

R&S®SMA100B

RF Signal Generator

Getting Started



1419.8620.02 – 03



ROHDE & SCHWARZ

This document describes the R&S®SMA100B, stock no. 1419.8888.02 and its options.

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The following abbreviations are used throughout this manual: R&S®SMA100B is abbreviated as R&S SMAB, Linux® is abbreviated as Linux, R&S®VISA is abbreviated as R&S VISA

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.

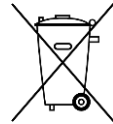
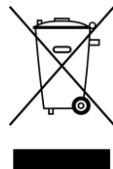
Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety 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)

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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.

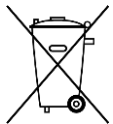
Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. 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

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1 Preface

The R&S SMA100B is a new high-performance signal generator developed to meet demanding customer requirements. Offering excellent signal characteristic and straightforward and intuitive operation, the signal generator makes signal generation fast and easy.

1.1 Key Features

Outstanding key features of the R&S SMA100B are:

- Frequency range from 8 kHz to up to 20 GHz
- Excellent signal quality
- Excellent single sideband (SSB) phase noise
- Nearly no wideband noise
- Very high output power
- Low harmonics
- Unique pulse train generation
- High-stability reference oscillator
- Intuitive operation via touchscreen with the tile diagram as key element

For more information, see data sheet.

1.2 For Your Safety

The R&S SMA100B is designated for the development, production and verification of electronic components and devices in industrial and laboratory environments. Use the R&S SMA100B only for its designated purpose. Observe the operating conditions and performance limits stated in the data sheet.

The product documentation helps you to use the R&S SMA100B 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 SMA100B 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.

2 Documentation Overview

This section provides an overview of the R&S SMA100B user documentation. Unless specified otherwise, you find the documents on the R&S SMA100B product page at:

www.rohde-schwarz.com/manual/sma100b

2.1 Getting Started Manual

Introduces the R&S SMA100B and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

2.2 User Manuals and Help

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.

The contents of the user manuals are available as help in the R&S SMA100B. The help offers quick, context-sensitive access to the complete information.

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

2.3 Service Manual

Describes the performance test for checking the rated specifications, module replacement and repair, firmware update, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS, <https://gloris.rohde-schwarz.com>).

2.4 Instrument Security Procedures

Deals with security issues when working with the R&S SMA100B in secure areas. It is available for download on the Internet.

2.5 Basic Safety Instructions

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

2.6 Data Sheets and Brochures

The data sheet contains the technical specifications of the R&S SMA100B. It also lists the options and their order numbers as well as optional accessories.

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

See www.rohde-schwarz.com/brochure-datasheet/sma100b

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/sma100b

Application Notes, Application Cards, White Papers, etc.

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/sma100b

3 Preparing for Use

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3.1 Putting into Operation

This section describes the basic steps to be taken when setting up the R&S SMA100B for the first time.

⚠ WARNING

Risk of injury due to disregarding safety information

Observe the information on appropriate operating conditions provided in the data sheet to prevent personal injury or damage to the instrument. Read and observe the basic safety instructions provided with the instrument, in addition to the safety instructions in the following sections. In particular:

- Do not open the instrument casing.
-

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.

NOTICE**Instrument damage caused by electrostatic discharge**

Electrostatic discharge (ESD) can damage the electronic components of the instrument and the device under test (DUT). Electrostatic discharge is most likely to occur when you connect or disconnect a DUT or test fixture to the instrument's test ports. To prevent electrostatic discharge, use a wrist strap and cord and connect yourself to the ground, or use a conductive floor mat and heel strap combination.

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.

3.1.1 EMI Suppression

Electromagnetic interference (EMI) may affect the measurement results.

To suppress generated Electromagnetic Interference (EMI),

- Use suitable shielded cables of high quality. For example use double-shielded RF and LAN cables.

Note: USB cables are of varying and often poor quality. Therefore, check the quality of each individual USB cable as described in the service manual.

- Always terminate open cable ends.

- Note the EMC classification in the data sheet

3.1.2 Unpacking and Checking the Instrument

Unpack the R&S SMA100B carefully and check the contents of the package.

- Check if all items listed on the delivery note, including this getting started manual, are included in the delivery.
- Check the R&S SMA100B for any damage.
If the contents are damaged, immediately contact the carrier who delivered the package.



Packing material

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

WARNING

Risk of injury during transportation

The carrying handles at the front and side of the casing are designed to lift or carry the instrument. Do not apply excessive force to the handles. If a handle is ripped off, the falling instrument can cause injury.

3.1.3 Accessory List

The instrument comes with the following accessories:

- Power cable
- Getting Started printed manual

3.1.4 Placing or Mounting the Instrument

The R&S SMA100B is designed for use under laboratory conditions, either on a bench top or in a rack using the standard rackmount kit.

Bench top operation

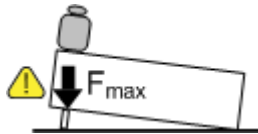
If the R&S SMA100B is operated on a bench top, the surface must be flat. The instrument can be used in horizontal position, standing on its feet, or with the support feet on the bottom extended.

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.

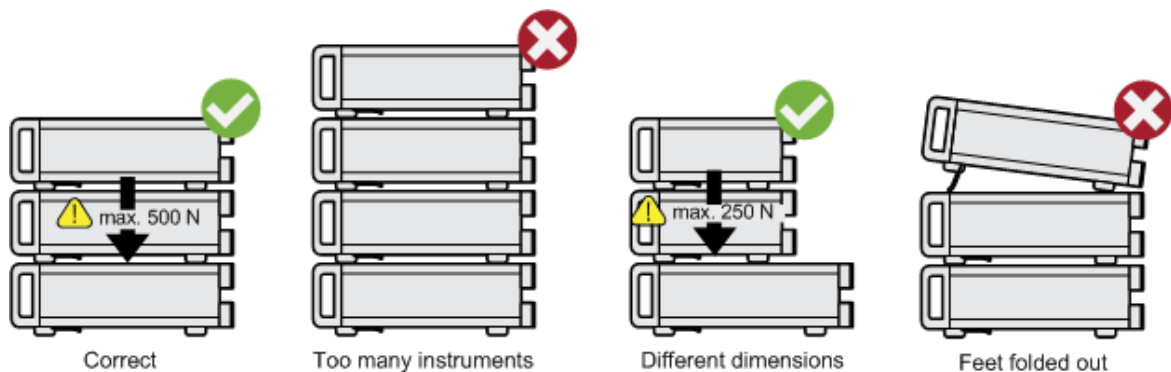


⚠ WARNING**Risk of injury if stacking heavy instruments**

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.

**Mounting in a rack**

The R&S SMA100B can be installed in a rack using a rack adapter kit (Order No. see data sheet). The installation instructions are part of the adapter kit.

NOTICE**Risk of instrument damage due to insufficient airflow in a rack**

If the instrument is run with insufficient airflow for a longer period, the instrument overheats, which can disturb the operation and even cause damage.

Make sure that all fan openings are unobstructed, that the airflow perforations are unimpeded, and that the minimum distance from the wall is 10 cm.

3.1.5 Connecting AC Power

The R&S SMA100B is equipped with an AC power supply connector, that can be operated with different AC power voltages. Once it is connected, the instrument automatically adjusts to the given voltage. Refer to the data sheet for the requirements of voltage and frequency. There is no need to set the voltage manually or change fuses. The [AC supply and power switch](#) is at the rear of the unit.

To connect the AC supply

- ▶ Connect the R&S SMA100B to the AC power source using the supplied power cable.

Note: Since the instrument is designed in compliance with standard EN 61010-1 safety class I, it must only be connected to an outlet that has a ground contact.

Characteristics of the AC power supply:

- 100 V to 240 V AC
- 50 Hz to 60 Hz; 400 Hz
- 3.5 to 1.6 A, 2HU height unit (R&S SMAB-B92)
- 7.3 to 4.6 A, 3HU height unit (R&S SMAB-B92)

3.1.6 Turning the Instrument On and Off

To turn on the R&S SMA100B

1. [Connect the instrument to the AC supply.](#)

2. Turn on the main AC power switch at the rear panel of the R&S SMA100B (position "I" (on)).

The instrument is supplied with AC power.



Warm-up time for OCXO

When the instrument is switched on, the OCXO requires an extended warm-up time (see data sheet).

To start the R&S SMA100B

Starting the R&S SMA100B requires that it is **connected** and **turned on**.

- ▶ At the front panel, press the ON/STANDBY key briefly.

The instrument boots the operating system and starts the instrument firmware.

After booting, the instrument is in the state before the last power off (standby or ready), indicated by the ON/STANDBY illumination:

- Green: the R&S SMA100B is running and ready for operation.
All modules are power-supplied.
- Orange: the R&S SMA100B is in standby mode (main AC power switch is in position "I").

The standby power mode keeps the power switch circuits and the oven-controlled crystal oscillator OCXO active. In this state, it is safe to switch off the AC power and disconnect the instrument from the power supply.

To switch between standby and ready state, briefly press the ON/STANDBY key.

If a previous session was terminated regularly, the instrument uses the last setup with the relevant instrument settings.

- ▶ To set up a new configuration, press the PRESET key to return the instrument to its defined reset/preset state.

To shut down and turn off the R&S SMA100B

NOTICE

Risk of losing data

If you switch off the running instrument using the rear panel switch or by disconnecting the power cord, the instrument loses its current settings. Furthermore, program data can be lost.

Press the ON/STANDBY key first to shut down the application properly.

1. Press the ON/STANDBY key.

The current setup is saved, the operating system shuts down and sets the instrument to standby state.

The ON/STANDBY LED must be orange.

2. Turn off the main AC power switch at the rear panel of the R&S SMA100B (position "0" (off)).

The instrument is no longer supplied with AC power.



Turning off the AC power

You can leave the AC power on permanently. Switching off is required only if the instrument must be disconnected from all power supplies.

3.1.7 Functional Check

When the instrument is switched on, it automatically monitors the main functions.

A detected fault is indicated by an "Error" message displayed in the "Info" line of the instrument together with a brief error description. For an in-depth identification of the error, press the "Info" button. In response, a description of the errors is displayed. For more information, refer to the "Troubleshooting and Error Messages" section in the user manual.

3.1.8 Checking the Supplied Options and Licenses

The instrument can be equipped with both, hardware and firmware options. To check whether the installed options correspond to the options indicated on the delivery note, proceed as follows:

1. Press the SETUP key.
2. Select "Instrument Assembly > Hardware Config" and "Software / Options".
A list with hardware and firmware information is displayed.
3. Check the availability of the hardware options as indicated in the delivery note.
For an overview of the available options, refer to the data sheet.

3.2 Connecting USB Devices

The USB interfaces of the R&S SMA100B allow you to connect USB devices, including USB hubs directly to the instrument. Due to the large number of available USB devices, there is almost no limit to the expansions that are possible with the R&S SMA100B.

The following list shows various USB devices that can be useful:

- Memory stick for easy transfer of data to/from a computer (for example firmware updates)
- Keyboard or mouse to simplify the entry of data, comments, filenames, etc.
- Power sensors of the R&S NRP families

All USB devices can be connected to or disconnected from the instrument during operation.

Connecting a USB storage device

When a USB storage device like a memory stick, a CD-ROM drive, or a hard disk is connected, it is detected automatically. The device is made available as a new drive (`/usb`). The name of the drive is manufacturer-dependent.

Connecting a keyboard

A keyboard is detected automatically when it is connected. The default keyboard layout is English – US.

Connecting a mouse

A mouse is detected automatically when it is connected.

3.3 Setting Up a Network (LAN) Connection

The R&S SMA100B is equipped with a network interface and can be connected to an Ethernet LAN (local area network). Provided the appropriate rights have been assigned by the network administrator, the interface can be used, for example:

- To transfer data between a controller and the instrument, for example to run a remote control program.
- To access or operate the instrument from a remote computer using the Ultr@VNC program (or a similar tool, like another VNC client or any Web browser supporting Java).
- To transfer data from a remote computer and back, for example using network folders.
- To transfer data between R&S NRP power sensors and the instrument.

This section describes how to configure the LAN interface.



Accessing operating system

No access to the operating system is required for normal operation.
All necessary system settings can be made in the "Setup" dialog.

3.3.1 Connecting the Instrument to the Network

There are two methods to establish a LAN connection to the instrument:

- A non-dedicated network (Ethernet) connection from the instrument to an existing network
- A dedicated network connection (Point-to-point connection) between the instrument and a single computer

Setting Up a Network (LAN) Connection

For addressing, both the instrument and the computer require an IP address. The address information is usually assigned to the devices automatically, depending on the network capabilities.

If the IP address is not assigned automatically, see "Assigning the IP Address" in the R&S SMA100B user manual, for information on how to assign the address manually.

To set up a network (LAN) connection**NOTICE****Risk of network failure**

Consult your network administrator before performing the following tasks:

- Connecting the instrument to the network
- Configuring the network
- Changing IP addresses
- Exchanging hardware

Errors can affect the entire network.

- Connect the instrument to the network or to a single PC.

If the instrument is connected to the LAN, the operating system automatically detects the network connection and activates the required drivers.

By default, the instrument is configured to use dynamic TCP/IP configuration and to obtain the whole address information automatically.

**Risk of network connection failure**

Network cables and cable connectors of poor quality, or failures in the auto-negotiation process, can cause network connection failures.

If the network connection to the instrument fails, check the network infrastructure and contact your network administrator.

For details, see section "Troubleshooting and Error Messages" in the R&S SMA100B user manual.

When connected, the R&S SMA100B displays the address information on the screen.

Setting Up a Network (LAN) Connection

System Config

IP: 10.113.0.19

GPIB Address: 28

FW: 4.00.040

4 Instrument Tour

The following topics help you to get familiar with the instrument and perform the first steps:

- [Chapter 4.1, "Front Panel Tour"](#), on page 24
- [Chapter 4.2, "Rear Panel Tour"](#), on page 33

This section explains the control elements and the connectors of the R&S SMA100B with the aid of the front and rear views. For specifications of the interfaces, refer to the data sheet.

4.1 Front Panel Tour

This section provides an overview of the control elements at the front panel of the R&S SMA100B. Most of the connectors are at the rear panel and are described in [Chapter 4.2, "Rear Panel Tour"](#), on page 33.



Figure 4-1: Front panel view of the R&S SMA100B RF Signal Generator with height unit 2HU (option R&S SMAB-B92)

- 1 = Touchscreen
- 2 = Utility keys
- 3 = ON/STANDBY
- 4 = Function keys
- 5 = Keypad
- 6 = Navigation controls
- 7 = Display keys
- 8 = USB connector
- 9 = SD card slot
- 10 = SENSOR connector
- 11 = RF output connector



Figure 4-2: Front panel view of the R&S SMA100B RF Signal Generator with height unit 3HU (option R&S SMAB-B93)

- 1 = Touchscreen
- 2 = Utility keys
- 3 = ON/STANDBY
- 4 = Function keys
- 5 = Keypad
- 6 = Navigation controls
- 7 = Display keys
- 8 = USB connector
- 9 = SD card slot
- 10 = SENSOR connector
- 11 = RF output connector
- 12 = EXT1/2 input connectors
- 13 = LF output connector
- 14 = Pulse signal input and output connectors
- 15 = CLK SYNC and CLK SYNC N output connectors (SMA)

4.1.1 Touchscreen

The screen at the front panel is the graphical user interface. It shows the settings dialogs and parameters, and the current configuration at a glance, see [Chapter 6.3, "Understanding the Display Information"](#), on page 50.

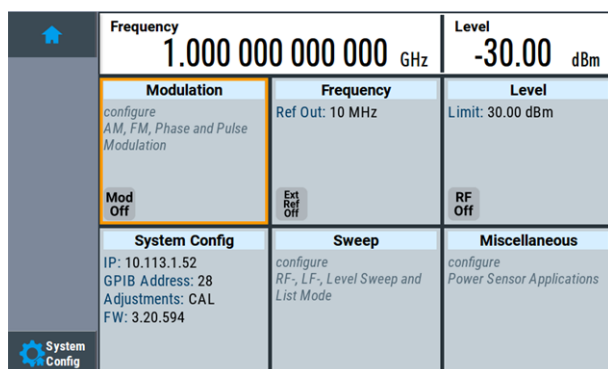


Figure 4-3: Touchscreen

The touch-sensitive panel provides an alternative means of user interaction for quick and easy handling of the instrument, see [Chapter 6.2, "Means of Manual Interaction"](#), on page 50.

NOTICE

Risk of touchscreen damage

Inappropriate tools or excessive force can damage the touchscreen.

Observe the following instructions when operating the touchscreen:

- Never touch the screen with ball point pens or other sharp objects, use your fingers instead.
As an alternative, you can use a stylus pen with a smooth soft tip.
- Never apply excessive force to the screen. Touch it gently.
- Never scratch the screen surface, for example with a finger nail.
- Never rub the screen surface strongly, for example with a dust cloth.
For instructions on cleaning the screen, see the Maintenance chapter in the R&S SMA100B user manual.

4.1.2 Utility Keys

The utility keys set the R&S SMA100B to a defined state, and provide access to basic settings and information on assistance.

Table 4-1: Utility keys

Utility Key	Assigned functions
PRESET	Sets the instrument to a defined state
LOCAL	Switches from remote control to local (manual) control
SETUP	Accesses the general instrument settings
HELP	Displays context-sensitive help text

4.1.3 ON/STANDBY

The ON/STANDBY key starts up and shuts down the instrument, and switches between the standby and the ready state.

- In the ready state, ON/STANDBY key lights green. The instrument is ready for operation.
- In the standby state, the ON/STANDBY key lights orange. The standby power mode keeps the power switch circuits and the oven-controlled crystal oscillator OCXO active. In this state, it is safe to switch off the AC power and disconnect the instrument from the power supply.

4.1.4 Function Keys

Function keys provide access to the most common generator settings and functions. You can find a detailed description of the corresponding functions in the user manual.

Table 4-2: Function keys

Function key	Assigned functions
FREQ	Activates frequency entry.
LEVEL	Activates level entry.
MOD ON/OFF	Switches the modulation on and off.
RF ON/OFF	Switches the RF output on and off.

4.1.5 Keypad

The keypad enables you to enter alphanumeric parameters, including the corresponding units. It contains the following keys:

Table 4-3: Keys on the keypad

Type of key	Description
Alphanumeric keys	Enter numbers and (special) characters in edit dialog boxes.
Decimal point	Inserts a decimal point "." at the cursor position.
Sign key	Changes the sign of a numeric parameter. In the case of an alphanumeric parameter, inserts a "-" at the cursor position.
Unit keys (G/n dBμV, M/μ μV, k/m mV and x1 dB(m))	These keys add the selected unit to the entered numeric value and complete the entry. In the case of level entries (e.g. in dB) or dimensionless values, all units have the value "1" as multiplying factor. Thus, they have the same function as an ENTER key.

4.1.6 Navigation Controls

The navigation controls include a rotary knob, navigation keys, and the display keys. They allow you to navigate within the display or within dialog boxes.

4.1.6.1 Rotary Knob

The rotary knob has several functions:

- Increments (clockwise direction) or decrements (counterclockwise direction) the instrument parameter at a defined step width in the case of a numeric entry.
- Moves the selection, e.g. to a function block in the block diagram
- Shifts the selection bar within focused areas (e.g. lists).
- Acts like the ENTER key, when it is pressed.

4.1.6.2 Editing Keys

Editing keys enable you to confirm an entry, delete individual characters, or exit the current operation.

Table 4-4: Editing keys

Type of key	Description
ESC key	Closes all kinds of dialog boxes, if the edit mode is not active. Quits the edit mode, if the edit mode is active. In dialog boxes that contain a "Cancel" button it activates that button. For "Edit" dialog boxes the following mechanism is used: • If data entry has been started, it retains the original value and closes the dialog box. • If data entry has not been started or has been completed, it closes the dialog box.
ENTER key	Has the same effect as pressing the rotary knob • Concludes the entry of dimensionless entries. The new value is accepted. • With other entries, this key can be used instead of the default unit key. • In a dialog box, selects the default or focused element. • Calls the next dialog level. • Confirms and closes open input windows.
BACKSPACE key	Deletes the character to the left of the cursor in editing mode.

4.1.6.3 Navigation Keys

As an alternative to the rotary knob or the touchscreen, you can use the navigation keys to navigate through dialog boxes, diagrams, or tables.

Table 4-5: Navigation keys

Type of key	Description
UP/DOWN Key	The UP and the DOWN key does the following: • In a numeric edit dialog box, increase or decrease the instrument parameter. • In a list, scroll forward and backward through the list entries. • In a table, move the selection bar vertically. • In windows or dialog boxes with vertical scrollbar, move the scrollbar.
LEFT/RIGHT Key	The LEFT and the RIGHT key does the following: • In an alphanumeric edit dialog box, move the cursor. • In a list, scroll forward and backward through the list entries. • In a table, move the selection bar horizontally. • In windows or dialog boxes with horizontal scrollbar, move the scrollbar.

4.1.7 Display Keys

The display keys arrange different windows on the display.

Table 4-6: Display keys

Display key	Assigned functions
HOME	Returns to the initial feature screen.
NEXT WINDOW	Toggles between the entry fields in the taskbar.
ON/OFF	• Switches highlighted elements or a function block on and off. • Switches between two or more settings, e.g. items of selection lists. At the end of a list, the cursor is set on the first entry again.
UNDO	Reverts the last operation.
USER	Adds a parameter to the user menu for quick access.

4.1.8 USB Connector

USB (universal serial bus) interfaces of type A (host USB).

- Connection of peripherals such as mouse or keyboard
- Connection of memory stick for file transmission
- Firmware update



Further USB interface type A (host USB) and a USB interface type B (USB IN) are available on the rear panel.

4.1.9 SD card slot

Slot for removable mass storage (option R&S SMAB-B85).

4.1.10 SENSOR

Connector for R&S NRP sensors.

The R&S SMA100B supports the use of R&S NRP power sensors in various ways including the use as a power viewer.

A power sensor is connected to the R&S SMA100B by inserting the male connector. To disconnect, pull the connector by its sleeve. You cannot disconnect the sensor simply by pulling at the cable or the rear part of the connector.

4.1.11 RF 50 Ω

Output of the RF signal.

NOTICE

Maximum input levels

Do not overload the RF output.

The instrument is equipped with a reverse power protection that prevents the RF output against back feed, see section "Reverse Power Protection" in the operating manual. However, the maximum permissible reverse power is specified in the data sheet.

The connector type depends on the installed frequency option.

Table 4-7: Overview of RF connector types depending on the frequency range

Required option	Connector type
RF: R&S SMAB-B103	N female
RF: R&S SMAB-B106	N female
RF: R&S SMAB-B112	Test port adapter, PC 3.5 mm female
RF: R&S SMAB-B120	Test port adapter, PC 3.5 mm female

NOTICE**Risk of RF connector and cable damage**

If you tighten the connectors too strongly, you can damage the cables and connectors. If you do not tighten the connectors enough, the measurement results can be inaccurate.

Always use an appropriate torque wrench suitable for this type of connector and apply the torque specified in the application note [1MA99](#).

The application notes are available on the Internet and provide additional information on care and handling of RF connectors.

Rohde & Schwarz offers appropriate torque wrenches for various connectors. For ordering information, see the R&S SMA100B data sheet or product brochure.

4.1.12 Pulse Signal Connectors

Pulse Sync

Output signal for synchronizing the pulse generator signal. The synchronization signal is generated at the beginning of each pulse. For double-pulse generation, the synchronization signal is generated at the beginning of the first pulse.

PULSE VIDEO

Output of the internal pulse generator signal or the external pulse signal fed in via the PULSE EXT connector (video signal).

PULSE EXT

Input for an external pulse modulation signal or an external trigger/gate signal for the pulse generator.

4.1.13 LF Modulation Connectors

LF

Output for internal LF generator signal.

See also data sheet and user manual, section "Analog Modulation".

EXT 1/2

Inputs for external analog modulation signal, and an external detector voltage.

4.1.14 Clock Synthesizer Connectors**CLK SYNC/CLK SYNC N**

Connectors for output of the clock synthesizer signal, or the inverted signal.

4.2 Rear Panel Tour

This section provides an overview of the connectors at the rear panel of the instrument. For technical data of the connectors, refer to the data sheet.

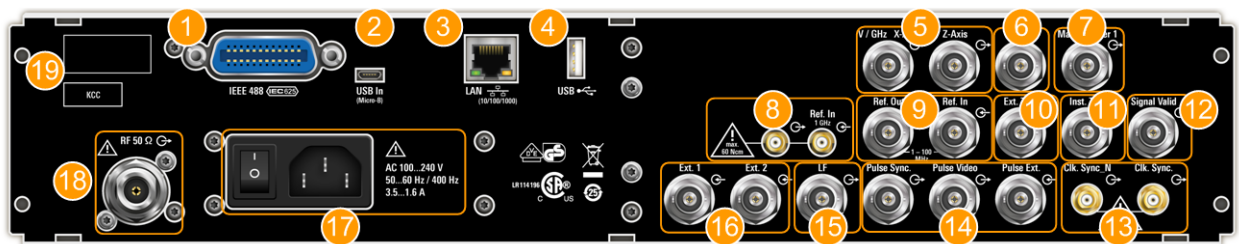


Figure 4-4: Rear panel view of the R&S SMA100B RF Signal Generator with height unit 2HU (option R&S SMAB-B92)

- 1 = IEC 625/IEEE 488 connector
- 2 = USB IN connector (type micro-B)
- 3 = LAN connector
- 4 = USB connector (type A)
- 5 = V/GHz X-AXIS and Z-AXIS output connectors (BNC)
- 6 = STOP input and output connector (BNC)
- 7 = MARKER USER1 output connector (BNC)
- 8 = REF IN 1GHz and REF OUT 1GHz connectors (SMA)
- 9 = REF IN and REF OUT connectors (BNC)
- 10 = EFC input connector (BNC)
- 11 = INST TRIG input connector (BNC)
- 12 = SIGNAL VALID output connector (BNC)
- 13 = CLK SYNC and CLK SYNC N output connectors (SMA)
- 14 = PULSE SYNC, PULSE VIDEO and PULSE EXT connectors (BNC)
- 15 = LF output connector (BNC)
- 16 = EXT 1/2 input connectors (BNC)
- 17 = AC power supply connection and main power switch
- 18 = RF output connector
- 19 = Serial number (last six digits in the string 1419.8888.02-<serial number>)

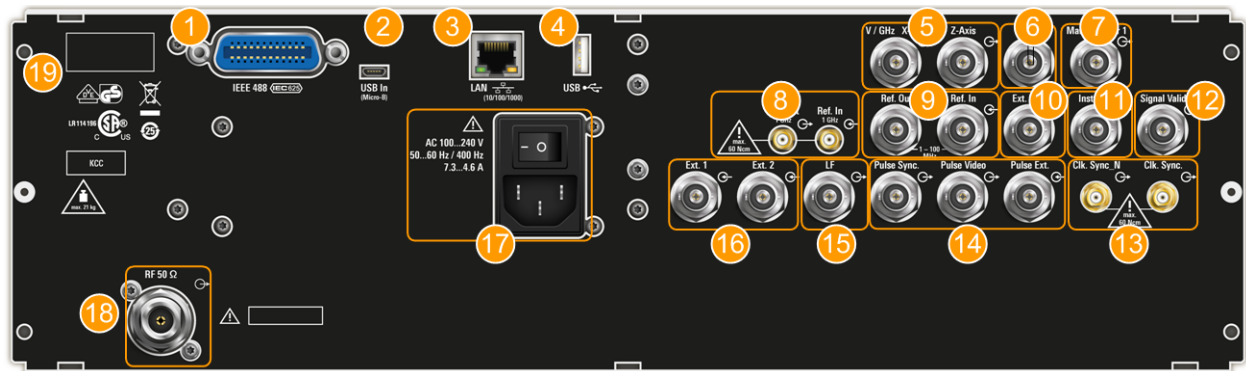


Figure 4-5: Rear panel view of the R&S SMA100B RF Signal Generator with height unit 3HU (option R&S SMAB-B93)

- 1 = IEC 625/IEEE 488 connector
- 2 = USB IN connector (type micro-B)
- 3 = LAN connector
- 4 = USB connector (type A)
- 5 = V/GHz X-AXIS and Z-AXIS output connectors (BNC)
- 6 = STOP input and output connector (BNC)
- 7 = MARKER USER1 output connector (BNC)
- 8 = REF IN 1GHz and REF OUT 1GHz connectors (SMA)
- 9 = REF IN and REF OUT connectors (BNC)
- 10 = EFC input connector (BNC)
- 11 = INST TRIG input connector (BNC)
- 12 = SIGNAL VALID output connector (BNC)
- 13 = CLK SYNC and CLK SYNC N output connectors (SMA)
- 14 = PULSE SYNC, PULSE VIDEO and PULSE EXT connectors (BNC)
- 15 = LF output connector (BNC)
- 16 = EXT 1/2 input connectors (BNC)
- 17 = AC power supply connection and main power switch
- 18 = RF output connector
- 19 = Serial number (last six digits in the string 1419.8888.02-<serial number>)

4.2.1 Connectors

IEC 625/IEEE 488

Option: R&S SMAB-B86

GPIO-bus interface for remote control of the instrument.

The IEC 625 interface is in compliance with IEEE488 and SCPI. A computer for remote control can be connected via this interface. To set up the connection, we recommend that you use a shielded cable.

Note: To avoid electromagnetic interference (EMI) caused by open lines, always terminate any connected IEC-bus cable with an instrument or a controller.

See also "Annex: Hardware Interfaces" and chapter "Network and Remote Control" in the user manual.

USB/USB IN

- Female USB type A connector, to connect devices like a keyboard, a mouse, a memory stick, or the R&S NRP-Z3/Z4 cable for the R&S NRP sensors
- Female USB IN connector (USB type B), for example for remote control.
Option: R&S SMAB-B86

See also [Chapter 3.2, "Connecting USB Devices"](#), on page 20.

LAN

The LAN interface can be used to connect the R&S SMA100B to a local network for remote control, remote operation, and data transfer.

V/GHZ X-AXIS

Output of a voltage ramp:

- "V / GHz": the voltage is proportional to the frequency.
- "X-Axis": output of a voltage ramp for the X deflection of an oscilloscope or an XY recorder.

Z-AXIS

Output of a voltage pulse, e.g. for the combined blanking and marker generation of network analyzers.

STOP

Input and output for stopping the sweep in all modes.

This connector is bidirectional. Used as:

- "Input": enables you to stop a sweep triggered by an external network analyzer.
- "Output": enables the R&S SMA100B to stop the sweep of an external network analyzer.

MARKER USER1

Output signal for marker or trigger signal.

SIGNAL VALID

Output signal that marks the valid signal times (valid level and frequency) for all analog modulations.

INST TRIG

Input for external trigger of sweeps and list mode.

EFC

Input connector for an EFC (external frequency control) signal for electronic tuning of the internal reference frequency.

REF IN/REF OUT

Input/output for external reference signal.

Incl. dedicated connectors for the 1GHz reference signal.

CLK SYNC/CLK SYNC N

Connectors for output of the clock synthesizer signal, or the inverted signal.

PULSE EXT

Input for an external pulse modulation signal or an external trigger/gate signal for the pulse generator.

PULSE VIDEO

Output of the internal pulse generator signal or the external pulse signal fed in via the PULSE EXT connector (video signal).

PULSE SYNC

Output signal for synchronizing the pulse generator signal. The synchronization signal is generated at the beginning of each pulse. For double-pulse generation, the synchronization signal is generated at the beginning of the first pulse.

LF

Output for internal LF generator signal.

See also data sheet and user manual, section "Analog Modulation".

EXT 1/2

Inputs for external analog modulation signal, and an external detector voltage.

AC supply and power switch

The AC power supply connector and the main power switch are located in a unit on the rear panel of the instrument.

Main power switch function:

- Position 1: The instrument is in operation.
- Position 0: The entire instrument is disconnected from the AC power supply.

For details, refer to [Chapter 3.1.6, "Turning the Instrument On and Off"](#), on page 17.

RF

Rear panel connector for the RF signal. This connector is for use of the instrument in a 19" rack.

5 Trying Out the Instrument

This chapter introduces the first steps with the R&S SMA100B. It shows how to operate and configure the instrument using simple examples. The complete description of the functionality and its usage is given in the R&S SMA100B user manual. Basic instrument operation is described in [Chapter 6, "Instrument Control"](#), on page 49.

Prerequisites

The instrument is set up, connected to the power supply, and started up as described in [Chapter 3, "Preparing for Use"](#), on page 12.

The first signal generation tasks explain how to generate an unmodulated signal, to configure the RF signal output, and how you can vary the RF frequency and level in sweep mode.

The instrument is manually operated via the touchscreen. Try out the following:

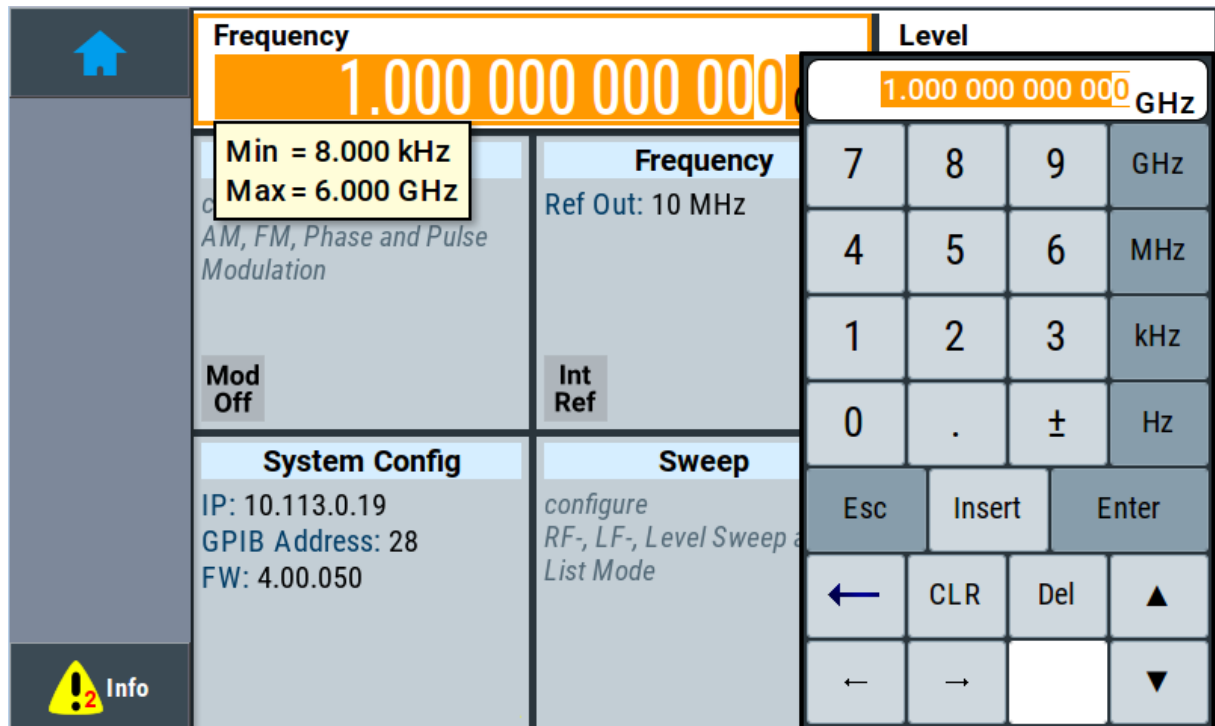
- [Generating an Unmodulated Carrier](#)..... 38
- [Generating an RF Frequency Sweep Signal](#).....42
- [Saving and Recalling Settings](#)..... 45

5.1 Generating an Unmodulated Carrier

We start to generate a simple unmodulated signal. In this example, the R&S SMA100B can be in its minimal configuration.

1. On the R&S SMA100B front panel, press the PRESET key to set a defined initial instrument state.
2. Set the frequency:
 - a) In the "Status Bar", tap the "Frequency" field.
 - b) On the on-screen keypad, enter "6" and press the "GHz" key.

Generating an Unmodulated Carrier



The on-screen key pad closes and the frequency value is displayed.

3. To set the signal level, tap the "Level" field and enter the level in the same way.
4. To activate RF signal output, select "Level" > "RF On" in the tile diagram.

Generating an Unmodulated Carrier

Frequency 6.000 000 000 000 GHz		Level -25.00 dBm
Modulation <i>configure AM, FM, Phase and Pulse Modulation</i>	Frequency Ref Out: 10 MHz	Level Limit: 30.00 dBm
Mod Off	Int Ref	Level ☒ RF ON
System Config IP: 10.113.0.19 GPIB Address: 28 FW: 4.00.050	Sweep <i>configure RF-, LF-, Level Sweep List Mode</i>	Level...
		Attenuator...
		Automatic Level Control...

The blue colored "RF On" icon indicates that the RF output is activated.

The R&S SMA100B provides the 6 GHz signal at the RF A connector at the front panel.

Frequency 6.000 000 000 000 GHz		Level -25.00 dBm
Modulation <i>configure AM, FM, Phase and Pulse Modulation</i> Mod Off	Frequency <i>Ref Out: 10 MHz</i> Int Ref	Level <i>Limit: 30.00 dBm</i> RF On
System Config <i>IP: 10.113.0.19 GPIB Address: 28 FW: 4.00.050</i>	Sweep <i>configure RF-, LF-, Level Sweep and List Mode</i>	Clk Syn / Pow Sens <i>configure Clock Synthesis and Power Sensor Applications</i> Clock Syn Off

Figure 5-1: Generating an unmodulated signal

Alternative ways to access the instrument functions

To fulfill the same task, you can also use the front panel keys or the setting parameters provided in the frequency and level dialogs.

Try out the settings dialogs

1. In the "Frequency" tile, select "Frequency > RF Frequency".
 - a) Tap the "Frequency" field.
 - b) Set the frequency via the on-screen keypad.
2. Access the "RF Level" dialog via the "Level" tile.
 - a) In the "RF Level" tab, select "Amplitude".
 - b) Set the amplitude (level) via the on-screen keypad.
3. Select "RF State > On" to activate the RF signal generation.

Try out the front panel keys

- Use the **FREQ**, **LEVEL**, and **RF ON/OFF** key on the front panel.



Connect RF of the R&S SMA100B to a signal analyzer, for example R&S®FSW, to display the generated signal.

For the required settings of the signal analyzer, refer to its user manual or its online help.

5.2 Generating an RF Frequency Sweep Signal

The "Sweep" operating mode allows you to generate an RF signal with periodically varying frequencies or amplitudes.

This example deals with an RF signal with varying frequency and constant level. To configure the sweep, you need to determine a defined start and end frequency with constant time intervals between the frequency steps.

The sweep function does not require specific options.

1. On the front panel, press the **PRESET** key to set a defined initial instrument state.
2. In the status bar, set "Frequency > 6 GHz".
3. Set "Level > -25 dBm".
4. In the tile diagram, select "Sweep" > "RF Frequency Sweep".
5. In the "General" tab:

Generating an RF Frequency Sweep Signal

General		Frequency Range	
State	0	Current Freq	350.000 000 000 MHz
Mode	Auto	Retrace	☐
Shape	Sawtooth		
Spacing	Linear	Dwell Time	15.0 ms
Ext Trig Inp Slope	Positive		
Reset Sweep		Execute Single Sweep	

- Select "Mode > Auto" to run the sweep continuously.
- Select "Shape > Sawtooth" to set the waveform shape of the sweep signal.
- Select "Spacing > Linear", to determine the calculation method for the frequency shift of a step.
- Set "Dwell Time > 15.0 ms", to determine the time interval of the sweep steps.

6. Select the "Frequency Range" tab.

Generating an RF Frequency Sweep Signal

General <i>Auto</i>		Frequency Range	
Start Frequency	200.000 000 000 MHz	Stop Frequency	600.000 000 000 MHz
Center Frequency	400.000 000 000 MHz	Span	400.000 000 000 MHz
Spacing	Linear	Step Linear	10.000 000 000 MHz

- a) Set "Start Freq > 200 MHz" and "Stop Freq > 600 MHz" to determine the frequency sweep range.
 - b) Set the step width "Step Lin > 10.0 MHz" to determine the width for a frequency step.
7. In the "General" tab, activate the frequency sweep with "State > On".
 8. Close the sweep dialog.
(Alternatively, tap the "Home" button to minimize the dialog. The R&S SMA100B indicates the "Sweep" dialog as active dialog in the task bar.)
 9. To activate the RF signal output, select "Level" > "RF On".

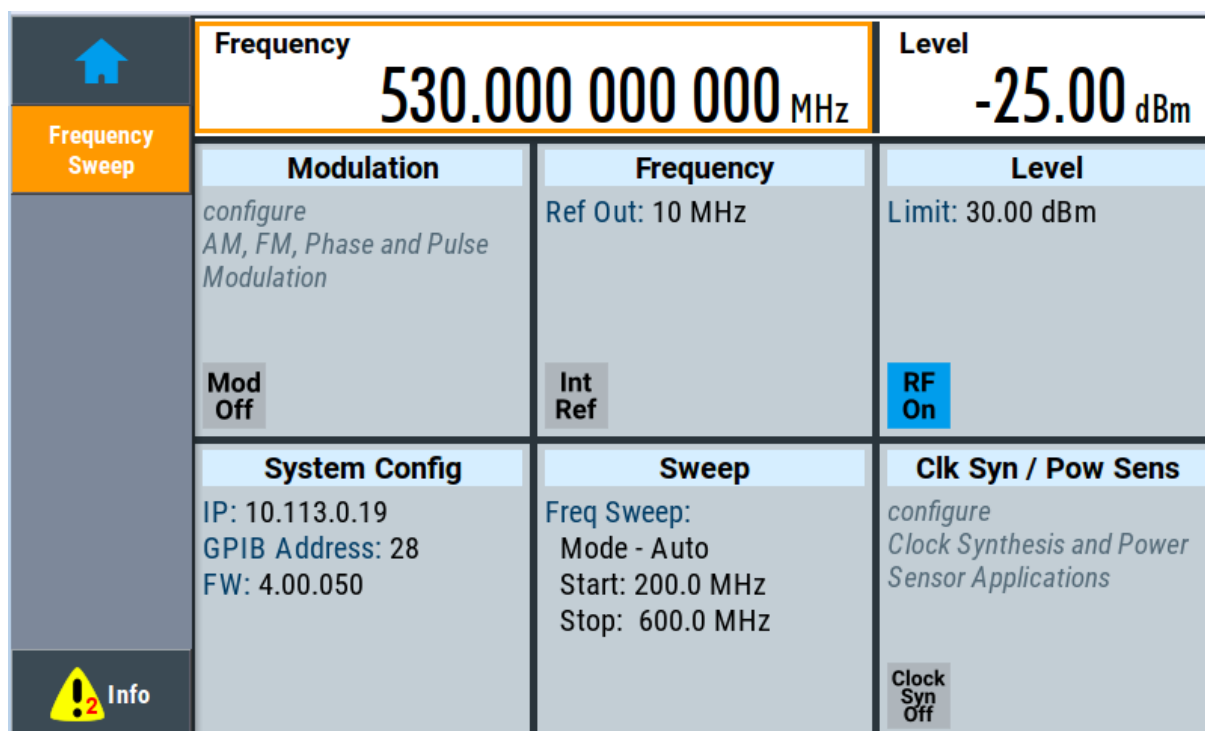


Figure 5-2: Generating a frequency sweep signal

The frequency display indicates the frequencies of the running sweep. The R&S SMA100B provides the 6 GHz signal at the RF connector at the front panel.

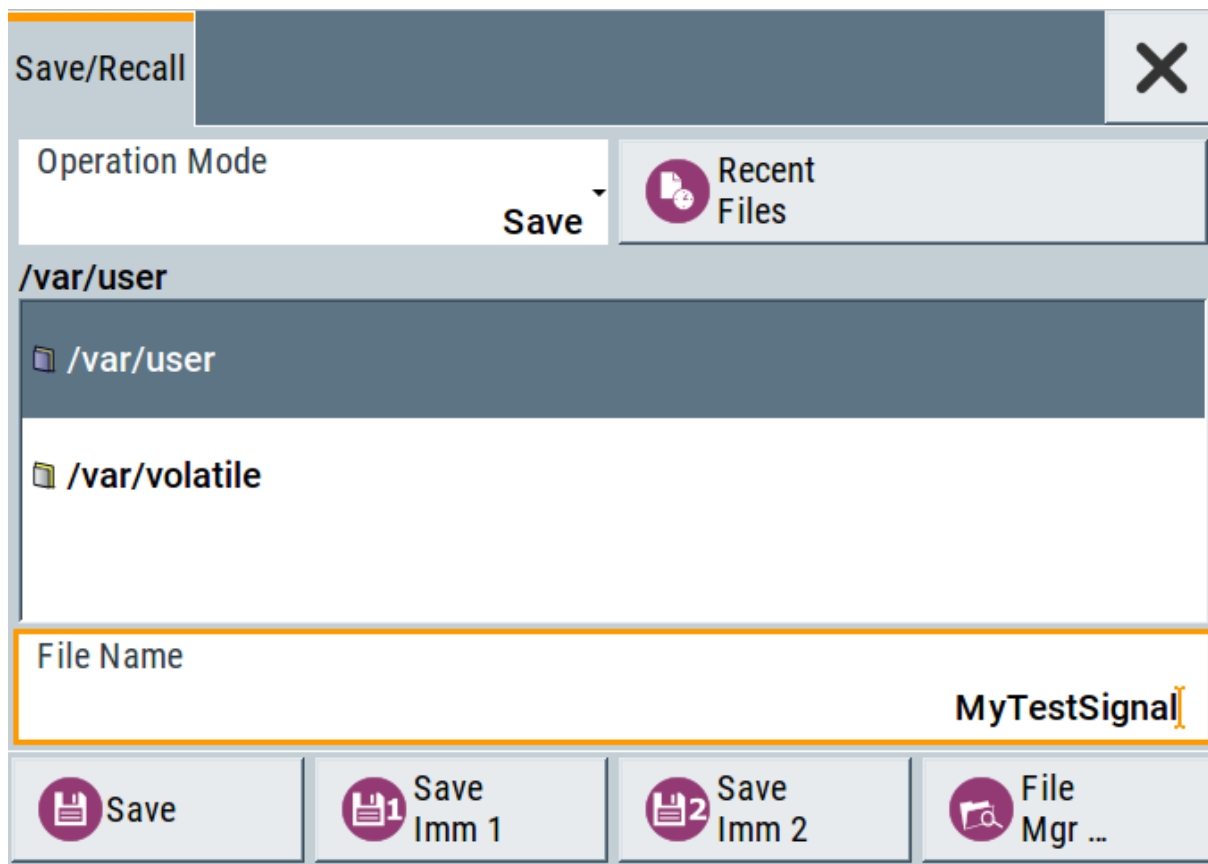
5.3 Saving and Recalling Settings

To restore the results of our measurements later, we save the instrument settings in a file.

To save the instrument settings in a file

We assume, a test configuration as described in [Chapter 5.2, "Generating an RF Frequency Sweep Signal"](#), on page 42.

1. Press the SETUP key on the front panel.
2. In the "Setup" menu, select "Settings > Save/Recall".
3. In the "Save/Recall" dialog, select "Operation Mode > Save".



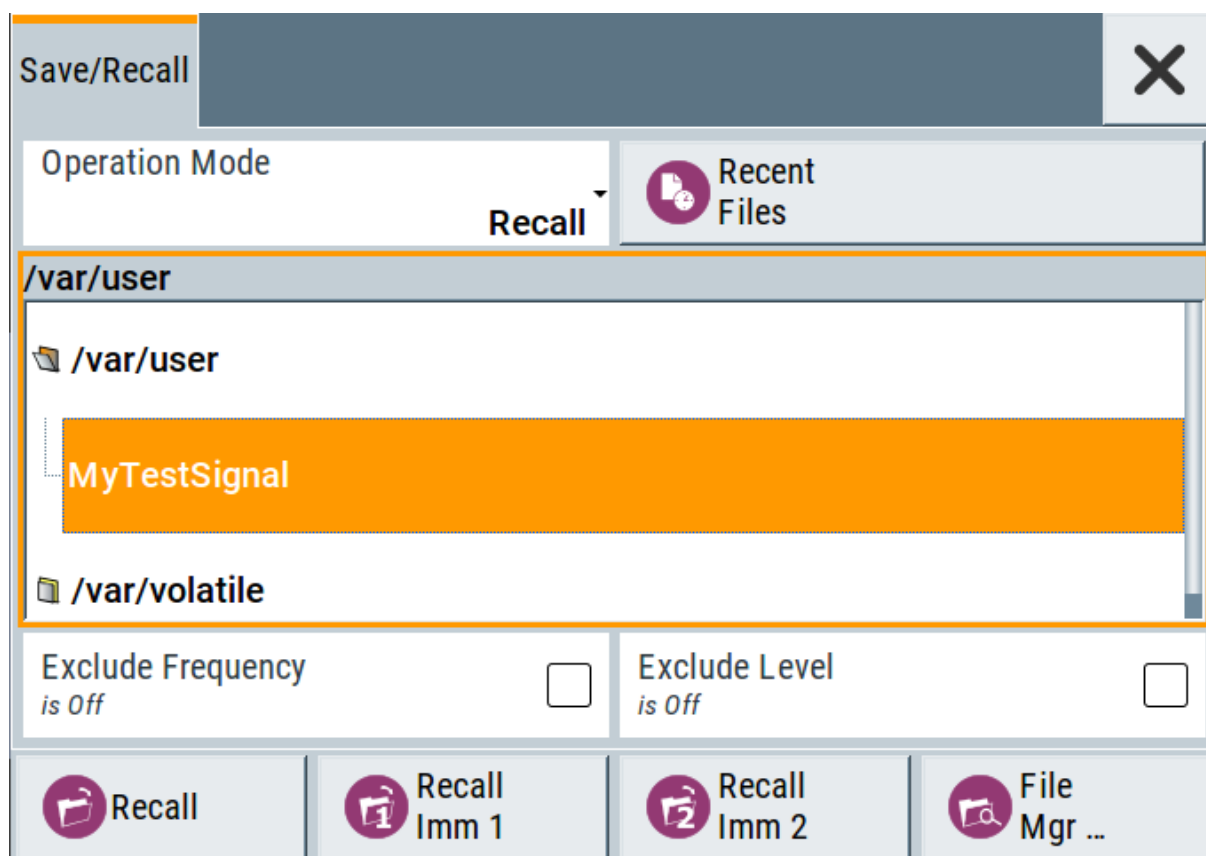
4. Tap the "Filename", use the on-screen keyboard, and enter *MyTestSignal*.
5. Tap the "Save" button.

The file `MyTestSignal.savrc1.txt` is stored in the default directory `/var/user/`.

To load saved instrument settings

You can restore the settings to the instrument at any time using the settings file.

1. Press the PRESET button to restore the default instrument settings so you can check that the stored user settings are restored afterwards.
2. Press the SETUP key on the front panel.
3. In the "Setup" menu, select "Settings > Save/Recall".
4. In the "Save/Recall" dialog, select "Operation Mode > Recall".
Navigate to the directory the file is saved in and select the `MyTestSignal` file.



5. Tap the "Recall" button.

All instrument settings are restored and the display resembles [Chapter 5.2, "Generating an RF Frequency Sweep Signal"](#), on page 42, which shows the instrument display right before the settings were saved.



How to display all parameters with values different to their preset values

When you load a file to your instrument, you do not have enough information on the changed settings. In such case, it is useful to visualize all parameters that have been changed from their default state.

Try out the following:

- Tap and hold on an empty space on in the tile diagram to access the context-sensitive menu.
- Select "Mark All Parameters Changed from Preset".

	Start SCPI Recording
	Mark All Parameters Changed from Preset
	Undo
	Redo
	Help
	Key Emulation

- All changed parameters are highlighted.

 Key Emulation Frequency Sweep  Info	Frequency 298.000 000 000 MHz		Level -25.00 dBm
	Modulation <i>configure</i> AM, FM, Phase and Pulse Modulation Mod Off	Frequency Ref Out: 10 MHz Int Ref	Level Limit: 30.00 dBm RF On
	System Config IP: 10.113.0.19 GPIB Address: 28 FW: 4.00.050	Sweep Freq Sweep: Mode - Auto Start: 100.0 MHz Stop: 500.0 MHz	Clk Syn / Pow Sens <i>configure</i> Clock Synthesis and Power Sensor Applications Clock Syn Off

6 Instrument Control

This chapter provides an overview on how to work with the R&S SMA100B.

It covers the following topics:

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6.1 Possible Ways to Operate the Instrument

There are three ways to operate the R&S SMA100B:

- Manual operation:
Use the touchscreen, hard keys and rotary knob, or an optional mouse and/or keyboard. The principles of manual operation are explained in [Chapter 6, "Instrument Control"](#), on page 49.
- Remote control:
Create programs to automatize repeating settings, tests and measurements. The instrument is connected to a computer running the program. This way of operation is described in the user manual, chapter "Network and Remote Control Operation".
- Remote operation from a computer:
Remote monitoring and control of the instrument from a connected computer is based on the common cross-platform technology VNC (Virtual Network Computing). On the remote computer, any standard web browser (supporting Java) or a dedicated VNC client (like Ultr@VNC) can be used. See also [Chapter 6.8, "Remote Operation over VNC"](#), on page 60.

6.2 Means of Manual Interaction

For the manual interaction with the R&S SMA100B, you have several methods that you can use as an alternative to perform a task:

- **Touchscreen:**
Touchscreen operation is the most direct way to interact. Almost all control elements and actions on the screen are based on the standard operating system concept. You can tap any user interface element to set parameters in dialog boxes, enter data, scroll within a dialog etc., as if you work with a mouse pointer.
Tapping the screen works like clicking mouse buttons:
 - Touch quickly = click: Selects a parameter or provokes an action.
 - Touch and hold = right-click: Opens a context-sensitive menu.
 - Touch and swipe = drag: Scrolls through the contents of a display element larger than the screen, e.g. a list or a table.
- **Function keys and rotary knob:**
The front panel provides nearly all functions and controls to operate the instrument in the classic way, without touchscreen.
- **Optional mouse and/or keyboard:**
These devices work like known from PCs. The navigation keys on the front panel correspond to the keys on the keyboard.

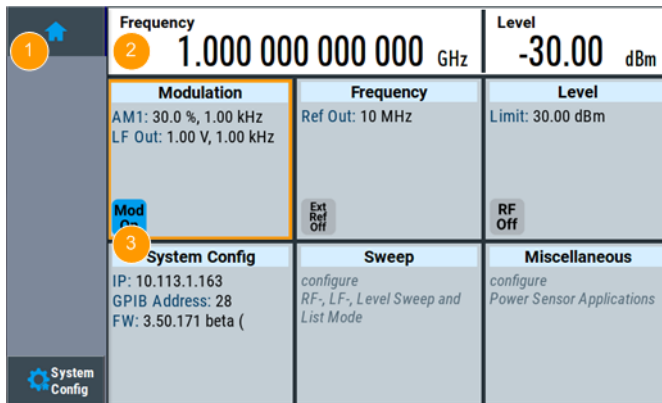
This manual describes the manual interaction with the instrument via the touchscreen. It mentions the alternative methods using the keys on the instrument or the on-screen keyboard if it deviates from the standard operating procedures. The usage of the touchscreen and navigation keys is described in [Chapter 6.4, "Accessing the Functionality"](#), on page 54.

Throughout the manual, the term "select" refers to any of the described methods, i.e. using a finger on the touchscreen, a mouse pointer in the display, or a key on the instrument or on a keyboard.

6.3 Understanding the Display Information

The home screen of the R&S SMA100B displays all main settings and generator states, divided into three main operation areas.

Understanding the Display Information



1 = Taskbar/softkey bar with "Home" and "System Config" key

2 = Status bar

3 = Tile diagram

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6.3.1 Status Bar

The status bar at the top of the screen indicates the RF frequency and the level of the output signal provided to the DUT. You can set both parameters directly here.

6.3.2 Tile Diagram

The tile diagram is the main entry to the settings of the R&S SMA100B.

Tile	Access to:
"Modulation"	• Analog and pulse modulation settings¹⁾ • Built in LF generator
"System Con-fig"	• "Save/Recall": settings for saving and loading instrument configurations • "Remote access": Network and emulation settings. • "Setup": general system configuration
"Sweep"	• Frequency and level sweeps • List mode
"Frequency"	• RF frequency and phase • Reference frequency

Tile	Access to:
"Level"	• RF level • Attenuator • Automatic level control • User correction
"Clk Syn / Pow Sens"	• Clock synthesis¹⁾ • Power sensors
¹⁾ requires additional options	

6.3.3 Taskbar

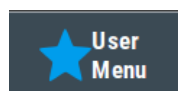
The "Taskbar" shows a home and an info button, and assigns a labeled button whenever you open a dialog. If more dialogs are open than the taskbar can display, touch and swipe the taskbar to scroll up and down.

The buttons shown in the following example represent the variants.

Table 6-1: Example of buttons in the taskbar



"Home" button
Returns to the home screen.

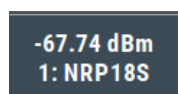


"User Menu"
Lists parameters that can be defined for quick access.



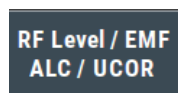
Shows the current remote access connections when the instrument is remotely controlled.

Tip: An indicator in the "System Config" tile shows the current remote control status.



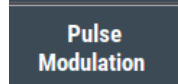
R&S NRP power sensors

Shows a connected external power sensor. The button displays the current readings when the sensor is active.



Active dialogs

Indicates the dialog name of each active dialog in a separate button.



"Info" key

Provides access to status and error messages.

Note: The warning symbol signifies a permanent error message.

6.3.4 Additional Display Characteristics

The following section provides a short insight on the indication of the screen in general, and significant elements that you see under specific operating modes, in dialogs or settings.

- **Appearance of active elements**

- *Active* elements like On/Off switches, state buttons, etc. have a **blue** background
- *Selected* elements are framed or highlighted **orange**.
- *Inactive* elements are **gray**

- **On-Screen keypads**

As additional means of interacting with the instrument without having to connect an external keyboard, either a numerical or alphanumerical on-screen keypad appears when you activate an entry field (see [Chapter 6.5, "Entering Data"](#), on page 55).

- **Info line**

The "Info line" shows brief status information and error messages. It appears when an event generates a message.

- **Key parameters indicated in tab labels**

Most dialogs are divided into tabs with logically grouped parameters. The tab label expresses the content and can also contain status indicators or the set value of a key parameter.

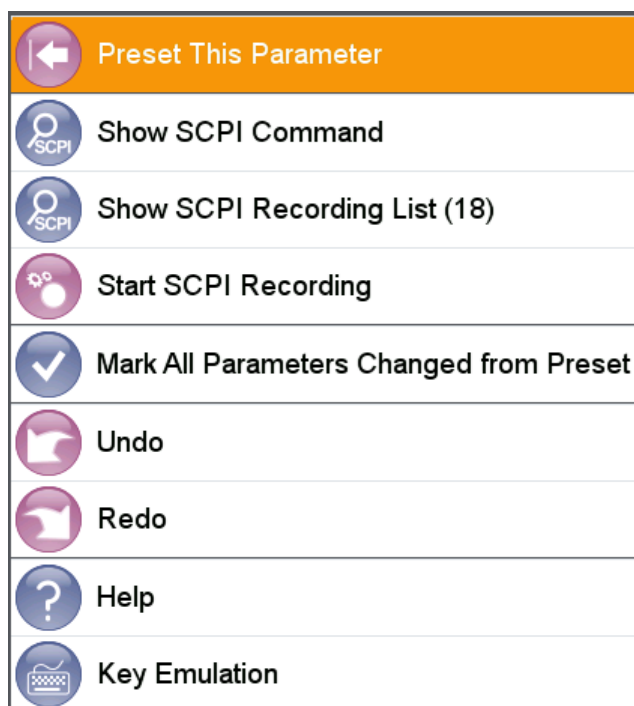
- **Scroll bar handle**

An arrow icon that appears when you touch a scroll bar helps you to scroll in a dialog or list.

If no scrollbar handle appears, you can touch and swipe an element to scroll up and down.

- **Context-sensitive menus**

Within the entire screen display, including single parameters, you can access context-sensitive menus that provide some additional functions.



6.4 Accessing the Functionality

All functionalities are provided in dialog boxes as known from computer programs. You can control the instrument intuitively with the touchscreen. This section provides an overview of the accessing methods.

The instrument's functions and settings can be accessed by selecting one of the following elements:

- System and function keys on the front panel of the instrument
- Taskbar/softkeys on the touchscreen
- Context-sensitive menus for specific elements on the touchscreen
- Elements on the status bar in the touchscreen
- Displayed setting on the touchscreen, that means block diagram and all settings available in dialogs.

To open a dialog box

- ▶ Perform one of the following actions:
 - Tap the required tile, and then the menu entry.

- Tap the minimized view (button) on the taskbar.

Some of the utility keys access a dedicated dialog, too.

To minimize a dialog box

1. To return to the home screen, tap the "Home" button.
2. To switch to another dialog, press the NEXT WINDOW button.

To close a dialog box

- ▶ Tap the "Close" icon in the upper right corner.
Or:
Press the ESC key on the front panel.

To select an option in a dialog box

- ▶ Tap the required option.

6.5 Entering Data

Some parameters have their own key on the front panel.

For data input in dialog boxes, the instrument provides an on-screen keypad for numeric values, and an on-screen keyboard for alphanumeric settings. Thus, you can always set the parameters via the touchscreen, the front panel, or an external keyboard.

Correcting an entry

1. Using the arrow keys, move the cursor to the right of the entry you want to delete.
2. Press the BACKSPACE key.
3. Deletes the entry to the left of the cursor.
4. Enter your correction.

Completing the entry

- ▶ Press the ENTER key or the rotary knob.

Aborting the entry

- ▶ Press the ESC key.
The dialog box closes without changing the settings.

6.5.1 Entering Numeric Parameters

To enter values with the on-screen keypad

If a field requires numeric input, the keypad provides only numbers. The provided units correspond to the units of the parameter.

1. Enter the numeric value.
2. Tap the unit button to complete the entry.
The unit is added to the entry.
3. If the parameter does not require a unit, confirm the entered value by pressing "Enter".

To enter values by using the front panel controls

1. Change the currently used parameter value by using the rotary knob (small steps) or the UP/DOWN keys (large steps).
2. If the parameter does not require a unit, confirm the entered value by pressing the ENTER key or any of the unit keys.
The instrument highlights the editing line to confirm the entry.

If you edit numeric data in tables, the entry field must be in edit mode: Press ENTER, or the rotary knob to activate the edit mode.

6.5.2 Entering Alphanumeric Parameters

If a field requires alphanumeric input, you can use the on-screen keyboard to enter numbers and (special) characters.

The interaction with the on-screen keyboard is as tipping on a connected keyboard.

6.5.3 Undo and Redo Actions

Accessed via the context-sensitive menus, "Undo" allows you to restore one or more actions on the instrument. Depending on the available memory, the "Undo" steps can restore all actions.



"Redo" restores a previously undone action.

6.6 Getting Information and Help

In some dialog boxes, graphics are included to explain the way a setting works.

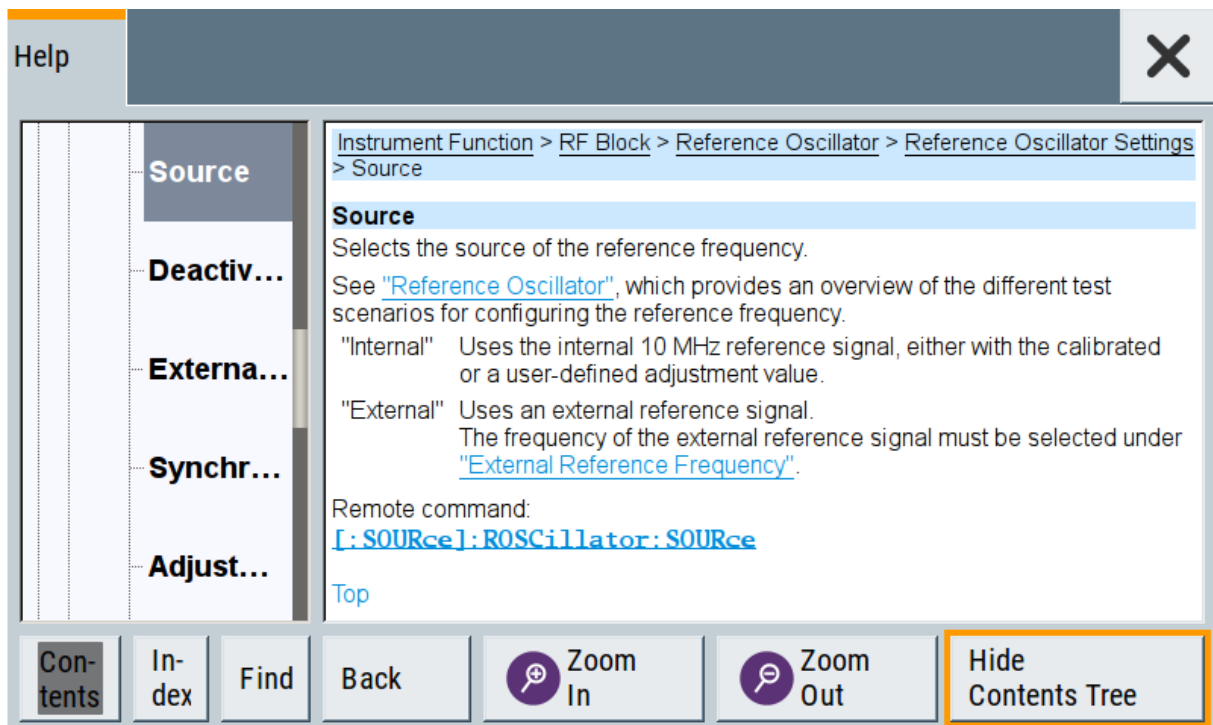
For further information, you can use the following sources:

- Tooltips give the value range of the parameter.
- The context help provides functional description on a setting.
- The general help explains a dialog box, provides instructions, and general information.

To display context help

- ▶ To access a help topic, perform one of the following:
 - a) Tap and hold the parameter for which you need information and tap "Help" in the context menu.
 - b) Tap the parameter and press the HELP key.

The "Help" dialog opens. You can browse the help for further information.



Contents of the help dialog box

The help dialog box covers two main areas:

- "Contents" - contains a table of help contents
- "Topic" - contains a specific help topic

The help system also provides an "Index" and a "Find" area, and "Zoom" functions that are accessed via the corresponding buttons.

To open general help

- Press the yellow HELP key on the front panel.

If a dialog box is opened, the help topic for the current tab is shown. Otherwise the "Contents" page appears.

Navigating in the table of contents and in the help topics

1. To move through the displayed contents entries, tap on an entry and scroll or use a connected mouse or the UP/DOWN keys.
Entries with a plus sign contain further entries.
2. To display a help topic, tap on the topic name or double click on the topic name or press the ENTER key.

3. To follow a cross-reference, tap on the link text.
4. To return to the previous page, select "Back".
This function scrolls back all steps you have performed before.
5. Use the "scroll bars" to shift the visible section of content shown.
6. To maximize the "Topics" area, tap the "Hide Contents Tree" button to hide the contents tree.

Using the index

1. Select the "Index" button.
2. Enter the first characters of the topic you are interested in.
The entries starting with these characters are displayed.
3. Tap on the index entry.
The corresponding help topic is displayed.

6.7 Remote Control

In addition to working with the R&S SMA100B interactively, located directly at the instrument, it is also possible to operate and control it from a remote PC.

The R&S SMA100B supports various methods for remote control:

- Connecting the instrument to a (LAN) network (see [Chapter 3.3, "Setting Up a Network \(LAN\) Connection"](#), on page 21)
- Using the LXI browser interface in a LAN network
- Connecting a PC via the IEC-bus (IEEE 488) interface
- Remote control via the USB interface



For remote control over LAN or USB, you can use the R&S VISA (Virtual Instrument Software Architecture) library provided for download at the Rohde & Schwarz website <http://www.rohde-schwarz.com/rsvisa>.

How to configure the remote control interfaces is described in the user manual, chapter "Network and Remote Control Operation".

6.8 Remote Operation over VNC

The VNC is an application which can be used to access and control the instrument from a remote computer through a LAN connection. While the instrument is in operation, the instrument screen contents are displayed on the remote computer, and VNC provides access to all applications, files, and network resources of the instrument. Thus, remote operation of the instrument is possible.



Instrument control from a remote computer

To access the basic utility functions of the R&S SMA100B, perform a right mouse click on the block diagram and select "Key Emulation".

A key panel to the right of the block diagram gives access to the utility functions provided by the front panel keys.

The VNC is an add-on program, included in operating system Linux/Unix, and available as a free-of-charge download on the internet.

For more information, refer to the R&S SMA100B user manual, chapter "How to Set Up Remote Operation via VNC".

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