> ,

Where <LF> is a single 0x0a character and(file content) is the direct byte-by-byte contents of the *.rsu file.

Setting parameters:

<fwudata> <block_data>

Usage: Setting only

SYSTem:FWUPdate:STATus?

While a firmware update is in progress, the LED of the sensors flashes in bright white color. As soon as the firmware update is over you can read the result of the update with the SYST:FWUP:STAT? command.

The result of the query is a readable string.

Example: SYSTem:FWUPdate:STATus?
 Response: "Success"

Usage: Query only

SYSTem:HELP:HEADers? [<Parser>]

Query parameters:

<Parser>

Return values:

<Headers> <dblock>

Usage: Query only

SYSTem:HELP:SYNTax? <Header>

Query parameters:

<Header>

Return values:

<Syntax> <dblock>

Usage: Query only

SYSTem:HELP:SYNTax:ALL?

Return values:

<Syntax> <dblock>

Usage: Query only

SYSTem:KLOCK <klock>**Parameters:**

<klock>

SYSTem:LOCK:NAME?**Return values:**

<name>

Usage: Query only

SYSTem:LOCK:NAME:DETAILED?**Return values:**

<name>

Usage: Query only

SYSTem:LOCK:OWNER?**Return values:**

<owner>

Usage: Query only

SYSTem:LOCK:OWNER:DETAILED?**Return values:**

<owner>

Usage: Query only

SYSTem:LOCK:RELEASE**Usage:** Event

SYSTem:LOCK:RELEASE:ALL**Usage:** Event

SYSTem:LOCK:REQUEST:SHARED? <lock_string>[, <timeout>]**Query parameters:**

<lock_string>

<timeout>

Return values:

<result>

Usage: Query only

SYSTem:LOCK:REQuest[:EXCLusive]? [<timeout>]

Query parameters:

<timeout>

Return values:

<result>

Usage: Query only

SYSTem:LOCK:SHARed:STRing?

Return values:

<result>

Usage: Query only

SYSTem:LOCK:TIMEout <timeout>

Setting parameters:

<timeout>

Return values:

<result>

SYSTem:SERRor?

Returns the next static error (if any). Static errors are generally more severe than normal error conditions, which can be queried with `SYSTem:ERRor[:NEXT]?`. While normal errors result from, for example, unknown commands or syntax errors and generally affect a single parameter or setting, the static errors, as a rule, prevent the execution of normal measurements.

Usage: Query only

SYSTem:SERRor[:ALL]?

Queries the (next) error from the list of static errors.

Usage: Query only

SYSTem:SERRor:REMove <num>

Removes an entry from the list of static errors. The entry is identified by a unique sequence number <num>.

Setting parameters:

<num>

Usage: Setting only

SYSTem:SERRor:LIST:ALL?

Queries the list of all static errors that have occurred so far. The list is persistent. Entries can be removed by `SYSTem:SERRor:REMove <n>`.

Usage: Query only

SYSTem:SHUTdown

Shuts down the instrument.

Usage: Event

SYSTem:TIME:DSTime:MODE <dst>**Parameters:**

<dst>

SYSTem:TIME:DSTime:RULE <rule>

Sets the timezone. You can query the list of the available timezones with `SYSTem:TIME:DSTime:RULE:CATalog?` on page 160.

Parameters:

<rule>

Manual operation: See "Time Zone" on page 60

SYSTem:TIME:DSTime:RULE:CATalog?

Queries the list of available time zones.

Return values:

<cat>

Usage: Query only

Manual operation: See "Time Zone" on page 60

SYSTem:TIME:HRTimer:ABSolute <duration>

Start a timer relative to an absolutely set start time.

Setting parameters:

<duration>

Usage: Setting only
Asynchronous command

SYSTem:TIME:HRTimer:ABSolute:SET

Define the start time for an absolute timer.

Return values:

<year>

<month>

<day>

<hour>

<min>

<sec>

<msec>

SYSTem:TIME:HRTimer:RELative <duration>

Start a timer expiring after a given duration from the command's execution time.

Setting parameters:

<duration>

Usage:

Setting only

Asynchronous command

SYSTem:TZONE <hour>, <minute>

Defines the time zone.

Parameters:

<hour>

<minute>

SYSTem:VERSion?**Return values:**

<version>

Usage:

Query only

13.16 TEST

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TEST:SENsOr<Sensor>?

This command returns the status of the active sensor.

Example:

TEST:SENS ?

The response is sensor-dependent and could read as follows:

"NRT-Z44 V1.40", "TEMPERATURE ERR", "CAL VALUES CHECKSUM ERR"

The response always contains an identification string for the sensor with the type name and the FW version number. In case of an error, error messages in plain text are appended. The content of the response string is identical with the status query in manual control.

Usage:

Query only

TEST:ALL?

The command tests all memories of the instrument. This command is a query and therefore has no *RST value.

Parameters:

<sensor_command> *RST: -

Example:

TEST?

Usage:

Query only

TEST:DIRect <sensor_command>

This command is used for transferring direct setting commands to the active sensor. The setting commands are contained in the sensor manual. With a ? appended, the command returns the response of the sensor to the transferred command.

This command has no *RST value.

Parameters:

<sensor_command> *RST: -

Example:

TEST:DIR "sensor command"

TEST:FRAM?

The command tests the parameter memory. This command is a query and therefore has no *RST value.

Parameters:

<sensor_command> *RST: -

Example:

TEST:FRAM?

Usage:

Query only

TEST:RAM?

The command tests the RAM. This command is a query and therefore has no *RST value.

Parameters:

<sensor_command> *RST: -

Example: TEST:RAM?

Usage: Query only

TEST:ROM?

The command tests the program ROM. This command is a query and therefore has no *RST value.

Parameters:

<sensor_command> *RST: -

Example: TEST:ROM?

Usage: Query only

13.17 TRIGGER

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TRIGger<Measurement>[:IMMediate]

This command triggers a measurement.

Suffix:

<Measurement> 1...100

Usage: Event

TRIGger<Measurement>:MODE <mode>

The trigger mode determines the behavior of the instrument if no trigger occurs, and also the number of acquired waveforms when a trigger occurs.

Suffix:

<Measurement> 1...100

Parameters:

<mode> NORMal | FREerun | SINGle

NORMal

Continuous triggering with regular trigger events.

FREerun

This setting automatically starts a measurement if no trigger event has occurred after 300 ms.

SINGle

This setting disables continuous triggering so that only one trigger event at a time is executed.

*RST: NORMal

TRIGger<Measurement>:SOURce <mode>

This command sets the trigger source for all the following measurements.

Suffix:

<Measurement> 1...100

Parameters:

<mode> INTernal | EXTernal

INTernal

The internal timer is used as a trigger source. As a result, the measurement is performed in the freerun mode. This implies that the sensor carries out measurements permanently but that they are not related to the test signal.

EXTernal

This mode allows to trigger measurements via the two remote control interfaces (commands :TRIG and *TRG) or the AUX TTL connector at the rear panel of the device. The event which arrives first is used for triggering. The measurement is triggered immediately after the trigger event arrives. The measured quantity may change before triggering starts but should then remain unchanged until the end of the measurement.

*RST: INTernal

13.18 UNIT

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UNIT<Measurement>:POWER:RATio <unit>

Selects the output unit for the measured power ratio values.

This setting also determines the unit for the parameters of the following commands:

- CALC:REL
- CALC:LIM:UPP
- CALC:LIM:LOW
- DISP:MET:UPP
- DISP:MET:LOW
- OUTP:REC:LIM:LOW
- OUTP:REC:LIM:UPP

Error messages:

If the compute function of the associated calculate block is :SWR, :RLOSS or :REFlection, then the unit cannot be changed and error message **26,"State not supported"**, is output.

Suffix:

<Measurement> 1...100

Parameters:

<unit> DB | DPCT | O
*RST: DB

UNIT<Measurement>:POWer[:VALue] <unit>

Selects the output unit for the measured power values.

This setting also determines the unit for the parameters of the following commands:

- CALC:REL
- CALC:LIM:UPP
- CALC:LIM:LOW
- DISP:MET:UPP
- DISP:MET:LOW
- OUTP:REC:LIM:LOW
- OUTP:REC:LIM:UPP

Suffix:

<Measurement> 1...100

Parameters:

<unit> DBM | DBUV | W
*RST: DBM

UNIT<Measurement>:POWer:REFlection <unit>

This command defines the matching of the load being measured as standing wave ratio, return loss, reflection coefficient, or power ratio R/F (in percent).

NOTE: The command is only effective if the measurement function POW:S11 or POW:REFL has been activated, see SENS<n>:FUNC subsystem

Suffix:

<Measurement> 1...100

Parameters:

<unit> RCO | RL | SWR | RFR

RCO

Reflection coefficient (0 to 1, without unit)

RL

Return loss (in dB)

SWRStanding wave ratio (1 to ∞ , without unit)**RFR**

Ratio between forward and reverse power (0% to 100%)

*RST: SWR

Example:

```
SENSe1:FUNC "POW:REFL"
UNIT1:POW:REFL RCO
```

UNIT<Measurement>:POWer:RELative:STATe <state>

This command defines the indication of the forward power (FWD), reverse power (REV) and absorbed power (F-R) in absolute units (W, dBm) or in relative display mode (% , dB).

Suffix:

<Measurement> 1...100

Parameters:

<state>

ON

Switches the relative display mode on and the absolute display off.

OFF

OFF has the opposite effect.

*RST: 0

Example:

UNIT1:POW:REL:STAT ON

UNIT<Measurement>:POWer:RELative[:VALue] <unit>

This command allows the forward power (FWD) and the absorbed power (F-R) to be indicated in relative display mode. For the setting to become effective, the relative display mode must be switched on, see [UNIT<Measurement>:POWer:RELative:STATe](#) on page 166 and the `UNIT<n>:POWer:RELative: STATe ON` command.

Suffix:

<Measurement> 1...100

Parameters:

<unit>

PCT | DB

PCT

Deviation from reference value in percent.

DB

Deviation from reference value in dB.

***RST:** PCT**Example:**

UNIT2:POW:REL:STAT ON

UNIT2:POW:REL DB

Glossary: List of Abbreviations

A

AVG: Average

C

CCDF: Complementary Cumulative Distribution Function

CDMA: Code Division Multiple Access

D

DAB: Digital Audio Broadcast

DHCP: Dynamic Host Control Protocol

DNS: Domain Name Service

DVB-T: Digital Video Broadcasting - Terrestrial

E

EMC: Electromagnetic Compatibility

EMI: Electromagnetic Interference

G

GPB: General Purpose Interface Bus
General Purpose Instrumentation Bus

I

IDN: Instrument Identification String

IP: Internet Protocol

L

LAN: Local Area Network

O

OPT: Option Identification String

OSA: Open Source Acknowledgement

P

PEP: Peak Envelope Power

R

RFB: Remote Framebuffer Protocol

S

SCPI: Standard Commands for Programmable Instruments

SSH: Secure Shell

SWR: Standing Wave Ratio

U

USB: Universal Serial Bus

V

VISA: Virtual Instrument Software Architecture

VNC: Virtual Network Computing

W

WCDMA: Wideband Code Division Multiple Access

List of Commands

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